VISUAL IMPACT ASSESSMENT REPORT

Tharisa Mine: Additional Waste Rock Storage

June 2022

GYLA

VISUAL IMPACT ASSESSMENT REPORT

THARISA ADDITIONAL WASTE ROCK STORAGE PROJECT

Submitted to:

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Report Revision No:	*DRAFT*
Date Issued:	06 JUNE 2022
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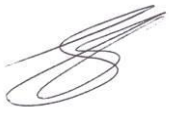
Signed:	
Reference:	041_2022: Tharisa Mine - VIA

EXPERTISE OF SPECIALIST

Name:	Graham A Young
Qualification:	BL (Toronto) ML (Pretoria)
Professional Registration:	South African Council for the Landscape Architectural Profession (SACLAP) Reg. No. 87001 Fellow Institute of Landscape Architects of South Africa (FILASA)
Experience in Years:	Over 40 years
Experience	Graham Young is a registered landscape architect with an interest and experience in landscape architecture, urban design, and environmental planning. He holds a degree in landscape architecture from the Universities of Toronto (BL) and Pretoria (ML). He has carried out visual impact assessments in Canada and Africa, where he has spent most of his working life. He has served as President of the Institute of Landscape Architects of South Africa (ILASA) and vice president of the Board of Control for Landscape Architects. He is a Fellow of the ILASA and a professionally registered landscape architect in South Africa (SACLAP). He is Secretary-General for the International Federation of Landscape Architects, Africa Region (IFLA Africa). He runs his practice, Graham A Young Landscape Architect (GYLA). A speciality is Visual Impact Assessments, for which he has been cited with an Institute of Landscape Architects of South Africa (ILASA), Merit Award (1999). This work also includes landscape characterization studies, end-use studies for quarries, and computer modelling and visualization. He has completed over three hundred specialist reports for projects and conducted several VIA reviews. He has served as a specialist witness in legal cases involving visual impact issues. Mr Young helped develop the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes* (Oberholzer 2005) and produced a research document for Eskom, *The Visual Impacts of Power Lines* (2009). In 2011 he produced '*Guidelines for involving visual and aesthetic specialists'* for the Aapravasi Ghat Trust Fund Technical Committee, which manages a World Heritage Site in Mauritius, along with the *Visual Impact Assessment Training Module Guideline Document* for the same client.

DECLARATION OF INDEPENDENCE

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF THE SPECIALIST, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Tharisa Mine Additional Waste Rock Dumps Project - Visual Impact Assessment Report

Specialist Company Name:	Graham Young Landscape Architect			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100%
Specialist name:	Graham Albert Young			
Specialist Qualifications:	BL (Toronto), ML (Pretoria)			
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Physical address:	608 Leyds Street, Muckleneuk, 0002			
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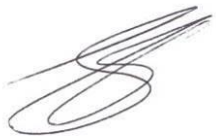
E-mail:	grahamyounglandarch@gmail.com			

I, Graham Albert Young declare that –

- I act as the independent specialist in this application.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- I declare that there are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the Act, Regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation forty-eight and is punishable in terms of section 24F of the Act.



Signature of the Specialist

Graham Young Landscape Architect

Name of Company:

06 June 2022

Date

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PROTECTION OF PERSONAL INFORMATION ACT

In compliance with the Protection of Personal Information Act, No. 37067 of 26 November 2013, please ensure the following:

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- All documentation containing personal information must be destroyed as soon as the purpose for which the information was collected has run out.

SPECIALIST REPORTING REQUIREMENTS

Specialist Reporting Requirements According to Appendix 6 of the National Environmental Management Act (Act 107 of 1998), Environmental Impact Assessment Regulation 2014 (as amended on 7 April 2017)	
Requirement	**Relevant section in report**
Details of the specialist who prepared the report	Pg iii and Appendix B
The expertise of that person to compile a specialist report including a curriculum vitae	Pg iii and Appendix B
A declaration that the person is independent in a form as may be specified by the competent authority	Pg iv
An indication of the scope of, and the purpose for which, the report was prepared;	Section 1.3 and 1.4
An indication of the quality and age of base data used for the specialist report;	Section 1.5
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 8.4, 10 and 11
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 1.4 and 3.2
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 3.2
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	Section 6
An identification of any areas to be avoided, including buffers	N/A
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;	Figure 5
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.5
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Sections 8 and 10
Any mitigation measures for inclusion in the EMPr;	Section 9
Any conditions for inclusion in the environmental authorisation	Section 9
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 10
A reasoned opinion whether the proposed activity, activities or portions thereof should be authorised regarding the acceptability of the proposed activity or activities; and	Section 12

If the opinion is that the proposed activity, or activities or portions thereof should be authorised, any avoidance, management, and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	Section 9
A description of any consultation process that was undertaken during the carrying out the study	N/A this activity is being conducted by SLR
A summary and copies of any comments that were received during any consultation process	N/A this activity is being conducted by SLR
Any other information requested by the competent authority.	N/A

ACRONYMS, ABBREVIATIONS AND GLOSSARY

Acronyms & Abbreviations	
BAR	Basic Assessment Report
ESIA	Environmental and Social Impact Assessment
EMPr	Environmental Management Programme
ECO	Environmental Control Officer
GYLA	Graham Young Landscape Architect
MRA	Mining Rights Area
ROM	Run of Mine
SACLAP	South African Council for the Landscape Architectural Profession
SLR	SLR Consulting (South Africa) (Pty) Ltd
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment
WRD	Waste Rock Dump

Glossary	
Aesthetic Value	Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace the sound, smell and any other factor having a strong impact on human thoughts, feelings, and attitudes (Ramsay, 1993). Thus, aesthetic value encompasses more than the seen view, visual quality, or scenery, and includes atmosphere, landscape character, and sense of place (Schapper, 1993).
Aesthetically significant place	A formally designated place visited by recreationists and others for the express purpose of enjoying its beauty. For example, tens of thousands of people visit Table Mountain on an annual basis. They come from around the country and even from around the world. By these measurements, one can make the case that Table Mountain (a designated National Park) is an aesthetic resource of national significance. Similarly, a resource that is visited by large numbers who come from across the region has regional significance. A place visited primarily by people whose place of origin is local is of local significance. Unvisited places either have no significance or are "no trespass" places.

Aesthetic impact	Aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Mere visibility, even startling visibility of a project proposal, should not be a threshold for decision making. Instead, a project, by its visibility, must interfere with or reduce (i.e. visual impact) the public's enjoyment and/or appreciation of the appearance of a valued resource e.g. cooling tower blocks a view from a National Park overlook (after New York, Department of Environment 2000).
Cumulative Effects	The summation of effects that result from changes caused by development in conjunction with the other past, present, or foreseeable actions.
Landscape Character	The individual elements that make up the landscape, including prominent or eye-catching features such as hills, valleys, woods, trees, water bodies, buildings, and roads. They are quantifiable and can be easily described.
Landscape Impact	Landscape effects derive from changes in the physical landscape, which may give rise to changes in its character and how this is experienced (Institute of Environmental Assessment & The Landscape Institute 1996).
Study area	For this report, this project the study area refers to the proposed project footprint/project site as well as the 'zone of potential influence' (the area defined as the radius about the centre point of the project beyond which the visual impact of the most visible features will be insignificant) which is a 5,0km radius surrounding the proposed project footprint/site.
Project Footprint / Site	For this report, the Project *site*/*footprint* refers to the actual layout of the project as described.
Sense of Place (genius loci)	Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. *A genius locus means* 'spirit of the place.'
Sensitive Receptors	Sensitivity of visual receptors (viewers) to a proposed development.
Viewshed analysis	The two-dimensional spatial pattern created by an analysis defines areas, which contain all observation sites from which an object would be visible. The basic assumption for preparing a viewshed analysis is that the observer eye height is 1,8m above ground level.
Visibility	The area from which project components would potentially be visible. Visibility depends upon general topography, aspect, tree cover, or other visual obstruction, elevation, and distance.
Visual Envelope	A visual envelope is established through a viewshed analysis, to define the extent of visual influence of a Project.
Visual Exposure	Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion and visual acuity, which is also influenced by weather and light conditions.
Visual Impact	Visual effects relate to the changes that arise in the composition of

	available views because of changes to the landscape, to people's responses to the changes, and the overall effects concerning visual amenity.
Visual Intrusion	The nature of intrusion of an object on the visual quality of the environment resulting in its compatibility (absorbed into the landscape elements) or discord (contrasts with the landscape elements) with the landscape and surrounding land uses.
Visual absorption capacity	Visual absorption capacity is defined as the landscape's ability to absorb physical changes without transforming its visual character and quality. The landscape's ability to absorb change ranges from low-capacity areas, in which the location of the activity is likely to cause a visual change in the character of the area, to high-capacity areas, in which the visual impact of the development will be minimal (Amir & Gidalizon 1990).
Worst-case Scenario	The principle applied where the environmental effects may vary, for example, seasonally to ensure the most severe potential effect is assessed.
Zone of Potential Visual Influence	By determining the zone of potential visual influence, it is possible to identify the extent of potential visibility and views which could be affected by the proposed development. Its maximum extent is the radius around an object beyond which the visual impact of its most visible features will be insignificant primarily due to distance.

EXECUTIVE SUMMARY

Project Overview

Graham Young Landscape Architect was commissioned by SLR Consulting (South Africa) (Pty) Ltd to conduct a Visual Impact Assessment (VIA) of the proposed Tharisa Mine Additional Waste Rock Dumps (WRDs) project ("the Project"). The VIA focuses on the potential impact of the physical aspects of the proposed WRDs (i.e. form, scale, and bulk) and their potential impact within the local landscape and receptor context. It forms part of the application that Tharisa Minerals (Pty) Ltd (Tharisa) is making to the Department of Mineral Resources and Energy (DMRE) for an integrated Environmental Assessment (EA) and update of the mine's current EMPr.

Project background, site, and study area

The Project site is in the mining belt immediately south of Marikana, approximately 20km east of Rustenburg, North West Province, on the farms 342 JQ and Elandsdrift 467 JQ, south of the Marikana Town, in the North West Province.

Mining is undertaken in two mining sections, namely the East Mine and West Mine, using conventional open pit truck and shovel methods. The two mining sections are separated by the perennial Sterkstroom River and the D1325 (Marikana Road). Waste rock from the open pit areas is stockpiled on Waste Rock Dumps (WRDs) and some in-pit dumping of waste rock has taken place at the East Mine. Key existing mine infrastructure includes haul roads, run-of-mine, a concentrator complex, various product stockpiles, topsoil stockpiles, WRDs, tailings storage facilities (TSFs) and supporting infrastructure such as offices, workshops, change house and access control facilities. As part of its on-going mine planning, Tharisa has identified the need for additional waste rock storage on site. The following activities are now proposed:

- The expansion of the existing and approved Far West WRD 1 by a footprint of 109 ha. The expanded area will be referred to as the West Above Ground (West OG) WRD. Portions of the West OG WRD will be located on backfilled areas of the West Pit; and
- The establishment of a waste rock dump (referred to as the East OG WRD) on backfilled portions of the East Pit. The proposed East OG WRD will cover an area of approximately 72 ha.

The study area for the Project is 10km[1] about the centre of the Mining Rights Area (MRA). Refer to Figure 1.

Objective of the specialist study

The study's main aim is to ensure that the visual/aesthetic consequences of the proposed Project are understood. Therefore, the report aims to identify the landscape characteristics of the study area (landscape context) and visually sensitive areas or receptors. It also identifies the significance of visual impacts and potential mitigation measures.

[1] The extent of the study area is determined by the zone of potential influence, which in this study relates to a radius of 10,0km around the Project sites. At 10,0km and beyond the development would recede into background views and or be screened by topography, vegetation or existing or proposed (approved) power infrastructure. It should also be noted that the 2015 Assessment Reports (Golder 2015) also recommended a 10km study area for the project.

Terms of Reference

A specialist study is required to establish the visual baseline and to identify potential visual impacts arising from the Project based on the general requirements of a Level 3 assessment[2] (Oberholzer 2005:19). The following terms of reference was established:

- Identification of issues raised in scoping phase, and site visit (the site visit was conducted on 27 April 2022
- Description of the receiving environment (landscape context) and the proposed project
- Establishment of view catchment area, view corridors, viewpoints and receptors
- Indication of potential visual impacts using established criteria
- Inclusion of potential lighting impacts at night
- Description of alternatives, mitigation measures and monitoring programmes.

Assumption, Uncertainties, and Limitations

The following assumptions limitations have been made in the study:

- The description of project components is limited to what has been supplied to the author before this report's completion date.
- The basic simulations are indicative and used to illustrate the location, scale and bulk of the proposed WRDs.
- The viewshed modelling assumes that at closure, bulking will occur, and some residual material will remain above natural ground level at the locations of the existing and proposed WRD sites, as well as above the two open pits. The offset used in the modelling is 10m.
- No alternative sites have been proposed.
- Site photos were taken at the end of summer and did not reflect the complete landscape character of the area as experienced through all seasons. However, due to the disturbed nature of the study area, this is not a major concern in assessing potential visual impacts.

Findings

The existing visual condition of the landscape that may be affected by the proposed Project has been described. The study area's scenic quality has been rated *low* within the context of the sub-region, and sensitive viewing areas and landscape types were identified and mapped, indicating potential receptor sensitivity to the project from properties immediately adjacent to the mine. Project sites are in a landscape rated *low*.

Impacts on views are the highest when receptors are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the changes to the landscape. It is anticipated that a few I&APs would be sensitised to the Project.

The Project will introduce a land use currently occurring in the sub-region and within the mine itself and will cause a minor loss and alteration to the baseline's key features and characteristics. The pre-development landscape and views will be affected, but in a minor way, through the introduction of elements considered

[2] i.e. a Category 5 development (Mining Activities) on Disturbed or degraded sites is expected to have a moderate visual impact. Projects with a moderate visual impact expected require a Level 3 visual assessment.

characteristic when set within the attributes of the receiving landscape. Low visual and sense of place impacts would result.

Impacts assessed to have a LOW significance would occur in the operation phase, be long-term, and cause a minor loss of landscape and visual resources. The unmitigated impact would be localized, extending beyond the site boundary and affect neighbours.

Mitigation measures cannot significantly reduce the visual impact of the Project, however, mitigation, including good house-keeping, should be rigorously applied and maintained throughout the life of the mine and during closure to ensure the long-term reduction of potential residual impacts and feasibility of rehabilitation efforts.

Cumulative Effects

The proposed Project would have a moderate cumulative effect with respect to existing mining activities due to the intervisibility of the proposed WRDs with existing WRDs and other mining infrastructure.

Opinion of the author

The author believes that the Project would cause a minor change to the visual environment and sensitive receptor locations. The Project should be approved provided that the mitigation/management measures are effectively implemented and managed in the long-term.

*** GYLA ***

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1. INTRODUCTION

1.1 Project Overview

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The study area for the Project is 10km[3] about the centre of the Mining Rights Area (MRA). Refer to Figure 1.

1.3 Objective of the Specialist Study

The study's main aim is to ensure that the visual/aesthetic consequences of the proposed Project are understood. Therefore, the report aims to identify the landscape characteristics of the study area (landscape context) and visually sensitive areas or receptors. It also identifies the significance of visual impacts and potential mitigation measures.

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- The worst-case scenario, i.e. when all WRDs are at their designed height, was modelled
- No alternative sites have been proposed.
- Site photos were taken at the end of summer and did not reflect the complete landscape character of the area as experienced through all seasons. However, due to the disturbed nature of the study area, this is not a major concern in assessing potential visual impacts.

[4] i.e. a Category 5 development (Mining Activities) on Disturbed or degraded sites is expected to have a moderate visual impact. Projects with a moderate visual impact require a Level 3 visual assessment.

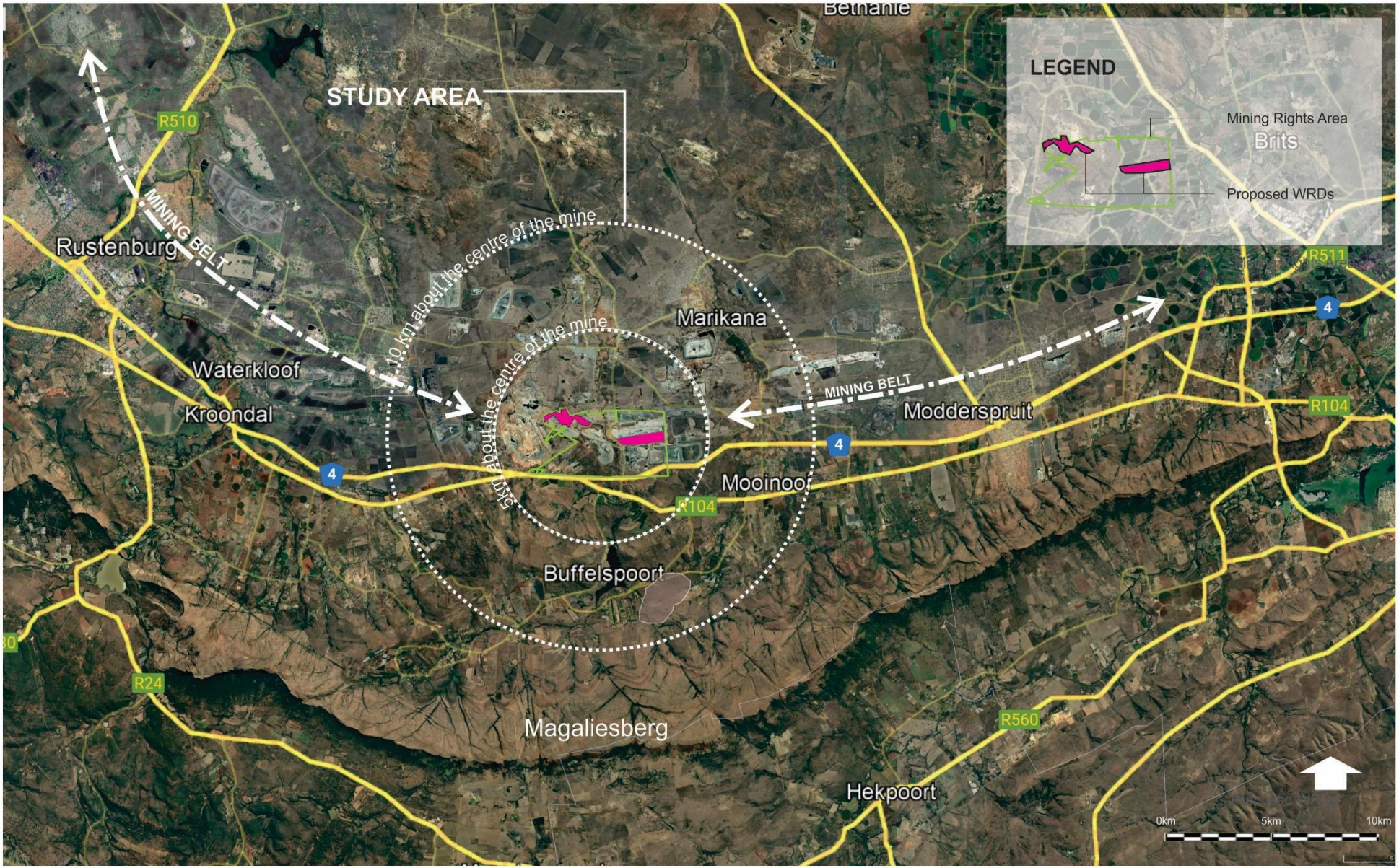

Figure 01: LOCALITY - Tharisa Mine: Additional Waste Rock Storage Project

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Graham A Young
Landscape Architect
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2. LEGAL REQUIREMENTS AND GUIDELINES

This report adheres to the following legal requirements and guideline documents.

2.1 National Legislation and Guidelines

National Environmental Management Act (Act 107 of 1998), EIA Regulations

The specialist report is in accordance with the specification on conducting specialist studies as per Government Gazette (GN) R 982 of the National Environmental Management Act (NEMA) Act 107 of 1998. The mitigation measures as stipulated in the specialist report can be used as part of the Environmental Management Programme (EMPr) and will be in support of the Environmental Impact Assessment (EIA) and Appendix 6 of the EIA Regulations 2014, as amended on 7 April 2017.

Western Cape Department of Environmental Affairs & Development Planning: Guideline for Involving Visual and Aesthetic Specialists in EIA Processes Edition 1 (CSIR, 2005)

Although the guidelines were compiled explicitly for the Province of the Western Cape[5], they provide appropriate guidance for any EIA process. The Guideline document also seeks to clarify instances when a visual specialist should get involved in the EIA process.

[5] The Western Cape Guidelines are the only official guidelines for visual impact assessment reports in South Africa and can be regarded as best practice throughout the country.

3. APPROACH AND METHODOLOGY

3.1 Approach

The assessment of likely effects on a landscape resource and visual amenity is complex since it is determined through a combination of quantitative and qualitative evaluations. When assessing visual impact, the worst-case scenario is considered. Landscape and visual assessments are separate, although linked, procedures. The landscape, its analysis, and the evaluation of impacts on the landscape all contribute to the visual impact assessment baseline. The potential impact on the landscape is assessed as an impact on an environmental resource, i.e. the physical landscape. On the other hand, visual impacts are assessed as one of the interrelated effects on people (i.e. the viewers and the result of an introduced object into a view or scene). Associated with these is the impact on the sense of place, a combination of the landscape impact and its potential effect on the senses, of which visual is a part.

3.1.1 The Visual Resource

Landscape character, landscape quality (Warnock & Brown 1998), and “sense of place” (Lynch 1992) are used to evaluate the visual resource, i.e. the receiving environment. A qualitative evaluation of the landscape is a subjective matter. In this study, the aesthetic evaluation of the study area is determined by the author's professional opinion based on on-site observations and the results of contemporary research in perceptual psychology (Schapper 1993, Ramsey (1993) and Crawford 1994).

Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response is usually to visual and non-visual elements and can embrace the sound, smell, and any other factor that strongly impacts human thoughts, feelings, and attitudes (Ramsay 1993). Thus, aesthetic value is more than the combined factors of the seen view, visual quality, or scenery. It includes atmosphere, landscape character, and sense of place (Schapper 1993). Refer also to Appendix A for further elaboration. Aesthetic value is not easy to measure, but it can be assumed that some places, such as declared nature reserves by their very definition, evoke emotional connections with the land due to the already defined importance of the area, i.e. that it is declared a nature reserve and by implication is, therefore, worth saving in its most pristine condition.

Studies for perceptual psychology have shown a human preference for landscapes with higher visual complexity, for instance, scenes with water or topographic interest. Based on contemporary research, landscape quality increases where:

- Topographic ruggedness and relative relief increase.
- Water forms are present.
- Diverse patterns of grassland and trees occur.
- Natural landscape increases and man-made landscape decreases.
- Where land use compatibility increases (Crawford 1994).

Aesthetic appeal (value) is, therefore, considered high when the following are present (Ramsay 1993):

- Abstract qualities: such as the presence of vivid, distinguished, uncommon, or rare features or abstract attributes.
- Evocative responses: the ability of the landscape to evoke particularly strong responses in community members or visitors.
- Meanings: the existence of a long-standing special meaning to a group of people or the ability of the landscape to convey meanings to viewers in general.
- Landmark quality: a feature that stands out and is recognized by the broader community.

And conversely, it would be low where:

- Limited patterns of grasslands and trees occur.
- Natural landscape decreases, and man-made landscape increases, causing significant contrast/discord between the natural and cultural landscape.
- And where land use compatibility decreases (Crawford 1994).

In determining the quality of the visual resource for the project site, both the objective and the subjective or aesthetic factors (determined by the specialist) associated with the landscape are considered. Many landscapes can be said to have a keen sense of place, regardless of whether they are scenically beautiful. However, where landscape quality, aesthetic value, and a powerful sense of place coincide, the visual resource or perceived value of the landscape is extremely high. The criteria given in Appendix A are used to assess landscape quality, sense of place and to determine the aesthetic value of the study area.

3.1.2 Sensitivity of Visual Resource

The sensitivity of a landscape or visual resource is the degree to which a landscape type or area can accommodate change arising from development without detrimental effects on its character. Its determination is based on evaluating each essential element or characteristic of the landscape likely to be affected. The evaluation will reflect such factors as its “quality, value, contribution to landscape character, and the degree to which the particular element or characteristic can be replaced or substituted” (LiEMA 2013). Landscape sensitivity, therefore, relates to the nature and character of the study area’s landscape to the potential to accept change (VAC) caused by the proposed development.

3.1.3 Sense of Place

Central to the concept of a sense of place is that the landscape requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape and the cultural transformations and traditions associated with the historical use and habitation of the area. According to Lynch (1992), a sense of place is how a person can recognize or recall a place as being distinct from other places – as having a vivid, unique, or at least particular, character of its own. Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. In some cases, the values allocated to the place are similar for a wide spectrum of users or viewers, giving the place a universally recognized and, therefore, strong sense of place.

The study area’s sense of place is derived from the emotional, aesthetic, and visual response to the environment, and, therefore, it cannot be experienced in isolation. The landscape context must be

considered. The combination of the natural landscape together with the man-made structures and features contributes to the sense of place in the study area. This combination defines the study area and establishes its visual and aesthetic identity.

3.1.4 Sensitive Receptors

The sensitivity of visual receptors and viewing areas is dependent on the location and context of the viewpoint, the expectations and occupation or activity of the receptor, or the importance of the view, which may be determined by its popularity or numbers of people affected, its appearance in guidebooks, on tourist maps, and in the facilities provided for its enjoyment and references to it in literature or art. Typically, sensitive receptors may include ((LiEMA 2013):

- Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape i.e. nature reserves.
- Communities where development results in adverse changes in the landscape setting or valued views enjoyed by the community.
- Occupiers of residential/tourist properties with views negatively affected by the development i.e. game lodges.
- People travelling through recognized nature reserves or areas of declared scenic beauty (i.e. tourist routes)

Viewing areas, typically from residences and tourist facilities/routes are typically the most sensitive since views from within these areas are potentially frequent and of long duration.

Other less sensitive receptors include:

- People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value).
- People travelling through or past the affected landscape in cars or other transport modes, other than recognized areas of scenic beauty.
- People at their place of work.

Refer also to Box 11 Oberholzer 2005:27.

For a detailed description of the methodology to determine the value of a visual resource, refer to Appendix A. Image 1 below, graphically illustrates the visual impact process used in this project.

3.1.5 Landscape Effects

The landscape impact of a proposed development is measured as the change to the fabric, character, and quality of the landscape as a resource caused by the physical presence of the proposed development (LiIEMA 2013:35). Identifying and describing the nature of change in the landscape brought about by the proposed new development is based on the professional opinion of the author, supported by photographic simulations. It is imperative to depict the change to the landscape in as realistic a manner as possible (Van Dortmont in Lange, 1994) and to identify and describe and illustrate visual effects. To do this, photographic panoramas were taken from critical viewpoints and altered using computer simulation techniques to represent the physical nature of the proposed Project in its final form within the context of the landscape setting. The resultant change to the landscape is then observable and an assessment of the anticipated

visual intrusion can be made.

3.1.6 Visual Effects

Visual impacts are a subset of landscape impacts and are the effects on views and visual amenities (LiIEMA 2013:35). Visual impacts relate to the changes that arise in the composition of available views because of changes to the landscape, people's responses to the changes, and the overall effect concerning visual amenity. Visual impact is therefore measured as the change to the existing visual environment (i.e. views) caused by the intervention and the extent to which that change compromises (negative impact) or enhances (positive impact) or maintains the visual quality of the scene as perceived by people visiting, working or living in the area. This approach reflects the layman's concerns, which are:

- Will I be able to see the new development?
- What will it look like?
- Will the development affect views in the area, and if so, how?

Landscape and visual impacts do not necessarily coincide. Landscape impacts can occur in the absence of visual impacts. For instance, a development is screened from available public views but nonetheless results in a loss of landscape elements and character within a localized area (the site and its immediate surroundings).

3.1.7 *Intensity* of Visual Impact

The intensity of visual impact is determined using visual intrusion, visibility, and visual exposure criteria (Hull, R.B. and Bishop, I.E., 1988), qualified by viewers' sensitivity (visual receptors) towards the proposed development. The intensity of visual impact is therefore concerned with:

- The overall impact on the visual amenity, which can range from degradation through to enhancement.
- The direct impacts of the development upon views of the landscape through intrusion or obstruction.
- The reactions of viewers who may be affected.

3.1.8 Significance of Visual Impact

As supplied by the Environmental Practitioner (SLR), a combined quantitative and qualitative methodology was used to describe the significance of impacts. Significance of impact is rated because of impact X the *probability* of the impact occurring. The consequence is determined using intensity, spatial scale, and duration criteria. A summary of each qualitative description and the equivalent quantitative rating scale is given in Annexure C.

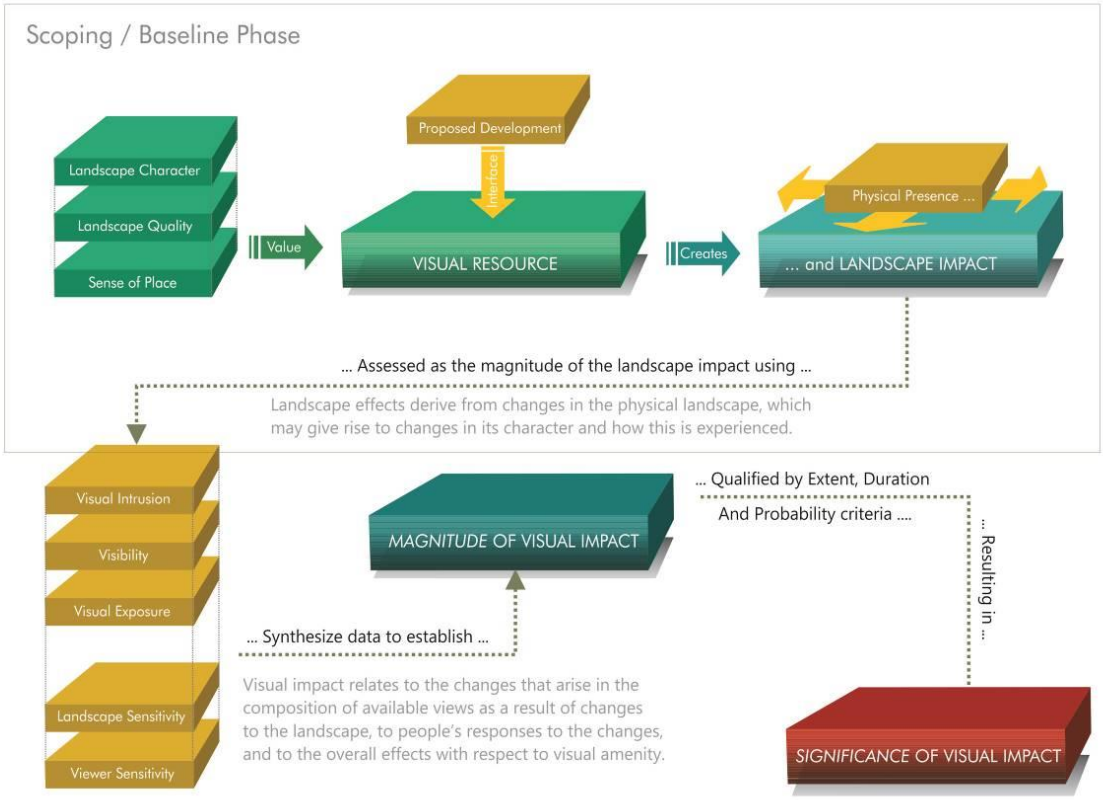

Image 1: Visual Impact Process

3.2 Methodology

The following method was used:

- Site visit: A field survey was undertaken on 27 April 2022, when the study area was visited to the extent that the receiving environment could be documented and adequately described. The climate conditions were mostly sunny with some cloud cover. Refer to Figure 3 for the route travelled during the site visit.
- Project components: The physical characteristics of the project components were described and illustrated based on information supplied by SLR Background Information (May 2022).
- General landscape characterization: The description of the landscape focused on the nature of the land rather than a viewer's response.
- The sense of place of the study area was described as to its uniqueness and distinctiveness. The primary informant of these qualities was the spatial form and character of the natural landscape together with the cultural transformations associated with the historical/current use of the land.
- A significance of impacts on the visual environment of the proposed projects was identified.
- Measures to mitigate the negative impacts of the proposed project were recommended.

4. DESCRIPTION OF THE PROJECT

Figure 2 identifies the location of the proposed WRDs along with current mining activities i.e. open pits, WRDs, plant, ROM pad, mining contractor area and TSFs. The two proposed WRDs, West OG WRD (W OG WRD) and East OG WRD (E OG WRD) activities are the focus of the visual impact assessment.

4.1 Description of Activities – Overview of existing mining and processing operations

Tharisa currently operates the Tharisa mine, producing chrome and PGM concentrates and has been operational since 2008. Mining is undertaken in two sections, namely the East Mine and West Mine, using conventional open pit truck and shovel methods. The two mining sections are separated by the perennial Sterkstroom River and the D1325 (Marikana Road).

The mining method at Tharisa comprises a standard open pit truck and shovel method. Access to the mining face is by means of haul roads and boxcuts with ramps. Steady state open pit dimensions will differ between the east and west sections because of the varying dip of the target ore body. In the western section, the dimensions are expected to be 360 m wide, 1 km in length along the outcrop with a final high wall averaging at approximately 180 m. On the eastern section, the dimensions are expected to be 580 m wide, 1 km in length along the outcrop with a final high wall averaging at approximately 180 m.

4.2 Design of the proposed WRDs

Waste rock will be used to backfill the open pits and then the two proposed WRDs (i.e. W OG WRD and E OG WRD) will be established to a heigh of approximately 70m above the pits as illustrated in Figure 2 (SLR 2022).

The management of residue stockpiles and deposits must be undertaken in accordance with Regulations regarding the Planning and Management of Residue Stockpiles and Residue Deposits (GN 632 of 2015, as amended). In this regard, the physical design features of the proposed WRD's are presented in Table 1 (SLR 2022).

Table 1: Design Features of the proposed WRDs

Feature	Detail
Physical dimensions	**Height:** Approximately 70 m (applies to all proposed WRD's) **Bench height:** Approximately 15 m **Footprint:** West OG WRD: Approximately 109 ha; and East OG WRD: Approximately 72 ha. **Maximum storage capacity:** West OG WRD: Approximately 35.31 million m^3; and East OG WRD: Approximately 26.26 million m^3.
Waste rock transport and deposition	Excess open pit waste rock loaded onto mine dump trucks and transported to WRDs. Waste rock access ramps constructed with a maximum gradient of 1V:7H (8°) for mine dump trucks. Waste rock is then dumped and spread / flattened with a bulldozer.

Feature		Detail
Diversion of clean water		Stormwater diversion trenches will be established to divert clean surface run-off from the surrounding area away from the WRD to prevent the contamination of clean water.
Topsoil stripping		Topsoil in WRD footprint areas will be stripped and stockpiled in accordance with the topsoil conservation guide. A stripping depth of 500 mm has been recommended by the soils study. Stripping and stockpiling of topsoil will be done in advance of dumping.
Side slopes		Average slope: 1V:3H
Access and access control		A 4m wide waste rock road will be constructed around the perimeter of each dump for routine inspections and maintenance. A perimeter fence around each WRD is planned.
Dust control		Operational Phase: Watering of roads for dust suppression. Post Operational Phase: No measures necessary due to the coarse particle size distribution.
Closure		The WRD should be shaped to ensure the area is free draining (i.e. no ponding of water on the top surface post closure). The WRD side slopes to be confirmed through on-going field trails. The WRD should be capped with a minimum of 300 mm soil/growth medium material. The capping thickness should be confirmed through on-going field trails.
Rehabilitation	Revegetation	The WRD is to be revegetated using a mix of indigenous grasses (i.e. dry seeding) and trees/shrubs (i.e. hand planting of seedlings). The vegetation species will be confirmed through ongoing field trials.
	Erosion control	The erosion management measures and/or mitigation measures to be confirmed through ongoing field trials.
	Maintenance and aftercare	Maintenance and aftercare period to be confirmed through ongoing field trials.
	Rehabilitation success criteria	Rehabilitation success will be determined by monitoring trends in soil nutrient levels, soil microbial levels, vegetation cover and vegetation biodiversity levels and comparing data and temporal trends in the data to numerical targets.

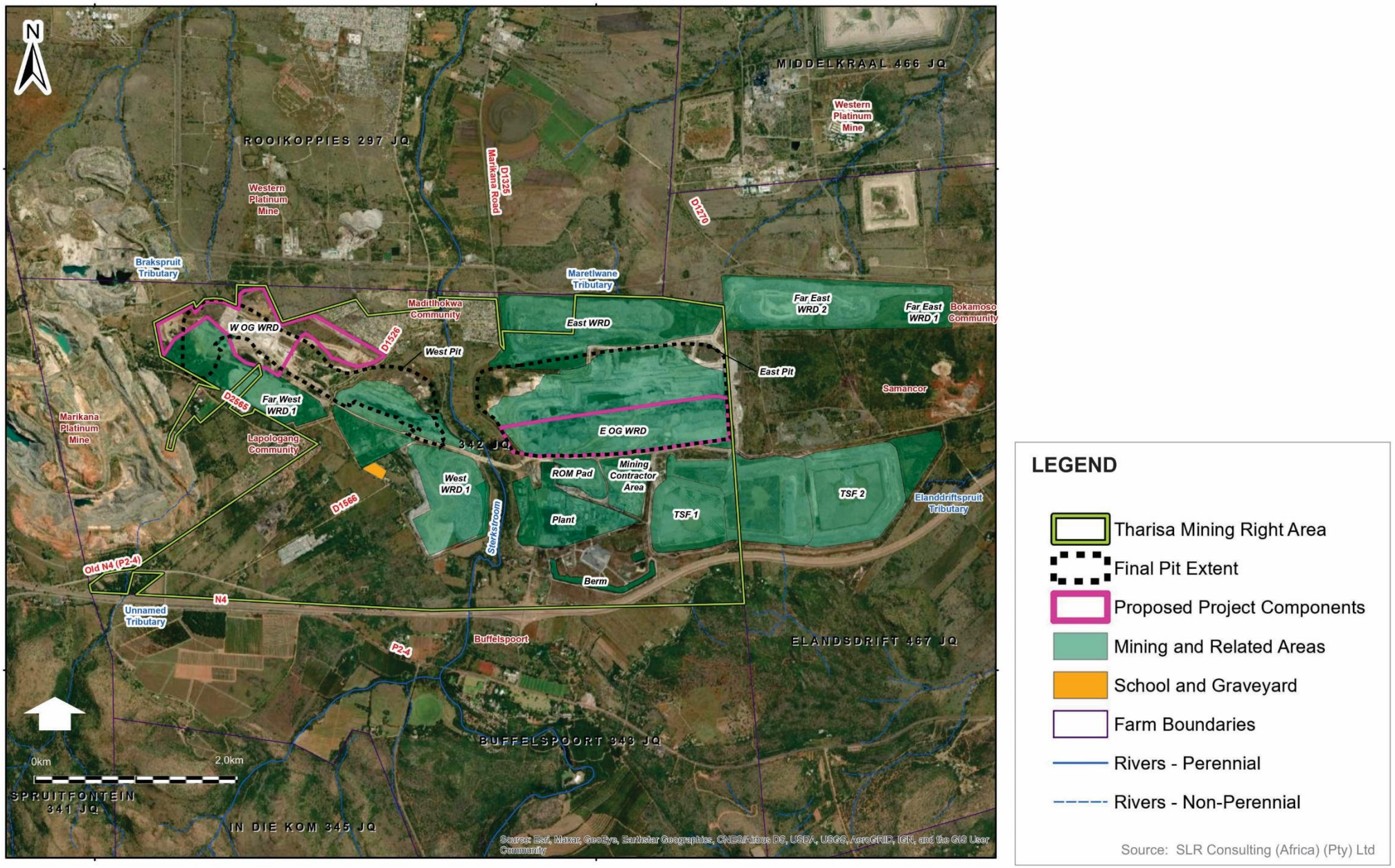

Figure 02: LAYOUT - Tharisa Mine: Additional Waste Rock Storage Project

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5. ENVIRONMENTAL SETTING

5.1 Landscape Character

Tharisa mine is in the mining belt that stretches from north west of Rustenburg through to Brits (Figure 1) and the Project's WRD's are in the mine's MRA adjacent to existing mining infrastructure and WRDs.

The landscape character of the study is therefore dominated by mining infrastructure as indicated in Figure 3. Mining activities occur to the north, and immediate west and east of Tharisa Mine. Amongst the mining activities north of the mine is open land mostly owned by mining companies and the community of Marikana. Immediately north of the mine, in the MRA, is the Maditihokwa Community. And east of the MRA is community.

Immediately south of the MRA, between it and the N4 road, are nine homesteads and the Lapologang community, with its associated primary school. The eastern section of Lapologang is in the MRA. All homesteads except one, located south west of the mine, occur within the MRA. Refer also to Figure 5 for the location of the residential areas.

South of the N4 is cultivated agricultural lands and open land, which extends to the Magaliesberg.

The panoramas (viewing locations indicated in Figure 3) in Figures 4-1 to 4-4 illustrate the existing nature of the landscape from various viewing points about the Project WRDs.

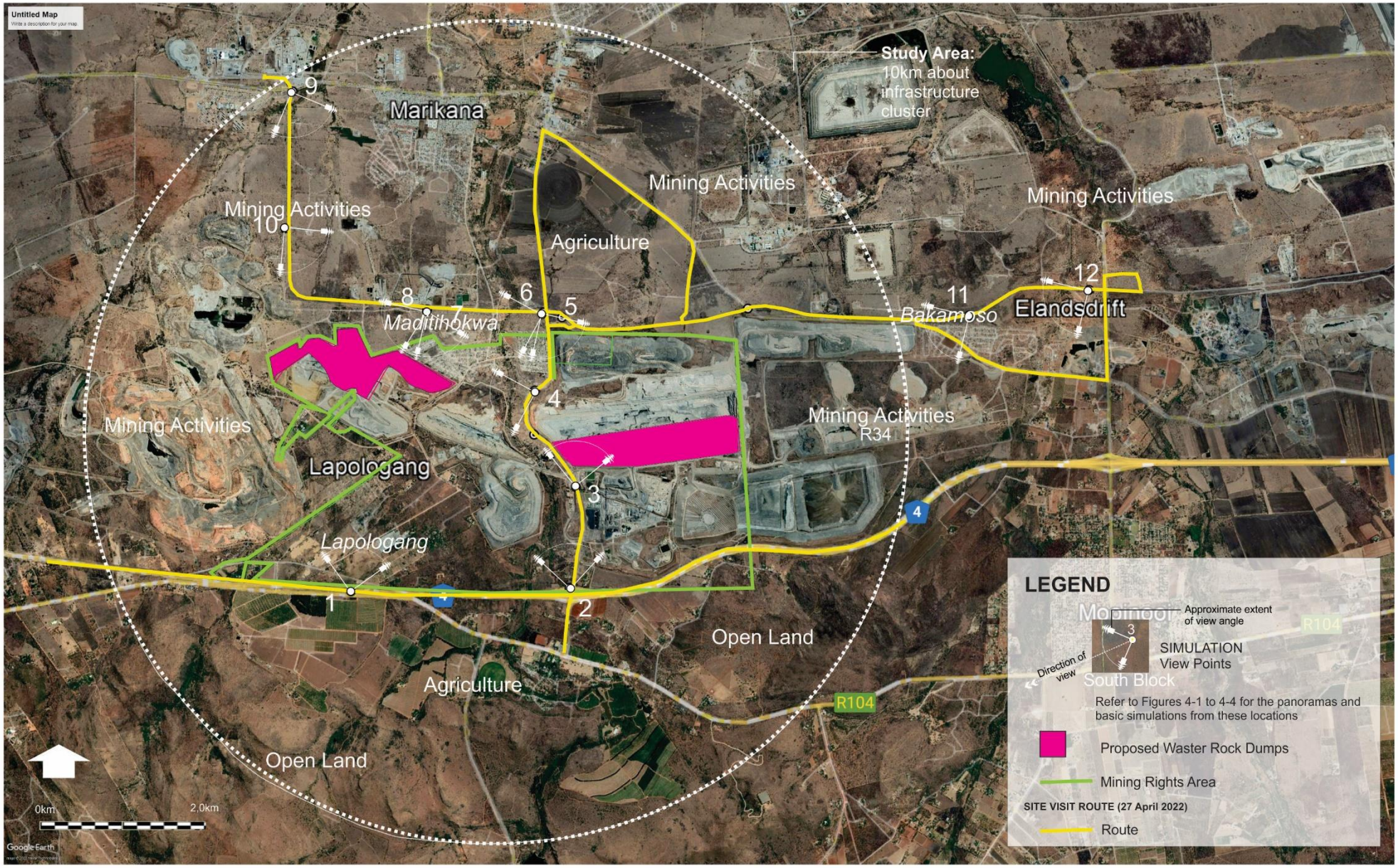

Figure 03: LANDSCAPE CONTEXT and VIEW SITES - Tharisa Mine

Refer to Figure 4-1 to 4-4 for panoramas

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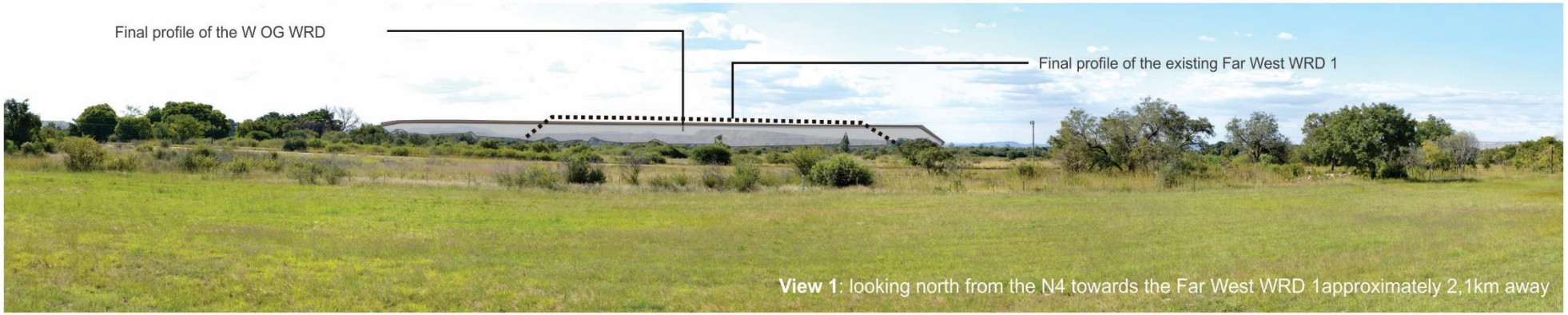

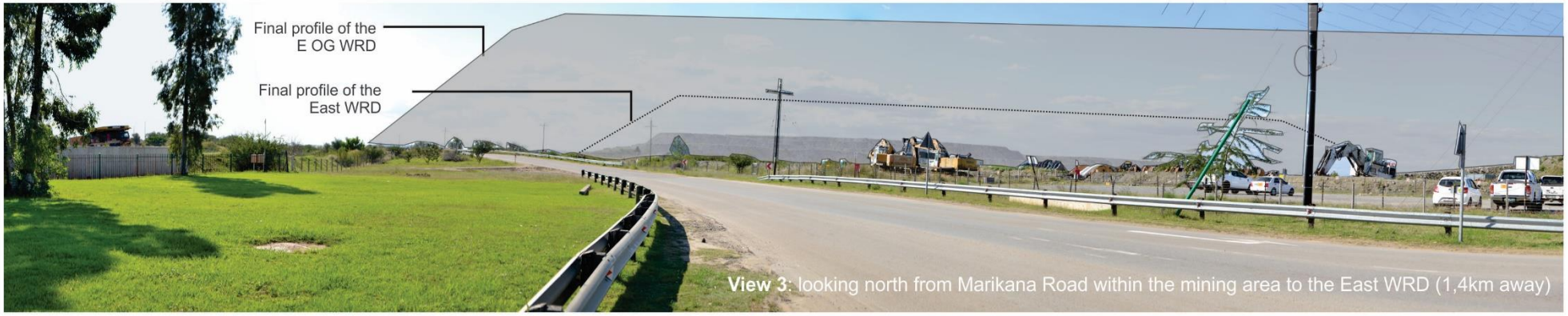

Figure 04-1: LANDSCAPE CHARACTER - Views 1, 2 and 3

Refer to Figure 3 for location of viewing points and Figure 2 for Project Layout: The basic simulations illustrate the worst case scenario before rehabilitation

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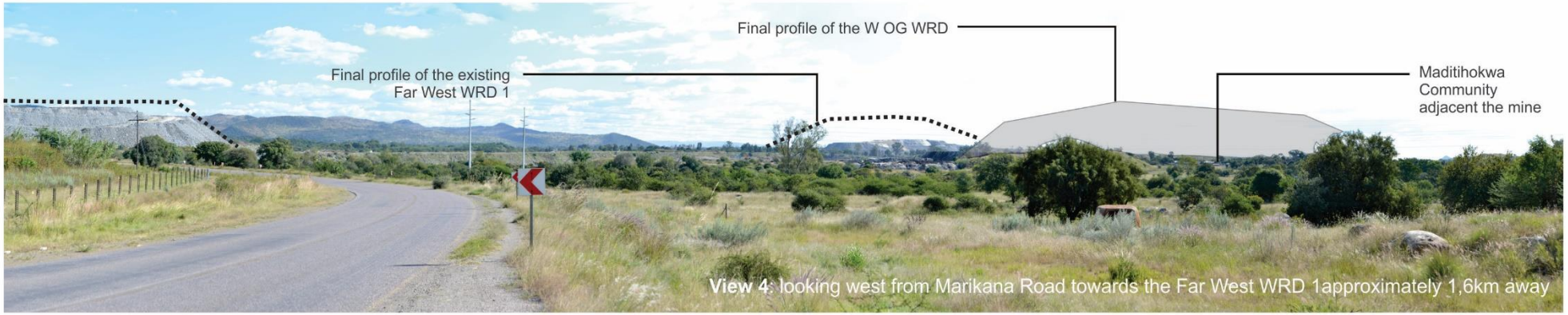

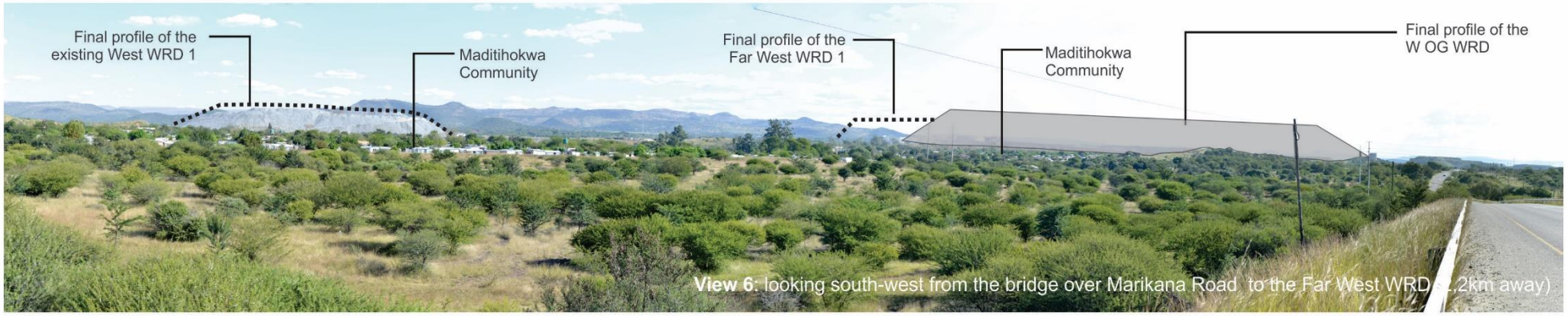

Figure 04-2: LANDSCAPE CHARACTER & SIMULATIONS - Views 4, 5 and 6

Refer to Figure 3 for location of viewing points and Figure 2 for Project Layout: The basic simulations illustrate the worst case scenario before rehabilitation

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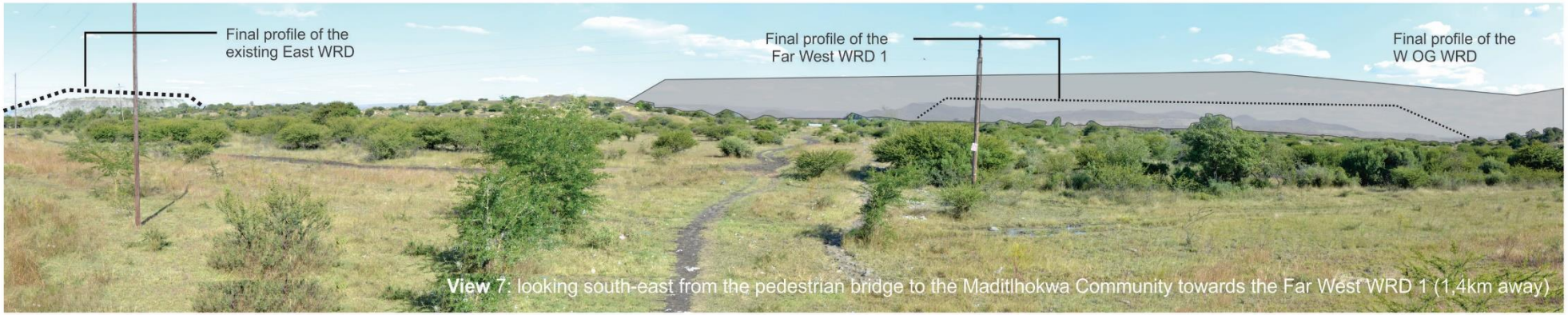

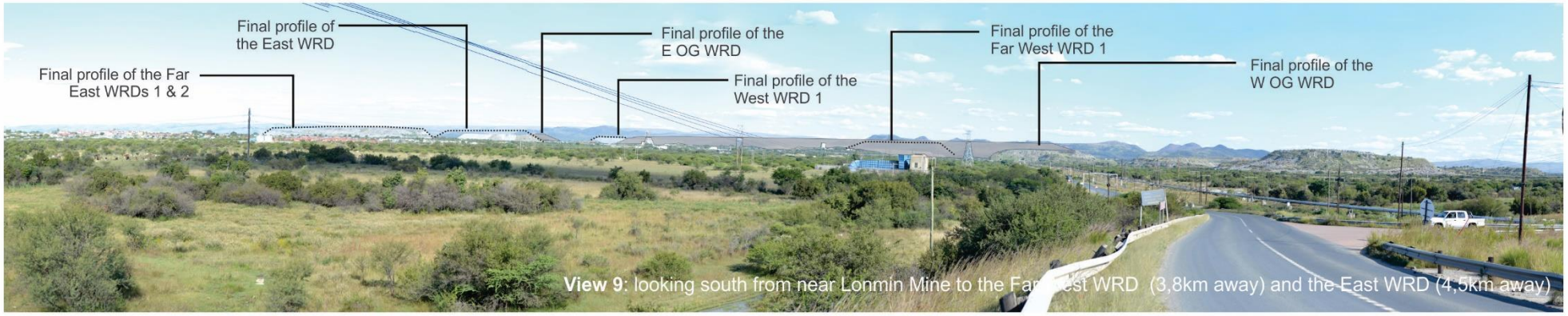

Figure 04-3: LANDSCAPE CHARACTER - Views 7, 8 and 9

Refer to Figure 3 for location of viewing points and Figure 2 for Project Layout: The basic simulations illustrate the worst case scenario before rehabilitation

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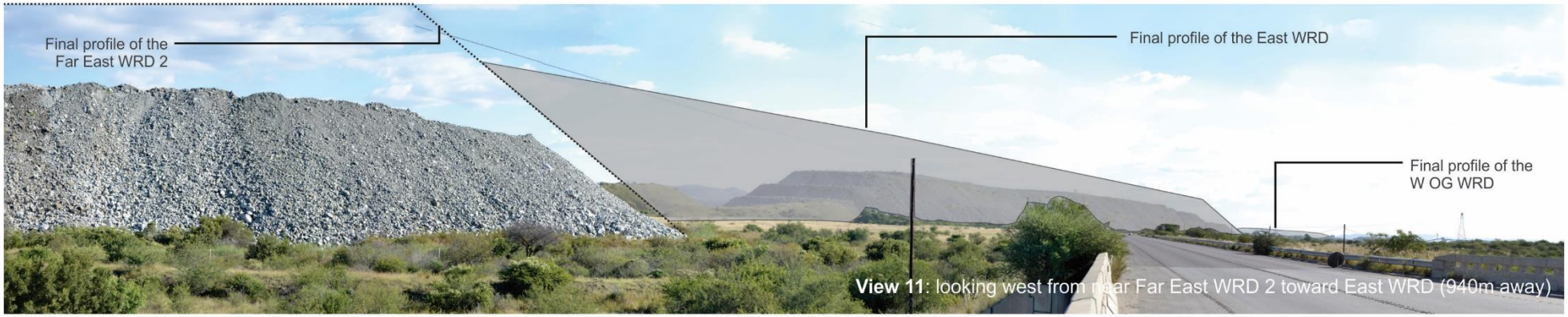

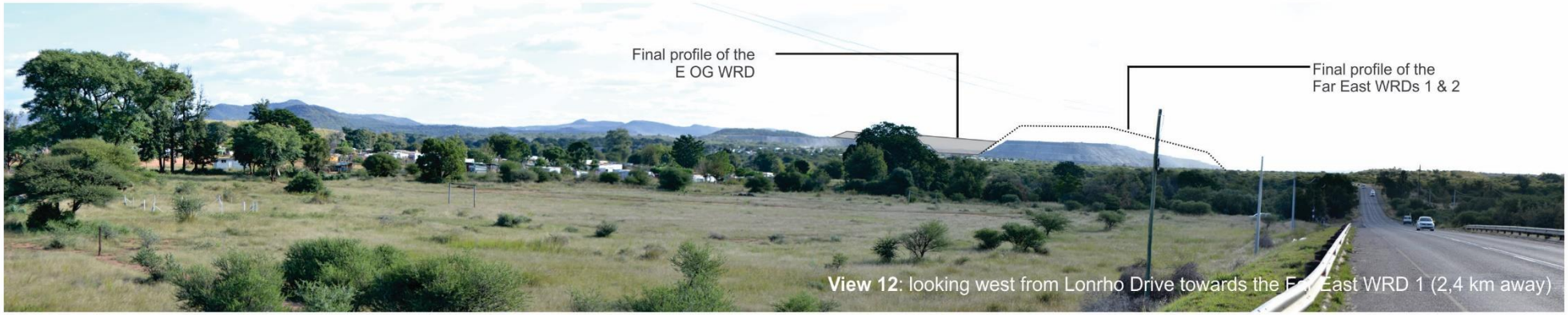

Figure 04-4: LANDSCAPE CHARACTER - Views 10, 11 and 12

Refer to Figure 3 for location of viewing points and Figure 2 for Project Layout: The basic simulations illustrate the worst case scenario before rehabilitation

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6. VISUAL RESOURCE AND SENSE OF PLACE

6.1 Visual Resource Value

The value of the visual resource and its associated scenic quality (using the scenic quality rating criteria described in Appendix A) attached to the landscape character areas described in Section 5 is determined through the value of "individual contributors to landscape character, especially key characteristics, which may include individual elements of the landscape, particular landscape features, notable aesthetic, perceptual or experiential qualities, and combinations of these contributors" (LiEMA 2013:89). These primary features give the area its typical characteristics and a sense of place. The panoramic views in Figures 4-1 to 4-10 illustrate this effect across the southern parts of the study area.

When the criteria listed in Appendix A are considered and understood within the context of the sub-region, a visual resource value of *low*. This value is dependent on the character (does it contribute to the area's sense of place and distinctiveness?); quality – in what condition is the existing landscape; Value – is the landscape valued by people, local community, visitors, and is the landscape recognised, locally, regionally, or nationally; and capacity – what scope is there for change (either negative or positive) in the existing landscape character? (LiEMA 2013). The Project WRDs occur within the mine and would therefore not be considered 'out of context' with the sub-region's main land-use types.

Whilst a few areas immediately south of the MRA and west of Marikana Road have some visual appeal and exhibit positive character, any long view (i.e. beyond the immediate surrounds of a residential property) from within these areas would be dominated by mining activities and would not be sensitive to change in general. Table 1 summarises the value of the visual resource of the study area 5,0km about the centre of the MRA.

Table 2: Value of the Visual Resource
(After LiEMA 2013)

High	Moderate	Low
	.	General for the MRA and the study area surrounding the mine
This landscape type is considered to have a *high* value because it is a: A distinct landscape that exhibits an extremely positive character with valued features that combine to give the experience of unity, richness, and harmony. It is a landscape that may be of particular importance to conserve, and which has a strong sense of place. Sensitivity:	This landscape type is considered to have a *moderate* value because it is a: A common landscape that exhibits some positive character, but which has evidence of alteration/ degradation/ erosion of features resulting in areas of more mixed character. Sensitivity: It is potentially sensitive to change in general and change may be	This landscape type is considered to have a *low* value because it is a: Minimal landscape, negative with few, if any, valued features. Sensitivity: It is not sensitive to change in general and scope for positive enhancement frequently occurs

High	Moderate	Low
It is sensitive to change in general and will be detrimentally affected if the change is inappropriately dealt with.	detrimental if inappropriately dealt with	

6.2 Sense of Place

According to Lynch (1992), a sense of place is how a person can recognize or recall a place as being distinct from other places - as having a vivid, unique, or at least particular, character of its own. The sense of place for the study area derives from the local landscape character types described above, their relative 'intactness,' and their impact on the senses. The mining activities and land use in the study area are expected within the sub-region as they are well established and form part of the mining belt north of the N4 national road.

The combination of the mining, agricultural, open land and communities, create the sense of place for the study area. It comprises a variety of land uses common to the sub-region resulting in a landscape that exhibits little positive character, due to major evidence of alteration and degradation of its original natural features. The resultant sense of place is weak and of mixed character.

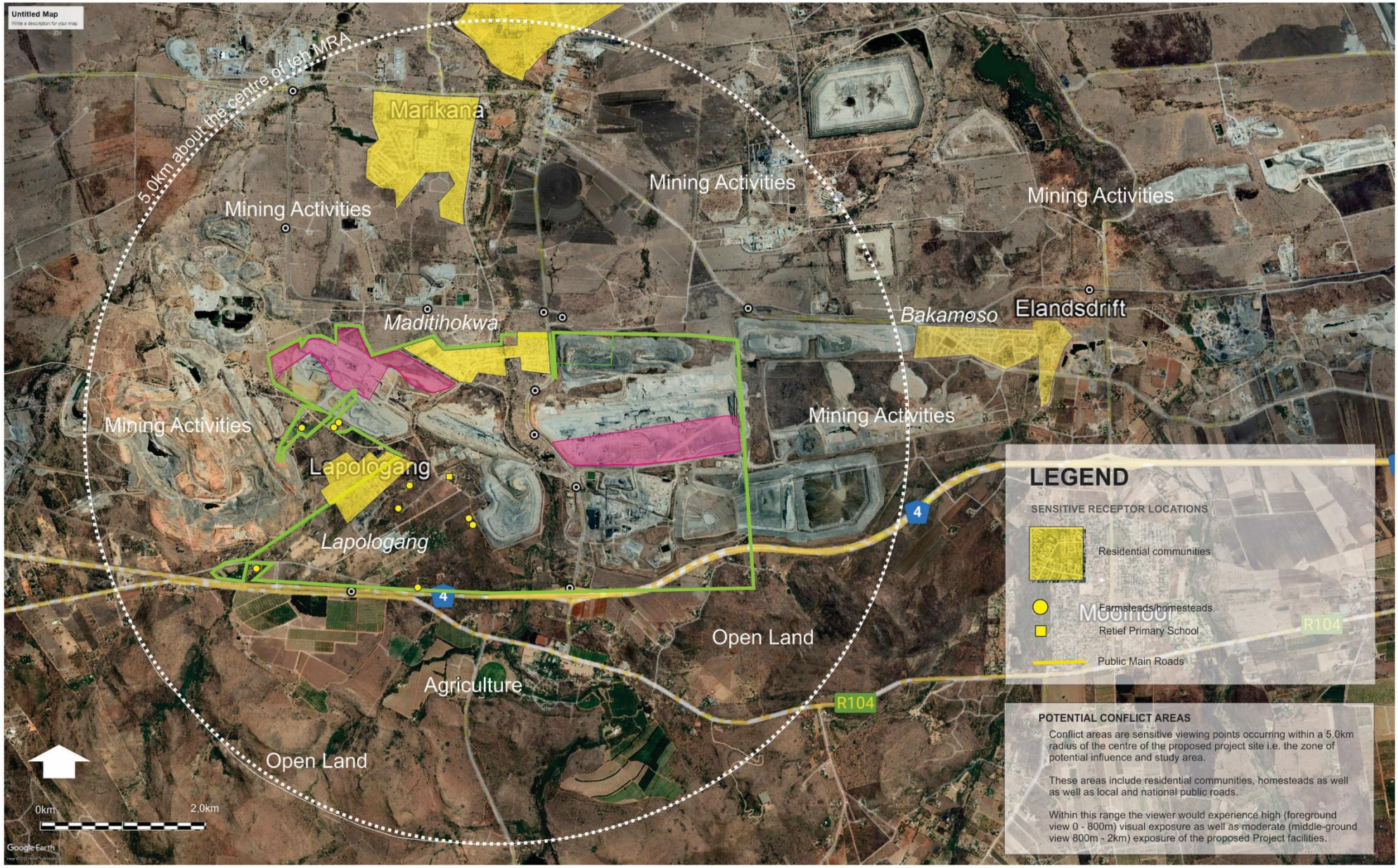

Figure 05: SENSITIVE RECEPTOR LOCATIONS - Tharisa Mine

Refer to Figure 4-1 to 4-4 for panoramas

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7. LANDSCAPE IMPACT

The proposed Project occurs in landscape rated low in visual resource value. The development of the WRDs within the MRA and immediately adjacent to current mining activities, will not cause major changes to the existing mixed character of the landscape described in Section 5.

In addition, due to the location of the proposed WRDs amongst approved WRDs that will grow to a height of seventy metres, the visual absorption capacity (VAC) of the visual environment is high i.e. the existing and future landscape's ability to absorb physical changes caused by the project without transforming its visual character and is high.

The landscape impact is rated low**.**

8. INTENSITY OF VISUAL IMPACT

It has been established that the landscape impact of the proposed project would be low and, according to the terms of reference derived from Oberholzer (2005), visual impacts that may occur are likely to be moderate to low. Concurrently, visual impacts may result from the activities in all Project phases, i.e. operational and closure.

Activities associated with the Project will be visible to varying degrees and from varying distances around the project sites. During the operational phase, the Project's visibility will be influenced by the growing height of the WRDs as dumping progresses until they reach a height of approximately seventy metres above ground level. However, it must be noted that, the other approved WRDs will also be growing in height and therefore the proposed WRDs will always be seen within the context of other mining activities and will not stand proud of the landscape.

Typical issues associated with mining projects, and discussed below, are:

- Who will be able to see the new development?
- What will it look like, and will it contrast with the receiving environment?
- Will the development affect sensitive views in the area, and if so, how?
- What will be the impact of the development during the day and at night?
- What will the cumulative impact be, if any?

At the time of writing, the public participation process had confirmed that visual issues would be raised by some members of the public, particularly people living in homesteads immediately south of existing mining activities, indicating sensitivity to visual and aesthetic concerns. However, the Project is in a predominantly 'Brownfields' area, surrounded by mining activities, which would reduce general sensitivity towards it (refer to Figure 5).

8.1 Sensitive Viewers and Locations

Figure 6 identifies receptor locations potentially vulnerable to changes in the landscape caused by the physical presence of the Project. Given the sensitivity of receptors as described above, the primary areas of concern are:

- Residential properties (farm and homesteads) south of the Project site (expressed sensitivity).
- Residential communities in the MRA and north and south of it (potentially sensitive)
- Travellers along the N4 National road (not likely to be sensitive due to the context of the sub-region).

These sensitive viewing locations are indicated in Figure 5. In the worst-case scenario, people living and visiting properties immediately adjacent the existing mine will experience changes to existing views (refer to the simulations in Figures 8-1 to 8-9), notably due to the growing scale and extent of the WRDs, both approved and proposed. However, due to the high VAC of the existing and future mining activities, views to the proposed WRD's will be experienced along with other mining activities of equal scale and bulk. i.e. visibility will not increase *per se*, rather the bulk of what is seen would increase.

8.2 Visibility, Visual Exposure and Visual Intrusion

8.2.1 Visibility

The Project is potentially highly visible to people living within a 5,0km radius of project components and along the N4 and local roads. However, as the Project occurs amongst existing, and growing, ever changing mining activities, visibility must be understood in terms of their context i.e. within an operating mine that is dynamic and whose features will continue to grow throughout the live of the mine.

The viewsheds in Figures 6-1 and 6-2 indicate this. The viewshed in Figure 6-1 Existing Situation, illustrates the visibility of existing mine dumps (i.e. Far West WRD 1, West WRD 1, East WRD, Far East WRD 1 & 2, and the two TSFs as located in Figure 2) at their current heights. The second viewshed in Figure 6-1 has modelled the worst-case scenario i.e. when all current and proposed WRDs have reached their maximum height of seventy metres. It is evident that visibility is not greatly affected due to the relatively flat nature of the landscape. The difference between the existing situation and the worst-case scenario, is illustrated in the viewshed 'Difference' in Figure 6-2. The proposed WRDs will not greatly affect the visibility of the mine's activities. None of the sensitive viewing locations shown in Figure 5, will experience increased visibility of mining activities. A low visual impact is expected for most sections of the study area.

8.2.2 Visual Exposure

Visual exposure is determined by qualifying the visibility of an object, with a distance rating to indicate the degree of intrusion and visual acuity. As the distance between the viewer and the object increases, the visual perception of the object reduces exponentially as changes in form, line, colour, and texture in the landscape become less perceptible with increasing distance. Appendix C illustrates this point. Due to visual exposure, residential properties immediately north of the W OG WRD (Maditihokwa) would experience a growing waste rock dump in the foreground of south facing views (refer to Views 4, 5 and 6 Figure 4-2; Views 7,8,9 Figure 4-3; and Views 10, 11 and 12 Figure 4-4).

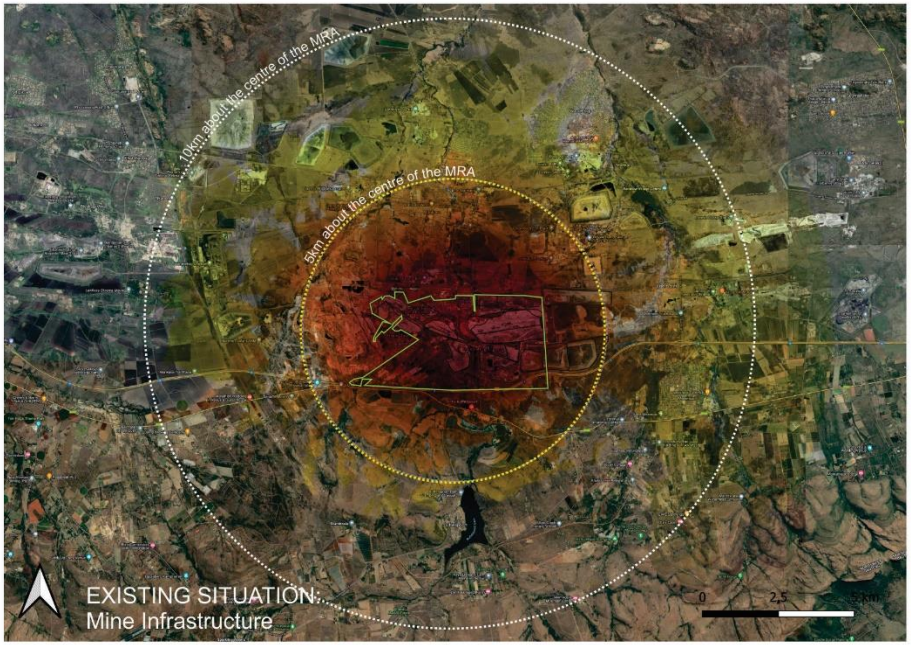
South of the mine, the community of Lapologang and other farm/homesteads, will not see the W OG WRD as the existing Far West WRD 1, would block views to the proposed WRD as it grows in bulk and height. Also views towards the W OG WRD would be seen with the mining activities of the Marikana Platinum mine as the backdrop. It would never appear isolated in the landscape.

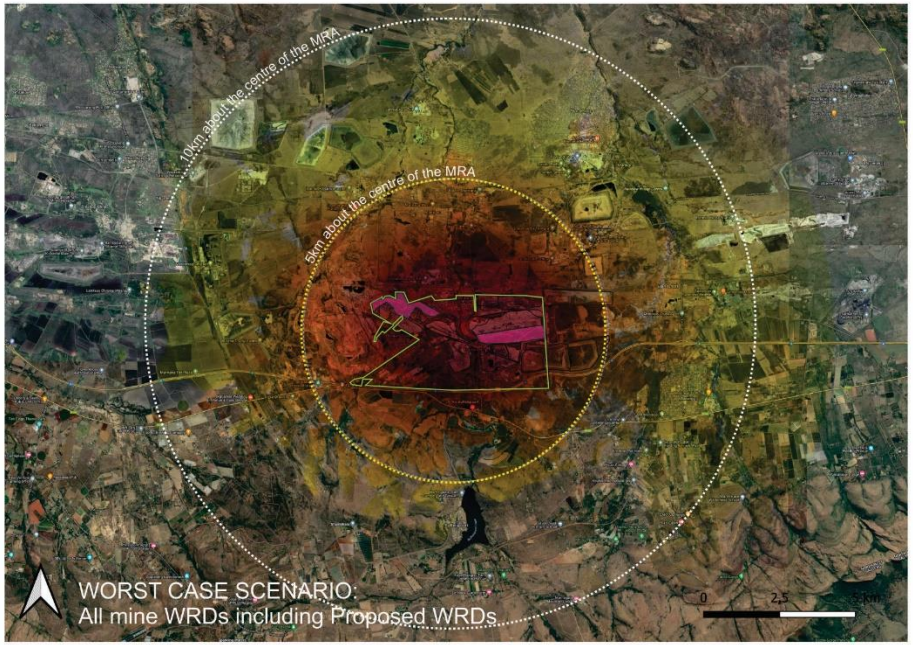
The E OG WRD, situated on the existing East Pit, would not affect sensitive views as existing, approved WRDs would block most sensitive views to it. It would, however, be highly visible from Marikana Road as people drive past the site in the MRA. Refer to View 3 Figure 4-1.

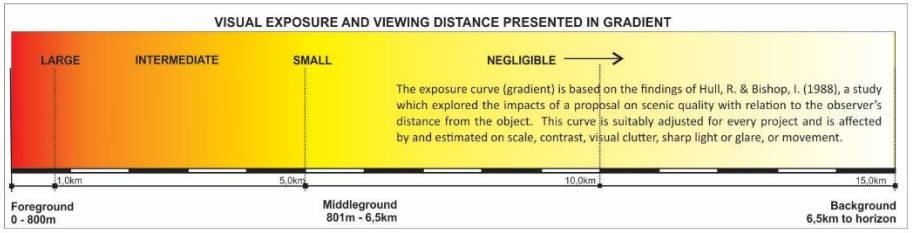
8.2.3 Visual Intrusion

Visual intrusion deals with contextualism, i.e. how well does a Project activity fit with or disrupt/ enhance the ecological and cultural aesthetic of the landscape as a whole? The basic simulations in Figures 4-1 to 4-4 illustrate the effect that the Project will have on views experienced from various viewing points indicative of typical views of the mining activities.

The W OG WRD will appear in foreground and middle-ground views in areas to the north of the mine and be moderately intrusive, as illustrated in Figures 8-5, 8-6, 8-8 and 8-9. Visual intrusion would dimmish for







Note:
The accuracy of the viewshed analysis depends on the quality of the input digital surface model (DSM). Readily available digital contours for the area are limited to 20m contours. We have interpolated these down to 1m intervals to get better accuracy. However, these types of viewshed investigations (using readily available GIS software and terrain contours only) are limited in their accuracy due to their inability to incorporate vegetation information. On-site observations indicated that most views from within the study area would actually be blocked to the mine. And that no unobstructed views would be available, even within the middle to foreground of views.

The viewshed analyses include a comparative analysis between the current mine layout and the worst case scenario, which includes the proposed WRDs. Viewsheds showing the difference between the existing and proposed scenarios and the mine at closure as also included in Figure 6-2.

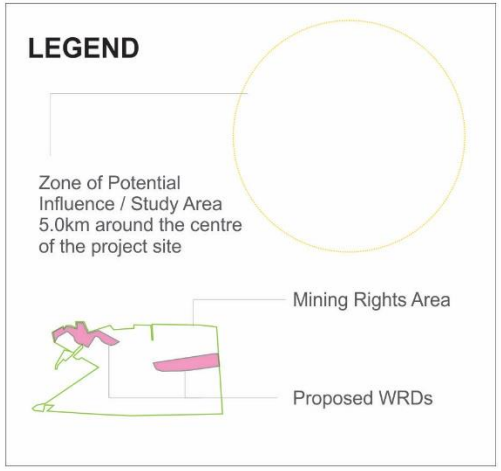


Figure 6-1: VIEWSHED ANALYSES - EXISTING & WORST CASE SCENARIO

Refer to Figures 8-1 to 8-8 for panorama simulations.

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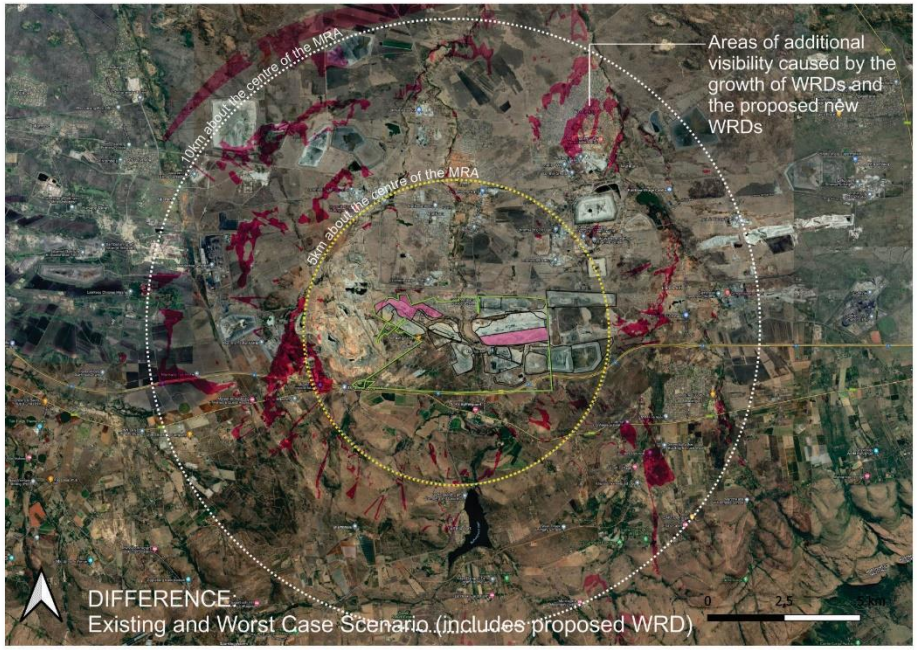

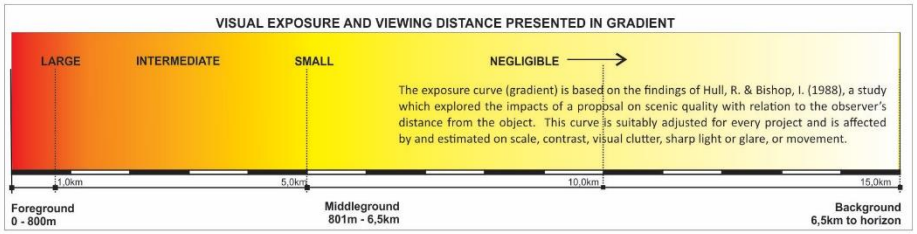

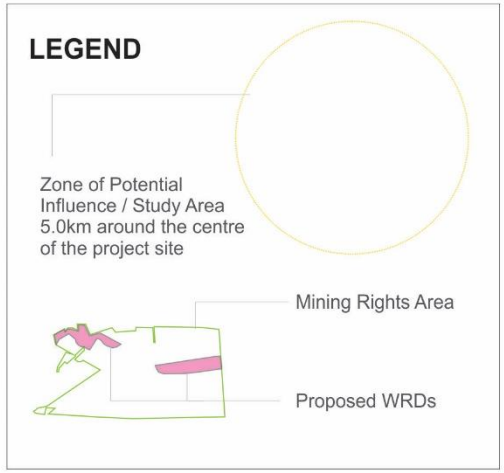

Note:
The accuracy of the viewshed analysis depends on the quality of the input digital surface model (DSM). Readily available digital contours for the area are limited to 20m contours. We have interpolated these down to 1m intervals to get better accuracy. However, these types of viewshed investigations (using readily available GIS software and terrain contours only) are limited in their accuracy due to their inability to incorporate vegetation information. On-site observations indicated that most views from within the study area would actually be blocked to the mine. And that no unobstructed views would be available, even within the middle to foreground of views.

The viewshed analyses include a comparative analysis between the current mine layout and the worst case scenario, which includes the proposed WRDs. Viewsheds showing the difference between the existing and proposed scenarios and the mine at closure as also included in Figure 6-2.

Figure 6-2: VIEWSHED ANALYSES - DIFFERENCE EXISTING AND PROPOSED & CLOSURE

Refer to Figures 8-1 to 8-8 for panorama simulations.

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receptors from south of the mine, as only the far western section of W OG WRD would be visible, with a backdrop of activities at Marikana Platinum Mine. Most views from east of the mine to the E OG WRD would be screened by existing WRDs and visual intrusion, from this perspective, is low (refer to Figure 4-4).

Table 3: Visual Intrusion

HIGH INTRUSION	**MODERATE INTRUSION** ***Maditihokwa Community***	**LOW INTRUSION** ***Remainder of the study area***
The Project would: • Have a substantial negative effect on the visual quality (sense of place) of the landscape relative to the baseline landscape. • Contrast dramatically with the patterns or elements that define the structure of the landscape.	The Project would: • Have a moderate negative effect on the visual quality and sense of place of the landscape. • Contrast with the current patterns or elements that define the structure of the landscape.	The Project would: • Have a minimal to insignificant effect on the visual quality and sense of place of the landscape. • Contrasts minimally with the patterns or cultural elements that define the structure of the landscape.
RESULT: An intensive change over a localized area resulting in major changes in key views.	*RESULT:* Moderate change in landscape characteristics over localized area resulting in a moderate change to key views.	*RESULT:* Minimal to insignificant change resulting in a minor change to key views sensitive viewing areas.

8.3 Effects of Night-lighting

The impact of lights at night is a sensitive issue associated with mines. I&APs consistently raise the impact of night lighting, specifically if they can be seen from residential sites and when the effect would continue for the life of the mine. The negative effect of night lighting would however, occur against what is currently a highly polluted night sky. However, over the life of the mine, the negative effect of night-lighting would vary dependent on the location of activities on the proposed WRDs and on access and haul roads. Stringent management measures should limit light spillage beyond the mine's site boundaries are proposed in Section 9.0 below.

8.4 INTENSITY of Visual Impacts

Referring to discussions in the previous sections and using the criteria listed in Appendix B, the *intensity* of visual impact (worst-case scenario with all facilities combined) of the Project is rated in the table below. To assess the intensity of visual impact, four main factors are considered.

- *Visual Intrusion:* The nature of intrusion or contrast (physical characteristics) of a Project component on the visual quality of the surrounding environment and its compatibility/discord with the landscape and surrounding land use within the context of the landscape's VAC.
- *Visibility:* The area/points from which Project components will be visible.
- *Visual exposure:* Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion.
- *Sensitivity:* Sensitivity of visual receptors to the proposed development

In synthesizing the criteria, a numerical or weighting system is avoided. Attempting to attach a precise numerical value to qualitative resources is rarely successful and should not be used as a substitute for reasoned professional judgement (LI-IEMA 2013). Given these factors, the *intensity* of visual impact is summarised in Table 4. It must be noted that the intensity of impact is rated against the difference between the approved, future activities of the mine and the Project's proposed WRDs. I.e. it cannot be rated against the current situation only.

Table 4: *Intensity* of Visual Impact [6]

High	**Moderate**	Low For residential properties immediately north and south of the mine.	**Negligible** The remainder of the study area
Major loss of or alteration to key elements / features / characteristics of the baseline in the immediate vicinity of the site. i.e. Pre-development landscape or view and / or introduction of elements considered to be uncharacteristic when set within the attributes of the receiving landscape. **High visual impacts would result.**	Partial loss of or alteration to key elements / features / characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that may be prominent but may not necessarily be problematic when set within the attributes of the receiving landscape. **Moderate visual impacts would result**	Minor loss of or alteration to key elements / features / characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that may not be problematic when set within the attributes of the receiving landscape. **Low visual impacts would result.**	Very minor loss or alteration to key elements/features/characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that is not problematic with the surrounding landscape – approximating the 'no change' situation. **Negligible scenic quality impacts would result.**

[6] Refer also to Appendix C – SLR Ratings Methodology

9. MITIGATING OPTIONS

In considering mitigating options, three rules are considered - the measures should be feasible (economically), effective (how long will it take to implement and what provision is made for management/maintenance), and acceptable (within the framework of the existing landscape and land use policies for the area). To address these rules, the following principles have been established:

- Mitigation measures should be designed to suit the existing landscape character and needs of the locality, and they should respect and build upon landscape distinctiveness.
- Mitigation measures especially planted screens and rehabilitation, are not immediately effective.

The following measures are proposed and should be included in the Environmental Management Programme Report (EMPR).

9.1 Planning and site development

- Good housekeeping to reduce dust from the mine, WRDs and in all working areas and access/haul roads associated with the project to an absolute minimum.
- The minimum amount of existing vegetation and topsoil should be removed in preparing areas where development will take place.
- Topsoil that occurs within the proposed footprint of an activity must be removed and stockpiled for later use. The construction contract must include the stripping and stockpiling of topsoil for use during the rehabilitation phase.
- Specifications with regards to the placement of construction camps, as well as a site plan of the construction camp, indicating waste areas, storage areas, and placement of ablution facilities should be included in the EMPr. These areas should either be screened or positioned in areas where they would be less visible from human settlements and main roads.
- Ensure that the mine's design uses natural features and includes engineered barriers (trees, earth berms, etc.) for visual screening of operations and infrastructure.
- Before commencing operations, develop a post-closure rehabilitation plan to acceptable topographic and ecological conditions.

9.2 Earthworks

- Earthworks should be executed so that only the footprint and a small 'construction buffer zone' around the proposed activities are exposed. The naturally occurring vegetation should be retained in all other areas, especially along the periphery of the Project's sites (relates to W OG WRD).
- The soil must be exposed for the minimum time possible once cleared of vegetation to avoid prolonged exposure to wind and water erosion and to minimise dust generation.

- At closure, all remaining exposed terraced areas should be contoured and revegetated to appear natural and blend with the surrounding topographic features.

9.3 Landscaping and ecological approach

- Where new vegetation is introduced to the residual WRD footprints, an ecological approach to rehabilitation, as opposed to a horticultural approach, should be adopted. For example, communities of indigenous plants will enhance biodiversity, a desirable outcome for the area. This approach can significantly reduce long-term costs as less maintenance would be required over conventional landscaping methods as well as the introduced landscape is more sustainable.

9.4 Lighting

The following measures are proposed to minimize light pollution beyond the perimeter of the project and should be considered in the lighting design of the Project:

- Install light fixtures that provide precisely directed illumination to reduce light “spillage” beyond the immediate surrounds of the WRDs, i.e. lights (spotlights) are pointed away from sensitive viewing areas (Maditihokwa, Lapologang and homesteads south of the W OG WRD).
- Avoid high pole top security lighting along the site's periphery and use only lights activated on illegal entry to the site.
- Minimise the number of light fixtures to the bare minimum, including security lighting.

10. SIGNIFICANCE OF VISUAL IMPACT

Identifying and assessing environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgment to determine the significance of the proposed project's environmental impacts. The process requires consideration of, among other things: the purpose and need for the Project, concerns of interested and affected parties (I&APs), social and political norms, and the public's interest (SLR 2021).

Tables 5 and 6 summarise the consequence and significance of the Project's visual impact during the Operational and Closure Phases. The significance findings are based on all aspects of the Project when taken together and using the impact criteria in Appendix C. *Consequence* of impact, is a function of intensity, duration, and spatial extent. *Significance* is the function of the *probability* of exposure to impacts and *consequence* (SLR 2020).

10.1 Operational Phase

Potential Impacts

Operational activities include the removal of vegetation and topsoil from the footprint of the WRDs that is not above the existing pit areas. excavation in the pit areas, trucks moving overburden to the WRDs, and material being transferred to the processing plant, graders maintaining the haul roads and water tankers wetting the roads, expansion of the WRD as the mining progresses and light security instillations and lights associated with the movement of vehicles at night.

The impact on the visual environment during the operational phase is assessed to have a low intensity and would occur over the long term (anticipated to be approximately twenty years). The unmitigated impact would be localized but extend beyond the site boundary, affecting neighbours (at least to 3,0km) resulting in a MEDIUM consequence. The significance of impact is rated LOW (i.e. Medium Consequence and Possible/frequent probability of exposure to impacts). Mitigation measures will not significantly reduce the visual impact of the mine and its infrastructure.

Table 5 Impact Summary: Change of landscape characteristics and key views in Operational Phase

Issue: Change to the landscape characteristics and key views during the Operational phase		
Phases: Operational Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Low (L)	Low (L)
Duration	Long-term (H)	Long-term (H)
Extent	Extending beyond the site boundary effecting neighbours	Extending beyond the site boundary effecting neighbours
Consequence	Medium (M)	Medium (M)
Probability	Possible/Frequent (M)	Possible/Frequent (M)
Significance	Low (L)	Low (L)
Degree to which impact can be reversed	Low as the reversal of the change to key elements/features/ characteristics of the baseline landscape and key views is not realistically feasible.	

Degree to which impact may cause irreplaceable loss of resources	Low as there would be a minor loss of or alteration to key elements/features/ characteristics of the baseline causing a minor change over a localized area resulting in a minor change in key views.

Decision Guideline

A low significance rating implies that the impact will have a real influence on the decision. Limited mitigation is likely required (SLR 2022).

Mitigation Measures

The following measures should be implemented:

- Good housekeeping to reduce dust from the mine, WRD and in all working areas and the access roads, to an absolute minimum.
- Where new vegetation is proposed to be introduced to the site, an ecological approach to rehabilitation, as opposed to a horticultural approach, should be adopted. For example, communities of indigenous plants will enhance biodiversity, a desirable outcome for the area. This approach can significantly reduce long-term costs as less maintenance would be required over conventional landscaping methods as well as the introduced landscape is more sustainable.
- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the site, i.e. lights (spotlights) are to be aimed away from sensitive viewing areas.
- Avoid high pole top security lighting along the periphery of the site and use only lights that are activated on illegal entry to the site.
- Minimise the number of light fixtures to the bare minimum, including security lighting.

Monitoring and Reporting

Monitoring or reporting of adherence to the proposed management measures should be conducted by the Mine's Environmental Officer on a regular monthly basis, specifically as it relates to the negative effects of night lighting.

10.2 Closure Phases

Potential Impacts

Decommissioning and closure activities include the rehabilitation and shaping of the WRDs.

The impact on the visual environment during the closure phase is assessed to have a *very low intensity* and would occur over the short term (less than five years). The unmitigated impact would be localized but extend beyond the site boundary and effect neighbours and is assessed to be LOW consequence. The significance of impact is rated VERY LOW (i.e. Low Consequence and Possible/frequent probability of exposure to impacts). The impact would not be significantly reduced, even with the implementation of mitigation

measures. After closure, when the rehabilitation of the WRDs takes hold, the impact could reduce significantly to Insignificant.

Table 6 Impact Summary: Change of landscape characteristics and key views in the Closure Phase

Issue: Change to the landscape characteristics and key views during the decommissioning and closure phases		
Phase: Closure Phase		
Criteria	Without Mitigation	With Mitigation
Intensity	Very Low (VL)	Very Low (VL)
Duration	Medium-term (M)	Medium-term (M)
Extent	Extending beyond the site boundary but localized (at least 3,0km)	Extending far beyond the site boundary but localized (at least 3,0km)
Consequence	Low (L)	Low (L))
Probability	Possible (M)	Possible (M)
Significance	Very Low (VL)	Very Low (VL)
Degree to which impact can be reversed	Reasonable as the reversal of the change to key elements/features/ characteristics of the baseline landscape and key views is feasible once the effects of rehabilitation take hold.	
Degree to which impact may cause irreplaceable loss of resources	Reasonable as there would be an improvement key elements/features/ characteristics of the baseline causing a minor positive change over a localized area.	

Mitigation Measures

The following measures should be implemented:

- At closure, all residual waste rock dump areas should be formed, contoured, and revegetated to appear natural and blend with the surrounding topographic features.
- Where new vegetation is proposed to be introduced to the site, an ecological approach to rehabilitation, as opposed to a horticultural approach should be adopted. For example, communities of indigenous plants will enhance biodiversity, a desirable outcome for the area. This approach can significantly reduce long-term costs as less maintenance would be required over conventional landscaping methods as well as the introduced landscape being more sustainable.

Monitoring and Reporting

Monitoring or reporting of adherence to the proposed management measures should be conducted by the Environmental Control Officer (ECO) on a regular monthly basis to ensure effective rehabilitation in the long term.

11. CUMULATIVE IMPACTS

Cumulative landscape and visual effects (impacts) result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to happen in the foreseeable future. They may also affect how the landscape is experienced, and cumulative effects may be positive or negative. Where they comprise a range of benefits, they may be considered to form part of the mitigation measures.

Cumulative effects can also arise from the intervisibility of a range of developments and the combined effects of individual components of the proposed development occurring in different locations or over time. The separate effects of such individual components or developments may not be significant, but taken together, they may create an unacceptable degree of adverse impact on visual receptors within their combined visual envelopes. Intervisibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation, and distance, as this affects visual acuity, which is also influenced by weather and light conditions (LI-IEMA (2013)).

11.1 Cumulative effect of the project

The proposed Project would have a moderate cumulative effect with respect to existing mining activities due to the intervisibility of the proposed WRDs with existing WRDs and other mining infrastructure.

12. CONCLUSION

The existing visual condition of the landscape that may be affected by the proposed Project has been described. The study area's scenic quality has been rated *low* within the context of the sub-region, and sensitive viewing areas and landscape types were identified and mapped, indicating potential receptor sensitivity to the project from properties immediately adjacent to the mine. Project sites are in a landscape rated *low*.

Impacts on views are the highest when receptors are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the changes to the landscape. It is anticipated that a few I&APs would be sensitised to the Project.

The Project will introduce a land use currently occurring in the sub-region and within the mine itself and will cause a minor loss and alteration to the baseline's key features and characteristics. The pre-development landscape and views will be affected, but in a minor way, through the introduction of elements considered characteristic when set within the attributes of the receiving landscape. Low visual and sense of place impacts would result.

Impacts assessed to have a LOW significance would occur in the operation phase, be long-term, and cause a minor loss of landscape and visual resources. The unmitigated impact would be localized, extending beyond the site boundary and affect neighbours.

Mitigation measures cannot significantly reduce the visual impact of the Project, however, mitigation, including good house-keeping, should be rigorously applied and maintained throughout the life of the mine and during closure to ensure the long-term reduction of potential residual impacts and feasibility of rehabilitation efforts.

Opinion of the author

The author believes that the Project would cause a minor change to the visual environment and sensitive receptor locations. The Project should be approved provided that the mitigation/management measures are effectively implemented and managed in the long-term.

***** GYLA *****

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APPENDIX A: DETERMINING THE VISUAL RESOURCE VALUE OF A LANDSCAPE

To reach an understanding of the effect of development on a landscape resource, it is necessary to consider the various aspects of the landscape as follows:

Landscape Elements and Character

The individual elements that make up the landscape, including prominent or eye-catching features such as hills, valleys, savannah, trees, water bodies, buildings, and roads are quantifiable and can be easily described.

Landscape character is therefore the description of the pattern, resulting from combinations of natural (physical and biological) and cultural (land use) factors and how people perceive these. The visual dimension of the landscape reflects how these factors create repetitive groupings and interact to create areas that have a specific visual identity. The process of landscape character assessment can increase appreciation of what makes the landscape distinctive and what is important about an area. The description of landscape character thus focuses on the *nature of the land*, rather than the response of a viewer.

Landscape Value – all-encompassing (Aesthetic Value)

Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace the sound, smell and any other factor having a strong impact on human thoughts, feelings, and attitudes (Ramsay 1993). Thus, aesthetic value encompasses more than the seen view, visual quality or scenery, and includes atmosphere, landscape character, and sense of place (Schapper 1993).

Aesthetic appeal (value) is considered high when the following are present (Ramsay 1993):

- *Abstract qualities*: such as the presence of vivid, distinguished, uncommon, or rare features or abstract attributes.
- *Evocative responses*: the ability of the landscape to evoke particularly strong responses in community members or visitors.
- *Meanings*: the existence of a long-standing special meaning to a particular group of people or the ability of the landscape to convey special meanings to viewers in general.
- *Landmark quality*: a particular feature that stands out and is recognized by the broader community.

Sense of Place

Central to the concept of a sense of place is that the place requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape together with the cultural transformations and traditions associated with historic use and habitation. According to Lynch (1992) sense of place "is the extent to which a person can recognize or recall a place as being distinct from other places - as having a vivid, or unique, or at least particular, character of its own". Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. In some cases, these values allocated to the place are similar for a wide spectrum of users or viewers, giving the place a universally recognized and therefore, keen sense of place.

Scenic Quality

Assigning values to visual resources is a subjective process. The phrase, “beauty is in the eye of the beholder,” is often quoted to emphasize the subjectivity in determining scenic values. Yet, researchers have found consistent levels of agreement among individuals asked to evaluate visual quality.

Studies for perceptual psychology have shown human preference for landscapes with a higher visual complexity particularly in scenes with water, over homogeneous areas. Based on contemporary research

landscape quality increases when:

- Topographic ruggedness and relative relief increase.
- Where water forms are present.
- Where diverse patterns of grasslands and trees occur.
- Where natural landscape increases and man-made landscape decreases.
- And where land use compatibility increases and land use edge diversity decreases (Crawford 1994).

Scenic Quality - Explanation of Rating Criteria:

(After The Visual Resource Management System, Department of the Interior of the USA Government, Bureau of Land Management)

Landform: Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, as the Fish River or Blyde River Canyon, the Drakensberg or other mountain ranges, or they may be exceedingly artistic and subtle as certain pinnacles, arches, and other extraordinary formations.

Vegetation: (Plant communities) Give primary consideration to the variety of patterns, forms, and textures created by plant life. Consider short-lived displays when they are known to be recurring or spectacular (wildflower displays in the Karoo regions). Consider also smaller scale vegetational features, which add striking and intriguing detail elements to the landscape (e.g., gnarled or wind beaten trees, and baobab trees).

Water: That ingredient which adds movement or serenity to a scene. The degree to which water dominates the scene is the primary consideration in selecting the rating score.

Colour: Consider the overall colour(s) of the basic components of the landscape (e.g., soil, rock, vegetation, etc.) as they appear during seasons or periods of high use. Key factors to use when rating "colour" are variety, contrast, and harmony.

Adjacent Scenery: Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-8 kilometres, depending upon the characteristics of the topography, the vegetative cover, and other such factors. This factor is applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.

Scarcity: This factor provides an opportunity to give added importance to one or all the scenic features that are relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.

Cultural Modifications: Cultural modifications in the landform / water, vegetation, and addition of structures should be considered and may detract from the scenery in the form of a negative intrusion or complement or improve the scenic quality of a unit.

Scenic Quality Inventory and Evaluation Chart

(After The Visual Resource Management System, Department of the Interior of the USA Government, Bureau of Land Management)

Key factors	Rating Criteria and Score

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

Scenic Quality (i.e. value of the visual resource)

In determining the quality of the visual resource both the objective and the subjective or aesthetic factors associated with the landscape are considered. Many landscapes can be said to have a strong sense of place, regardless of whether they are scenically beautiful but where landscape quality, aesthetic value and a strong sense of place coincide - the visual resource or perceived value of the landscape is very high.

When considering both objective and subjective factors associated with the landscape there is a balance between landscape character and individual landscape features and elements, which would result in the values as follows:

Value of Visual Resource – expressed as Scenic Quality
(After The Landscape Institute with the Institute of Environmental Management and Assessment (2002))

High	Moderate	Low
Areas that exhibit an incredibly positive character with valued features that combine to give the experience of unity, richness, and harmony. These are landscapes that may be of particular importance to conserve, and which may be sensitive change in general and which may be detrimental if change is inappropriately dealt with.	Areas that exhibit positive character, but which may have evidence of alteration to /degradation/erosion of features resulting in areas of more mixed character. Potentially sensitive to change in general; again, change may be detrimental if inappropriately dealt with, but it may not require special or diligence.	Areas negative in character with few, if any, valued features. Scope for positive enhancement frequently occurs.

APPENDIX B: METHOD FOR DETERMINING THE *INTENSITY* OF LANDSCAPE AND VISUAL IMPACT

A visual impact study analysis addresses the importance of the inherent aesthetics of the landscape, the public value of viewing the natural landscape, and the contrast or change in the landscape from the Project.

For some topics, such as water or air quality, it is possible to use measurable, technical international or national guidelines or legislative standards, against which potential effects can be assessed. The assessment of likely effects on a landscape resource and on visual amenity is more complex, since it is determined through a combination of quantitative and qualitative evaluations. (The Landscape Institute with the Institute of Environmental Management and Assessment (2002).

Landscape impact assessment includes a combination of objective and subjective judgements, and it is therefore important that a structured and consistent approach is used. It is necessary to differentiate between judgements that involve a degree of subjective opinion (as in the assessment of landscape value) from those that are normally more objective and quantifiable (as in the determination of magnitude of change). Judgement should always be based on training and experience and be supported by clear evidence and reasoned argument. Accordingly, suitably qualified and experienced landscape professionals carry out landscape and visual impact assessments (The Landscape Institute with the Institute of Environmental Management and Assessment (2002),

Landscape and visual assessments are separate, although linked, procedures. The landscape baseline, its analysis and the assessment of landscape effects all contribute to the baseline for visual assessment studies. The assessment of the potential effect on the landscape is carried our as an effect on an environmental resource, i.e. the landscape. Visual effects are assessed as one of the interrelated effects on population.

Landscape Impact

Landscape impacts derive from changes in the physical landscape, which may give rise to changes in its character and from effects to the scenic values of the landscape. This may in turn affect the perceived value ascribed to the landscape. The description and analysis of effects on a landscape resource relies on the adoption of certain basic principles about the positive (or beneficial) and negative (or adverse) effects of change in the landscape. Due to the inherently dynamic nature of the landscape, change arising from a development may not necessarily be significant (Institute of Environmental Assessment & The Landscape Institute (2002)).

Visual Impact

Visual impacts relate to the changes that arise in the composition of available views as a result of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to visual amenity. Visual impact is therefore measured as the change to the existing visual environment (caused by the physical presence of a new development) and the extent to which that change compromises (negative impact) or enhances (positive impact) or maintains the visual quality of the area.

To assess the magnitude of visual impact four main factors are considered.

Visual Intrusion:	The nature of intrusion or contrast (physical characteristics) of a Project component on the visual quality of the surrounding environment and its compatibility/discord with the landscape and surrounding land use.
Visibility:	The area/points from which Project components will be visible.
Visual exposure:	Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion.
Sensitivity:	Sensitivity of visual receptors to the proposed development

Visual Intrusion / contrast

Visual intrusion deals with the notion of contextualism i.e. how well does a Project component fit into the ecological and cultural aesthetic of the landscape as a whole? Or conversely what is its contrast with the receiving environment. Combining landform / vegetation contrast with structure contrast derives overall visual intrusion/contrast levels of high, moderate, and low.

Landform / vegetation contrast is the change in vegetation cover and patterns that would result from construction activities. Landform contrast is the change in landforms, exposure of soils, potential for erosion scars, slumping, and other physical disturbances that would be noticed as uncharacteristic in the natural landscape. Structure contrast examines the compatibility of the proposed development with other structures in the landscape and the existing natural landscape. Structure contrast is typically strongest where there are no other structures (e.g., buildings, existing utilities) in the landscape setting.

Photographic panoramas from key viewpoints before and after development are presented to illustrate the nature and change (contrast) to the landscape created by the proposed development. A computer simulation technique is employed to superimpose a graphic of the development onto the panorama. The extent to which the component fits or contrasts with the landscape setting can then be assessed using the following criteria.

- Does the physical development concept have a negative, positive or neutral effect on the quality of the landscape?
- Does the development enhance or contrast with the patterns or elements that define the structure of the landscape?
- Does the design of the Project enhance and promote cultural continuity, or does it disrupt it?

The consequence of the intrusion / contrast can then be measured in terms of the sensitivity of the affected landscape and visual resource given the criteria listed below. For instance, within an industrial area, a new sewage treatment works may have an insignificant landscape and visual impact; whereas in a *valued* landscape it might be considered to be an intrusive element. (Institute of Environmental Assessment & The landscape Institute (1996)).

Visual Intrusion

High	Moderate	Low	Positive
If the Project: - Has a substantial negative effect on the visual quality of the landscape. - Contrasts dramatically with the patterns or elements that define the structure of the landscape. - Contrasts dramatically with land use, settlement or enclosure patterns. - Is unable to be 'absorbed' into the landscape.	If the Project: - Has a moderate negative effect on the visual quality of the landscape. - Contrasts moderately with the patterns or elements that define the structure of the landscape. - Is partially compatible with land use, settlement or enclosure patterns. - Is partially 'absorbed' into the landscape.	If the Project: - Has a minimal effect on the visual quality of the landscape. - Contrasts minimally with the patterns or elements that define the structure of the landscape. - Is mostly compatible with land use, settlement or enclosure patterns. - Is 'absorbed' into the landscape.	If the Project: - Has a beneficial effect on the visual quality of the landscape. - Enhances the patterns or elements that define the structure of the landscape. - Is compatible with land use, settlement or enclosure patterns.

Result Notable change in landscape characteristics over an extensive area and/or intensive change over a localized area resulting in major changes in key views.	*Result* Moderate change in landscape characteristics over localized area resulting in a moderate change to key views.	*Result* Imperceptible change resulting in a minor change to key views.	*Result* Positive change in key views.

Visual intrusion also diminishes with scenes of higher complexity, as distance increases, the object becomes less of a focal point (more visual distraction), and the observer's attention is diverted by the complexity of the scene (Hull and Bishop (1988)).

Visibility

A viewshed analysis was carried out to define areas, which contain all possible observation sites from which the development would be visible. The basic assumption for preparing a viewshed analysis is that the observer eye height is 1.8m above ground level. Topographic data was captured for the site and its environs at 10 m contour intervals to create the Digital Terrain Model (DTM). The DTM includes features such as vegetation, rivers, roads and nearby urban areas. These features were 'draped' over the topographic data to complete the model used to generate the viewshed analysis. It should be noted that viewshed analyses are not absolute indicators of the level of significance (magnitude) of the impact in the view, but merely a statement of the fact of potential visibility. The visibility of a development and its contribution to visual impact is predicted using the criteria listed below:

Visibility

High	Moderate	Low
Visual Receptors If the development is visible from over half the zone of potential influence, and/or views are mostly unobstructed and/or most viewers are affected.	*Visual Receptors* If the development is visible from less than half the zone of potential influence, and/or views are partially obstructed and or many viewers are affected	*Visual Receptors* If the development is visible from less than a quarter of the zone of potential influence, and/or views are mostly obstructed and/or few viewers are affected.

Visual Exposure

Visual exposure relates directly to the distance of the view. It is a criterion used to account for the limiting effect of increased distance on visual impact. The impact of an object in the foreground (0 – 800m) is greater than the impact of that same object in the middle ground (800m – 5.0 km) which, in turn is greater than the impact of the object in the background (greater than 5.0 km) of a particular scene.

Distance from a viewer to a viewed object or area of the landscape influences how visual changes are perceived in the landscape. Generally, changes in form, line, colour, and texture in the landscape become less perceptible with increasing distance.

Areas seen from 0 to 800m are considered foreground; foliage and fine textural details of vegetation are normally perceptible within this zone.

Areas seen from 800m to 5.0km are considered middle ground; vegetation appears as outlines or patterns. Depending on topography and vegetation, middle ground is sometimes considered to be up to

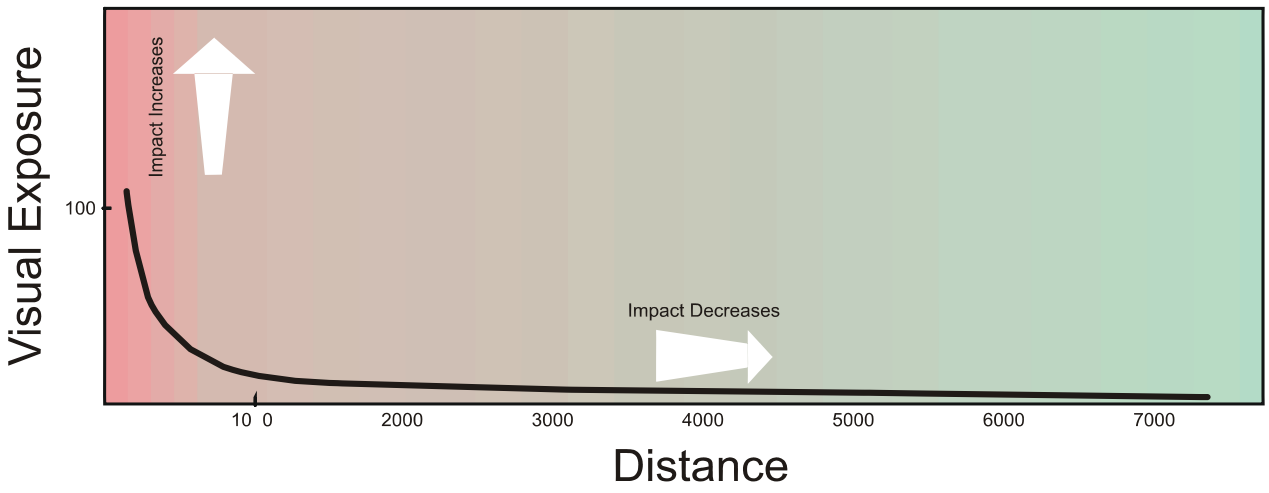
8.0km.

Areas seen from 5.0km to 8.0km and sometimes up to 16km and beyond are considered background. Landforms become the most dominant element at these distances.

Seldom seen areas are those portions of the landscape that, due to topographic relief or vegetation, are screened from the viewpoint or are beyond 16km from the viewpoint. Landforms become the most dominant element at these distances.

The impact of an object diminishes at an exponential rate as the distance between the observer and the object increases. Thus, the visual impact at 1000 m would be 25% of the impact as viewed from 500 m. At 2000 m it would be 10% of the impact at 500 m. The inverse relationship of distance and visual impact is well recognised in visual analysis literature (e.g.: Hull and Bishop (1988)) and is used as an important criteria for the study. This principle is illustrated in the Figures below.

Effect of Distance on Visual Exposure



View from 10 000 metres

View from 5 000 metres

View from 3 000 metres

View from 1 000 metres

Sensitivity of Visual Receptors

When visual intrusion, visibility and visual exposure are incorporated, and qualified by sensitivity criteria (visual receptors) the magnitude of the impact of the development can be determined.

The sensitivity of visual receptors and views will be depended on:

- The location and context of the viewpoint.
- The expectations and occupation or activity of the receptor.
- The importance of the view (which may be determined with respect to is popularity or numbers of people affected, its appearance in guidebooks, on tourist maps, and in the facilities provided for its enjoyment and references to it in literature or art).

The most sensitive receptors may include:

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

Other receptors include:

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

The least sensitive receptors are likely to be people at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

In this process more weight is usually given to changes in the view or visual amenity which are greater in scale, and visible over a wide area. In assessing the effect on views, consideration should be given to the effectiveness of mitigation measures, particularly where planting is proposed for screening purposes (Institute of Environmental Assessment & The Landscape Institute (1996).

Sensitivity of Visual Receptors

High	Moderate	Low
Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape.	People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes	The least sensitive receptors are likely to be people at their place of work, or engaged in similar activities, whose attention may be

Communities where the development results in changes in the landscape setting or valued views enjoyed by the community. Occupiers of residential properties with views affected by the development.	of acknowledged importance or value). People travelling through or past the affected landscape in cars, on trains or other transport routes.	focused on their work or activity and who therefore may be potentially less susceptible to changes in the view (i.e. office and industrial areas). Roads going through urban and industrial areas

Intensity of the Visual Impact

Potential visual impacts are determined by analysing how the physical change in the landscape, resulting from the introduction of a Project, are viewed and perceived from sensitive viewpoints. Impacts to views are the highest when viewers are identified as being sensitive to change in the landscape, and their views are focused on and dominated by the change. Visual impacts occur when changes in the landscape are noticeable to viewers looking at the landscape from their homes or from parks, and conservation areas, highways and travel routes, and important cultural features and historic sites, especially in foreground views.

The magnitude of impact is assessed through a synthesis of visual intrusion, visibility, visual exposure and viewer sensitivity criteria. Once the magnitude of impact has been established this value is further qualified with spatial, duration and probability criteria to determine the *significance* of the visual impact.

For instance, the fact that visual intrusion and exposure diminishes significantly with distance does not necessarily imply that the relatively small impact that exists at greater distances is unimportant. The level of impact that people consider acceptable may be dependent upon the purpose they have in viewing the landscape. A particular development may be unacceptable to a hiker seeking a natural experience, or a household whose view is impaired, but may be barely noticed by a golfer concentrating on his game or a commuter trying to get to work on time (Ittleson *et al.,* 1974).

In synthesising these criteria a numerical or weighting system is avoided. Attempting to attach a precise numerical value to qualitative resources is rarely successful, and should not be used as a substitute for reasoned professional judgement. (Institute of Environmental Assessment and The landscape Institute (1996)).

Intensity (Intensity) of Visual Impact

High	Moderate	Low	Negligible
Total loss of or major alteration to key elements/features/characteristics of the baseline. I.e. Pre-development landscape or view and/or introduction of elements considered to	Partial loss of or alteration to key elements/features/characteristics of the baseline. I.e. Pre-development landscape or view and/or introduction of elements that may be	Minor loss of or alteration to key elements/features/characteristics of the baseline. I.e. Pre-development landscape or view and/or introduction of elements that may not	Very minor loss or alteration to key elements/features/characteristics of the baseline. I.e. Pre-development landscape or view and/or introduction of elements that are

be totally uncharacteristic when set within the attributes of the receiving landscape. High scenic quality impacts would result.	prominent but may not necessarily be uncharacteristic when set within the attributes of the receiving landscape. Moderate scenic quality impacts would result	be uncharacteristic when set within the attributes of the receiving landscape. Low scenic quality impacts would result.	characteristic with the surrounding landscape – approximating the 'no change' situation. Negligible scenic quality impacts would result.

Cumulative effects

Cumulative landscape and visual effects (impacts) result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future. They may also affect the way in which the landscape is experienced. Cumulative effects may be positive or negative. Where they comprise a range of benefits, they may be considered to form part of the mitigation measures.

Cumulative effects can also arise from the intervisibility (visibility) of a range of developments and /or the combined effects of individual components of the proposed development occurring in different locations or over a period of time. The separate effects of such individual components or developments may not be significant, but together they may create an unacceptable degree of adverse effect on visual receptors within their combined visual envelopes. Intervisibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation and distance, as this affects visual acuity, which is also influenced by weather and light conditions. (Institute of Environmental Assessment and The landscape Institute (1996)).

APPENDIX C: SIGNIFICANCE OF ENVIRONMENTAL IMPACTS (SLR methodology)

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

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

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

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

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

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

APPENDIX D: CURRICULUM VITAE

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Graham is a registered landscape architect with interest and experience in landscape architecture, urban design, and environmental planning. He holds a degree in landscape architecture from the University of Toronto and has practiced in Canada and Africa, where he has spent most of his working life. He has served as President of the Institute of Landscape Architects of South Africa (ILASA) and as Vice President of the Board of Control for Landscape Architects.

During his 30 years plus career he has received numerous ILASA and other industry awards. He has published widely on landscape architectural issues and has had projects published both locally and internationally in, scientific and design journals and books. He was a being a founding member of Newtown Landscape Architects and is also a senior lecturer, teaching landscape architecture and urban design at post and undergraduate levels, at the University of Pretoria. He has been a visiting studio critic at the University of Witwatersrand and University of Cape Town and in 2011 was invited to the University of Rhode Island, USA as their Distinguished International Scholar for that year. Graham resigned from NLA and now practices as a Sole Proprietor.

A niche specialty of his is Visual Impact Assessment for which he was cited with an ILASA Merit Award in 1999. He has completed over 250 specialist reports for projects in South Africa, Canada, and other African countries. He was on the panel that developed the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes* (2005) and produced a research document for Eskom, *The Visual Impacts of Power Lines* (2009). In 2011, he produced '*Guidelines for involving visual and aesthetic specialists'* for the Aapravasi Ghat Trust Fund Technical Committee (they manage a World Heritage Site) along with the *Visual Impact Assessment Training Module Guideline Document.*

APPENDIX E: CRITERIA FOR PHOTO / COMPUTER SIMULATION

To characterize the nature and magnitude of visual intrusion of the proposed Project, a photographic simulation technique was used. This method was used according to Sheppard (in Lange 1994), where a visual simulation is good quality when the following five criteria are met.

Representativeness:	A simulation should represent important and typical views of a Project.
Accuracy:	The similarity between a simulation and the reality after the Project has been realized.
Visual clarity:	Detail, parts and overall contents have to be clearly recognizable.
Interest:	A simulation should hold the attention of the viewer.
Legitimacy:	A simulation is defensible if it can be shown how it was produced and to what degree it is accurate.

To comply with this standard it was decided to produce a stationary or static simulation (Van Dortmont in Lange, 1994), which shows the proposed development from a typical static observation points (Critical View Points).

Photographs are taken on site during a site visit with a manual focus, 50mm focal depth digital camera. All camera settings are recorded and the position of each panoramic view is recorded by means of a GPS. These positions, coordinates are then placed on the virtual landscape (see below).

A scale model of the proposal is built in virtual space, scale 1:1, based on CAD (vector) information as supplied by the architect / designers. This model is then placed on a virtual landscape, scale 1:1, as produced by means of GIS software. The accuracy of this depends on the contour intervals.

The camera views are placed on the points as recorded on the virtual landscape. The respective photographs are overlaid onto the camera views, and the orientation of the cameras adjusted accordingly. The light source is adjusted to suit the view. Each view is then rendered as per the process above.