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VISUAL IMPACT ASSESSMENT AS PART OF THE ENVIRONMENTAL IMPACT ASSESSMENT AND AUTHORISATION PROCESS FOR THE PROPOSED MAMATWAN MINE PROJECT, NEAR HOTAZEL, NORTHERN CAPE PROVINCE

Prepared for:

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EXECUTIVE SUMMARY

Scientific Aquatic Services (SAS) was appointed to conduct a Visual Impact Assessment (VIA) as part of the environmental assessment and authorisation process for the proposed Mamatwan Mine Project, near Hotazel, Northern Cape Province. The Mamatwan Mine (MMT) is located within the John Taolo Gaetsewe District Municipality and the Joe Morolong Local Municipality.

The MMT is situated approximately 17km south of the town of Hotazel, 32,6km north of the town of Kathu and 43km west of the town of Kuruman. The R380 runs directly adjacent to the MMT in a north-south direction from Hotazal to Kathu, the M31 roadway is located approximately 14km east of MMT and the N14 highway is located approximately 24km southeast of the MMT.

The proposed MMT expansion activities include the following:

- Establishment of a top-cut stockpile and associated crushing and screening plant;
- Upgrading the railway and railway loadout station;
- Changes to the waste rock dump heights;
- Establishment of a pipeline to transport abstracted water from Middelplaats Mine to MMT; and
- Establishment of stormwater infrastructure.

Since the layout and or activity changes have already taken place it is associated with the existing infrastructure and are situated within the MMT boundary, the visual impact is thus already there. As a result of this the layout changes or activities are already absorbed in the mining environment, the visual impact thereof is therefore deemed negligible. As these activities form part of the existing activities and are already taking place, it was deemed unnecessary to assess these layout and or activity changes separately. It was however considered during the assessment of the proposed infrastructure and activities.

The proposed railway loop alternatives and pipeline alternatives will be at ground level and with the bushveld vegetation limiting the view to the immediate vicinity, it was deemed unnecessary to assess these infrastructure components in detail as the visual impact will be negligible on the receiving environment. It is also notable that alternative 3 of the railway and loadout station proposing a railway loop is further from the road than the existing railway line and Overhead Powerline (OHPL). It will therefore partially fade into the background and not be highly visible. Furthermore, due to the limited height of the OHPL associated with the proposed railway loop (alternative 3) and the existing OHPL present, the visual intrusion thereof is considered limited as the only receptors that will observe the OHPL are motorists traveling on the R380 which are mostly mine workers and farmers and on occasion tourists. In this context, the proposed railway loop and its associated OHPL (alternative 3) will not be regarded as an unwelcome intrusion in the already affected landscape. Furthermore, the proposed railway loop and associated OHPL (alternative 3) will only be visible from the R380 roadway for a short distance, due to the bushveld vegetation screening it the further away the motorist travels from the proposed railway loop.

The sale of waste rock as aggregates could reduce the volume of waste rock stockpiled at any given time, however as the waste rock dumps are already present the visual impact is present, thus the selling of waste rock as aggregates will not have an effect on the visual impact on the receiving environment.

Since the Adams Pit is an existing pit within the MMT boundary, it is surrounded by waste rock dumps, stockpiles and other mining infrastructure, thus the visual impact of the re-processing of material within the Adams Pit is considered negligible and it was deemed unnecessary to formally assess the Adams Pit from a visual perspective.

The objective of this study was to provide sufficient information on the visual environment of the area, together with other studies on the physical and socio-cultural environment, in order for the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development. The need for conservation as well as the risks to other spheres of the physical and socio-cultural environment need to be compared and considered along with the need to ensure economic development of the country.

A visual impact will only occur if there are sensitive receptors present in the area to observe or experience the impact. Based on the desktop and field assessments it is evident that the MMT is situated within a remote area where there are very limited number of receptors present, with the Adams Solar Photovoltaic Power Plant and the R380 roadway being the only receptors situated within a 2 km radius and all other receptors situated further than 4km from the MMT. Furthermore, the Adams Solar Photovoltaic Power Plant and R380 roadway are considered moderately sensitive receptors, as workers at the Solar Plant are likely to focus on their work at hand rather than the surroundings and motorists traveling on the R380 are focusing on the road and have a limited view time of the surroundings. The proposed top-cut stockpile and mobile crushing and screening plant is therefore expected to have a minimal visual impact on the receiving environment.

Even though the terrain is relatively flat, the bushveld vegetation of the area limits the view of the observer to the immediate vicinity. Additionally, the MMT is situated within the Gamagara Corridor which is the mining belt of the John Taolo Gaetsewe and Siyanda districts and focuses on mining of iron and manganese, thus the proposed MMT expansion activities remains within the mining land use of the area.

The R380 roadway is situated directly adjacent to the proposed expansion activities, with the activities being in the foreground, there are however existing anthropogenic structures (waste rock dumps, stockpiles, and OHPL) rendering the landscape visually degraded. In this context the frequent road users (mine and farm workers) are accustomed to an affected landscape. The proposed MMT expansion activities will therefore not have a significant visual impact on motorists traveling along the R380 roadway. The proposed MMT expansion activities will only be visible for a short distance along the R380, thereafter the bushveld vegetation screens the view of the proposed expansion activities.

Based on the impact assessment, it is evident that the proposed top-cut stockpile and mobile crushing and screening plant has a very low visual impact on the surrounding environment. This is mainly attributed to the limited sensitive receptors within a 4km radius as well as the bushveld vegetation limiting the view and the fact that the proposed MMT expansion activities are situated within the mining belt of the Northern Cape, thus it is in keeping with the land use of the area. The roadside vegetation of the R380 partially obscures the view towards the proposed top-cut stockpile and mobile crushing and screening plant. Furthermore, road users of the R380 predominantly comprise mine workers, farmers and occasional tourists. As such these receptors are considered low to moderate sensitive receptors, as they are accustomed to the mining infrastructure and they have a momentary view of the area. Since the proposed top-cut stockpile does not have any fixed lighting associated with it, there will be no visual impact on the receiving environment. The mobile crushing and screening plant as well as the product stockpile stacker and reclaimer will have limited lighting associated with them; thus it is likely to contribute in a limited manner to the effects of skyglow, however the lighting associated with the MMT will be more visible due to the larger scale of these operations.

The mitigation measures outlined below would serve to minimise the potential visual impacts during the construction and operational phases of the proposed project:

- The development footprint and disturbed areas surrounding the proposed top-cut stockpile should be kept as small as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum;
- All construction areas must be kept in a neat and orderly condition at all times;
- Existing vegetation, with particular reference to tall trees and larger shrubs adjacent to the R380 and in the vicinity of the proposed expansion activities must be retained, in order to partly obscure the view toward the proposed top-cut stockpile;
- Should it be deemed feasible, the topsoil stockpile should be vegetated with indigenous species to reduce the visual impact of the soil contrast;
- Construction and operation activities should be limited to be undertaken between 6am and 6pm, in order to limit the need for bright floodlighting and the potential for skyglow;
- It is recommended that the mobile crushing and screening plant as well as the product stockpile stacker and reclaimer make use of neutral colours and the use of highly reflective material should be avoided. Any metal surfaces should be painted to fit in with the natural environment in a colour that blends in effectively with the background;
- All lights used for illumination at the mobile crushing and screening plant and product stockpile stacker and reclaimer (except for lighting associated with security) should be faced inwards and shielded to avoid light escaping above the horizon; and

- Security lighting required at night during the operational phase of the mobile crushing and screening plant and product stockpile stacker and reclaimer at the railway loop, should use minimum lumen or wattage in light fixtures. Furthermore, making use of motion detectors on security lighting, where possible, ensures that the site will remain in relative darkness, until lighting is required for security or operational purposes.

DOCUMENT GUIDE

The following table indicates the requirements for Specialist Studies as per Appendix 6 of Government Notice 326 as published in Government Notice 40772 of 2017, amendments to the Environmental Impact Assessment (EIA) Regulations, 2014 as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998).

NEMA Regulations (2014) - Appendix 6		Relevant section in report
1a	Details of	
	(i) the specialist who prepared the report; and	Appendix J
	(ii) the expertise of that specialist to compile a specialist report including	Appendix J
b	a declaration that the specialist is independent in a form as may be specified by the competent authority;	Appendix J
c	an indication of the scope of, and the purpose for which, the report was prepared;	Section 1.2
cA	an indication of the quality and age of base data used for the specialist report	Section 4
cB	a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 6
d	the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 4.2
e	A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 4 and Appendix D to H
f	details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan	Section 5
g	an identification of any areas to be avoided, including buffers	Not applicable – findings from ecological assessment may be used to conserve natural visual resources
h	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 – findings from ecological assessment may be used to conserve natural visual resources
i	a description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.4
j	a description of the findings and potential implications of such findings on the impact of the proposed activity including identified alternatives on the environment or activities;	Section 5 and 6
k	any mitigation measures for inclusion in the EMPr	Section 6.3
l	any conditions for inclusion in the environmental authorisation	Section 6.3
m	any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 6.3
n	a reasoned opinion	
	(i)as to whether the proposed activity, activities or portions thereof should be authorised;	Section 7
	(1A) regarding the acceptability of the proposed activity or activities; and	Section 7
	(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 6.3 and 7
o	a description of any consultation process that was undertaken during the course of preparing the specialist report;	Consultation with interested and affected parties (I&APs) will be undertaken as part of the project
p	summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Comments and responses that are raised by I&APs will be included in the EIA report compiled by the EAP
q	any other information requested by the competent authority	No information requested at this time

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GLOSSARY OF TERMS

Best Practicable Environmental Option	This is the alternative/option that provides the most benefit or causes the least damage to the environment as a whole, at a cost acceptable to society, in the long term as well as in the short term.
Characterisation	The process of identifying areas of similar landscape character, classifying and mapping them and describing their character.
Characteristics	An element, or combinations of elements, which make a contribution to landscape character.
Development	Any proposal that results in a change to the landscape and/ or visual environment.
Elements	Individual parts, which make up the landscape, for example trees and buildings.
Feature	Particularly prominent or eye-catching elements in the landscape such as tree clumps, church towers or wooded skylines.
Geographic Information System (GIS)	A system that captures, stores, analyses, manages and presents data linked to location. It links spatial information to a digital database.
Impact (Visual)	A description of the effect of an aspect of the development on a specified component of the visual, aesthetic or scenic environment within a defined time and space.
Key characteristics	Those combinations of elements which are particularly important to the current character of the landscape and help to give an area it particularly distinctive sense of place.
Land cover	The surface cover of the land, usually expressed in terms of vegetation cover or the lack of it. Related to but not the same as Land use.
Land use	What land is used for based on broad categories of functional land cover, such as urban and industrial use and the different types of agriculture and forestry.
Landform	The shape and form of the land surface which has resulted from combinations of geology, geomorphology, slope, elevation and physical processes.
Landscape	An area, as perceived by people, the character of which is the result of the action and interaction, of natural and/ or human factors.
Landscape Character Type	These are distinct types of landscape that are relatively homogeneous in character. They are generic in nature in that they may occur in different areas in different parts of the country, but wherever they occur, they share broadly similar combinations of geology, topography, drainage patterns, vegetation and historical land use and settlement pattern, and perceptual and aesthetic attributes.
Landscape integrity	The relative intactness of the existing landscape or townscape, whether natural, rural or urban, and with an absence of intrusions or discordant structures.
Landscape quality	A measure of the physical state of the landscape. It may include the extent to which typical landscape character is represented in individual areas, the intactness of the landscape and the condition of individual elements.
Landscape value	The relative value that is attached to different landscapes by society. A landscape may be valued by different stakeholders for a variety of reasons.
Receptors	Individuals, groups or communities who are subject to the visual influence of a particular project. Also referred to as viewers, or viewer groups.
Sense of place	The unique quality or character of a place, whether natural, rural or urban, allocated to a place or area through cognitive experience by the user. It relates to uniqueness, distinctiveness or strong identity and is sometimes referred to as genius loci meaning 'spirit of the place'.
Sky glow	Brightening of the night sky caused by outdoor lighting and natural atmospheric and celestial factors.
Skylining	Siting of a structure on or near a ridgeline so that it is silhouetted against the sky.

View catchment area	A geographic area, usually defined by the topography, within which a particular project or other feature would generally be visible.
Viewshed	The outer boundary defining a view catchment area, usually along crests and ridgelines.
Visibility	The area from which project components would potentially be visible. Visibility is a function of line of sight and forms the basis of the VIA as only visible structures will influence the visual character of the area. Visibility is determined by conducting a viewshed analysis which calculates the geographical locations from where the proposed power line might be visible.
Visual Absorption Capacity	The ability of an area to visually absorb development as a result of screening topography, vegetation or structures in the landscape.
Visual Character	The overall impression of a landscape created by the order of the patterns composing it; the visual elements of these patterns are the form, line, colour and texture of the landscape's components. Their interrelationships are described in terms of dominance, scale, diversity and continuity. This characteristic is also associated with land use.
Visual Exposure	The relative visibility of a project or feature in the landscape. Visual exposure is based on distance from the project to selected viewpoints. Visual exposure or visual impact tends to diminish exponentially with distance.
Visual Intrusion	The nature of intrusion of an object on the visual quality of the environment resulting in its compatibility (absorbed into the landscape elements) or discord (contrasts with the landscape elements) with the landscape and surrounding land uses.
Zone of visual influence	An area subject to the direct visual influence of a particular project.

*Definitions were derived from Oberholzer (2005) and the Institute of Environmental Management and Assessment (2013)

LIST OF ACRONYMS

ARC	Agricultural Research Council
BLM	(United States) Bureau of Land Management
BPEO	Best Practicable Environmental Option
DEM	Digital Elevation Model
DENC	Department of Environment and Nature Conservation
DME	Department of Minerals and Energy
DMR	Department of Mineral Resources
DMS	Dense Medium Separation
DTM	Digital Terrain Model
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
GIS	Geographic Information System
GPS	Global Positioning Systems
IAPs	Interested and Affected Parties
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
KOP	Key Observation Points
LI IEMA	Institute of Environmental Management and Assessment
m.a.m.s.l.	Meters above mean sea level
MMT	Mamatwan Mine
NEMA	National Environmental Management Act (No. 108 of 1997)
NGL	Natural Ground Level
SANBI	South African National Biodiversity Institute
SAS	Scientific Aquatic Services
TFR	Transnet Freight Rail
UNESCO	United Nations Educational Scientific and Cultural Organization
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
VRM	Visual Resource Management
WHS	World Heritage Site

1. INTRODUCTION

1.1 Background

Scientific Aquatic Services (SAS) was appointed to conduct a Visual Impact Assessment (VIA) as part of the environmental impact assessment and authorisation process for the proposed Mamatwan Mine Project, near Hotazel, Northern Cape Province. The Mamatwan Mine (MMT) is located within the John Taolo Gaetsewe District Municipality and the Joe Morolong Local Municipality.

The MMT is situated approximately 17km south of the town of Hotazel, 32,6km north of the town of Kathu and 43km west of the town of Kuruman. The R380 runs directly adjacent to the MMT in a north-south direction from Hotazal to Kathu, the M31 roadway is located approximately 14km east of MMT and the N14 highway is located approximately 24km southeast of the MMT. The location and extent is indicated in Figures 1 & 2.

The proposed MMT expansion activities include the following:

- Establishment of a top-cut stockpile and associated crushing and screening plant;
- Upgrading the railway and railway loadout station;
- Changes to the waste rock dump heights;
- Establishment of a pipeline to transport abstracted water from Middelplaats Mine to MMT; and
- Establishment of stormwater infrastructure.

A VIA entails a process of data collection, spatial analysis, visualisation and interpretation to describe the quality of the landscape prior to development taking place and then identifying possible visual impacts after development. Assessing visual impacts are difficult as it is very subjective due to a person's perception being affected by more than only the immediate environmental factors (Oberholzer, 2005). Since the MMT has been in operation since 1963, the visual impact on the receiving environment is already there, thus minor visual impacts will occur as a result of the development of the proposed expansion activities during the construction and operational phases.

This report, after consideration and description of the visual integrity of the MMT expansion and surroundings, must guide the proponent, authorities and Environmental Assessment Practitioner (EAP), by means of recommendations, as to the suitability of the expansion

activities of the MMT, from a visual and aesthetic point of view. This report should furthermore serve to inform the planning, design and decision-making process as to the layout and nature of the proposed activities.

1.2 Project Scope

The purpose of this report is:

- To determine the Category of Development and Level of Assessment as outlined by Oberholzer (2005);
- To describe the receiving environment in terms of regional context, location and environmental and landscape characteristics;
- To describe and characterise the proposed project and the receiving environment in its envisioned future state;
- To identify the main viewsheds through undertaking a viewshed analysis, based on the proposed height of infrastructure components and the Digital Elevation Model (DEM), as a mechanism to identify the locations of potential sensitive receptors sites and the distance of these receptor sites from the MMT, if necessary;
- To identify and describe potential sensitive visual receptors residing at or utilising receptor sites;
- To establish receptor sites and identify Key Observation Points (KOPs) from which the proposed project will have a potential visual impact, if necessary;
- To prepare a photographic study and conceptual visual simulation of the proposed project as the basis for the viewshed identification and analysis, if necessary;
- To assess the potential visual impact of the proposed project from selected receptors sites in terms of standard procedures and guidelines; and
- To describe mitigation measures in order to minimise any potential visual impacts.

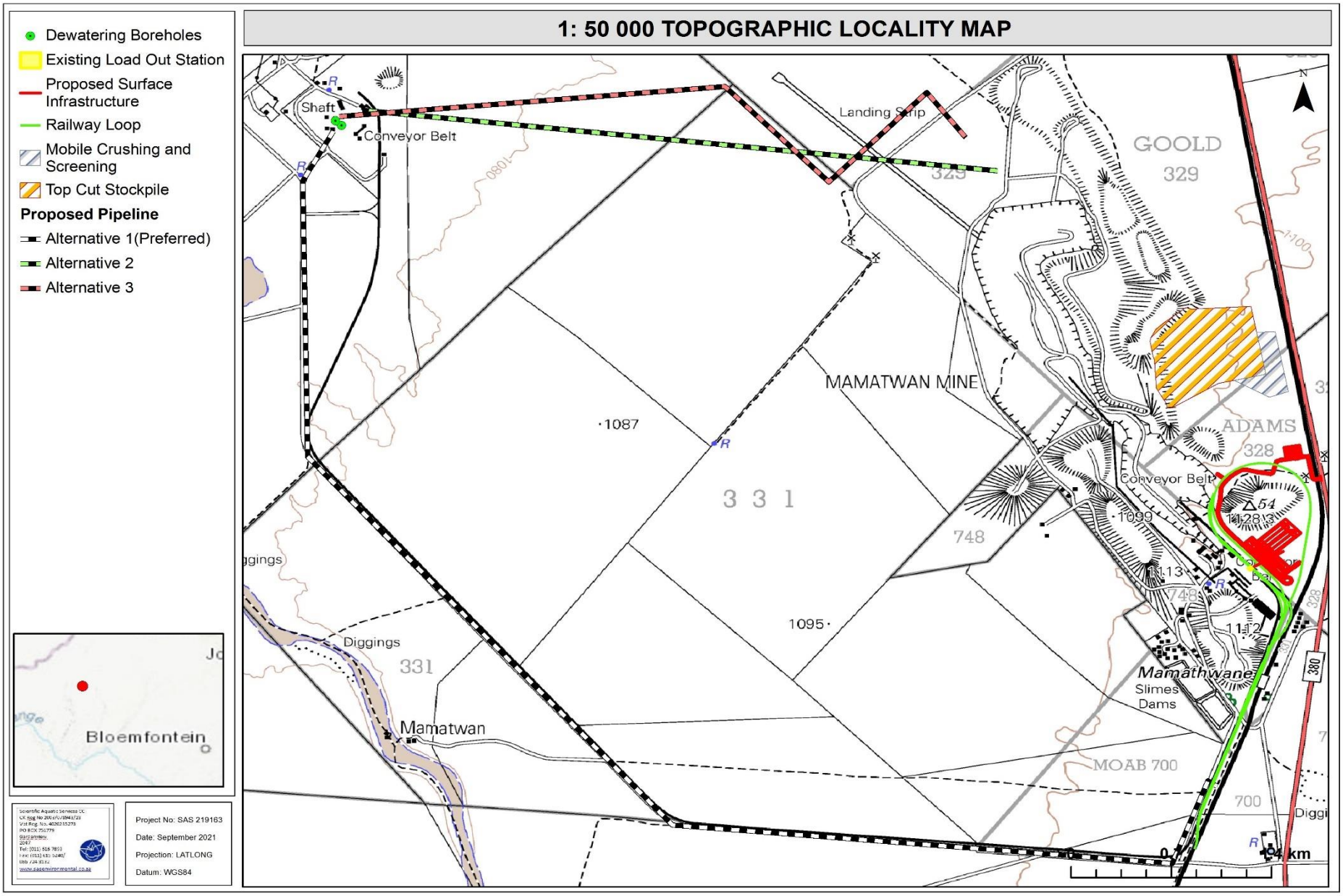


Figure 1: 1:50 000 Topographical map depicting the location of the Mamatwan Mine expansion activities in relation to the surrounding region.

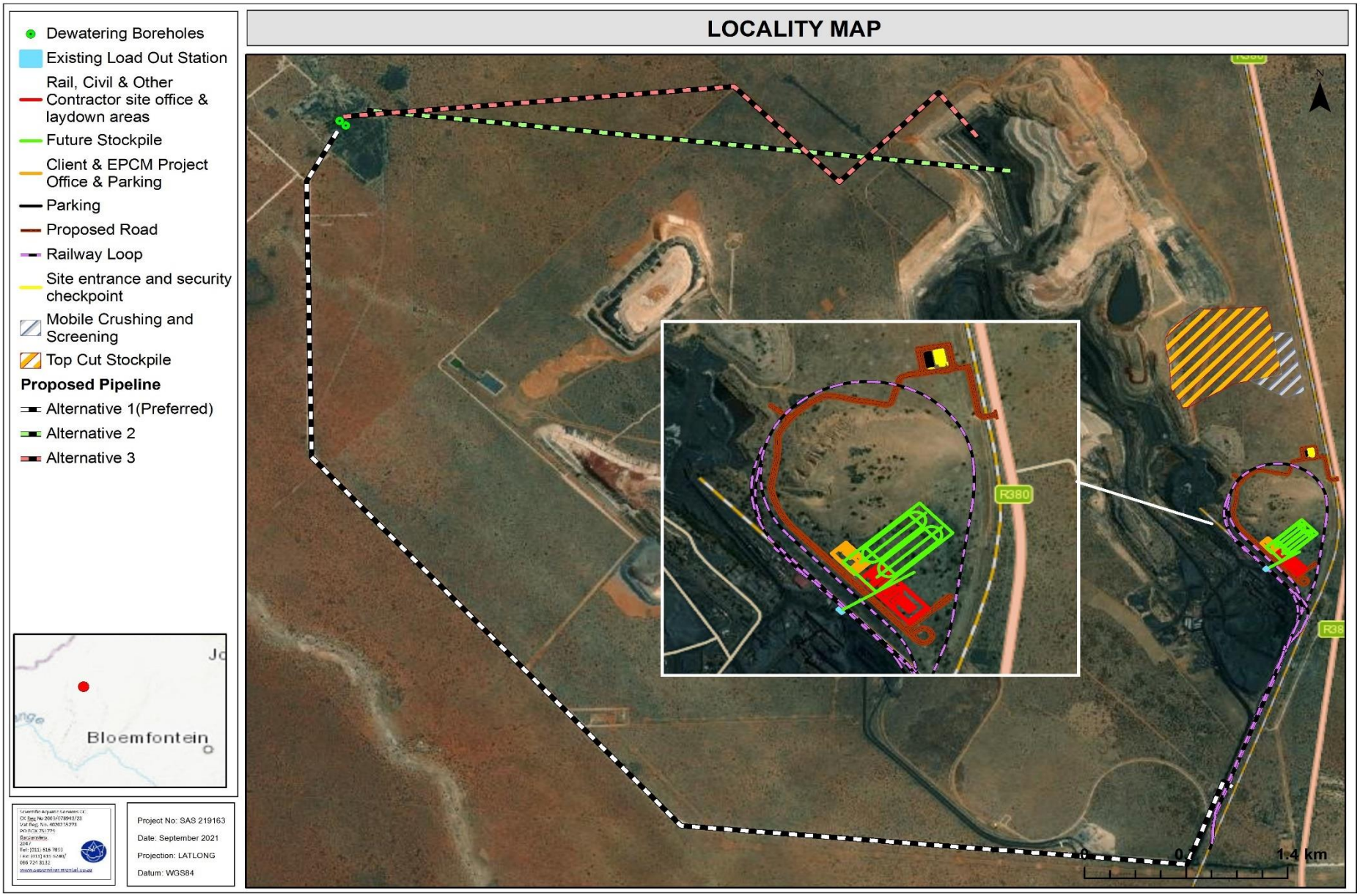


Figure 2: Digital satellite image depicting the location of the Mamatwan Mine expansion activities in relation to the surrounding region.

1.3 Principles and Concepts of VIAs

Visual resources have value in terms of the regional economy and inhabitants of the region. Furthermore, these resources are often difficult to place a value on as they normally also have cultural or symbolic values. Therefore, VIAs are to be performed in a logical, holistic, transparent and consistent manner. Oberholzer (2005) identifies the following concepts to form an integral part of the VIA process:

- Visual resources include the visual, aesthetic, cultural and spiritual aspects of the environment, which contribute toward and define an area's sense of place;
- Natural and cultural landscapes are inter-connected and must be considered as such;
- All scenic resources, protected areas and sites of special interest within a region need to be identified and considered as part of the VIA;
- All landscape processes such as geology, topography, vegetation and settlement patterns that characterise the landscape must be considered;
- Both quantitative criteria, such as 'visibility' and qualitative criteria, such as aesthetic value or sense of place has to be included as part the assessment;
- VIAs must inform the Environmental Impact Assessment (EIA) process in terms of visual inputs; and
- Public involvement must form part of the process.

The guideline furthermore recommends that the VIA process identifies the Best Practicable Environmental Option (BPEO) based on the following criteria:

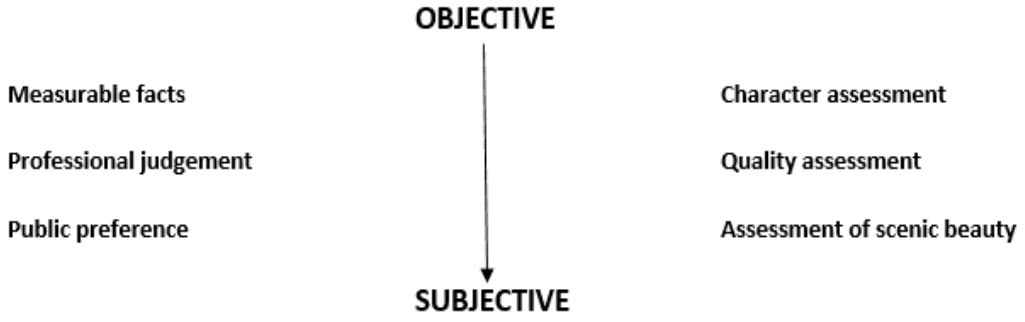
- Long term protection of important scenic resources and heritage sites;
- Minimisation of visual intrusion on scenic resources;
- Retention of wilderness or special areas intact as far as possible; and
- Responsiveness to the area's uniqueness, or sense of place.

1.4 Assumptions and Limitations

- No specific national legal requirements for VIAs currently exist in South Africa. However, the assessment of visual impacts is required by implication when the provisions of relevant acts governing environmental management are considered and when certain characteristics of either the receiving environment or the proposed project indicate that visibility and aesthetics are likely to be significant issues and that visual input is required (Oberholzer, 2005);
- No viewshed analysis was undertaken, as the topography of the area surrounding and within the MMT is relatively flat. Within this context, minor topographical features,

vegetative screening and anthropogenic structures would be important factors influencing the degree of visibility and visual intrusion, which is not taken into account during the viewshed analysis;

- Distance and terrain plays a critical role when assessing visual impacts of an area. Due to the relatively flat terrain of the MMT area and height of the proposed structures, it was deemed necessary to identify all potential sensitive receptors within a 10km radius, on a desktop-level, which would then be verified during the field assessment. The 10km radius can be considered the visual assessment zone. It should be noted that the visibility of an object decreases exponentially the further away the observer is from the source of impact. During the field assessment it was established that the bushveld vegetation limits the view of the observer to the immediate surroundings, not allowing one to see across the vistas. Consequently, it was deemed unnecessary to visit all potentially sensitive receptors within the visual assessment zone, thus focus was placed on visiting sensitive receptors within a 2 km radius. Several sensitive receptors situated further than 3 km were however visited to confirm that both the MMT and proposed expansion activities are not visible from these locations;
- Due to a lack of visual specialist guidelines within the Northern Cape Province, the "Guidelines for Involving Visual and Aesthetic Specialists in the EIA Process" (Oberholzer, 2005), prepared for the Western Cape Department of Environmental Affairs & Development Planning, was used;
- All information relating to the proposed project as referred to in this report is assumed to be the latest available information. Additionally, best practice guidelines were taken into consideration and utilising the maximum expected heights of the infrastructure and the placement thereof in viewshed calculations as a precautionary approach; and
- Abstract or qualitative aspects of the environment and the intangible value of elements of visual and aesthetic significance are difficult to measure or quantify and as such depend to some degree on subjective judgments. It therefore is necessary to differentiate between aspects that involve a degree of subjective opinion and those that are more objective and quantifiable, as outlined in the diagram below (The



Landscape Institute and Institute of Environmental Management and Assessment (LI IEMA, 2002).

2. LEGAL, POLICY AND PLANNING CONTEXT FOR VIAs

Oberholzer (2005) indicates that current South African environmental legislation governing the EIA process, which may include consideration of visual impacts if this is identified as a key issue of concern, is the National Environmental Management Act (NEMA) (Act 107 of 1998). This includes the 2014 NEMA EIA regulations as amended (published in General Notice (GN) No. R.982 as well as R 983 Listing Notice 1, R 984 Listing Notice 2 and R 985 Listing Notice 3).

In addition, the following acts and guidelines are applicable (Oberholzer, 2005):

National Environmental Management: Protected Areas Act (Act 57 of 2003)

This act is intended to identify and protect natural landscapes.

National Heritage Resources Act (Act 25 of 1999)

This provides legislative protection for listed or proclaimed sites, such as urban conservation areas, nature reserves and proclaimed scenic routes.

Advertising on Roads and Ribbons Act (Act 21 of 1940)

Visual pollution is controlled, to a limited extent, by the Advertising on Roads and Ribbons Act (Act 21 of 1940), which deals mainly with signage on public roads.

Municipal Systems Act (Act 32 of 2000)

In terms of the Municipal Systems Act (Act 32 of 2000), it is compulsory for all municipalities to initiate an Integrated Development Planning (IDP) process in order to prepare a five-year strategic development plan for the area under their control. The IDP process, specifically the spatial component is based in certain areas and provinces on a bioregional planning approach to achieve continuity in the landscape and to maintain important natural areas and ecological processes. The MMT is situated within the Taolo Gaetsewe District Municipality and the Joe Morolong Local Municipality. The Taolo Gaetsewe District Municipality IDP for 2018/19 states that mining and agriculture is the dominant land use, and was the richest mining region in the Northern Cape until decline in mining employment and the near extinction of the asbestos mining industry in the 1980s. According to the Joe Morolong IDP for 2017/18 mines have been contributing to the socio-economic development of the municipality through the Social Labour Plan by implementing different projects and programmes.

Other

- According to the Northern Cape Provincial Spatial Development Framework (NCPSDF, 2012) the mining industry of the province is of national and international importance;
- Visual and aesthetic resources are also protected by local authorities, where policies and by-laws relating to urban edge lines, scenic drives, special areas, signage, communication masts, etc. have been formulated; and
- Other decision-making authorities such as the Department of Water and Sanitation (DWS) and relevant authorities of the local and district municipality, in terms of their particular legislative frameworks, may also require VIAs to support informed decision-making.

3. DESCRIPTION OF THE PROPOSED PROJECT

South 32 operates the opencast manganese MMT (forms part of the legal entity of Hotazel Manganese Mines (Pty) Ltd), which started operations in 1963. MMT holds the following environmental permits and authorisations:

- A Mining right (Reference number: NC 256 MR) issued and approved by the former Department of Minerals and Energy (DME) (currently the Department of Mineral Resources (DMR)) in May 2006;
- An Environmental Management Programme (EMP reference number NC 6/2/2/118) that was approved in November 2005;
- An Air Emissions Licence (AEL) (Licence number: NC/AEL/NDM/ZRH01/2014) issued by the Northern Cape Department of Environment and Nature Conservation (DENC) in March 2015;
- An amended Integrated Water Use Licence (IWUL) License number: 10/D41K/AGJ/1537) issued by the Department of Water and Sanitation (DWS) in January 2012 as amended in October 2017; and
- An Environmental Authorisation (Reference number: NC/KGA/HOT3/07) for bulk fuel storage issued by former Department of Tourism, Environment and Conservation (currently DENC) in July 2007.

MMT is proposed to undertake an integrated regulatory process to cater or layout / activity changes that have already taken place as well as proposed layout / activity changes. The table below provides further information.

Table 1: Summary of the changes that have already taken place and proposed changes at the MMT.

Layout changes and activities that have already taken place	
Layout changes already taken place	**Activities that already take place**
➢ **Expansion of the north eastern and south eastern waste rock dump** MMT is committed to undertake rehabilitation concurrent with mining operations as per the approved 2005 EMPr. As part of rehabilitation the north waste rock dump and the south eastern waste rock dump footprints were extended.	➢ The use of Adam's pit for the disposal of mine waste water, tailings and storage of product
➢ **Establishment and changes to the rehabilitation criteria of waste rock dumps** South32 is committed to rehabilitate the waste rock dumps to 1:3 slopes. Based on rehabilitation trials, a slope of this gradient results in the development of erosion gulley's. It is proposed to change the rehabilitation criteria to reduce the slope steepness.	➢ The abstraction of mine water from Adam's pit for dust suppression
➢ **Expansion of the stockyard** The approved product stockyard area has been extended and caters for the storage of various grades of product ore.	➢ Irrigation of gardens and veld using treated sewage effluent
➢ **Potable and process water storage facilities** Potable and process water storage facilities are catered for in the approved 2005 EMPr, however the EMPr does not provide specifics pertaining to the number of tanks, location and quantities. Potable water storage facilities include potable water tanks and JOJO tanks. Process water storage facilities include process water tanks, aqua tanks, catchment tanks and JOJO tanks.	
➢ **Expansion of an existing road** An internal haul road located along the eastern side of the open pit area has been widened and lengthened.	
Proposed layout changes and activities	
Proposed layout changes	**Proposed activity changes**
➢ **Establishment of a top-cut stockpile and associated crushing and screening plant** Top-cut is low grade ore that that is currently discarded onto the current waste rock dumps. Based on recent investigations, this material is viable for sale to third parties. The sale of top-cut material is likely to extend the life of mine by 15 years. Therefore, additional storage space is required to stockpile top-cut material prior to processing at the sinter plant. The cop-cut material will need to be subjected to crushing and screening via a mobile crushing and screening plant, prior to material being sent to the sinter plant. The estimated height for the proposed top cut stockpile is between 50m and 80m at a maximum, which corresponds with the adjacent waste rock dumps.	➢ **Sale of waste rock as aggregate** MMT is proposing on selling some of the waste rock that would have remained on surface in perpetuity as aggregate to third parties.
➢ **Establishment of stormwater management infrastructure** As part of the proposed project, investigations will be undertaken to determine the adequacy of the current stormwater management system. Based on pre-liminary findings, it is envisaged that pollution control dams, channels and a pumping system to return water from pollution control dams to the plant for re-use may be required.	➢ **Re-processing of Dense Medium Separation (DMS) and Sinter Fines located in the Adam's Pit.** As part of rehabilitation, MMT is proposing to re-process material located within Adam's pit, for sale to third parties. This material includes the tailings, DMS grit, sinter de-dust and plant spillages. This material will be screened using mobile screens prior to sale to third parties. Screened waste (conveyors and metal) will be removed from Adam's pit and deposited at the designated waste disposal area at the MMT.
➢ **Changes to waste rock dump height** MMT is proposing on increasing the approved 2005 EMPr height of the waste rock dumps from 50m to 80m.	

➢ **Establishment of a pipeline to transport abstracted water from Middelplaats to MMT** MMT is proposed to abstract water from the decommissioned Middelplaats Mine as and when needed when water is not available from the open pit (dewatering) or from the Vaal Gamagara Water Pipeline. Water will be abstracted via two proposed boreholes. A pipeline to transfer the water from the Middelplaats Mine to MMT will need to be established. Three alternative routes are being considered, and based on initial investigations the preferred route is Alternative 1.	
➢ **Upgrading the railway and railway loadout station** Transnet Freight Rail (TFR) plans to increase capacity of the Manganese rail line. In order to meet the TFR expansion requirements the loading rate of trains at the MMT needs to be increased. This can be achieved by upgrading the existing loadout station and related railway. Three alternatives were considered: 1. Alternative 1: Reduces loading times to 12 hours which requires the reconfiguration of the train station; 2. Alternative 2: Reduces loading times to 8 hours. The existing load out station and conveyor system will be upgraded; and 3. Alternative 3: Reducing loading times to 4 hours which requires the establishment of a new railway loop, new loadout station, product stockpile areas, stacker and reclaimers.	

Since the layout and or activity changes have already taken place it is associated with the existing infrastructure and are situated within the MMT boundary, the visual impact is thus already there. As a result of this the layout changes or activities are already absorbed in the mining environment, the visual impact thereof is therefore deemed negligible. As these activities form part of the existing activities and are already taking place, it was deemed unnecessary to assess these layout and or activity changes separately. It was however considered during the assessment of the proposed infrastructure and activities.

The proposed railway loop alternatives and pipeline alternatives will be at ground level and with the bushveld vegetation limiting the view to the immediate vicinity, it was deemed unnecessary to assess these infrastructure components in detail as the visual impact will be negligible on the receiving environment. It is also notable that alternative 3 of the railway and loadout station proposing a railway loop is further from the road than the existing railway line and Overhead Powerline (OHPL). It will therefore partially fade into the background and not be highly visible. Furthermore, due to the limited height of the OHPL associated with the proposed railway loop (alternative 3) and the existing OHPL present, the visual intrusion thereof is considered limited as the only receptors that will observe the OHPL are motorists traveling on the R380 which are mostly mine workers and farmers and on occasion tourists. In this context, the proposed railway loop and its associated OHPL (alternative 3) will not be regarded as an unwelcome intrusion in the already affected landscape. Furthermore, the proposed railway loop and associated OHPL (alternative 3) will only be visible from the R380

roadway for a short distance, due to the bushveld vegetation screening it the further away the motorist travels from the proposed railway loop.

The sale of waste rock as aggregates could reduce the volume of waste rock stockpiled at any given time, however as the waste rock dumps are already present the visual impact is present, thus the selling of waste rock as aggregates will not have an effect on the visual impact on the receiving environment.

Since the Adams Pit is an existing pit within the MMT boundary, it is surrounded by waste rock dumps, stockpiles and other mining infrastructure, thus the visual impact of the re-processing of material within the Adams Pit is considered negligible and it was deemed unnecessary to formally assess the Adams Pit from a visual perspective.

4. METHOD OF ASSESSMENT

4.1 Desktop Assessment

The method of assessment for this report is based on a spatial analysis of the MMT expansion activities and the surrounding areas, using Geographic Information Systems (GIS) such as Planet GIS, ArcGIS, Global Mapper as well as digital satellite imagery, photographs, various databases and all available data on the planned infrastructure. The desktop assessment served to guide the field assessment through identifying preliminary areas of importance in terms of potential visual impacts.

The desktop study included an assessment of the current state of the environment of the area including the climate of the area, topography, land uses and land cover with data obtained from the websites of the South African National Biodiversity Institute (SANBI) and the Agricultural Research Council (ARC). All databases used were published within the last 5 years and contain up to date and relevant information.

During the desktop assessment, which took place prior to and in preparation of the field assessment, the 1:50 000 topographical map, as well as high definition aerial photographs from Google Earth Pro were used to identify the dominant landforms and landscape patterns. These resources together with digital elevation data were utilised to establish a parameter within which potential sensitive receptors were to be identified via Google Earth Pro. These parameters can henceforth be referred to as the visual assessment zone. Based on the

relatively flat terrain of the area, the visual assessment zone encompasses a 10km radius of the MMT expansion activities. The potentially sensitive receptors identified within the visual assessment zone during the desktop assessment will be verified during the field assessment.

Detailed assessment methods used to determine the landscape characteristics of the receiving environment and potential visual impacts of the project are outlined in the relevant sections below as well as in Appendices B – K.

4.2 Field Assessment

A field assessment was undertaken during the winter season on 9 July 2019, which is considered to be a suitable time period during which to conduct the VIA, due to natural vegetation being less dense during the time of assessment than during a high rainfall period. This allows for an observer to see further across the landscape with seasonal screening effects such as vegetation density and relative surface grass cover, being lower. It is important to note that due to the drought conditions experienced within the Northern Cape, the vegetation composition was lower than would be expected after good rainfall for a few consecutive years.

The field assessment included a drive-around and on-foot survey of the proposed top-cut stockpile and associated crushing and screening plant area and in the immediate vicinity thereof and a drive-around of the surrounds, in order to determine the visual context within which the proposed project is to be developed. Focus was placed on assessing the potentially sensitive receptors identified within the visual assessment zone, these included farmsteads, and prominent roads within the area. Points from where the proposed top-cut stockpile was determined to be visible were recorded (making use of Global Positioning Systems (GPS) i to confirm these aesthetically sensitive viewpoints and potential sensitive visual receptors in relation to the proposed project.

5. RESULTS OF INVESTIGATION

5.1 Public Involvement

A public involvement process will be initiated as part of the Environmental Authorisation process, whereby stakeholders are invited to provide input concerning the proposed development.

5.2 Development Category and Level of Impact Assessment

Through application of the VIA methods of assessment as presented in Appendix B, it was determined that the proposed project can be defined as a Category 5 development, which includes mining activities. According to Oberholzer (2005), a high visual impact is therefore expected, with potential intrusion on farm steads and may potentially lead to a significant change in the scenic resources and visual character of the area. In line with the above, a Level 4 Assessment is therefore required.

Based on the outcome of the field assessment the MMT is situated in a remote area where sensitive receptors are limited and sparse, with the Adams Solar Photovoltaic Power Plant and R380 roadway being the only receptors situated within a 2km radius and all other receptors situated further than 4km from the MMT. It is important to note that visual impacts are only experienced when there are receptors present to experience the impact, thus in this context there are sparse receptors present, thus there are not likely to be many visual impacts experienced. Furthermore, the proposed top-cut stockpile will be indistinguishable from the surrounding environment due to the adjacent existing waste rock dumps being the same height as the proposed top cut stockpile. Even though the terrain is relatively flat, the bushveld vegetation of the area limits the view of the observer to the immediate vicinity.

Due to the limited height of both the OHPL associated with the proposed railway loop as well as the mobile crushing and screening plant, in comparison to the height of the proposed top-cut stockpile, and the bushveld vegetation limiting the view, the only receptors that will observe the infrastructure are motorists traveling along the R380. Motorists traveling along the R380 are considered low sensitive receptors as they focus more on the road than the surroundings and have momentary views of the surroundings.

Additionally, the MMT is situated within the Gamagara Corridor which is the mining belt of the John Taolo Gaetsewe and Siyanda districts and focuses on mining of iron and manganese, thus the proposed MMT expansion activities remains within the mining land use of the area. As there are very limited sensitive receptors within the area (within 4km), the presence of the existing waste rock dumps and the proposed land use being mining as is fitting for the Gamagara Corridor, it is anticipated that the MMT expansion activities will have a minimal visual impact. A level two assessment is therefore undertaken.

5.3 Description of the Receiving Environment

To holistically describe the receiving environment, this section of the report aims to determine the intrinsic value of the receiving landscape including aspects of the natural, cultural and scenic landscape, taking both tangible and intangible factors into consideration. The table below aims to describe the particular character, uniqueness, intactness, rarity, vulnerability and representability of the proposed top-cut stockpile and mobile crushing and screening plant within its existing context, for ease of reference the proposed top-cut stockpile and mobile crushing and screening plant will hereafter be collectively referred to as the 'proposed expansion activities'. General views of the landscape associated with the expansion activities and surrounds with respect to the slightly undulating topography, bushveld area and the overall character are indicated in the table below.

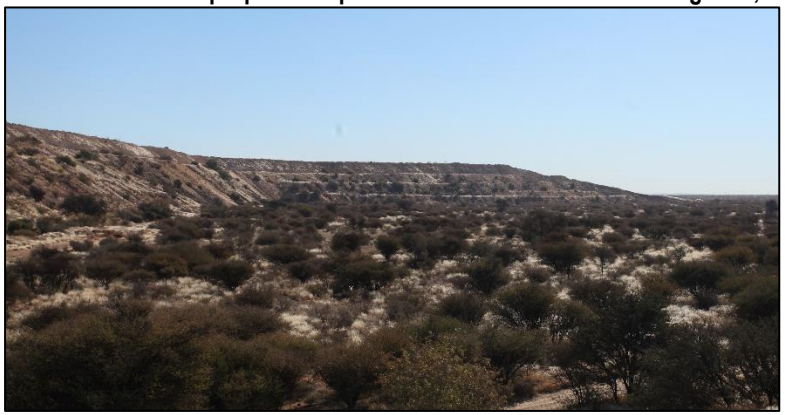
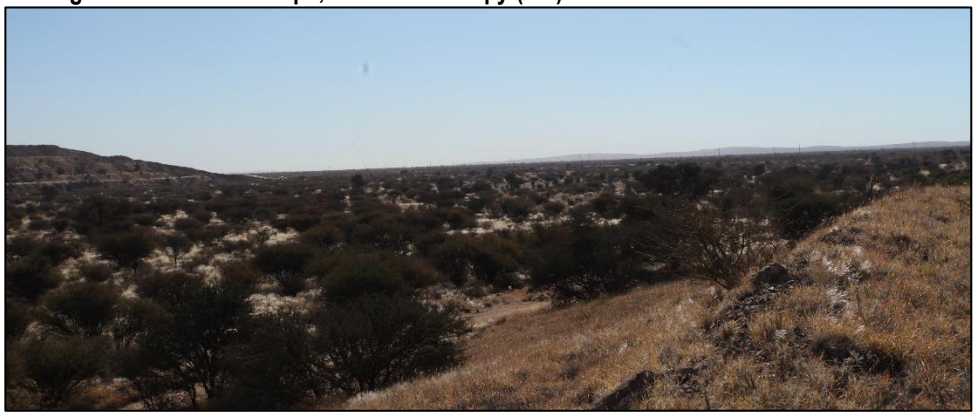
5.3.1 Findings of the proposed railway loop area

The proposed railway loop and its associated OHPL are not features of the natural environment, but rather a representation of anthropogenic alterations. As such, the proposed railway loop and the OHPL is likely to be perceived as visually intrusive when placed in a largely undeveloped landscape. Based on the field assessment, the surrounding landscape is not undeveloped as it is affected by various anthropogenic alterations, such as the MMT itself with its associated waste rock dumps, stockpiles, opencast pits and other mining infrastructure, an existing railway line with OHPL and roads (Figure 3). Thus, the proposed railway loop and its associated OHPL is not incongruous to the landscape as the existing infrastructure has degraded the visual landscape of the area already.

Due to the screening ability of the bushveld vegetation of the area, the limited height of the OHPL, the existing anthropogenic structures and the only receptors that are likely to be affected by the proposed railway loop and its associated OHPL being motorists traveling along the R380 roadway, situated directly east of the proposed railway loop, the visual intrusion is considered low. Motorists utilising the R380 roadway comprise predominantly of mine workers and farmers and to a lesser extent the occasional tourist, thus the frequent road users are accustomed to the existing OHPL and other anthropogenic and mining structures in the area. In this context, the proposed railway loop and its associated OHPL will not be regarded as an unwelcome intrusion in the already affect landscape. The proposed railway loop and associated OHPL will only be visible from the R380 roadway for a short distance, due to the bushveld vegetation screening it the further away the motorist travels from the proposed railway loop.

Figure 3: Photograph depicting the view from the R380 toward the proposed railway loop, indicating the existing overhead powerlines in the foreground and waste rock dumps of the MMT in the middle ground.

Table 2: Summary of the visual assessment of the proposed expansion activities and surrounds.

<table>
<tr><td colspan="4">General view of the proposed expansion activities and surrounding area, indicating the waste rock dumps, bushveld canopy (left) and flat terrain with mountains in the distance (right).
   </td></tr>
<tr><td>Climate (Appendix C)</td><td>As a result of climate variations throughout the year, the appearance and perception of the landscape within and surrounding the proposed expansion activities changes with the seasons. The proposed expansion activities' area and its surrounds appear muted during the winter months, while it appears more vibrant with various colours during the summer months. The Northern Cape has experienced extreme drought conditions for several years, thus there is limited seasonal variation. Atmospheric dust concentration is higher during the dry winter months due to drier soil conditions and lower rainfall, resulting in atmospheric haziness, which will affect the visibility of surrounding landscape. Blasting within MMT took place at the time of assessment, and due to the dry conditions, the dust from blasting was suspended in the air for quite some time before it settled again, as seen in the figures below. The figure on the left was taken just after blasting took place, and the picture to the right was taken half an hour after the blasting event.</td><td>Landscape Character (Appendix E)</td><td>The landscape character associated with the proposed expansion activities and immediate surroundings can be described as bushveld, relatively flat terrain surrounded by the existing waste rock dumps of the MMT. Key aesthetic aspects of the landscape associated with the proposed top-cut stockpile area and the surrounding region are described in Appendix C. When an observer is at an elevated height one can see a significant distance across the relatively flat terrain. It should however be noted that the bushveld vegetation and haziness of the dry climatic conditions in the area serve to somewhat obscure the proposed expansion activities. The adjacent waste rock dumps with its significant heights obscure the views from receptors situated to the north and west. The landscape is considered simple with the vegetation composition being homogenous with the surrounding area. The level of movement within the proposed expansion activities is still, with the exception of occasional mine workers, there is little to almost no movement within the proposed expansion activities' area.</td></tr>
</table>

	 		Since the existing adjacent waste rock dumps are of the same height as the proposed top-cut stockpile, the visual impact is already present in the area and receptors within the vicinity thereof have grown accustomed to the dumps. Therefore, it may be concluded that the proposed development is expected to have a low to negligible impact on the landscape character within the region.
Land Use and visual receptors (Appendix D)	The proposed expansion activities are situated in a relatively flat area, adjacent to existing waste rock dumps of MMT and surrounded by mountainous terrain in the greater region (approximately 16.3km from the proposed top-cut stockpile area), located in open bushveld with limited disturbance. The dominant land use of the municipality is mining (MMT, Tshipi Mine, Black Rock Mine, Sishen Mine) and agriculture. The arid nature of the climate restricts stocking densities which has led to relatively large farms across the area, resulting in the area being sparsely populated. Permanent residents such as farmers and farm workers residing in the area are considered to be highly sensitive receptors due to their permanent view of the surroundings, while people at their place of work are moderately sensitive receptors such as those working at the Adams Solar Photovoltaic Power Plant, as they are likely to focus on the activities at hand and not the surrounding environment. Furthermore, the orientation of a receptor is also important, as a receptor is typically oriented in a certain direction, for example with view towards a certain area from a highly frequented area like a porch or garden. The visual impact of a development could thus be potentially much greater if the proposed development intruded into such a view. Based on the field assessment the farm houses have larger indigenous trees in the surroundings and the houses were not oriented towards the MMT. Since the MMT is situated within a remote area, the only main road within the area is the R380 which is predominantly utilised by mine and farm workers and on occasion a tourist traveling to Botswana. Furthermore, several farm roads are present in the area, which are utilised infrequently. Due to their momentary views and experience of the receiving environment motorists are classified as low sensitivity receptors.	**Visual Absorption Capacity (VAC) (Appendix F)**	**Medium (Score 8)** According to the calculation the VAC of the area is considered moderate, indicating that the proposed expansion activities will be absorbed in the area. Due to the nature of the project, its location adjacent to waste rock dumps, and the fact that it is situated within the Gamagara Corridor which is the mining belt, the proposed top-cut stockpile will lead to a moderately low level of visual intrusion on the landscape and is expected to be indistinguishable from the waste rock dumps. Additionally, should the mobile crushing and screening plant be of neutral (grey) colour the visual intrusion thereof will also be moderately low. Furthermore, the bushveld vegetation of the larger region, the distance from sensitive receptors, and the existing waste rock dumps and mining infrastructure, will serve to lower the visual intrusion. Since the majority of sensitive receptors, with the exception of the R380 roadway, are situated further than 4km from the proposed expansion activities, the proposed mining activities fall within the background with a low visual intrusion on the viewer. Even though the R380 roadway is situated directly adjacent to the proposed expansion activities, with the activities being in the foreground, the existing anthropogenic structures (waste rock dumps, stockpiles, and OHPL) renders the landscape visually degraded resulting in the frequent road users (mine and farm workers) being accustomed to an affected landscape. The proposed expansion activities will therefore not have a significant visual impact on motorists traveling along the R380 roadway. The proposed expansion activities will only be visible for a short distance along the R380, thereafter the bushveld vegetation screens the view of the proposed expansion activities.

		Landscape Quality (Appendix G)	**Low (Score 9)** The landscape associated with the proposed expansion activities and surroundings provide limited topographical variety since the terrain is relatively flat with limited distinguishing topographical features. At the time of the assessment and due to the drought conditions of the Northern Cape the vegetation was dull, however should sufficient rainfall occur, the vegetation will be greener resulting in colour variation with the brown of the bare soils. The landscape associated with the proposed expansion activities are not considered scarce as it is representative of the greater landscape and common in the area. Since the proposed top-cut stockpile is situated adjacent to existing waste rock dumps, the proposed top-cut stockpile will add little or no visual variety to the area, and introduce no discordant elements. The mobile crushing and screening plant will introduce a new metal infrastructure element to the area, however due to the existing waste rock dumps and the heights thereof the mobile crushing and screening plant will not be significantly visually intrusive
Topography	The local topography of the proposed expansion activities consists of flat to slightly undulating plains, and is surrounded by mountainous terrain in the larger region. Limited distinguishing topographical features in the form of prominent hills or outcrops are present within or around the proposed top cut stockpile area. The existing waste rock dumps of the MMT and Tshipi Mine form prominent features within the landscape and form part of the skyline of the area. Please refer to Figures 4 and 5 for the elevation and slope models of the area.	**Landscape Value (Appendix H)**	With reference to Appendix I, the area surrounding the MMT is likely to be most valued by the MMT, as it is the property of the mine. Since the proposed expansion activities area situated within the Gamagara Corridor, which is the mining belt of the Northern Cape, the proposed expansion activities will not lower the value of the area, it will add to the socio-economic development of the municipality.
Vegetation Cover (Appendix C)	The proposed top-cut stockpile area falls within a single biome and bioregion according to Mucina & Rutherford (2012) namely Savanna Biome and Eastern Kalahari Bushveld Bioregion. The Kathu Bushveld vegetation type characterises the region (Appendix I). Refer to the Biodiversity Impact Assessment undertaken by STS (2019) for further detail on the dominant floral species observed within the proposed top-cut stockpile area. Due to the drought conditions experienced within the Northern Cape, the colour palette of the vegetation is muted and bare ground is present. The woody species layer is dominant within the proposed top-cut stockpile area and surrounding area. As previously mentioned, the bushveld vegetation limits the view of the observer to the immediate surroundings, therefore the observer is not able to see across the broad vistas. The roadside vegetation (taller trees) associated with the R380 serves to somewhat obscure the view of the proposed top-cut stockpile area.	**Sense of Place**	Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. It is created by the land use, character and quality of a landscape, as well as by the tangible and intangible value assigned thereto. The sense of place associated with the proposed expansion activities are related to the landscape character type, defined as rural, flat to slightly undulating terrain, with sparsely isolated farmsteads in the far distance. During the field assessment it was evident that even though the proposed expansion activities are situated within close proximity to the opencast mining activities the proposed expansion activities' area itself can be described as calm, tranquil and peaceful, with limited development and disturbance. The sense of place is however not unique to the proposed expansion activities' area as it extends to the larger region. The proposed expansion activities will affect the sense of place of the area, shifting it from calm and tranquil to busy with vehicular movement in and out of the area. It is important to note however that the proposed expansion activities will not affect the calmness and tranquillity of the larger region, as the impact will be confined to a localised area.

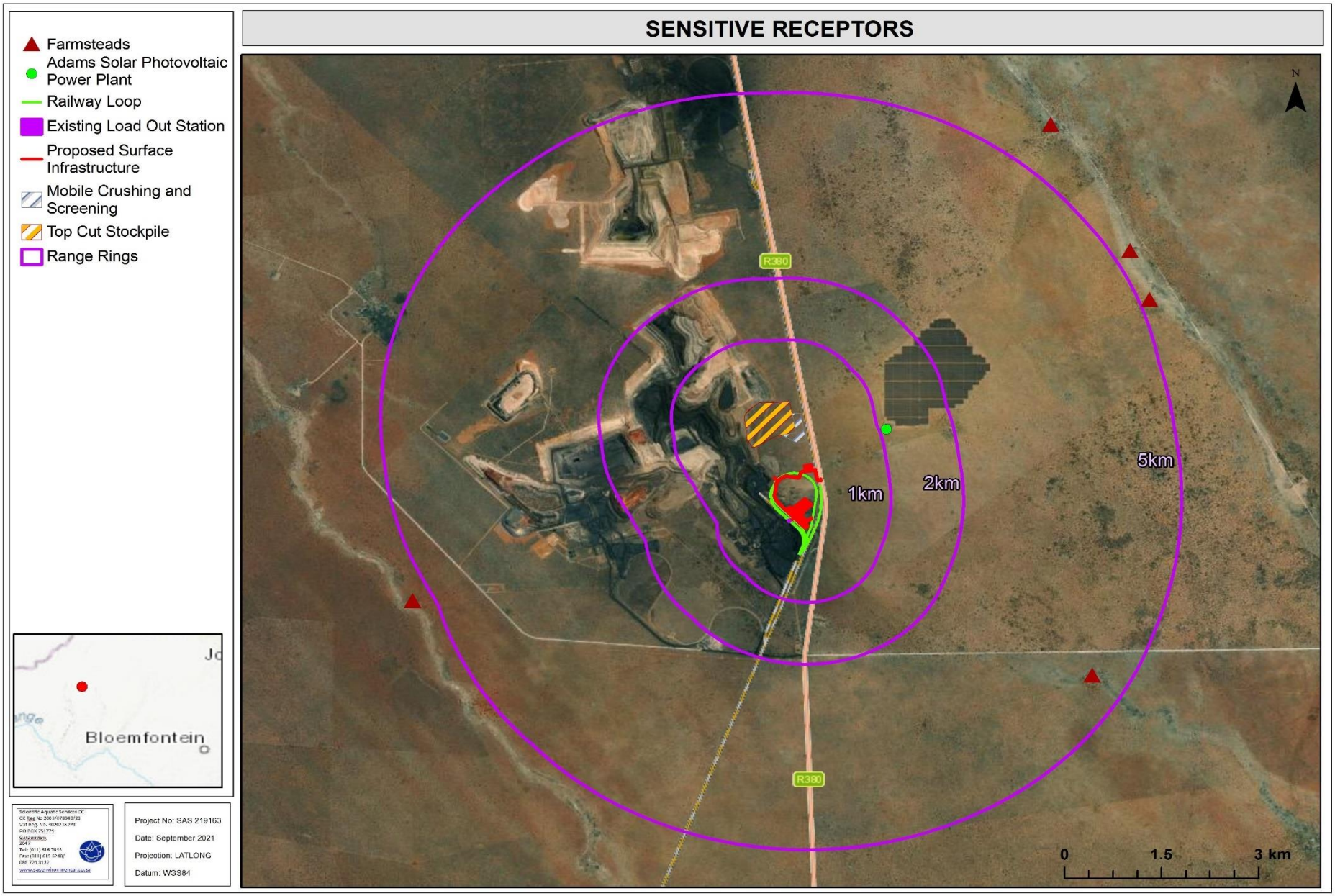


Figure 4: Map indicating the location of sensitive receptors within 5km of the proposed top-cut stockpile.

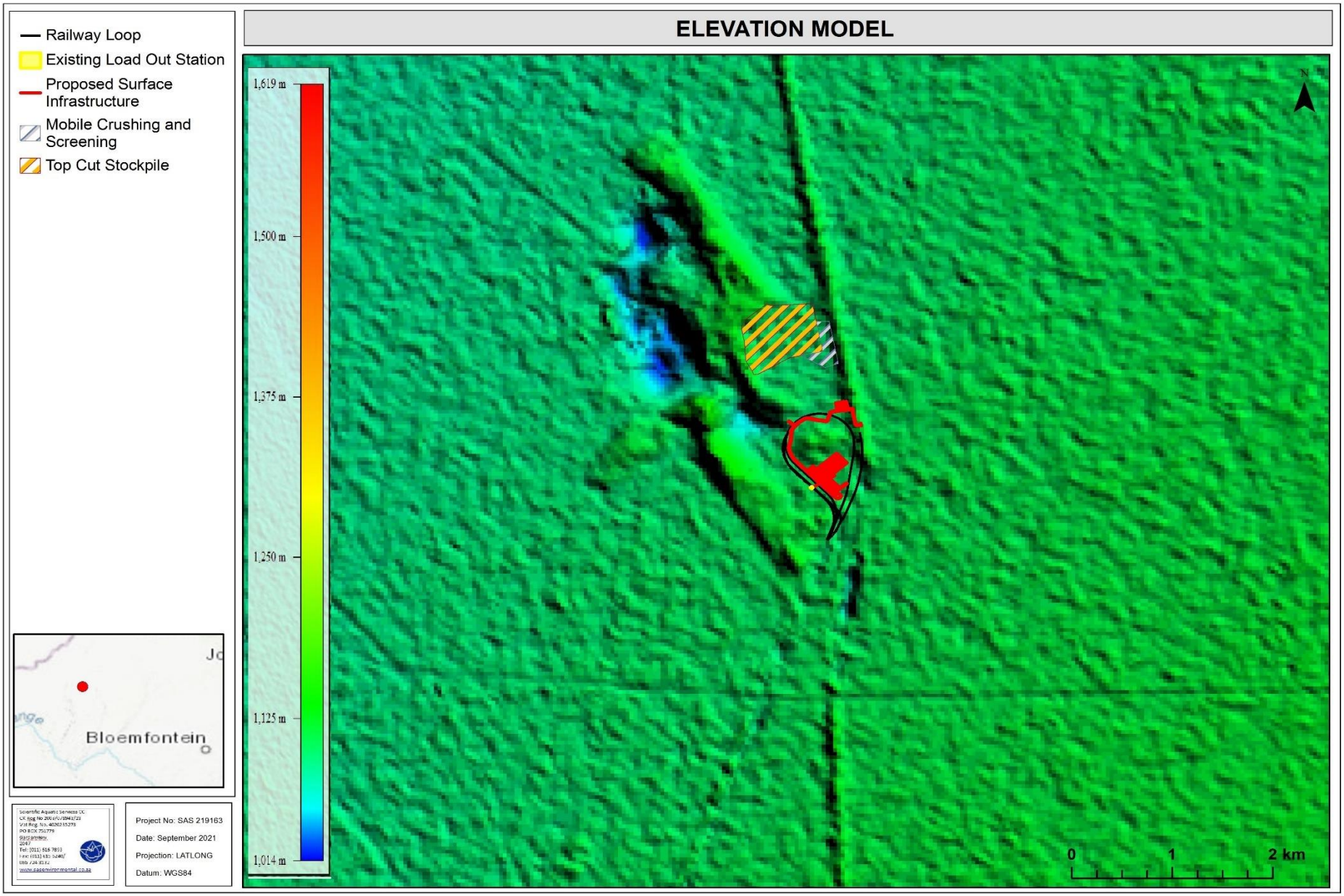


Figure 5: False colour elevation rendering depicting the topographical character of the MMT expansion activities.

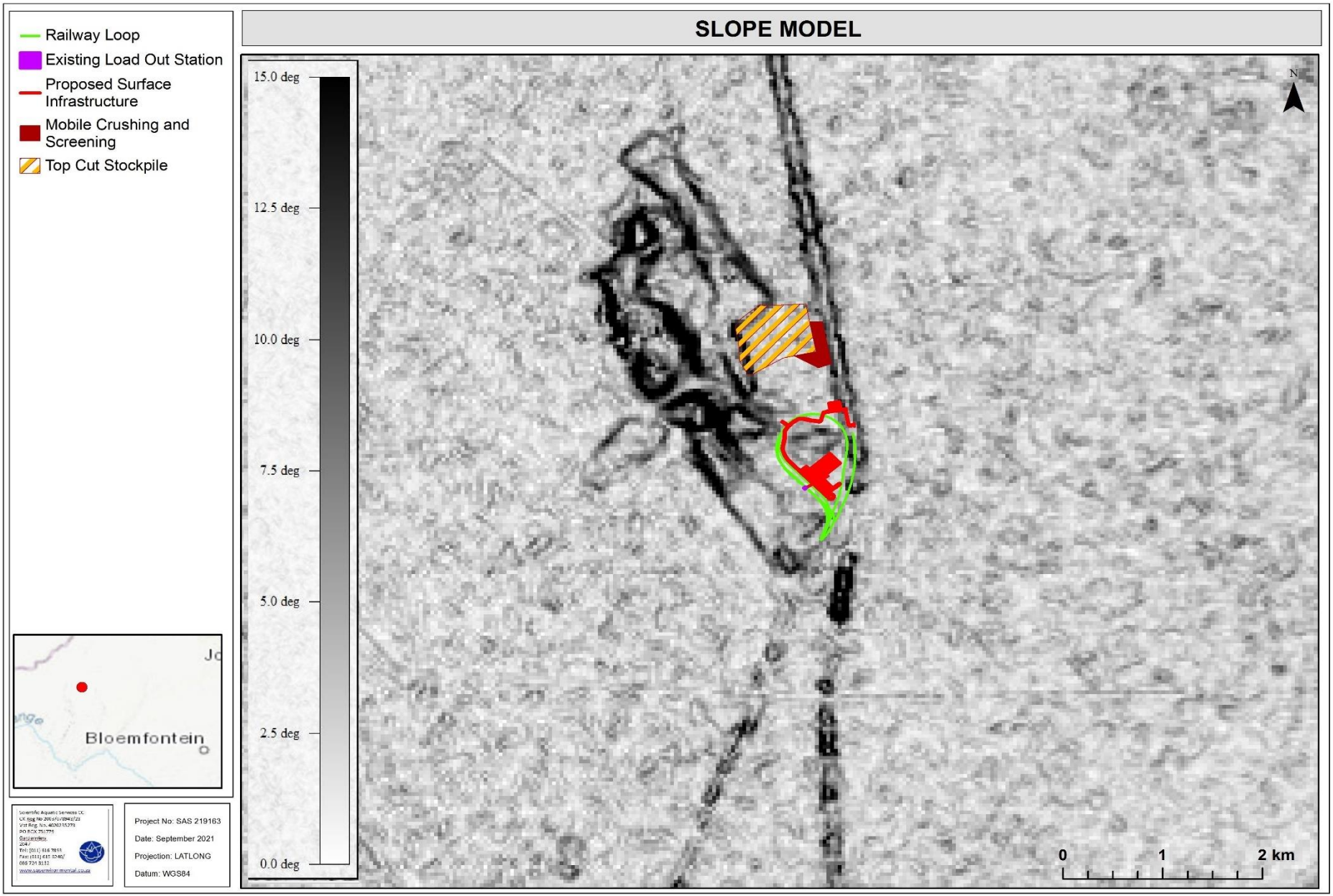


Figure 6: Monochromatic map indicating the general relief associated with the MMT expansion activities.

6. IMPACT ASSESSMENT

Potential impacts on the visual environment associated with the region surrounding the project area as a result of the proposed top-cut stockpile area and based on available information, are discussed in the sections below, according to the method outlined in Appendix B. This section presents an assessment of the significance of the impacts prior to mitigation and management measures being put in place and taking into consideration the available mitigatory measures, assuming that they are fully implemented.

After consideration of the findings of these assessments, recommendations and mitigation measures have been developed which will assist in minimising the proposed project's visual impact throughout the various development phases of the project. The mitigation measures outlined would serve to minimise the potential visual impacts identified to lower significance levels.

6.1 Impact Discussion

Since the proposed top-cut stockpile is situated adjacent to existing waste rock dumps which are of the same height, the visual impact is already present in the area and receptors (i.e. farmers and farm workers traveling along the R380 on a regular basis) within the vicinity thereof have grown accustomed to the dumps. As a result, the proposed establishment of the proposed top-cut stockpile is likely to have a minimal visual impact on the receiving environment. A visual impact will only be experienced if there are sensitive receptors present to experience the impact, thus in this context the receptors that are present are sparse and far from the proposed top-cut stockpile area, thus there are not likely to be many visual impacts experienced. In addition to the sparse receptors the bushveld vegetation of the area limits the view of the observer to the immediate vicinity, rendering a very low visual intrusion of the proposed top-cut stockpile and mobile crushing and screening plant. It should be noted that the R380 roadway is situated directly east of the proposed expansion activities, thus the proposed expansion activities are in the foreground of motorists traveling along the road, and will observe the proposed expansion activities. Due to the landscape already degraded by existing anthropogenic structures (OHPL, waste rock dumps, stockpiles etc.) the proposed MMT expansion activities will not have a significant visual impact on the R380 roadway. Additionally, the road is utilised predominantly by mine and farm workers which are accustomed to the existing mining infrastructure and they have momentary views of the surroundings. Furthermore, the proposed expansion activities are situated within the

Gamagara Corridor which is the mining belt of the Northern Cape, thus it does not stray from the land use of the Corridor.

When considering the development phases of the proposed project, the construction and operational phase will have the highest visual intrusion due to the removal of vegetation and levelling of the ground in preparation for the proposed expansion activities, thus increased vehicular movement in the area. Additionally, the stockpiling of material and thus the increase in the height of the proposed top-cut stockpile will also likely have a high visual intrusion. The points below briefly describe the visual impacts the proposed project will have during the mining and associated construction phase:

- The sense of place of the area will shift from calmness and tranquillity to busy due to vehicular and mine worker movement in the area during the preparation of the area and removal of vegetation for the proposed stockpiling and handling of material. The MMT will only be observable within a small radius and a short distance along the R380 roadway;
- Visual contrast to the surrounding environment may occur as the red / yellow mobile crushing and screening plant may be clearly noticeable from the green and brown background formed by the vegetation and the waste rock dumps;
- Direct visual exposure of the mining activities will occur for road users (mine workers, farmers and occasional tourists) traveling on the R380, as well as indirectly through fugitive dust generated by the earthworks and dumping of the top-cut stockpile material on a windy day. Fugitive dust generated from the workings at the mobile crushing and screening plant will also be visible from the R380 roadway;
- The only form of lighting that will be associated with the proposed top-cut stockpile is in the event that the mine requires mining vehicles to dump the material at night on occasion, thus the visual impact associated with night time lighting is negligible.
- The product stockpile stacker and reclaimer associated with the railway loop and the mobile crushing and screening plant will have limited stationary security lighting, thus it is likely to contribute in a limited manner to the effects of skyglow, however the lighting associated with other infrastructure of the MMT and Thsipi Mine will be more visible due to the larger scale of these operations; and
- Since the proposed top-cut stockpile will be the same height as the existing adjacent waste rock dumps and similar in colour, the proposed top-cut stockpile will be indistinguishable from the surrounding environment, as is evident in Figure 6 below. Since the proposed project is situated within the mining belt of the Northern Cape (Gamagara Corridor) the project will not be discordant with the land use and landscape character of the area. Furthermore, due to the bushveld vegetation and distance of the

sensitive receptors from the proposed project, situated further than 3km, the proposed top-cut stockpile will not be visible to these receptors, as is evident in Figure 7 below.

Figure 7: Conceptual rendering of the view from the R380 adjacent to the proposed top-cut stockpile where it will be visible, but indistinguishable from the existing waste rock dumps.

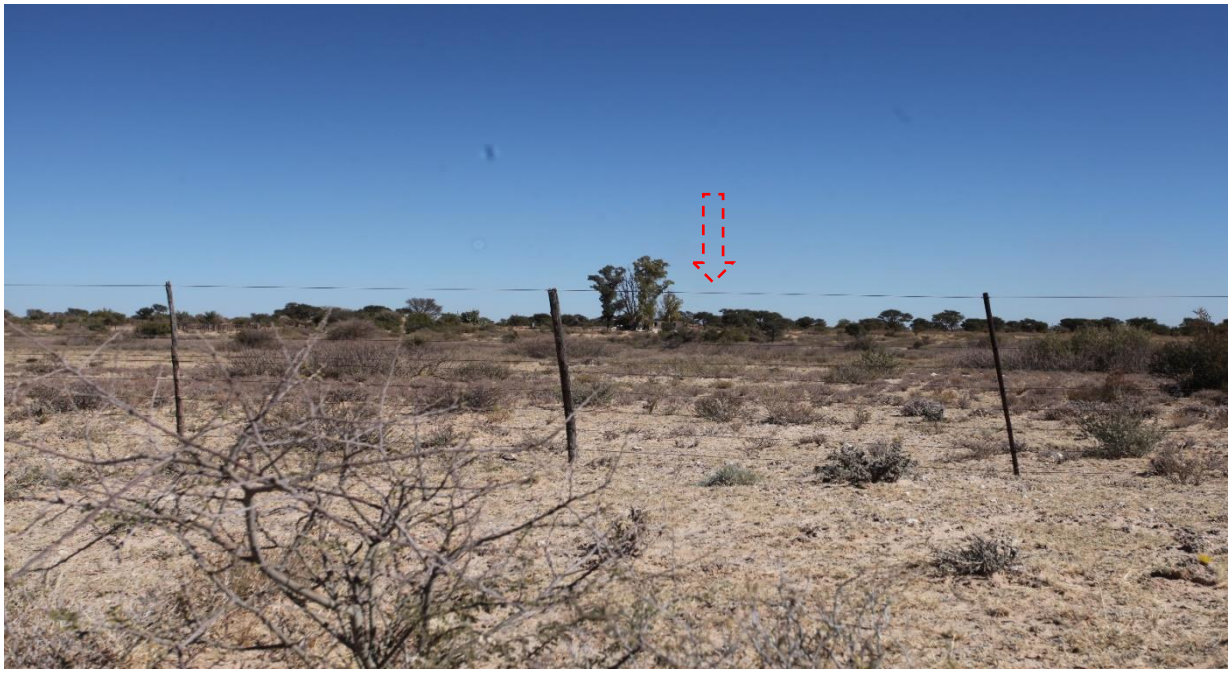


Figure 8: Conceptual rendering of the view from a farm house approximately 5.2km to the east where the proposed top cut stockpile will not be visible, as indicated by the dashed red arrow.

Activities and aspects register

The table below identifies potential activities that might take place during the various phases of the proposed development, which could possibly impact on the landscape character and sense of place of the area. It should be noted that these activities listed in the table below were utilised during the impact assessment as pre-mitigated impacts to ascertain the significance of the perceived impacts prior to mitigation measures.

Preconstruction and construction	Operational	Decommissioning and closure
Site clearing of the proposed top-cut stockpile area	On-going mining activities, including potentially increasing the height and extent of the top-cut stockpile resulting in it being closer to the R380 roadway	Potential ineffective rehabilitation leading to poor vegetation cover with bare areas remaining present
Site preparation, vegetation clearance and establishment of the top-cut stockpile	Potential contrast between the proposed top-cut stockpile material and existing adjacent waste rock dumps, due to the vegetation not established on the proposed top-cut stockpile	Ongoing proliferation of alien vegetation
Potential lighting at night if the mine requires top-cut material to be dumped at night	Potential increased introduction and proliferation of alien plant species leading to further change in landscape character	Stationary and vehicle mounted lighting during the decommissioning and rehabilitation phase
Potential lighting at night should the mobile crushing and screening plant be operational 24 hours a day 7 days a week	Vehicular movement and stockpiling of top-cut material leading to increased dust suspension	
	Increased amount of human activity and presence of mining vehicles affecting the sense of place	
	Potential lighting at night from operational vehicles	
	Maintenance activities conducted at night	

6.1.1 IMPACT 1: Impact on Sensitive Receptors

The MMT is situated in a remote area where a very limited number of sensitive receptors are present, with the Adams Solar Photovoltaic Power Plant and R380 roadway being the only receptors situated within a 2 km radius and all other receptors situated further than 4km from the MMT. Furthermore, the proposed top-cut stockpile is likely to be indistinguishable from the surrounding environment due to the adjacent existing waste rock dumps being the same height as the proposed top-cut stockpile. Even though the terrain is relatively flat, the bushveld vegetation of the area limits the view of the observer to the immediate vicinity, thus an observer would have to be at a higher elevation and closer than 1 km to the proposed expansion activities to have a view thereof.

The MMT is situated within the Gamagara Corridor which is the mining belt of the John Taolo Gaetsewe and Siyanda districts and focuses on mining of iron and manganese, thus the proposed expansion activities remains within the character and common mining land use of the area. As such the receptors that are present in the area are generally accustomed to the mining activities within the region as various mines are present (Sishen, MMT, Kathu, Black Rock etc.), although some tourists may pass through the area traveling to Botswana. Since a visual impact will only occur when there are sensitive receptors present to experience the impact, the proposed expansion activities will have a low visual impact due to the very limited number of sensitive receptors present.

Phase	Intensity	Duration	Extent	Consequence	Probability	Significance
Unmanaged						
Construction	L	L	L	Low	M	Very Low
Operational	L	L	L	Low	M	Very Low
Decommissioning	L	L	L	Low	M	Very Low
Managed						
Construction	L	L	L	Low	M	Very Low
Operational	L	L	L	Low	M	Very Low
Decommissioning	L	L	L	Low	M	Very Low

6.1.2 IMPACT 2: Impacts due to Night Time Lighting

The proposed top-cut stockpile does not have any stationary lighting sources associated with it, hence the only form of lighting that is likely to be associated with the proposed top-cut stockpile is if the mining vehicles should dump the top-cut material at night or when maintenance activities are taking place in the vicinity of the proposed top-cut stockpile. The

proposed top-cut stockpile will therefore not contribute to the effects of skyglow or light pollution. In conclusion, the visual impact associated with night time lighting of the topsoil stockpile is considered negligible. It should be noted that the impact due to night time lighting was scored based on the assumption that no dumping of material will take place at night.

It should be noted that the product stockpile stacker and reclaimers associated with the proposed railway loop will have limited stationary security lighting during the operational phase, thus it is likely to contribute in a limited manner to the effects of skyglow, however the lighting associated with other infrastructure of the MMT will be more visible as it is on a large scale. The mobile crushing and screening plant will also have limited stationary security lighting associated with it; thus it will have limited contributions to the effects of skyglow. The impact assessment below was assessed on the assumption that the operations of the mobile crushing and screening plant and product stockpile stacker and reclaimer will not take place 24 hours a day 7 days a week, but is restricted to daylight hours.

Phase	Intensity	Duration	Extent	Consequence	Probability	Significance
Unmanaged						
Construction	VL	VL	VL	Very Low	VL	Insignificant
Operational	VL	VL	VL	Very Low	VL	Insignificant
Decommissioning	VL	VL	VL	Very Low	VL	Insignificant
Managed						
Construction	VL	VL	VL	Very Low	VL	Insignificant
Operational	VL	VL	VL	Very Low	VL	Insignificant
Decommissioning	VL	VL	VL	Very Low	VL	Insignificant

6.2 Cumulative Impacts

Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. Cumulative visual impacts resulting from landscape modifications as a result of the proposed top-cut stockpile is of low significance, due to existing mining activities within the area (Mamatwan, Tshipi Mine, Sishen Mine and Kathu) as well as the area being within the Gamagara Corridor which is the mining belt of the John Taolo Gaetsewe and Siyanda districts. Since the proposed top-cut stockpile is situated within the mining belt, the cumulative impact thereof is not considered significant, as receptors within the area are generally accustomed to mining activities. These receptors include mine workers, farmers, contract workers and occasional tourists passing through the area.

Cumulative visual impacts resulting from the night time lighting associated with the existing mines in the area (MMT, Tshipi Mine, Sishen Mine, Black Rock Mine and Kathu Mine) as well as from the towns (Kuruman, Hotazel, and Kathu) are considered of low significance due to the distance between these areas as well as the screening provided by the bushveld vegetation.

6.3 Mitigation Measures

The mitigation measures outlined below would serve to minimise the visual impacts during the various development phases of the project:

- The development footprint and disturbed areas surrounding the proposed top-cut stockpile should be kept as small as possible and the areas cleared of natural vegetation and topsoil must be kept to a minimum;
- All construction areas must be kept in a neat and orderly condition at all times;
- Existing vegetation, with particular reference to tall trees and larger shrubs adjacent to the R380 and in the vicinity of the proposed expansion activities must be retained, in order to partly obscure the view toward the proposed top-cut stockpile and railway loop;
- Should it be deemed feasible, the topsoil stockpile should be vegetated with indigenous species to reduce the visual impact of the soil contrast;
- Construction and operation activities should be limited to be undertaken between 6am and 6pm, in order to limit the need for bright floodlighting and the potential for skyglow;
- It is recommended that the mobile crushing and screening plant as well as the product stockpile stacker and reclaimer make use of neutral colours and the use of highly reflective material should be avoided. Any metal surfaces should be painted to fit in with the natural environment in a colour that blends in effectively with the background;
- All lights used for illumination at the mobile crushing and screening plant and product stockpile stacker and reclaimer (except for lighting associated with security) should be faced inwards and shielded to avoid light escaping above the horizon; and
- Security lighting required at night during the operational phase of the product stockpile stacker and reclaimer at the railway loop and mobile crushing and screening plant, should use minimum lumen or wattage in light fixtures. Furthermore, making use of motion detectors on security lighting, where possible, ensures that the site will remain in relative darkness, until lighting is required for security or operational purposes.

7 CONCLUSION

Scientific Aquatic Services (SAS) was appointed to conduct a Visual Impact Assessment (VIA) as part of the environmental assessment and authorisation process for the proposed Mamatwan Mine Project, near Hotazel, Northern Cape Province. The Mamatwan Mine (MMT) is located within the John Taolo Gaetsewe District Municipality and the Joe Morolong Local Municipality.

The MMT is situated approximately 17km south of the town of Hotazel, 32,6km north of the town of Kathu and 43km west of the town of Kuruman. The R380 runs directly adjacent to the MMT in a north-south direction from Hotazal to Kathu, the M31 roadway is located approximately 14km east of MMT and the N14 highway is located approximately 24km southeast of the MMT.

The proposed MMT expansion activities include the following:

- Establishment of a top-cut stockpile and associated crushing and screening plant;
- Upgrading the railway and railway loadout station;
- Changes to the waste rock dump heights;
- Establishment of a pipeline to transport abstracted water from Middelplaats Mine to MMT; and
- Establishment of stormwater infrastructure.

Since the proposed railway loop and pipeline will be at ground level and the bushveld vegetation limits the view to the immediate vicinity, it was deemed unnecessary to assess these infrastructure components in detail as the visual impact will be negligible on the receiving environment. It is also notable that the extent of the new portion of the railway loop is further form the road than the existing railway line and OHPL. It will therefore partially fade into the background and not be highly visible. Furthermore, due to the limited height of the overhead powerlines (OHPL) associated with the proposed railway loop and the existing OHPL present, the visual intrusion thereof is considered limited as the only receptors that will observe the OHPL are motorists traveling on the R380 which are mostly mine workers and farmers and on occasion tourists. In this context, the proposed railway loop and its associated OHPL will not be regarded as an unwelcome intrusion in the already affect landscape. Furthermore, the proposed railway loop and associated OHPL will only be visible from the R380 roadway for a short distance, due to the bushveld vegetation screening it the further away the motorist travels from the proposed railway loop.

The objective of this study was to provide sufficient information on the visual environment of the area, together with other studies on the physical and socio-cultural environment, in order for the relevant authorities to apply the principles of Integrated Environmental Management (IEM) and the concept of sustainable development. The need for conservation as well as the risks to other spheres of the physical and socio-cultural environment need to be compared and considered along with the need to ensure economic development of the country.

Even though the terrain is relatively flat, the bushveld vegetation of the area limits the view of the observer to the immediate vicinity. Additionally, the MMT is situated within the Gamagara Corridor which is the mining belt of the John Taolo Gaetsewe and Siyanda districts and focuses on mining of iron and manganese, thus the proposed MMT expansion activities remains within the mining land use of the area.

A visual impact will only occur if there are sensitive receptors present in the area to observe or experience the impact. Based on the desktop and field assessment it is evident that the MMT is situated within a remote area where there are very limited number of receptors present, with the Adams Solar Photovoltaic Power Plant and the R380 roadway being the only receptors situated within a 2 km radius and all other receptors situated further than 4km from the MMT. Furthermore, the Adams Solar Photovoltaic Power Plant and R380 roadway are considered moderate sensitive receptors, as workers at the Solar Plant are likely to focus on their work at hand rather than the surroundings and motorists traveling on the R380 are focusing on the road and have a limited view time of the surroundings. The proposed top-cut stockpile is therefore expected to have a minimal visual impact on the receiving environment.

Based on the impact assessment, it was evident that the proposed top-cut stockpile and mobile crushing and screening plant has a low visual impact on the surrounding environment. This is mainly attributed to the very limited number of sensitive receptors present within a 4km radius as well as the bushveld vegetation limiting the view and the fact that the proposed MMT expansion activities are situated within the mining belt of the above mentioned districts, thus it is in keeping with the land use of the area. As the proposed top-cut stockpile does not have any fixed lighting associated with it, there will be no visual impact of night time lighting on the receiving environment. The mobile crushing and screening plant as well as the product stockpile stacker and reclaimer will have limited lighting associated with it, thus it is likely to contribute in a limited manner to the effects of skyglow, however the lighting associated with the MMT will be more visible as it is at a larger scale.

8 REFERENCES

Astronomical Society of South Australia. 2012. *Light pollution brochure.*

Bureau of Land Management, 1984, *Visual Resource Management,* BLM Manual Handbook 8400, Release 8-24, U.S. Department of the Interior, Washington, DC.

Bureau of Land Management, 1986, *Visual Resource Contrast Rating,* BLM Manual Handbook 8431-1, Release 8-30, U.S. Department of the Interior, Washington, DC, Jan.

Bureau of Land Management, 1986, *Visual Resource Inventory,* BLM Manual Handbook 8410-1, Release 8-28, U.S. Department of the Interior, Washington, DC, Jan.

Bureau of Land Management, U.S. Department of Interior. 2004. *Bureau of Land Management Visual Resource Inventory Classes, Appendix C:* Visual Absorption Capacity

Bureau of Land Management. *Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands.* First Edition 2013

Century Development. 2018. Construction Method Statement Sidewalk and Earth Dam Construction for portion 5, 187, 202 and 601 of farm Zevenfontein.

Department of the Environment and Local Government, Ireland 2000. *Landscape and Landscape Assessment.* Consultation Draft of Guidelines for Planning Authorities.

ILP 2011. *Guidance notes for the reduction of obtrusive light.* GN01: 2011, Rugby: Institute of Lighting Professionals

Mucina, L. & Rutherford, M.C. (eds.). 2012. *The Vegetation of South Africa, Lesotho and Swaziland.* Strelitizia 19. South African National Biodiversity Institute, Pretoria, South Africa.

Oberholzer, B., 2005. *Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1.* CSIR Report No. ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Swanwick, C. and Land Use Consultants. 2002. *Landscape character assessment guidance for England and Scotland,* Cheltenham: Countryside Agency and Battle by: Scottish National Heritage.

The Landscape Institute, Institute of Environmental Management and Assessment, 2002. Second Edition *Guidelines for Visual and Landscape Impact Assessment.* E & FN Spon, London.

The Landscape Institute, Institute of Environmental Management and Assessment, 2013. Third Edition, *Guidelines for Visual and Landscape Impact Assessment.* E & FN Spon, London.

The Landscape Institute, Institute of Environmental Management and Assessment, 2013. Third Edition, *Guidelines for Visual and Landscape Impact Assessment*. E & FN Spon, London.

APPENDIX A – METHOD OF ASSESSMENT

Level of Assessment

The following methods of assessment for determining the level of detail of the assessment was utilised in this report (Oberholzer, 2005):

Table B1: Categories of development and impact severity.

Type of environment	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, 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, 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, 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 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

The following key provides an explanation to the categories of development:

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

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

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

Category 4 development:
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 development:
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, large scale infrastructure generally. Large-scale development of agricultural land and commercial tree plantations. Quarrying and mining activities with related processing plants.

The following box explains the nature of the impacts:

Very high visual impact expected:
Potentially significant effect on wilderness quality or scenic resources;
Fundamental change in the visual character of the area;
Establishes a major precedent for development in the area.

High visual impact expected:
Potential intrusion on protected landscapes or scenic resources;
Noticeable change in visual character of the area;
Establishes a new precedent for development in the area.

Moderate visual impact expected:
Potentially some effect on protected landscapes or scenic resources;
Some change in the visual character of the area;
Introduces new development or adds to existing development in the area.

Minimal visual impact expected:
Potentially low level of intrusion on landscapes or scenic resources;
Limited change in the visual character of the area;
Low-key development, similar in nature to existing development.

Little or no visual impact expected:
Potentially little influence on scenic resources or visual character of the area;
Generally compatible with existing development in the area;
Possible scope for enhancement of the area.

From the above, the severity of the impact determines the level of the assessment:

Table B2: Impact assessment level of input determination.

Approach	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	Very high visual impact expected
Level of visual input recommended	Level 1	Level 2	Level 3	Level 4	

The following box explains the inputs required at each level of assessment. As indicated in Section 5.2, a Level 4 assessment is required for the proposed project (Oberholzer, 2005).

Level 1 input:
Identification of issues, and site visit;
Brief comment on visual influence of the project and an indication of the expected impacts / benefits.

Level 2 input:
Identification of issues raised in scoping phase, and site visit;
Description of the receiving environment and the proposed project;
Establishment of Receptor Site area and receptors;
Brief indication of potential visual impacts, and possible mitigation measures.

Level 3 assessment:
Identification of issues raised in scoping phase, and site visit;
Description of the receiving environment and the proposed project;
Establishment of Receptor Site area, view corridors, viewpoints and receptors;
Indication of potential visual impacts using established criteria;
Inclusion of potential lighting impacts at night;
Description of alternatives, mitigation measures and monitoring programmes.
Review by independent, experienced visual specialist (if required).

Level 4 assessment:
As per Level 3 assessment, plus complete 3D modelling and simulations, with and without mitigation.
Review by independent, experienced visual specialist (if required).

APPENDIX B – IMPACT ASSESSMENT METHODOLOGY

PART A: DEFINITIONS AND CRITERIA*		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of intensity, spatial extent and duration**
Criteria for ranking of the INTENSITY of environmental impacts	**VH**	Severe change, disturbance or degradation. Associated with severe consequences. May result in severe illness, injury or death. Targets, limits and thresholds of concern continually exceeded. Substantial intervention will be required. Vigorous/widespread community mobilization against project can be expected. May result in legal action if impact occurs.
	H	Prominent change, disturbance or degradation. Associated with real and substantial consequences. May result in illness or injury. Targets, limits and thresholds of concern regularly exceeded. Will definitely require intervention. Threats of community action. Regular complaints can be expected when the impact takes place.
	M	Moderate change, disturbance or discomfort. Associated with real but not substantial consequences. Targets, limits and thresholds of concern may occasionally be exceeded. Likely to require some intervention. Occasional complaints can be expected.
	L	Minor (Slight) change, disturbance or nuisance. Associated with minor consequences or deterioration. Targets, limits and thresholds of concern rarely exceeded. Require only minor interventions or clean-up actions. Sporadic complaints could be expected.
	VL	Negligible change, disturbance or nuisance. Associated with very minor consequences or deterioration. Targets, limits and thresholds of concern never exceeded. No interventions or clean-up actions required. No complaints anticipated.
	VL+	Negligible change or improvement. Almost no benefits. Change not measurable/will remain in the current range.
	L+	Minor change or improvement. Minor benefits. Change not measurable/will remain in the current range. Few people will experience benefits.
	M+	Moderate change or improvement. Real but not substantial benefits. Will be within or marginally better than the current conditions. Small number of people will experience benefits.
	H+	Prominent change or improvement. Real and substantial benefits. Will be better than current conditions. Many people will experience benefits. General community support.
	VH+	Substantial, large-scale change or improvement. Considerable and widespread benefit. Will be much better than the current conditions. Favourable publicity and/or widespread support expected.
Criteria for ranking the DURATION of impacts	**VL**	Very short, always less than a year. Quickly reversible
	L	Short-term, occurs for more than 1 but less than 5 years. Reversible over time.
	M	Medium-term, 5 to 10 years.
	H	Long term, between 10 and 20 years. (Likely to cease at the end of the operational life of the activity)
	VH	Very long, permanent, +20 years (Irreversible. Beyond closure)
Criteria for ranking the EXTENT of impacts	**VL**	A part of the site/property.
	L	Whole site.
	M	Beyond the site boundary, affecting immediate neighbours
	H	Local area, extending far beyond site boundary.
	VH	Regional/National

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
Very High	Potential fatal flaw unless mitigated to lower significance.
High	It must have an influence on the decision. Substantial mitigation will be required.
Medium	It should have an influence on the decision. Mitigation will be required.
Low	Unlikely that it will have a real influence on the decision. Limited mitigation is likely required.
Very Low	It will not have an influence on the decision. Does not require any mitigation
Insignificant	Inconsequential, not requiring any consideration.

***VH = very high, H = high, M= medium, L= low and VL= very low and + denotes a positive impact.**

PART B: DETERMINING CONSEQUENCE							
INTENSITY = VL							
DURATION	Very long	**VH**	**Low**	**Low**	**Medium**	**Medium**	**High**
	Long term	**H**	**Low**	**Low**	**Low**	**Medium**	**Medium**
	Medium term	**M**	**Very Low**	**Low**	**Low**	**Low**	**Medium**
	Short term	**L**	**Very low**	**Very Low**	**Low**	**Low**	**Low**
	Very short	**VL**	**Very low**	**Very Low**	**Very Low**	**Low**	**Low**
INTENSITY = L							
DURATION	Very long	**VH**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Long term	**H**	**Low**	**Medium**	**Medium**	**Medium**	**High**
	Medium term	**M**	**Low**	**Low**	**Medium**	**Medium**	**Medium**
	Short term	**L**	**Low**	**Low**	**Low**	**Medium**	**Medium**
	Very short	**VL**	**Very low**	**Low**	**Low**	**Low**	**Medium**
INTENSITY = M							
DURATION	Very long	**VH**	**Medium**	**High**	**High**	**High**	**Very High**
	Long term	**H**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Short term	**L**	**Low**	**Medium**	**Medium**	**Medium**	**High**
	Very short	**VL**	**Low**	**Low**	**Low**	**Medium**	**Medium**
INTENSITY = H							
DURATION	Very long	**VH**	**High**	**High**	**High**	**Very High**	**Very High**
	Long term	**H**	**Medium**	**High**	**High**	**High**	**Very High**
	Medium term	**M**	**Medium**	**Medium**	**High**	**High**	**High**
	Short term	**L**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Very short	**VL**	**Low**	**Medium**	**Medium**	**Medium**	**High**
INTENSITY = VH							
DURATION	Very long	**VH**	**High**	**High**	**Very High**	**Very High**	**Very High**
	Long term	**H**	**High**	**High**	**High**	**Very High**	**Very High**
	Medium term	**M**	**Medium**	**High**	**High**	**High**	**Very High**
	Short term	**L**	**Medium**	**Medium**	**High**	**High**	**High**
	Very short	**VL**	**Low**	**Medium**	**Medium**	**High**	**High**

VL	L	M	H	VH
A part of the site/ property	Whole site	Beyond the site, affecting neighbours	Extending far beyond site but localised	Regional/ National
EXTENT				

PART C: DETERMINING SIGNIFICANCE							
PROBABILITY (of exposure to impacts)	Definite/ Continuous	VH	Very Low	Low	Medium	High	Very High
	Probable	H	Very Low	Low	Medium	High	Very High
	Possible/ frequent	M	Very Low	Very Low	Low	Medium	High
	Conceivable	L	Insignificant	Very Low	Low	Medium	High
	Unlikely/ improbable	VL	Insignificant	Insignificant	Very Low	Low	Medium
			VL	L	M	H	VVH
			CONSEQUENCE				

Mitigation measure development

According to the DEA *et al.,* (2013) "Rich biodiversity underpins the diverse ecosystems that deliver ecosystem services that are of benefit to people, including the provision of basic services and goods such as clean air, water, food, medicine and fibre; as well as more complex services that regulate and mitigate our climate, protect people and other life forms from natural disaster and provide people with a rich heritage of nature-based cultural traditions. Intact ecological infrastructure contributes significant savings through, for example, the regulation of natural hazards such as storm surges and flooding by which is attenuated by wetlands".

According to the DEA *et al.,* (2013) Ecosystem services can be divided into 4 main categories:

- Provisioning services are the harvestable goods or products obtained from ecosystems such as food, timber, fibre, medicine, and fresh water;
- Cultural services are the non-material benefits such as heritage landscapes and seascapes, recreation, ecotourism, spiritual values and aesthetic enjoyment;
- Regulating services are the benefits obtained from an ecosystem's control of natural processes, such as climate, disease, erosion, water flows, and pollination, as well as protection from natural hazards; and
- Supporting services are the natural processes such as nutrient cycling, soil formation and primary production that maintain the other services.

Loss of biodiversity puts aspects of the economy, wellbeing and quality of life at risk, and reduces socio-economic options for future generations. This is of particular concern for the poor in rural areas who have limited assets and are more dependent on common property resources for their livelihoods. The importance of maintaining biodiversity and intact ecosystems for ensuring on-going provision of ecosystem services, and the consequences of ecosystem change for human well-being, were detailed in a global assessment entitled the Millennium Ecosystem Assessment (MEA, 2005), which established a scientific basis for the need for action to enhance management and conservation of biodiversity.

Sustainable development is enshrined in South Africa's Constitution and laws. The need to sustain biodiversity is directly or indirectly referred to in a number of Acts, not least the National Environmental Management: Biodiversity Act (No. 10 of 2004) (hereafter referred to as the Biodiversity Act), and is fundamental to the notion of sustainable development. In addition, International guidelines and commitments as well as national policies and strategies are important in creating a shared vision for sustainable development in South Africa (DEA *et al.,* 2013).

The primary environmental objective of the Mineral and Petroleum Resources Development Act (MPRDA) is to give effect to the environmental right contained in the South African Constitution. Furthermore, Section 37(2) of the MPRDA states that "any prospecting or mining operation must be conducted in accordance with generally accepted principles of sustainable development by integrating social, economic and environmental factors into the planning and implementation of prospecting and mining projects in order to ensure that exploitation of mineral resources serves present and future generations".

Pressures on biodiversity are numerous and increasing. According to the DEA *et al.,* (2013) Loss of natural habitat is the single biggest cause of biodiversity loss in South Africa and much of the world. The most severe transformation of habitat arises from the direct conversion of natural habitat for human requirements, including[1]:

- Cultivation and grazing activities;
- Rural and urban development;
- Industrial and mining activities, and
- Infrastructure development.

Impacts on biodiversity can largely take place in four ways (DEA *et al.,* 2013):

- **Direct impacts:** are impacts directly related to the project including project aspects such as site clearing, water abstraction and discharge of water from riverine resources;
- **Indirect impacts:** are impacts associated with a project that may occur within the zone of influence in a project such as surrounding terrestrial areas and downstream areas on water courses;
- **Induced impacts:** are impacts directly attributable to the project but are expected to occur due to the activities of the project. Factors included here are urban sprawl and the development of associated industries; and
- **Cumulative impacts:** can be defined as the sum of the impact of a project as well as the impacts from past, existing and reasonably foreseeable future projects that would affect the same biodiversity resources. Examples include numerous mining operations within the same drainage catchment or numerous residential developments within the same habitat for faunal or floral species.

Given the limited resources available for biodiversity management and conservation, as well as the need for development, efforts to conserve biodiversity need to be strategic, focused and supportive of sustainable development. This is a fundamental principle underpinning South Africa's approach to the management and conservation of its biodiversity and has resulted the definition of a clear mitigation strategy for biodiversity impacts.

'Mitigation' is a broad term that covers all components of the 'mitigation hierarchy' defined hereunder. It involves selecting and implementing measures – amongst others – to conserve biodiversity and to protect, the users of biodiversity and other affected stakeholders from potentially adverse impacts as a result of mining or any other land use. The aim is to prevent adverse impacts from occurring or, where this is unavoidable, to limit their significance to an acceptable level. Offsetting of impacts is considered to be the last option in the mitigation hierarchy for any project.

The mitigation hierarchy in general consists of the following in order of which impacts should be mitigated (DEA *et al.,* 2013):

- **Avoid/prevent impact:** can be done through utilising alternative sites, technology and scale of projects to prevent impacts. In some cases, if impacts are expected to be too high the "no project" option should also be considered, especially where it is expected that the lower levels of mitigation will not be adequate to limit environmental damage and eco-service provision to suitable levels;
- **Minimise impact:** can be done through utilisation of alternatives that will ensure that impacts on biodiversity and ecoservices provision are reduced. Impact minimisation is considered an essential part of any development project;
- **Rehabilitate impact** is applicable to areas where impact avoidance and minimisation are unavoidable where an attempt to re-instate impacted areas and return them to conditions which are ecologically similar to the pre-project condition or an agreed post project land use, for example arable land. Rehabilitation can however not be considered as the primary mitigation tool as even with significant resources and effort rehabilitation that usually does not lead to adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project. Practical rehabilitation should consist of the following phases in best practice:

[1] Limpopo Province Environment Outlook. A Report on the State of the Environment, 2002. Chapter 4.

- **Structural rehabilitation** which includes physical rehabilitation of areas by means of earthworks, potential stabilisation of areas as well as any other activities required to develop a long terms sustainable ecological structure;
- **Functional rehabilitation** which focuses on ensuring that the ecological functionality of the ecological resources on the study area supports the intended post closure land use. In this regard special mention is made of the need to ensure the continued functioning and integrity of wetland and riverine areas throughout and after the rehabilitation phase;
- **Biodiversity reinstatement** which focuses on ensuring that a reasonable level of biodiversity is re-instated to a level that supports the local post closure land uses. In this regard special mention is made of re-instating vegetation to levels which will allow the natural climax vegetation community of community suitable for supporting the intended post closure land use; and
- **Species reinstatement** which focuses on the re-introduction of any ecologically important species which may be important for socio-cultural reasons, ecosystem functioning reasons and for conservation reasons. Species re-instatement need only occur if deemed necessary.

➢ **Offset impact:** refers to compensating for latent or unavoidable negative impacts on biodiversity. Offsetting should take place to address any impacts deemed to be unacceptable which cannot be mitigated through the other mechanisms in the mitigation hierarchy. The objective of biodiversity offsets should be to ensure no net loss of biodiversity. Biodiversity offsets can be considered to be a last resort to compensate for residual negative impacts on biodiversity.

The significance of residual impacts should be identified on a regional as well as national scale when considering biodiversity conservation initiatives. If the residual impacts lead to irreversible loss or irreplaceable biodiversity the residual impacts should be considered to be of *very high significance* and when residual impacts are considered to be of *very high significance*, offset initiatives are not considered an appropriate way to deal with the magnitude and/or significance of the biodiversity loss. In the case of residual impacts determined to have *medium to high significance*, an offset initiative may be investigated. If the residual biodiversity impacts are considered of low significance no biodiversity offset is required.[2]

In light of the above discussion the following points present the key concepts considered in the development of mitigation measures for the proposed development.

- ➢ Mitigation and performance improvement measures and actions that address the risks and impacts[3] are identified and described in as much detail as possible.
- ➢ Measures and actions to address negative impacts will favour avoidance and prevention over minimisation, mitigation or compensation.
- ➢ Desired outcomes are defined, and have been developed in such a way as to be measurable events with performance indicators, targets and acceptable criteria that can be tracked over defined periods, with estimates of the resources (including human resource and training requirements) and responsibilities for implementation wherever possible.

Recommendations

Recommendations were developed to address and mitigate impacts associated with the proposed development. These recommendations also include general management measures which apply to the proposed development as a whole. Mitigation measures have been developed to address issues in all phases throughout the life of the operation from planning, through to construction and operation.

[2] Provincial Guideline on Biodiversity Offsets, Western Cape, 2007.
[3] Mitigation measures should address both positive and negative impacts

APPENDIX C – VEGETATION TYPE

Table C1: Kathu Bushveld Vegetation type associated with the proposed project area (Mucina & Rutherford, 2012)

Climate	Summer and autumn rainfall, very dry winters
Altitude (m)	960 – 1300
MAP* (mm)	300
MAT* (°C)	18.5
MFD* (Days)	27
MAPE* (mm)	2883
MASMS* (%)	85
Distribution	Northern Cape Province
Geology & Soils	Aeolian red sand and surface calcrete, deep (>1.2m) sandy soils of Hutton and Clovelly soil forms.
Conservation	Least Threatened. Target 16%. None statutorily conserved.
Vegetation & landscape features	Medium-tall tree layer with *Acacia erioloba* in places, but mostly open and including *Boscia albitrunca* as the prominent trees. Shrub layer generally most important with, for example, *A, mellifera, Diospyros lycioides* and *Lycium hirsutum.* Grass layer is variable in cover.

Dominant floral taxa		
Grass Species	**Herb Species**	**Tree/ Shrub Species**
Aristida meridionalis (d), *Brachiaria nigropedata* (d), *Centropodia glauca* (d), *Eragrostis lehmanniana* (d), *Schmidtia pappophoroides* (d), *Stipagrostis ciliata* (d), *Aristida congesta*, *Eragrostis biflora*, *E. chloromelas*, *E. heteromera*, *E. pallens*, *Melinis repens*, *Schmidtia kalahariensis*, *Stipagrostis uniplumis*, *Tragus berteronianus*.	*Acrotome inflata*, *Erlangea misera*, *Gisekia africana*, *Heliotropium ciliatum*, *Hermbstaedtia fleckii*, *H. odorata*, *Limeum fenestratum*, *L. viscosum*, *Lotononis platycarpa*, *Senna italica* subsp. *arachoides*, *Tribulus terrestris*.	**Tall Tree** *Acacia erioloba* (d) **Small Trees** *Acacia mellifera subsp. detinens (d),* *Boscia albitrunca (d),* *Terminalia sericea.* **Tall Shrubs** *Diospyros lycioides subsp. lycioides (d),* *Dichrostachys cinerea,* *Grewia flava,* *Gymnosporia buxifolia,* *Rhigozum brevispinosum.* **Low Shrubs** *Aptosimum decumbens,* *Grewia retinervis,* *Nolletia arenosa,* *Sida cordifolia,* *Tragia dioica.*

APPENDIX D – VISUAL RECEPTORS

The number of observers and their perception of the proposed project will have an impact on the VIA and also on the perceived sensitivity of the landscape. The perception of viewers is difficult to determine as there are many variables to consider, such as cultural background, state of mind, reason for the sighting and how often the project is viewed within a set period. It is therefore necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the project. It is also necessary to generalise the viewer sensitivity to the proposed project to some degree (Oberholzer, 2005).

The IEMA (2002) identifies a number of potential sensitive receptors that may be affected by a proposed development, namely:

- Users of recreational landscapes/ public footpaths and bridleways, including tourists and visitors;
- Residents;
- Users of public sports grounds and amenity open space;
- Users of public roads and railways;
- Workers; and
- Views of or from within valued landscapes.

The sensitivity of visual receptors and views will depend on:

- The location and context of the viewpoint;
- The expectation and occupation or activity of the receptor; and
- The importance of the view.

The most sensitive receptors may include:

- Users of outdoor recreational facilities, including public rights of way, whose attention or interest may be focused on the landscape;
- Communities where the development results in changes in the landscape setting or valued views enjoyed by the community; and
- Occupiers of residential properties with views affected by the development.

Other receptors include:

- People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscape of acknowledges importance or value);
- People travelling through or past the affected landscape in cars on trains or other transport routes;
- People at their place of work.

APPENDIX E – LANDSCAPE CHARACTER

Landscape character, from an aesthetic perspective, is mainly defined by natural determinants, such as vegetation, geology and topography, as well as cultural factors including land use, settlement patterns and the manner in which humans have transformed their natural surroundings. According to Swanwick (2002), landscape character may be defined as a distinct, recognisable and consistent pattern of elements in the landscape that makes it unique and provides it with a particular sense of place. Individual "landscape elements" that contribute to landscape character include hills, rolling plains, valleys, woods, trees, water bodies, as well as buildings and roads. "Landscape features" are those elements that are prominent or eye-catching.

Landscapes may be divided into landscape character types, which are defined as distinct types of landscape that are relatively homogeneous in character. Such landscape character types are generic in nature and may occur in different areas in different parts of the country, but wherever they occur, they share broadly similar combinations of geology, topography, drainage patterns, vegetation, land use and settlement patterns (Swanwick, 2002).

Key aesthetic aspects of the landscape are described in the table below, according to the method prescribed by Swanwick (2002).

Table E1: Aesthetic and perceptual aspects of landscape character.

Aspect	Characteristics				Motivation
Scale	Intimate	Small	Large	Vast	The scale of the landscape is considered to be **large** due to the significant distance one can see across the terrain. The mountainous terrain of the greater area does however obscure views. Furthermore, the adjacent waste rock dumps with its significant heights obscure the views from receptors situated to the north and west.
Enclosure	Tight	Enclosed	Open	Exposed	The landscape is considered **open,** with limited distinguishing topographical features in the surrounds that would result in it being enclosed within the MMT.
Diversity	Uniform	Simple	Diverse	Complex	The landscape is considered **simple** with the vegetative cover being homogenous with the surrounding area
Texture	Smooth	Textured	Rough	Very rough	The texture associated with the landscape is **textured** due to the dominant woody and grass layer throughout the greater area.
Form	Vertical	Sloping	Rolling	Horizontal	Taking only the proposed expansion activities and immediate surrounds into consideration, the landscape is relatively flat (**horizontal**). The dominant form of the landscape of the greater region is **rolling**, due to the mountainous terrain of the surrounding region.
Line	Straight	Angular	Curved	Sinuous	The line landscape element is **straight** to slightly **curved** with limited linear anthropogenic elements present. The existing adjacent waste rock dumps and mountains in the greater region prevents the landscape from appearing completely straight.

Aspect	Characteristics				Motivation
Colour	Monochrome	Muted	Colourful	Garish	The colours associated with the landscape are **muted**, with limited vegetation colour variation due to the drought conditions experienced and bare ground forming the dominant colour palette of shades of green and brown. Significant seasonal colour is expected, especially after summer rains when the vegetation is expected to be darker shades of green.
Balance	Harmonious	Balanced	Discordant	Chaotic	The landscape is considered to be **balanced** in terms of the relationship between the vertical and horizontal landscape elements.
Pattern	Random	Organised	Regular	Formal	The landscape is considered **regular,** with elements being even spaced and well-balanced.
Movement	Dead	Still	Calm	Busy	The level of movement within the proposed expansion activities' area is **still**, with the exception of occasional mine workers, there is little movement in the proposed top cut stockpile area.

In addition to the above, other aspects of landscape perception, such as perception of beauty and scenic attractiveness also play a role in defining landscape character. These aspects are more subjective and responses thereto are personal and based on the experience and preference of the observer. Factors simultaneously perceived by senses other than sight, such as noisiness, tranquillity, exposure to the elements and sense of safety, further influence landscape character.

APPENDIX F – VISUAL ABSORPTION CAPACITY

Visual Absorption Capacity (VAC) refers to the inherent ability of a landscape to accommodate change without degeneration of the visual quality and without resulting in an overall change of the identified landscape character type. A high VAC rating implies a high ability to absorb visual impacts and manmade structures and the ability of natural features such as trees or higher-lying areas to screen or hide an object where it would have visible otherwise (Oberholzer, 2005), while a low VAC rating implies a low ability to absorb or conceal visual impacts.

The factors that have been considered during the VAC analysis are listed and explained in the table below, according to the methodology prescribed by the United States Bureau of Land Management (BLM, 2004) and as adapted to the South African context (Table D1). Five factors have been considered, namely vegetation, soil contrast, visual variety, topographical diversity and recovery time.

Table F1: VAC Factors and Rating table.

Factors	Rating Criteria and Score		
Vegetation	Low, uniform vegetation or sparse vegetative cover, typically less than 1m in height, lacking in variety, uniform colour, minimal screening capability, typically low scrub or grass type vegetation. **Score: 1**	Vegetation of moderate height (1 – 2m), some species variety (2 to 3 types), some variation in colour, mostly continuous vegetative cover, effectively screens low-profile projects such as low-profile surface disturbance, scrub/grass, and intermingled shrubs. **Score: 2**	Higher vegetation (>2m height), lush, continuous vegetative cover; some variety of vegetative types is typical but not mandatory, provides significant screening capability of projects up to 4 – 6m in height, woodlands. **Score: 3**
Soil contrast	Surface disturbance would expose a high degree of contrast in colour with surrounding soil, rock and vegetation. **Score: 1**	Surface disturbance would expose a medium degree of contrast in colour with surrounding soil, rock and vegetation. **Score: 2**	Surface disturbance would expose only a low degree of contrast in colour with surrounding soil, rock and vegetation. **Score: 3**
Visual variety	Rating unit exhibits a low degree of visual variety in terms of the landscape character elements of form, line and texture and may also exhibit minimal variety in landforms, vegetation, or colour. **Score: 1**	Rating unit exhibits a medium degree of visual variety in terms of the landscape character elements of form, line, and texture and may also exhibit medium variety in landforms, vegetation, or colour. **Score: 2**	Rating unit exhibits a high degree of visual variety in terms of the landscape character elements of form, line, and texture and may also exhibit high degree of variety in landforms, vegetation, or colour. **Score: 3**
Topographical diversity	Landform has low amount of topographic diversity and variety. **Score: 1**	Landform has moderate amount of topographic diversity and variety. **Score: 2**	Landform has high amount of topographic diversity and variety. **Score: 3**
Recovery time	Long-term recovery time (greater than 5 years) **Score: 1**	Medium recovery time (3 to 5 years) **Score: 2**	High (rapid) recovery time (1 to 2 years) **Score: 3**

Scores, when added, amounting to between 5 and 7 are categorised as Low, scores between 8 and 11 as Medium and between 12 and 15 as High.

VAC is further closely related to visual intrusion, which refers to the physical characteristics and nature of the contrast created by a project on the visual aspects of the receiving environment. It is also, as with VAC, a measure of the compatibility or conflict of a project with the existing landscape and surrounding land use. The visual intrusion ratings are listed in the table below.

Table F2: Visual intrusion ratings.

Rating	Explanation
High visual intrusion	Results in a noticeable change or is discordant with the surroundings.
Moderate visual intrusion	Partially fits into the surroundings, but clearly noticeable.
Low visual intrusion	Minimal change or blends in well with the surroundings.

Through applying the scoring categories as outlined above, the following scores have been calculated for the proposed project area, which have similar landscape characteristics:

Table F3: VAC Scores achieved.

Factor	Score obtained	Motivation
Vegetation	**2**	Vegetation is of moderate (grass and shrubs) to high height (trees) and mostly continuous with good cover, however bare ground is present. Even though the terrain is relatively flat, the vegetation associated with the surrounding area provides good screening ability for receptors in the area.
Soil contrast	**2**	Surface disturbance would result in a medium degree of contrast in colour with the surrounding area due to the brown colour of the waste rock dumps and vegetation and bare ground present in the vicinity of the proposed expansion activities' area.
Visual variety	**1**	There is a low degree of visual variety due to the homogenous nature of the vegetation, the relatively flat terrain and limited distinguishing topographical features in the area.
Topographical diversity	**1**	The topography of the proposed expansion activities' area is relatively flat, with limited topographical features, which results in low topographical variety within the area.
Recovery time	**2**	Due to the dominant vegetation within the proposed expansion activities' area comprising grass and woody trees with some complexity, recovery time is expected to be moderate.
Total	**8**	**Medium**

APPENDIX G – LANDSCAPE QUALITY

Landscape visual quality, integrity or 'scenery beauty' relates primarily to human impact on a landscape and the physical state of the landscape in terms of intactness from visual, functional and ecological perspectives (Swanwick, 2002). It also serves as an indication of the condition of landscape elements and features (as outlined in Section 5.3.5), which in turn depends largely on an observer's visual perception through either increasing or reducing the visual quality of a landscape. Visual quality is thus a factor of an observer's emotional response to physical landscape characteristics and therefore assigning values to visual resources is a subjective process.

According to the BLM Visual Resource Management (VRM) system (1984), a system specifically developed for minimising the visual impacts of surface-disturbing activities and maintaining scenic values for the future, landscape, visual and scenic quality evaluation may be determined based on seven key factors, as outlined in the tables below and adapted to the South African environment. It is important to note that there may be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area, however within the context of the proposed project, this method of assessment is deemed suitable as an indication of landscape quality.

Table G1: Landscape Quality - Explanation of Rating Criteria.

Factor	Definition
Landform	Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental or they may be exceedingly artistic and subtle.
Vegetation	Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular. Consider also smaller scale vegetation features, which add striking and intriguing detail elements to the landscape.
Water	That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.
Colour	Consider the overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "colour" are variety, contrast, and harmony.
Adjacent Scenery	Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-8 kilometres, depending upon the characteristics of the topography, the vegetative cover, and other such factors. This factor is generally applied to units that would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.
Scarcity	This factor provides an opportunity to give added importance to one or all of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.
Cultural Modifications	Cultural modifications in the landform/water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit. Rate accordingly.

Table G2: Scenic Quality - Rating Criteria and scoring system.

Factor	Rating Criteria and Score		
Landform	High vertical relief as expressed in prominent cliffs, spires, massive rock outcrops, areas of severe surface variation, highly eroded formations, dune systems or detail features that are dominant and exceptionally striking and intriguing. **Score: 5**	Steep canyons, mesas, buttes, interesting erosional patterns, landforms of variety in size and shape or detail features, which are interesting though not dominant or exceptional. **Score 3**	Low rolling hills, foothills, or flat valley bottoms or few or no interesting landscape features. **Score: 1**
Vegetation	A variety of vegetative types as expressed in interesting forms, textures, and patterns. **Score: 5**	Some variety of vegetation, but only one or two major types. **Score: 3**	Little or no variety or contrast in vegetation. **Score: 1**
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. **Score: 5**	Flowing, or still, but not dominant in the landscape. **Score: 3**	Absent, or present, but not noticeable. **Score: 0**
Colour	Rich colour combinations, variety or vivid colour; or pleasing contrasts in the soil, rock, vegetation, water or snowfields. **Score: 5**	Some intensity or variety in colours and contrast of the soil, rock and vegetation, but not a dominant scenic element. **Score: 3**	Subtle colour variations, contrast, or interest; generally mute tones. **Score: 1**
Adjacent Scenery	Adjacent scenery greatly enhances visual quality **Score: 5**	Adjacent scenery moderately enhances overall visual quality. **Score: 3**	Adjacent scenery has little or no influence on overall visual quality. **Score: 0**
Scarcity	One of a kind, unusually memorable or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. **Score: 5**	Distinctive, though somewhat similar to others within the region. **Score: 3**	Interesting within its setting, but fairly common within the region. **Score; 1**
Cultural Modifications	Modifications add favourably to visual variety while promoting visual harmony. **Score: 2**	Modifications add little or no visual variety to the area, and introduce no discordant elements **Score: 0**	Modifications add variety but are very discordant and promote strong disharmony. **Score: -4**

Scores, when added, amounting to less than 11, are categorised as Low, scores between 12 and 18 as Medium and scores more than 19 as High.

Through applying the scoring categories as outlined above, the following scores have been calculated for the proposed project area:

Table G3: Scenic Quality – Results and motivation.

Factor	Score obtained	Motivation
Landform	**1**	The landscape associated with the proposed expansion activities' area and surroundings provide limited topographical variety since the terrain is relatively flat with limited distinguishing topographical features.
Vegetation	**1**	The vegetation composition within the proposed expansion activities' area and surrounds are homogenous, resulting in little variety vegetation in the area.
Water	**0**	Surface water is absent within the landscape, with the exception of the water associated with the open cast pits of the MMT.
Colour	**3**	At the time of the assessment and due to the drought conditions of the Northern Cape the vegetation was dull, however should sufficient rainfall occur, the vegetation will be more green resulting in colour variation with the bare soils.
Adjacent Scenery	**3**	Adjacent scenery, which is similar to the proposed expansion activities' area, contributes to the greater landscape viewing experience, moderately enhancing the overall visual quality of the area.
Scarcity	**1**	The landscape character type is interesting, however it is relatively common within the region as it is similar to the surrounds
Cultural Modifications	**0**	Since the proposed expansion activities are situated adjacent to existing waste rock dumps, the proposed top cut stockpile will add little or no visual variety to the area, and introduce no discordant elements
Total	**9**	Low

Scores, when added, amounting to less than 11, are categorised as Low, scores between 12 and 18 as Medium and scores more than 19 as High.

APPENDIX H – LANDSCAPE VALUE

Landscape value is concerned with the relative value that is attached to different landscapes. Landscape values are described as the environmental or cultural benefits, including services and functions that are derived from various landscape attributes (Department of the Environment and Local Government, Ireland (DoE, 2000). A landscape may be valued by different communities for many different reasons without any formal designation, recognising, for example, perceptual aspects such as scenic beauty, tranquillity or wildness, special cultural associations, the influence and presence of other conservation interests, or the existence of a consensus about importance, either nationally or locally (DoE, 2000). These attributes include the components and image of the landscape as already established in the assessment of landscape character, including aesthetic and ecological components, but also includes historical and socio-cultural associations, as well as religious and mythological dimensions.

In determining landscape value, the people or groups of people who could be affected by the proposed development should be considered, due to landscapes being valuable to people in different ways. In this regard, consideration is given to:

- People who live and work in an area may have a different perception of the landscape to that held by visitors because of their more regular contact with the landscape and the ongoing changes within it;
- Special interest, for example the ecological, cultural or historic value of the landscape, as knowledge of these issues can often affect people's perception and appreciation of a landscape; and
- Landscapes valued by a public wider than the local population, because they have a strong image or are well known and valued nationally and internationally.

APPENDIX I – INDEMNITY AND TERMS OF USE OF THIS REPORT

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and SAS CC and its staff reserve the right to modify aspects of the report including the recommendations, at their discretion, if and when new information may become available from ongoing research or further work in this field, or pertaining to this investigation.

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APPENDIX J – SPECIALIST INFORMATION

Details of the specialist who prepared the report

Stephen van Staden	MSc Environmental Management (University of Johannesburg)
Sanja Erwee	BSc Zoology (University of Pretoria)

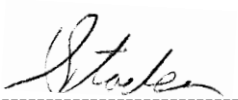
The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Terrestrial Services		
Name / Contact person:	Stephen van Staden		
Postal address:	29 Arterial Road West, Oriel, Bedfordview		
Postal code:	2007	Cell:	082 442 7637
Telephone:	011 616 7893	Fax:	011 615 6240/ 086 724 3132
E-mail:	stephen@sasenvgroup.co.za		
Qualifications	MSc (Environmental Management) (University of Johannesburg) BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg) BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)		
Registration / Associations	Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP) Accredited River Health practitioner by the South African River Health Program (RHP) Member of the South African Soil Surveyors Association (SASSO) Member of the Gauteng Wetland Forum		

Specialist Declaration

I, Stephen van Staden, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



Signature of the Specialist

SCIENTIFIC AQUATIC SERVICES (SAS) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF STEPHEN VAN STADEN

PERSONAL DETAILS

Position in Company	Managing member, Ecologist with focus on Freshwater Ecology
Date of Birth	13 July 1979
Nationality	South African
Languages	English, Afrikaans
Joined SAS	2003 (year of establishment)
Other Business	Trustee of the Serenity Property Trust and emerald Management Trust

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Registered Professional Scientist at South African Council for Natural Scientific Professions (SACNASP);

Accredited River Health practitioner by the South African River Health Program (RHP);

Member of the South African Soil Surveyors Association (SASSO);

Member of the Gauteng Wetland Forum;

Member of International Association of Impact Assessors (IAIA) South Africa;

Member pf the Land Rehabilitation Society of South Africa (LaRSSA)

EDUCATION

Qualifications

MSc (Environmental Management) (University of Johannesburg)	2003
BSc (Hons) Zoology (Aquatic Ecology) (University of Johannesburg)	2001
BSc (Zoology, Geography and Environmental Management) (University of Johannesburg)	2000
Tools for wetland Assessment short course Rhodes University	2016

COUNTRIES OF WORK EXPERIENCE

South Africa – All Provinces

Southern Africa – Lesotho, Botswana, Mozambique, Zimbabwe Zambia

Eastern Africa – Tanzania Mauritius

West Africa – Ghana, Liberia, Angola, Guinea Bissau, Nigeria, Sierra Leone

Central Africa – Democratic Republic of the Congo

PROJECT EXPERIENCE (Over 2500 projects executed with varying degrees of involvement)

1 Mining Coal, Chrome, PGM's, Mineral Sands, Gold, Phosphate, river sand, clay, fluorspar
2 Linear developments
3 Energy Transmission, telecommunication, pipelines, roads
4 Minerals beneficiation
5 Renewable energy (wind and solar)
6 Commercial development
7 Residential development
8 Agriculture
9 Industrial/chemical

REFERENCES

- Terry Calmeyer (Former Chairperson of IAIA SA)
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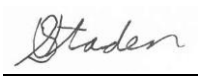
- Marietjie Eksteen
  Managing Director: Jacana Environmental
  Tel: 015 291 4015

Yours faithfully



STEPHEN VAN STADEN

SCIENTIFIC AQUATIC SERVICES (SAS) – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF SANJA ERWEE

PERSONAL DETAILS

Position in Company	Ecologist, GIS Technician, Faunal Specialist
Date of Birth	8 April 1991
Nationality	South African
Languages	English, Afrikaans
Joined SAS	2014

EDUCATION

Qualifications

BSc Zoology	2013

Short Courses

Global Mapper	2015
SANBI BGIS Course	2017
Global Mapper Lidar Course	2017

COUNTRIES OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, North West, KwaZulu-Natal, Limpopo, Free State, Northern Cape

SELECTED PROJECT EXAMPLES

GIS Assessments

- Completed GIS mapping and GIS analysis for a significant number of ecological projects
- Desktop assessment of 45 wetland and river crossings identified along the proposed Fibreco Fibre Optic Cable Route changes between Cape Town to George, George to Port Elizabeth and from Port Elizabeth to Durban
- High level desktop ecological study and site sensitivity report as part of the site selection process for the possible Rapid Rail Extension to the Gauteng Rapid Rail Network
- Ecological scan and site sensitivity report as part of the environmental authorisation process prior to prospecting activities for two prospecting areas in Newcastle, Kwazulu-Natal
- High level desktop study and site sensitivity report as part of the environmental authorisation process prior to prospecting activities on Portion 4 of the Farm Kapstewel no 436, Administrative District of Hay, Northern Cape
- Cumulative Sensitivity Analyses using GIS Techniques for the Fuleni Anthracite Project, KwaZulu Natal.
- High level desktop study and site sensitivity report for mining activities on the farm Wessel 227 and Dibiaghomo, North of Black Rock, Northern Cape Province
- High level desktop study and site sensitivity report prior to prospecting activities for the Minerano Gold Fields Project, near Viljoenskroon, Free State Province

Wetland Assessments

- Wetland and aquatic ecological assessment for the proposed N3 De Beers Pass Route.
- Wetland assessment as part of the environmental authorisation process for the proposed Sappi Enstra Mill Wastewater Pipeline in Springs
- Wetland Verification and Rehabilitation Criteria for Aspen Hills Estate
- Wetland Ecological Assessment for development in Shoshanguve, adjacent to Tshwane University of Technology
- Wetland assessment as part of the environmental authorisation process for the proposed Braakfontein Coal Mine near Newcastle, Kwazulu-Natal Province
- Wetland assessment as part of the water use license application for the proposed extension of a flood protection wall within the Sorex Estate, Centurion, Gauteng

Faunal Assessments

- Faunal assessment as part of the environmental authorisation process for the proposed New Belfast Mine Railway Siding, Mpumalanga
- Terrestrial ecological scan as part of the environmental authorisation process for the proposed construction of a sewer system in the Ekangala Township, Gauteng Province
- Faunal assessment as part of the environmental authorisation process for the Ledig Water Project near Pilanesberg National Park, North West Province
- Faunal assessment as part of the ecological assessment for the Op Goedenhoop Section 102 Coal Project, Mpumalanga Province
- Terrestrial faunal, floral and wetland ecological assessment update for the proposed water supply pipeline upgrade at the Duvha Power Station, Mpumalanga

Rehabilitation Plan

- Wetland rehabilitation plan for Dorothy Road, Midrand, Gauteng Province
- Rehabilitation and Management Plan for the Freshwater Resources within the Proposed Rivierplaas Farm No 1486 Residential Development, Western Cape Province
- Wetland Rehabilitation and Management Plan for proposed mixed land use development (Kosmosdal extension 92) on the remainder of portion 2 of the farm Olievenhoutbosch 389 jr, Gauteng
- Wetland rehabilitation and management plan, including input into the storm water management, landscaping and Red Data Listed species conservation for the Olifantsvlei Cemetery, Gauteng

Risk Assessment

- Motivation for General Authorisation for the development of a pipeline at Sappi in Springs, Gauteng Province

Water Use Licence Application

- Assisting in the public participation for an Integrated Water Use Licence for the proposed sewer pipeline and upgrade of the Refengkgotso Waste Water Treatment Works (WWTW);
- Writing an emergency response plan for the proposed sewer pipeline and Refengkgotso WWTW

Visual Impact Assessment

- Assistance with the proposed Haga Haga Wind Energy Facility and Grid Connection between Komga and Soto, Eastern Cape Province.
- Visual Impact Assessment as part of the Environmental Assessment and Authorisation Process for the proposed Transvaal Gold Mining Estates (TGME) Development Project: Gold Mining Project (GMP) – Pre-Mined Residue (PMR) And Hard Rock Mining (HRM) Near Sabie (Project 10161), Mpumalanga Province.
- Visual Impact Assessment as part of the Environmental Assessment and Authorisation Process for the proposed Transvaal Gold Mining Estates (TGME) Development Project: Gold Mining Project (GMP) – Pre-Mined Residue (PMR) And Hard Rock Mining (HRM) Near Pilgrims Rest (Project 10167), Mpumalanga Province.
- Visual Impact Assessment as part of the Environmental Assessment and Authorisation Process for the proposed N3 Logistics Hub, adjacent to the N3 national highway, Gauteng Province.
- Visual Impact Assessment as part of the Environmental Assessment and Authorisation Process for the proposed Mining of Gypsum on Portion 0 of the Farm Kanakies 332, near Loeriesfontein, Northern Cape Province.
- Visual Impact Assessment as part of the Environmental Authorisation Process for the Mining Right for opencast and underground mining of Gold for the Soweto Cluster West Wits Project, North of Soweto, Gauteng Province.

- Visual Impact Assessment as part of the Environmental Impact Assessment and Authorisation Process for the proposed construction of a New Water Treatment Plant at the Khutala Colliery, Ogies, Mpumalanga Province.
- Visual Impact Assessment as part of the Environmental Assessment and Authorisation Process for the proposed Olievenhoutbosch Solar Facility, Centurion, Gauteng Province.
- Visual Impact Assessment as part of the Section 24G rectification process for the unauthorised activities at the Mamatwan Mine, near Hotazel, Northern Cape Province.
- Visual Impact Assessment as part of the Environmental Impact Assessment and Authorisation process for the proposed development of a coal washing plant, discard dump and associated activities on Portion 2 of Kromdraai 303 JS and Portion 5 of Elandsfontein 309 JS, east of Balmoral, Mpumalanga Province.
- Visual Impact Assessment as part of the Environmental Impact Assessment and Authorisation Process for the proposed Cygnus Mining Project, Limpopo Province.
- Visual Impact Assessment part of the Environmental Impact Assessment and Authorisation Process for the proposed TGME mine development project: amendment to MR83 to include the Theta, Browns and Iota Projects, near Pilgrim's Rest, Mpumalanga Province.