



**Social Impact Assessment
Application for Environmental Authorisation
Prieska Zinc Copper Project (Vardocube Section)
Copperton, Northern Cape
January 2019**

EXECUTIVE SUMMARY

SOCIO-ECONOMIC BASELINE ENVIRONMENT

The Project site falls within Ward 4 of the Siyathemba Local Municipality, which is within the Pixley Ka Seme District Municipality. There are approximately 22 000 people residing in the municipality. This represents approximately 1.9% of the total population in the Northern Cape.

Opportunities for employment, linked to sustainable economic growth, are the most critical concern for the SLM.

The regional and local economy is poorly diversified with a reliance on, in the case of SLM, the government and agriculture sectors. The mining and manufacturing sectors provide very few of the employment opportunities in the SLM. The mining sector is identified within the SLM IDP (2017-2018) as a sector with development potential.

LAND USES

Current land uses within the proposed MRA surface area are as follows:

- Grazing of livestock;
- An operating 20 MW solar power plant and a proposed solar PV power plant are within the proposed MRA surface area boundary;
- Windmills, boreholes and related agricultural infrastructure;
- Two existing quarry operations;
- The Alkantpan landing strip;
- Road to Copperton and Alkantpan from the R357; and
- Disused rail siding.

Land uses on immediately adjacent properties include the following:

- Alkantpan Test Range;
- Various infrastructure associated with the historical PCM;
- Registered servitude between the historical mineral processing area and the historical TSF
- Grazing of livestock;
- Residential town of Copperton;
- The proposed Copperton Wind Farm and Garob Wind Farm border the proposed MRA surface area boundary in the east. The nearest wind turbines are approximately 6 km from the proposed mining area;
- Several proposed solar PV projects are situated towards the south and south-east of the proposed MRA surface area boundary;
- Historical PCM TSF;
- Eskom Cuprum Substation; and
- Windmills and related agricultural infrastructure.

POTENTIAL IMPACTS

A summary description of the most significant social aspects and impacts identified are as follows:

Positive

- The development will create several hundred direct employment opportunities in the construction and operational phase respectively. Many more indirect employment opportunities will also be created. Implementation of the commitment to maximise local employment wherever practicable will increase the significance of this positive impact;
- Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the seven agreed LED projects committed to in the SLP will have a significant positive impact for the broader community;
- Implementation of the HRD programme, as described in the two SLPs is expected to result in skills transfer, career progression, re-skilling and improved levels of literacy in the community as a whole;
- The development of housing and direct and indirect mine investment in new/upgraded community infrastructure such as roads and potable water will have a positive impact for residents in Prieska and Copperton; and
- The mining will generate royalties in accordance with the MPRDA, payable to the national government. Furthermore, the development of the site and connection to municipal services will result in the payment of rates and taxes to the SLM.

Negative

- The procurement of goods and services by the mine, employees and contractors will result in an increased demand for various goods and services in Copperton and Prieska. This may result in conditions of hyperinflation. The impact is expected to be temporary as market forces respond and the gap between supply and demand narrows. The planned phasing in of housing in Prieska will also mitigate this impact;
- An influx of people seeking employment can be expected during the construction phase especially. This will be amplified by the potential overlap in the construction phase with two wind energy developments. This will place additional demand on municipal services in Prieska and Copperton such as public safety, health care, water, sanitation, and housing. The impact can be mitigated through cooperative planning with the SLM;
- Disruption of social patterns within the Prieska and Copperton communities may occur, especially during the construction phase because of the influx of job seekers for the mine and wind energy developments. This may be amplified if there is tension between locals and foreign nationals and/or racial or cultural differences. Human health impacts from diseases like HIV/AIDS can also occur as a result of a change in social dynamics. The impact can be mitigated through the housing strategy cooperative planning with the SLM and community leaders;
- Minor, major and fatal injuries from potential mine health and safety incidents. There are multiple health and safety risks associated with surface and underground mining, ore processing and movement of man and materials. In addition, the mine will store and handle various hazardous substances including explosives. Implementation of a comprehensive health and safety management programme and adherence to legislation governing mine health and safety requirements will mitigate this impact;
- Increased levels of crime may be experienced in the area as a result of the influx of people seeking employment. Contact crimes may result in injuries and in severe cases, fatalities;
- Minor, major and fatal injuries to community members from health and safety incidents like vehicle collisions, fire and other incidents. The pre-mitigation impact significance rating is High because of the potential human health and property damage consequences of a community safety incident, which may

include loss of life. The post-mitigation impact significance rating is Low due to the ability to prevent these impacts through adherence to the relevant legal requirements on mine health and safety and the mitigation measures in the EMP; and

- Decommissioning and closure of the mine will have a negative impact on those employed, the families they support and the businesses which provide services to the mine. The impact of closure can be mitigated through the implementation of the measures in the SLP, including regular, consultative review of closure strategies and the portable skills / re-skilling programme.

IMPACT STATEMENT

The renewable energy developments and the proposed Repli and Vardocube mining activities are likely to have a significant cumulative regional impact on the socio-economic environment, with a substantial inflow of people and resources into a local economy which is currently small and poorly diversified. The establishment of a committee between developers, government and the local community is recommended to ensure that the regional opportunities created by these developments can be optimised and the potential synergistic benefits realised.

Key findings of the social impact assessment for the proposed Vardocube mine development are as follows:

- Sufficient and appropriate information on the proposed development and the receiving environment was available for conducting the impact assessment;
- The proposed development is compatible with surrounding land uses;
- The proposed development has the potential to create significant employment and economic development opportunities for local communities during the construction and operational phases of the project;
- The mine social and labour plan has provided costed plans for optimising local employment, skills development and a commitment to implementing seven local economic development projects, identified in collaboration with the SLM;
- Several negative social impacts have been identified. These impacts have been assessed to be reversible and can be satisfactorily mitigated;
- Provided that the mitigation measures in this report and the measures in the mine social and labour plan are implemented, it is the opinion of the EAP that the authorisation may be granted; and
- Compliance with the mitigation measures in this report should be included as conditions of the environmental authorisation.

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LIST OF ACRONYMS AND ABBREVIATIONS

BFS	Bankable Feasibility Study
Cu	Copper
DEA	Department of Environmental Affairs
DMR	Department of Mineral Resources
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
FSR	Final Scoping Report
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
kl	Kilolitre
ktpa	Kiltons per annum
ktpm	Kiltons per month
l	litre
m	Metre
mamsl	Metres above mean sea level
mm	Millimetre
MPRDA	Minerals and Petroleum Resources Development Act
MR	Mining Right
MRA	Mining Right Application
Mtpa	Million tons per annum
NEMA	National Environmental Management Act
NEM:AQA	National Environmental Management: Air Quality Act
NEM:BA	National Environmental Management: Biodiversity Act
NEM:WA	National Environmental Management: Waste Act
NHRA	National Heritage Resources Act
NWA	National Water Act
p.a.	Per annum
PCM	Prieska Copper Mine
PCML	Prieska Copper Mine Limited
PR	Prospecting Right
PRA	Prospecting Right Application
RWD	Return Water Dam
S&EIR	Scoping and Environmental Impact Reporting
SAHRA	South African Heritage Resource Agency
SARAO	South African Radio Astronomy Observatory
SDF	Spatial Development Framework
SLM	Siyathemba Local Municipality
SLP	Social and Labour Plan

WML	Waste Management Licence
Zn	Zinc

NEMA EIA REGULATIONS (2014) APPENDIX 6 REQUIREMENTS

NEMA REGULATIONS (2014) - APPENDIX 6	RELEVANT PAGE / SECTION IN REPORT
Details of the specialist who prepared the report.	Section 3
The expertise of that person to compile a specialist report including curriculum vitae.	Section 3 Appendix A
A declaration that the person is independent in a form as may be specified by the competent authority.	Section 4
An indication of the scope of, and the purpose for which, the report was prepared.	Introduction Section 2
The date and season of the site investigation and the relevance of the season to the outcome of the assessment.	Not Applicable
A description of the methodology adopted in preparing the report or carrying out the specialised process.	Section 2 Section 10
The specific identified sensitivity of the site related to the activity and its associated structures and infrastructure.	Not Applicable
An identification of any areas to be avoided, including buffers.	Not Applicable
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers.	Not Applicable
A description of any assumptions made and any uncertainties or gaps in knowledge.	Section 2.3
A description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment.	Section 11
Any mitigation measures for inclusion in the environmental management programme report	Section 12
Any conditions for inclusion in the environmental authorisation	Not Applicable
Any monitoring requirements for inclusion in the environmental management programme report or environmental authorisation.	Not Applicable
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised.	Section 13
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the environmental management programme report, and where applicable, the closure plan.	Sections 12 and 13
A description of any consultation process that was undertaken during the course of carrying out the study.	Not Applicable
A summary and copies if any comments that were received during any consultation process.	Assessment of comments received during the Scoping Phase is presented in Section 8.4
Any other information requested by the competent authority.	Not applicable.

SOCIAL IMPACT ASSESSMENT

PRIESKA ZINC COPPER PROJECT (VARDOCUBE SECTION), COPPERTON, NORTHERN CAPE

1 INTRODUCTION

Orion Minerals (Orion), through its subsidiary company of Vardocube (Pty) Ltd., is the holder of a prospecting right in the Copperton area of the Northern Cape Province. The prospecting right was recently executed, and drilling of the Volcanogenic Massive Sulphide (VMS) Deposit, to confirm the mineral resource estimate for Cu and Zn, has commenced.

The applicant (Vardocube) is applying for a Mining Right for the Prieska Zinc Copper Project (Vardocube Section). The activity being applied for is exclusively for underground mining with no requirement for any surface area disturbance within the proposed mining right area.

The proposed Vardocube Mining Rights Application (MRA) boundary comprises of the following properties:

- Portion 1 of the Farm Vogelstruisbult 104.

This Social Impact Assessment (SIA) has been undertaken as part of the Scoping and Environmental Impact Reporting (S&EIR) process in support of the Mining Right Application (MRA) and Environmental Authorisation (EA) required for the proposed underground mining activity.

The SIA facilitates an understanding of the receiving environment (providing a baseline description) and the identified impacts to the social environment which may be associated with the proposed project implementation. The study comprises of a quantitative assessment of identified impacts related to the Project's activities.

2 SCOPE OF WORK AND APPROACH

2.1 SCOPE OF WORK

The scope of work for the SIA was as follows:

- Identify and review the social aspects of the mining development. These aspects will indicate the potential positive and negative social benefits of the development for the surrounding affected communities and provide the basis for identifying the potential changes in the social status of the communities; and
- Characterise the social status using secondary data from 2017-2018 Integrated Development Plans (IDP) of the SLM and Census 2011.

2.2 APPROACH

The approach included the steps below:

- Development of a pre-development understanding of the social baseline environment characterising the intended mining area;
- Consideration of the project description and analysis of the manner and extent to which the planned activities may affect the social environment;
- Review of legislative policies and documents;
- Incorporation of relevant information and outcomes from specialist studies and the Project interactions to date with stakeholders and Interested and Affected Parties (I&APs). This was done to ensure that the SIA considered the issues, concerns, and comments raised by those involved and participating in the Environmental Impact Assessment (EIA);
- Identification and assessment of potential social impacts likely to be caused by the proposed project activities; and
- Development of mitigation measures to eliminate (where possible) and reduce or minimise the potential negative impacts identified and enhance potential positive impacts.

2.3 ASSUMPTIONS AND LIMITATIONS

Advisory on Business and Sustainability Africa (Pty) Ltd. (ABS Africa) has prepared this report specifically for Vardocube (Pty) Ltd. (Vardocube). The contents of this report:

- Are based on the legal requirements for undertaking an Environmental Impact Assessment, as defined in the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the scope of services as defined within the contractual undertakings between Vardocube and ABS Africa;
- Are specific to the intended development at the proposed site. The report shall not be used nor relied upon neither by any other party nor for any other purpose without the written consent of ABS Africa. ABS Africa accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report;
- Reflect the best judgement of ABS Africa in light of the information available at the time of preparation. The analyses contained in this report has been developed from information provided by Vardocube and other parties. This information is not within the control of ABS Africa and ABS Africa has not audited such information and makes no representations as to the validity or accuracy thereof;
- The assessment has been based on the project description provided by the Applicant. Changes to this project description may influence the assessment and the mitigation measures in the EMPr;
- Where relevant, the impact assessment has placed reliance on the information and recommendations in the specialist studies completed for the Project;
- It has been assumed that the respective specialists have ensured that the relevant quality control standards were applied with respect to sample collection, preparation and laboratory testing protocols, including equipment calibration;
- Reflect that there is a general lack of recent published demographic and other socio-economic data for the SLM. Except where noted, the information in the social baseline section of this report has been summarised from Statistics South Africa Census Data (2011) and the SLM Local Economic Development Strategy (2012); and

- The post-mitigation impact is based on the understanding that the Applicant will establish the financial and administrative framework necessary for the complete implementation of the mitigation measures outlined in the EMPr over the Life of Mine (LOM).

3 EXPERTISE OF THE SPECIALIST

Paul Furniss is a Director at ABS Africa with more than 17 years’ experience in environmental and social impact assessments. He has a MSc Degree in Environmental Science and is registered as a Professional Natural Scientist with the South African Council for Natural Scientific Professions (Registration No. 400086/07). His project experience includes conducting social and environmental assessment studies in South Africa, Nigeria, Lesotho, Namibia, Sudan, Democratic Republic of Congo, Botswana, Zimbabwe, and Mozambique.

Curriculum vitae are provided in Annexure A.

TABLE 3-1: SPECIALIST DETAILS

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4 DECLARATION OF INDEPENDENCE

ABS Africa is an independent consulting firm with no interest in the project other than to fulfil the contract between the client and the consultant for delivery of professional environmental services as stipulated in the terms of reference.

5 OVERVIEW OF PROPOSED DEVELOPMENT

5.1 LOCATION

Prieska Copper Mine (PCM) is an existing mine situated approximately 3 km south of Copperton and 53 km south-west of the town of Prieska in the Northern Cape Province

The mine falls within the authority of the Siyathemba Local Municipality.

The site is accessed via the R357 from Prieska. The mine was owned and operated by Prieska Copper Mine Limited (PCML) a subsidiary of Anglo-Transvaal Consolidated Investment Company Limited (Anglovaal), between 1971 and 1991. The mine operations ceased in 1991 and rehabilitation and closure of the mine was undertaken in accordance with agreements reached with the Department of Mineral and Energy Affairs. A closure certificate was issued by the latter on 19 October 1995. No mining activities have taken place at PCM since 1991.

5.2 PLANNED OPERATIONS

The planned operations comprise of underground mining of the deeper portions of the Copperton Deposit.

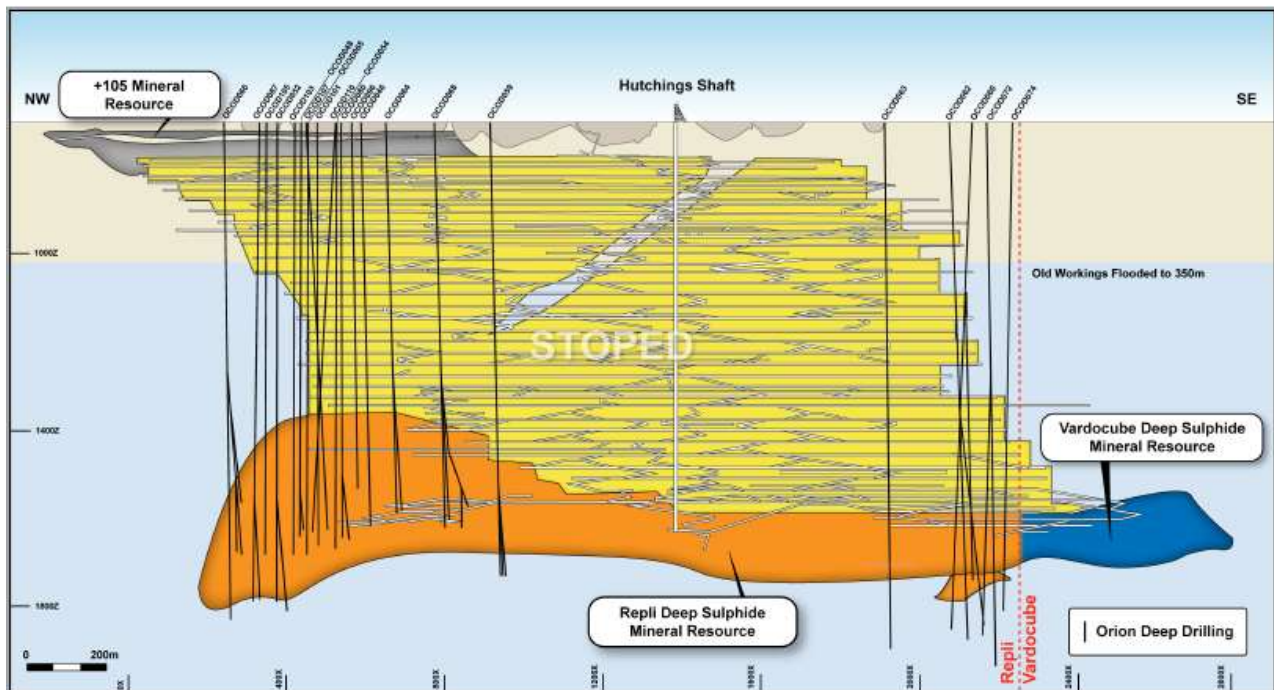
Figure 5-1 shows the resource of interest in relation to the historically mined out areas, and the division of the resource into two sections based on separate company ownership, Repli Trading No.27 (Pty) Ltd (Repli) and Vardocube (Pty) Ltd (Vardocube).

All surface infrastructure will be constructed by Repli within the Repli MRA boundary. This will comprise of among others, a new tailings storage facility, as well as waste rock dumps, water storage facilities, ore processing plant

and other associated infrastructure will be required. Some dewatering of the old workings at PCM will be required as the mine is partially inundated. The mine support infrastructure and structures are proposed to be located primarily on Portions 25 and 26 of the Farm Vogelstruisbult 104. The proposed Tailings Storage Facility (TSF) is located on Portion 1 of the Farm Vogelstruisbult 104.

No surface infrastructure or disturbance of any kind, including subsidence, is anticipated for the Vardocube MRA.

The construction of the required infrastructure and mine development needed to support the planned Repli mining activities will also be used for the Vardocube portion of the Mineral Resource. An agreement is in place between the two companies that provides for Repli to purchase the mined ore from Vardocube at an agreed price based on prevailing metal prices, the recovered grade and includes mining, processing and marketing costs to sell the copper and zinc concentrates which will be produced from the Repli processing plant. Repli will carry out all the development, mining, processing and marketing activities for the Repli and Vardocube sections of the Mineral Resource. Repli will also provide the staff to manage the day to day running of the operation and will manage all required safety, health and regulatory issues.



Source: Orion Minerals (2018)

FIGURE 5-1: SECTION VIEW OF THE DEEP SULPHIDE MINERAL RESOURCE

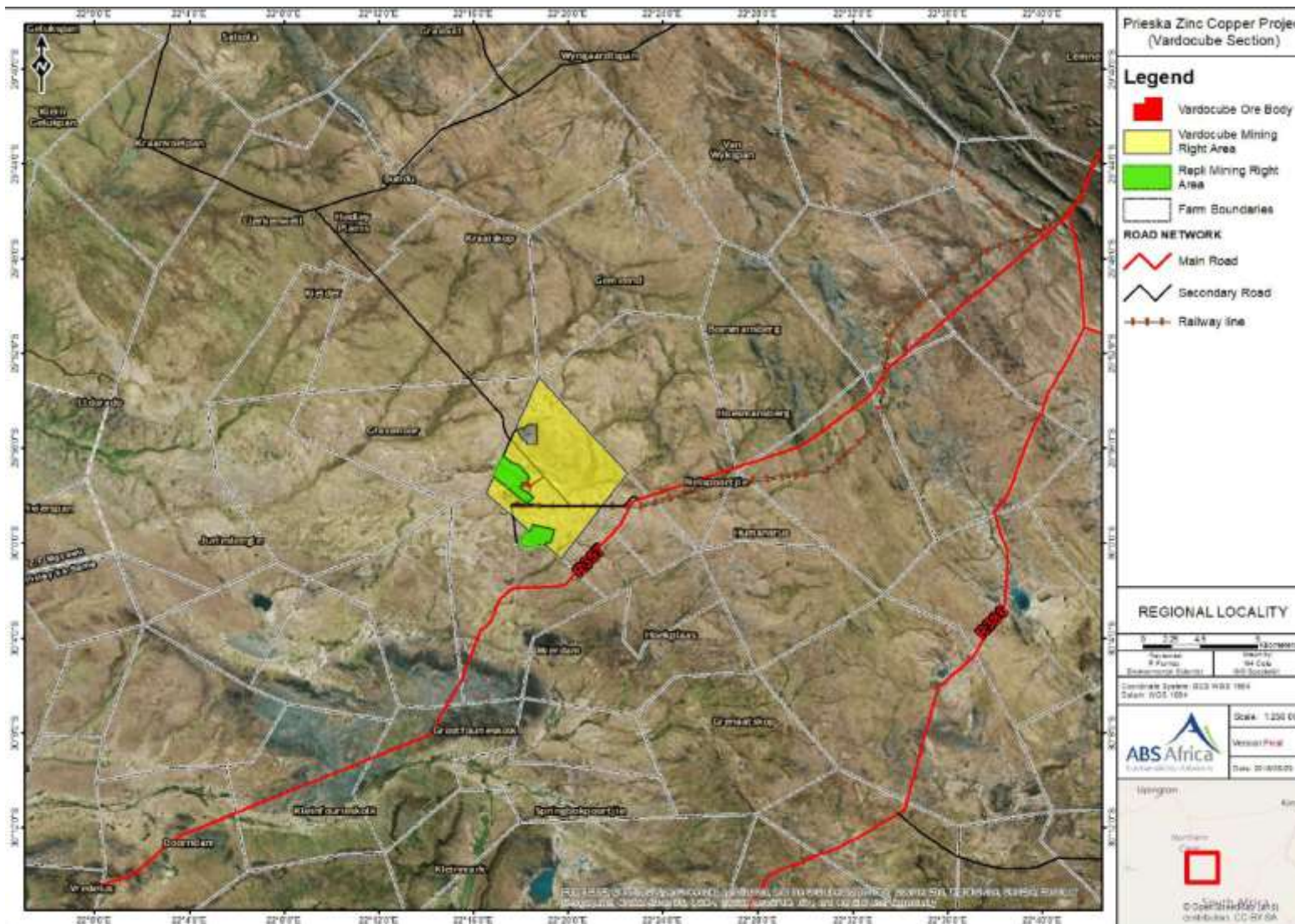


FIGURE 5-2: REGIONAL LOCALITY MAP

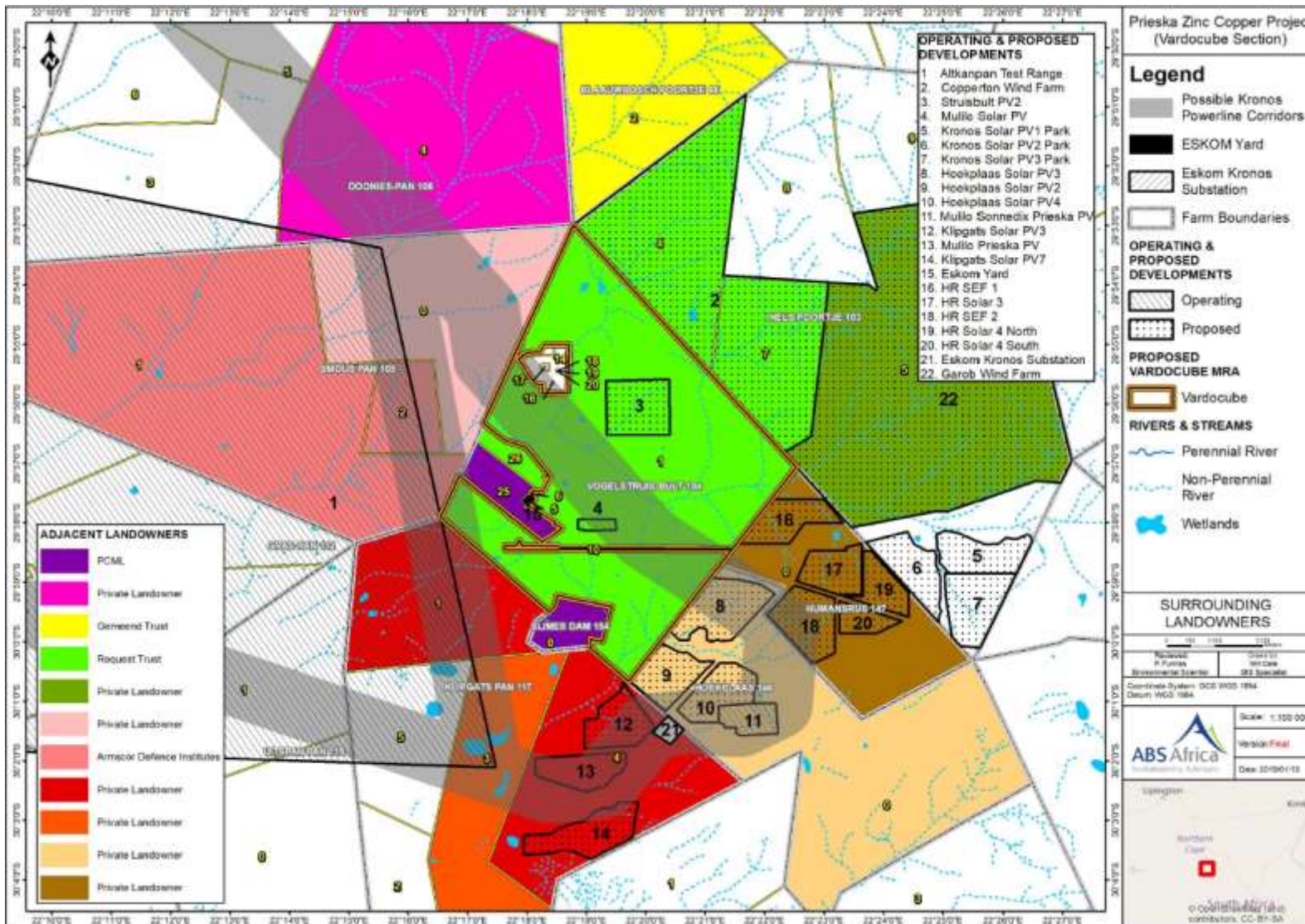


FIGURE 5-3: SURROUNDING LANDOWNERS MAP

6 POLICY AND LEGISLATIVE CONTEXT

6.1 OVERVIEW

A summary list of the various legislation reviewed to inform the SIA is provided below:

6.1.1 ACCESS TO LAND, LAND USE AND DEVELOPMENT PLANNING

- Less Formal Township Establishment Act 113 of 1991
- Restitution of Land Rights Act 22 of 1994
- Land Reform (Labour Tenants) Act 3 of 1996
- Communal Property Associations Act 28 of 1996
- Interim Protection of Informal Land Rights Act 31 of 1996
- Communal Land Rights Act 11 of 2004
- The Development Facilitation Act 67 of 1995
- Local Government Transition Act 209 of 1993
- Local Government: Municipal Structures Act 117 of 1998
- Local Government: Municipal Systems Act 32 of 2000
- Northern Cape Planning and Development Act 7 of 1998
- Spatial Planning and Land Use Management Act 16 of 2013
- Siyathemba Local Municipality Integrated Development Plan (2017/2018)
- Siyathemba Local Municipality Economic Development Strategy (2012).

6.1.2 MINING AND MINERAL RIGHTS

- Minerals and Petroleum Resources Development Act 28 of 2002 (MPRDA)
- Minerals and Petroleum Resources Development Amendment Act 49 of 2008
- Mine Health and Safety Act 29 of 1996

6.1.3 ENVIRONMENTAL MANAGEMENT

- National Environmental Management Act 107 of 1998 (NEMA)

6.1.4 AGRICULTURAL RESOURCES

- Conservation of Agricultural Resources Act 43 of 1983
- Subdivision of Agricultural Land Act 70 of 1970

6.1.5 BIODIVERSITY

- National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA)
- Game Theft Act 105 of 1991
- Animals Protection Act 71 of 1962
- National Veld and Forest Fire Act 101 of 1998
- Nature Conservation Ordinance 19 of 1974
- Northern Cape Nature Conservation Act 9 of 2009

- Municipal Ordinance PN955 of 1975

6.1.6 WATER

- National Water Act 36 of 1998
- National Water Amendment Act 27 of 2014
- Water Services Act 108 of 1997

6.1.7 ROADS AND TRAFFIC

- National Land Transport Act 5 of 1998
- Road Traffic Act 29 of 1989

6.1.8 POLLUTION

- Health Act 63 of 1977
- Hazardous Substances Act 115 of 1973
- National Environmental Management: Waste Act 59 of 2008
- National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA)
- Municipal Ordinance PN20 of 1974

7 BASELINE SOCIAL ENVIRONMENT

7.1 SOCIO-ECONOMIC ENVIRONMENT

7.1.1 SIYATHEMBA LOCAL MUNICIPALITY

PCM is located within Ward 4 of the Siyathemba Local Municipality (SLM), which is managed by the Pixley Ka Seme District Municipality, within the Northern Cape Province of South Africa. The towns of Brakbos, Brulpoot, Draghoender, Koegas, Marydale, Niekerkshoop, Prieska, Shamley's Farm, Uitvlug, and Westerberg fall within the boundaries of the SLM (Figure 7-1).

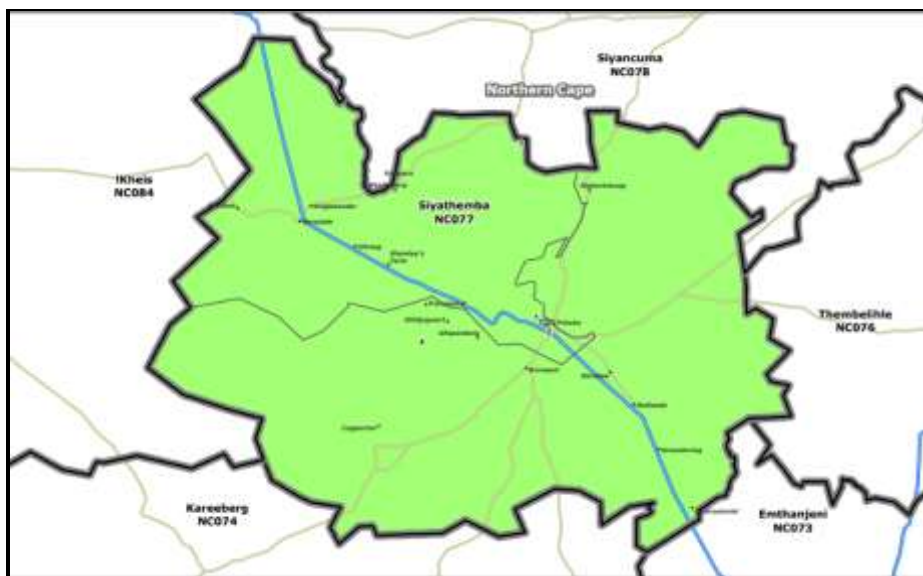


FIGURE 7-1: GEOGRAPHICAL BOUNDARY OF THE SLM

SLM was established in 2001, and is a category B municipality. It is located within the central easterly parts of the Northern Cape Province along the Orange River. It is approximately 220 km away from the nearest business center of Kimberley. The surface area of the municipality is approximately 8 200 km², accounting for 8% of the total district surface area and approximately 3% of the provincial area. A summary of the key statistics of the municipality is provided in Table 7-1.

7.1.2 SPATIAL AND REGIONAL DEVELOPMENT PLANNING

The SLM Spatial Development Framework (SDF) was compiled in 2006 and, according to the SLM IDP (2017-2018), is no longer used for guiding development planning in the municipality. No development planning guidelines or objectives have therefore been defined for Copperton or the proposed MRA surface area.

Similarly, no local or regional development plans for the Copperton area have been proposed.

The historical mining activities pre-dated the requirement for land use zoning and it is understood that the SLM has indicated that the proposed mining right area is, at present, without a land use zoning designation in terms of the Spatial Land Use Management Act 16 of 2013 and the Spatial Planning and Land Use Management By-Law, Notice 189 of 2015. The Applicant is presently in discussions with the SLM with respect to making an application for the required land use zoning in terms of the applicable zoning scheme.

7.1.3 POPULATION

There are approximately 22 000 people residing in the municipality. This represents approximately 1.9% of the total population in the Northern Cape. The population of Siyathemba contracted by 0.4% on average per annum between 2000 and 2010. The decline of the Siyathemba population was mainly driven by lower fertility rates.

The death rate (the number of deaths per 1,000 people in a year) increased from 11.2 deaths per 1,000 people in 1995 to 11.6 during 2010.

This is significantly lower than the death rates recorded over the same period for the Northern Cape and South Africa. The reason for the lower death rate in the study area was mainly the result of lower HIV/AIDS prevalence rates when compared with South African averages.

The most dominant population group in the SLM are Coloured individuals, who represent more than 75% of the total population in the municipal area.

Black African and White population groups comprise around 12% and 8% of the population respectively. The dominant languages in the SLM are Xhosa and Afrikaans. Afrikaans is the most widely spoken language (78%).

TABLE 7-1: KEY STATISTICS OF SIYATHEMBA LOCAL MUNICIPALITY

KEY STATISTICS	NUMERICAL VALUE
Total population	21,591
Young (0-14)	30,8%
Working age	63,2%
Elderly (65+)	6%
Dependency Ratio	58,2%
Gender Ratio	99,3%
Growth Rate	1.57% (2001 - 2011)
Population density	1 person/km ²
Unemployment rate	24.3%
Youth unemployment rate	30.2%

No schooling aged 20+	11.5%
Higher education aged 20+	5.3%
Matric aged 20+	18%
Number of Households	5.831%
Number of Agricultural Households	1.334%
Average Household size (person)	3.6
Female headed households	36.1%
Formal dwellings	88.6%
Housing owned/paying off	54.3%
Flush toilet connected to sewerage	64.9%
Weekly refuse removal	73.9%
Piped water inside dwelling	43.1%
Electricity for lighting	86.2%

Source: Statistics South Africa (2011)

7.1.4 EDUCATIONAL FACILITIES AND EDUCATION

There are 10 schools (3 combined, 6 primary and 1 secondary) within the SLM (SLM IDP 2017-2018).

4.2% of the municipal population has not attended any type of a schooling system, while 48.5% have primary school education. A little over 1700 individuals (4%) have graduated from a University / Technikon.

In Siyathemba, around 14% of adults have a matric certificate compared to 24.7% in the Northern Cape. The percentage of the population with a tertiary education in Siyathemba (5.1%) is also lower than that for the Northern Cape (7.3%).

7.1.5 ACCESS TO WATER, SEWAGE AND SOLID WASTE SERVICES

SLM is the Water Services Authority (WSA) and Water Services Provider (WSP) for the 3 towns within their area of authority. Piped water is accessed by about 98% of the SLM population and about 90% of the municipal population have access to flush toilets¹.

Siyathemba has three water supply schemes. For PCM, water is provided from the Water Treatment Works in Prieska. Water abstraction is from the Orange River. Waterborne sanitation is only available in the urban areas of Prieska.

About 75% of the population have access to a weekly refuse collection service². There is an existing licensed waste disposal site in Prieska. This facility is a G:C:B³ licensed facility and can only accept general waste. According to the SLM IDP (2017-2018), the site has a remaining airspace of 20 years. SLM has indicated that the site is not well managed at present due to financial and personnel constraints⁶. A new incinerator is proposed to be installed at the facility, the timing of which is unclear.

No facilities for the treatment and disposal of medical waste are available within SLM. Medical waste from the health facilities is transported by a contractor to a licensed treatment facility in the Free State Province.

¹ SLM Water Services Development Plan, 2017

² SLM IDP (2017-2018)

7.1.6 HOUSING

Within the Pixley Ka Seme District Municipality, 87.2% of households live in formal units, while 12.8% utilise informal housing units.

A variety of residential components are available within the municipal boundaries. More than 81% of household dwellings found in Siyathemba can be classified as houses or brick structures on separate stands. The average for the Northern Cape is 77.4%. Some 8.6% of local dwellings can be described as shacks.

The average household size in the larger Pixley Ka Seme District Municipality is about 3.7, female headed households is about 36.90%, formal dwellings at 86.30% and the housing owned is at 52.00%.

Housing for the mine personnel to be employed during the operational phase of the mine development is an important aspect of the project. The SLM IDP (2017-2018) has identified the need for proper and realistic information with regards to the housing need in the municipality.

The SDF indicated the need for an additional 33 ha for residential housing purposes. A housing development area has been demarcated by SLM within Prieska and funding for the construction of 364 houses in this area has been requested (Figure 7-2).

The demarcated sites for the housing have apparently been serviced and the funding, when granted, will be used for completion of the top structures.



FIGURE 7-2: LOCATION OF THE PRIESKA HOUSING DEVELOPMENT AREA

7.1.7 PUBLIC SAFETY AND SECURITY

There are three police stations within the SLM, situated in Marydale, Niekerkshoop, and Prieska respectively. There is no municipal fire-fighting capability in the SLM and no disaster manager plan for the municipality.

7.1.8 COMMUNITY HEALTH AND HEALTH FACILITIES

There is a total of 4 health facilities within the SLM, namely Niekerkshoop Clinic, E'Thembeni Clinic, Marydale PHCC, and Prieska Clinic.

The 2010 HIV/AIDS prevalence rate of the Siyathemba population was 6%. This is lower than the prevalence rates in the Northern Cape (8%) and South Africa (13%). However, since 2000, the number of people living with HIV/AIDS in the Siyathemba municipal area more than doubled from about 400 to just over 1,200 people in 2010. The prevalence rate is expanding faster in Siyathemba (at 11% p.a.) when compared with South Africa (at 6% on average p.a. since 2000).

SLM manages 3 cemeteries in Prieska, and 2 cemeteries in Niekerkshoop and Marydale. Expansion of the cemeteries in each of these towns is planned to be undertaken by the SLM.

7.1.9 ELECTRICITY AND ENERGY

Around 86% of household dwellings found in Siyathemba have access to electricity. This indicator is on par with the provincial average.

Between 2006 and 2011, there was a general increase in the use of electricity as a primary source of energy. This is due to local electrical infrastructure improvements across the province (SLM IDP, 2016).

As shown in the graph below, the majority of the population have access to electricity, which is used primarily for cooking, heating and lighting. The proportion of households within the municipality that use electricity for lighting has increased from 57% in 1996 to approximately 84% in 2011.

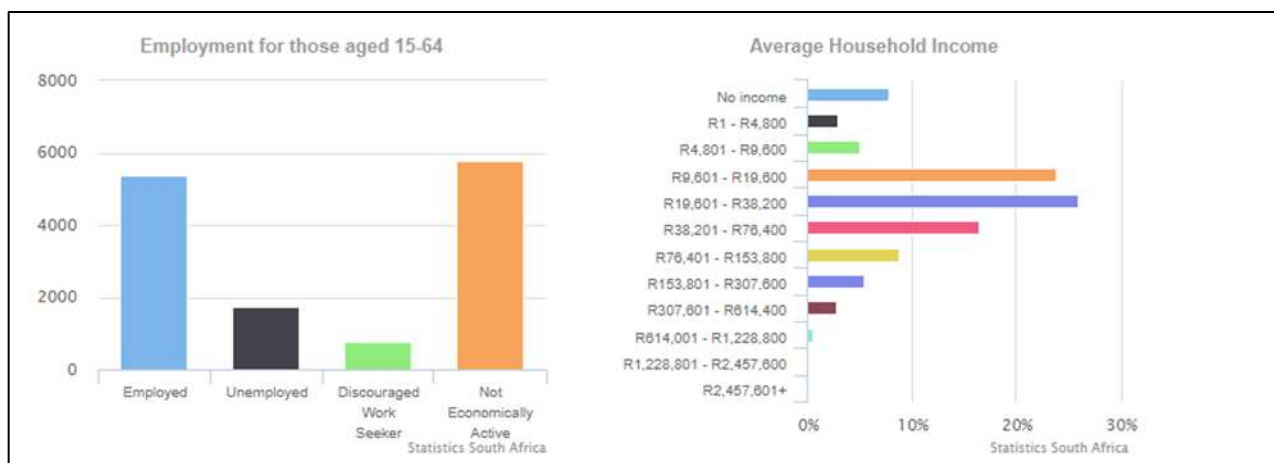
Although relatively expensive, paraffin and gas are used for cooking and heating in some places. Households using electricity as a source of energy for cooking increased from 48% in 1993 to 74% in 2011.

7.1.10 EMPLOYMENT³

Between 2001 and 2011, there has been a decrease in the number of people employed and a concomitant increase in the number of unemployed people across the Pixley Ka Seme District Municipality.

For Siyathemba, 5 787 individuals remain as being economically inactive, while 5 370 are employed. The unemployment rate in SLM in 2011 was 24.3%.

The average household income is approximately R9 000 – R19 500. Obtaining any form of income generating employment within the municipality has become increasingly difficult in recent years. This is attributed to the lack of education, resulting in the uneducated experiencing the highest incidences of poverty.



Source: Statistics South Africa (2011)

FIGURE 7-3: SUMMARY OF EMPLOYMENT AND INCOME IN SLM

The largest sectoral employers are agriculture (24%), government (23%), and community and social services (16%).

³ SLM IDP (2017-2018)

7.1.11 LABOUR

The labour participation rate across the Pixley Ka Seme District Municipality is 50%. The labour dependency ratio for Siyathemba is estimated at 2 (An additional two persons are supported by every person in the labour force).

Other significant labour ratio statistics for SLM are provided in Table 7-2.

TABLE 7-2 LABOUR RATIOS FOR SLM

LABOUR PARTICIPATION RATE	LABOUR DEPENDENCY RATIO	LABOUR YOUTH DEPENDENCY RATIO	LABOUR AGED DEPENDENCY RATIO
48	2	0.4	84

Source: SLM IDP (2017-2018)

7.1.12 SOCIAL SERVICES

From the Statistics South Africa Community Survey 2016 on community perception of a range of social aspects, the Repli Trading No. 27 Social and Labour Plan 2018 concluded the following:

- Residents of SLM are less concerned about safe and reliable water compared to the average citizen in South Africa. This can be ascribed to the abundance of water from the Orange River;
- Residents of SLM had a much bigger concern with respect to the lack of jobs in their municipality as opposed to the national average. This is not surprising given the lack of job opportunities in the municipality; and
- On the whole, the Community Survey of 2016 gives a picture of a local area that seems far more content than the average South African regarding social expectations.

7.1.13 ECONOMY

The SLM Local Economic Development (LED) Vision is "Ensuring long term economic sustainability through local value addition and social upliftment, as well as integrated community development. We strive towards an economy owned by local people."

The regional and local economy is poorly diversified with a reliance on, in the case of SLM, the government and agriculture sectors. The mining and manufacturing sectors provide very few (1% and 5% respectively) of the employment opportunities in the SLM.

The most significant contributors to the Gross Domestic Product (GDP) of the SLM are agriculture (28%), the finance and property sector (19%) and government (13%). At present, mining contributes approximately 3% to the GDP for the SLM. The mining sector is identified within the SLM IDP (2017-2018) as a sector with development potential.

The Repli Trading No. 27 Social and Labour Plan 2018 notes the following with respect to the economy of the SLM and the potential economic influence of the proposed mine development:

- SLM is a small economy. Larger rural municipalities in South Africa have a Gross Geographic Product (GGP) of between R5bn and R10bn. By contrast, SLM has an estimated GGP of R1.3bn. A GGP is simply the sum of all salaries and wages, depreciation and operating profits in an economy. This means the new mine, with 450 employees, could add an annual GGP of R216 million per annum, or 16,6% of GGP to the local economy. This is significantly high. Another perspective is that the average salaries and wages in mining is R120 000 per annum and hence 450 new employees in the SLM has a purchasing power of R54 million per annum;

- The small economy in SML is a result of two factors, one the lack of rainfall that results in less than productive land (thus demand for land is low), and two, as a result, its low population. In addition, there is no innovation in the local economy;
- Furthermore, the average income per capita in SLM is half of that of the average income in South Africa, which furthermore reduces the economic quality of life of the SLM population because they have less disposable income, in a remote area where the prices of goods are more than the average South Africa prices due to high transport costs;
- The quality of social services is rated much higher by the SLM population than the average South African because the demand for services is much less locally; and
- The lack of adequate employment opportunities is the most significant concern for the SLM population. There are almost 14 000 people in the workforce in Siyathemba and just over 4 000 formal jobs. Thus two-thirds of the working population does not have formal jobs.

7.2 DESCRIPTION OF CURRENT LAND USES

Current land uses within the proposed MRA surface area are as follows:

- Grazing of livestock;
- An operating 20 MW solar power plant and a proposed solar PV power plant are within the proposed MRA surface area boundary;
- Windmills, boreholes and related agricultural infrastructure;
- Two existing quarry operations;
- The Alkantpan landing strip;
- Road to Copperton and Alkantpan from the R357; and
- Disused rail siding.

Land uses on immediately adjacent properties include the following:

- Alkantpan Test Range;
- Various infrastructure associated with the historical PCM;
- Registered servitude between the historical mineral processing area and the historical TSF
- Grazing of livestock;
- Residential town of Copperton;
- The proposed Copperton Wind Farm and Garob Wind Farm border the proposed MRA surface area boundary in the east. The nearest wind turbines are approximately 6 km from the proposed mining area;
- Several proposed solar PV projects are situated towards the south and south-east of the proposed MRA surface area boundary;
- Historical PCM TSF;
- Eskom Cuprum Substation; and
- Windmills and related agricultural infrastructure.

7.3 EXISTING SURFACE LAND USES

An operating 20 MW solar power plant is situated towards the middle of the MRA surface area boundary. Other existing infrastructure within the MRA surface area includes partially intact stormwater diversion berms

constructed by PCML in the 1970s, the access road to Copperton and PCM from the R357, a disused rail spur and several mine houses used, at present, by contractors involved with the prospecting activities.

The remainder of the MRA surface area is largely undisturbed scrubland used for grazing of small livestock.

There is no registered land claim applicable to Portion 1 of Vogelstruisbult 104.

7.4 SURROUNDING LAND USES

Copperton is situated to the north of the proposed Vardocube underground mining operation. The town is still in use, though only 40 of the original 300 houses now remain. The full extent of the town is excluded from the proposed Vardocube mining right area. Similarly, Portions 5 and 6 of the Farm Vogelstruisbult 104, are excluded from the MRA. The Eskom Cuprum Substation is located on these properties.

Surrounding landowners and land users comprise of the historical PCM, private landowners and the Alkantpan Test Range (to the west). Several proposed renewable energy (wind and solar) projects are situated towards the east and south of the proposed MRA surface area boundary. (Figure 5-3).

The Copperton Wind Farm commenced with construction in the last quarter of 2018 and the Garob Wind Farm is scheduled to commence with construction in April 2019. The construction phase of these two developments may overlap with the construction phase of Repli and Vardocube and this will have a cumulative impact on social aspects for the region.

Most of the buildings and related infrastructure associated with the historical PCM were demolished when the mine closed in 1991. The western section of the Repli MRA surface area is characterised by remnants of the demolished infrastructure remaining from the historical mining between 1971 and 1991. Remaining surface infrastructure includes the Hutching Shaft column, crusher bins, flotation dams and a concentrate drying slab.

The historical tailings storage facility containing the residues from the historical mining borders the proposed Vardocube MRA surface area in the south-west.

8 PROJECT NEED AND DESIRABILITY

8.1 NEED

Recent drilling of the Vardocube Section of the orebody has confirmed that there is valuable zinc and copper metal in the orebody which, through the arrangement with the adjacent Repli operation, can be mined in a cost-effective manner. The market demand for zinc and copper concentrate is strong with a projection for a supply-side constraint for these metals, especially in developed economies. The proposed development is ideally situated to provide for this demand.

In addition to the export market need for zinc and copper concentrate, there is a significant need in South Africa for developments which facilitate economic growth and provide employment opportunities at a local and regional scale. The royalties arising from the mineral extraction, payable to the South African Government in terms of the MPRDA, will provide revenue to the country. The construction and operational phases of the development will furthermore result in employment opportunities and contribute to local economic development through the procurement of goods and services and the implementation of the mine's social development commitments.

8.2 DESIRABILITY

Due to the nature of mineral extraction and processing, underground mining developments do have various physical, social and environmental hazards. These hazards are generally controlled through the application of various engineering design standards and the health, safety and environmental procedures and plans which the operating company implements during the day to day operation of the site.

No significant risks or impacts associated with the proposed underground mining have been identified at this stage. The proposed use of Repli infrastructure and facilities for the mining of the Vardocube Section, including the TSF, WRD, process plant and other surface infrastructure, is beneficial in terms of reducing the potential cumulative impacts from the proposed mining.

Establishment of dedicated infrastructure and facilities for mining and mineral processing of the Vardocube Section would have a significantly greater environmental impact in terms of, among others, resource consumption, emissions to air and water, and loss of natural habitat.

Using the Repli infrastructure and facilities is desirable both in terms of economic feasibility and in reducing potential direct, indirect and cumulative impacts of the proposed mining to the environment. This is consistent with the principles for sustainable development in NEMA. The proposed development has also been found to be consistent with the spatial development planning context applicable to the area. With the appropriate environmental controls in place, the proposed development is also considered to be compatible with surrounding land uses.

Accordingly, it is concluded that there is a need for the project and that undesirable aspects of the development can be satisfactorily mitigated.

8.3 NO DEVELOPMENT OPTION

Should the Vardocube Section not be implemented, PCM will remain as is and:

- The royalties and tax revenue from mining of the Vardocube Section will not accrue to the South African Government;
- The local economic development opportunities associated with the procurement of local goods and services to support the Vardocube Section mine activities will not be realised;
- Projected employment opportunities during the construction and operational phases will not be fulfilled;
- The various social development projects under discussion with local government as part of the applicant's social and labour plan commitments for the mining of the Vardocube Section, will not be implemented; and
- The potential negative impacts of the underground mining will not occur.

8.4 INTERESTED AND AFFECTED PARTY COMMENTS

Various comments have been received by interested and affected parties as part of the public participation processes undertaken for the Repli Section and Vardocube Section to date. The concerns listed can largely be summarised as follows:

- Impact to heritage and paleontological resources;
- Management of surface water;
- Management of solid waste;
- Management of hazardous substances;
- Groundwater and dewatering Impact;
- Rehabilitation;
- Impact of mining (blasting, geotechnical issues, traffic and dust) on the Copperton Wind Farm;
- Air Quality (Dust fallout) impact;
- Mining plan concerns;

- Road access, traffic and road safety impact;
- Influx, crime and security impact;
- Housing impact;
- Labour and employment;
- Noise, blasting and vibration impact;
- EM and RF interference (SKA) impact;
- Biodiversity impact; and
- Rail infrastructure impact.

Several interested parties have commented to date, including government departments such as Transnet, DMR, SARAO, SANRAL and the DWS, operating and proposed solar PV plant and wind energy facility owners, surrounding landowners and agricultural organisations.

No clear opposition to the proposed mining project is evident from the comments submitted.

In general, the comments reflect concerns related to the possible direct and indirect impacts of the proposed mining activities on existing land uses in the area, particularly with respect to farming and the operating and proposed renewable energy developments (wind and solar).

8.5 FINDINGS OF SPECIALIST STUDIES

Specialist studies undertaken as part of the Repli Section EIA Process and the studies undertaken for Vardocube, which have relevance to the social environment include the following:

- Heritage Impact Assessment;
- Noise Impact Assessment;
- Groundwater Impact Assessment;
- Air Quality Impact Assessment;
- Blasting Impact Assessment;
- Visual Impact Assessment; and
- Traffic Impact Assessment.

The key findings of these studies, as they relate to the social environment, include the following:

- No additional impact to heritage or paleontological resources is anticipated as a result of the mining of the Vardocube Section;
- Dewatering may have an impact on some of the boreholes nearest to the mine. Groundwater contamination from the unlined historical TSF is the most significant potential source of contamination to groundwater resources in the area. At present, the historical TSF does not appear to be impacting on surrounding water users;
- Simulated noise levels from the proposed mining activities indicate that during the mine operational phase, there is likely to be a noticeable increase in daytime and night-time noise levels at two of the nearest noise sensitive receptors (nearest solar PV plant and a house currently being used by mine contractors involved in prospecting activities);
- Simulated dustfall rates are predicted to be in compliance with the National Dust Control Regulations (residential area limit) at all sensitive receptors;

- The potential soiling impact of dustfall on solar PV plants during the mine operational phase cannot be predicted with any accuracy at this stage as information on soiling impact as a result of baseline dustfall is not available;
- Simulated particulate emission (PM_{2.5} and PM₁₀) levels, with mitigation in place, are predicted to be in non-compliance with the daily average ambient air quality standards for an area to the south-east of the proposed mining right area, in the direction of several proposed solar PV plants. The main source of these emissions is expected to be from the historical and proposed TSF. The simulated annual average levels were low and within compliance;
- No sensitive receptors are located within the calculated blasting-induced vibration and fly rock impact areas; and
- No significant road traffic impacts have been identified. Road safety intersection improvements (dedicated turning lanes, road markings and road signage) are recommended for three road intersections between the proposed mine site and the R357.

9 VARDOCUBE SOCIAL AND LABOUR PLAN

9.1 OVERVIEW

A Social and Labour Plan (SLP), in accordance with the requirements of the Minerals and Petroleum Resources Development Act 28 of 2002 and Mining Charter II, has been compiled in support of the Vardocube Mining Right Application.

The SLP address the Applicant's plans for ensuring that it achieves commercial success whilst also developing its employees and community for the better and in compliance with transformation targets as stipulated in the Mining Charter II, as it may be amended and developed from time to time (Orion Minerals, 2018).

A summary of the key aspects of the Vardocube SLP is provided hereunder.

9.2 HUMAN RESOURCE DEVELOPMENT

The mining of the Vardocube Section will be undertaken by Repli employees and contractors. Initial estimates are that a peak workforce of 112 persons will be required for the mining of the Vardocube Section.

The Human Resource Development Programme included in the SLP is aimed at achieving the following four key outcomes:

- To provide skills training opportunities to mine workers during their employment to improve their income-earning capacity during the mine life and after mine closure;
- To promote employment and skills development in the local communities and major labour-sending areas;
- To ensure substantially higher levels of inclusiveness and advancement of HDSAs, including women, in the mining industry; and
- To contribute to the development of a pool of skilled South African workers in support of National Economic and Skills Development strategies.

The primary objective of the Human Resource Development programme is to ensure the development of requisite skills in respect of learnerships, bursaries (core and critical skills), artisans, ABET training (level I, II, III, IV and NQF 1) and other training initiatives as required by the amended Mining Charter.

Although employed by Repli, Vardocube will be responsible for the skills development of a portion of the workforce.

Skills levels in the area are generally low and Vardocube would like to start developing community members as soon as possible to ensure greater employment opportunities at the mine. Vardocube is determined to facilitate employment of locals as far as viably possible. The Human Resource Development activities will thus mostly be focused on members of the community, equipping them with skills that will make them desired employees both during the construction and operational phases of the project.

Through its HRD Programme, Vardocube intends to provide necessary skills training and development opportunities as well as educational opportunities to employees, including the opportunity to become literate.

Other aspects of training and skills development included in the SLP are:

- Adult Basic Education and Training (ABET);
- Learnerships;
- Core Skills Training (relevant to the core business functions);
- Portable Skills Training (promoting employment beyond mine closure);
- Internships and Bursaries; and
- Career Progression and Mentorship Programmes.

An amount of R3.8 million has been budgeted in the SLP for the implementation of the complete HRD programme over a 5-year period.

9.3 MINE COMMUNITY DEVELOPMENT

9.3.1 COMMUNITY DEVELOPMENT / LOCAL ECONOMIC DEVELOPMENT PROJECTS

Based on a review of the developmental needs identified in the SLM IDP and consultations with the SLM, two community development projects have been included in the Vardocube SLP. Since Repli and Vardocube have common and complimentary interests in the development of the community, the projects are aligned with the Local Economic Development Projects identified in the Repli IDP.

Table 9-1 provides a summary of the LED projects from the Repli SLP and the Vardocube SLP.

TABLE 9-1: LOCAL ECONOMIC DEVELOPMENT PROJECTS

REPLI		
PROJECT	OBJECTIVES	5 YEAR BUDGET
Local Community Skills Development	To develop the skills of at least ten community members through a partnership with the Siyathemba municipality and a preferred training centre (possibly the De Beers Training Centre in Kimberley), or an alternative facility to be developed in Prieska.	R 2 500 000
Greening of Prieska	Contribute towards the design and implementation of a "greener" image for Prieska, in co-operation with Siyathemba Municipality.	R 1 825 000
Residential Development Planning	Determine the feasibility of developing large areas of land for residential development in co-operation with the Siyathemba Municipality.	R 1 620 000
Community Information Centre / Internet Café	<ul style="list-style-type: none"> ➤ Provide access to the internet and other information sources to the local population. ➤ Provide access to local entrepreneurs to supply products and services to Repli. ➤ Acts as an interface for procurement between Repli and the local community. 	R 5 460 000

Sharing of a Fire Brigade	To share the mine's fire-fighting and protection services to the local community on behalf of Siyathemba Municipality.	R 5 220 000
Community HIV/AIDS Prevention	To educate and give all mine workers, temporary and permanent, the awareness of how HIV/AIDS is spread and to distribute condoms amongst workers and in social meeting places in the local areas.	R 1 324 286
VARDOCUBE		
PROJECT	OBJECTIVES	5 YEAR BUDGET
Local Community Skills Development	To develop the skills of community members through a partnership with the Siyathemba municipality and a preferred training centre.	R 1 475 000
Community HIV/AIDS Prevention	The object of this project is to educate mine workers, contractors, and community members on matters of HIV&AIDS, community health and related matters. The Vardocube project will enhance the project impact from the Repli SLP by means of contracting an organisation such as Future Families who specializes in such programmes.	R 250 000

9.3.2 HOUSING AND LIVING CONDITIONS

Repli will be managing the implementation of a housing strategy for employees on behalf of Repli and Vardocube. The proposed housing strategy is consistent with government policy in that it is intended to construct housing in suitable towns and not in mine villages. The company strategy is that all employees should be integrated in the local communities, reside in their place of choosing and if possible, with their families. The company's remuneration takes into consideration the strategy so that employees can provide for their selected accommodation, by means of a living out allowance. Where possible the mine will promote home ownership.

The mines housing programmes will be flexible, allowing for a variety of solutions based on the affordability levels of employees. The company subscribes to meeting the challenges of housing and living conditions through partnerships with all the relevant stakeholders.

Engagement with local municipalities is vital, as they are responsible and accountable for ongoing service delivery.

9.4 PROCUREMENT PROGRESSION PLAN

According to the agreement signed between Vardocube and Repli, procurement for Vardocube will be undertaken by Repli.

Repli is committed to procure locally (to the extent that this proves feasible) and to assist potential HDSA suppliers (through mentoring) to become part of the mine's supply chain. Through its proposed mining operation, it is intended to create an enabling environment for the empowerment of HDSAs within the surrounding areas. A Procurement Policy will be formulated to provide HDSAs and surrounding communities with a preferred supplier status in all 3 levels of procurement, namely: capital goods, consumables and services.

The following procurement targets have been established:

- Procure a minimum 40% of capital goods from BEE entities;
- Multinational suppliers must contribute 0.5% of annual income generated from local mining companies to a Social Development Fund; and
- Procure 70% of services and 50% of consumer goods from BEE entities.

9.5 MANAGEMENT OF DOWNSCALING AND RETRENCHMENT

Repli, on behalf of Vardocube, commits to making every effort to promote security of employment through sound management of the operations for the life of the mine.

The contracting companies, once appointed, will be expected to play a significant role in supporting initiatives that will contribute to avoiding job losses during a retrenchment exercise.

The SLP requires extensive investment (time, resources and money) from the contractors in respect of the training and development of employees. It will be required that they endorse a policy that focuses on retaining skills rather than losing them during a retrenchment exercise.

Although not yet identified or appointed, the core contractors are likely to have several ongoing contracts. Thus, they will be encouraged to seek alternative employment for their employees through various initiatives, including seeking to transfer employees to other projects or companies within the same group (if this is feasible). Such transfers could be between mining and non-mining operations depending on the nature of the projects to which the contractor is committed.

The Repli SLP indicates that there will be compliance with all requirements of the MPRDA with respect to the relevant processes pertaining to the management of downscaling and retrenchment. The following aspects are included within the SLP in this respect:

- Establish a joint labour management committee (Future Forum) at mine site level that will focus on the implementation and monitoring of the SLP and which will be responsible for the statutory notifications related to retrenchment;
- A commitment to promote security of employment and implement mechanisms to save jobs, avoid job losses and a decline in employment;
- Compliance with all relevant legislation if retrenchments are unavoidable, including comprehensive consultation with all parties;
- Implementation of mechanisms to manage and, wherever possible, minimise the social and economic impact that a retrenchment exercise has on individuals, regions and economies;
- Prior to the development of detailed closure management plans, a detailed socio-economic impact assessment will be undertaken;
- Development of mine closure strategies, incorporating the principles of consultation, capacity building, mentorship, and skills portability; and
- Financial provisioning for affected employees, calculated for each individual and comprising of provision for a severance package, cost of retrenchment counselling and portable skills training.

Vardocube will establish a downscaling investment fund to the value of R 250 000 (accrued over 5 years) for the management of downscaling and retrenchments.

10 IMPACT ASSESSMENT

10.1 OVERVIEW

The impact assessment methodology comprised of a risk-based impact matrix in which the outcomes, impacts and residual risk of the project activities was determined as follows:

- Step 1: Identify and describe the impact in terms of its nature (negative or positive) and type (direct or indirect);
- Step 2: Assess the impact severity (including reversibility and the potential for irreplaceable loss of resources), impact duration and impact spatial scale (extent);
- Step 3: Assign an impact consequence rating;
- Step 4: Assess the impact probability;
- Step 5: Assign the impact significance rating;
- Step 6: Identify measures and controls by which the impact can be avoided, managed or mitigated; and
- Step: Repeat the impact assessment on the assumption that the mitigation measures are applied and assign the residual impact (post mitigation) significance rating.

The purpose of the impact assessment was not to identify every possible risk and impact which the proposed project activities may have on the receiving social environment. Rather, the assessment was focused on identifying and assessing the most material impacts, commensurate with the nature of the project activity and the characteristics of the receiving social environment.

All impacts were assessed in the following phases:

- Construction;
- Operation; and
- Decommissioning and Closure.

The various impact rating criteria used and how they were applied are described in the section that follows.

10.2 APPLICATION OF IMPACT RATING CRITERIA

The first phase of impact assessment is the identification of the various project activities which may impact upon the identified environmental and social categories.

The identification of significant project activities is supported by the identification of the various receiving environmental receptors and resources. These receptors and resources allow for an understanding of the impact pathways and assessment of the sensitivity of the receiving environment to change.

The significance of the impact is then assessed by rating each variable numerically, according to defined criteria as provided in Table 10-1. The purpose of the significance rating of the identified impacts is to develop a clear understanding of the influences and processes associated with each impact.

The severity, spatial scope and duration of the impact together comprise the consequence of the impact; and when summed can obtain a maximum value of 15. The frequency of the activity and the frequency of the impact together comprise the likelihood of the impact, and can obtain a maximum value of 10.

The values for likelihood and consequence of the impact are then read from a significance rating matrix as shown in Table 10-2 and Table 10-3.

The model outcome of the impacts is then assessed in terms of impact certainty and consideration of available information. The NEMA Precautionary Principle is applied in instances of uncertainty or lack of information by increasing assigned ratings or adjusting final model outcomes. In certain instances, where a variable or outcome requires rational adjustment due to model limitations, the model outcomes are adjusted. Arguments and descriptions for such adjustments, as well as arguments for each specific impact assessments are presented in the text and encapsulated in the assessment summary table linked to each impact discussion.

The assessment of impacts is done initially for the scenario where no mitigation measures are implemented. Mitigation measures are then identified and considered for each impact and the analysis repeated in order to determine the significance of the residual impacts (the impact remaining after the mitigation measure has been implemented).

TABLE 10-1: CRITERIA FOR ASSESSING THE SIGNIFICANCE OF IMPACTS

SEVERITY OF IMPACT	RATING
Insignificant / non-harmful	1
Small / potentially harmful	2
Significant / slightly harmful	3
Great / harmful	4
Disastrous / extremely harmful	5
SPATIAL SCOPE OF IMPACT	RATING
Activity specific	1
Area specific	2
Whole project site / local area	3
Regional	4
National/International	5
DURATION OF IMPACT	RATING
One day to one month	1
One month to one year	2
One year to ten years	3
Life of operation	4
Post closure / permanent	5
FREQUENCY OF ACTIVITY / DURATION OF ASPECT	RATING
Annually or less / low	1
6 monthly / temporary	2
Monthly / infrequent	3
Weekly / life of operation / regularly / likely	4
Daily / permanent / high	5
FREQUENCY OF IMPACT	RATING
Almost never / almost impossible	1
Very seldom / highly unlikely	2
Infrequent / unlikely / seldom	3
Often / regularly / likely / possible	4
Daily / highly likely / definitely	5

}

CONSEQUENCE

}

LIKELIHOOD

Activity: a distinct process or task undertaken by an organisation for which a responsibility can be assigned.

Environmental aspect: an element of an organisation’s activities, products or services which can interact with the environment.

Environmental impacts: consequences of these aspects on environmental resources or receptors.

Receptors: comprise, but are not limited to people or man-made structures.

Resources: include components of the biophysical environment.

Frequency of activity: refers to how often the proposed activity will take place.

Frequency of impact: refers to the frequency with which a stressor will impact on the receptor.

Severity: refers to the degree of change to the receptor status in terms of the reversibility of the impact; sensitivity of receptor to stressor; duration of impact (increasing or decreasing with time); controversy potential and precedent setting; threat to environmental and health standards.

Spatial scope: refers to the geographical scale of the impact.

Duration: refers to the length of time over which the stressor will cause a change in the resource or receptor.

TABLE 10-2: SIGNIFICANCE RATING MATRIX

		CONSEQUENCE (SEVERITY + SPATIAL SCOPE + DURATION)														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
LIKELIHOOD (FREQUENCY OF ACTIVITY + FREQUENCY OF IMPACT)	1	2	4	6	8	10	12	14	16	18	20	22	24	26	28	30
	2	4	6	9	12	15	18	21	24	27	30	33	36	39	42	45
	3	6	8	12	16	20	24	28	32	36	40	44	48	52	56	60
	4	8	10	15	20	25	30	35	40	45	50	55	60	65	70	75
	5	10	12	18	24	30	36	42	48	54	60	66	72	78	84	90
	6	12	14	21	28	35	42	49	56	63	70	77	84	91	98	105
	7	14	16	24	32	40	48	56	64	72	80	88	96	104	112	120
	8	16	18	27	36	45	54	63	72	81	90	99	108	117	126	135
	9	18	20	30	40	50	60	70	80	90	100	110	120	130	140	150
	10	20														

TABLE 10-3: POSITIVE/NEGATIVE MITIGATION RATINGS

COLOUR CODE	SIGNIFICANCE RATING	VALUE	NEGATIVE IMPACT MANAGEMENT RECOMMENDATION	POSITIVE IMPACT MANAGEMENT RECOMMENDATION
	Very High	126-150	Improve current management	Maintain current management
	High	101-125	Improve current management	Maintain current management
	Medium-High	76-100	Improve current management	Maintain current management
	Low-Medium	51-75	Maintain current management	Improve current management
	Low	26-50	Maintain current management	Improve current management
	Very Low	1-25	Maintain current management	Improve current management

11 IMPACT ASSESSMENT OUTCOMES

Several impacts on the social environment have been assessed by the relevant technical specialists as summarised in Section 8.5 of this report. These impacts are not re-assessed in the tables that follow but it is important to note that they are part of the overall Project impact to the social environment.

Of most importance in this regard in terms of the underground mining of the Vardocube Section are the potential impacts noted with respect to dewatering of the mine on several boreholes nearest the mine site which are currently used for livestock watering, and the possible contamination of boreholes downgradient of the historical TSF.

Regular review of the mitigation measures recommended for these impacts, informed by the required monitoring to be undertaken, should be undertaken to ensure that these impacts are managed over the LOM. The assessed impacts per project phase are provided below. The complete impact matrix for each impact is presented in Annexure B.

The Copperton Wind Farm commenced with construction in the last quarter of 2018 and the Garob Wind Farm is scheduled to commence with construction in April 2019. The construction phase of these two developments may

overlap with the construction phase of Repli and Vardocube and this will have a cumulative impact on social aspects for the region. These developments have also been considered as part of the impact assessment.

The assessment of social impacts and associated mitigation measures has been assessed cumulatively for the Repli and Vardocube Mining Right Areas.

TABLE 11-1: ASSESSMENT OF SOCIAL IMPACTS

Impact	Project Phase	Impact Description	Significance	Significance
			Pre-Mitigation	Post Mitigation
Local employment	All Phases	The development will create several hundred direct employment opportunities in the construction and operational phase respectively. Many more indirect employment opportunities will also be created. Implementation of the commitment to maximise local employment wherever practicable will increase the significance of this positive impact.	Medium-High '+'	High '+'
Local economic development	All Phases	Procurement of local goods and services by the mine, employees and contractors will stimulate local business and create opportunities for entrepreneurship. In addition, implementation of the seven agreed LED projects committed to in the SLP will have a significant positive impact for the broader community.	Medium-High '+'	Medium-High '+'
Training and development	All Phases	Implementation of the HRD programme, as described in the two SLPs is expected to result in skills transfer, career progression, re-skilling and improved levels of literacy in the community as a whole.	Medium-High '+'	High '+'
Community infrastructure development	Construction and Operation	The development of housing and direct and indirect mine investment in new/upgraded community infrastructure such as roads and potable water will have a positive impact for residents in Prieska and Copperton.	Low-Medium '+'	Medium-High '+'
Local inflation	Construction and Operation	The procurement of goods and services by the mine, employees and contractors will result in an increased demand for various goods and services in Copperton and Prieska. This will be amplified by the potential overlap in the construction phase with two wind energy developments. This may result in conditions of hyperinflation. The impact is expected to be temporary as market forces respond	Low-Medium '-'	Low-Medium '-'

		and the gap between supply and demand narrows. The planned phasing in of housing in Prieska will also mitigate this impact.		
Impact	Project Phase	Impact Description	Significance	Significance
			Pre Mitigation	Post Mitigation
Influx of job seekers – demand on municipal services	Construction and Operational	An influx of people seeking employment can be expected during the construction phase especially. This will be amplified by the potential overlap in the construction phase with two wind energy developments. This will place additional demand on municipal services in Prieska and Copperton such as public safety, health care, water, sanitation, and housing. The impact can be mitigated through cooperative planning with the SLM.	Low-Medium ^{'-'}	Low-Medium ^{'-'}
Influx of job seekers - disruption in community dynamics	Construction and Operational	Disruption of social patterns within the Prieska and Copperton communities may occur, especially during the construction phase because of the influx of job seekers for the mine and wind energy developments. This may be amplified if there is tension between locals and foreign nationals and/or racial or cultural differences. Human health impacts from diseases like HIV/AIDS can also occur as a result of a change in social dynamics. The impact can be mitigated through the housing strategy cooperative planning with the SLM and community leaders.	Medium-High ^{'-'}	Low-Medium ^{'-'}
Mine health and safety	All Phases	Minor, major and fatal injuries from potential mine health and safety incidents. There are multiple health and safety risks associated with surface and underground mining, ore processing and movement of man and materials. In addition, the mine will store and handle various hazardous substances including explosives. The pre-mitigation impact significance rating is High because of the potential human health and property damage consequences of an incident, which may include loss of life. Implementation of a comprehensive health and safety	High ^{'-'}	Low-Medium ^{'-'}

Impact	Project Phase	Impact Description	Significance	Significance
			Pre Mitigation	Post Mitigation
		management programme and adherence to legislation governing mine health and safety requirements will mitigate this impact.		
Security risk	Construction and Operational	Increased levels of crime may be experienced in the area as a result of the influx of people seeking employment. Contact crimes may result in injuries and in severe cases, fatalities. The pre-mitigation impact significance rating is Medium-High because of the potential human health consequences of a crime. The post-mitigation impact significance rating is Low-Medium due to the ability to prevent these impacts through the implementation of security measures.	Medium-High ¹ - ¹	Low-Medium ¹ - ¹
Contribution of royalties, rates and taxes	Operational	The mining will generate royalties in accordance with the MPRDA, payable to the national government. Furthermore, the development of the site and connection to municipal services will result in the payment of rates and taxes to the SLM. This is considered to be a positive impact of Low-Medium significance.	Low-Medium ¹ + ¹	Low-Medium ¹ + ¹
Community health and safety	All Phases	Minor, major and fatal injuries to community members from health and safety incidents like vehicle collisions, fire and other incidents. The pre-mitigation impact significance rating is High because of the potential human health and property damage consequences of a community safety incident, which may include loss of life. The post-mitigation impact significance rating is Low due to the ability to prevent these impacts through adherence to the relevant legal requirements on mine health and safety and the mitigation measures in the EMPr.	High ¹ - ¹	Low ¹ - ¹

<p>Mine closure and associated effects on local economy</p>	<p>Decommissioning and Closure</p>	<p>Decommissioning and closure of the mine will have a negative impact on those employed, the families they support and the businesses which provide services to the mine. The impact of closure can be mitigated through the implementation of the measures in the SLP, including regular, consultative review of closure strategies and the portable skills / re-skilling programme.</p>	<p>Medium-High'-'</p>	<p>Low-Medium'-'</p>
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12 MITIGATION MEASURES

Recommended mitigation measures for preventing and/or reducing the significance of the potential impacts of the development on the social environment are provided hereunder. These mitigation measures are to be included in the Environmental Management Programme (EMPr) and compliance therewith should be included as a condition to the environmental authorisation:

- Vardocube must continue to reassess the risks and impacts of the development throughout its operational life. Should any change in the risk and impact profile of the development be determined, additional management controls and mitigation measures must be implemented and the EMPr amended to reflect these changes;
- The SLP and EMPr, including all management and monitoring measures must be implemented and compliance thereto audited by a competent independent person on an annual basis;
- The following social management plans and procedures must be jointly developed and implemented by Repli and Vardocube prior to construction commencing:
 - An emergency preparedness and response plan;
 - A comprehensive mine health and safety management plan, incorporating controls for ensuring community health and safety;
 - An influx management plan developed in collaboration with the Siyathemba Local Municipality. The plan must identify responsibilities between the Applicant and the SLM for ensuring that access to municipal services such as public health, public safety, water, sanitation, power and affordable housing are available in Prieska and Copperton;
 - A construction camp management plan which outlines access to services (water, sanitation and power) as well as policies with respect to conduct, including substance abuse;
 - A compensation policy and framework outlining the procedure to be followed for the compensation of any losses confirmed to be as a result of the activities of the mine; and
 - A written complaints and grievance procedure.
- A community engagement forum for Copperton comprising of representatives of, among others, the mine management, surrounding landowners / land users, community members, authorities, and local business must be established by Repli / Vardocube;
- All relevant environmental monitoring data from mining activities must be made available to the community engagement forum;
- An annual report on the progress of implementation of the programmes and commitments made by Vardocube in the mine social and labour plan should be provided to the community engagement forum, steering committee and all other relevant stakeholders. It is recommended that the report include feedback on relevant socio-economic indicators, to be agreed by the forum, and which may include indicators such as:
 - Local employment;
 - Business opportunities;
 - Crime and safety;
 - Housing supply and suitability;
 - Housing affordability;
 - Influx management;

- Income distribution;
- Skills development, training and development; and
- Transport and traffic.

13 IMPACT STATEMENT

The renewable energy developments and the proposed Repli and Vardocube mining activities are likely to have a significant cumulative regional impact on the socio-economic environment, with a substantial inflow of people and resources into a local economy which is currently small and poorly diversified. The establishment of a committee between developers, government and the local community is recommended to ensure that the regional opportunities created by these developments can be optimised and the potential synergistic benefits realised.

Key findings of the social impact assessment for the proposed Vardocube mine development are as follows:

- Sufficient and appropriate information on the proposed development and the receiving environment was available for conducting the impact assessment;
- The proposed development is compatible with surrounding land uses;
- The proposed development has the potential to further contribute to employment and economic development opportunities for local communities;
- The mine social and labour plan has provided costed plans for optimising local employment, skills development and a commitment to implementing two local economic development projects, identified in collaboration with the SLM; and
- Several negative social impacts have been identified. These impacts have been assessed to be reversible and can be satisfactorily mitigated.

Provided that the mitigation measures in this report and the measures in the mine social and labour plan are implemented, it is the opinion of the EAP that the authorisation may be granted.

Compliance with the mitigation measures in this report should be included as conditions of the environmental authorisation.

14 REFERENCES

- Heritage Contracts and Archaeological Consulting, 2017. Archaeological Scoping Report for the Proposed Prieska Copper Mine, Northern Cape
- Orion Gold NL, 2017. Prieska Copper Mine Scoping Study
- Orion Minerals Limited, 2018. Prieska Zinc Copper Mine Accommodation and Housing Strategy, Revision 1. May 2018
- Orion Minerals Limited, 2018. Vardocube Social and Labour Plan, September 2018
- Repli Trading No. 27, 2018. Social and Labour Plan for the Proposed Prieska Zinc Copper Mining Operation
- Siyathemba Local Municipality, 2006. Spatial Development Framework
- Siyathemba Local Municipality, 2017. Integrated Development Plan 2017 - 2018
- Siyathemba Local Municipality, 2017. Water Services Development Plan

Statistics South Africa, Census 2011. Available at: http://www.statssa.gov.za/?page_id=593 [Accessed January 2018]

Statistics South Africa, Census 2011 Municipal report, Northern Cape, Report 03-01-51

ANNEXURE A: SPECIALIST CVS

CURRICULUM VITAE

PAUL FURNISS

ENVIRONMENTAL ADVISOR / ENVIRONMENTAL ASSESSMENT PRACTITIONER

BACKGROUND

Paul is a Director of ABS Africa. He has 17 years environmental assessment and management experience in the energy, water, mining and infrastructure sectors. His project experience includes conducting environmental assessment studies in South Africa, Guinea, Lesotho, Democratic Republic of Congo, Sudan, Namibia, Botswana, Zimbabwe, and Mozambique.

In the role of environmental manager, he has been responsible for the setup and auditing of environmental construction management procedures for a range of developments. Having led various environmental due diligence assessments for mining clients and project financiers, he has a good understanding of international environmental governance requirements including Equator Principles and IFC Performance Standards.

FIELDS OF COMPETENCE

- Environmental and Social Impact Assessments for the energy, water, mining, and infrastructure sectors
- Integration of environmental management principles into EPCM activities throughout the project lifecycle
- Environmental risk and screening assessments
- Environmental permitting
- Environmental auditing
- Environmental due diligence studies
- Strategic environmental assessment
- Integrated waste management

ACADEMIC QUALIFICATIONS

- Bachelor of Agricultural Science in Animal Science: University of Pretoria, 1998
- Bachelor of Science (Honours) in Wildlife Management: University of Pretoria, 1999
- Master of Science in Environmental Science (Water Resource Management): University of Pretoria, 2000

PROFESSIONAL REGISTRATION

Pr.Sci.Nat. Professional Natural Scientist (Environmental Science): The South African Council for Natural Scientific Professions, 2007

Certified Environmental Assessment Practitioner: Environmental Assessment Practitioners Association of South Africa

ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT STUDIES

KRANSpan PROJECT – SOUTH AFRICA (2018 - PRESENT)

Environmental Assessment Practitioner for an environmental authorisation, waste management license and integrated water use licence for a proposed surface and underground coal mine, near Carolina in the Mpumalanga Province.

NORTHERN CAPE PROSPECTING – SOUTH AFRICA (2018 - PRESENT)

Environmental Assessment Practitioner for three environmental authorisation process in support of prospecting right applications, near Copperton and Marydale in the Northern Cape Province.

ZANDVOORT IWULA PROJECT – SOUTH AFRICA (2018 - PRESENT)

Environmental Assessment Practitioner for an integrated water use licence application (IWULA) for a proposed surface coal mine near Carolina in the Mpumalanga Province.

PRIESKA ZINC COPPER PROJECT – SOUTH AFRICA (2017- PRESENT)

Environmental Assessment Practitioner for an environmental authorisation, waste management license and integrated water use licence for the proposed re-establishment of the Prieska Copper Mine, near Copperton in the Northern Cape Province.

TRI-K GOLD PROJECT – GUINEA (2017-2018)

Environmental Assessment Practitioner for an IFC-compliant ESIA for a greenfields gold mining project in the Mandiana Prefecture of Guinea.

LENASIA SOUTH HOSPITAL PROJECT – SOUTH AFRICA (2016)

Environmental Assessment Practitioner for an environmental authorisation, waste management license and atmospheric emission license for the conversion of a community health centre into a Level 1 District Hospital.

SEDIBENG WATER HARTSWATER REGIONAL OFFICE PROJECT – SOUTH AFRICA (2016-2017)

Environmental Assessment Practitioner for a rapid environmental screening assessment and compilation of an Environmental Management Plan for the new Sedibeng Water Regional Office in Hartswater.

SPRINGS FRESH PRODUCE MARKET EXPANSION PROJECT – SOUTH AFRICA (2016-2017)

Environmental Assessment Practitioner for an environmental authorisation for the expansion of the Springs Fresh Produce Market.

MORUPULE B UNITS 5 & 6 – BOTSWANA (2015-2016)

Specialist consultant for a JBIC and IFC compliant ESIA for a 300 MW thermal coal power plant.

EDF PROJECT TIZERT – MOROCCO (2015-2016)

Technical advisory services for an IFC-compliant ESIA for a copper mine and associated facilities in the Taroudant Province.

PUMPI COPPER AND COBALT PROJECT – DEMOCRATIC REPUBLIC OF CONGO (2014 – 2016)

Project Environmental Manager responsible for a comprehensive update of the Environmental Impact Study for an open-cast copper and cobalt mine, process plant and associated infrastructure.

HASSAÏ VMS PROJECT – SUDAN (2014 – 2015)

Lead consultant responsible for the legal register, review and gap analysis of environmental and social aspects for a gold mining and processing prefeasibility study at the Hassaï Mine.

THUSANANG HOUSING PROJECT – SOUTH AFRICA (2013)

Project Environmental Manager for the EIA and EMP for a 4000 unit residential 1 housing development for Anglo American Platinum, Rustenburg Local Municipality and the Department of Human Settlements.

MANGANESE PROJECT – BURKINA FASO AND CÔTE D'IVOIRE (2013)

Environmental coordinator for a prefeasibility study for a proposed mine, port and rail project for the export of Manganese from Burkina Faso to the Port of Abidjan.

MINERAL SANDS PROJECT – MOZAMBIQUE (2012)

Environmental programme manager responsible for establishing and coordinating all social and environmental studies for a pre-feasibility study for a large mineral sands project in Mozambique.

CONFIDENTIAL PROJECT – MOZAMBIQUE (2012)

Project Environmental Manager responsible for the preparation of environmental and social design criteria and high-level comparison of different rail alignment and port location options for a coal export project.

LANDAU LIFEX PROJECT - SOUTH AFRICA (2012)

Project Environmental Manager responsible for the compilation of non-mineral waste management plan and hazardous substances plan as part of a pre-feasibility study for Anglo American Thermal Coal.

CONFIDENTIAL PROJECT – SOUTH AFRICA (2011-2012)

Project Environmental Manager for a pre-feasibility study for the development of a new iron and steel plant in South Africa including all associated infrastructure. Inputs included a multi-criteria site selection analysis and coordination of all environmental and social assessment inputs to the study.

NATIONAL INTEGRATED RESOURCE PLAN – NAMIBIA (2011)

Environmental advisor responsible for the assessment and description of the environmental and social issues associated with primary and secondary generation options.

150 MW WIND FARM PROJECT – LESOTHO (2011)

Project Environmental Manager responsible for the management and coordination of all environmental studies and environmental approval processes required for a 150 MW wind farm development in the Lesotho Highlands.

TRANSNET CAPITAL EXPANSION PROGRAMME – SOUTH AFRICA (2008-2011)

Mobilised as a full-time Environmental Manager for the Richards Bay region for the HMG-Joint Venture. The latter was established as the EPCM agent for the Transnet Capital Projects operating division of Transnet Limited. The role involved management and coordination of numerous environmental studies throughout the project lifecycle process including an environmental resource economic study for the Port of Richards Bay, environmental authorisation processes and fatal flaw assessments.

NUCLEAR 1 PROJECT – SOUTH AFRICA (2008)

Senior Project Scientist for the EIA and EMP for the proposed construction of a conventional nuclear power station and associated infrastructure in the Western Cape.

PEBBLE-BED MODULAR REACTOR DEMONSTRATION POWER PLANT PROJECT – SOUTH AFRICA (2007-2008)

Project Manager and Senior Project Scientist for the Impact Assessment Phase of the EIA and EMP for the proposed Pebble Bed Modular Reactor Demonstration Power Plant in the Western Cape.

600 MW MORUPULE B POWER STATION PROJECT – BOTSWANA (2008)

Team Leader for the 600 MW Morupule B coal-fired power station in Botswana. Compilation of the ESIA in a manner that complied with Botswana legislation and World Bank Group requirements.

INGULA PUMPED STORAGE SCHEME – SOUTH AFRICA (2007)

Project Manager for seven mining permit applications for borrowpits in the Free State and KwaZulu-Natal Provinces for the Ingula (previously Braamhoek) Pumped Storage Scheme Project.

GABORONE WASTEWATER RECLAMATION PROJECT – BOTSWANA (2007)

Senior Project Scientist for the Gaborone Wastewater Reclamation EIA. This project was aimed at determining the feasibility of reclaiming wastewater for direct potable reuse in Gaborone and its satellite villages.

SELEBI-PHIKWE WATER MASTER PLAN – BOTSWANA (2006)

Senior Project Scientist for the EIA, EMP and Public Consultation Process for the Selebi-Phikwe Water Master Plan.

HYDRA-PERSEUS 765KV POWER LINE EIA – SOUTH AFRICA (2007)

Senior Project Scientist for the EIA for the 260 km 765 kV transmission power line from the Hydra to Perseus Substations.

ENVIRONMENTAL MANAGEMENT, COMPLIANCE MONITORING AND REGULATION

DINGLETON RESETTLEMENT PROJECT – SOUTH AFRICA (2014)

Project Environmental Control Officer responsible for compilation of an Environmental Execution Plan for the Feasibility Study and the setup and implementation of the environmental compliance monitoring requirements for the project implementation phase.

DEA COMPLIANCE MONITORING PROJECT - SOUTH AFRICA (2007)

Task Team Leader for the Department of Environmental Affairs (DEA) Compliance Monitoring Project. The project involved the development of guidelines, systems and programmes for the Compliance Monitoring Directorate of DEA including compilation of a guideline for Emergency Incident reporting in terms of section 30 of the National Environmental Management Act, 1998 (Act 107 of 1998) and a compliance monitoring protocol for environmental authorisations.

JOHANNESBURG CITY PARKS GENERIC EMP - SOUTH AFRICA (2006)

Project Manager and Senior Project Scientist for the Generic EMP for Johannesburg City Parks (JCP). The Generic EMP was developed as a tool for managing the activities of all contractors employed to undertake construction work in the Public Open Spaces within the jurisdiction of the JCP.

ENVIRONMENTAL AUDITS AND DUE DILIGENCE

CONFIDENTIAL PROJECT – SOUTH AFRICA (2018)

Technical due diligence of environmental risks, permitting and closure liabilities associated with two coal mine assets in South Africa.

CONFIDENTIAL PROJECT – SOUTH AFRICA (2017)

Technical due diligence of environmental risks and closure liabilities associated with several operating gold and coal mine assets in South Africa.

CHROME ASSET ACQUISITION – SOUTH AFRICA (2016)

Technical due diligence review of an existing chrome washing facility. The due diligence required identification of environmental and social risks, a review of all existing environmental licenses and consideration of rehabilitation and closure liabilities.

CONFIDENTIAL PROJECT – GUINEA (2012)

Environmental specialist responsible for advising on environmental risks associated with a potential project acquisition of an iron ore resource in West Africa.

SOLAR ENERGY FACILITY – SOUTH AFRICA (2012)

Environmental specialist for a lender's technical due diligence review against local regulations, International Finance Corporation performance standards and Equator Principles for a proposed 30 MW solar energy facility in the Western Cape Province.

WIND ENERGY FACILITY – SOUTH AFRICA (2012)

Environmental specialist for a technical due diligence review against local regulations, International Finance Corporation performance standards and Equator Principles for a proposed new wind energy facility in the Western Cape Province.

SUSTAINABILITY REPORTING

SASOL LIMITED SUSTAINABILITY ASSURANCE PROJECT – SOUTH AFRICA (2009)

Project Manager for the 2009 sustainability reporting assurance engagement for Sasol Limited. The engagement consisted of assuring sustainable performance data from health and safety, environmental and social indicators. Site audits were undertaken at numerous operational sites representative of Sasol's different business units.

**ANGLO AMERICAN PLC SUSTAINABILITY ASSURANCE
PROJECT – VARIOUS COUNTRIES (2009)**

Project Manager for the 2009 sustainability reporting assurance engagement for Anglo American plc. This assurance engagement comprised of site audits at representative operations within Anglo Platinum, Kumba Iron Ore, Scaw, Anglo Coal and Tarmac. The site audits were undertaken in South Africa, Brazil, Chile, Australia and the United Kingdom with twenty sustainability indicators in key performance areas of human capital, natural capital and social capital.

STRATEGIC ENVIRONMENTAL ASSESSMENTS

**SEA FOR THE PORT HARCOURT MASTERPLAN – NIGERIA
(2008)**

Project Manager and Senior Project Scientist for the Strategic Environmental Assessment of the Masterplan for the city of Port Harcourt. The Masterplan was to provide for the development of a new city, appropriately designed for the current and future population of the existing Port Harcourt.

**SEA FOR ELECTRICITY DISTRIBUTION INFRASTRUCTURE FOR
THE MAGALIESBERG AND SURROUNDING AREAS - SOUTH
AFRICA (2007)**

Project Manager and Senior Project Scientist for the Strategic Environmental Assessment of the Magaliesberg and Surrounding Areas for Eskom Distribution. The SEA considered the environmental attributes of the study area and provided an environmental planning framework specific to the needs of Eskom Distribution.

SEA FOR HERITAGE PARK - SOUTH AFRICA (2006)

Senior Project Scientist for the Strategic Environmental Assessment of the one million ha Heritage Park. This ecologically sensitive and socio-economically complex Park encompasses Pilansberg and Madikwe Nature Reserve and crosses the border between South Africa and Botswana.

ANNEXURE B: IMPACT RATINGS

SOCIO-ECONOMIC

Project Activity	Socio-Economic		Likelihood		Consequence			Significance Rating
	Phase of Project	All	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All activities involving employment and procurement of goods and services	Impact Classification	Positive - Direct and indirect	Significance Pre-Mitigation					
	Resulting Impact from Activity	Local employment	4	4	4	3	4	88
			Significance Post- Mitigation					
			4	5	5	3	4	108

Project Activity	Socio-Economic		Likelihood		Consequence			Significance Rating
	Phase of Project	All	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All activities involving employment and procurement of goods and services	Impact Classification	Positive - Direct and indirect	Significance Pre-Mitigation					
	Resulting Impact from Activity	Local economic development	3	4	4	3	4	77
			Significance Post- Mitigation					
			3	5	5	3	4	96

Project Activity	Socio-Economic		Likelihood		Consequence			Significance Rating
	Phase of Project	All	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All activities involving employment and procurement of goods and services	Impact Classification	Positive - Direct and indirect	Significance Pre-Mitigation					
	Resulting Impact from Activity	Training and development	5	4	3	3	5	99
			Significance Post- Mitigation					
			5	5	4	3	5	120

Project Activity	Socio-Economic		Likelihood		Consequence			Significance Rating
	Phase of Project	All	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All activities involving employment and procurement of goods and services	Impact Classification	Positive - Direct and indirect	Significance Pre-Mitigation					
	Resulting Impact from Activity	Community infrastructure development	3	4	3	3	4	70
			Significance Post- Mitigation					
			3	5	3	3	5	88

Project Activity	Socio-economic		Likelihood		Consequence			Significance Rating
	Phase of Project	All	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All activities involving employment and procurement of goods and services	Impact Classification	Negative - Direct and indirect	Significance Pre-Mitigation					
	Resulting Impact from Activity	Local inflation	3	5	3	3	2	64
			Significance Post- Mitigation					
			3	4	3	3	2	56

Project Activity	Socio-Economic		Likelihood		Consequence			Significance Rating
	Phase of Project	All	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All activities involving employment and procurement of goods and services	Impact Classification	Negative - Direct and indirect	Significance Pre-Mitigation					
	Resulting Impact from Activity	Influx of job seekers - demand on municipal services	3	5	3	3	3	72
			Significance Post- Mitigation					
			3	4	3	3	2	56

Project Activity	Socio-Economic		Likelihood		Consequence			Significance Rating
	Phase of Project	All	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All activities involving employment and procurement of goods and services	Impact Classification	Negative - Direct and indirect	Significance Pre-Mitigation					
	Resulting Impact from Activity	Influx of job seekers - disruption in community dynamics	3	5	4	3	3	80
			Significance Post- Mitigation					
			3	4	3	3	2	56

Project Activity	Socio-economic		Likelihood		Consequence			Significance Rating
	Phase of Project	All	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All mine-related activities	Impact Classification	Negative - Direct	Significance Pre-Mitigation					108
	Resulting Impact from Activity	Mine health and safety	4	5	5	3	4	72
			Significance Post- Mitigation					
			3	3	5	3	4	


Project Activity	Socio-Economic		Likelihood		Consequence			Significance Rating
	Phase of Project	All	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All mine-related activities	Impact Classification	Negative - Direct	Significance Pre-Mitigation					88
	Resulting Impact from Activity	Security risk	4	4	5	2	4	55
			Significance Post- Mitigation					
			2	3	5	2	4	

Project Activity	Socio-Economic		Likelihood		Consequence			Significance Rating
	Phase of Project	Construction and Operational	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All mine-related activities	Impact Classification	Positive - Direct and indirect	Significance Pre-Mitigation					70
	Resulting Impact from Activity	Contribution of royalties, rates and taxes	3	4	3	3	4	70
			Significance Post- Mitigation					
			3	4	3	3	4	

Project Activity	Socio-Economic		Likelihood		Consequence			Significance Rating
	Phase of Project	All	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All mine-related activities	Impact Classification	Negative - Direct and indirect	Significance Pre-Mitigation					108
	Resulting Impact from Activity	Community health and safety	4	5	5	3	4	48
			Significance Post- Mitigation					
			2	2	5	3	4	

Project Activity	Socio-Economic		Likelihood		Consequence			Significance Rating
	Phase of Project	Decommissioning and Closure	Frequency of Activity	Frequency of Impact	Severity	Spatial Scope	Duration	
All mine-related activities	Impact Classification	Negative - Direct and indirect	Significance Pre-Mitigation					78
	Resulting Impact from Activity	Mine closure and associated effects on the local economy	1	5	5	3	5	66
			Significance Post- Mitigation					
			1	5	3	3	5	



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