Visual Impact Assessment

Application for Environmental Authorisation, Waste Management Licence and Water Use Licence

Prieska Zinc Copper Project, Copperton, Northern Cape

May 2018

ABS Africa
Sustainability Advisors

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LIST OF ACRONYMS AND ABBREVIATIONS

m	Metre
mamsl	Metres above mean sea level
PCM	Prieska Copper Mine
PCML	Prieska Copper Mine Limited
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
WRD	Waste Rock Dump
TSF	Tailings Storage Facility

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.

ABS Africa
Sustainability Advisors

Date: May 2018

VISUAL IMPACT ASSESSMENT
PRIESKA ZINC COPPER PROJECT, COPPERTON, NORTHERN CAPE

1 INTRODUCTION

Prieska Copper Mine (PCM) is an existing, closed 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.

Repli Trading No. 27 Pty Ltd (hereafter referred to as "the Applicant") is seeking to establish mining operations centred at the PCM, whereby the remaining copper and zinc-rich Copperton Deposit is mined by surface and underground mining techniques.

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

- Portions 1, 25 and 26 of the Farm Vogelstruisbult 104; and
- Portion 0 of the Farm Slimes Dam 154.

This Visual Impact Assessment (VIA) has been undertaken as part of the Scoping and Environmental Impact Reporting (S&EIR) process in support of the Mining Right Application (MRA), Environmental Authorisation (EA), Waste Management Licence (WML), and Water Use Licence (WUL) required for the proposed mining and associated activities.

The VIA facilitates an understanding of the receiving environment (providing a baseline description) and the identified impacts to the visual environment which may be associated with the proposed project implementation. The study comprises of a qualitative 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 VIA was as follows:

- A description of the existing visual characteristics of the surrounding environment where development is to take place;
- A determination of the extent to which the proposed development will be visible during the final year before closure;
- A determination of any potential visual impacts; and
- A recommendation of possible mitigation measures

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2.2 APPROACH

The approach included the steps below:

- Examine the current visual exposure based on the historic mining activities and determine if proposed mining infrastructure will increase current visual exposure.
- To evaluate the potential impacts of the proposed activity, the inherent scenic value of the landscape first needs to be determined. Data collected during a site visit allowed for a comprehensive description and evaluation of the receiving environment.
- The physical characteristics of the project components were determined, described and illustrated;
- Determine the setting, visual character and the sense of place of the area surrounding the proposed mining area. Define the extent of the affected visual environmental, the viewing distance and the critical views/visual receptors that may be affected by the proposed project;
- Determine the Visual Absorption Capacity (ability of the landscape to accommodate the proposed project from a visual perspective); and
- Complete an assessment of the potential impacts in order to determine the significance thereof.

2.3 ASSUMPTIONS AND LIMITATIONS

- The major limitation of this study is the inherent subjectivity relating to the assessment of the visual impact. Findings are also limited, based on the available information, as well as the quality of spatial data;
- The use of two different elevation datasets namely 50 cm contours derived from a WorldView-3 4-Band satellite survey which covers the majority of the mining activity and immediate surrounds and 20 m contours from the surveyor general that covers the remainder of the study area creates a sharp contrast. As the visual analysis relies heavily on topography, the areas where surveyor general data was used will be less accurate then the WorldView contours;
- 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 Repli 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; and
- The assessment has been based on the project description provided by the Applicant. Changes to this project description may influence the assessment and the proposed mitigation measures.

2.4 LEGISLATION AND GUIDELINES

There are no specific legal requirements in the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) or the Mineral and Petroleum Resources Development Act, 2002 (Act No 28 of 2002) (MPRDA) that specifically regulate activities that may infringe on the visual attributes of a region.

The National Heritage Resources Act, 1999 (Act No. 25 of 1999) provides legislative protection for listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes and requires that these areas are protected against physical and aesthetic change.

Visual pollution is controlled, to a limited extent, by the Advertising on Roads and Ribbons Act (Act No. 21 of 1940), which deals mainly with signage on public roads.

The 'Guideline for involving visual & aesthetic specialists in EIA processes', by Oberholzer (2005) has been developed to provide guidelines and general good practices for the specialist visual input into the EIA process in

South Africa. These guidelines are used extensively and will be used as a guide for this assessment (refer to **APPENDIX A**)

Legislation pertaining to this specific project includes the Astronomy Geographic Advantage Act which governs activities within specifically declared areas in relation to the Square Kilometre Array (SKA) project. Certain aspects of this Act could potentially impact on the proposed activities of the Prieska Zinc Copper Project and the visual implication, particularly regarding light (refer to APPENDIX B)

2.5 INFORMATION AND DATA SOURCES

- 50cm contours derived from a WorldView-3 4-Band satellite survey completed on the 14th of April 2015
- Additional 1m contours from the mine surveyor that extends eastward beyond the satellite survey.
- Regional 20m contours from the 1:50000 vector data supplied by the Chief Surveyor General.

3 EXPERTISE OF THE SPECIALIST

Leroy du Plessis completed his BSc Honours in Geographic Information Systems (GIS) at the University of Free State in 2008. He has 9 years' experience in the field of geomatics and visual assessments. His project experience includes the management and compilation of large spatial datasets in order to facilitate the production of thematic maps and spatial analysis.

TABLE 1: SPECIALIST DETAILS

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4 DECLARATION OF INDEPENDENCE

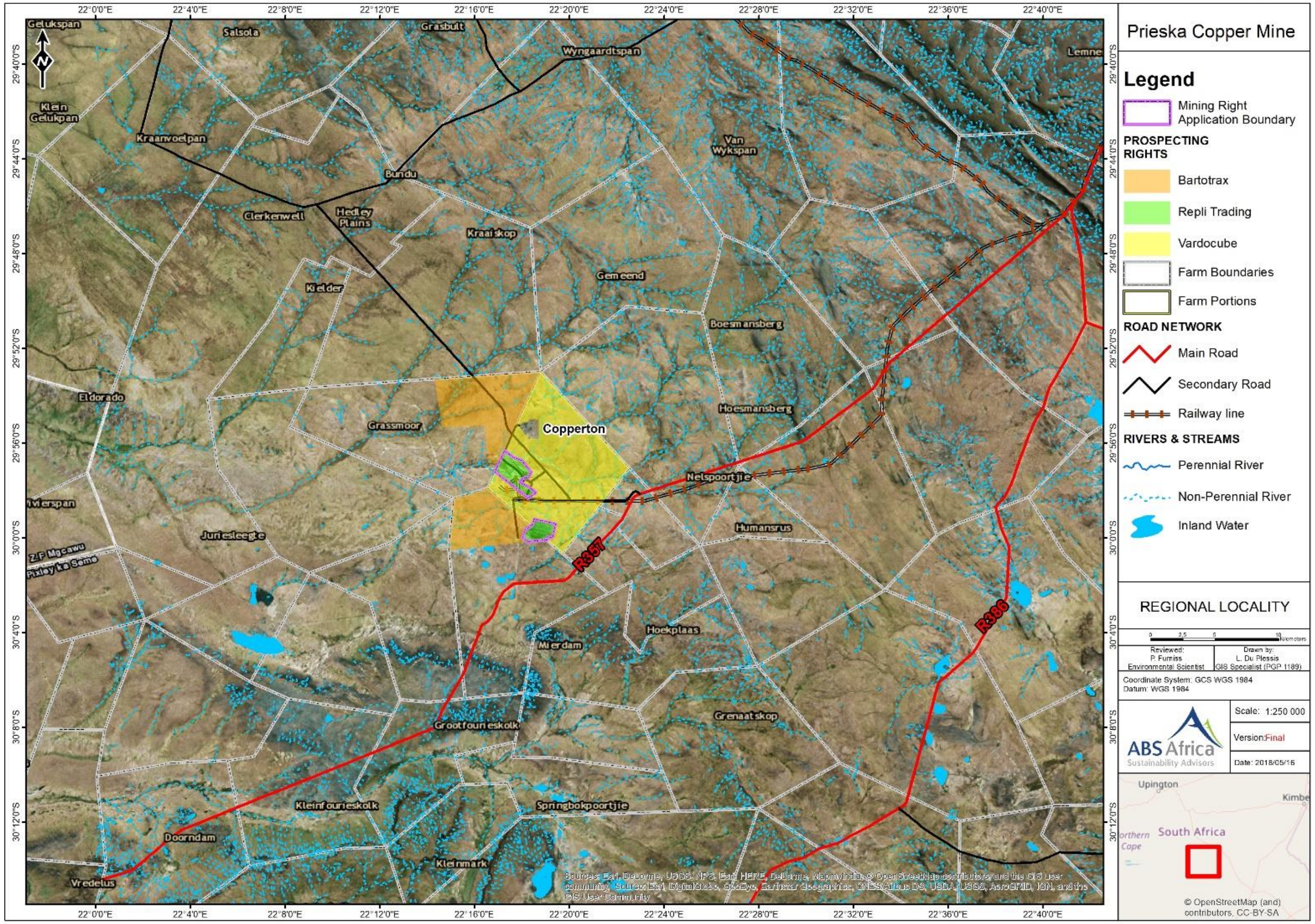
ABS Africa is an independent consulting firm with no interest in the project other than to fulfil the contract between the client and the consultant for delivery of professional environmental services as stipulated in the terms of reference.

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 (Map 1). 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.



MAP 1: REGIONAL LOCALITY

5.2 PROJECT FEATURES

Physical dimensions of the proposed mining infrastructure are of particular relevance to the VIA. The height of the infrastructure has a direct impact on its resulting visual exposure. Secondary to height the size of the overall footprint can further add to the total visual disturbance. Details of existing and proposed mine infrastructure, used in the VIA, are provided Table 2 and Table 3.

TABLE 2: EXISTING INFRASTRUCTURE

Infrastructure	Area (HA)	Height (m)
Waste Rock Dump (WRD)	7.97	20
Hutchings Shaft	0.02	55
Historical Ore Stockpile Bunker	0.08	15
Tailings Storage Facility (TSF)	126.03	25

TABLE 3: PROPOSED INFRASTRUCTURE

Infrastructure	Area (HA)	Height (m)
Waste Rock Dump (WRD)	43.98	40
Topsoil Stockpile	20.46	5
Plant and Related Infrastructure	14.64	10
Tailings Storage Facility	107.09	15

FIGURE 1: HUTCHINGS SHAFT

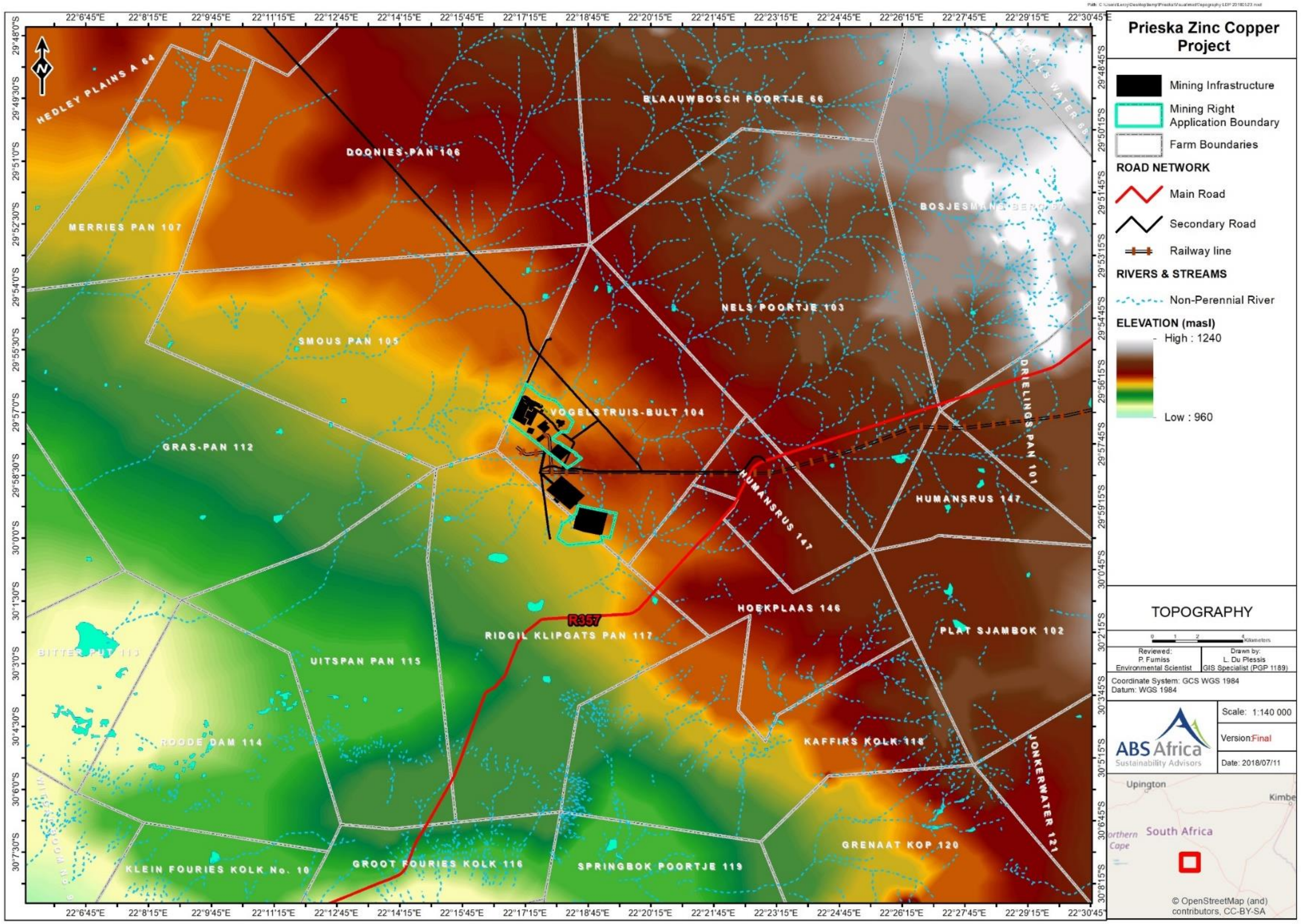
FIGURE 2: VIEW OF HISTORICAL ORE STOCKPILE BUNKER, CONCENTRATE THICKENERS AND CONCENTRATE DRYING BEDS FROM HUTCHINGS SHAFT

6 DESCRIPTION OF RECEIVING VISUAL ENVIRONMENT

6.1 TOPOGRAPHY

The surrounding topography is categorized by gentle slopes ranging from 1150 mamsl, in the north eastern extent of the 'zone of visual influence', (see section 7.2) to 1008 mamsl, in the south western extent. There are very few distinct topographical features in the surrounding project area, other than the existing mining infrastructure. The natural terrain, therefore offers very little form of topographic / terrain screening potential.

The average gradient is less than 1:100 (1%) and slopes down in a westerly direction across the extent of the zone of influence. (Refer to Map 2).



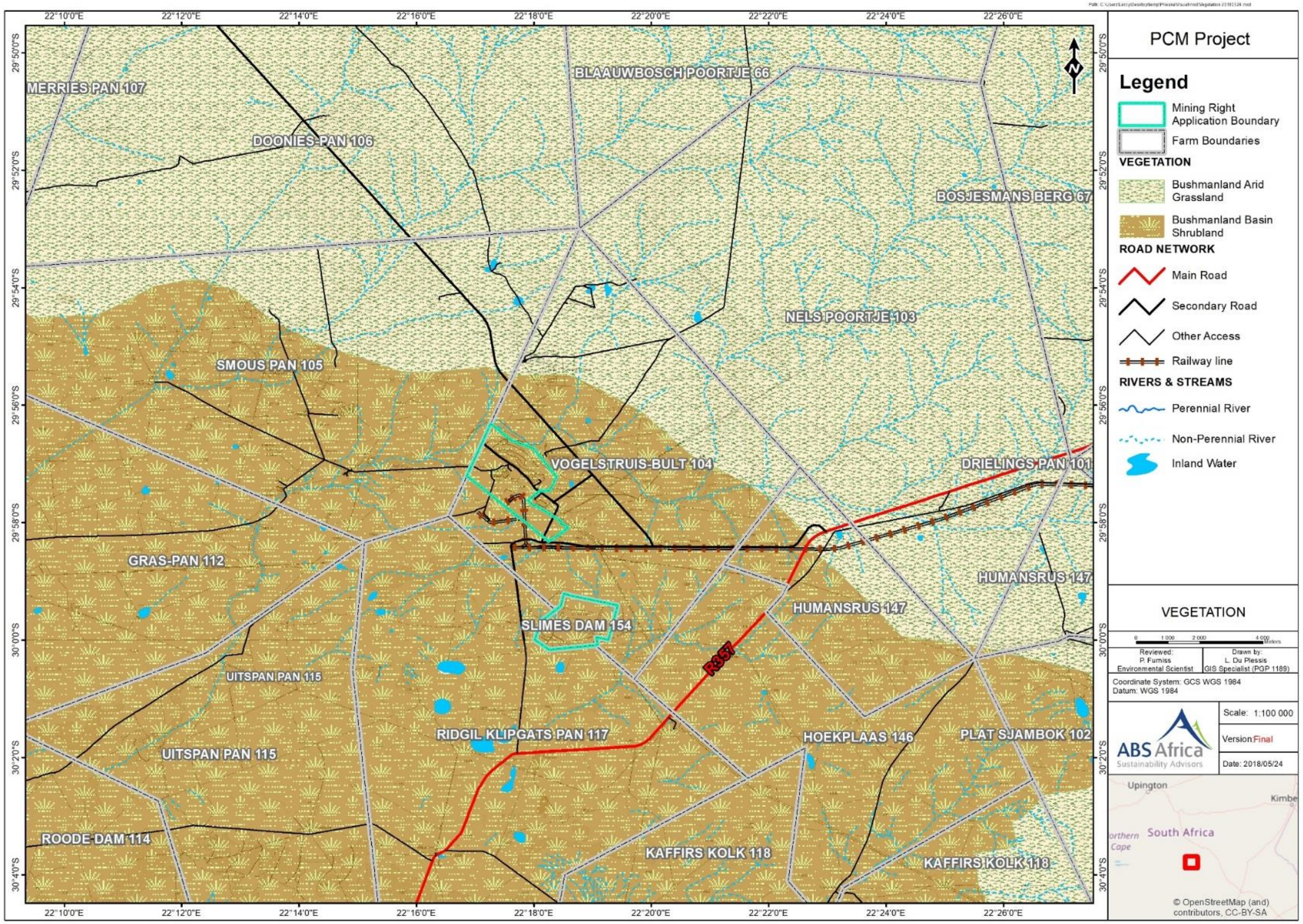
MAP 2: TOPOGRAPHY

6.2 VEGETATION

The study area is split amongst two vegetation types namely the Bushmanland Arid Grasslands and Bushmanland Basin Shrublands which forms part of the Karoo biome (refer to Map 3**)**. There is very little interference in the form of anthropogenic activities, with a few larger trees in the Copperton residential area. The vegetation offers little to no visual screening. (Refer to Figure 3 and Figure 4).

FIGURE 3: TYPICAL VEGETATION VISUAL SCREENING

FIGURE 4: PARTIAL VEGETATION SCREENING OF MINE



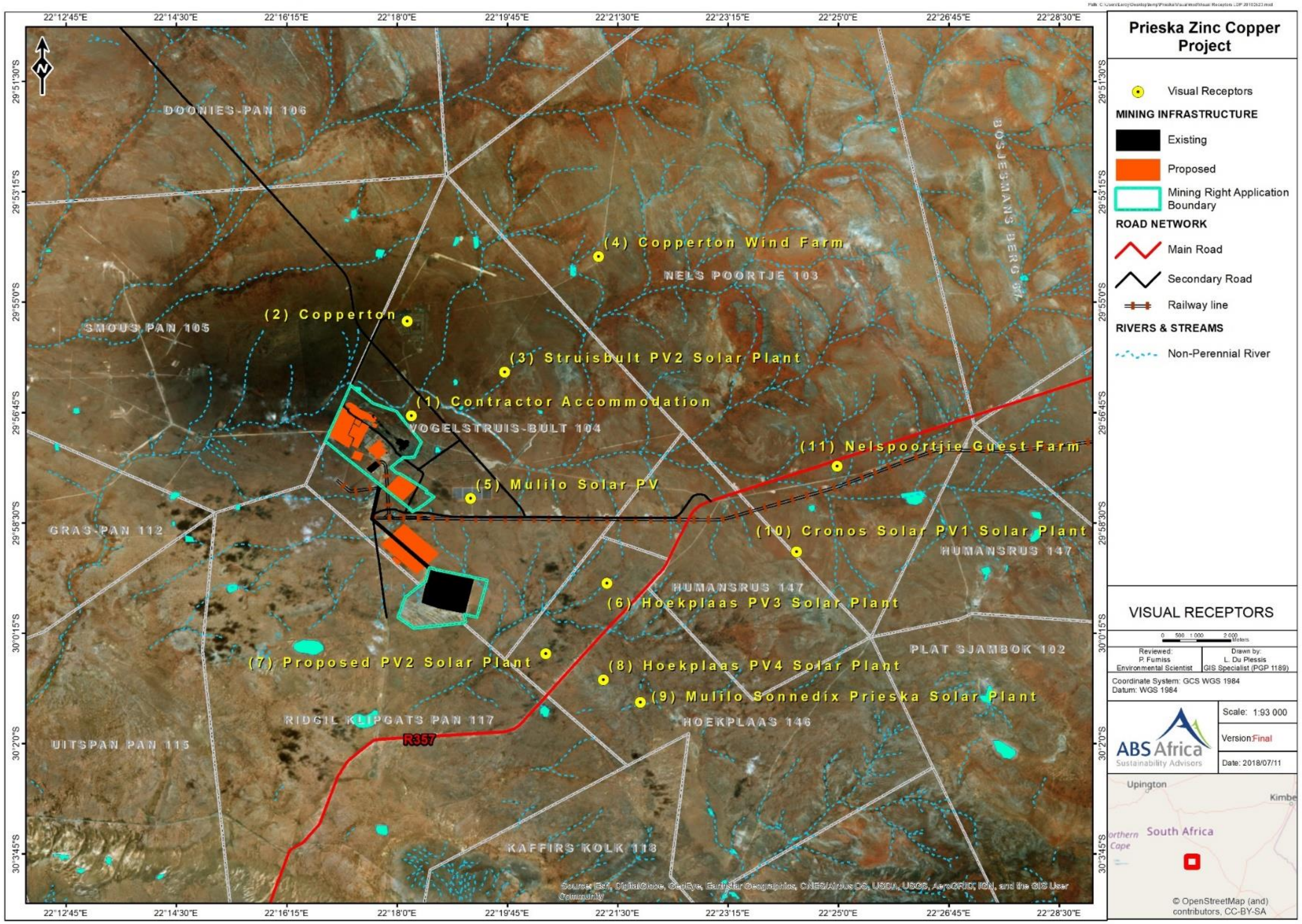
MAP 3: VEGETATION

6.3 VISUAL RECEPTORS

Visual receptors are defined as "Individuals, groups or communities who are subject to the visual influence" (Oberholzer, 2010). There are two types of visual receptors namely static and dynamic. Both of these types are explained below. Visual receptors are scattered throughout the region due to the remoteness of the study area and the daily activities of its inhabitants. Static visual receptors refer to views from fixed locations such as communities which are scattered throughout the region. Static visual receptors can be sub-grouped into 3 categories namely:

- **Existing infrastructure** – There are a number of existing and planned solar facilities towards the south east of the project. These facilities are seen as less significant as they themselves are a visual disturbance.
- **Tourists** - Tourists are regarded as visual receptors of exceptionally high sensitivity. Their attention is focused towards the landscape which they essentially utilise for enjoyment purposes and appreciation of the quality of the landscape. The Nelspoortjie Guest farm located roughly 10 km West of the site along the R357 is the only notable destination that tourists passing through the area might visit.
- **Communities**- The town of Copperton is situated roughly 2.5 km directly north of the site. The community is keenly familiar with the historic mine operations and although they would be visually exposed to new mining infrastructure, it would not disturb the existing sense of place.

Dynamic visual receptors refer to motorists. Motorists are generally classified as visual receptors of low sensitivity due to their momentary views and experience of the proposed development. Under normal conditions, views from a moving vehicle are dynamic as the visual relationship between the activities is constantly changing as well as the visual relationship between the activity and the landscape in which they are seen. The view cone for motorists, particularly drivers, is generally narrower than for static viewers. Motorists will therefore show low levels of sensitivity as their attention is focused on the road and their exposure to roadside objects is brief. The R357 is a regional road that passes by the south-eastern side of the mine, motorists using this road would be able to see the majority of the mining activities (Map 4).



MAP 4: VISUAL RECEPTORS

6.4 SENSE OF PLACE

Central to the concept of sense of place is that the landscape requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historic use and habitation of the area.

The majority of the surrounding land-use is classified as vacant / unspecified, with wide open spaces with very few anthropogenic activities observed during the site visit. There are a few isolated rural farmsteads within the 'zone of potential influence'. There is also very little anthropogenic activity in the surrounding area with the main form of activity being small livestock grazing. The closest settlement to the proposed surface infrastructure is the town of Copperton roughly 3 km north. The majority of the surrounding environment is characterized by historical mining activities and related infrastructure. In recent years several new renewable energy projects, mainly solar, have been and/or are proposed to be developed in the area. These facilities give the study area a disturbed/industrial sense of place mixed into large open areas.

6.5 SCENIC VALUE

Central to the concept of sense of place is that the landscape requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historic use and habitation of the area. Much of the inherent scenic value of the project area has been altered due to the historic mining activity, powerline infrastructure and new solar facilities that have been constructed. There are no unique natural landscape features associated with the study area.

7 VISUAL IMPACT CONCEPTS AND ASSESSMENT CRITERIA

7.1 VISUAL ANALYSIS

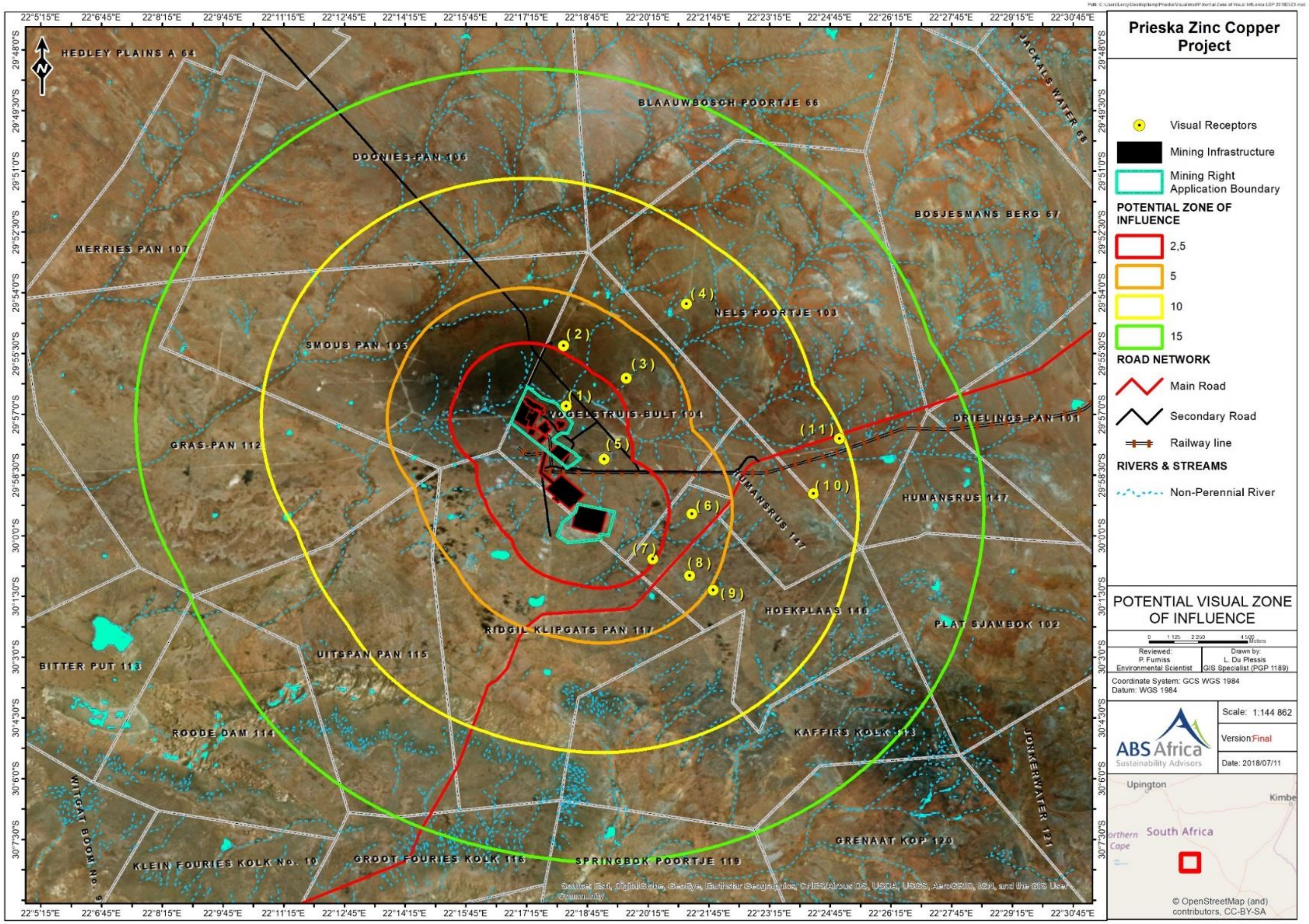
This section describes the aspects which have been considered in order to assess the intensity of the visual impact on the area. The criterion includes:

- Project visibility (proximity);
- Visual exposure (viewshed);
- Landscape integrity; and
- Visual absorption capacity

Each of the above-mentioned categories are examined independently. The results are then integrated and interpreted in order to reach an overall visual assessment conclusion. The methodology that has been followed in this project is based on the work of Oberholzer (2005).

7.2 VISIBILITY (PROXIMITY) OF THE PROJECT

The visual impact of an object in the landscape diminishes at an exponential rate as the distance between the observer and the object increases (Hull and Bishop, 1988). Thus, the visual impact at 1000 m would be approximately a quarter of the impact as viewed from 500 m. Consequently, at 2000 m, it would be one sixteenth of the impact at 500 m. The 'zone of potential influence' (the area defined as the radius from the centre point of the project beyond which the visual impact of the most visible features will be insignificant) was established at 5 km (see Map 5 below).



MAP 5: ZONE OF POTENTIAL INFLUENCE

Over 5 km, the impact of the proposed infrastructure on visibility would have diminished considerably due to the diminishing effect of distance and atmospheric conditions (haze). On the other hand, the visual impact of the project components within a distance of 2500 m or less would be at its maximum. The zone of potential influence further helps to determine which of the identified receptors are present in the above-mentioned zones. The majority of visual receptors are within the 2.5 km - 5 km range see Table 4.

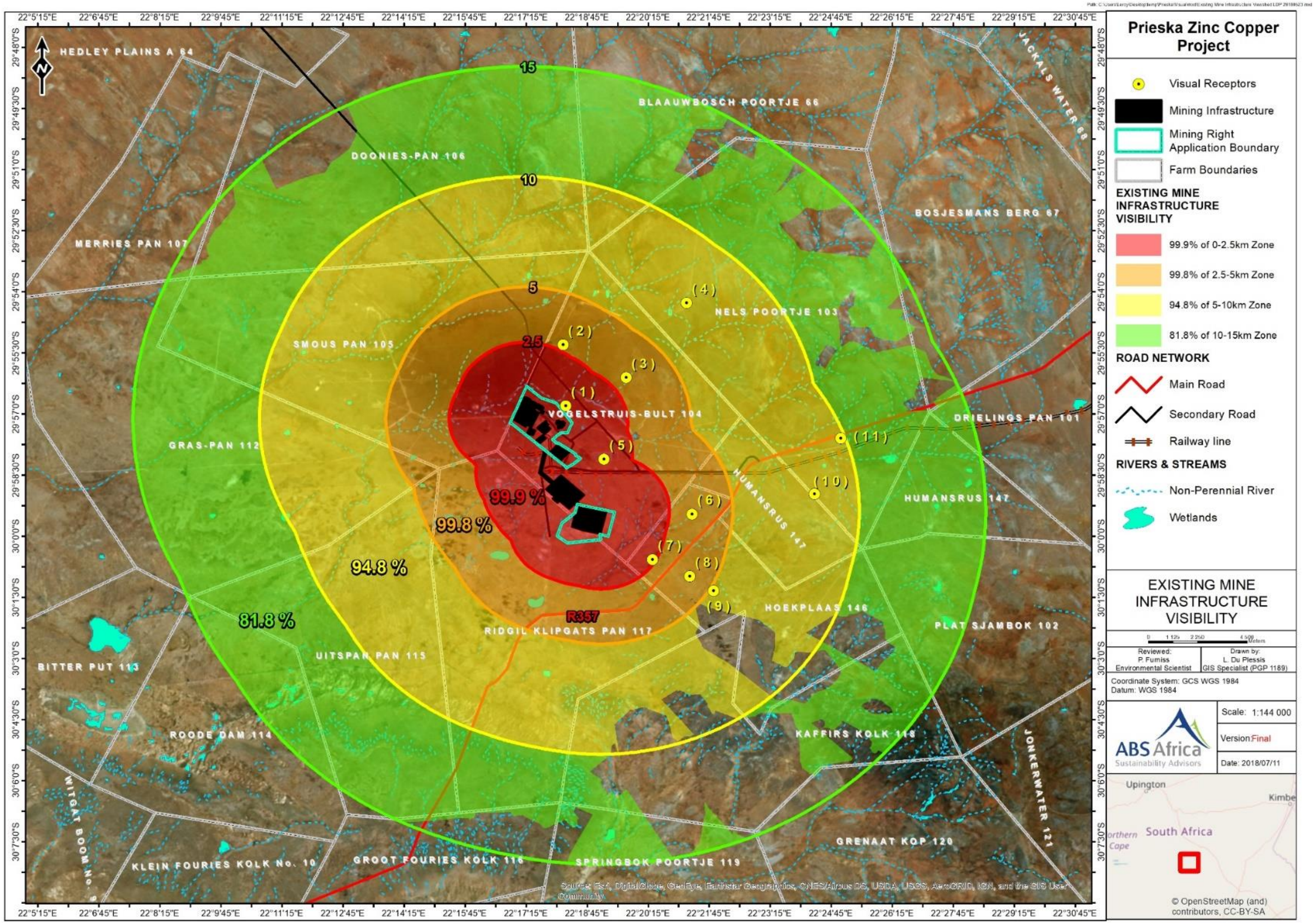
TABLE 4: VISUAL RECEPTORS WITHIN ZONE OF INFLUENCE

	HIGH EXPOSURE (SIGNIFICANT CONTRIBUTION TO VISUAL IMPACT)	MODERATE EXPOSURE (MODERATE CONTRIBUTION TO VISUAL IMPACT)	LOW EXPOSURE (MINIMAL INFLUENCE ON VISUAL IMPACT)	INSIGNIFICANT EXPOSURE (NEGLIGIBLE INFLUENCE ON VISUAL IMPACT)
RESIDENTS	0 to 2.5 km	2.5 to 5 km	5 to 10 km	10 to20 km
MOTORISTS	0 to 2.5 km	2.5 to 5 km	5 to 10 km	10 to 20 km

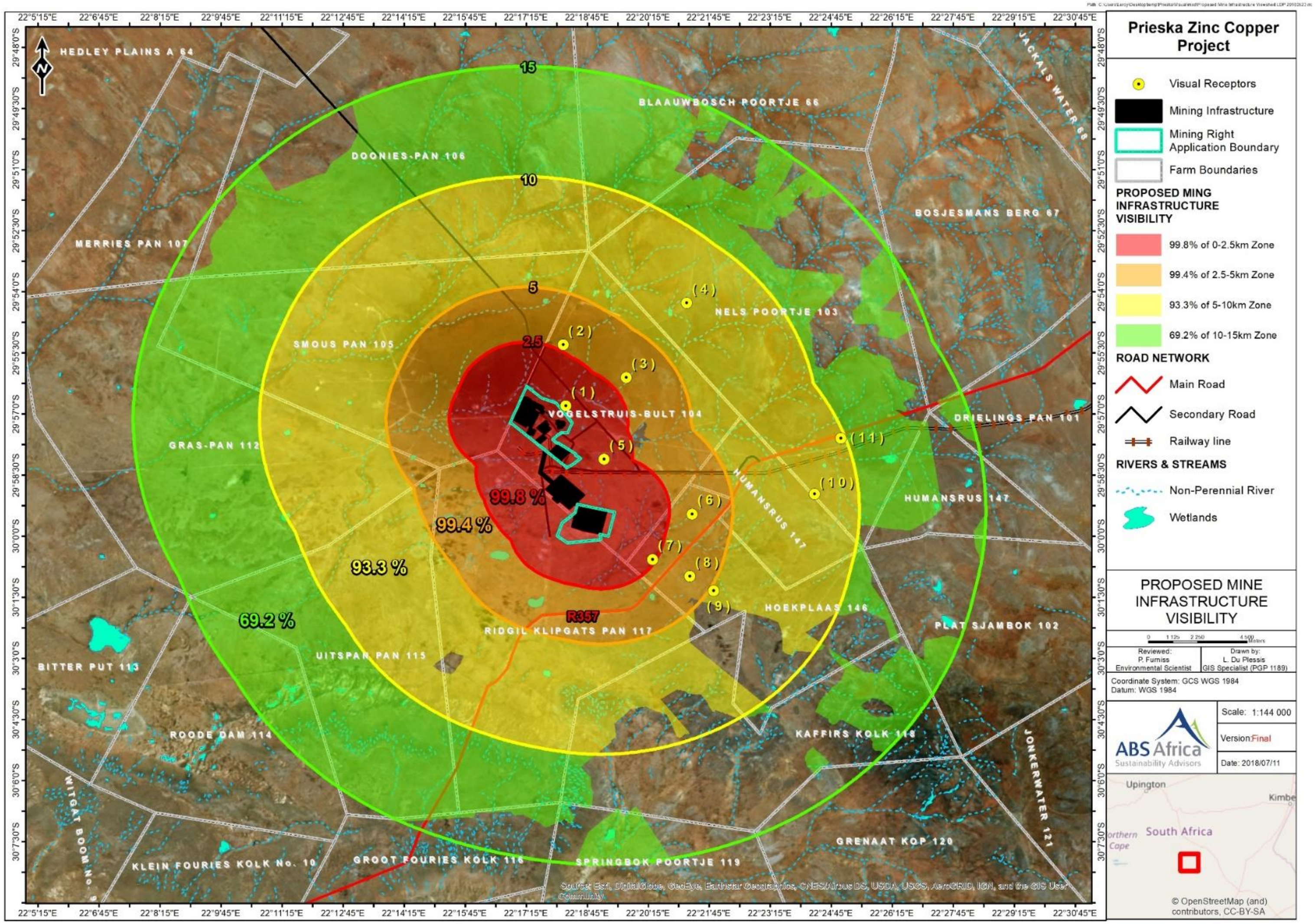
7.3 VISUAL EXPOSURE OF THE AREA

The visual exposure of the area (viewshed) refers to the geographic area from which the project will be visible, or view catchment area. (The actual zone of visual influence of the project may be smaller because of screening by existing trees and buildings).

The visibility analysis considers the worst-case scenario, using line-of-sight i.e. ignoring trees and other structures and is based on topography alone. This assists the process of identifying possible affected visual receptors and the extent of the effected environment. The combined visual exposure of the historic and proposed mining infrastructure components is represented in Map 6 and Map 7.



MAP 6: VISUAL EXPOSURE OF EXISTING MINE INFRASTRUCTURE



MAP 7: VISUAL EXPOSURE OF PROPOSED MINE INFRASTRUCTURE

The analysis indicates that the existing mine infrastructure already generates a significant visual exposure in the area. The addition of the proposed new mine infrastructure does not increase the overall project visual exposure. A comparison of the visual exposure between existing and proposed infrastructure is provided in Table 5.

TABLE 5: VISUAL EXPOSURE COMPARISON

Potential Zone of Influence	Existing Mine Infrastructure	Proposed New Mine Infrastructure
0 to 2.5 Km	99.9%	99.8%
2.5 to 5 Km	99.8%	99.4%
5 to 10 Km	94.8%	93.3%
10 to 20 Km	81.8%	69.2%

The overall project visual exposure rating is determined by the amount of exposure relative to the total size of the zone of influence (Table 6**)**.

TABLE 6: TOTAL PROJECT VISUAL EXPOSURE RATING

CRITERIA	HIGH VISUAL EXPOSURE (HIGH IMPACT)	MODERATE VISUAL EXPOSURE (MEDIUM IMPACT)	LOW VISUAL EXPOSURE (LOW IMPACT)
THE EXTENT AT WHICH THE PROJECT WILL BE VISIBLE.	If the project and its infrastructure is visible from over half the zone of potential influence, and/or views are mostly unobstructed**.**	If the project and its infrastructure are visible from less than half the zone of potential influence, and/or views are partially obstructed**.**	If the project and its infrastructure is visible from less than a quarter of the zone of potential influence, and/or views are mostly obstructed.

7.4 VISUAL ABSORPTION CAPACITY (VAC)

Visual Absorption Capacity (VAC) signifies the ability of the landscape to accept additional human intervention without serious loss of character and visual quality or value. VAC is founded on the characteristics of the physical environment such as:

7.4.1 DEGREE OF VISUAL SCREENING

A degree of visual screening is provided by landforms, vegetation cover and/or structures such as buildings. For example, a high degree of visual screening is present in an area that is mountainous and is covered with a forest compared to an undulating and mundane landscape covered in grass.

7.4.2 TERRAIN VARIABILITY

Terrain variability reflects the magnitude of topographic elevation and diversity in slope variation. A highly variable terrain will be recognized as one with great elevation differences and a diversity of slope variation creating talus slopes, cliffs and valleys. An undulating landscape with a monotonous and repetitive landform will be an example of low terrain variability.

TABLE 7: VISUAL ABSORPTION CAPACITY

CRITERIA	HIGH VAC (LOW IMPACT)	MODERATE VAC (MEDIUM IMPACT)	LOW VAC (HIGH IMPACT)
THE LANDSCAPE'S ABILITY TO VISUALLY ABSORB THE PROPOSED DEVELOPMENT	Effective screening by topography and vegetation	Partial screening by topography and vegetation	Little screening by topography or vegetation

The study area is categorized by sparse vegetation screening and low terrain variability and thus low visual absorption is recorded.

7.5 LANDSCAPE INTEGRITY

Landscape integrity refers to the compatibility of the proposed project with the existing landscape or 'sense of place'. The sensitivity of a landscape or visual resource is the degree to which a particular landscape type or area can accommodate change arising from a particular development, without detrimental effects on its character. Its determination is based upon an evaluation of each key element or characteristic of the landscape likely to be affected. The evaluation will reflect such factors such as its quality, value, contribution to landscape character, and the degree to which the particular element or characteristic can be replaced or substituted (Institute of Environmental Assessment & The Landscape Institute, 1996:87).

A practical example which illustrates this would be constructing a factory in an industrial zone. The area has a high compatibility due to similar developments already present and the landscape integrity remains unaffected. Constructing a similar factory adjacent to a park used for recreational purposes and the opposite will be true. Similarly, a rural area will not automatically be incompatible with large developments such as mine infrastructure. If the countryside is known for its strong mining industry, then a new mine development would be more easily integrated.

Keeping the existing sense of place in mind, it becomes evident that the region is familiar with mining and even though the area is in a remote location with an increasing number of solar facilities and the presence of large Eskom electrical infrastructure, the area is developing more and more into an industrial setting. Despite the relatively low impact on the landscape integrity there are still practical solutions to help mitigate some of these visual disturbances. These are discussed in Section 9.

TABLE 8: LANDSCAPE COMPATIBILITY/INTEGRITY OF PROPOSED PROJECT

CRITERIA	LOW COMPATIBILITY (HIGH IMPACT)	MODERATE COMPATIBILITY (MEDIUM IMPACT)	HIGH COMPATIBILITY (LOW IMPACT)
THE COMPATIBILITY OF THE PROJECT TO BLEND WITH THE EXISTING LANDSCAPE.	Visually intrudes, or is discordant with the surroundings	Partially fits into the surroundings, but clearly noticeable	Blends in well with the surroundings

8 THE VISUAL IMPACT

8.1 VISUAL IMPACT

The overall visual impact is determined by assessing the average impact across all four categories as set out in **Section 7.1**. The results are tabled below.

With the introduction of the proposed new mine infrastructure, the impact rating is adjusted downward because of the already diminished landscape integrity.

TABLE 9: VISUAL IMPACT TABLE

	VISIBILITY (PROXIMITY)	VISUAL EXPOSURE (VIEWSHED)	VISUAL ABSORPTION CAPACITY (VAC)	LANDSCAPE INTEGRITY	VISUAL IMPACT
EXISTING INFRASTRUCTURE (HISTORICAL MINING)	Residents in close proximity, motorists in ZOI and tourists outside ZOI (Medium)	If the project and its infrastructure is visible from over half the zone of potential influence, and/or views are mostly unobstructed (High)	Little screening by topography or vegetation (High)	Visually intrudes, or is discordant with the surroundings (High)	**High**
PROPOSED INFRASTRUCTURE (ASSUMING MITIGATION IS SUCCESSFUL)	Residents in close proximity, motorists in ZOI and tourists outside ZOI (Medium)	If the project and its infrastructure is visible from over half the zone of potential influence, and/or views are mostly unobstructed (High)	Little screening by topography or vegetation (High)	Blends in well with the surroundings (Low)	**Medium**

9 MITIGATION MEASURES

The aim of mitigation is to avoid, reduce and where possible remedy or offset, any significant negative (adverse) effects on the environment arising from the proposed activity (GLVIA; 2008). In considering measures to effect mitigation, there are three rules to consider. Mitigation measures should be:

- Economically feasible;
- Effective (time allowed for implementation and provision for management/maintenance); and
- Visually acceptable (within the context of the existing landscape).

To address these measures the following principles should be considered:

- Mitigation should be planned to fit into the existing landscape character. They should respect and build upon landscape distinctiveness;
- Mitigation should primarily aim to blend the proposed development into its surroundings and generally reduce its visibility; and
- It should be recognized that many mitigation measures, especially planting/rehabilitation, are not immediately effective.

9.1 BUILDINGS AND STRUCTURES

Structures that are required to be built from steel or concrete can be painted in a natural tone fitting with the surrounding environment. Light faded green and tans can be used at the base of buildings, fading to lighter colors, with the top section of the buildings painted a light grey to merge with the skyline. Tall structures' roofs should be painted a 'dirty' grey or light blue. A principle to note is that lighter tones advance toward the viewer while darker tones recede from the viewer. Pure whites, blacks and bright colors should be avoided.

To reduce the potential of glare external surfaces of buildings and structures should be articulated or textured to create interplay of light and shade. Avoid shiny or bare metal where possible.

9.2 ACCESS ROADS

During construction of the project development, access roads will require an effective dust suppression management program, such as regular wetting and/or the use of non-polluting chemicals that will retain moisture in the road surface. Where a paved surface is required use dark paving materials that complement the natural brown colours and textures of the soil and rock in the area rather than light coloured materials i.e. concrete colours should be avoided.

9.3 LANDSCAPING

Where practicable, an ecological approach to rehabilitation and vegetative screening measures, as opposed to a horticultural approach to landscaping should be adopted. For example, communities of indigenous plants enhance bio-diversity and blend well with existing vegetation. This ecological approach to landscaping costs significantly less to maintain than conventional landscaping methods and is more sustainable. A registered landscape architect should be consulted for this purpose. Trees and shrubs can be used to screen structures and break stark contrasting lines if carefully planned and positioned. Where structures are silhouetted when viewed from public roads, the harsh lines can be broken by planting fast growing large trees.

9.4 LIGHT POLLUTION

9.4.1 LIGHT SHIELDING

Shielding of night lights can greatly reduce the sky glow by ensuring that lights have proper shielding which ensures that light does not spill into the night sky.

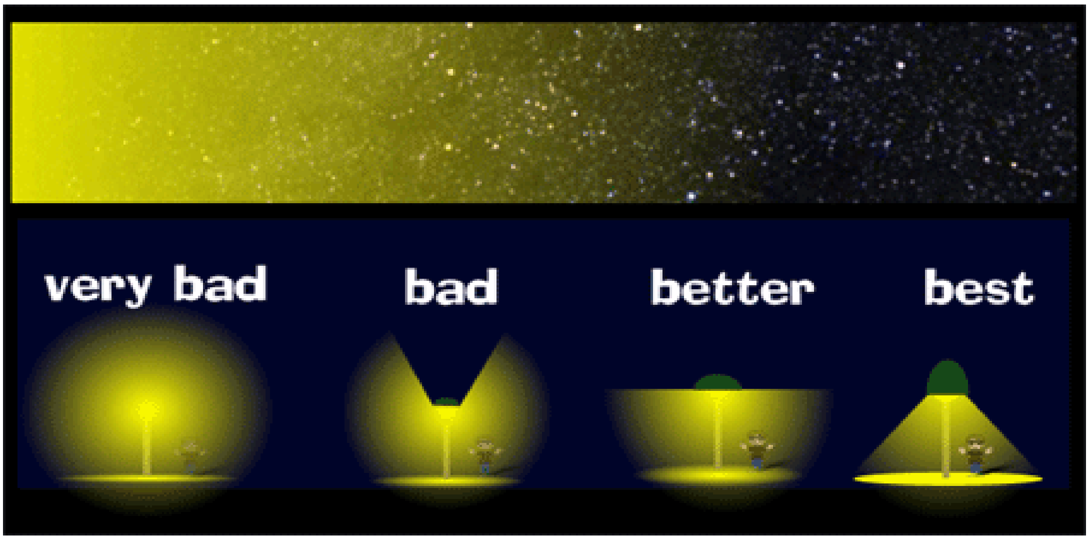


FIGURE 5: THE EFFECT OF PROPER LIGHT SHIELDING

9.4.2 LIGHT DIRECTION

The direction of the main beam of all lights directed towards any potential observer should be at an angle smaller than 70°. Higher mounted lights allow lower main beam angles, which can assist in reducing glare. In areas with low ambient lighting levels, glare can be very obtrusive and extra care should be taken when positioning and aiming lighting equipment.

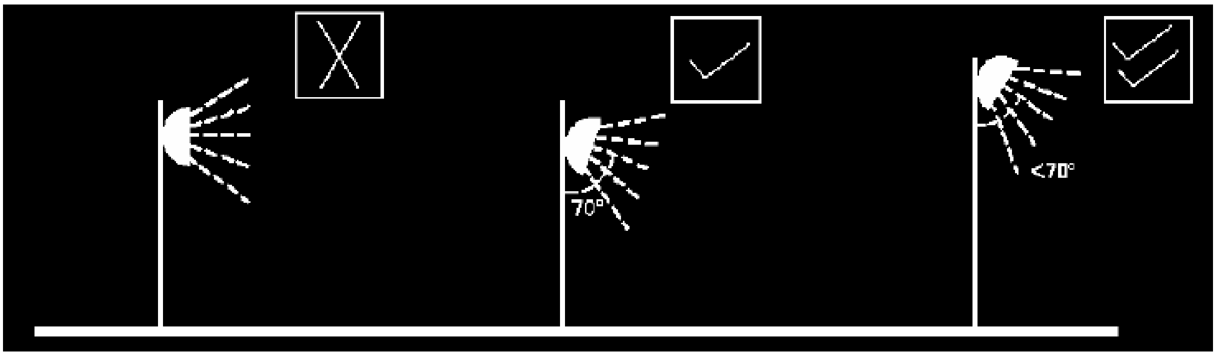


FIGURE 6: APPLICATION OF PROPER LIGHT DIRECTION

10 CONCLUSIONS

Due to the fact that is the area is characterised by historical mining activities, there is already a visual impact on the area that has been in place for many years. This has also affected the sense of place to a more mining and industrial type. The visual exposure from the proposed mine infrastructure is less than the existing mine infrastructure. In other words, the "new" visual exposure fits inside the existing visual exposure. In that sense there is no additional impact. Based on information collected**,** it is concluded that the majority of criteria measured are the same with the exception of landscape integrity. When the existing mine infrastructure was built years ago it would have had a significant impact on the landscape integrity as the area would have been largely undeveloped.

With the introduction of the proposed new mine infrastructure, the impact rating is adjusted downward because of the already diminished landscape integrity.

11 REFERENCES

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12 APPENDICES

12.1 APPENDIX A: GUIDELINES FOR VISUAL ASSESSMENT

Table 10 below depicts the general expected level of visual impacts for various types of developments and environments. According to the categorization of visual impacts (Oberholzer, 2005) the activity is expected to have a high visual impact.

Category 1: e.g. nature reserves, nature-related recreation, camping, picnicking, trails and minimal visitor facilities.

Category 2: e.g. low-key recreation / resort / residential type development, small-scale agriculture / nurseries, narrow roads and small-scale infrastructure.

Category 3: e.g. low-density resort / residential type development, golf or polo estates, low to medium-scale infrastructure.

Category 4: e.g. medium density residential development, sports facilities, small-scale commercial facilities / office parks, one-stop petrol stations, light industry, medium-scale infrastructure.

Category 5: e.g. high-density township / residential development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, power lines, freeways, toll roads, largescale infrastructure generally. Large-scale development of agricultural land and commercial tree plantations. Quarrying and mining activities with related processing plants.

TABLE 10: CATEGORISATION OF VISUAL IMPACTS (OBERHOLZER, 2005)

Type of environment	Type of development (Low to high intensity)				
	Category 1 development	**Category 2 development**	**Category 3 development**	**Category 4 development**	**Category 5 development**
Protected/wild areas of international, national, or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high scenic, cultural or historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected
Areas or routes of low scenic, cultural or historical significance /disturbed	Little or no visual impact expected. Possible Benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	*High visual impact expected*
Disturbed or degraded sites / run-down urban areas / wasteland	Little or no visual impact expected. Possible Benefits	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

12.2 APPENDIX B: EXTRACT FROM ASTRONOMY GEOGRAPHIC ADVANTAGE ACT

National standards for control of activities, equipment or devices 37. (1) The Minister may, with the concurrence of ICASA, in so far as the Minister's action is likely to affect broadcasting service license or broadcasting service in the core or central astronomy advantage area and in relation to actions which may detrimentally impact on astronomy and related scientific endeavours, prescribe national standards or measures for the control or minimisation of—

(a) light pollution;

(b) radio frequency interference; or

(c) any other activity.

(2) The Minister may by notice in the Gazette incorporate into law any standard set by the Council for the South African Bureau of Standards in terms of section 16 of the Standards Act, 1993 (Act No. 29 of 1993), dealing with any matter related to the elimination, prevention or mitigation of light pollution or radio frequency interference without stating the text thereof, by mere reference to the number, title and year of issue of that standard or to any other particulars by which that standard is sufficiently identified.

(3) The national standards and measures which may be prescribed in terms of subsection (1) in respect of light pollution may include measures regarding—

(a) shielding of light by physical barriers;

(b) mounting height limits;

(c) maximum lumen or wattage limits;

(d) curfews requiring light users to extinguish lights after a certain time at night;

(e) the prohibition of or restrictions on the sale or use of certain types of light fixtures;

(f) the use of Low Pressure Sodium lighting or other types of low impact lighting;

(g) the type of lighting that is permissible on billboards; and

(h) the imposition of permitting and inspection requirements.

(4) Before publishing any standards in terms of subsection (1), the Minister must conduct a public participation process in accordance with section 42.

(5) The Minister may declare that any national standards or measures prescribed in terms of subsection (1) apply—

(a) to declared astronomy advantage areas, or only in a specified area or category of areas;

(b) generally, to all persons or only a specified category of persons;

(c) within one or more astronomy advantage areas declared in terms of this Act; or

(d) to specific activities wherever undertaken within the Republic.

(6) Where the actions contemplated in subsection (1)(b) are part of a broadcasting service license or broadcasting service in a coordinated astronomy advantage area or anywhere in the Republic, the Minister must notify ICASA in writing of such actions.

(7) Upon receipt of a notice contemplated in subsection (6) ICASA must, in terms of the procedure contemplated in section 4 of the Electronic Communication Act, 2005, prescribe national standards or measures for the control or minimization of radio frequency interference.

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