



HAIB COPPER PROJECT

VIEWSHED IMPACT ASSESSMENT

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ABBREVIATIONS

B1	National B1 Highway
DTM.....	Digital Terrain Model
ECC.....	Environmental Clearance Certificate
EIA.....	Environmental Impact Assessment
EMP.....	Environmental Management Plan
EPL.....	Exclusive Prospecting License
GIS	Geographic Information Systems
ha	Hectares
HLP	Heap Leach Pad
km.....	Kilometres
KP.....	Knight Piésold (Pty) Ltd
mamsl.....	Metres Above Mean Sea Level
Mtpa	Million Tonnes per Annum
MWp	Megawatt Peak
PV.....	Photovoltaic
Project	Haib Copper Project
SWAD.....	Storm Water Attenuation Dam
TSF.....	Tailings storage facility
VIA.....	Viewshed Impact Assessment
WRD	Waste Rock Dump

1.0 INTRODUCTION

1.1 Project Background

Haib is a porphyry copper exploration Project located in the //Karas Region of southern Namibia, approximately six kilometres (km) north of the border with South Africa and between 12 km and 15 km east of the tarred B1 Highway that connects Namibia with South Africa.

Koryx Copper Inc. has a 100% interest in Haib Holdings (Pty) Ltd (formerly Deep South Mining Company (Pty) Ltd.), a Namibian subsidiary which holds the exploration rights to the Haib Project (the Project). Exclusive Prospecting Licence (EPL) 3140 allows for the exploration of base, rare and precious metals over an area of 36,571 hectares (ha).

Towards advancing the copper mining activities at Haib, a comprehensive Environmental Impact Assessment (EIA) with an associated Environmental Management Plan (EMP) and public consultations are currently being undertaken and developed to meet both Namibian national requirements for the Project. The EIA is being prepared to obtain an Environmental Clearance Certificate (ECC) for the Project from Namibian authorities.

The proposed Project comprises an open pit mine, crushing, milling and flotation concentrator, optional heap leaching, as well as infrastructure on and off site necessary to support these operations (waste rock dumps, stockpiles, tailings storage facilities, pipelines and abstraction works, power infrastructure, roads, offices etc.). The operation will achieve a combined throughput of 40 Mtpa. The mining schedule indicates a total material movement of approximately 87.5 Mtpa, providing approximately 33 years supply of mineralised material.

The proposed Project is currently in the exploration and studies phase, whereby the feasibility of the Project is being defined through ongoing investigations and analysis.

This report represents a viewshed analysis required as input to the environmental impact assessment process. The report is a revised version that reflects the updated conceptual mine layout. The impact assessment and findings presented herein have been updated to incorporate the changes associated with the revised conceptual layout.

1.2 Project Location

The Haib Copper Project (EPL 3140) covers an area of approximately 36 571 ha and is located in the south of Namibia, approximately 9 km (from the south-western boundary) from Noordoewer (Figure 1-1). The B1 Road forms the north-western boundary of the EPL. The Orange River runs immediately to the south of the EPL, and a number of farms surround the EPL. The biggest portion of EPL 3140 lies on state land. The eastern part of the EPL is located on Farm Tsams and the Farm Withoek is located within and on the north-eastern boundary of the EPL.

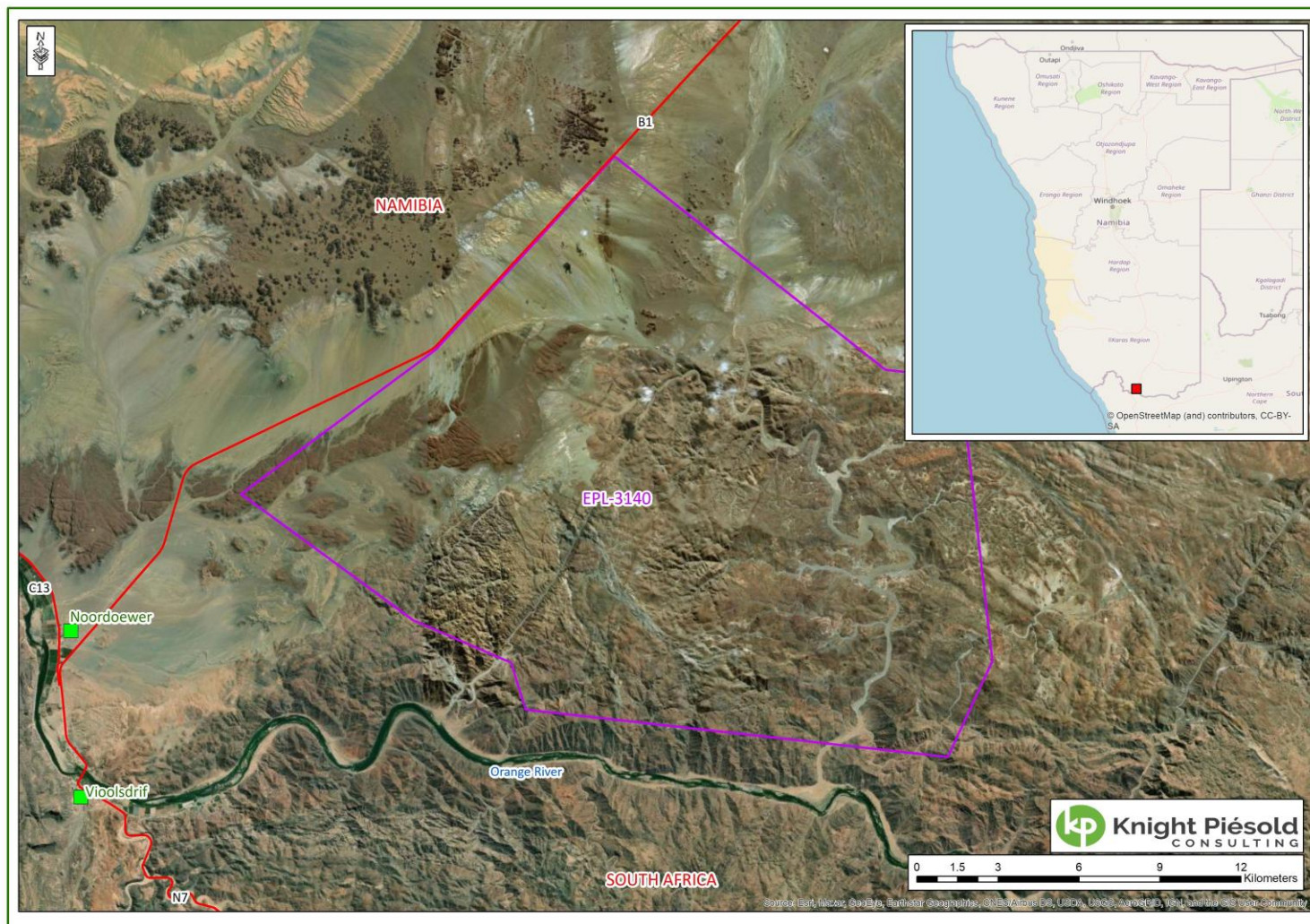


Figure 1-1: Location of EPL 3140

1.3 Project Description

The Haib deposit lies at elevations from a floor elevation of just under 375 meters above mean sea level (mamsl) to over 600 mamsl. The surrounding area is up to about 650 mamsl at the highest point. The area is rugged with steep-sided valleys and rugged local relief. Flatter topography is present in the west and north-west portions of the EPL footprint, but these areas are far away from the Haib deposit.

The site layout has been designed around critical landform features such as topography, sensitive biodiversity areas, and heritage features. The optimisation has additionally considered the efficiencies required for the mining operation. The proposed site layout is provided in Figure 1-2.

The mine development is at an advanced conceptual phase, the key components and potential options include the following:

1. A single large open pit
2. A concentrator processing plant
3. An optional heap leach, solvent extraction and electrowinning plant
4. A tailings storage facility (TSF)
5. Waste Rock Dumps (WRDs)
6. A solar photovoltaic (PV) plant (150 MWp)
7. Off-channel water storage
8. Water abstraction works on the Orange River, pipeline and associated infrastructure
9. Ancillary infrastructure (access roads, transmission lines, offices, etc.)

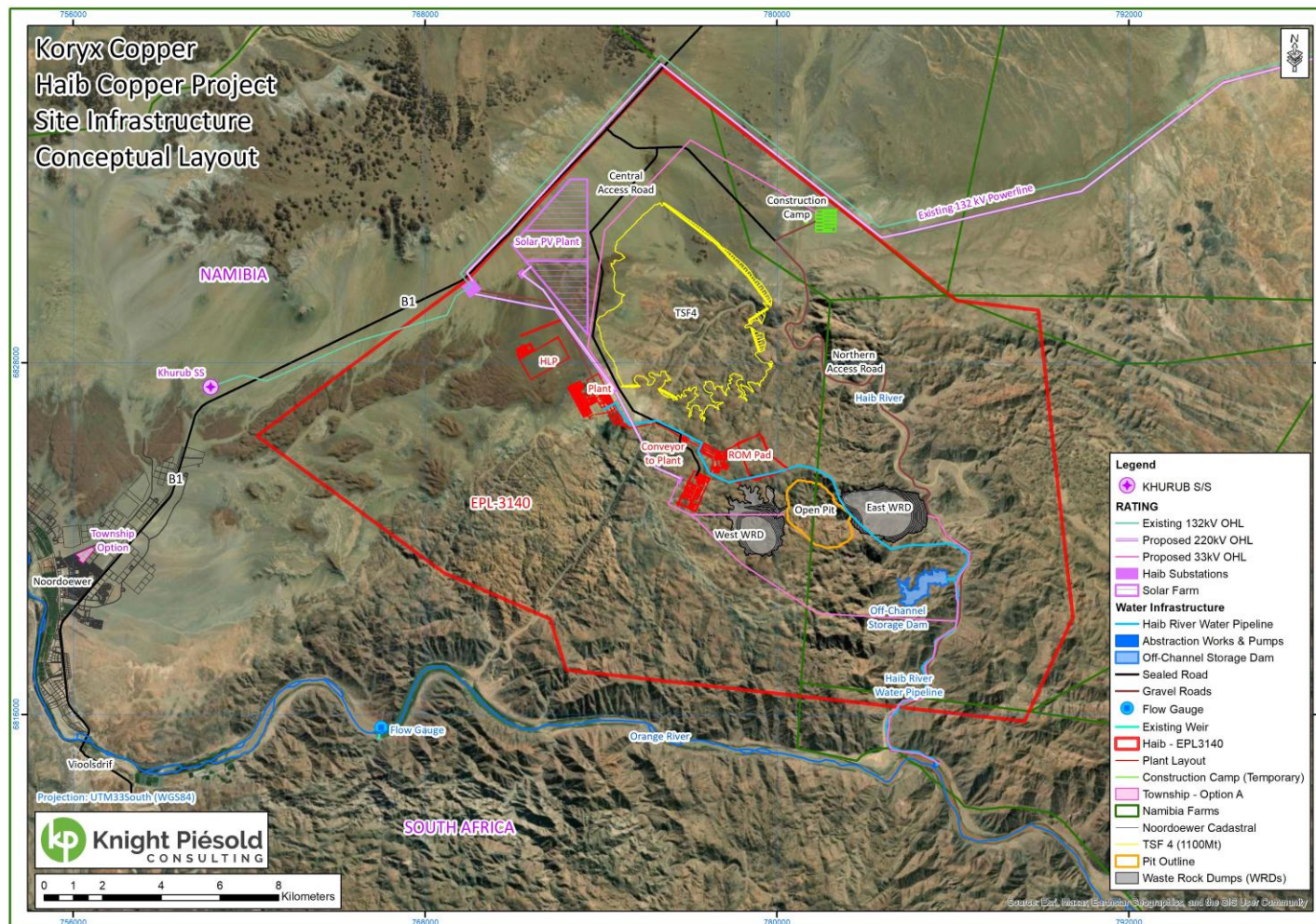


Figure 1-2: Haib Copper Site Layout

1.4 Receiving Environment

The Project is situated in a sparsely populated and semi-arid region in the south of Namibia. There is very little vegetation and only a single farmstead in this area and consequently limited visual receptors. Apart from the tourism activities associated with the Orange River, no other tourist sites are known in the immediate vicinity of the proposed Mine.

The rugged topography associated with the area further inhibits site visibility around the proposed Haib Copper Project and limits potential viewpoints of the proposed mining activities. Some of the proposed mining and processing facilities will be visible to travellers along the B1 Highway, but this will exclude the bulk of the extraction and processing activities (including the mine pit and the processing plant). There will also likely be limited visibility from the Orange River as most of the site infrastructure will be hidden from view behind higher ground to the north of the river.

Project construction and operational processes may lead to excessive dust, and the waste rock dumps and tailings storage facilities will alter the landscape in perpetuity.

The closest town is Noordoewer, situated 20km from the site on the banks of the Orange River. The residents of the properties in Noordoewer will likely not be able to see the waste rock dumps or tailing storage facilities from their properties. The sense of place will likely not be altered for these residents.

2.0 METHODOLOGY

2.1 Viewshed Impact Assessment Methodology

The desktop viewshed impact assessment (VIA) was undertaken using Geographic Information Systems (GIS) software to generate a viewshed analysis. The analysis was performed using ESRI ArcGIS 10.8.2. Base data included using the latest Google Earth imagery (October 2023) of the project area.

Additional data sources were:

- NGI 5 m contours (circa 2014)
- Drawings depicting Tailings Storage Facilities (TSF) and Waste Rock Dumps (WRD) modelled designs.

Using ArcGIS 10.8.2, the contour data was used to generate a detailed 10 m Digital Terrain Model (DTM). This model formed the basis for the viewshed analyses and was merged with each of the modelled WRD and TSF facilities to create the Viewshed input DTM.

The viewshed analysis focused on two main corridors associated with potential visual receptors areas:

- The B1 Highway and
- The Orange River.

A viewshed analysis was performed for the two WRD sites and the three TSF sites. The results of these analyses were then buffered and colour-coded to provide a visual representation of visibility.

2.2 Visual Exposure

The main purpose of a VIA is to determine the visual exposure or visibility of a certain activity. In this instance the activity being investigated are the proposed WRD and TSF facilities associated with the Haib Copper Project. Other visual intrusions were considered based on applying a viewshed from potential viewpoints (i.e. the Orange River or the B1 Highway).

Visibility was determined using a viewshed analyses for each site. Each of the viewshed analyses were undertaken using the DTM with all facilities modelled into the existing topography. The receptor height within the surrounding areas was set at 1.8 m above ground level, representative of a person standing upright. Topography alone determined the exposure of each feature, with no consideration given to intervening vegetation.

2.3 Visual Distance

The Visual Distance of the activity investigated is determined by the distance between the activity and the potential observer. The principle of reduced impact over distance implies that long distance observers will be impacted less, than those near the new facilities.

For this reason, proximity buffers (radii) for each facility were used to indicate the viewing distance of the facility and to determine the prominence of the structures in relation to its environment.

The following proximity buffers were used:

- Less than 500 m – Short distance, high visual prominence.
- 500 - 1 000 m – Medium visual prominence

- 1 000 - 2 000 m – Low visual prominence
- 2 000 - 5 000 m – Low to negligible visual prominence.

2.4 Visual Perception

The number of observers and their perception of an activity or structure play an important role in determining the visual impact. A lack of observers or a positive visual perception of the structure will dramatically reduce the visual impact.

Viewer perception was not considered in this assessment, while areas of high viewer incidence (many observers) will be restricted to travellers along the B1 Highway. The B1 Highway forms the north-western boundary of the lease area.

3.0 VISUAL FEATURES

The subsections below list the major visual features under consideration for this assessment. Viewpoints on the B1 Highway and Orange River corridors were identified and the visibility of key infrastructure assessed. Given the extreme topography and large area many features, such as the pit, plant facilities or low-level facilities such as ablutions, operational offices etc. are not considered to present significant visual / viewscape impacts as these will be out of view of the general public from the corridors.

3.1 B1 Highway Corridor

The B1 Highway runs parallel to the north-western boundary of EPL3140. The proposed TSF4 option, the heap leach pad (HLP) and the proposed solar farm are situated east of the road. The Haib TSF4 option is just over 2km east of the B1 Highway but will reach a height of 55m. The TSF facility is visible to observers travelling along the B1 Highway. The proposed Solar Farm is within 500 m of the B1 and is the only facility inside the high visibility zone. Additional features which will have reduced visibility but are likely to be visible include the WRD West, Process facilities and Crusher Plant. There are no settlements or homesteads along the B1 Highway associated with the EPL (refer to Figure 3-1).

A summary of visibility of proposed infrastructure from the B1 Highway is provided:

- High visibility (<500m)
 - o Solar Plant
- Low visibility (2-5km)
 - o TSF 4
 - o HLP
- Limited visibility - potentially beyond visible range (may vary with conditions)
 - o WRD West, Process facilities and Crusher Plant

3.2 Orange River Corridor

The visual receptors along the Orange River Corridor are restricted to occasional rafting parties and other tourists. The river is in a well-defined valley and the high topography along the northern boundary makes it impossible for visual receptors to see the major infrastructure associated with the Haib Copper Project. According to contour data, the abstraction infrastructure associated water supply would be visible along the river (refer to Figure 3-2).

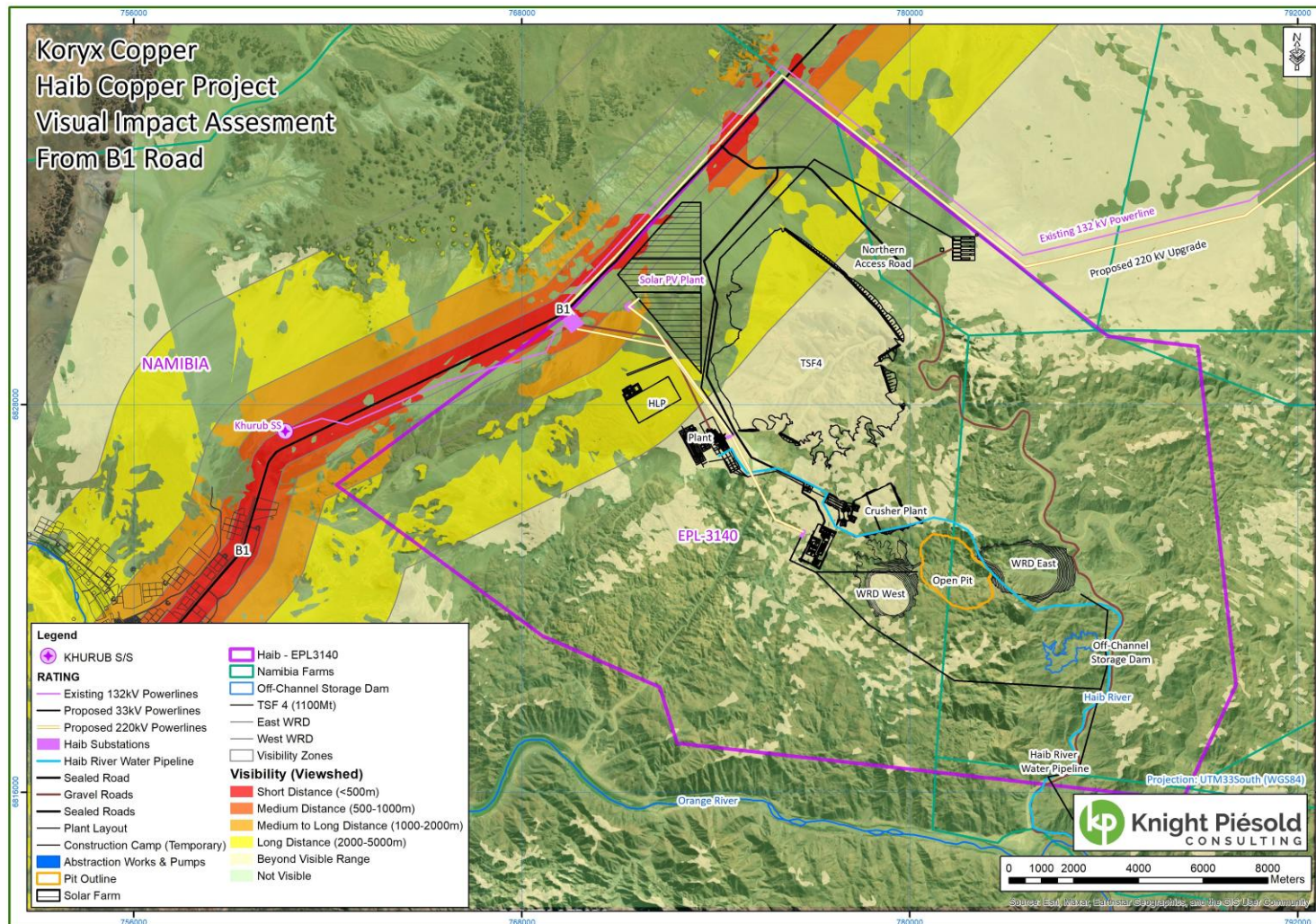


Figure 3-1: B1 Highway Corridor – Visibility

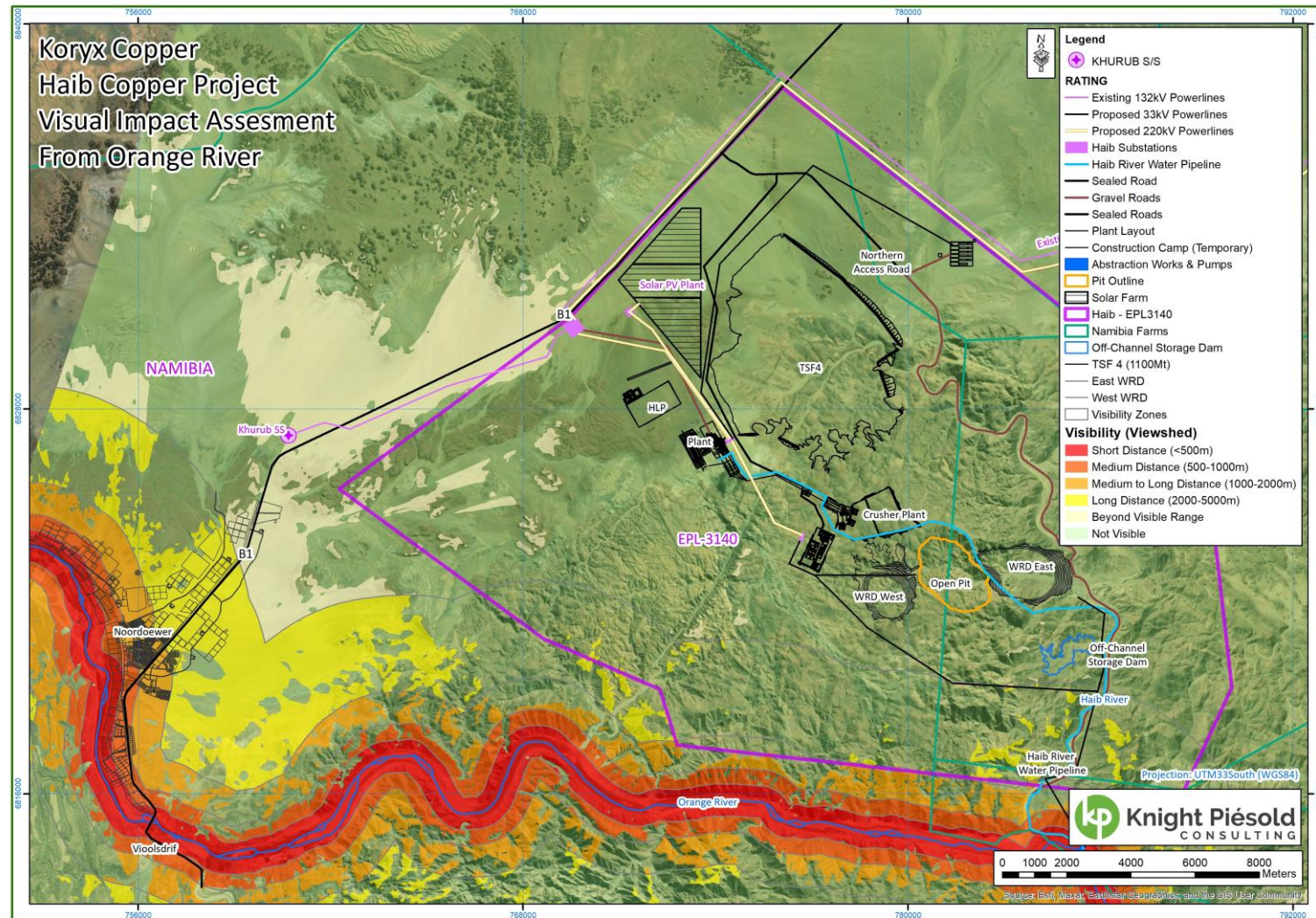


Figure 3-2: Orange River Corridor - Visibility

4.0 IMPACT ASSESSMENT

4.1 Impact Rating

For the VIA, the impact relates to the presence of visual intrusions and the associated impact on the visual character of the receiving receptors. From the outset it must be noted that the area surrounding the proposed Haib Copper Project is in sparsely populated area. This, coupled with the rugged topography suggest that visual impacts will be less pronounced.

The proposed development will result in a notable alteration of visual character from the B1 National Highway due to the scale and permanence of the mining landforms. There will also be changes to views from the Orange River corridor, however this will be more localised and limited to the abstraction infrastructure.

The proposed development will result in a notable alteration of visual character from the B1 National Highway due to the scale and permanence of TSF 4, HLP and the Solar PV Plant, which will have low to high visibility, while the WRD West, Processing facility and Crusher Plant will have comparatively low visibility as a result of topography and partial natural screening. The B1 is a major regional transport corridor and represents a high-sensitivity visual receptor due to the regular presence of commuters, tourists and commercial traffic. Collectively, the development footprint will create prominent industrial features within a predominantly natural and rural setting. This will result in changes to landscape form, increased colour and texture contrast, and an overall perception of intensified industrialisation along the corridor.

In contrast, the Orange River corridor is valued for its scenic, agricultural and recreational character, but the scale of proposed infrastructure within this area is significantly smaller. Sensitive receptors include river users (tourism and recreation), adjacent landowners, agricultural operations and visitors utilising the river corridor. The abstraction works will be visible from sections of the river, however, the scale of the infrastructure is relatively limited compared to the proposed large mining landforms and abstraction works along these agricultural regions are not uncommon.

Construction Phase

During the construction phase, visual disturbance will result from earthworks associated with the shaping of TSF 4, HLP, Solar PV Plant, Processing facilities, Crusher Plant and WRD West, as well as from the installation of abstraction works, pipelines, pumps and storage infrastructure along the Orange River. Construction activities will involve heavy machinery, vehicle movement, temporary laydown areas, exposed soils and potential dust generation. These activities will temporarily increase visual intrusion within the landscape.

- **View from the B1 National Highway (Mining Infrastructure):** From the B1 National Highway, the progressive shaping of TSF 4 and the HLP in particular may become noticeable as the landform increases in height. The mobilisation of equipment to the project site to establish process facilities and other infrastructure may also result in visual disturbance. However, construction activities are temporary in duration and will reduce as areas are stabilised. The significance of the visual impact during construction from the B1 is rated as **LOW** before and after mitigation, reflecting the short-term nature of the disturbance and the fact that permanent landform shaping is not yet complete. The impact magnitude is considered to have increased due to the enlarged footprint of TSF4 and the closer proximity of the HLP to the B1 highway. Although the significance rating during the construction phase remains low, the visual impact experienced by road users is expected to be greater as a result of the increased visibility of these project components.

- **View from the Orange River (Water Abstraction, Supply and Storage Infrastructure):** Within the Orange River corridor, construction of the abstraction infrastructure will be localised and limited in spatial extent. Although construction equipment and minor vegetation clearing may be visible from certain viewpoints along the river, the scale of disturbance will remain small relative to the broader landscape. The construction phase impact from the river is therefore also rated as **LOW** both before and after mitigation.

Operational Phase

View from the B1 National Highway (Mining Infrastructure): From the B1 highway, TSF 4 will constitute a prominent and permanent engineered landform within the landscape. Its scale and elevation will result in high visibility from sections of the highway, and it will alter the natural skyline and overall landscape character which will gradually increase through operation phase. The Solar PV Plant is directly adjacent to the B1 highway and will be highly visible. Based on the updated layout, the HLP is in closer proximity to the B1 highway (<5km) however is assessed as low visibility to observers. Although the WRD West, processing and crushing facilities will have lower individual visibility due to topography and partial screening, they will contribute cumulatively to the perception of an expanded mining footprint. Due to the scale, permanence and the high sensitivity of road users, the operational visual impact from the B1 is assessed as **HIGH** before mitigation and remains **HIGH** after mitigation. While mitigation measures such as shaping, profiling and surface treatment may reduce visual contrast, they cannot fully screen or visually integrate infrastructure of this magnitude.

View from the Orange River (Water Abstraction, Supply and Storage Infrastructure): In contrast, the operational visual impact from the Orange River corridor will be substantially lower. The abstraction infrastructure, including pumps and pipelines, will introduce permanent built elements into the riverine setting, however, these structures are limited in vertical scale and spatial footprint. Visibility will be localised to certain viewpoints, and existing riparian vegetation may provide partial screening. No major alteration of landform will occur within the river corridor. As a result, the operational visual impact from the Orange River is rated as **LOW** before mitigation and remains **LOW** after mitigation.

Decommissioning Phase

- **View from the B1 National Highway (Mining Infrastructure):** Decommissioning will focus on stabilisation and rehabilitation of TSF 4, HLP, and the WRDs. This will involve flattening the slopes of the TSFs and covering the facility with topsoil and vegetation. Nevertheless, the landform alterations will remain permanent features within the landscape. The decommissioning phase visual impact from the B1 is therefore rated as **MODERATE** before mitigation and **MODERATE** after mitigation, reflecting improvement through rehabilitation but acknowledging residual, long-term visual alteration.
- **View from the Orange River (Water Abstraction, Supply and Storage Infrastructure):** For the abstraction infrastructure within the Orange River corridor, decommissioning will involve dismantling or removal of infrastructure and rehabilitation of disturbed areas. Following removal and reinstatement, the affected areas have a high potential to return to a condition similar to the pre-project visual character. The decommissioning phase impact from the river is rated as **LOW** both before and after mitigation, reflecting the limited scale of infrastructure and the reversibility of the disturbance.

Table 1: Summary of significance rating

Project activity or issue	Potential impact	Phase	Nature of impact		Significance before mitigation							Significance after mitigation as per EMP						
			+ / -	D/I/C	M	R	D	S	P	TOTAL	SP	M	R	D	S	P	TOTAL	SP
Construction, operation and decommissioning of mining infrastructure	Visual disturbance and alteration of visual character from sensitive receptors from the B1 National Highway (HLP, TSF 4 and the Solar plant will have low to high visibility, while the WRD West, processing and crushing facilities will have low visibility)	Construction	-	D	3	3	1	2	3	27	L	2	3	1	2	2	16	L
		Operation	-	D	5	3	4	2	5	70	H	5	3	5	2	4	60	H
		Decommissioning	-	D	4	3	5	2	4	56	M	3	3	5	2	3	39	M
Construction, operation and decommissioning of water abstraction, supply and storage infrastructure	Visual disturbance and alteration of visual character from sensitive receptors from the Orange River (Abstraction works will be visible from the Orange River)	Construction	-	D	2	3	2	5	2	24	L	2	3	2	5	2	24	L
		Operation	-	D	2	3	4	5	2	28	L	2	3	4	5	2	28	L
		Decommissioning	-	D	2	1	2	5	2	20	L	2	1	2	5	2	20	L

4.2 Mitigation Measures

The existing visual landscape surrounding the Haib Copper Project is sparsely populated and largely pristine. The proposed WRDs and TSFs will negatively impact the visual character, but there remain mitigation measures which can be implemented to lessen this impact. These include:

- Restricting the activity footprints during the construction phase
- Use of downward facing artificial lighting to reduce excessive light generation
- Associated services and infrastructure should be placed in such a way as to minimise their visual impact
- Good housekeeping around these facilities
- Undertake progressive reshaping of WRD and TSF slopes and buttresses to obtain final land feature forms that are congruent with the landscape and final land use
- Concurrent rehabilitation of embankments during the operational phase
- Closure rehabilitation once the facilities reach end of life.

5.0 CONCLUSION

A viewshed analysis was performed for two corridors impacted by the project namely the B1 Highway and the Orange River. The results of these analyses were then buffered and colour-coded to provide a visual representation of visibility.

Visibility was determined using a viewshed analyses for each site. Each of the viewshed analyses were undertaken using the DTM WRDs and TSFs modelled into the existing topography.

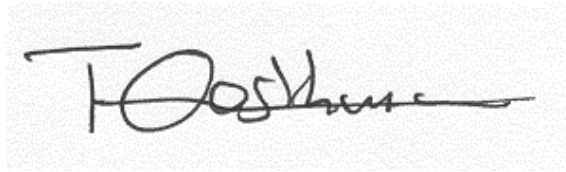
The majority of proposed facilities associated with the Haib Copper Project are largely beyond the visual perception of visual receptors travelling along the B1 Highway corridor and the Orange River corridor. The features highly visible from the B1 Highway will be the Solar Farm, HLP and the Haib TSF4 facility. Low visibility includes the WRD West, the processing and crusher facilities. The water abstraction infrastructure will be visible from the Orange River not unusual infrastructure for the area.

Consequently, the visual impact is likely not as prohibitive in this rugged terrain and is aided by the fact that most of the large infrastructure footprint are far away from visual receptor and placed at lower elevation where line of sight makes them impossible to see. For this reason, it is expected that the advantage associated with economic activity associated with mining activities will likely soften negative perceptions towards the infrastructure. This perception, together with the mitigations of visual impacts listed above will mean that the anticipated visual impacts of the Solar Plant, HLP and TSF 4 will be an acceptable addition to the visual landscape. An important note is that the viewshed analysis looked at static landforms in the landscape only and dust generated from TSF 4 has been modelled which will increase or amplify visual perception from the B1 highway and require mitigation measures discussed in the project ESIA.

6.0 CERTIFICATION

This report was prepared and reviewed by the undersigned.

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