APPENDIX J: VISUAL ASSESSMENT

THE PROPOSED GAMSBERG SMELTER PROJECT, NORTHERN CAPE PROVINCE, SOUTH AFRICA

Final Visual Impact Assessment Report

DATE: 20 August 2020

Document prepared for SLR Consulting (Pty) Ltd
On behalf of Black Mountain Mining (Pty) Ltd

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TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS

APHP	Association of Professional Heritage Practitioners
BLM	Bureau of Land Management (United States)
BPEO	Best Practicable Environmental Option
CALP	Collaborative for Advanced Landscape Planning
DEM	Digital Elevation Model
DoC	Degree of Contrast
EIA	Environmental Impact Assessment
GIS	Geographic Information System
GPS	Global Positioning System
IDP	Integrated Development Plan
IEMA	Institute of Environmental Management and Assessment (United Kingdom)
KOP	Key Observation Point
LVIA	Landscape and Visual Impact Assessment
MAMSL	Metres above mean sea level
NELPAG	New England Light Pollution Advisory Group
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SLF	Secured Landfill Facility
TSF	Tailings Storage Facility
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
VRM	Visual Resource Management
VRMA	Visual Resource Management Africa
ZVI	Zone of Visual Influence

GLOSSARY OF TECHNICAL TERMS

Technical Terms	**Definition** (Oberholzer, 2005)
Degree of Contrast	The measure in terms of the form, line, colour and texture of the existing landscape in relation to the proposed landscape modification in relation to the defined visual resource management objectives.
Visual intrusion	Issues are concerns related to the proposed development, generally phrased as questions, taking the form of "what will the impact of some activity be on some element of the visual, aesthetic or scenic environment".
Receptors	Individuals, groups or communities who would be subject to the visual influence of a particular project.
Sense of place	The unique quality or character of a place, whether natural, rural or urban.
Scenic corridor	A linear geographic area that contains scenic resources, usually, but not necessarily, defined by a route.
Viewshed	The outer boundary defining a view catchment area, usually along crests and ridgelines. Similar to a watershed. This reflects the area, or the extent thereof, where the landscape modification would probably be seen.
Visual Absorption Capacity	The potential of the landscape to conceal the proposed project.

Technical Term	**Definition** (USDI., 2004)
Key Observation Point	Receptors refer to the people located in the most critical locations, or key observation points, surrounding the landscape modification, who make consistent use of the views associated with the site where the landscape modifications are proposed. KOPs can either be a single point of view that an observer/evaluator uses to rate an area or panorama, or a linear view along a roadway, trail, or river corridor.
Visual Resource Management	A map based landscape and visual impact assessment method development by the Bureau of Land Management (USA).
Zone of Visual Influence	The ZVI is defined as 'the area within which a proposed development may have an influence or effect on visual amenity.'

Table 1. Specialist declaration of independence.

All intellectual property rights and copyright associated with VRM Africa's services are reserved, and project deliverables, including electronic copies of reports, maps, data, shape files and photographs, may not be modified or incorporated into subsequent reports in any form, or by any means, without the written consent of the author. Reference must be made to this report, should the results, recommendations or conclusions in this report be used in subsequent documentation. Any comments on the draft copy of the Visual Impact Assessment (VIA) must be put in writing. Any recommendations, statements or conclusions drawn from, or based upon, this report, must make reference to it.

This document was completed by Silver Solutions 887 cc trading as VRM Africa, a Visual Impact Study and Mapping organisation located in George, South Africa. VRM Africa cc was appointed as an independent professional visual impact practitioner to facilitate this VIA. I, Stephen Stead, hereby declare that VRM Africa, an independent consulting firm, has no interest or personal gains in this project whatsoever, except receiving fair payment for rendering an independent professional service.

Stephen Stead
APHP accredited VIA Specialist

Table 2 Specialist report requirements in terms of Appendix 6 of the EIA Regulations (2014), as amended in 2017

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	**Relevant section in report**
Details of the specialist who prepared the report	Stephen Stead, owner / director of Visual Resource Management Africa. steve@vrma.co.za Cell: 0835609911 **Error! Reference source not found.**
The expertise of that person to compile a specialist report including a curriculum vitae	Registration with Association of Professional Heritage Practitioners **Error! Reference source not found.**
A declaration that the person is independent in a form as may be specified by the competent authority	Table 1. Specialist declaration of independence.
An indication of the scope of, and the purpose for which, the report was prepared	**Error! Reference source not found.**
An indication of the quality and age of base data used for the specialist report;	Data utilised was recent (within last 5 years) or

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	Relevant section in report
	generated from other specialist reports.
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	**Error! Reference source not found.**
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment	Not relevant to the Visual Impact Assessment.
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	**Error! Reference source not found.**
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 identifying site alternative;	**Error! Reference source not found.**
An identification of any areas to be avoided, including buffers	Due to the existing mining landscape context, no exclusion buffers were identified.
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;	No exclusion areas were defined.
A description of any assumptions made and any uncertainties or gaps in knowledge;	**Error! Reference source not found.**
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities	**Error! Reference source not found.**
Any mitigation measures for inclusion in the EMPr	**Error! Reference source not found.**
Any conditions for inclusion in the environmental authorisation	Review of the possibility of moving the SLF to the north of the N14 to an area outside the high exposure receptors.
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Not necessary for this assessment.
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised	The existing mining landscape is already set in place (with further expansion planned). The proposed smelter will be viewed against the existing mine landscapes as a backdrop. While the smelter is going to result in a strong landscape change due to the 70m stack and large scale of the plant, the zone of visual influence of the new plant is similar in extent. As such, it is the finding of the assessment that the Smelter component should be authorised WITH MITIGATION.**Error!**

A specialist report prepared in terms of the Environmental Impact Regulations of 2014 (as amended in 2017) must contain:	**Relevant section in report**
	Reference source not found. **Error! Reference source not found.**
Regarding the acceptability of the proposed activity or activities; and	Regarding the SLF, should this landscape change be authorised in its current location (adjacent to the N14 National Highway), the Relevant Authorities need to recognise that this will result in permanent, local landscape degradation long after the smelter has been decommissioned.
If the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	**Increased cladding of the smelter complex where possible, with natural colour coding as specified. Assess the viability of moving the SLF to the north of the N14 adjacent to the existing mine tailings storage facility.** Error! Reference source not found.
A description of any consultation process that was undertaken during the course of carrying out the study	**Not relevant to the Visual Impact Assessment.**
A summary and copies if any comments that were received during any consultation process	Not relevant to the Visual Impact Assessment.
Any other information requested by the competent authority.	Not relevant to the Visual Impact Assessment.

1 EXECUTIVE SUMMARY

Visual Resource Management Africa CC (VRMA) was appointed by SLR Consulting (Pty) Ltd to undertake a ***Visual Impact Assessment*** for the proposed Gamsberg Smelter Project (here-after referred to as the project). A field survey was undertaken to inform the landscape and visual impact assessment. During the site visit, photographs were taken from each viewpoint, and the view direction and Global Positioning System (GPS) location captured. The main land-use was documented as well as the nature of the dominant landscape in the vista. In order to represent views of the proposed landscape modification by means of photomontages for assessment purposes, panoramic photographs were also taken from key viewpoints. A photograph from each of the sample points was documented.

A literature review was undertaken to determine policy fit to international best practice, as well as regional and local planning. In terms of international best practice, the proposed landscape modification is unlikely to trigger significant issues. Although the area does have mountain landscape features that increase scenic quality, the adjacent Gamsberg Zinc Mine does dominate the local and regional landscape character, with the town of Aggeneys historically being a mining town and the residents associated with mining landscape modifications. From a regional and local planning perspective, there is clear mention of the economic value that the mining in the Aggeneys region can bring to the local and district municipalities. There is also a strong emphasis on tourism, the wilderness areas to the north of Aggeneys along the Orange River, and a recognition that the N14 National Highway is an import tourist view corridor that could be used to further tourism initiatives in the area. The wilderness area to the north of the Aggeneys, and the N14 as a tourist view corridor would need to be taken into consideration when defining the Key Observation Points and Visual Impacts.

A viewshed was undertaken to ascertain the approximate zone of visual influence the proposed landscape modification would have in the surrounding landscape. The finding was that visual extent is typically fragmented by the moderate undulation of the terrain as well as the surrounding mountain features. Within the 2km High Exposure areas, the plant will be clearly visible, with views limited to the south by the Gamsberg Mountain, to the east by undulating terrain, to the north and west by smaller hill features. Within the 6km to 12km distance range, views of the plant will mainly be obscured by topography, with a small exception to the northeast. Beyond the 12km, the viewshed extends mainly to the southwest over gently undulating terrain, as well as catching higher elevation portions of local mountains. Due to the fragmentation of the viewshed by undulating terrain and mountain features, the zone of visual influence is likely to be contained within the 6km Foreground / Mid Ground distance area. As such, the plant visual influence is defined as Localised. Due to the height of the proposed stack which could be approximately 80m in height and have a plume, the stack zone of visual influence is likely to extend into the Background areas. However, the surrounding mountain terrain is also likely to contain the visual extent to within 24km.

An assessment of the receptors located within the zone of visual influence found that five receptor locations were identified with four points fulfilling Key Observation Point (KOP) status. The Aggeneys KOP is a residential area and, although a mining town, is not highly exposed to mining landscapes from this locality. Maintaining this precedence increases the opportunities for future tourism. The other KOPs are all related to the N14 National Route. The route is associated with tourism and the importance is emphasised in the local and

regional planning. As the N14 does come within close proximity to the project area, the Receptor Exposure is rated High.

The Scenic Quality of the sites was evaluated using the standardised Visual Resource Management Ratings Table. Landform is rated Low as the site terrain is flat and offers no interesting landscape features with limited vegetation in this arid region to add variation or scenic contrast. Water is rated Low as, although there are drainage channels, they're not noticeable. Colour is rated Medium to Low as the greys and browns of the vegetation on the site offer subtle colour variations and generally mute tones. Adjacent scenery is rated Low as the landscape is strongly defined by the mining context of the adjacent mine plant and waste rock dump (WRD). Cultural modifications on the site are limited to farm tracks with the lack of transformation adding value to the area by contrasting to the highly transformed background. The total overall scenic quality of the site was rated Medium.

The Receptor Sensitivity assessment found that due to the proximity of the site to the N14 national highway, which has been identified in the report as an important tourist view corridor, the maintenance of visual quality is necessary. As views include the existing Gamsberg Zinc Mine, some moderation of the sensitivity is expected. Due to this close proximity to the N14 national highway, the amount of use was rated High. As the site is located within a mining context, public interest for the maintenance of visual quality was rated as Low. Adjacent land uses are also mainly mining related with no obvious tourist related use, and hence rated as Low. The proposed site falls within the existing mine licence area and does not fall under any special area management objectives. Receptor Sensitivity to landscape change is likely to be Medium.

The VRM Management analysis defined the two sites as having Class III Visual Resource Management Objectives. Although the site has lower levels of Scenic Quality, and Medium Receptors Sensitivity to landscape changes due to the adjacent mine, the sites are in close proximity to the N14 National Road. This route is identified in the local and regional planning as an important tourist view corridor. For this reason, the Class IV Visual *Inventory* ratings were changed to that of a Class III for Visual *Management*. The Class III objective is to partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate. Management activities may attract attention, but should not dominate the view of the casual observer, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape.

Smelter and Stack Visual Impact Significance

Making use of the standardised SLR impact assessment methodology, visual impact significance was assessed for the Smelter complex, and the Tailings Facility.

The Visual Impact Significance of the Construction and Operation Phases of the proposed Smelter and Stack is expected to be High without mitigation. While the existing mining landscape does increase the visual carrying capacity for industrial type landscape modifications, strong reflecting colours and texture and light spillage is likely to increase the visual intensity of the landscape change and detract from this section of the N14 National Highway. The expansion of the 'Vedanta blue' that is currently used for cladding on the existing mine plant would be visually inappropriate. The complexity of the Smelter complex is another factor that is likely to increase visual intrusion, although the existing mine context increases the landscape visual absorption capacity to some degree

Without mitigation, the Visual Impact Significance of the Construction and Operation Phases of the proposed Smelter and Stack is expected to be ***High***. While the existing mining landscape does increase the visual carrying capacity for industrial type landscape modifications, strong reflecting colours and texture and light spillage is likely to increase the visual intensity of the landscape change and detract from this section of the N14 National Highway. The expansion of the 'Vedanta blue' that is currently used for cladding on the existing mine plant would be visually inappropriate.

With mitigation and the expansion of cladding to simplify the complexity of the plant, incorporation of a variation of grey-brown colours for cladding and roof sheeting colours, the intensity of the expansion of the industrial sense of place can be contained to some degree. Lights at night would also need to be carefully managed with no uplighting incorporated into the lighting design. With effective mitigation, Impact Significance of the Construction and Operation Phases of the proposed Smelter and Stack could be reduced to ***Medium***.

With effective mitigation and the removal of all structures, rehabilitation and restoration, the Visual Impact Significance of the Post-Closure Phases of the proposed Smelter and Stack is expected to be ***Very Low.*** Without removal of the structure, landscape sterilisation is likely to take place, resulting in long-term visual intrusion to local scenic resources. The Northern Cape region does have aesthetic value and the scenic quality of the area is high. Although a large-scale mining operation has taken place, the waste rock dumps have been effectively created to appear as natural forms. With the removal of the mine works, the resultant post mining landscape can resemble a scree slopes, as the form and colour reflect the natural forms and colours in the surrounding landscape. With the non-removal of the Smelter structures and stacks, landscape decay will ensue, significantly degrading the local landscape character. This is also likely to set a negative precedent for other mining related landscapes post-closure that should not be followed. Without mitigation, the Visual Impact Significance of the Post-Closure Phases of the proposed Smelter and Stack is expected to be ***High.***

<u>Secured Landfill Facility (SLF) Visual Impact Significance</u>

While the Construction Phase impact of the SLF is likely to be ***Medium*** initially when the SLF has a low profile, once established and raised the SLF is likely to result in permanent visual intrusion to the adjacent N14 National Road users. Visual Impact Significance once established is likely to remain ***High*** with and without mitigation, as mitigation potential is limited. Although the mining landscape context is established, in the post mining scenario, the effective dumping strategy of the mine operation will assist in allowing the landscape character to still appear natural once the plant structures have been removed. This is primarily due to the WRD strategy that will result in a textured form that appears as a natural scree slope found in the surrounding landscape. With the removal of all structures and plants, the distance to the dumps and the natural arid zone haze will allow casual observers to view the landscape as primarily natural. However, with the establishment of the SLF directly adjacent to the N14 National Road, the unusual form and uniform colour would permanently create high levels of visual intrusion for receptors using the N14.

As the N14 is identified in local and regional planning documents as an import tourist view corridor, the SLF in this locality is likely to result in a permanent negative change to the local landscape character in an area in high exposure to the N14 National Highway receptors.

From a visual impact mitigation perspective, the only mitigation for the SLF is re-location outside the high exposure zone of visual influence of the N14 receptors. It is recommended that the design team assess the feasibility of re-locating the SLF to the north of the N14 to where the existing Gamsberg Mine tailings storage facility (TSF) is located. Should the SLF be authorised in its current location (adjacent to the N14 National Highway), the Relevant Authorities need to recognise that this will result in permanent, local landscape degradation long after the smelter has been decommissioned.

2 INTRODUCTION

2.1 Terms of Reference

Visual Resource Management Africa CC (VRMA) was appointed by SLR Consulting (Pty) Ltd to undertake a ***Visual Impact Assessment*** for the proposed Gamsberg Smelter Project (here-after referred to as the project). The process that VRM Africa follows when undertaking a VIA is based on the United States Bureau of Land Management's (BLM) Visual Resource Management method (USDI., 2004). This mapping and GIS-based method of assessing landscape modifications allows for increased objectivity and consistency by using standard assessment criteria.

The scope of this study is to cover the entire proposed project area. The broad terms of reference for the study are as follows:

- Collate and analyse all available secondary data relevant to the affected proposed project area. This includes a site visit of the full site extent, as well as of areas where potential impacts may occur beyond the site boundaries;
- Specific attention is to be given to the following:
  - Quantifying and assessing existing scenic resources/visual characteristics on, and around, the proposed site;
  - Evaluation and classification of the landscape in terms of sensitivity to a changing land use;
  - Determining viewsheds, view corridors and important viewpoints in order to assess the visual impacts of the proposed project;
  - Determining visual issues, including those identified in the public participation process;
  - Reviewing the legal framework that may have implications for visual/scenic resources;
  - Assessing the significance of potential visual impacts resulting from the proposed project for the construction, operation and decommissioning phases of the proposed project;
  - Assessing the potential cumulative impacts associated with the visual impact;
  - Generate photomontages of the proposed landscape modification;
  - Identifying possible mitigation measures to reduce negative visual impacts for inclusion into the proposed project design, including input into the Environmental Management Programme (EMPr).

2.2 Study Team

Contributors to this study are summarised in Table 3 below.

Table 3: Authors and Contributors to this Report.

Aspect	Person	Organisation / Company	Qualifications
Landscape and Visual Assessment (author of this report)	Stephen Stead B.A (Hons) Human Geography, 1991 (UKZN, Pietermaritzburg)	VRMA	• Accredited with the Association of Professional Heritage Practitioner and • 16 years of experience in visual assessments including renewable energy, powerlines, roads, dams across southern Africa.
Contrast rating and editing.	Lisa Schultz B.A Fine Art 1989 (UKZN, Pietermaritzburg)	VRMA	• 8 years of experience in contrast ratings.

2.3 Visual Assessment Approach

The following approach was used in understanding the landscape processes and informing the magnitude of the impacts of the proposed landscape modification. The table below lists a number of standardised procedures recommended as a component of best international practice.

Table 4: Methodology Summary Table

Action	*Description*
Site Survey	The identification of existing scenic resources and sensitive receptors in and around the study area to understand the context of the proposed development within its surroundings to ensure that the intactness of the landscape and the prevailing sense of place are taken into consideration.
Project Description	Provide a description of the expected project, and the components that will make up the landscape modification.
Reviewing the Legal Framework	The legal, policy and planning framework may have implications for visual aspects of the proposed development. The heritage legislation tends to be pertinent in relation to natural and cultural landscapes, while Strategic Environmental Assessments (SEAs) for renewable energy provide a guideline at the regional scale.
Determining the Zone of Visual Influence	This includes mapping of viewsheds and view corridors in relation to the proposed project elements, in order to assess the zone of visual influence of the proposed project. Based on the topography of the landscape as represented by a Digital Elevation Model, an approximate area is defined which provides an expected area where the landscape modification has the potential to influence landscapes (or landscape processes) or receptor viewpoints.
Identifying Visual Issues and Visual Resources	Visual issues are identified during the public participation process, which is being carried out by others. The visual, social or heritage specialists may also identify visual issues. The significance and proposed mitigation of the visual issues are addressed as part of the visual assessment.
Assessing Potential Visual Impacts	An assessment is made of the significance of potential visual impacts resulting from the proposed project for the construction, operational and decommissioning phases of the project. The rating of visual significance

	is based on the methodology provided by the Environmental Assessment Practitioner (EAP).
Formulating Mitigation Measures	Possible mitigation measures are identified to avoid or minimise negative visual impacts of the proposed project. The intention is that these would be included in the project design, the Environmental Management programme (EMPr) and the authorisation conditions.

2.4 Assumptions and Uncertainties

- Digital Elevation Models (DEM) and viewsheds were generated using ASTER elevation data (NASA, 2009). Although every effort to maintain accuracy was undertaken, as a result of the DEM being generated from satellite imagery and not being a true representation of the earth's surface, the viewshed mapping is approximate and may not represent an exact visibility incidence. Thus specific features identified from the DEM and derive contours (such as peaks and conical hills) would need to be verified once a detailed survey of the project area took place.
- The use of open source satellite imagery was utilised for base maps in the report;
- Some of the mapping in this document was created using Bing Maps, Open Source Map, ArcGIS Online and Google Earth Satellite imagery.
- The project deliverables, including electronic copies of reports, maps, data, shape files and photographs are based on the author's professional knowledge, as well as available information.
- VRM Africa reserves the right to modify aspects of the project deliverables if and when new/additional information may become available from research or further work in the applicable field of practice, or pertaining to this study.
- Due to limited accessibility of the area, northwest portions of the site could not be accessed but high points were gained in order to allow viewing of most of these areas.
- The 3D modelling of the proposed smelter complex was not provided. This is a limitation in that the true nature of the proposed landscape change could not be assessed. However, a replicate of a typical smelter complex was compile and used in the photomontages.

3 PROJECT DESCRIPTION

Vedanta Resources PLC is proposing to develop a Smelter Complex, with associated infrastructure, as well as an Indicative Jarofix Secured Landfill Facility (SLF). The proposed project is located in the Northern Cape Province, in South Africa. The District Municipality (DM) is called the Namakwa DM, and the Local Municipality (LM) is the Khâi-Ma LM.

Mapping of the proposed project footprint is located on the following page. The following text highlighted in *italics*, outlines the clients project description.

3.1.1 Project Description Provided by the client

> *"Vedanta Resources PLC operations in Southern Africa includes Vedanta Zinc International (VZI), Black Mountain Mining (BMM, South Africa) and Skorpion Zinc (SZ, Namibia). Gamsberg Zinc Mine Project, a unit of BMM, is currently at 90% capacity and is exploiting one of the largest known zinc orebodies in the world. The Project currently comprises of two open pits (north and south pits) and a concentrator plant. There is a tailings facility to the north of the N14.*
>
> *Vedanta now intends to extend the scope of the Gamsberg Project to align with its philosophy of full beneficiation of the deposits that it mines. In line with this, the company intends to develop a Smelter complex at the Gamsberg site (the Gamsberg Smelter Project) to process the concentrate and produce refined zinc metal (finished product).*
>
> *The Smelter process will be downstream of the concentrator and will receive the concentrated material by truck. Both water and power are required as inputs into the Smelter. Gamsberg Zinc Mine currently has a total water allocation from the Orange River of 44 Ml per day. The Smelter has numerous processes in order to produce a final product of zinc ingots, these include: roasting, leaching, electro-winning and smelting. By-products of the process include sulphuric acid and manganese oxide. The sulphuric acid will initially be trucked offsite using 30 trucks per day. The other major by-product is Jarosite. Jarosite will be mixed with lime and cement to create a more inert by-product, jarofix. Both co-disposal in the current tailings facility and creating a new secured landfill facility are being determined. The final product, zinc ingots, will also be taken from the mine by road to the chosen port. This will require a further 30 trucks per day."*

The following project components are proposed:

- Construction of a Smelter Complex:
    - Movement of large vehicles during construction and operation,
    - Industrial scaled facility including large structures up to 40m in height,
    - Plant stack up to 70m in height with plume emissions,
    - Lights at night.
- Power lines,
- Indicative Jarofix Secured Landfill Facility (SLF)

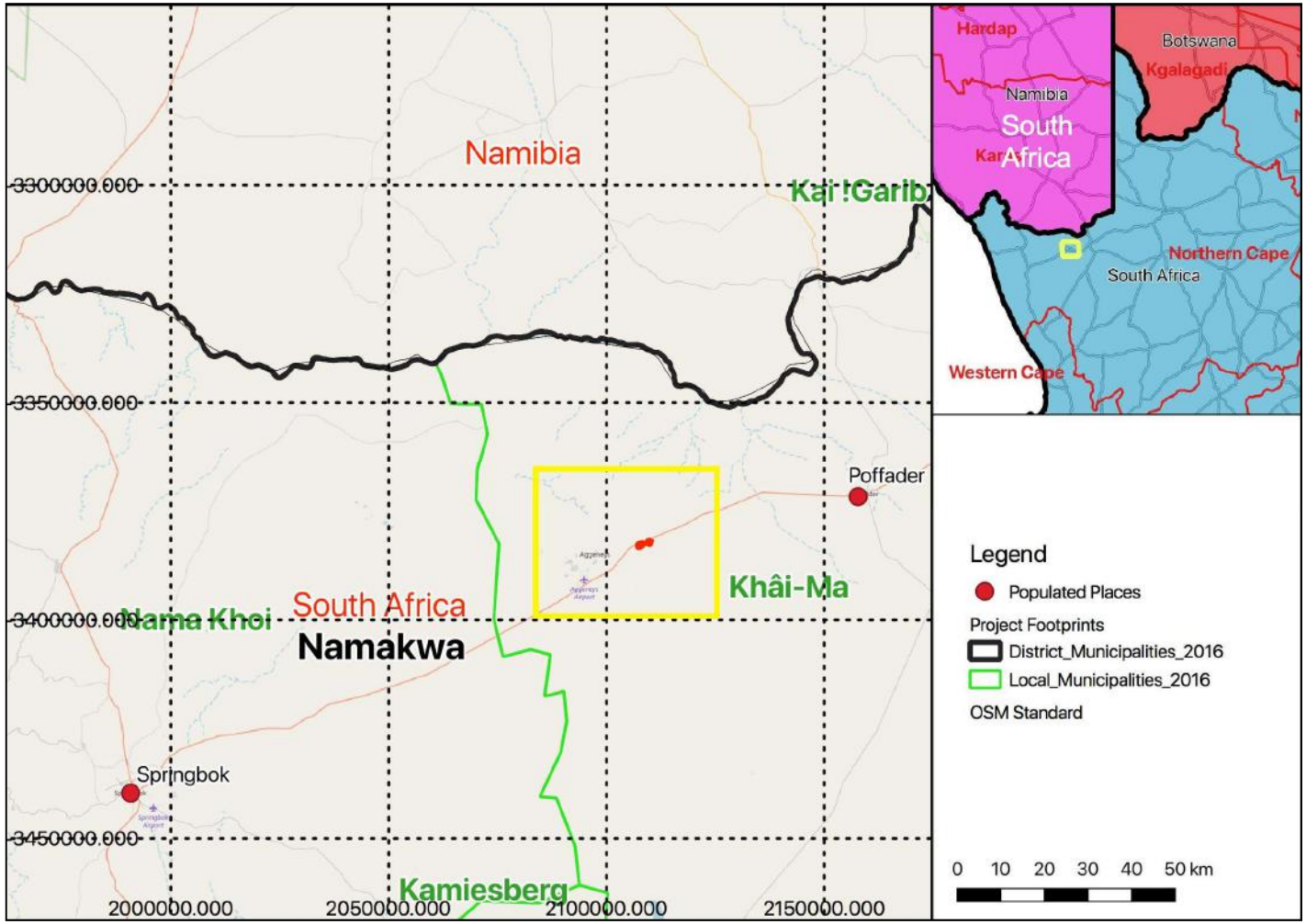


Figure 1: Proposed project National and Provincial locality map with yellow block reflecting location as the national level.

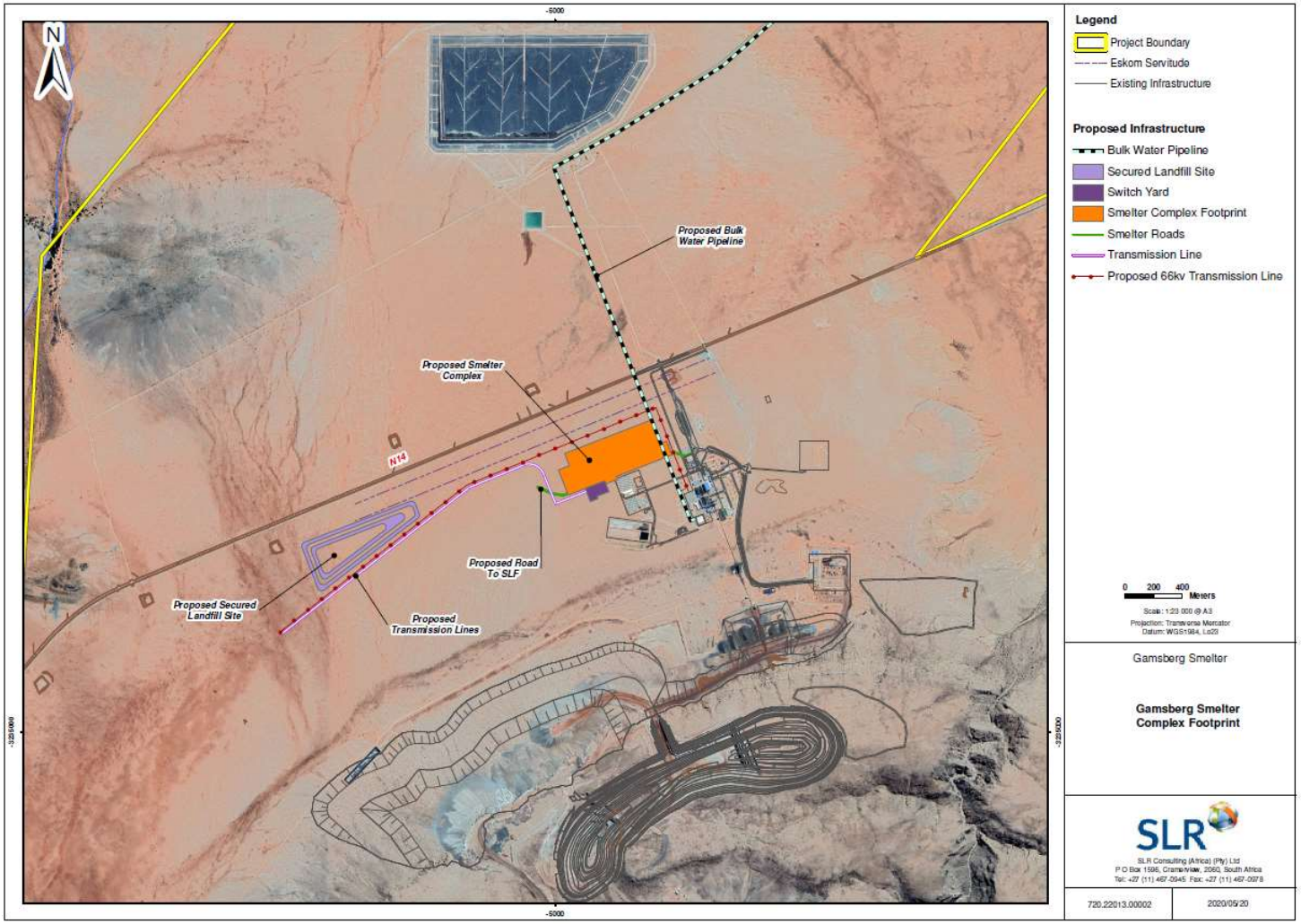


Figure 2: Proposed project footprint map provided by SLR.

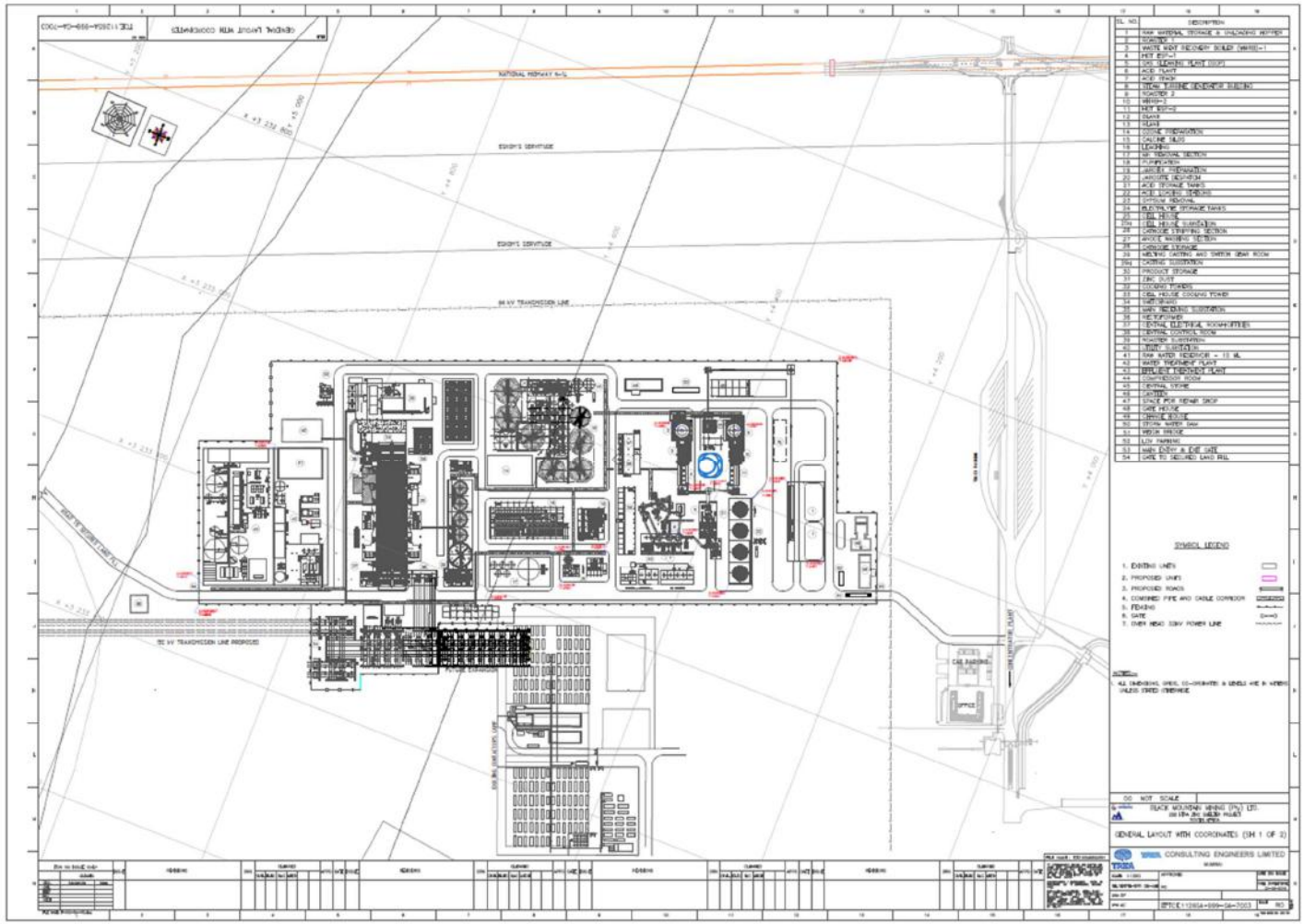


Figure 3: Proposed Smelter Plan.

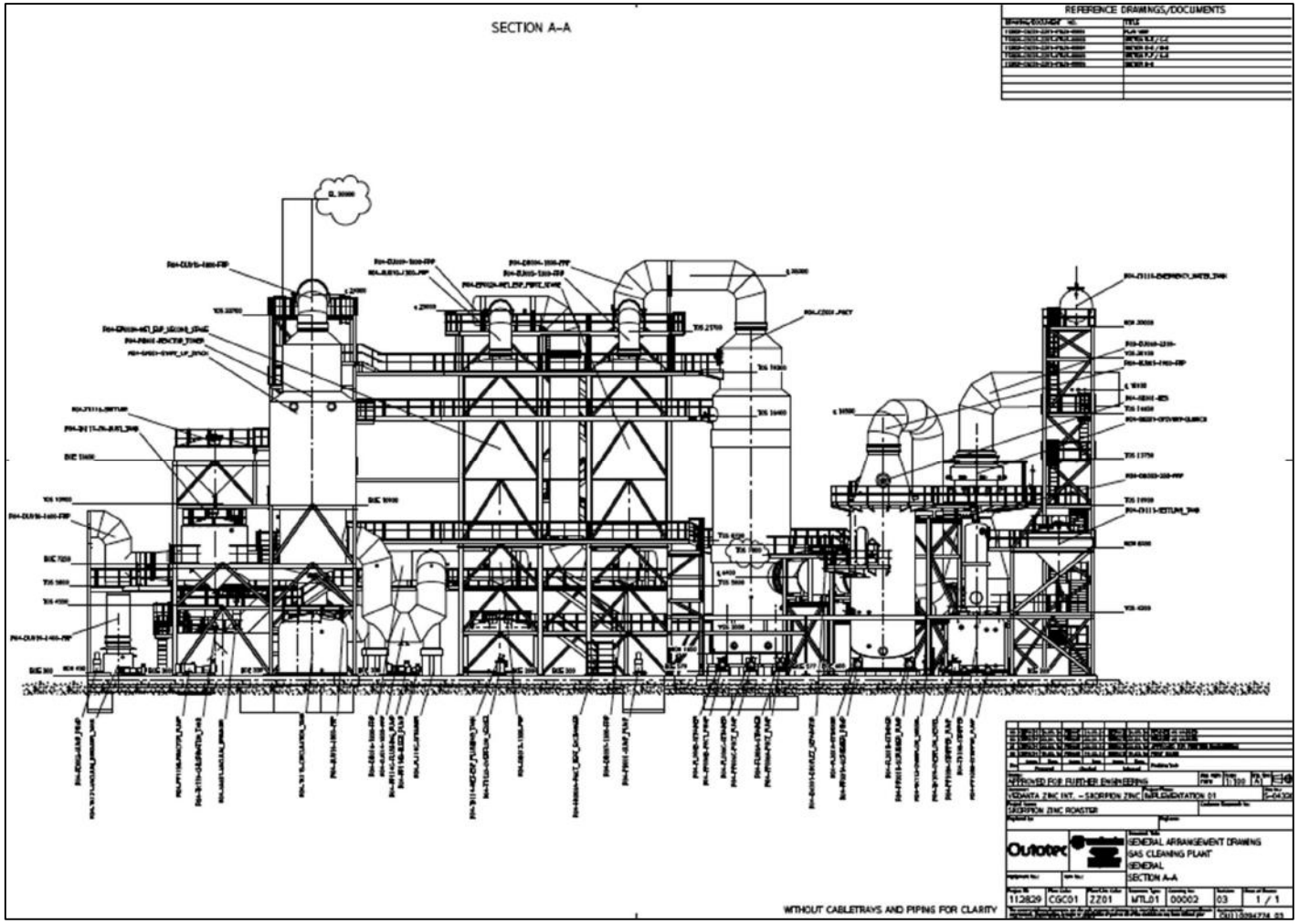


Figure 4: Proposed Smelter Section Drawing A-A

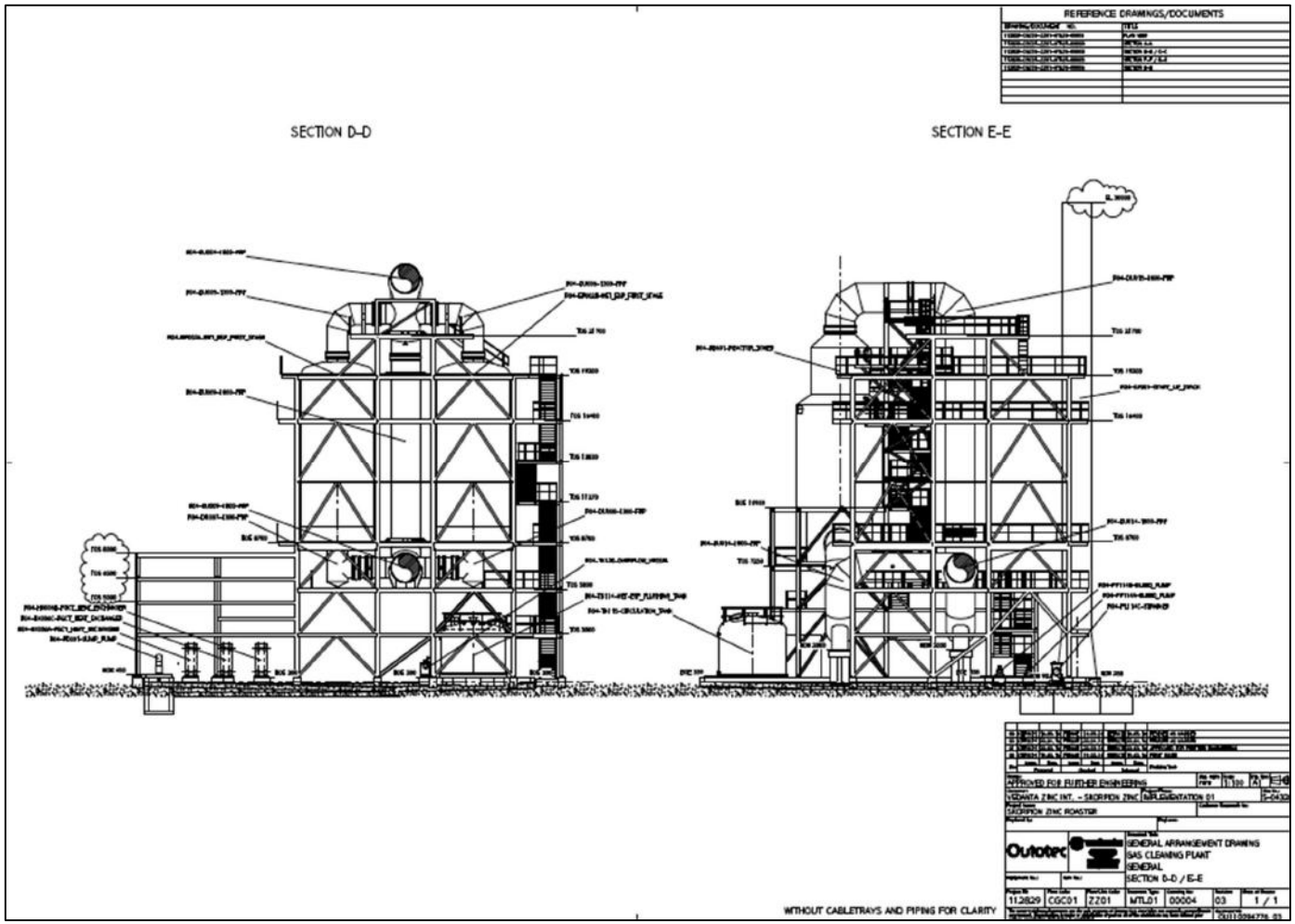


Figure 5: Proposed Smelter Section Drawing D-D

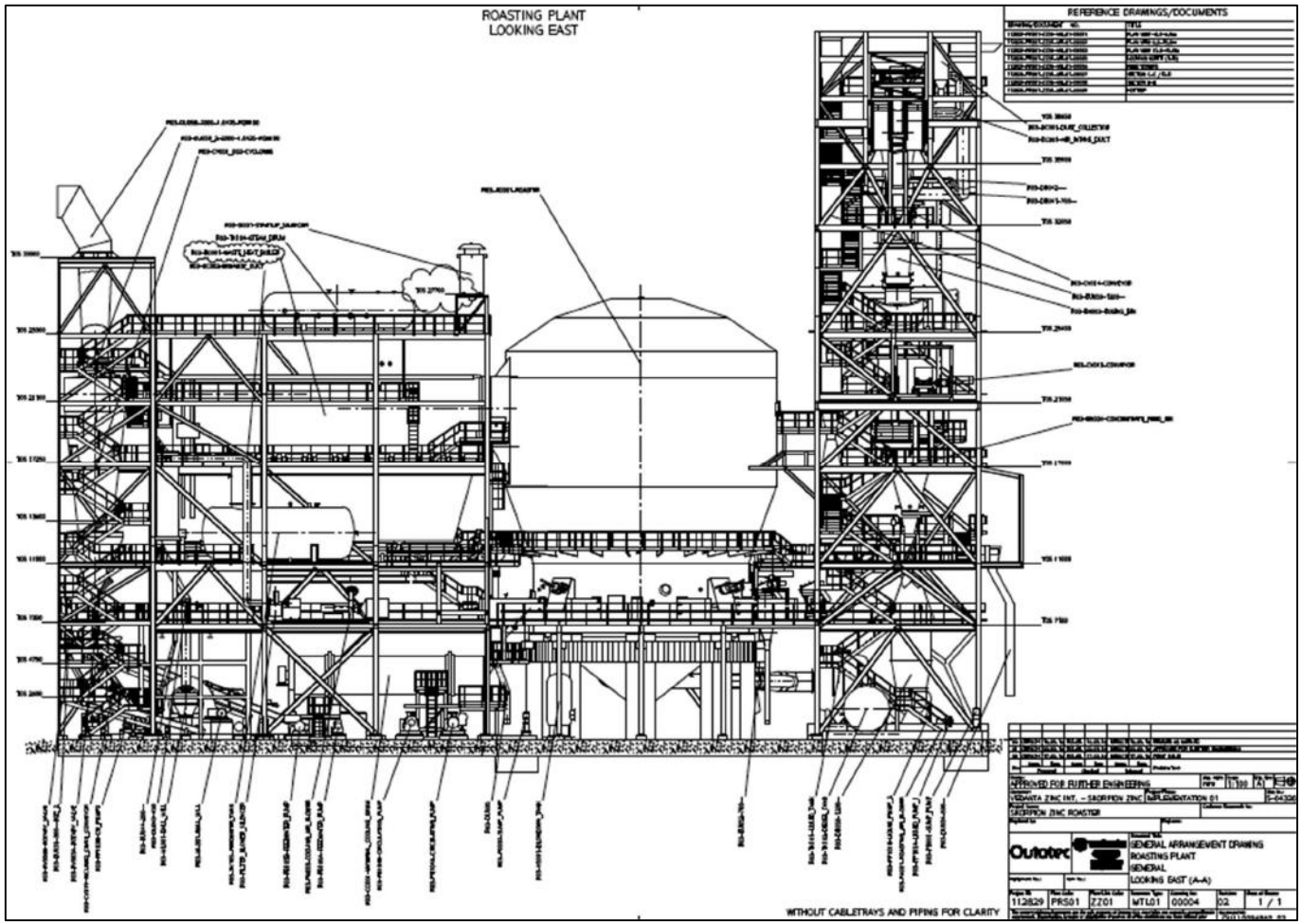


Figure 6: Proposed Roasting Plant Looking East

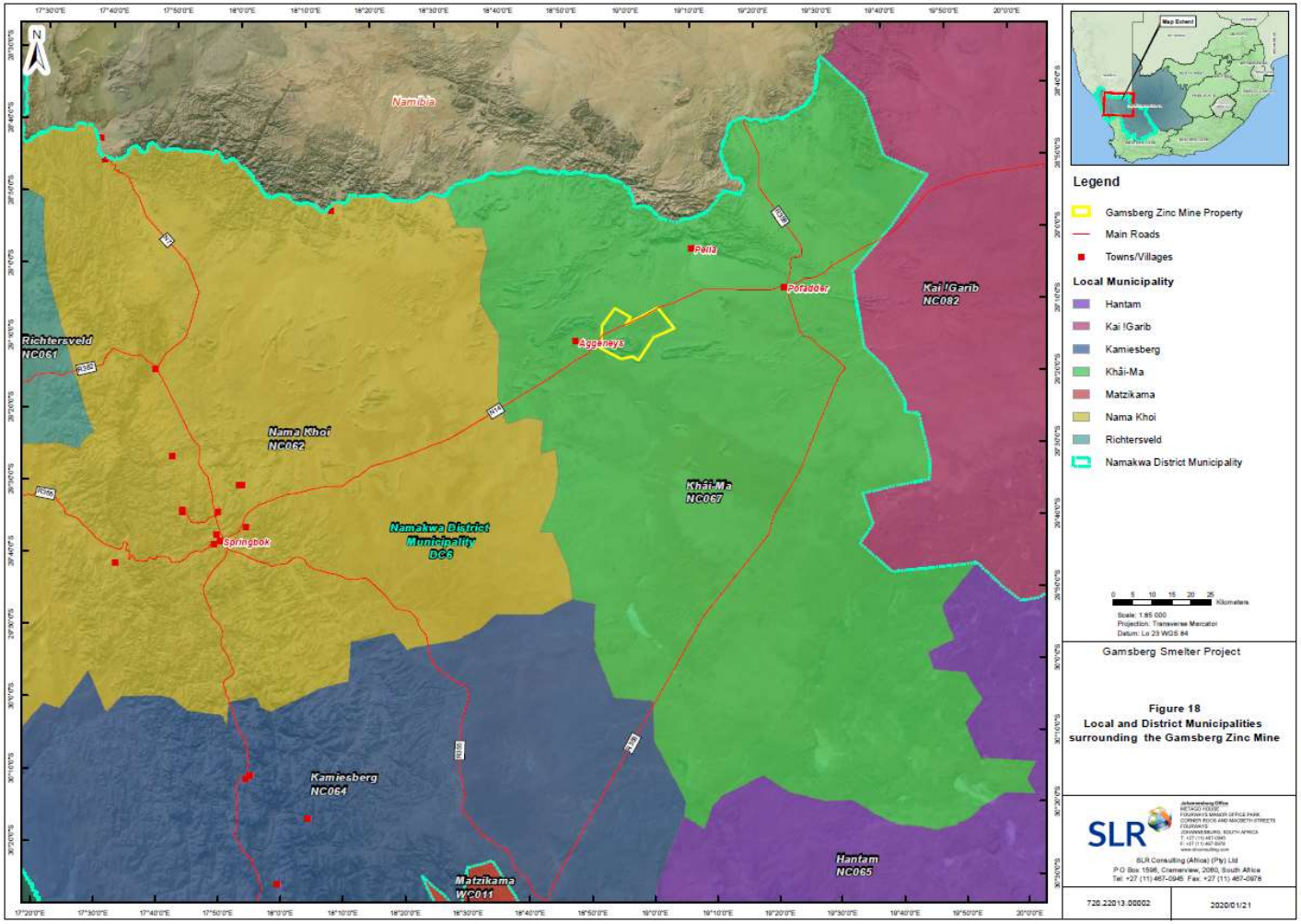


Figure 7: Khâi-Ma Local Municipality and District Municipality locality map.

4 LEGAL FRAMEWORK

In order to comply with the Visual Resource Management requirements, it is necessary to relate the proposed landscape modification in terms of international best practice in understanding landscapes and landscape processes. The proposed project also needs to be evaluated in terms of 'policy fit'. This requires a review of National and Regional policy and planning for the area to ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the planned sense of place and character of the area.

4.1 International and National Good Practice

For cultural landscapes, the following documentation provides good practice guidelines, specifically:

- Guidelines for Landscape and Visual Impact Assessment (GLVIA), Second Edition;
- International Finance Corporation (IFC);
- Millennium Ecosystem Assessment (MEA);
- United Nations Educational, Scientific and Cultural Organisation (UNESCO) World Heritage Convention (WHC);

4.1.1 Guidelines for Landscape and Visual Impact Assessment, Second Edition

The Landscape Institute and the Institute of Environmental Management and Assessment (United Kingdom) have compiled a book outlining best practice in landscape and visual impact assessment. This has become a key guideline for LVIA in the United Kingdom. "The principal aim of the guideline is to encourage high standards for the scope and context of landscape and visual impact assessments, based on the collegiate opinion and practice of the members of the Landscape Institute and the Institute of Environmental Management and Assessment. The guidelines also seek to establish certain principles and will help to achieve consistency, credibility and effectiveness in landscape and visual impact assessment, when carried out as part of an EIA" (The Landscape Institute, 2003);

In the introduction, the guideline states that 'Landscape encompasses the whole of our external environment, whether within village, towns, cities or in the countryside. The nature and pattern of buildings, streets, open spaces and trees – and their interrelationships within the built environment – are an equally important part of our landscape heritage" (The Landscape Institute, 2003: Pg. 9). The guideline identifies the following reasons why landscape is important in both urban and rural contexts, in that it is:

- An essential part of our natural resource base;
- A reservoir of archaeological and historical evidence;
- An environment for plants and animals (including humans);
- A resource that evokes sensual, cultural and spiritual responses and contributes to our urban and rural quality of life; and
- A valuable recreation resource. (The Landscape Institute, 2003).

4.1.2 International Finance Corporation (IFC)

The IFC Performance Standards (IFC, 2012) do not explicitly cover visual impacts or assessment thereof. Under IFC PS 6, ecosystem services are organized into four categories, with the third category related to cultural services which are defined as “the non-material benefits people obtain from ecosystems” and “may include natural areas that are sacred sites and areas of importance for recreation and aesthetic enjoyment” (IFC, 2012).

However, the IFC Environmental Health and Safety Guidelines for Electric Power Transmission and Distribution (IFC, 2007) specifically identifies the risks posed by power transmission and distribution projects to create visual impacts to residential communities. It recommends mitigation measures to be implemented to minimise visual impact. These should include the siting of powerlines and the design of substations with due consideration to landscape views and important environmental and community features. Prioritising the location of high-voltage transmission and distribution lines in less populated areas, where possible, is promoted.

IFC PS 8 recognises the importance of cultural heritage for current and future generations and aims to ensure that projects protect cultural heritage. The reports defines Cultural Heritage as “(i) tangible forms of cultural heritage, such as tangible moveable or immovable objects, property, sites, structures, or groups of structures, having archaeological (prehistoric), paleontological, historical, cultural, artistic, and religious values; (ii) unique natural features or tangible objects that embody cultural values, such as sacred groves, rocks, lakes, and waterfalls” (IFC, 2012). The IFC PS 8 defines Critical Heritage as “one or both of the following types of cultural heritage: (i) the internationally recognized heritage of communities who use, or have used within living memory the cultural heritage for long-standing cultural purposes; or (ii) legally protected cultural heritage areas, including those proposed by host governments for such designation” (IFC, 2012).

Legally protected cultural heritage areas are identified as important in the IFC PS 8 report. This is for “the protection and conservation of cultural heritage, and additional measures are needed for any projects that would be permitted under the applicable national law in these areas”. The report states that “in circumstances where a proposed project is located within a legally protected area or a legally defined buffer zone, the client, in addition to the requirements for critical cultural heritage, will meet the following requirements:

- Comply with defined national or local cultural heritage regulations or the protected area management plans;
- Consult the protected area sponsors and managers, local communities and other key stakeholders on the proposed project; and
- Implement additional programs, as appropriate, to promote and enhance the conservation aims of the protected area”. (IFC, 2012).

4.1.3 Millennium Ecosystem Assessment

In the Ecosystems and Human Well-being document compiled by the Millennium Ecosystem Assessment in 2005, Ecosystems are defined as being “essential for human well-being through their provisioning, regulating, cultural, and supporting services. Evidence in recent decades of escalating human impacts on ecological systems worldwide raises concerns about the consequences of ecosystem changes for human well-being”. (Millennium Ecosystem Assessment, 2005)

The Millennium Ecosystem Assessment defined the following non-material benefits that can be obtained from ecosystems*:*

- Inspiration: Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture, and advertising;
- Aesthetic values: Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, scenic drives, and the selection of housing locations;
- Sense of place: Many people value the “sense of place” that is associated with recognised features of their environment, including aspects of the ecosystem;
- Cultural heritage values: Many societies place high value on the maintenance of either historically important landscapes (“cultural landscapes”) or culturally significant species; and
- Recreation and ecotourism: People often choose where to spend their leisure time based in part on the characteristics of the natural or cultivated landscapes in a particular area. (Millennium Ecosystem Assessment, 2005)

The Millennium Ecosystem Assessment Ecosystems and Human Well-being: Synthesis report indicates that there has been a “rapid decline in sacred groves and species” in relation to spiritual and religious values, and aesthetic values have seen a “decline in quantity and quality of natural lands”. (Millennium Ecosystem Assessment, 2005)

4.2 National and Regional Legislation and Policies

In order to comply with the Visual Resource Management requirements, it is necessary to clarify which National and Regional planning policies govern the proposed development area to ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the sense of place and character of the area.

- DEA&DP Visual and Aesthetic Guidelines;
- Regional and Local Municipality Planning and Guidelines.

4.2.1 DEA&DP Visual and Aesthetic Guidelines

Reference to the Western Cape Department of Environmental Affairs and Development Planning (DEA&DP) Guideline for involving visual and aesthetic specialists in Environmental Impact Assessment (EIA) processes is provided in terms of southern African best practice in Visual Impact Assessment. The report compiled by Oberholzer states that the Best Practicable Environmental Option (BPEO) should address the following:

- Ensure that the scale, density and nature of activities or developments are harmonious and in keeping with the sense of place and character of the area. The BPEO must also

ensure that development must be located to prevent structures from being a visual intrusion (i.e. to retain open views and vistas).
- Long term protection of important scenic resources and heritage sites.
- Minimisation of visual intrusion in scenic areas.
- Retention of wilderness or special areas intact as far as possible.
- Responsiveness to the area's uniqueness, or sense of place." (Oberholzer, 2005)

4.2.2 Local and Regional Planning

The following tables list key regional and local planning that has relevance to the project.

Table 5: Namakwa District Municipality Integrated Development Plan 2019/2020 Comments for Mining and Tourism (Namakwa District Municipality Integrated Development Plan 2019 - 2020, 2019)

Theme	Requirements	Page
Opportunities for mining	District Investment Books for each Municipality: Government is hard at work to increase investments in the country. As the Namakwa District Municipality, we need to focus and lobby for investment in the mining, agricultural, energy, tourism and aquaculture sectors so that we can support SMME's and create the most needed jobs to grow our economy. This we will implement through the resolutions of a District Investment Summit which will come up with an integrated approach with dedicated timelines for the next five years.	3
	It is expected that the population of Khâi-Ma Municipality will increase due to the mining activities in the area.	9
	The mining development in the District can benefit from the new mining and renewable energy project if planned efficiently.	18
	Diversification and the development of a competitive manufacturing sector is a must with agriculture and mining as focus areas.	18
	Zinc Smelter – Location to be determined – Vedanta identified in the listing of Namakwa District Municipality projects	61
Opportunities for mining	Manufacturing, mining, agriculture, tourism & related high-level services & related IPAP sectors	26
National Concerns wrt Mining	Rising unemployment and increasing inequality; (Closure of mining houses, ##middle class and poor)	19
	Low revenue base for municipalities and increasing demand for maintenance (old infrastructure – mining towns)	19
Tourism	Tourism Market Development identified as a key issue by the Northern Cape State of the Province Address (SOPA) 2019	29
	Tourism routes identified in the listing of Namakwa District Municipality projects	61
	Tourism opportunities e.g. film industry, rallies, mountain bikes, spiritual routes, etc. identified in the listing of Namakwa District Municipality projects	61

Table 6: Khâi-Ma Local Municipality Integrated Development Plan 2017/2018 Comments for Mining and Tourism (Khâi-Ma Local Municipality Integrated Development Plan 2012 - 2017, 2012)

Theme	Requirements	Page
Mining	Mining • Establish a permanent working group between the Municipality and the mine managers responsible for developing Plans • Develop a database of available labour and skills to encourage the employment of local people • Provide skills training and support programmes • Instigate mining procurement opportunities in consultation with the mines, develop a database of such opportunities and ensure that this information is made available to local businesses and communities • Develop a small scale Mining Strategy	15
Tourism	Tourism The Municipality should develop and implement an aggressive marketing strategy. Tourism opportunities should be packaged and marketed accordingly. New Tourism Opportunities should be explored and communicated through the LED forum.	15
	The site is located in the centre of the Namakwa District between the main economic centres of the Northern Cape, i.e. Springbok and Upington. Not only has this location road-transport benefits but it largely presents opportunities from trade and retail and further broadens the scope for tourism development.	15
	The municipality is characterized by vast tracts of land, pristine natural environment, unique mountains with limited cell phone reception, which can be regarded as a unique attraction by some urban dwellers who wish to escape the rush of the cities. This inherent potential for eco-tourism needs to be exploited and managed in a sustainable manner in order to retain this unique setting.	22
	In addition, the Orange River and flowering season in Namaqualand attracts tourists from across the country and abroad. Khâi-Ma offers numerous tourism attractions like 4x4 trails, walking routes, mountain climbing, canoeing, the cathedral at Pella, a “Quiver”forest at Onseepkans and cultural heritage.	58
	Due to the strategic location of the municipality along the N14, Khâi-Ma should align its Spatial Plan with the Municipal Integrated Development Plan (IDP) of Richtersveld and Namakwa District, and Kai Garib and //Kara Hais Municipalities in the Siyanda District, as there is scope to develop nodal points along the corridor in terms of agricultural development and tourism. It is also notable that the European motor industry uses this route to test their cars at high speeds	60

Theme	Requirements	Page
	Mining holds potential due to unexploited mineral deposits especially in the Gamsberg areas. Tourism, while limited at present, is viewed as the main growth point for the region in terms of its economic development. It is the main driver behind increasing marginalized towns' money supply.	61
	Likewise, the Orange River, like the N14, provides a potential corridor of both agricultural and tourism development. While this may suggest more investment from outside government, the municipality should look to providing a better business-enabling environment to promote such investments.	61
	"To optimally develop our inherent economic opportunities, i.e. mining, agriculture, tourism, to protect and utilize the rich and diverse natural and cultural heritage for the enjoyment of all and to develop sustainable settlements where residents can live enriched, healthy and convenient lives"	62

Table 7: Khâi-Ma Local Municipality Rural Spatial Development Plan 2010 (Kai-Ma Local Municipality Spatial Development Plan, 2010)

Theme	Requirements	Page
Wilderness and Mountains around Aggeneys	The wilderness category includes the mountainous areas along the Orange River, north-west of Pofadder, north of Aggeneys and the mountains of Gamsberg and Namiesberg. Diep-in-Dier-Kloof behind Pella Mountain and along the banks of the Orange River is a spectacular wilderness area that can only be accessed by foot.	91
Aggeneys Conservation	There are currently no statutory protected areas in Khai Ma; however the Vedanta Black Mountain mine has a conservation agreement covering approximately 23 000ha of mine holdings around Aggeneys (Namakwa Biodiversity Sector Plan, 2008). This is an important conservation initiative due to its significant biodiversity.	93
Mining Concerns regarding biodiversity	Mining activities in Khai Ma present a huge threat to local biodiversity – especially the proposed development of opencast zinc mining on the Gamsberg. The irrigation along the Orange River and encroachment of Prosopis (an aggressive invasive alien) along the Orange River banks poses a threat to the biodiversity of the area. Environmental Management Plans need to be prepared for the mining of granite, commonage farming and other farming activities (Khâi-Ma IDP 2010)	94
Employment and Mining	• Currently 77% of households are considered indigent and receive subsidies for basic services (Khâi-Ma IDP 2010). Employment • The high poverty level directly affects the Municipality's financial ability to provide and maintain services.	99

	• The main sources of income are the Black Mountain Mine at Aggeneys, government departments (i.e. Department of Education, Health, Safety and Communication) and the local Municipality.	
Mine Closure Concerns	The Public Participation Initiative indicates concern for the future of Aggeneys mine, which will have a detrimental impact on Khâi-Ma if it closes down (Public Participation Initiative).	115

4.3 Policy Fit

Policy fit refers to the degree to which the proposed landscape modifications align with International, National, Provincial and Local planning and policy.

In terms of international best practice, the proposed landscape modification is unlikely to trigger significant issues. Although the area does have mountain landscape features that increase scenic quality, the adjacent Gamsberg Zinc Mine does dominate the local and regional landscape character, with the town of Aggeneys historically being a mining town and the residents associated with mining landscape modifications.

In terms of regional and local planning, there is clear mention of the economic value that the mining in the Aggeneys region can bring to the local and district municipalities. There is also a strong emphasis on tourism, the wilderness areas to the north of Aggeneys along the Orange River, and a recognition that the N14 National Highway is an import tourist view corridor that could be used to further tourism initiatives in the area. The wilderness area to the north of Aggeneys, and the N14 as a tourist view corridor would need to be taken into consideration when defining the Key Observation Points and Visual Impacts.

5 METHODOLOGY

The process that VRMA followed when determining landscape significance is based on the United States Bureau of Land Management's (BLM) Visual Resource Management method (USDI., 2004). This mapping and Geographic Information System (GIS) based method of assessing landscape modifications allows for increased objectivity and consistency by using standard assessment criteria. The following key factors determine the suitability of landscape change:

- *"Different levels of scenic values require different levels of management. For example, management of an area with high scenic value might be focused on preserving the existing character of the landscape, and management of an area with little scenic value might allow for major modifications to the landscape. Determining how an area should be managed first requires an assessment of the area's scenic values".*
- *"Assessing scenic values and determining visual impacts can be a subjective process. Objectivity and consistency can be greatly increased by using the basic design elements of form, line, colour, and texture, which have often been used to describe and evaluate landscapes, to also describe proposed projects. Projects that repeat these design elements are usually in harmony with their surroundings; those that don't create contrast. By adjusting project designs so the elements are repeated, visual impacts can be minimized" (USDI., 2004).*

The assessment comprises two main sections: firstly, the ***Baseline Stage*** to identify the visual resources and key observation locations within the project zone of visual influence; and secondly, the ***Assessment Stage*** which determines the visual impacts and significance of the proposed landscape modifications.

5.1 Baseline Analysis Stage

In terms of VRM methodology, landscape character is derived from a combination of ***scenic quality***, ***receptor sensitivity*** to landscape change and ***distance*** from the proposed landscape change. The objective of the analysis is to compile a mapped inventory of the visual resources found in the receiving landscape, and to derive a mapped Visual Resource sensitivity layer from which to evaluate the suitability of the landscape change.

5.1.1 Scenic Quality

The scenic quality is determined making use of the VRM Scenic Quality Checklist (refer to Annexure D). The checklist identifies seven scenic quality criteria which are rated with 1 (low) to 5 (high) scale. The scores are totalled and assigned an A (High), B (Moderate) or C (low) based on the following split:
A= scenic quality rating of ≥19;
B = rating of 12 – 18,
C= rating of ≤11

The seven scenic quality criteria are defined below:

- **Land Form**: Topography becomes more of a factor as it becomes steeper, or more severely sculptured.
- **Vegetation**: Primary consideration given to the variety of patterns, forms, and textures created by plant life.
- **Water**: That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration.
- **Colour**: The overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) are considered as they appear during seasons or periods of high use.
- **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.
- **Adjacent Land Use**: Degree to which scenery and distance enhance, or start to influence, the overall impression of the scenery within the rating unit.
- **Cultural Modifications**: Cultural modifications should be considered, and may detract from the scenery or complement or improve the scenic quality of an area.

5.1.2 Receptor Sensitivity

Receptor Sensitivity levels are a measure of public concern for scenic quality and assessed making use of the Sensitivity Checklist in Annexure D. Receptor sensitivity to landscape change is determined by rating the following factors in terms of Low to High:

- **Type of Users**: Visual sensitivity will vary with the type of users, e.g. recreational sightseers may be highly sensitive to any changes in visual quality, whereas workers who pass through the area on a regular basis may not be as sensitive to change.
- **Amount of Use**: Areas seen or used by large numbers of people are potentially more sensitive.
- **Public Interest**: The visual quality of an area may be of concern to local, or regional, groups. Indicators of this concern are usually expressed via public controversy created in response to proposed activities.
- **Adjacent Land Uses**: The interrelationship with land uses in adjacent lands. For example, an area within the viewshed of a residential area may be very sensitive, whereas an area surrounded by commercially developed lands may not be as visually sensitive.
- **Special Areas**: Management objectives for special areas such as Natural Areas, Wilderness Areas or Wilderness Study Areas, Wild and Scenic Rivers, Scenic Areas, Scenic Roads or Trails, and Critical Biodiversity Areas frequently require special consideration for the protection of their visual values.
- **Other Factors**: Consider any other information such as research or studies that include indicators of visual sensitivity.

5.1.3 Exposure

The area where a landscape modification starts to influence the landscape character is termed the Zone of Visual Influence (ZVI) and is defined by the U.K. Institute of Environmental Management and Assessment's (IEMA) *'Guidelines for Landscape and Visual Impact Assessment'* as 'the area within which a proposed development may have an influence or effect on visual amenity (of the surrounding areas).'

The inverse relationship of distance and visual impact is well recognised in visual analysis literature *(Hull, R.B. and Bishop, I.E., 1988)*. According to Hull and Bishop, exposure, or visual impact, tends to diminish exponentially with distance. The areas where most landscape modifications would be visible are located within 2 km from the site of the landscape modification. Thus, the potential visual impact of an object diminishes at an exponential rate as the distance between the observer and the object increases due to atmospheric conditions prevalent at a location, which causes the air to appear greyer, thereby diminishing detail. For example, viewed from 1000 m from a landscape modification, the impact would be 25% of the impact as viewed from 500 m from a landscape modification. At 2000m it would be 10% of the impact at 500 m.

Distance from a landscape modification influences the size and clarity of the landscape modification viewing. The Bureau of Land Management defines three distance categories:

i. ***Foreground / Middle ground***, up to approximately 6km, which is where there is potential for the sense of place to change;
ii. ***Background areas***, from 6km to 24km, where there is some potential for change in the sense of place, but where change would only occur in the case of very large landscape modifications; and
iii. ***Seldom seen areas***, which fall within the Foreground / Middle ground area but, as a result of no receptors, are not viewed or are seldom viewed.

5.1.4 Visual Resource Management Classes

These findings are then submitted to a VRM Matrix below. The VRM Classes are not prescriptive and are used as a guideline to determine the carrying capacity of a visually preferred landscape as a basis for assessing the suitability of the landscape change associated with the proposed project.

Table 8: VRM Class Matrix Table

		VISUAL SENSITIVITY LEVELS								
		High			Medium			Low		
SCENIC QUALITY	A (High)	II	II	II	II	II	II	II	II	II
	B (Medium)	II	III	III/ IV *	III	IV	IV	IV	IV	IV
	C (Low)	III	IV	IV	IV	IV	IV	IV	IV	IV
DISTANCE ZONES		Fore/middle ground	Background	Seldom seen	Fore/middle ground	Background	Seldom seen	Fore/middle ground	Background	Seldom seen

* If adjacent areas are **Class III** or lower, assign **Class III**, if higher, assign **Class IV**

The visual objectives of each of the classes are listed below:

- The Class I objective is to preserve the existing character of the landscape, the level of change to the characteristic landscape should be very low, and must not attract attention. Class I is assigned when a decision is made to maintain a natural landscape;
- The Class II objective is to retain the existing character of the landscape and the level of change to the characteristic landscape should be low. The proposed development may be seen, but should not attract the attention of the casual observer, and should repeat the basic elements of form, line, colour and texture found in the predominant natural features of the characteristic landscape;
- The Class III objective is to partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate. The proposed development may attract attention, but should not dominate the view of the casual observer, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape; and
- The Class IV objective is to provide for management activities that require major modifications of the existing character of the landscape. The level of change to the landscape can be high, and the proposed development may dominate the view and be the major focus of the viewer's (s') attention without significantly degrading the local landscape character.

5.1.5 Key Observation Points

During the Baseline Inventory Stage, Key Observation Points (KOPs) are identified. KOPs are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. These locations

are important in terms of the VRM methodology, which requires that the Degree of Contrast (DoC) that the proposed landscape modifications will make to the existing landscape be measured from these most critical locations, or receptors, surrounding the property. To define the KOPs, potential receptor locations were identified in the viewshed analysis, and screened, based on the following criteria:

- Angle of observation;
- Number of viewers;
- Length of time the project is in view;
- Relative project size;
- Season of use;
- Critical viewpoints, e.g. views from communities, road crossings; and
- Distance from property.

5.2 Assessment and Impact Stage

The analysis stage involves determining whether the potential visual impacts from proposed surface-disturbing activities or developments will meet the management objectives established for the area, or whether design adjustments will be required. This requires a contrast rating to assess the expected DoC the proposed landscape modifications would generate within the receiving landscape in order to define the Magnitude of the impact.

5.2.1 Contrast Rating

The contrast rating is undertaken to determine if the VRM Class Objectives are met. The suitability of landscape modification is assessed by comparing and contrasting existing receiving landscape to the expected contrast that the proposed landscape change will generate. This is done by evaluating the level of change to the existing landscape by assessing the line, colour, texture and form, in relation to the visual objectives defined for the area.

The following criteria are utilised in defining the DoC:

- **None**: The element contrast is not visible or perceived.
- **Weak**: The element contrast can be seen but does not attract attention.
- **Moderate**: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- **Strong**: The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

As an example, in a Class I area, the visual objective is to preserve the existing character of the landscape, and the resultant contrast to the existing landscape should not be notable to the casual observer and cannot attract attention. In a Class IV area example, the objective is to provide for proposed landscape activities that allow for major modifications of the existing character of the landscape. Based on whether the VRM objectives are met, mitigations, if required, are defined to avoid, reduce or mitigate the proposed landscape modifications so that the visual impact does not detract from the surrounding landscape sense of place.

Based on the findings of the contrast rating, the Magnitude of the Landscape and Visual Impact Assessment is determined.

5.2.2 Photomontages

As a component in this contrast rating process, visual representation, such as photo montages are vital in large-scale modifications, as this serves to inform Interested & Affected Parties and decision-making authorities of the nature and extent of the impact associated with the proposed project/development. There is an ethical obligation in this process, as visualisation can be misleading if not undertaken ethically. In terms of adhering to standards for ethical representation of landscape modifications, VRMA subscribes to the Proposed Interim Code of Ethics for Landscape Visualisation developed by the Collaborative for Advanced Landscape Planning (CALP) (Sheppard, 2000). This code states that professional presenters of realistic landscape visualisations are responsible for promoting full understanding of proposed landscape changes, providing an honest and neutral visual representation of the expected landscape, by seeking to avoid bias in responses and demonstrating the legitimacy of the visualisation process. Presenters of landscape visualisations should adhere to the principles of:

- Access to Information
- Accuracy
- Legitimacy
- Representativeness
- Visual Clarity and Interest

The Code of Ethical Conduct states that the presenter should:

- Demonstrate an appropriate level of qualification and experience.
- Use visualisation tools and media that are appropriate to the purpose.
- Choose the appropriate level of realism.
- Identify, collect and document supporting visual data available for, or used in, the visualisation process.
- Conduct an on-site visual analysis to determine important issues and views.
- Seek community input on viewpoints and landscape issues to address in the visualisations.
- Provide the viewer with a reasonable choice of viewpoints, view directions, view angles, viewing conditions and timeframes appropriate to the area being visualised.
- Estimate and disclose the expected degree of uncertainty, indicating areas and possible visual consequences of the uncertainties.
- Use more than one appropriate presentation mode and means of access for the affected public.
- Present important non-visual information at the same time as the visual presentation, using a neutral delivery.
- Avoid the use, or the appearance of, ‘sales’ techniques or special effects.
- Avoid seeking a particular response from the audience.
- Provide information describing how the visualisation process was conducted and how key decisions were taken (Sheppard, 2000).

5.2.3 Impact Assessment Criteria

Impacts will be defined in terms of the standardised impact assessment criteria provided by the environmental practitioner.

Table 9: SLR Interpretation of Significance Table

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 to be required.
Very Low	It will not have an influence on the decision. Does not require any mitigation
Insignificant	Inconsequential, not requiring any consideration.

The full impact assessment criteria can be seen in the Annexure B.

6 BASELINE VISUAL INVENTORY ASSESSMENT

Landscape character is defined by the U.K. Institute of Environmental Management and Assessment (IEMA) as the 'distinct and recognisable pattern of elements that occurs consistently in a particular type of landscape, and how this is perceived by people. It reflects particular combinations of geology, landform, soils, vegetation, land use and human settlement'. It creates the specific sense of place or essential character and 'spirit of the place' (IEMA, 2002). This section of the VIA identified the main landscape features that define the landscape character, as well as the key receptors that make use of the visual resources created by the landscape.

6.1 Site Investigation

A field survey was undertaken to inform the landscape and visual impact assessment. During the site visit, photographs were taken from each viewpoint, and the view direction and GPS location captured. The main land-use was documented as well as the nature of the dominant landscape in the vista. In order to represent views of the proposed landscape modification by means of photomontages for assessment purposes, panoramic photographs were also taken from key viewpoints. A photograph from each of the sample points is documented in Annexure A, with the photograph locations mapped below.

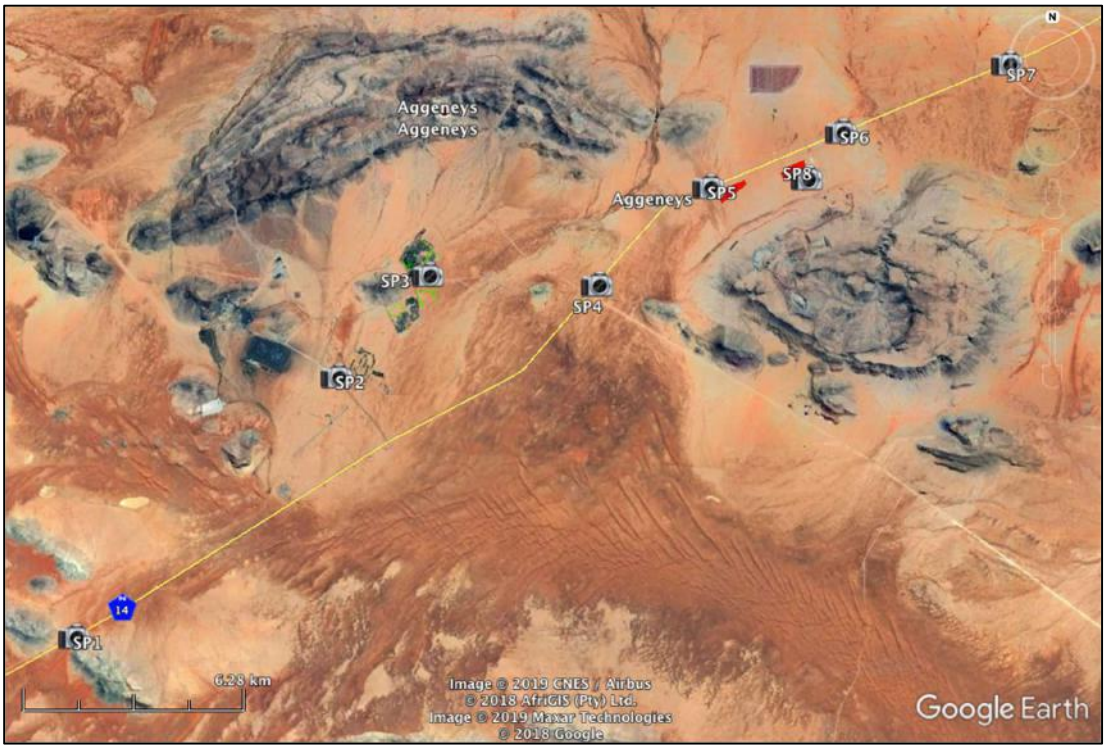


Figure 8: Survey Point Locality Map

Table 10: List of Sampling Sites where Landscape and Aesthetic Survey was Conducted

ID	Date	Lat	Long	Motivation
1	26 Aug 2019	29°20'3.51"S	18°44'28.41"E	N14 National Highway eastbound / Background views
2	26 Aug 2019	29°15'48.16"S	18°48'51.01"E	Black Mountain Mine / Golf Course
3	27 Aug 2019	29°14'30.59"S	18°50'42.17"E	Aggeneys Town
4	27 Aug 2019	29°15'7.28"S	18°53'14.35"E	N14 National Highway / PV Park
5	27 Aug 2019	29°13'9.22"S	18°55'38.70"E	N14 National Highway eastbound / Proximate views
6	27 Aug 2019	29°12'18.28"S	18°57'58.72"E	N14 National Highway westbound / Proximate views
7	27 Aug 2019	- 29°11'15.12"S	19° 0'54.62"E	N14 National Highway westbound / Background views
8	27 Aug 2019	29°12'57.00"S	18°57'12.67"E	Gamsberg Zinc Mine / Proposed Site

6.2 Landscape Context

6.2.1 Land use

Land use is a crucial factor in determining landscape character, especially regarding the Visual Absorption Capacity (VAC) of the landscapes. Oberholzer defines VAC as the potential of the landscape to conceal the proposed project (Oberholzer, 2005). General land uses of the area are described making use of Open Source Mapping vector data, overlaid onto ArcGIS World Satellite Imagery.

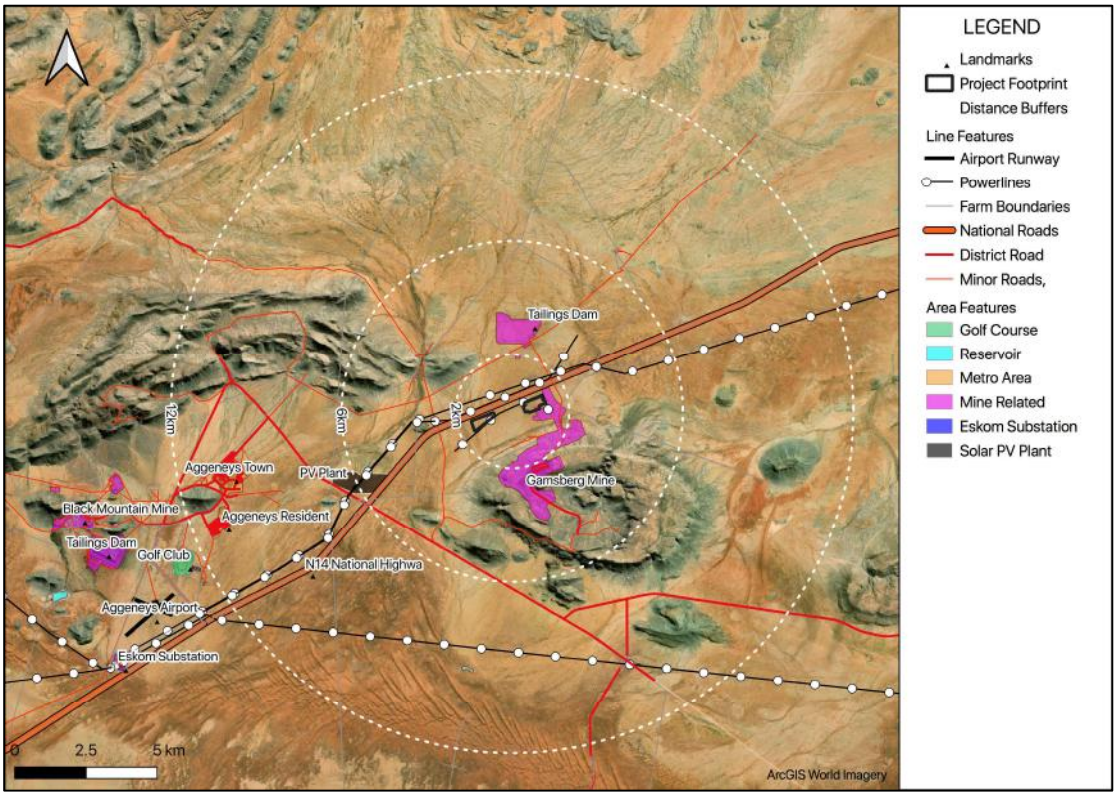


Figure 9: Landscape and land use context map.

Aggeneys Town and Mining

The small town of Aggeneys (meaning place of water) is located to the north of the N14 highway and historically a mining town. Aggeneys was founded to service the Black Mountain Mine. An 'oasis type' landscape character is created by many existing trees which potentially would screen views of the proposed landscape change. The Golf Club to the southwest of the Aggeneys operator's village is a small nine hole configuration. The area is important for recreation for the area. To create a golfing landscape and experience, many trees have been planted along the course to screen users from views of the mine and existing Black Mountain Mine TSF.

Black Mountain Mine is an underground base-metal operation, currently employing over 600 permanent staff. This copper, zinc, silver and lead mine is just to the west of the town. The earth-coloured tones of the TSF of the mine combined with the visual backdrop of mountains, reduces the visual impact of the existing mine. The industrial type activities associated with the Black Mountain Mine and processing plant are mainly concealed by the TSF and the surrounding hills.

The Gamsberg Zinc Mine was recently established for the extraction of Zinc. This included the construction of a plant adjacent to the N14 National Highway. While the existing plant is large, the setting against the Gamsberg Mountain as a backdrop reduces the intensity of the scale of the plant to some degree. The concentrator plant is to expand and is likely to double in size as approved under the original Environmental Authorization. This will increase the visual presence of the plant.

Substations and Infrastructure

Existing energy infrastructure in the area includes the Aggeneys substation, the Pelladrift and Gamsberg substations and various 400kV and 220kV transmission lines. The Aggeneys substation is situated close to N14 with no visual screening. Adjacent to the Gamsberg Zinc Mine, multiple power line routings are apparent. The lattice and monopole structures associated with the power lines create a strong vertical line presence in the local landscape.

The Aggeneys Aerodrome is located to the southeast of the Black Mountain Mine TSF and caters only for mine related flights. The lack of airport structures does not make this a dominant visual element in the landscape.

Access Routes

The N14 is the main highway through the Northern Cape. The N14 is a tourist link between the West Coast and Gauteng and as such it should be considered a view corridor where open and undisturbed landscapes should be maintained. The existing Gamsberg and Black Mountain Mine activities are clearly visible from the road, with the existing Black Mountain Mine TSF a noticeable feature in the Aggeneys landscape. The existing Black Mountain Mine infrastructure is less dominating as it is set further back and is relatively well screened by the TSF and smaller hills adjacent the site. However, the Gamsberg Zinc Mine Concentrator Plant is clearly visible to the N14 receptors, and dominates the attention of the casual observer. The Gamsberg Zinc Mine TSF is located to the north of the N14, but is yet to be raised to a height where the feature would become a dominant element in the landscape. The set-back from the road and the earth colour of the TSF, is also likely to reduce visual contrast of this landscape modification.

Other Land Uses

Due to the location of Aggeneys in the Renewable Energy Development Zones 7 (REDZ7), solar power projects are taking place in the vicinity. A large Solar Photovoltaic (PV) plant is located within the vicinity of the Gamsberg Zinc Mine and is located adjacent to the N14.

The other main land use in the area is dry-land agriculture which is characterised by large farms and isolated farmsteads. While farming lands do fall within the project zone of visual influence, no farmstead were identified within the foreground / mid ground distance zones.

The Khâi-Ma Spatial Development Plan emphasises the importance of the wilderness area to the north of Aggeneys that aligns with the Orange River ecological corridor. It is important to ensure that the wilderness qualities of this area are not visually degraded outside of the proposed industrial landscape modification. This is especially a requirement for the areas to the north of Aggeneys.

Landscape Context Visual Absorption Capacity Comment (VAC)

In summary, the main landscape elements influencing visibility are topographic in nature. The area is mountainous and while the surrounding terrain is flat, there is a natural undulation to the terrain. The vegetation in this arid region is sparse and offers limited VAC, but the built nature of the existing Gamsberg Zinc Mine and WRD does increase the VAC for similar industrial type developments within *the local context to some degree*. VAC is thus defined as Medium to Low. It should be noted that the greater landscape still has value as the existing mining plants modifications are not excessively dominating as they are set back from the road and are viewed against the backdrop of the mountain features, and the two step WRD's of the Gamsberg Zinc Mine which reflect similar form and texture to the surrounding mountain landscapes.

6.2.2 Vegetation

Vegetation is a key factor in defining the landscape character and can also influence the VAC of the site. Mapping of the vegetation is generic and makes use of SANBI data services and depicted in the following map.

The project area falls within the Nama Karoo Biome, essentially a grassy, dwarf shrubland with characteristic koppies. The dominant vegetation types found within the area are Bushmanland Sandy Grassland, Bushmanland Inselberg Shrubland and Aggeneys Gravel Vygieveld. The latter two vegetation types (Bushmanland Inselberg Shrubsland and Aggeneys Gravel Vrygieveld) are rare and unique. The broad classification provided by SANBI is that the project areas falls within the Bushmanland Arid Grassland.

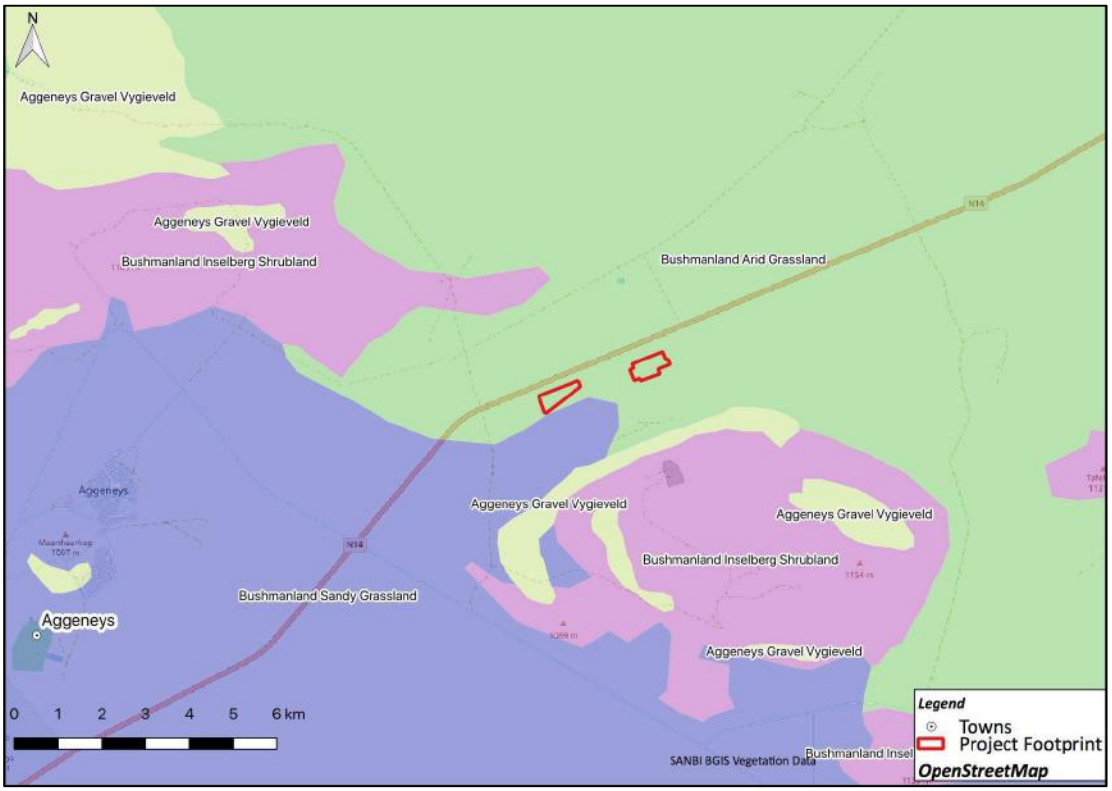


Figure 10: SANBI Regional Vegetation Map indicating the projects areas falling within the Bushmanland Arid Grassland vegetation type.

Due to the lack of vegetation in the arid environment, dust is prevalent in the landscape which does influence atmospheric conditions and thus visibility. As a result of the dust in the atmosphere, the site visit found that the ZVI of the existing Gamsberg Zinc Mine is contained to within the Foregound / Middle Ground distance. While the large structures of the mine plant are visible at a distance, the clarity of the visibility is limited. The effect of dust in the atmosphere is clearly visible in the photomontages in Figure 17.

6.2.3 Protected Areas

A website review of the SANBI BGIS online platform found that no protected areas fall within the project zone of visual influence. However, the Gamsberg Nature Reserve was

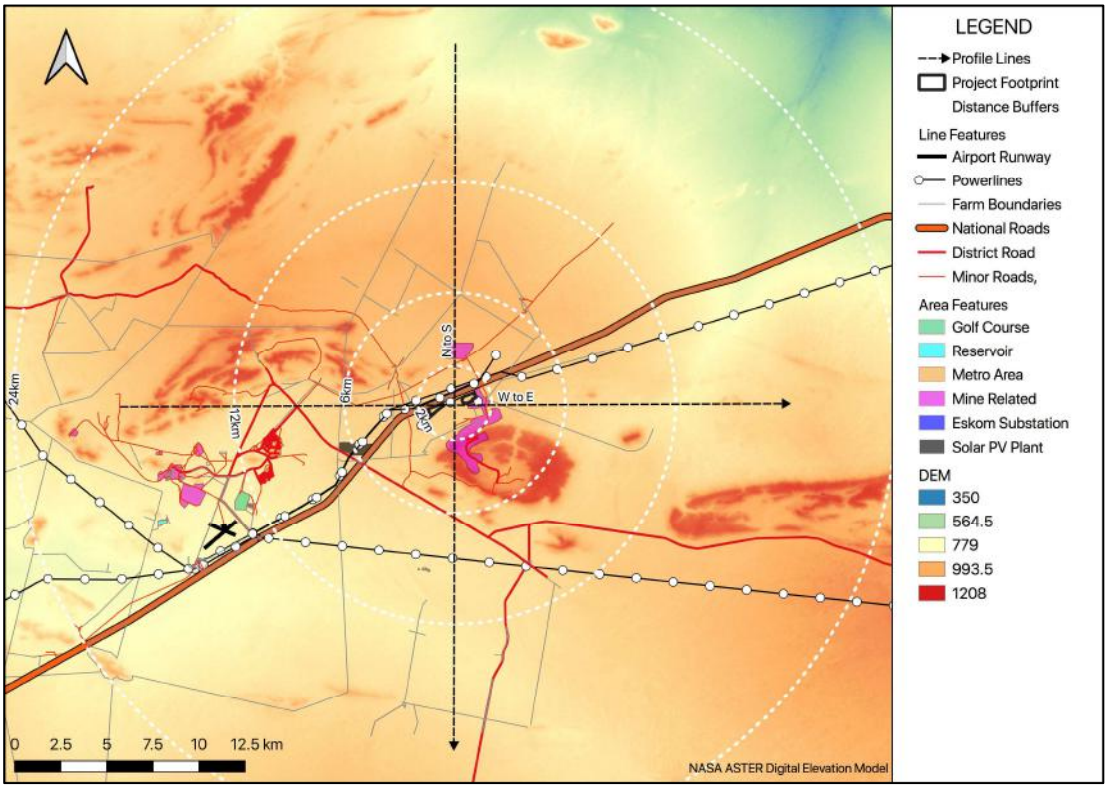
proclaimed on 5 August 2019 as part of the offset for the mine, as gazetted in the Northern Cape Provincial Gazette.

6.2.4 Topography

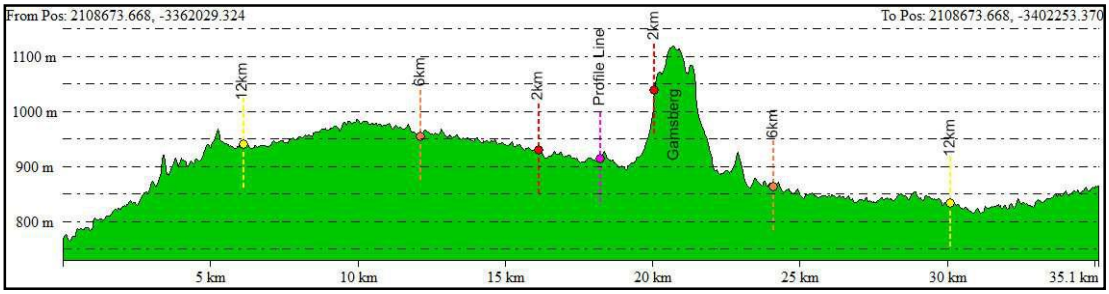
The topography is a crucial factor in determining the landscape as the fall of the land often defines mountain and river features. To better understand the topography, a regional Digital Elevation Model (DEM) was generated using NASA ASTER 90m DEM data (NASA, 2009). The data is generalised, and although it will not reflect smaller topographic features, it is useful in understanding the broader topographical landscape character. A regional Digital Elevation Map is also useful to determine general drainage of the site. To assist in the understanding of the elevation map, a graphical representation of the terrain profiles were also generated with lines running through the study area. The map can be viewed on the flowing page.

The area around the mine and Aggeneys is characterised by two distinct landform types; very flat and open plains characterised by low dunes in places, and rugged low mountains that rise approximately 200m above the surrounding plains (due to the presence of quartzite and iron formation layers within the stratigraphy that are less prone to weathering than other rocks) (Norman and Whitfield, 2006).

Due to the arid nature of the climate, the mountain ranges / hills are highly visually prominent creating a strong landscape-level contrast with the surrounding plains that adds to the landscape character. The Windhoek se Berge, Skelmberg and Hoedkop Mountains are located within the viewshed of the mine, with the main Gamsberg Zinc Mine located on the Gamsberg Mountain. The Gamsberg Mountain is in close proximity to the proposed site, with the other mountains and hills around Aggeneys, approximately 10km to the northwest. These mountain features are interesting in their setting and significantly add to the local sense of place.



North-South Profile



West-East Profile

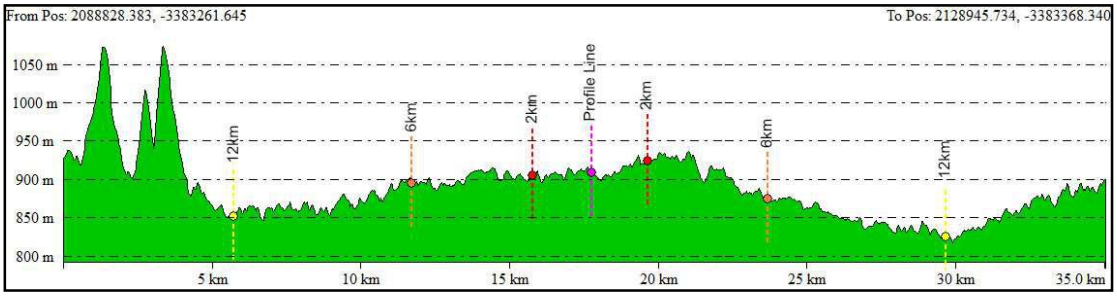


Figure 11: Regional Digital Elevation map and topographic profiles.

The north to south profile covers a range of approximately 16km on either side of the project site. Terrain increases in elevation cresting at approximately 7km north of the Gamsberg Zinc Mine at an elevation of just under 1 000 mamsl before starting to drop off down to the Orange River Valley. Visibility to the north would be clear in the Foreground / Mid Ground distance zones ranging from about 6km from the site, with topographic screening obscuring the landscape change beyond in the Orange River wilderness areas. To the south of the project, the Gamsberg Mountain is clearly visible and rises approximately 200m in height to an elevation of 1 100m and essentially obscures views of the plant and stack to receptors located in this direction. South of the Gamsberg mountain, the terrain is gently undulating.

The west to east profile reflects the gently undulating terrain, with the mountain features around Aggeneys, approximately 13km west of the Gamsberg Zinc Mine clearly dominating the regional topography. West of the project site, receptor views of the plant are likely to be topographically screened beyond the 6km distance, but with views of the plant stack extending beyond the background distance zones but contained by the high ground at the 14km distance. East of the project site, the slightly raised ground at the 2km distance and the subsequent drop in elevation beyond the 4km mark essentially obscures views of the plant and stack. This profile is important in that it tracks the routing of the N14 National Highway. Views from N14 receptors travelling toward the project site from the west, are likely to see the stack from the 24km mark, with the stack becoming clearly dominant after 12km due to the location of the plant on a skyline. Receptors travelling from the west, are likely to have clear view of the plant from about 6km. Views from N14 receptors travelling towards the project site from the east, are likely to experience clear views of the plant from about 6km mark, with views of the stack taking place at the 8km to 10km mark.

6.2.5 Steep Slopes and Site Prominence

Steep slope areas can add to the positive elements of the landscape in terms of relief, mountain and hill areas, and vegetation variety. Steep slopes can also pose adverse risks in terms of soil erosion and excessive cut and fills required for new road access. As no steep slope areas were identified within the project footprint during the site visit, no slopes analysis was undertaken. The proposed project sites are not locally or regionally prominent.

6.3 Project Zone of Visual Influence

The visible extent, or viewshed, is “the outer boundary defining a view catchment area, usually along crests and ridgelines” (Oberholzer, 2005). The viewshed analysis is undertaken to determine the extent to which the proposed landscape change would be visible to the surrounding areas. This mapping exercise is used to determine the people located within the project zone of visual influence, as well as define the significant visual resources that could be influenced by the proposed landscape modification.

A viewshed analysis was undertaken from the proposed site at a specified height above ground level to define the extent of the possible visual influence of the proposed landscape modification. A Digital Elevation Model was generated, making use of open source NASA ASTER Digital Elevation Model data (NASA, 2009). The extent of the viewshed analysis is restricted to a defined distance of 24km for the plant, and 30km for the stack, as the project ZVI is unlikely to extend beyond this distance due to atmospheric influences. This concept is supported in the literature which indicates that visibility tends to diminish exponentially with distance (Hull & Bishop, 1988).

Table 11: Proposed Project Heights Table

Proposed Activity	Approx. Maximum Height above ground level (m)	Viewshed Extent (km)
Smelter Plant	35	24
Smelter Stack	70	30

It is important to note that the terrain model ***excludes vegetation and structural screening*** which could influence the extent of the visibility. The receptor height value was set at 1.5m above ground to represent best international practice for receptor height. Mapping of the viewshed/s are depicted in the maps of the following page.

6.3.1 Plant Viewshed Analysis

As indicated in the table above, the viewshed for the Smelter Plant made use of 35m above ground as the viewshed offset height, with the terrain model restricted to 24km from point source. As depicted in the plant viewshed map, the visual extent is typically fragmented by the undulation of the terrain as well as the surrounding mountain features. Within the 2km High Exposure areas, the plant will be clearly visible, with views limited to the south by the Gamsberg Mountain, to the east by undulating terrain and to the north and west by smaller hill features. Within the 6km to 12km distance range, views of the plant will mainly be obscured by topography, with a small exception to the northeast. Beyond the 12km, the viewshed extends mainly to the southwest over gently undulating terrain, as well as catching higher elevation portions of local mountains. The viewshed also expands to the east but is contained in the 6km distance due to raised ground. Due to the fragmentation of the viewshed by undulating terrain and mountain features, the zone of visual influence is likely to be contained within the 6km Foreground / Mid Ground distance area. As such, the plant visual influence is defined as Localised as it is unlikely to expand the existing Gamsberg Zinc Mine zone of visual influence.

6.3.2 Stack Viewshed Analysis

As indicated in the table above, the viewshed for the Smelter Stack made use of 80m above ground as the viewshed offset height, with the terrain model capped at the 30km mark from source to take into consideration the expanded views of the tall stack. The viewshed is similar to the plant viewshed but is more intensely distributed within the 6km Foreground / Mid Ground areas. Topographic screening from the Gamsberg Mountain effectively screens views to the south, but with the views opening up further to the southwest over undulating terrain. The viewshed also extents to the east up to the 12km. As verified on the west to east profile, the visibility of the stack to the east is likely to be contained just past the 8km distance mark. As with the plant viewshed, fragmentation of the viewshed by undulating terrain and mountain features does influence the spread of the viewshed. However, as the stack is much higher, the zone of visual influence is likely to extend beyond the 12km Background distance area with the added height of the plume. As such, the plant visual influence is defined as Regional. Of importance for the Orange River wilderness area, is that the viewshed of the stack (and plant) are unlikely to be visually intrusive to these areas due to topographic screening.

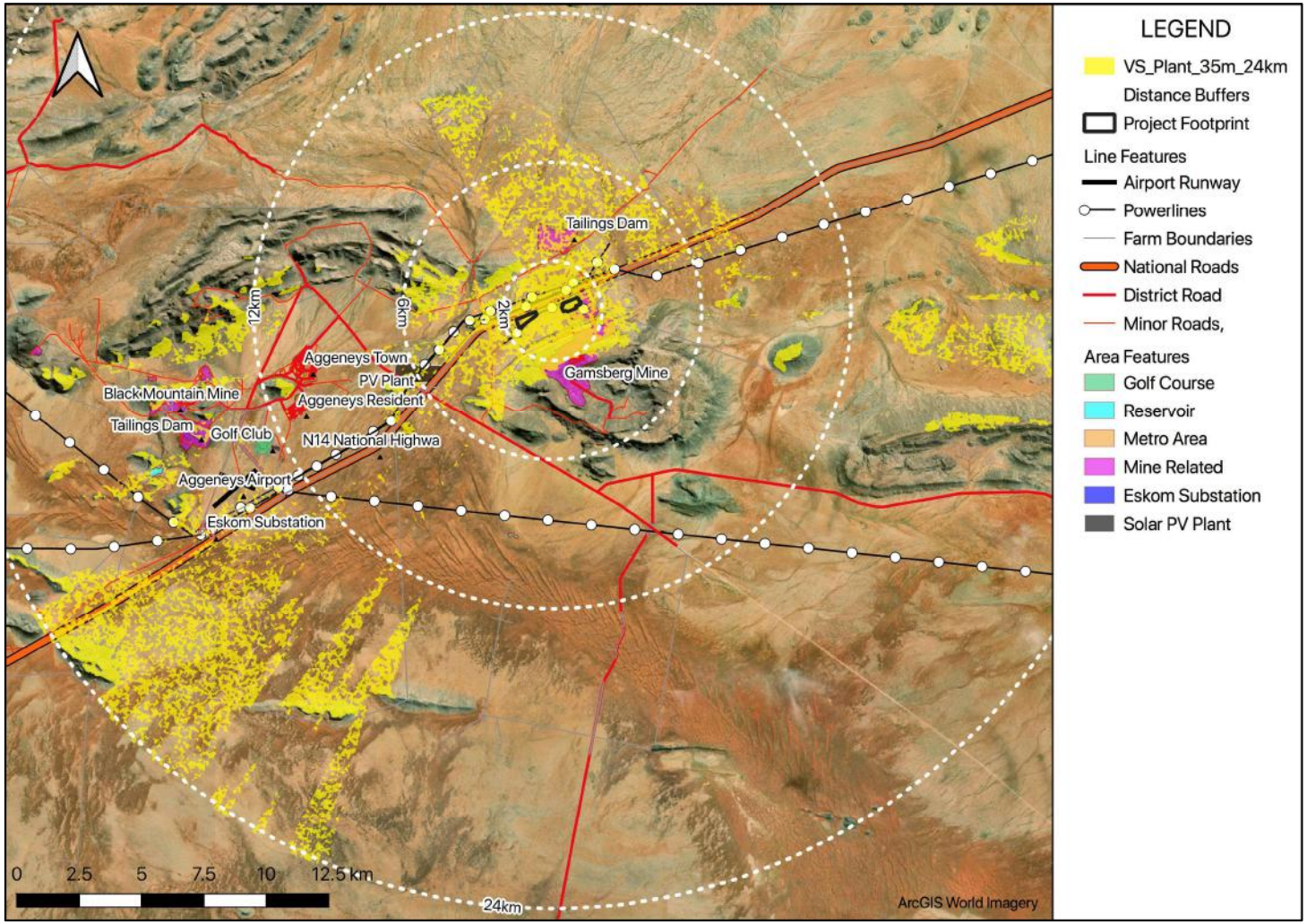


Figure 12: Proposed Plant 35m height viewshed as well as the existing mine plant viewshed *that also reflects the existing mine viewshed*.

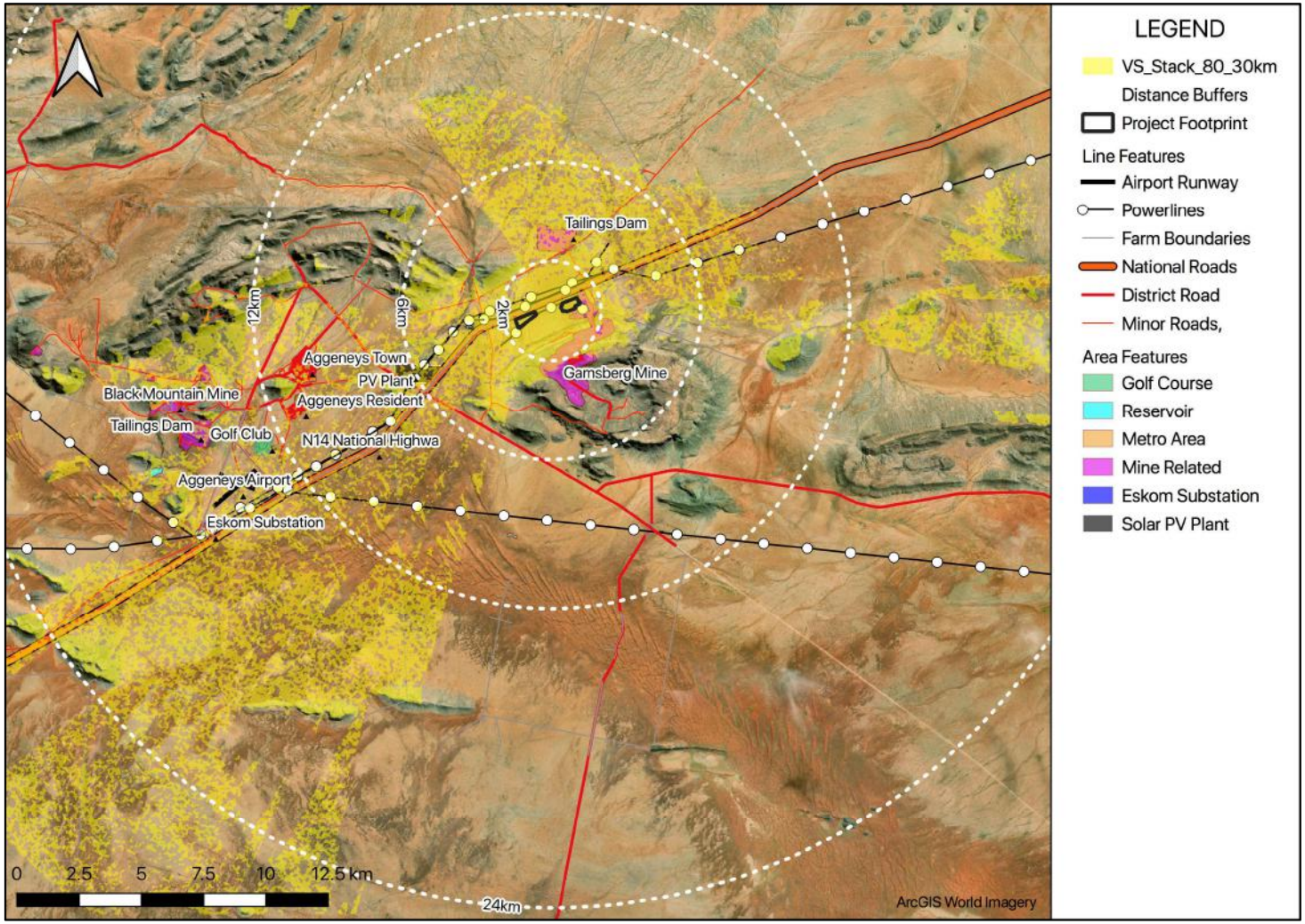


Figure 13: Proposed Plant Stack 80m height Viewshed

6.4 Receptors and Key Observation Points

As defined in the methodology, KOPs are defined by the Bureau of Land Management as the people (receptors) located in strategic locations surrounding the property that make consistent use of the views associated with the site where the landscape modifications are proposed. The following table identifies the receptors identified within the ZVI, as well as motivates if they have significance and should be defined as KOP for further evaluation in the impact assessment phase. The receptors located within the ZVI and KOPs view lines are indicated the map on the following page.

Table 12: Receptor and KOP Motivation Table.

Name	Km	Zone	Exposure	KOP	Motivation
N14 Eastbound (Distant)	24km	Background	Low	**Yes**	Although the views are in the background, the N14 route is associated with tourism and this point represents the first view of the proposed stack.
Aggeneys Golf Club	12km	Background	Low	No	The golf club is well screened by local trees which limits views of the proposed plant and stack.
Aggeneys	1km	Mid Ground	Medium to Low	**Yes**	Aggeneys is residential area, and while this is a town associated with mining, the town currently is not overtly exposed to mining landscapes which increases the town's sense of place.
N14 Eastbound (Middle Distance)	7km	Mid Ground	Medium to Low	**Yes**	The N14 route is associated with tourism and this point represents the first view of the proposed plant.
N14 West-bound (Prox.)	1km	Foreground	High	**Yes**	While not the first view of the plant along this route, the point reflects the high exposure views for receptors using the N14.

Five receptor locations were identified with four points fulfilling KOP status. The Aggeneys KOP is a residential area and, although a mining town, is not highly exposed to mining landscapes from this locality. Maintaining this precedence increases the opportunities for future tourism. The other KOPs are all related to the N14 National Route. The route is associated with tourism and the importance is emphasised in the local and regional planning. As the N14 does come within close proximity to the project area, the Receptor Exposure is rated High.

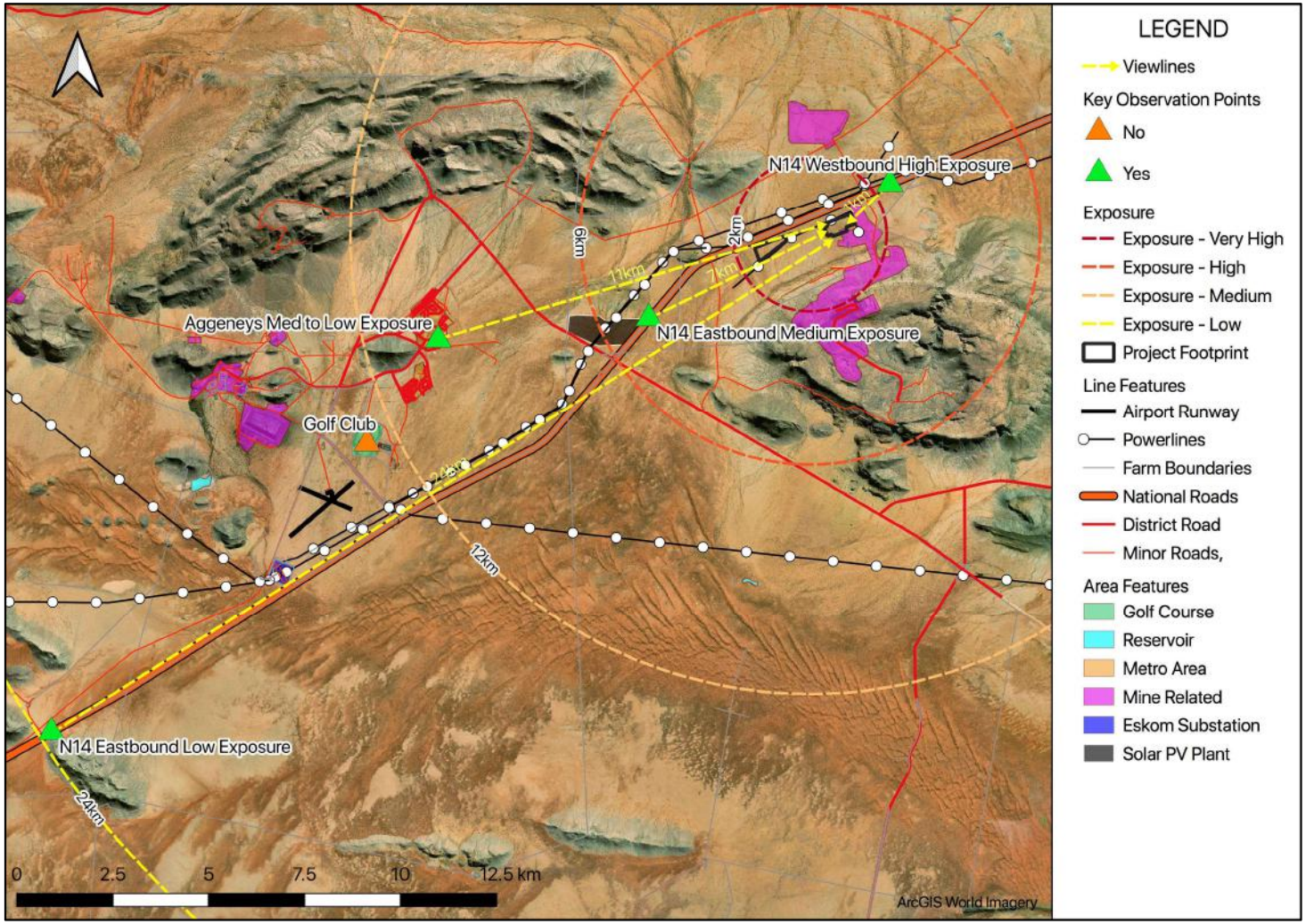


Figure 14: Project Receptor Exposure and Key Observation Point location map.

7 VISUAL RESOURCE MANAGEMENT

In terms of the VRM methodology, landscape character is derived from a combination of scenic quality, receptor sensitivity to landscape change, and distance of the proposed landscape modification from key receptor points. Making use of the key landscape elements defined in the landscape contextualisation sections above, landscape units are defined which are then rated to derive their intrinsic scenic value, as well as how sensitive people living in the area would be to changes taking place in these landscapes.

7.1 Physiographic Rating Units

The Physiographic Rating Units are the areas within the project development area that reflect specific physical and graphic elements that define a particular landscape character. These unique landscapes within the project development areas are rated to assess the scenic quality and receptor sensitivity to landscape change, which is then used to define a Visual Resource Management Class for each of the site's unique landscape/s. The exception is Class I, which is determined based on national and international policy / best practice and landscape significance and as such are not rated for scenic quality and receptor sensitivity to landscape change.

As only a single physiographic rating unit was identified on the sites, mapping was not undertaken. Based on the SANBI mapping, the broad brush vegetation was tabled below.

Table 13: Physiographic Landscape Rating Units

Landscapes	Motivation
Bushmanland Arid Grassland	The sites for both the smelter and the SLF are relatively small in size and reflect a homogenous landscape associated with Bushmanland Arid Grassland.

Table 14: Scenic Quality and Receptor Sensitivity Rating.

Project Site	**Landscape Rating Units**	**Scenic Quality**									**Receptor Sensitivity**						**VRM**	
		A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11									H = High; M = Medium; L = Low							
	Type	**Landform**	**Vegetation**	**Water**	**Colour**	**Scarcity**	**Adjacent Landscape**	**Cultural Modifications**	**Sum**	**Rating**	**Type of Users**	**Amount of Use**	**Public Interest**	**Adjacent Land Uses**	**Special Areas**	**Rating**	**Inventory Class**	**Management Class**
Both Sites	Any area defined by Ecological / Botanical / Heritage Specialist as Significant with a No-Go status for further development	**(Class I is not rated)**															**I**	**I**
Smelter Site	Bushmanland Arid Grassland	1	2	0	2	2	0	2	9	**C**	M	H	L	L	L	**M**	**IV**	**III**
TSF Site	Bushmanland Arid Grassland	1	2	0	2	2	0	2	9	**C**	M	H	L	L	L	**M**	**IV**	**III**

The ***Scenic Quality*** scores are totalled and assigned an A (High scenic quality), B (Moderate scenic quality) or C (Low scenic quality) category based on the following split: *A= scenic quality rating of ≥19; B = rating of 12 – 18, C= rating of ≤11* (USDI., 2004).

Receptor Sensitivity levels are a measure of public concern for scenic quality. Receptor sensitivity to landscape change is determined by rating the key factors relating to the perception of landscape change in terms of Low to High.

7.2 Scenic Quality Assessment

For both sites, one dominant landscape was rated for Scenic Quality, the Bushmanland Arid Grassland.

Table 15: Scenic Quality Rating

Landscapes	Rating	Motivation
Landform	Very Low	The terrain is flat with no significant landscape features.
Vegetation	Low	Vegetation within the sites is sparse and limited due to the arid climate.
Water	N/A	No water features were apparent on site and water added no value to scenic quality.
Colour	Medium to Low	Colours on site reflect subtle colour variations from the sand and grassland. Generally muted tones and is rated Medium to Low.
Scarcity	Low	The landscape is interesting in its setting, but fairly common within the region and is rated Low.
Adjacent Landscapes	Very Low	Adjacent landscapes are strongly dominated by the Gamsberg Zinc Mine and concentrator plant as well as the WRDs. Both these areas reflect degraded landscape modifications that detract from the site's sense of place.
Cultural Modifications	Medium	No dominating cultural modifications were identified on the sites. The lack of transformation adds value to these sites.
Resultant Scenic Quality		**Medium to Low**

Landform is rated Low as the terrain is flat and offers no interesting landscape features. The vegetation is rated Low as there is little variation or scenic contrast. Water is rated Low as, although there are drainage channels, they're not noticeable, and due to the arid environment very rarely have any surface water associated with them. Colour is rated Medium to Low as the greys and browns of the vegetation on the site offer subtle colour variations and generally muted tones. Adjacent scenery is rated Low as the landscape is strongly defined by the mining context of the adjacent mine plant and WRD's. Cultural modifications on the proposed project development area are limited to farm tracks with the lack of transformation adding some value to the area by contrasting to the highly transformed background. The total scenic quality was seven and rated as Low, with the VRM scenic quality rating of C.

7.3 Receptor Sensitivity Assessment

Table 16: Receptor Sensitivity Rating Table

Landscapes	Rating	Motivation
Type of Users	Medium	The site is in close proximity to the N14 National Highway that is an important tourist view corridor. As views include the existing Gamsberg Zinc Mine, some moderation of the sensitivity is expected.
Amount of use	High	The N14 is an important access route in the Northern Cape context.
Public interest	Low	Most users are mining related and the landscape context is strongly associated with mining.
Adjacent land Users	Low	No tourism activities are taking place in the vicinity.
Special Areas	Low	No special areas were identified on the sites.
Resultant Receptor Sensitivity		**Medium**

Due to the proximity of the site to the N14 national highway, which has been identified in the report as an important tourist view corridor, the maintenance of visual quality is necessary. As views include the existing Gamsberg Zinc Mine, some moderation of the sensitivity is expected. Due to this close proximity to the N14 national highway, the amount of use was rated High. As the site is located within a mining context, public interest for the maintenance of visual quality was rated as Low. Adjacent land uses are also mainly mining related with no obvious tourist related use, and hence rated as Low. The proposed site falls within the existing mining right area (MRA) and does not fall under any special area management objectives. Receptor Sensitivity to landscape change is likely to be Medium.

7.4 Visual Resources Management Classes

The BLM methodology defines four classes that represent the relative value of the visual resources of an area and are defined making use of the VRM Matrix. In summary, the following Classes are utilised:

i. **Classes I and II** are the most valued;
ii. **Class III** represent a moderate value;
iii. **Class IV** is of least value.

The Classes are not prescriptive and are utilised as a guideline to determine the carrying capacity of a visually preferred landscape that is utilised to assess the suitability of the landscape change associated with the proposed project. The Visual Inventory Classes are defined using the matrix below and with motivation, can be adjusted to Visual Resource Management Classes which take zoning and regional planning into consideration if applicable. The VRM Classes are mapping on the following page.

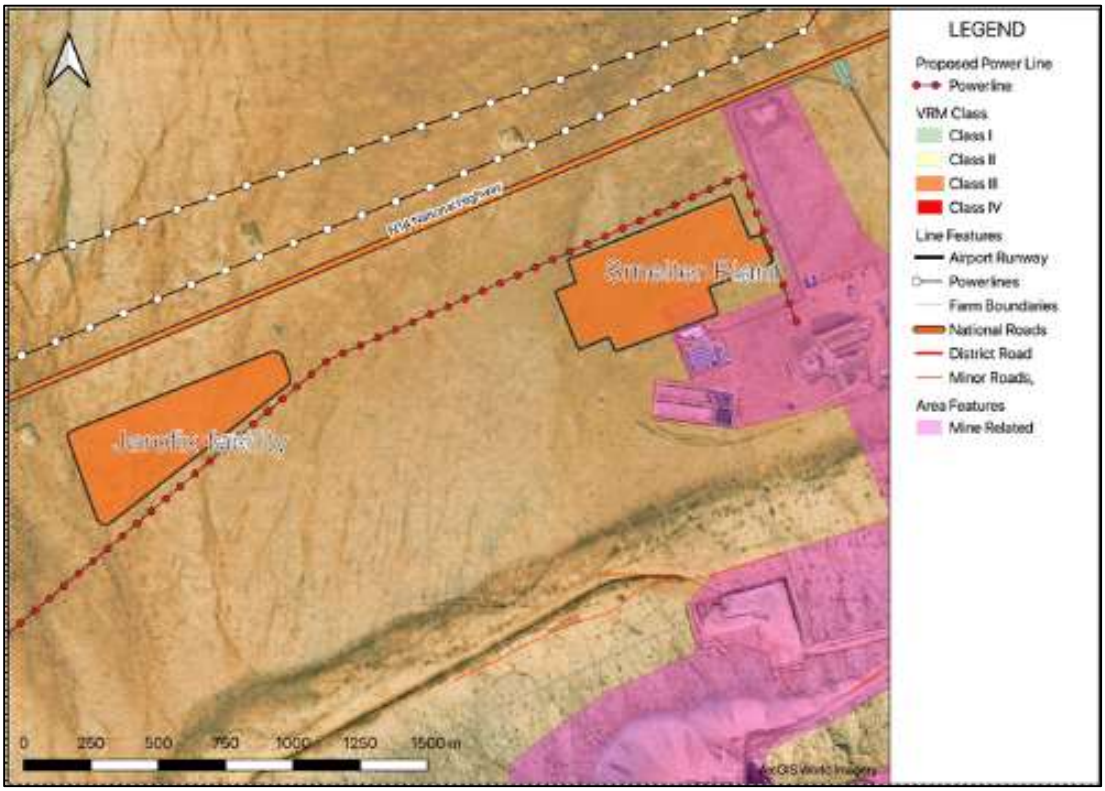


Figure 15: Visual Resource Management Class Map

Class I

The Class I objective is to preserve the existing character of the landscape, the level of change to the characteristic landscape should be very low and must not attract attention. Class I is assigned when a decision is made to maintain a natural landscape. No Class I areas were identified.

VRM Class II

The Class II objective is to retain the existing character of the landscape, and the level of change to the characteristic landscape should be low. Due to the transformed landscapes of the adjacent Gamsberg Zinc Mine, no Class II areas were identified in the study area.

VRM Class III

The following physiographic landscapes were assigned a Class III Visual Objective.

Smelter Site
SLF Site

Although the site has low levels of Scenic Quality, and Medium Receptor Sensitivity to landscape changes due to the adjacent mine, the sites are in close proximity to the N14 National Road. This route is identified in the local and regional planning as an important tourist view corridor. For this reason, the Class IV Visual *Inventory* ratings were changed to that of a Class III for Visual *Management*.

The Class III objective is to partially retain the existing character of the landscape, where the level of change to the characteristic landscape should be moderate. Management activities may attract attention but should not dominate the view of the casual observer, and changes should repeat the basic elements found in the predominant natural features of the characteristic landscape. However, it must be noted that the landscape context is strongly defined by the existing mining context, and thus the visual absorption capacity is high. Mitigations pertaining to meeting this visual objective would need to focus on ensuring that the zone of visual influence of the existing mine is not extended, as the surrounding areas outside the mine foreground/ mid ground do have scenic value and add to the sense of place of the N14 as a tourist view corridor.

VRM Class IV

The Class IV objective is to provide for management activities that require major modifications of the existing character of the landscape but working within international best practice for landscape modification management and restoration. Due to the close proximity of the sites to the N14, no Class IV areas were defined.

8 VISUAL IMPACT ASSESSMENT

Impacts are defined in terms of the standardised impact assessment criteria provided by the environmental practitioner. Using the SLR impact assessment criteria, the potential environmental impacts identified for the project were evaluated according to severity, duration, extent and significance of the impact. The potential occurrence and cumulative impact (as defined in the methodology) was also assessed. In order to better understand the nature of the severity of the visual impacts, a Contrast Rating exercise was undertaken.

8.1 Contrast Rating

As indicated in the methodology, a contrast rating is undertaken to determine if the VRM Class Objectives are met. The suitability of a landscape modification is assessed by comparing and contrasting the existing receiving landscape to the expected contrast that the proposed landscape change will generate. This is done by evaluating the level of change to the existing landscape by assessing the line, colour, texture and form, in relation to the visual objectives defined for the area.

The following criteria are utilised in defining the DoC:

- **None**: The element contrast is not visible or perceived.
- **Weak**: The element contrast can be seen but does not attract attention.
- **Moderate**: The element contrast begins to attract attention and begins to dominate the characteristic landscape.
- **Strong**: The element contrast demands attention, will not be overlooked, and is dominant in the landscape.

Photomontages were generated for each of the KOPs. Photographs taken during the field survey were modified to reflect the expected landscape, making use of a 3D model generated for the proposed mining landscape modifications. The photomontages are not an exact replication and are ***provided for visualisation purposes only***.

The photomontages can be viewed in the following page.

Table 17: Contrast Rating Key Observation Points.

	Exposure			Landscape Elements					
Key Observation Point	**Distance**	**Exposure**	**Mitigation**	**Form**	**Line**	**Colour**	**Texture**	**Doc**	**Visual Objectives Met?**
N14 Eastbound (Distant)	24km	Low	W/Out	W	S	M	W	M	Yes
			With	W	S	W	W	MW	Yes
Aggeneys Town	12km	Low	W/Out	W	M	S	W	W	Yes
			With	W	M	W	W	W	Yes
N14 Eastbound (Mid Distance)	7km	Medium to Low	W/Out	S	S	S	M	S	No
			With	S	S	M	M	MS	Yes
N14 Westbound (Proximate)	1km	High	W/Out	S	S	S	S	S	No
			With	M	S	M	M	MS	Yes

** S = Strong, M = Medium, W = Weak, N = None*

Combination of various large smelter type structures to provide an approximation of the proposed smelter (refer to limitations regarding not using a 3D model generated from the actual plan)

Generic image of Mount Polley mine (Canada) used to inform the nature of the proposed SLF

Figure 16: Photographic material used to inform the photomontages that was constructed from photographic images of smelters, stacks and plumes.

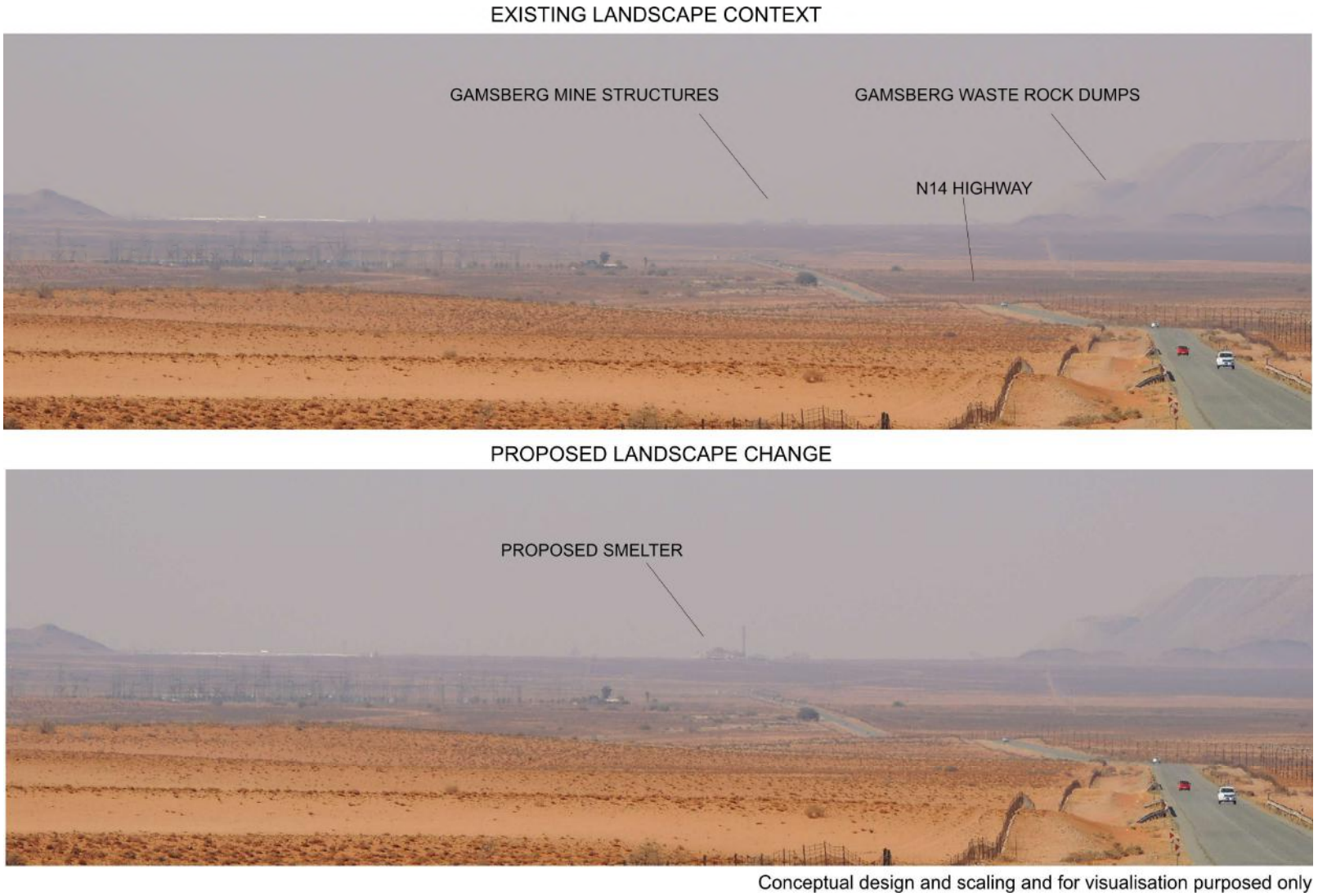


Figure 17: Existing and proposed view from the N14 National Highway 24km to the west of the smelter site.

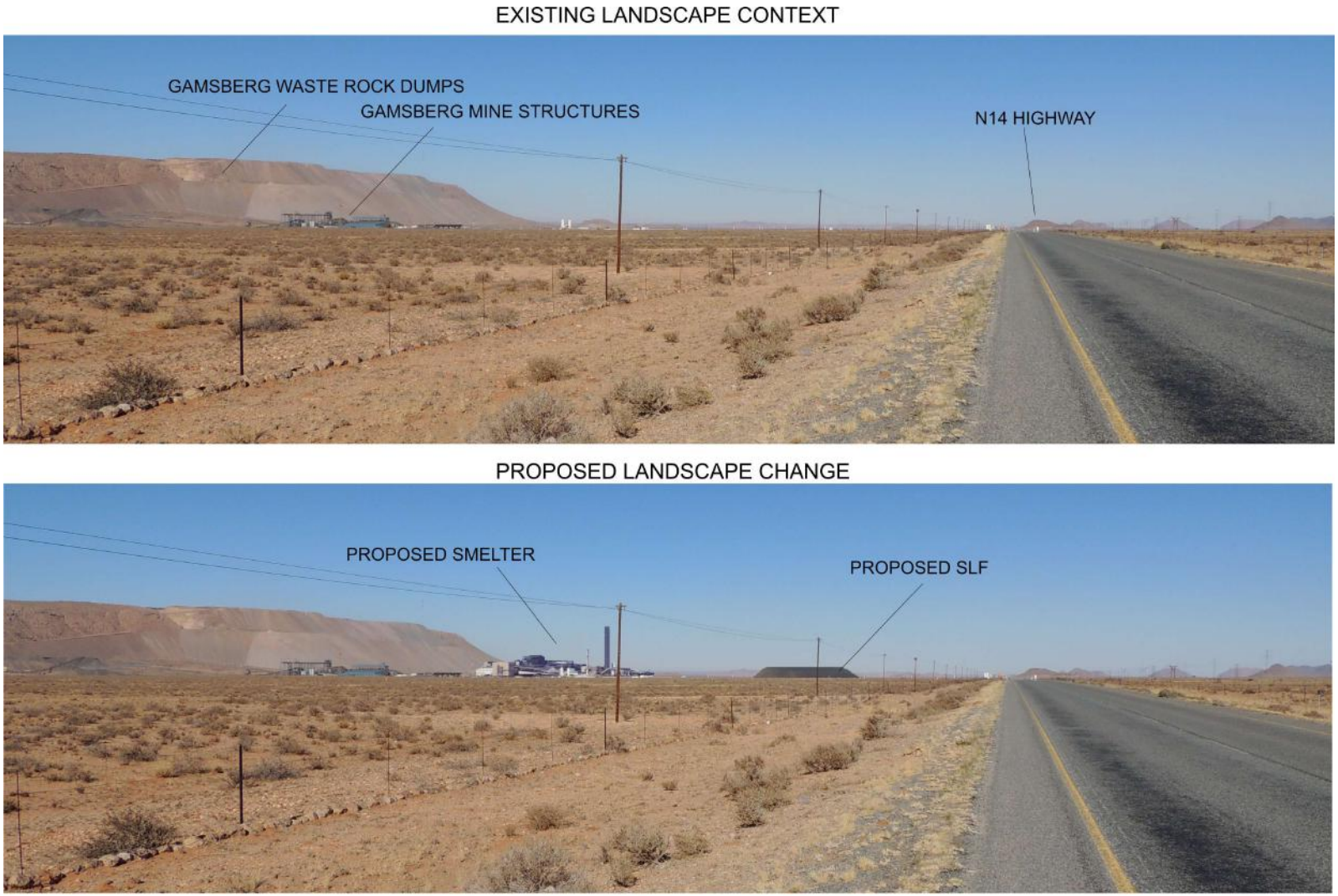


Figure 18: Existing and proposed view from the N14 National Highway 1km to the east of the smelter site.

8.1.1 N14 Eastbound: Class III Visual Objective for Project Site

Receptors travelling Eastbound on the N14 National Highway are likely to first view the proposed landscape modification at approximately 24km from the site, with clearer views taking place at approximately 12km due to the natural dust of this arid region. The view is dominated by the straight tarred road of the highway, the rugged dark coloured hills on the mid-distance, and some man-made industrial related modifications in the background in the vicinity of the proposed smelter site from the existing mining activities located adjacent to the site.

Due to the distance, form contrast is likely to be experienced as Weak as low box-like shapes are also located in the vicinity, and the atmospheric conditions from the arid environment and existing mining induce a haze around the area which reduces visual clarity. Due to the height of the smoke stack that will appear long and thin, and strong horizontal line created by the flat horizon line, contrast is likely to be experienced as Strong. Colour and Texture contrast are likely to be experienced as Weak due to the distance and the haze created by the arid environment. While lights at night could generate some colour contrast, the existing mining facility night lighting is well established and likely to increase with planned (authorised) expansions to the mine works.

With or without mitigation, the Class III visual objective would be met at this distance. This is due to the existing precedent for large structures in the vicinity of the proposed smelter site, the existing lights at night from the mining operation as well as the natural arid region haze exacerbated by the current dumping onto the WRD's taking place.

8.1.2 Aggeneys Town: Class III Visual Objective for Project Site

The town of Aggeneys is located approximately 12km to the south-west of the proposed smelter site. Aggeneys is a small mining village and is well established with shopping facilities, residential dwellings and offices. A key factor defining the landscape is the number of trees established by the mining management and residents for shade. The local trees thus effectively screen off most of the outside views. The shopping facility to the east of the town is where open views outward from the town are clearer. Due to topographic screening from slightly raised ground between the village and the site, views of the existing Gamsberg Zinc Mine plant structures are not visible. Although the Smelter structure is higher than the existing mine plant, views of the form, colour and texture of the structure is likely to be limited and generate weak levels of visual contrast. The only element that will be clearly visible is the tall stack that will break the horizon line, with the grey-brown plume also generating contrast. As existing vertical lines are included in the vista from local power lines and street lights, vertical contrast with and without mitigation is likely to be Medium. Due to the 12km distance and the natural / mine haze, atmospheric conditions would reduce clarity of view of the plume, resulting in Medium or Low colour change. Lights at night are already strongly defined in the vicinity of the Smelter site, with an addition to the night glow unlikely to be noticeable at the distance. Aircraft warning lights on the stack would be clearly visible, but this would not appear overly intrusive unless uplighting of the stack is applied. Without any uplighting, the visual contrast from lights at night is likely to be Medium to Weak.

With or without mitigation, the Class III visual objective would be met at this distance. This is due to the raised ground obscuring most (if not all) of the structures, the existing lights at

night of the mining operation as well as the natural arid region haze exacerbated by the current dumping taking place. The exception is Colour contrast from lights at night if uplighting is used. As such, the recommendation is that uplighting is not implemented on any structures or stacks, and that lighting is kept to an efficient minimum.

8.1.3 N14 Eastbound: Class III Visual Objective for Project Site

Receptors using the N14 and travelling eastbound may start to see views of the stack from the 24km mark depending on the level of dust in the air. Moving closer to the site, clearer views will take place from approximately the 12km mark. The road then bypasses the site, routed approximately 500m to the north of the proposed smelter site. This places the N14 receptors into the High visual exposure zone where views of the landscape modification are clear and would dominate the attention of the casual observer. Due to the close distance and the large size of the industrial landscape change, Form, Line, Colour and Texture contrast are likely to be Strong, with only Colour and Texture contrast reduced with mitigation. Mitigation includes lighting controls to limit security and night operational lights to an efficient minimum, restriction on uplighting of structures and stacks, as well as colour control to ensure that colours reflect natural colours with a grey-brown hue.

Without mitigation, the Class III visual objectives assigned to the site are unlikely to be met, as existing colours used in the mining plant include a blue hue that increases contrast. Should this precedent be replicated in the new, larger structures, the colour contrast would increase. With mitigation, which includes colour and lights at night controls, the existing precedent for industrial structure development in a mining context, sufficiently increases the visual absorption capacity of the site to accommodate the landscape change. The exception includes the new strong line contrast generated by the stack, as well as the location of the new SLF facility adjacent to the N14 to the south. The tailings facility is likely to be large with a stepped side that will dominate the attention of the casual observer, becoming a permanent feature in the landscape. The existing tailings facility is located 1.8km to the north of the N14, with the new tailings located 200m to the south of the road. Without mitigation, the SLF is likely to generate Strong levels of Form and Colour contrast as a permanent feature in the landscape and would not meet the Class III visual objectives. Re-location of the SLF to the north of the road in close proximity to the existing TSF, would effectively mitigate the visual intrusion, with Moderate to Low levels of Form and Colour contrast generated by the facility located further away from the N14 receptors, and incorporated into a landscape that already is associated with a TSF.

8.2 Visual Impact Ratings

Visual Impacts will address the proposed landscape modification in two components, firstly the Smelter complex as a whole, and secondly the proposed SLF.

8.2.1 Smelter Construction Phase Visual Impacts

The following impacts have been identified for the construction phase of the smelter complex:

- Removal of vegetation leading to increased visual contrast, degradation of the landscape character and visual intrusion to sensitive receptors.
- Alteration of surface topography as a result of infrastructure placement and positioning, leading to loss of visual quality and visual exposure.
- Construction-related earthworks activities resulting in increased dust.
- Increased vehicular movement in the vicinity.
- Light at night from night-time construction and security.
- Use of large cranes for the lifting of heavy equipment.
- Construction of a large-scale industrial complex with large structures and tall towers.

Table 18: Visual Impacts: Smelter Construction Phase

Type of Impact			
Direct ***Negative***			
Determining of Consequence (a function of Intensity, spatial extent and duration)			
Characteristic	**W/Out**	**With**	**Summary of Reasoning**
Intensity	High	Moderate	Without mitigation the intensity of the construction phase of the smelter is likely to be High due to strong contrast generated by bright cladding and roofing colours, highly reflective materials and light spillage. With mitigation of the cladding, roof-sheeting colour and lights at night, the construction of the Smelter is likely to result in a moderate change to the landscape as the context is already associated with mining and large structures.
Duration	Low	Low	With or without mitigation, the duration of the build is likely to be more than 1 but less than 5 years.
Extent	High	High	Due to the heights of the cranes, the plant components and the tall stack, in relation to the relatively flat terrain along the N14 National Highway, the Extent of the landscape change is likely to be visible from a wide area but would be contained to with the local area (up to 24km in distance).
Determining of Significance			
Characteristic	**W/Out**	**With**	**Summary of Reasoning**
Consequence	High	Medium	Consequence is a function of intensity, spatial extent and duration.
Probability	Definite	Definite	Due to the large scale of the construction (that is strongly industrial in nature), it is probable that construction phase visual impacts will take place. The N14 National Highway is also an important view corridor in the region and likely to carry tourist traffic.

Significance Without Mitigation	
High	The visual impact significance of the construction phase of the proposed smelter, stack and associated lighting at night is expected to be High. While the existing mining landscape does increase the visual carrying capacity for industrial type landscape modifications, strong reflecting colours and texture and light spillage is likely to increase the visual intensity of the landscape change and increase the intensity of the visual experience of this existing mining landscape. The expansion of the 'Vedanta blue' that is currently used for cladding on the existing mine plant would be visually inappropriate.
Significance With Mitigation	
Medium	The mining landscape context is already well established with the concentrator plant and other mine infrastructure located against the backdrop of the Gamsberg Mountain. The earth coloured hues used in some of the cladding of the structures assists in reducing colour contrast and reducing the intensity of the industrial nature of this existing development. With mitigation and the inclusion of a variety of grey-brown cladding and roof sheeting colours, as well as enclosing as much of the industrial building as possible, the intensity of the expansion of the industrial sense of place can be contained to some degree. Lighting at night would also need to be carefully managed with no uplighting incorporated into the lighting design.

Pre-Construction Phase Mitigation

- Review the structure design to incorporate more external cladding for the structures located on the N14 side of the development to help reduce visual contrast. The cladding should make use of desert grey-brown hues and needs to incorporate a two-toned grey-brown colouring for the cladding. The Vedanta Blue branding should not be incorporated into the cladding design.
- While a strong lights at night lighting presence is already in place due to the mine, care should be undertaken to minimise light spillage as much as possible. Other than the aircraft warning lights on the stacks, and uplighting of the stacks (or uplighting of large areas of the sides of the structure for advertising purposes) should not be used. Lighting should be downward, and inward facing to reduce light spillage.

Construction Phase Mitigation Measures

- Adopt responsible construction practices aimed at containing the construction activities to specifically demarcated areas thereby limiting the removal of natural vegetation to the minimum.
- The development footprints and disturbed areas should be kept as small as possible and the areas of disturbed natural vegetation and topsoil must be kept to a minimum.
- As much as possible, the cut platform for the complex needs to be set into the ground to create raised ground between the complex and the N14 to assist in visual screening of the lower complements of the industrial complex. Excess material should be stockpiled to the north of the cut platform and shaped into a low screening berm. The berms will need to be naturally shaped with crests rounded off and then rehabilitated to natural veld grass.
- Rehabilitate all disturbed areas to acceptable visual standards as soon as possible after construction is complete in an area.

- If very dry conditions prevail and dust becomes a nuisance, water should be sprayed on the road surface or areas cleared of vegetation (or other dust suppression measures implemented), without creating undue runoff.
- Although the gradients are flat, the hardened surfaces could lead to erosion. Soil stabilisation measures need to be implemented as soon as possible to ensure that erosion does not take place.
- The construction sites should be kept neat and tidy at all times with litter and dust management measures in place.
- Infrastructure components or structures to reflect natural colours with a grey-brown hue (unless bright colouring is required for emergency purposes). The Vedanta Blue branding should preferably not be incorporated into the cladding design.
- Visually cluttered material storage yards and laydown areas should be screened through the use of material fencing.
- As far as possible and within safety limitations, all lights used for illumination should be faced inwards and shielded to avoid light spillage to the surrounding areas.
- Reduce extra lighting by making use of motion detectors on security lighting, in office and maintenance areas.
- Schedule construction commencement as soon as possible after vegetation removal to reduce the amount of time during which surfaces are exposed.
- No large signage or advertising should be painted onto the cladding or roof sheeting.
- Other than required aircraft warning colours specified, the tall stack should not be painted but left a cement colour with a rough mid-grey texture. Smaller stacks that are metal should be painted a mid-grey colour.
- For aircraft warning on the tall stack, flashing lights (white during day, red at night) on the stack is preferable to painting the top of the stack red. However, if aircraft warning regulations stipulate that the top portion of the stack is to be painted, and there is a colour preference, with white preferable to red.

Residual / Cumulative Impacts

With mitigation the visual intrusion will still definitely take place due to the large scale and size of the development in close proximity. However, the existing mining landscape context increases the visual absorption capacity. The importance of the mitigations is to ensure that the smelter ZVI is contained to a similar extent as the existing mine ZVI. It is possible that with the development of the Smelter, other light or heavy industry type activities could be attracted to the area.

8.2.2 Smelter Operation Phase Visual Impacts

The following impacts have been identified for the operational phase of the smelter complex:

- Increased vehicular activity in the vicinity;
- Light at night from night-time operations and security measures;
- Possible continued use of large cranes for lifting of heavy equipment;
- Operation of a large-scale industrial node that will include large structures, tall stacks, smoke plumes as well as the release of gases; and
- Aircraft warning lights on the top of the stack.

Table 19: Visual Impacts Table: Smelter Operation Phase

Type of Impact			
Direct ***Negative***			
Determining Consequence (a function of Intensity, spatial extent and duration)			
Characteristic	**W/Out**	**With**	**Summary of Reasoning**
Intensity	High	Moderate	Without mitigation the intensity of the operation phase of the smelter is likely to be High due strong contrast generated by bright cladding and roofing colours, highly reflective materials and light spillage. With mitigation of the cladding, roof-sheeting colour and lights at night, the construction of the Smelter is likely to result in a moderate change to the landscape as the context is already associated with mining and large structures.
Duration	High	High	With or without mitigation, the duration of the building is likely to be more than 20 years and is defined as long-term.
Extent	High	High	Due to the heights of the cranes, the plant components and the tall stack, in relation to the relatively flat terrain along the N14 National Highway, the Extent of the landscape change is likely to be visible from a wide area but would be contained to with the local area (up to 24km in distance).
Determining Significance			
Characteristic	**W/Out**	**With**	**Summary of Reasoning**
Consequence	High	High	Consequence is a function of intensity, spatial extent and duration.
Probability	High	Medium	Due to the large scale of the construction that is strongly industrial in nature, it is probable that construction phase visual impacts will take place. The N14 National Highway is also an important view corridor in the region and likely to carry tourist traffic. With mitigation that includes increased earth colours cladding to simplify some of the complexity of the landscape change with appropriate light control measures, the intensity of the increase in the industrial landscape character can be reduced such that it is possible that the landscape change would be less obvious to receptors.

Significance Without Mitigation	
High	The Visual Impact Significance of the operational phase of the proposed smelter, stack and lighting at night is expected to be High. While the existing mining landscape does increase the visual carrying capacity for industrial type landscape modifications, strong reflecting colours and texture and light spillage is likely to increase the visual intensity of the landscape change and detract from the local sense of place. The expansion of the 'Vedanta blue' that is currently used for cladding on the existing mine plant would be visually inappropriate.
Significance With Mitigation	
Medium	The mining landscape context is already well established with the concentrator plant and other mine infrastructure located against the backdrop of the Gamsberg Mountain. The earth coloured hues used in some of the cladding of the structures assists in reducing colour contrast and reducing the intensity of the industrial nature of this existing development. With mitigation and the expansion of cladding to simplify the complexity of the plant, incorporation of a variation of grey-brown colours for cladding and roof sheeting colours, the intensity of the expansion of the industrial sense of place can be contained to some degree. Lights at night would also need to be carefully managed with no uplighting incorporated into the lighting design.

Mitigation Measures

The following mitigation measures should be implemented:

- Adopt responsible operational practices aimed at containing the operation activities to specifically demarcated areas thereby limiting the need to expand the operation footprint and further removal of natural vegetation.
- Continued rehabilitation of all disturbed areas to acceptable visual standards as soon as possible.
- If very dry conditions prevail and dust becomes a nuisance, water should be sprayed on the road surface or other dust suppression measures implemented, without creating undue runoff.
- The sites should be kept neat and tidy at all times with litter and dust management measures in place.
- Visually cluttered material storage yards and laydown areas should be screened through the use of material fencing.

Residual / Cumulative Impacts

Due to the size and scale of the landscape change, it is possible that landscape degradation will take place in areas proximate to the smelter site. This intensification of industrial landscape context, could attract other light or heavy industrial type activities to the locality. As vegetation in the area is sensitive, the expansion of the industrial node (should it take place) needs to be carefully planned and managed to reduce visual intrusion to receptors making use of the N14 National Highway.

8.2.3 Smelter Decommissioning, Closure and Post-Closure Phase Visual Impacts

The following impacts have been identified for the decommissioning, closure and post-closure phase:

- Increased vehicular movement in the vicinity for the decommissioning.
- Possible use of large cranes for lifting of heavy equipment.
- Dust from controlled implosion and moving vehicles.

Table 20: Visual Impacts Table: Smelter Post-Closure Phase

Type of Impact			
Direct Negative			
Determining Consequence (a function of Intensity, spatial extent and duration)			
Characteristic	**W/Out**	**With**	**Summary of Reasoning**
Intensity	High	Low	Without mitigation and the non-removal of the structure after closure, the intensity of the construction phase of the smelter is likely to be High due to the landscape decay created by the un-used structure. With mitigation of the removal of all structures and effective rehabilitation, the intensity of the visual impacts would be Low.
Duration	High	Low	Without mitigation, the old structures would permanently degrade the local landscape character resulting in the sterilisation of the local landscape. With mitigation and the removal of the structure, the visual impact would short-term and Low.
Extent	High	Low	Due to the height of the plant components and the tall stack, in relation to the relatively flat terrain along the N14 National Highway, the Extent of the landscape change is likely to be visible from a wide area but would be contained to with the local area (up to 24km in distance). With mitigation and the removal of the structure and stacks, the Extent of the Visual Impact would be contained to the Site.
Determining Significance			
Characteristic	**W/Out**	**With**	**Summary of Reasoning**
Consequence	High	Low	Consequence is a function of intensity, spatial extent and duration.
Probability	Very High	Conceivable	Due to the large scale of the construction that is strongly industrial in nature, the probability of landscape decay taking place from neglected buildings is Very High. The N14 National Highway is also an important view corridor in the region and likely to carry tourist traffic and the landscape decay would be clearly visible to the receptors. With the removal of all structures and stacks, and shaping of the cut platform, the landscape change is unlikely to be noticeable to the casual observer.

Significance Without Mitigation	
High	The Northern Cape region does have aesthetic value and the scenic quality of the area is high. Although a large-scale mining operation has taken place, the waste rock dumps have been effectively created to appear as natural forms. With the removal of the mine works, the resultant post mining landscape can appear as natural as similar scree slopes are apparent in the surrounding landscape. With the non-removal of the Smelter structures and stacks, landscape decay will ensue, significantly degrading the local landscape character. This is also likely to set a negative precedent for other mining related landscapes post-closure that should not be followed.
Significance With Mitigation	
Very Low	With the removal of all structures and stacks, and shaping of the cut platform, the landscape change is unlikely to be noticeable to the casual observer as the cut platform is below the view of the N14 receptors and unlikely to dominate the attention of the casual observer.

Mitigation Measures

The following mitigation measures should be implemented:

- Breaking down / removal and processing of all structures and stacks constructed for operations needs to be implemented. Rubble generated from the deconstruction should be spread across the cut platform (unless contaminated) and covered with the excess cut material stockpiles during construction phase. Any contaminated material would need to be processed in terms of applicable South African waste management law and standards.
- For all tarred roads, the tarred sections must be rehabilitated as per the closure plan and tar removed as much as possible, and the road ripped to 0.5m below surface to reduce compaction prior to rehabilitation.
- Rehabilitation of all disturbed areas needs to be implemented as soon as possible after deconstruction is complete in an area.
- If during deconstruction, very dry conditions prevail and dust becomes a nuisance, water should be sprayed on the road surface or other dust suppression measures implemented, without creating undue runoff.
- Although the gradients are flat, the hardened surfaces could lead to erosion. Soil stabilisation measures should be implemented to ensure that erosion does not take place.
- The deconstruction sites should be kept neat and tidy at all times with litter and dust management measures in place at all times.
- As far as possible and within safety limitations, all lights used for illumination during de-construction should be faced inwards and shielded to avoid light spillage to the surrounding areas.

8.2.4 SLF Construction Phase Visual Impacts

The following impacts have been identified for the construction phase:

- Removal of vegetation leading to increased visual contrast, degradation of the landscape character and visual intrusion to sensitive receptors.
- Alteration of surface topography as a result of infrastructure placement and positioning of the SLF, leading to loss of visual quality and a negative impact to the sense of place.

- Construction-related earthworks resulting in increased dust.
- Light at night from night-time construction activities and security.

Table 21: Visual Impacts: SLF Construction Phase

Type of Impact			
Direct Negative			
Determining Consequence (a function of Intensity, spatial extent and duration)			
Characteristic	**W/Out**	**With**	**Summary of Reasoning**
Intensity	Medium	Medium	Due to the gradual nature of the landscape change, the initial construction of the base of the SLF will not be excessively intrusive. Without colour mitigation of associated structures, the construction phase landscape change could become noticeable to the casual observer, but with the mining context of the background, the impact is likely to be Medium. Colour mitigation could assist in reducing some of the initial construction phase visual impacts.
Duration	Low	Low	With and without mitigation, the duration of the construction phase is likely to be Low, Short-term, occurring for more than 1 but less than 5 years.
Extent	Medium	Medium	Due to the predominantly flat terrain where adjacent receptors are located, the extent of the visual intrusion is likely to extend slightly beyond the site boundary.
Determining of Significance			
Characteristic	**W/Out**	**With**	**Summary of Reasoning**
Consequence	Medium	Medium	Consequence is a function of intensity, spatial extent and duration.
Probability	Probable	Probable	Due to the close proximity to the N14 National Road, without mitigation the construction phase landscape change is likely to be Probable,
Significance Without Mitigation			
Medium	Due to the existing mining landscape in the background, the initial phases of the SLF landscape modification is likely to be less dominating and is assumed to be Medium without mitigation.		
Significance With Mitigation			
Medium	As the site is in close proximity to the N14 National Road, visual impact mitigation is limited to dust suppression. As the region is arid and is prone to wind-blown dust, this mitigation is likely to be moderately successful. Due to the shorter time frame for preparing the pad, and the initial low profile of the SLF, the impact for the construction phase will be Medium after mitigation.		

Mitigation Measures

The following mitigation measures should be implemented:

- Adopt responsible construction practices aimed at containing the construction activities to specifically demarcated areas thereby limiting the removal of natural vegetation to the minimum.
- The development footprints and disturbed areas should be kept as small as possible and areas be demarcated to limit the extent of activities and to keep areas of disturbed natural vegetation and topsoil to a minimum.

- Rehabilitate all disturbed areas to as soon as possible after construction is complete.
- If very dry conditions prevail and dust becomes a nuisance, water should be sprayed on the road surface or other dust suppression measures implemented, without creating undue runoff.
- Erosion, which may lead to high levels of visual contrast and further detract from the visual environment, must be prevented throughout the lifetime of the project by means of putting soil stabilisation measures in place and concurrent rehabilitation.
- The site should be kept neat and tidy at all times with litter and dust management measures in place at all times.
- Visually cluttered material storage yards and laydown areas should be screened through the use of material fencing and not be located between the SLF and the N14 National Highway.
- No large signage or advertising should painted onto the structures.

Residual / Cumulative Impacts

Due to the ground level nature of the initial landscape modification, the visual extent of the SLF construction is likely to be fairly contained. However, the close proximity of the site to the N14 National Road does place the receptors in a High Visual Exposure zone. Background views of the mine landscape do influence the sense of place to some degree, but it is likely that a residual visual impact will be created and the site and local areas surrounding the site will be subject to landscape degradation.

8.2.5 SLF Operation Phase Visual Impacts

As visual mitigation of the SLF is limited, the operational and closure phase impacts are combined.

- Light at night from night-time operations and security measures.
- Possible continued use of heavy equipment for raising of retaining walls
- Raising of the SLF by lifts creating a pyramidal shape form with a uniform colour that is likely to generate strong levels of contrast as seen from the adjacent N14 National Road users

Table 22: Visual Impacts: SLF Operation and Closure Phase

Type of Impact			
Direct Negative			
Determining Consequence (a function of Intensity, spatial extent and duration)			
Characteristic	**W/Out**	**With**	**Summary of Reasoning**
Intensity	High	High	Once established over time, the pyramidal shaped form with uniform colour is likely to generate High levels of visual intrusion due to the close proximity of the road. As mitigation of the form and colour are not possible as they are a fundamental component of the design, the only mitigation is re-location of the site to an area outside the N14 zone of visual influence.
Duration	Very High	Very High	With or without mitigation, the SLF will become a permanent feature in the landscape.
Extent	High	High	The brown colour and rough texture of the SLF will assist in reducing the extent of the visual intrusion to some degree. However, due to the close proximity of the SLF site to the N14 views of the SLF would become a permanent feature in the landscape, retaining the mining sense of place long after the Gamsberg Zinc Mine has been closed. As mitigation is limited by design, the extent of the impact remains the same.
Determining of Significance			
Characteristic	**W/Out**	**With**	**Summary of Reasoning**
Consequence	Very High	Very High	Consequence is a function of intensity, spatial extent and duration.
Probability	Medium	Medium	

Significance Without Mitigation	
High	Although the mining landscape context is established, post mining an effective dumping strategy will assist in allowing the landscape character to still appear natural and have scenic quality. This is primarily due to the waste rock dump strategy that will result in a textured form that appears as a natural scree slope found in the surrounding landscape. With the removal of all structures and plant, the distance to the dumps and the natural arid zone haze will allow casual observers to view the landscape as primarily natural. However, with the establishment of the SLF directly adjacent to the N14 National Road, the unusual form and uniform colour would permanently create high levels of visual intrusion for receptors using the N14. The N14 is identified in local and regional planning documents as an important tourist view corridor.
Significance With Mitigation	
High	Due to the limited potential for mitigation, the only mitigation is to relocate the facility outside the zone of visual influence of the N14. As such, the Visual Impact Significance remains High with or without mitigation.

Mitigation Measures Operation

- Assess the feasibility of relocating the SLF to the north of the N14 National Highway where the existing Gamsberg Zinc Mine TSF has been located. This area is outside of High Exposure to N14 users and has a higher VAC level due to the existing TSF.

- Adopt responsible operational practices aimed at containing the operation activities to specifically demarcated areas thereby limiting the need to expand the operation footprint and further removal of natural vegetation.
- Continued rehabilitation of all disturbed areas as soon as possible after construction is complete in an area.
- If very dry conditions prevail and dust becomes a nuisance, water should be sprayed on the road surface or other dust suppression measures implemented.
- The sites should be kept neat and tidy at all times with litter and dust management measures in place.
- Visually cluttered material storage yards and laydown areas should be screened through the use of material fencing.

Mitigation Measures Closure

- Adopt responsible practices aimed at containing the closure activities to specifically demarcated areas.
- Breaking down / removal and processing of all structures constructed for operations needs to be implemented. Any contaminated material would need to be processed in terms of applicable South African waste management law and standards.
- Rehabilitation of all disturbed areas as soon as possible after decommissioning phase is complete in an area.
- If during decommissioning, very dry conditions prevail and dust becomes a nuisance, water should be sprayed on the road surface or other dust suppression measures implemented, without creating undue runoff.

Residual / Cumulative Impacts

Without mitigation there will be a permanent, residual visual impact that will detract from the N14 National Road scenic quality and residual visual impacts will remain High without and with mitigation. As the N14 is identified in local and regional planning documents as an import tourist view corridor, the SLF in this locality is likely to result in a permanent degradation of this section of the N14 National Road.

9 CONCLUSION

Smelter and Stack Visual Impact Significance

Without mitigation, the Visual Impact Significance of the Construction and Operation Phases of the proposed Smelter and Stack is expected to be ***High***. While the existing mining landscape does increase the visual carrying capacity for industrial type landscape modifications, strong reflecting colours and texture and light spillage is likely to increase the visual intensity of the landscape change and detract from this section of the N14 National Highway. The expansion of the 'Vedanta blue' that is currently used for cladding on the existing mine plant would be visually inappropriate. While the visual intensity is likely to be experienced as High, the area is already defined by a mining landscape context, and it is likely that the area will continue to become more industrialised at the local level. There are numerous renewable energy projects in the vicinity and the landscape character along this section of the N14 is likely to be changed. For this reason, the higher visual impacts do not constitute a fatal flaw, as the proposed project will take place predominantly within the existing Gamsberg Mine zone of visual influence. However, mitigations to reduce the intensity of the close proximity views to the N14 receptors should be implemented. The areas outside of the foreground/ mid ground areas (outside the main mining zone of visual influence) do have scenic value, and do add value to the N14 National Highway as a tourist view corridor. The importance of the N14 as a tourist route is also emphasised in the local and district planning. For these reasons, mitigations to reduce the extent of the project zone of visual influence should also be implemented.

With mitigation and the expansion of cladding to simplify the complexity of the plant on structures facing the N14 National Highway, and the incorporation of a variation of grey-brown colours for cladding and roof sheeting colours, the intensity of the visual intrusion can be contained to some degree. Lights at night would also need to be carefully managed. With effective mitigation, impact significance of the Construction and Operation Phases of the proposed Smelter and Stack could be reduced to ***Medium***.

With effective mitigation and the removal of all structures, rehabilitation and restoration, the Visual Impact Significance of the Post-Closure Phases of the proposed Smelter and Stack is expected to be ***Very Low.*** Without removal of the structure, landscape sterilisation is likely to take place, resulting in long-term visual intrusion to local scenic resources. The Northern Cape region does have aesthetic value and the scenic quality of the area is high. Although a large-scale mining operation has taken place, the WRDs have been effectively created to appear as natural forms from a colour perspective. With the removal of the mine works, the resultant post mining landscape can appear as natural as similar scree slopes are apparent in the surrounding landscape. With the non-removal of the Smelter structures and stacks, landscape decay will ensue, significantly degrading the local landscape character. This is also likely to set a negative precedent for other mining related landscapes post-closure that should not be followed. Without mitigation, the Visual Impact Significance of the Post-Closure Phases of the proposed Smelter and Stack is expected to be ***High.***

SLF Visual Impact Significance

While Construction Phase impacts of the tailings are likely to be **Medium** at initial phases while the SLF has a low profile, once established and raised the SLF is likely to result in permanent visual intrusion to the adjacent N14 National Road users. Visual Impact Significance once established is likely to remain **High** with and without mitigation, as mitigation potential is limited due to the steep angle of the SLR sides, and the arid

envirinment. Although the mining landscape context is established, in the post mining scenario, the effective dumping strategy of the mine operation will assist in allowing the landscape character to still appear natural once the plant structures have been removed. This is primarily due to the WRD strategy that will result in a textured form that appears as a natural scree slope found in the surrounding landscape. With the removal of all structures and plants, the distance to the dumps and the natural arid zone haze will allow casual observers to view the landscape as primarily natural. However, with the establishment of the SLF directly adjacent to the N14 National Road, the unusual form and uniform colour would permanently create high levels of visual intrusion for receptors using the N14.

As the N14 is identified in local and regional planning documents as an import tourist view corridor, the SLF in this locality is likely to result in a permanent negative change to the local landscape character in an area with high exposure to the N14 National Highway receptors. From a visual impact mitigation perspective, the only mitigation for the SLF is relocation outside the high exposure zone of visual influence of the N14 receptors. It is recommended that the design team assess the feasibility of relocating the SLF to the north of the N14 to where the existing Gamsberg Mine TSF is located. Should the SLF be authorised in its current location (adjacent to the N14 National Highway), the Relevant Authorities need to recognise that this will result in permanent, local landscape degradation long after the smelter has been decommissioned if appropriate rehabilitation strategies is not implemented for the SLF.

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11 ANNEXURE A: FIELD SURVEY PHOTOGRAPHS AND COMMENTS

The following photographs were taken during the field survey. The text below the photograph describes the landscape and visual issues of the locality, if applicable. The locality and direction for each of the photograph locations can be seen in the following map.

Figure 19: Distant view of the town of Aggeneys located adjacent to the inselbergs.

Typical view of the Nama-karoo landscape at sunset with the rocky inselbergs, arid vegetation as well as the isolated settlements included in the frame. The visual emphasis on natural landscape features emphasises a remote and arid wilderness sense of place that adds value to the region as a tourist destination.

Figure 20: Survey Point 2 photograph taken from the N14 National Highway towards the Gamsberg Mountain and existing Gamsberg Zinc Mine.

Figure 21: Photograph from the access road to Aggeneys Town of the existing Black Mountain Mine headgear for the underground mine works.

Figure 22: Photograph from the access road to Aggeneys Town of the existing Black Mountain Tailings Storage Facility.

Figure 23: Photograph of the main road in Aggeneys

Comment

The residential areas in the background obscured by the garden and road side trees that dominate the local landscape character.

Figure 24: Photograph of the Aggeneys Golf Club with many trees that limit open views to the adjacent Black Mountain mine.

Figure 25: Photograph taken from the N14 national Highway of the existing Gamsberg Zinc Mine and large scale waste rock dumps in the background (distance approximately 1 km).

Comment

The blue colour increases the visual dominance of the structure and reduces opportunity for blending in with background colours that have a grey hue.

Figure 26: Proximate photograph of the Gamsberg Zinc Mine Plant located adjacent to the proposed Smelter site.

Comment

This colour variation that includes a grey-brown colour for walled area and limited blue cladding, ***is a visually preferred colour usage*** *that allow the Vedanta blue branding without increasing the visual prominence of the plant due to colour contrast. Two tones or grey-brown colours would be preferable.*

Figure 27: Photograph taken from the N14 National Highway depicting the existing lights at night sense of place generated by the existing Gamsberg Zinc Mine (distance approximately 2 km)

Figure 28: Photograph taken from the N14 National Highway of the existing intensive power line infrastructure that dominates the sense of place at the existing Gamsberg Zinc Mine entrance.

Figure 29: Photograph taken from the N14 National Highway approximately 14km from the proposed mine site.

Comment

Due to the natural slope of the waste rock dump and gently undulating terrain, the mining landscape modifications of the existing Gamsberg Zinc Mine and Plant are not visible. The WRD form is similar to the natural shape of the inselberg, with similar colour and texture. Similar topographic screening opportunities could exist of the proposed Smelter Plant (due to similar height to the existing mine plant). However, due to the skyline created by the flat terrain, the proposed smelter plant stack will become more noticeable. The vertical lines of the telephone poles adjacent the road will help reduce contrast from background views.

Figure 30: Photograph north from the proposed smelter plant site depicting the arid vegetation and the power line with background view of the Gamsberg hills. No significant landscape features were identified on the two proposed development sites.

12 ANNEXURE B: SLR IMPACT SIGNIFICANT TABLE

Table 23: SLR Impact Definitions and Criteria

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

Table 24: SLR Determining Consequence Table

PART B: DETERMINING CONSEQUENCE							
			EXTENT				
			A part of the site/property	Whole site	Beyond the site, affecting neighbours	Local area, extending far beyond site.	Regional/ National
			VL	L	M	H	VH
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

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	VH
			CONSEQUENCE				

13 ANNEXURE C: SPECIALIST INFORMATION

Curriculum Vitae (CV)

1. **Position**: Owner / Director
2. **Name of Firm**: Visual Resource Management Africa cc *(www.vrma.co.za)*
3. **Name of Staff**: Stephen Stead
4. **Date of Birth**: 9 June 1967
5. **Nationality:** South African
6. **Contact Details:** **Tel: +27 (0) 44 876 0020**
   Cell: +27 (0) 83 560 9911
   Email: steve@vrma.co.za

7. **Educational qualifications**:
   - University of Natal (Pietermaritzburg):
   - Bachelor of Arts: Psychology and Geography
   - Bachelor of Arts (Hons): Human Geography and Geographic Information Management Systems

8. **Professional Accreditation**
   - Association of Professional Heritage Practitioners (APHP) Western Cape
     - Accredited VIA practitioner member of the Association (2011)

9. **Association involvement:**

   - International Association of Impact Assessment (IAIA) South African Affiliate
     - Past President (2012 - 2013)
     - President (2012)
     - President-Elect (2011)
     - Conference Co-ordinator (2010)
     - National Executive Committee member (2009)
     - Southern Cape Chairperson (2008)

10. **Conferences Attended:**
    - IAIAsa 2012
    - IAIAsa 2011
    - IAIA International 2011 (Mexico)
    - IAIAsa 2010
    - IAIAsa 2009
    - IAIAsa 2007

11. **Continued Professional Development:**

- Integrating Sustainability with Environment Assessment in South Africa (IAIAsa Conference, 1 day)
- Achieving the full potential of SIA (Mexico, IAIA Conference, 2 days 2011)
- Researching and Assessing Heritage Resources Course (University of Cape Town, 5 days, 2009)

12. Countries of Work Experience:

- South Africa, Mozambique, Malawi, Lesotho, Kenya and Namibia

13. Relevant Experience:

Stephen gained six years of experience in the field of Geographic Information Systems mapping and spatial analysis working as a consultant for the KwaZulu-Natal Department of Health and then with an Environmental Impact Assessment company based in the Western Cape. In 2004 he set up the company Visual Resource Management Africa that specializes in visual resource management and visual impact assessments in Africa. The company makes use of the well-documented Visual Resource Management methodology developed by the Bureau of Land Management (USA) for assessing the suitability of landscape modifications. Stephen has assessed of over 150 major landscape modifications throughout southern and eastern Africa. The business has been operating for eight years and has successfully established and retained a large client base throughout Southern Africa which include amongst other, Rio Tinto (Pty) Ltd, Bannerman (Pty) Ltd, Anglo Coal (Pty) Ltd, Eskom (Pty) Ltd, NamPower and Vale (Pty) Ltd, Ariva (Pty) Ltd, Harmony Gold (Pty) Ltd, Millennium Challenge Account (USA), Pretoria Portland Cement (Pty) Ltd

14. Languages:

- English – First Language
- Afrikaans – fair in speaking, reading and writing

15. Projects:

A list of ***some*** of the large scale projects that VRMA has assessed has been attached below with the client list indicated per project (Refer to www.vrma.co.za for a full list of projects undertaken).

Table 25: VRM Africa Projects Assessments Table

YEAR	NAME	DESCRIPTION	LOCATION
2018	Mogara PV	Solar Energy	Northern Cape (SA)
2018	Gaetsewe PV	Solar Energy	Northern Cape (SA)
2017	Kalungwishi Hydroelectric (2) and power line	Hydroelectric	Zambia
2017	Mossel Bay UISP (Kwanoqaba)	Settlement	Western Cape (SA)
2017	Pavua Dam and HEP	Hydroelectric	Mozambique (SA)
2017	Penhill UISP Settlement (Cape Town)	Settlement	Western Cape (SA)
2016	Kokerboom WEF * 3	Wind Energy	Northern Cape (SA)
2016	Hotazel PV	Solar Energy	Northern Cape (SA)
2016	Eskom Sekgame Bulkop Power Line	Infrastructrue	Northern Cape (SA)
2016	Ngonye Hydroelectric	Hydroelectric	Zambia
2016	Levensdal Infill	Settlement	Western Cape (SA)

2016	Arandis CSP	Solar Energy	Namibia
2016	Bonnievale PV	Solar Energy	Western Cape (SA)
2015	Noblesfontein 2 & 3 WEF (Scoping)	Wind Energy	Eastern Cape (SA)
2015	Ephraim Sun SEF	Solar Energy	Nothern Cape (SA)
2015	Dyasonsklip and Sirius Grid TX	Solar Energy	Nothern Cape (SA)
2015	Dyasonsklip PV	Solar Energy	Nothern Cape (SA)
2015	Zeerust PV and transmission line	Solar Energy	North West (SA)
2015	Bloemsmond SEF	Solar Energy	Nothern Cape (SA)
2015	Juwi Copperton PV	Solar Energy	Nothern Cape (SA)
2015	Humansrus Capital 14 PV	Solar Energy	Nothern Cape (SA)
2015	Humansrus Capital 13 PV	Solar Energy	Nothern Cape (SA)
2015	Spitzkop East WEF (Scoping)	Solar Energy	Western Cape (SA)
2015	Lofdal Rare Earth Mine and Infrastructure	Mining	Namibia
2015	AEP Kathu PV	Solar Energy	Nothern Cape (SA)
2014	AEP Mogobe SEF	Solar Energy	Nothern Cape (SA)
2014	Bonnievale SEF	Solar Energy	Western Cape (SA)
2014	AEP Legoko SEF	Solar Energy	Northern Cape (SA)
2014	Postmasburg PV	Solar Energy	Northern Cape (SA)
2014	Joram Solar	Solar Energy	Northern Cape (SA)
2014	RERE PV Postmasberg	Solar Energy	Northern Cape (SA)
2014	RERE CPV Upington	Solar Energy	Northern Cape (SA)
2014	Rio Tinto RUL Desalinisation Plant	Industrial	Namibia
2014	NamPower PV * 3	Solar Energy	Namibia
2014	Pemba Oil and Gas Port Expansion	Industrial	Mozambique
2014	Brightsource CSP Upington	Solar Energy	Northern Cape (SA)
2014	Witsand WEF (Scoping)	Wind Energy	Western Cape (SA)
2014	Kangnas WEF	Wind Energy	Western Cape (SA)
2013	Cape Winelands DM Regional Landfill	Industrial	Western Cape (SA)
2013	Drennan PV Solar Park	Solar Energy	Eastern Cape (SA)
2013	Eastern Cape Mari-culture	Mari-culture	Eastern Cape (SA)
2013	Eskom Pantom Pass Substation	Substation /Tx lines	Western Cape (SA)
2013	Frankfort Paper Mill	Plant	Free State (SA)
2013	Gibson Bay Wind Farm Transmission lines	Tranmission lines	Eastern Cape (SA)
2013	Houhoek Eskom Substation	Substation /Tx lines	Western Cape (SA)
2013	Mulilo PV Solar Energy Sites (x4)	Solar Energy	Northern Cape (SA)
2013	Namies Wind Farm	Wind Energy	Northern Cape (SA)
2013	Rossing Z20 Pit and WRD	Mining	Namibia
2013	SAPPI Boiler Upgrade	Plant	Mpumalanga (SA)
2013	Tumela WRD	Mine	North West (SA)
2013	Weskusfleur Substation (Koeburg)	Substation /Tx lines	Western Cape (SA)
2013	Yzermyn coal mine	Mining	Mpumalanga (SA)

2012	Afrisam	Mining	Western Cape (SA)
2012	Bitterfontein	Solar Energy	Northern Cape (SA)
2012	Kangnas PV	Solar Energy	Northern Cape (SA)
2012	Kangnas Wind	Solar Energy	Northern Cape (SA)
2012	Kathu CSP Tower	Solar Energy	Northern Cape (SA)
2012	Kobong Hydro	Hydro & Powerline	Lesotho
2012	Letseng Diamond Mine Upgrade	Mining	Lesotho
2012	Lunsklip Wind farm	Wind Energy	Western Cape (SA)
2012	Mozambique Gas Engine Power Plant	Plant	Mozambique
2012	Ncondezi Thermal Power Station	Substation /Tx lines	Mozambique
2012	Sasol CSP Tower	Solar Power	Free State (SA)
2012	Sasol Upington CSP Tower	Solar Power	Northern Cape (SA)
2011	Beaufort West PV Solar Power Station	Solar Energy	Western Cape (SA)
2011	Beaufort West Wind Farm	Wind Energy	Western Cape (SA)
2011	De Bakke Cell Phone Mast	Structure	Western Cape (SA)
2011	ERF 7288 PV	Solar Energy	Western Cape (SA)
2011	Gecko Industrial park	Industrial	Namibia
2011	Green View Estates	Residential	Western Cape (SA)
2011	Hoodia Solar	Solar Energy	Western Cape (SA)
2011	Kalahari Solar Power Project	Solar Energy	Northern Cape (SA)
2011	Khanyisa Power Station	Power Station	Western Cape (SA)
2011	Olvyn Kolk PV	Solar Energy	Northern Cape (SA)
2011	Otjikoto Gold Mine	Mining	Namibia
2011	PPC Rheebieck West Upgrade	Industrial	Western Cape (SA)
2011	George Southern Arterial	Road	Western Cape (SA)
2010	Bannerman Etango Uranium Mine	Mining	Namibia
2010	Bantamsklip Transmission	Transmission	Eastern Cape (SA)
2010	Beaufort West Urban Edge	Mapping	Western Cape (SA)
2010	Bon Accord Nickel Mine	Mining	Mapumalanga (SA)
2010	Etosha National Park Infrastructure	Housing	Namibia
2010	Herolds Bay N2 Development Baseline	Residential	Western Cape (SA)
2010	MET Housing Etosha	Residential	Namibia
2010	MET Housing Etosha Amended MCDM	Residential	Namibia
2010	MTN Lattice Hub Tower	Structure	Western Cape (SA)
2010	N2 Herolds Bay Residental	Residential	Western Cape (SA)
2010	Onifin(Pty) Ltd Hartenbos Quarry Extension	Mining	Western Cape (SA)
2010	Still Bay East	GIS Mapping	Western Cape (SA)
2010	Vale Moatize Coal Mine and Railway	Mining / Rail	Mozambique
2010	Vodacom Mast	Structure	Western Cape (SA)
2010	Wadrif Dam	Dam	Western Cape (SA)
2009	Asazani Zinyoka UISP Housing	Residential Infill	Western Cape (SA)

2009	Eden Telecommunication Tower	Structure	Western Cape (SA)
2009	George SDF Landscape Characterisation	GIS Mapping	Western Cape (SA)
2009	George SDF Visual Resource Management	GIS Mapping	Western Cape (SA)
2009	George Western Bypass	Road	Western Cape (SA)
2009	Knysna Affordable Housing Heidevallei	Residential Infill	Western Cape (SA)
2009	Knysna Affordable Housing Hornlee Project	Residential Infill	Western Cape (SA)
2009	Rossing Uranium Mine Phase 2	Mining	Namibia
2009	Sun Ray ## Farm	## Energy	Western Cape (SA)
2008	Bantamsklip Transmission Lines Scoping	Transmission	Western Cape (SA)
2008	Erf 251 Damage Assessment	Residential	Western Cape (SA)
2008	Erongo Uranium Rush SEA	GIS Mapping	Namibia
2008	Evander South Gold Mine Preliminary VIA	Mining	Mpumalanga (SA)
2008	George SDF Open Spaces System	GIS Mapping	Western Cape (SA)
2008	Hartenbos River Park	Residential	Western Cape (SA)
2008	Kaaimans Project	Residential	Western Cape (SA)
2008	Lagoon Garden Estate	Residential	Western Cape (SA)
2008	Moquini Beach Hotel	Resort	Western Cape (SA)
2008	NamPower Coal fired Power Station	Power Station	Namibia
2008	Oasis Development	Residential	Western Cape (SA)
2008	RUL Sulpher Handling Facility Walvis Bay	Mining	Namibia
2008	Stonehouse Development	Residential	Western Cape (SA)
2008	Walvis Bay Power Station	Structure	Namibia
2007	Calitzdorp Retirement Village	Residential	Western Cape (SA)
2007	Calitzdorp Visualisation	Visualisation	Western Cape (SA)
2007	Camdeboo Estate	Residential	Western Cape (SA)
2007	Destiny Africa	Residential	Western Cape (SA)
2007	Droogfontein Farm 245	Residential	Western Cape (SA)
2007	Floating Liquified Natural Gas Facility	Structure tanker	Western Cape (SA)
2007	George SDF Municipality Densification	GIS Mapping	Western Cape (SA)
2007	Kloofsig Development	Residential	Western Cape (SA)
2007	OCGT Power Plant Extension	Structure Power Plant	Western Cape (SA)
2007	Oudtshoorn Municipality SDF	GIS Mapping	Western Cape (SA)
2007	Oudtshoorn Shopping Complex	Structure	Western Cape (SA)
2007	Pezula Infill (Noetzie)	Residential	Western Cape (SA)
2007	Pierpoint Nature Reserve	Residential	Western Cape (SA)
2007	Pinnacle Point Golf Estate	Golf/Residential	Western Cape (SA)
2007	Rheebok Development Erf 252 Apeal	Residential	Western Cape (SA)
2007	Rossing Uranium Mine Phase 1	Mining	Namibia
2007	Ryst Kuil/Riet Kuil Uranium Mine	Mining	Western Cape (SA)
2007	Sedgefield Water Works	Structure	Western Cape (SA)
2007	Sulpher Handling Station Walvis Bay Port	Industrial	Namibia

2007	Trekkopje Uranium Mine	Mining	Namibia
2007	Weldon Kaya	Residential	Western Cape (SA)
2006	Farm Dwarsweg 260	Residential	Western Cape (SA)
2006	Fynboskruin Extention	Residential	Western Cape (SA)
2006	Hanglip Golf and Residential Estate	Residential	Western Cape (SA)
2006	Hansmoeskraal	Slopes Analysis	Western Cape (SA)
2006	Hartenbos Landgoed Phase 2	Residential	Western Cape (SA)
2006	Hersham Security Village	Residential	Western Cape (SA)
2006	Ladywood Farm 437	Residential	Western Cape (SA)
2006	Le Grand Golf and Residential Estate	Residential	Western Cape (SA)
2006	Paradise Coast	Residential	Western Cape (SA)
2006	Paradyskloof Residential Estate	Residential	Western Cape (SA)
2006	Riverhill Residential Estate	Residential	Western Cape (SA)
2006	Wolwe Eiland Access Route	Road	Western Cape (SA)
2005	Harmony Gold Mine	Mining	Mpumalanga (SA)
2005	Knysna River Reserve	Residential	Western Cape (SA)
2005	Lagoon Bay Lifestyle Estate	Residential	Western Cape (SA)
2005	Outeniquabosch Safari Park	Residential	Western Cape (SA)
2005	Proposed Hotel Farm Gansevallei	Resort	Western Cape (SA)
2005	Uitzicht Development	Residential	Western Cape (SA)
2005	West Dunes	Residential	Western Cape (SA)
2005	Wilderness Erf 2278	Residential	Western Cape (SA)
2005	Wolwe Eiland Eco & Nature Estate	Residential	Western Cape (SA)
2005	Zebra Clay Mine	Mining	Western Cape (SA)
2004	Gansevallei Hotel	Residential	Western Cape (SA)
2004	Lakes Eco and Golf Estate	Residential	Western Cape (SA)
2004	Trekkopje Desalination Plant	Structure Plant	Namibia (SA)
1995	Greater Durban Informal Housing Analysis	Photogrametry	KwaZulu-Natal (SA)

14 ANNEXURE D: VRM CHECKLISTS AND TERMINOLOGY

Table 26: Scenic Quality Checklist

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

Table 27: Sensitivity Level Rating Checklist

FACTORS	QUESTIONS	
Type of Users	**Maintenance of visual quality is:**	
	A major concern for most users	High
	A moderate concern for most users	Moderate
	A low concern for most users	Low
Amount of use	**Maintenance of visual quality becomes more important as the level of use increases:**	
	A high level of use	High
	Moderately level of use	Moderate
	Low level of use	Low
Public interest	**Maintenance of visual quality:**	
	A major concern for most users	High
	A moderate concern for most users	Moderate
	A low concern for most users	Low
Adjacent land Users	**Maintenance of visual quality to sustain adjacent land use objectives is:**	
	Very important	High
	Moderately important	Moderate
	Slightly important	Low
Special Areas	**Maintenance of visual quality to sustain Special Area management objectives is:**	
	Very important	High
	Moderately important	Moderate
	Slightly important	Low

Table 28: VRM Terminology Table

FORM	LINE	COLOUR	TEXTURE
Simple	Horizontal		Smooth
Weak	Vertical		Rough
Strong	Geometric		Fine
Dominant	Angular		Coarse
Flat	Acute		Patchy
Rolling	Parallel		Even
Undulating	Curved	Dark	Uneven
Complex	Wavy	light	Complex
Plateau	Strong	Mottled	Simple
Ridge	Weak		Stark
Valley	Crisp		Clustered
Plain	Feathered		Diffuse
Steep	Indistinct		Dense
Shallow	Clean		Scattered
Organic	Pro##nt		Sporadic
Structured	Solid		Consistent

Simple	Basic, composed of few elements	**Organic**	Derived from nature; occurring or developing gradually and naturally
Complex	Complicated; made up of many interrelated parts	**Structure**	Organised; planned and controlled; with definite shape, form, or pattern
Weak	Lacking strength of character	**Regular**	Repeatedly occurring in an ordered fashion
Strong	Bold, definite, having prominence	**Horizontal**	Parallel to the horizon
Dominant	Controlling, influencing the surrounding environment	**Vertical**	Perpendicular to the horizon; upright
Flat	Level and horizontal without any slope; even and smooth without any bumps or hollows	**Geometric**	Consisting of straight lines and simple shapes
Rolling	Progressive and consistent in form, usually rounded	**Angular**	Sharply defined; used to describe an object identified by angles
Undulating	Moving sinuously like waves; wavy in appearance	**Acute**	Less than 90°; used to describe a sharp angle
Plateau	Uniformly elevated flat to gently undulating land bounded on one or more sides by steep slopes	**Parallel**	Relating to or being lines, planes, or curved surfaces that are always the same distance apart and therefore never meet
Ridge	A narrow landform typical of a highpoint or apex; a long narrow hilltop or range of hills	**Curved**	Rounded or bending in shape
Valley	Low-lying area; a long low area of land, often with a river or stream running through it, that is surrounded by higher ground	**Wavy**	Repeatedly curving forming a series of smooth curves that go in one direction and then another
Plain	A flat expanse of land; fairly flat dry land, usually with few trees	**Feathered**	Layered; consisting of many fine parallel strands
Steep	Sloping sharply often to the extent of being almost vertical	**Indistinct**	Vague; lacking clarity or form
Pro##nt	Noticeable; distinguished, eminent, or well-known	**Patchy**	Irregular and inconsistent;
Solid	Unadulterated or unmixed; made of the same material throughout; uninterrupted	**Even**	Consistent and equal; lacking slope, roughness, and irregularity
Broken	Lacking continuity; having an uneven surface	**Uneven**	Inconsistent and unequal in measurement irregular
Smooth	Consistent in line and form; even textured	**Stark**	Bare and plain; lacking ornament or relieving features
Rough	Bumpy; knobbly; or uneven, coarse in texture	**Clustered**	Densely grouped
Fine	Intricate and refined in nature	**Diffuse**	Spread through; scattered over an area
Coarse	Harsh or rough to the touch; lacking detail	**Diffuse**	To make something less bright or intense

15 ANNEXURE E: GENERAL LIGHTS AT NIGHT MITIGATIONS

Mitigation:

- Effective light management needs to be incorporated into the design of the lighting to ensure that the visual influence is limited to the mine, without jeopardising mine operational safety and security (See lighting mitigations by The New England Light Pollution Advisory Group (NELPAG) and Sky Publishing Corp in 14.2).
- Utilisation of specific frequency LED lighting with a green hue on perimeter security fencing.
- Directional lighting on the more exposed areas of operation, where point light source is an issue.
- No use of overhead lighting and, if possible, locate the light source closer to the operation.
- If possible, the existing overhead lighting method utilised at the mine should be phased out and replaced with an alternative lighting using closer to source, directed LED technology.

Mesopic Lighting

Mesopic vision is a combination of photopic vision and scotopic vision in low, but not quite dark, lighting situations. The traditional method of measuring light assumes photopic vision and is often a poor predictor of how a person sees at night. The light spectrum optimized for mesopic vision contains a relatively high amount of bluish light and is therefore effective for peripheral visual tasks at mesopic light levels. *(CIE, 2012)*

The Mesopic Street Lighting Demonstration and Evaluation Report by the Lighting Research Centre (LRC) in New York found that the 'replacement of white light sources (induction and ceramic metal halide) were tuned to optimize human vision under low light levels while remaining in the white light spectrum. Therefore, outdoor electric light sources that are tuned to how humans see under mesopic lighting conditions can be used to reduce the luminance of the road surface while providing the same, or better, visibility. Light sources with shorter wavelengths, which produce a "cooler" (more blue and green) light, are needed to produce better mesopic vision. Based on this understanding, the LRC developed a means of predicting visual performance under low light conditions. This system is called the unified photometry system. Responses to surveys conducted on new installations revealed that area residents perceived higher levels of visibility, safety, security, brightness, and colour rendering with the new lighting systems than with the standard *High-Purity Standards* (HPS) systems. The new lighting systems used 30% to 50% less energy than the HPS systems. These positive results were achieved through tuning the light source to optimize mesopic vision. Using less wattage and photopic luminance also reduces the reflectance of the light off the road surface. Light reflectance is a major contributor to light pollution (sky glow).' *(Lighting Research Center. New York. 2008)*

‘Good Neighbour – Outdoor Lighting’

Presented by the New England Light Pollution Advisory Group (NELPAG) *(http://cfa/ www.harvard .edu /cfa/ps/nelpag.html)* and Sky & Telescope *(http://SkyandTelescope.com/).* NELPAG and Sky & Telescope support the International Dark-Sky Association (IDA) *(http://www.darksky.org/).*
(NELPAG)

What is good lighting? Good outdoor lights improve visibility, safety, and a sense of security, while minimizing energy use, operating costs, and ugly, dazzling glare.

Why should we be concerned? Many outdoor lights are poorly designed or improperly aimed. Such lights are costly, wasteful, and distractingly glary. They harm the night-time environment and neighbours’ property values. Light directed uselessly above the horizon creates murky skyglow — the “light pollution” that washes out our view of the stars.

Glare Here’s the basic rule of thumb: If you can see the bright bulb from a distance, it’s a bad light. With a good light, you see lit ground instead of the dazzling bulb. “Glare” is light that beams directly from a bulb into your eye. It hampers the vision of pedestrians, cyclists, and drivers.

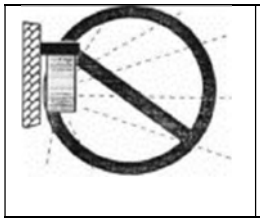
Light Trespass Poor outdoor lighting shines onto neighbours’ properties and into bedroom windows, reducing privacy, hindering sleep, and giving the area an unattractive, trashy look.

Energy Waste Many outdoor lights waste energy by spilling much of their light where it is not needed, such as up into the sky. This waste results in high operating costs. Each year we waste more than a billion dollars in the United States needlessly lighting the night sky.

Excess Lighting Some homes and businesses are flooded with much stronger light than is necessary for safety or security.

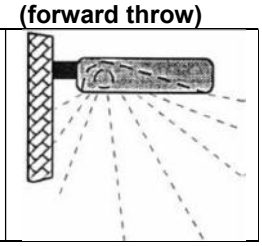
Good and Bad Light Fixtures

Typical “Wall Pack”



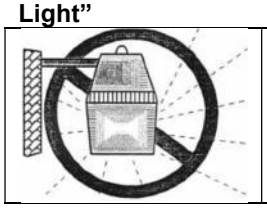
BAD
Waste light goes up and sideways

Typical “Shoe Box” (forward throw)



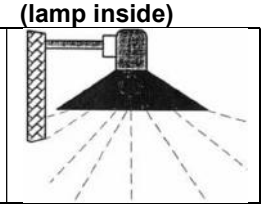
GOOD
Directs all light down

Typical “Yard Light”



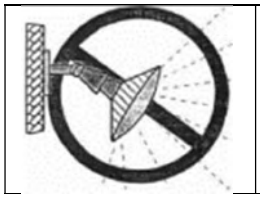
BAD
Waste light goes up and sideways

Opaque Reflector (lamp inside)



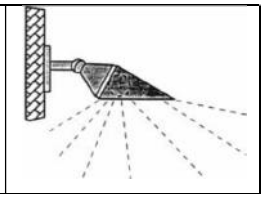
GOOD
Directs all light down

Area Flood Light



BAD
Waste light goes up and sideways

Area Flood Light with Hood



GOOD
Directs all light down

How do I switch to good lighting?
Provide only enough light for the task at hand; don’t over-light, and don’t spill light off your property. Specifying enough light for a job is sometimes hard to do on paper. Remember that a full Moon can make an area quite bright. Some lighting systems illuminate areas 100 times more brightly than the full Moon! More importantly, by choosing properly shielded lights, you can meet your needs without bothering neighbours or polluting the sky.

- Aim lights down. Choose “full-cutoff shielded” fixtures that keep light from going uselessly up or sideways. Full-cutoff fixtures produce minimum glare. They create a pleasant-looking environment. They increase safety because you see illuminated people, cars, and terrain, not dazzling bulbs.

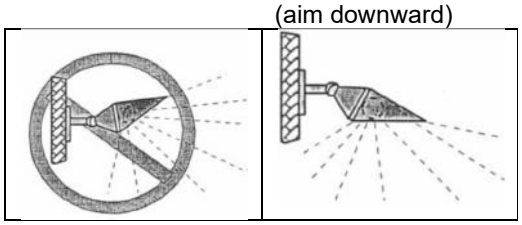
- Install fixtures carefully to maximize their effectiveness on the targeted area and minimize their impact elsewhere. Proper aiming of fixtures is crucial. Most are aimed too high. Try to install them at night, when you can see where all the rays actually go. Properly aimed and shielded lights may cost more initially, but they save you far more in the long run. They can illuminate your target with a low-wattage bulb just as well as a wasteful light does with a high-wattage bulb.

- If colour discrimination is not important, choose energy- efficient fixtures utilising yellowish high-pressure sodium (HPS) bulbs. If “white” light is needed, fixtures using compact fluorescent or metal-halide (MH) bulbs are more energy-efficient than those using incandescent, halogen, or mercury-vapour bulbs.

- Where feasible, put lights on timers to turn them off each night after they are no longer needed. Put home security lights on a motion-detector switch, which turns them on only when someone enters the area; this provides a great deterrent effect!

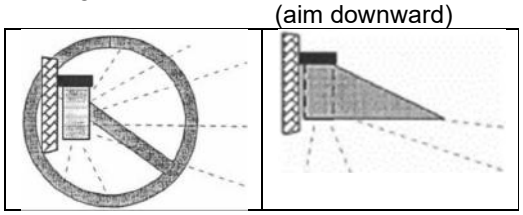
What You Can Do To Modify Existing Fixtures

Change this . . . to this (aim downward)



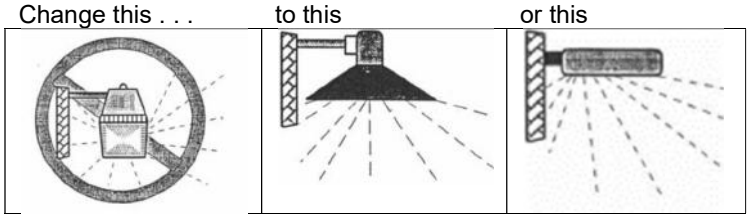
Floodlight:

Change this . . . to this (aim downward)



Wall Pack

Change this . . . to this or this



Yard Light | Opaque Reflecter | Show Box

Replace bad lights with good lights.
You’ll save energy and money. You’ll be a good neighbour. And you’ll help preserve our view of the stars.