# APPENDIX L: VISUAL STUDY

# VISUAL IMPACT ASSESSMENT REPORT

## Jindal Melmoth Iron Ore Project

February 2023

**VISUAL IMPACT ASSESSMENT REPORT**

**JINDAL MELMOTH IRON ORE PROJECT**

Submitted to:

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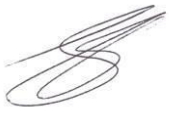
| | |
|---|---|
| Report Revision No: | *FINAL-Rev 03: Response to Client Comment* |
| Date Issued: | 20 February 2023 |
| Prepared By: | Graham Young PrLArch, FILASA |
| Reviewed By: | Graham Young PrLArch, FILASA |

Signed:



Reference: 073_2021: Jindal Melmoth Iron Ore 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<br>Fellow Institute of Landscape Architects of South Africa (FILASA) |
| Experience in Years | 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 nd 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).<br><br>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 300 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. |

## DECLARTION OF INDEPENDECE

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**

| |
|---|
| Jindal Melmoth Iron Ore 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) | | | |
| Professional affiliation/registration: | PrLArch Reg. No. 87001 FILASA | | | |
| Physical address: | 608 Leyds Street, Muckleneuk, 0002 | | | |
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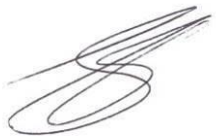
| Postal code: | 0027 | Cell: | 082 462 1491 | |
| Telephone: | 082 462 1491 | Fax: | | |
| E-mail: | grahamyounglandarch@gmail.com | | | |

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 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

**Graham Young Landscape Architect**

Name of Company:

24 October 2022

Date

## COPYRIGHT



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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:

- Any personal information provided herein has been provided exclusively for use as part of the Environmental Impact Assessment and public participation registration process and may therefore not be utilised for any purpose other than that for which it was provided.
- No additional copies may be made of documents containing personal information unless permission has been obtained from the owner of said information.
- 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; | Section 8.4 |
| 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 |
| 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; | Figures 5 and 6 |
| 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; | Section 8 |
| 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 |

| | |
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| 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 carried out by SLR |
| A summary and copies of any comments that were received during any consultation process | N/A this activity is being carried out by SLR |
| Any other information requested by the competent authority. | N/A |

## ACRONYMS, ABBREVIATIONS AND GLOSSARY

| Acronyms & Abbreviations | |
|---|---|
| **BAR** | Basic Assessment Report |
| **BFS** | Bankable Feasibility Study |
| **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 |
| **VAC** | Visual Absorption Capacity |
| **VIA** | Visual Impact Assessment |

| 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. |

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| **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 |

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| | 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 and Background

Graham Young Landscape Architect was commissioned by SLR Consulting (South Africa) (Pty) Ltd to conduct a Visual Impact Assessment (VIA) of the proposed Jindal Melmoth Iron Ore Project, KwaZulu Natal ("the Project"). The VIA focuses on the potential impact of the physical aspects of the proposed developments (i.e. form, scale, and bulk) and their potential impact within the local landscape and receptor context. It forms part of the Mining Right Application (MRA) and the Environmental and Social Impact Assessment (ESIA).

## Project, project site, and study area

The Project site is located 25 km southeast of Melmoth, within the Mthonjaneni Local Municipality in the KwaZulu-Natal Province. Jindal Iron Ore (Pty) Ltd (Jindal) is owned by Jindal Steel and Power (Mauritius) Limited and South African BEE partner Mr Thabang Khomo (Pty) Ltd. Jindal holds two Prospecting Rights over the project site. The prospecting rights are the North Block and South Block and have a total combined area of 20 170 ha.

The MRA and ESIA will consider the entire extent of the mining right area, but with a specific focus on Phase 1 of the Project as described in this section. Phase 1, the mine (open pit) and associated infrastructure (primary crusher, processing plant, power yard, and waste rock dump (WRD), are located within the south-eastern section of the South Block. A conceptual tailings storage facility (TSF) is proposed immediately east of the R66 and south of the R34 in the Mhlatuze River valley. However, it does not form part of this application and is not considered in this report.

The study area for Phase 1 is determined to be an area of 10km[1] around the proposed Project area including the power plant, processing plant, primary crusher, WRD and the Southeast Pit.

## 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 and scenic resources of the study area and visually sensitive areas or receptors. It also identifies the significance of impacts and potential mitigation measures.

## 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 comprehensive VIA report. The following terms of reference were established:

[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.

- Data collected during a site visit (carried out on 15 and 16 May 2021) allows for a description and characterization of the receiving environment.
- Describe the landscape character, quality and assess the visual resource of the study area.
- Describe the visual characteristics of the components of the project.
- Identify and rate the significance of visual impacts.
- Propose mitigation options to reduce the potential impact of the project.

### Assumptions, Uncertainties, and Limitations

The following assumptions/ limitations have been made in the study:

- The extent of the WRD was determined in discussions with the Client and has been modelled accordingly. The assumption is that the WRD will fill the valleys to a final level equivalent to the contour associated with the northern edge of the pit.
- It was also determined in discussions with the Client that the western section of the pit will be mined first. Overburden from this pit will be placed on the WRD. Once this pit is mined out, mining will take place in the eastern section of the pit. Waste Rock from the east section will be backfilled into the mined-out western area. Refer to Figure 2-1.
- Simulations of the Pit are based on layout and contour information supplied by the Client.
- No alternative sites have been proposed.
- Site photos were taken at the beginning of winter and did not reflect the complete landscape character of the area as experienced through all seasons. However, due to the relative openness and 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. Most of the study area's scenic quality has been rated *moderate* to *high* 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. Proposed Project footprints are in landscape types rated as *moderate* to *high*.

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. The results of the Comments and Response Report (CRR) dated 25 April 2022 indicate that visual issues are a concern to some of the I&APs. A few people raised the issue as:

- 'Open cast mining itself is a scar on the landscape' (CRR:30),
- [the mine will cause] pollution and aesthetic altering of the landscape …" (CRR: 31 and 34)
- '[the mine will] 'permanently alter the natural landscape' (CRR:176)

The Project will introduce a land use currently not occurring in the sub-region and will cause a significant loss of and alteration to the baseline's key features and characteristics. The pre-development landscape and

views will be affected by the introduction of elements considered uncharacteristic when set within the attributes of the receiving landscape. High visual and sense of place impacts would result.

The Project would negatively affect receptors travelling through the study area on the R66, local roads, and most importantly, living in homesteads and visiting tourist facilities within a 3,0km radius of project activities.

The impact on the visual environment during the construction phase is assessed to have a very high intensity and would occur over the short term (less than five years). The unmitigated impact would be localized but extend beyond the site boundary (at least 3,0km) and is predicted to be HIGH. The implementation of mitigation measures would not significantly reduce the anticipated impact, which would remain HIGH.

The impact on the visual environment during the operational phase is assessed to have a very high intensity and would occur over the long term (anticipated to be twenty-five years). The unmitigated impact would be localized but would extend beyond the site boundary (at least 3,0km) and is assessed to be VERY HIGH. Mitigation measures are possible and could reduce the visual impact of the mine and its infrastructure to HIGH.

The impact on the visual environment during the decommissioning and closure phases is assessed to have a moderate intensity and would occur over the long term. The unmitigated impact would be localized but extend beyond the site boundary (at least 3,0km) and is assessed to be HIGH.

Mitigation measures cannot significantly reduce the visual impact of the mine and its infrastructure, specifically during the construction and operational phases when the impact after mitigation would be HIGH.

However, substantial mitigation should be rigorously applied and maintained throughout the life of mine. At closure, effective mitigation could reduce the impact to MEDIUM. Before commencing operations, a post-closure Rehabilitation Plan designed for acceptable topographic and ecological conditions should be developed.

### Cumulative Effects

The proposed mine project would be a new land-use introduced to the sub-region, and as such, there is no cumulative effect with respect to other mining projects. The cumulative effect of individual components of the mine, which occur in distinct locations in the study area, and would be rated as per the ratings for the mine during the operational phase i.e. a VERY HIGH negative impact without mitigation and HIGH with extensive mitigation.

### Visual Impact Statement

It is the opinion of GYLA that the visual impacts associated with the proposed Project are of a high significance given the nature, scale and duration of project activities with the context of a greenfields receiving environment. Substantial mitigation will be required to lower the impacts at closure from HIGH to MEDIUM.

*** GYLA ***

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# 1. INTRODUCTION

## 1.1 Project Overview and Background

Graham Young Landscape Architect was commissioned by SLR Consulting (South Africa) (Pty) Ltd to conduct a Visual Impact Assessment (VIA) of the proposed Jindal Melmoth Iron Ore Project, KwaZulu Natal ("the Project"). The VIA focuses on the potential impact of the physical aspects of the proposed developments (i.e. form, scale, and bulk) and their potential impact within the local landscape and receptor context. It forms part of the Mining Right Application (MRA) and the Environmental and Social Impact Assessment (ESIA).

## 1.2 Project, Project site, and study area

The Project site is located 25 km southeast of Melmoth, within the Mthonjaneni Local Municipality in the KwaZulu-Natal Province. Jindal Iron Ore (Pty) Ltd (Jindal) is owned by Jindal Steel and Power (Mauritius) Limited and South African BEE partner Mr Thabang Khomo (Pty) Ltd. Jindal holds two Prospecting Rights over the project site. The prospecting rights are the North Block and South Block and have a total combined area of 20 170 ha. Refer to Figure 1.

Jindal's intent with the MRA is to consolidate the Prospecting Rights for the North and South blocks into a single Mining Right. However, development of the mine and mining infrastructure would be undertaken in a phased approach, with mining currently proposed to be conducted in the south-eastern section of the South Block (as per Figure 2), where the iron ore resource has been defined through the previous prospecting. Infrastructure would be developed to support this mining operation.

The MRA and ESIA will consider the entire extent of the MRA area, but with a specific focus on Phase 1 of the Project as described in this section. Phase 1, the mine (open pit) and associated infrastructure (primary crusher, processing plant, power yard, and waste rock dump (WRD), are located within the south-eastern section of the South Block. A conceptual tailings storage facility (TSF) is proposed immediately east of the R66 and south of the R34 in the Mhlatuze River valley. However, it does not form part of this application and is not considered in this report.

The R66 passes east of the South Block and between it and the North Block. The study area for Phase 1 is 10km$^2$ around the proposed Project area including the power plant, processing plant, primary crusher, WRD and the Southeast Pit as indicated in 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 and scenic resources of the study area and visually sensitive areas or receptors. It also identifies the significance of impacts and potential mitigation measures.

The Fatal Flaw Analysis (Golder 2013:45) of the project noted the following issues of concern:

[2] 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 and vegetation. It should be noted that the 2015 Assessment Reports (Golder 2015) also recommended a 10km study area for the project.

- "Change in the visual quality of the landscape will be visible in parts of the surrounding area, particularly the South Block.
- Disturbance to the community's sense of place."

Potential mitigation measures are:

- "Mine design to utilize natural features and include engineered barriers (trees, earth berms, etc.) for visual screening of operations and infrastructure as appropriate.
- Develop [a] post-closure rehabilitation plan to acceptable topographic and ecological conditions before commencing operations."

The Golder (2015) analysis concluded that the potential severity of visual issues is 2 = Factor of concern, mitigation feasible.

### 1.4 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 comprehensive VIA report. The following terms of reference were established:

- Data collected during a site visit (carried out on 15 and 16 May 2021) allows for a description and characterization of the receiving environment.
- Describe the landscape character and quality and assess the visual resource of the study area.
- Describe the visual characteristics of the components of the project.
- Identify and rate the significance of visual impacts.
- Propose mitigation options to reduce the potential impact of the project.

### 1.5 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.
- No specific layouts are available for the Processing Plant, Power Yard and Primary Crusher. The simulations have therefore been produced based on typical designs of similar projects. The layout is therefore indicative, and the detailed layouts could change, however, the various components would remain in the general vicinity of the areas currently shown in the figures in this report.
- The extent of the WRD was determined in discussions with the Client and has been modelled accordingly. The assumption is that the WRD will fill the valleys to a final level equivalent to the contour associated with the northern edge of the pit.
- It was also determined in discussions with the Client that the western section of the pit will be mined first. Overburden from this pit will be placed in the WRD. Once this pit is mined out, mining will take place in the eastern section of the pit. Waste rock from the east section will be backfilled into the mined-out western area. Refer to Figure 2-1.
- Simulations of the Pit are based on layout and contour information supplied by the Client in the AMEC report.
- No alternative sites have been proposed.
- Site photos were taken at the beginning of winter and did not reflect the complete landscape

character of the area as experienced through all seasons. However, due to the relative openness and nature of the study area, this is not a major concern in assessing potential visual impacts.

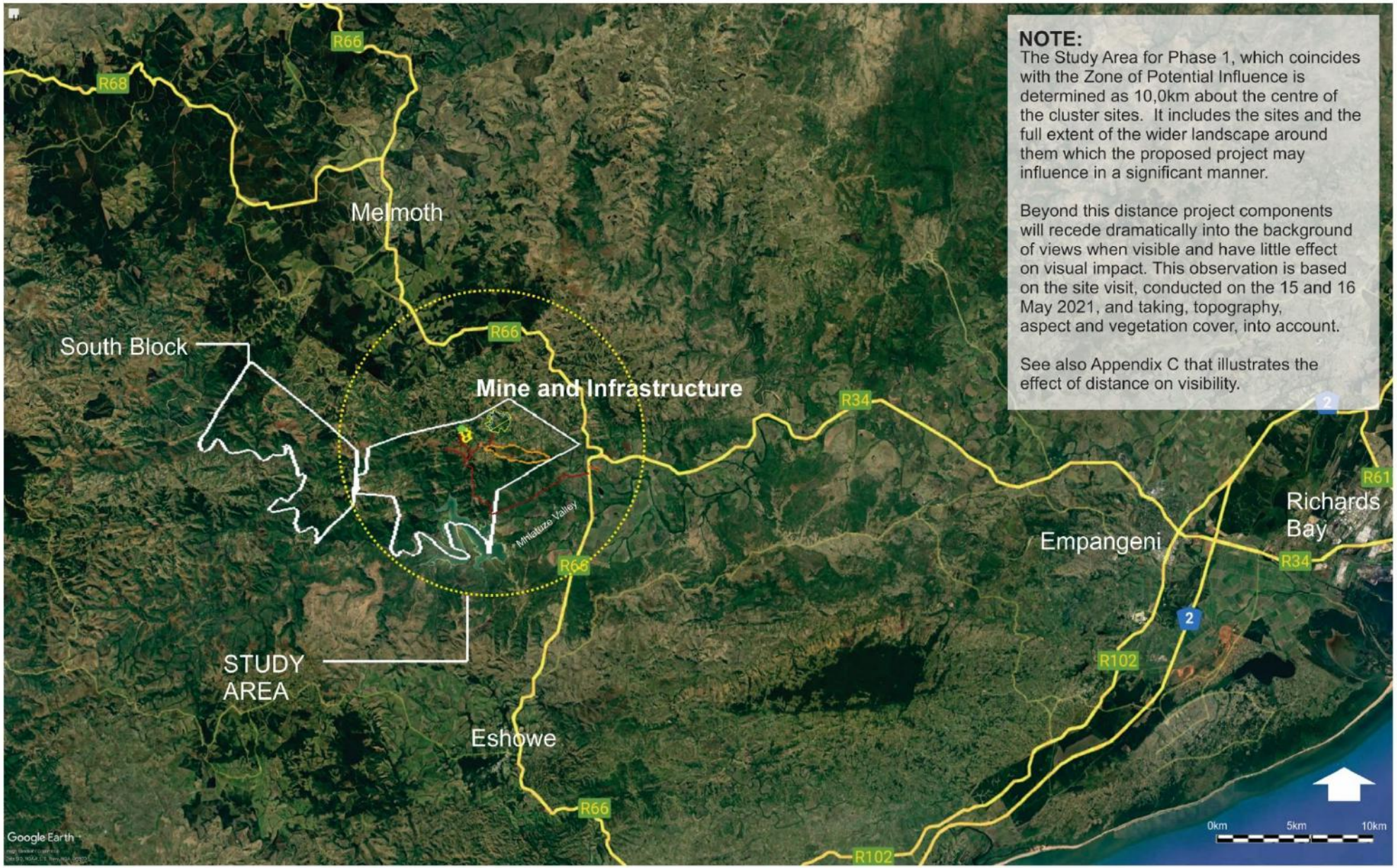


Figure 01: LOCALITY - Jindal Iron Ore Mine

GYLA
Graham A Young
Landscape Architect
082 462 1491

## 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[3], 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.

[3] 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 studies 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.

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 potentially 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 view 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 severity 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 severity 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, 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.

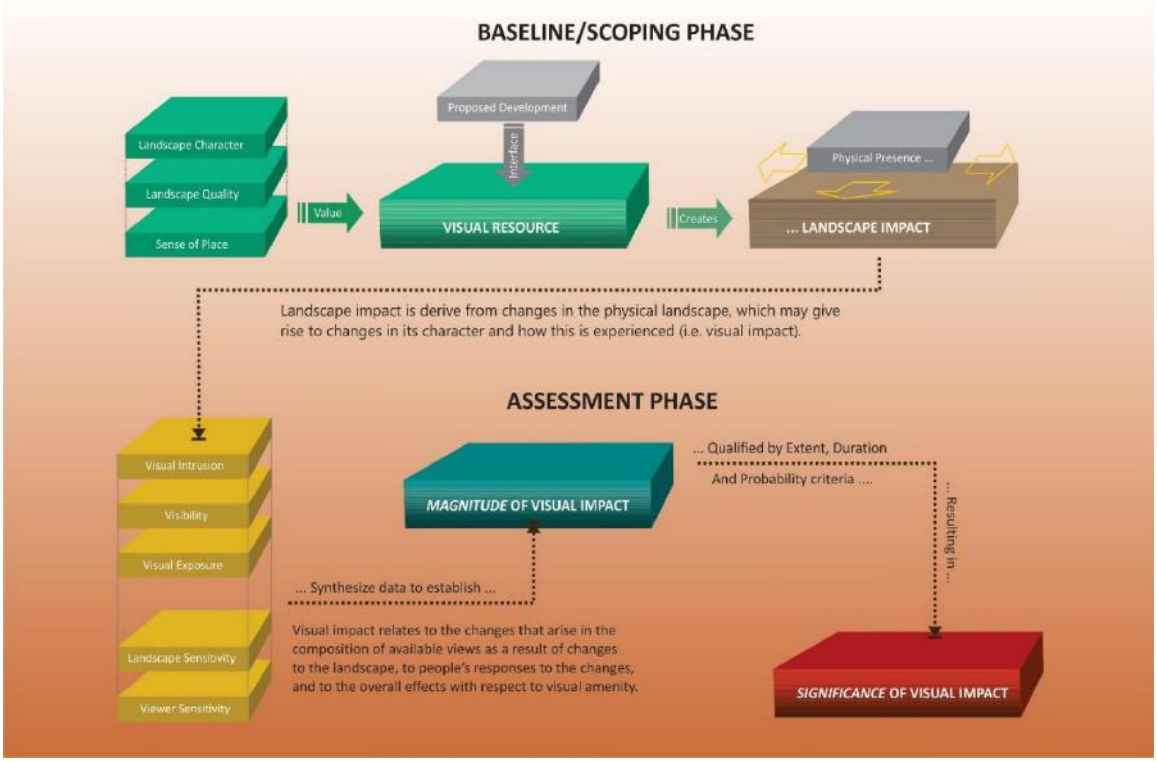


Image 1: Visual Impact Process

## 3.2 Methodology

The following method was used:

- Site visit: A field survey was undertaken on 15 and 16 May 2021, 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.
- General landscape characterization: The visual resource (i.e. receiving environment) was mapped using the field survey, Google Earth imagery, and Mucina and Rutherford's (2006) reference book, *The Vegetation of South Africa, Lesotho, and Swaziland* and the SANBI Vegetation Map[4]. The description of the landscape focused on the nature of the land rather than a viewer's response.
- The character of the landscape was described and rated in terms of its aesthetic appeal using recognized contemporary research in perceptual psychology as the basis and its sensitivity as a landscape receptor.
- 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] https://www.sanbi.org/biodiversity/foundations/national-vegetation-map/

# 4. DESCRIPTION OF THE PROJECT PHASE 1

Figure 2 identifies the proposed location of the major project activities i.e. open pit, WRD, primary crusher, processing plant, and a power yard. These activities are the focus of the visual impact assessment.

An open-pit mining operation is proposed to be developed in the south-eastern section of the South Block known as the Southeast Pit, which will be mined for approximately 25 years. Waste rock will be stripped from the pit and disposed of on a WRD proposed within the Mining Right Area. Drilling and blasting techniques will be used to excavate the iron ore, which will then be loaded onto trucks and transported to the Run-of-Mine (ROM) ore stockpile area, where it will be stored and subsequently transferred to the processing plant for milling and magnetic separation.

The processing plant will produce iron ore concentrate and a tailings slurry. The concentrate will be exported, and the tailings will be disposed of to a TSF, which will be subject to a separate application process. Associated infrastructure to support the mine will include access and haul roads, electrical transmission lines and sub-stations, raw water abstraction and pipelines, stormwater management infrastructure, tailings pipelines, concentrate pipelines, offices, change house, workshops, and perimeter fencing (amongst others).

Additional detail is provided in the following sections on the major infrastructure, where information is available.

## 4.1 Southeast Pit

The dimensions of the Southeast Pit as supplied by the applicant, and the pit, as shown in Figures 2 and 2-1 may end up being 2 or 3 separate pits but would follow the general outline as conceptually shown as this is the defined resource area. The pit is approximately 4 km east to west and about 1km north to south at its widest point. The final pit dimensions will be defined in the Bankable Feasibility Study (BFS).

## 4.2 Waste Rock Dump

WRDs are required to accommodate overburden and waste rock excavated as part of the mining process. The WRD would be designed to fit into the existing contours to the extent practical for stability and ultimate rehabilitation at closure. The conceptual position (maximum extent) is shown in Figures 2 to 2-3.

## 4.3 Crushing and Screening

ROM ore will be transported via haul truck to a semi-mobile in-pit primary crusher. The primary crushed ore will be transported from the in-pit primary crusher to the ROM stockpile via an overland conveyor. ROM ore will be reclaimed from the ROM stockpile for further crushing before being deposited onto the crushed ore stockpile.

## 4.4 Processing Plant

Ore from the crushed ore stockpile will be fed into the processing plant. The final size of the operation will be influenced by the results of the engineering, environmental, social, and economic studies. Iron ore will be processed using crushing, milling, and magnetic separation techniques. The plant will produce wet iron ore concentrate, which will be exported.

The plant will also produce thickened wet tailings slurry to be deposited on a TSF, as discussed above.

### 4.5 Water Infrastructure

The mining operations will require water for the processing plant, dust control, vehicle wash down, and for the change house and office use. The conceptual design is for water to be recycled from the TSF and the concentrate filters, thereby minimising daily water usage. Water requirements are likely to reduce as the pit deepens due to the reuse of water that collects within the pit. In addition, water management infrastructure will be required, including dirty water dams, pollution control dams, and stormwater management. The location and design of these will be identified as the Project progresses.

### 4.6 Office Complex

An office complex is required to accommodate all management, technical, and administration staff for the mine. The office complex will include a car park, canteen, meeting rooms, hall, training complex, security, and first aid station. The site will have a dedicated sewerage treatment plant the detail of which is to be considered as part of the BFS.

### 4.7 Workshops

Engineering and vehicle workshops, tyre shops, wash down areas, garages, fuel depots, and explosive magazines will be located at the centre of the activity that the facility services for ease of access. The detail will be considered as part of the BFS.

### 4.8 Access Road

An access road will be required. Further studies will be undertaken during the BFS, and inquiries with landowners about potential route planning, to identify access routes for the transport of labour, equipment, and materials to the Project site during the construction phase and other activities during the operational, decommissioning, and closure phases.

### 4.9 Power Supply

Existing 400 kV transmission lines owned by Eskom run through the South Block to within approximately 700 m from the envisioned main plant intake substation (refer to Figure 5). The lines are new and have an adequate installed capacity for the mine requirements. Connecting distribution lines and a substation will, however, be required for the mining operations. This would be adjacent to the processing plant, as in Figure 2.

### 4.10 Timeline

The expected operational life of the pit is approximately 25 years. The construction and commissioning of support infrastructure will take approximately 5 years.

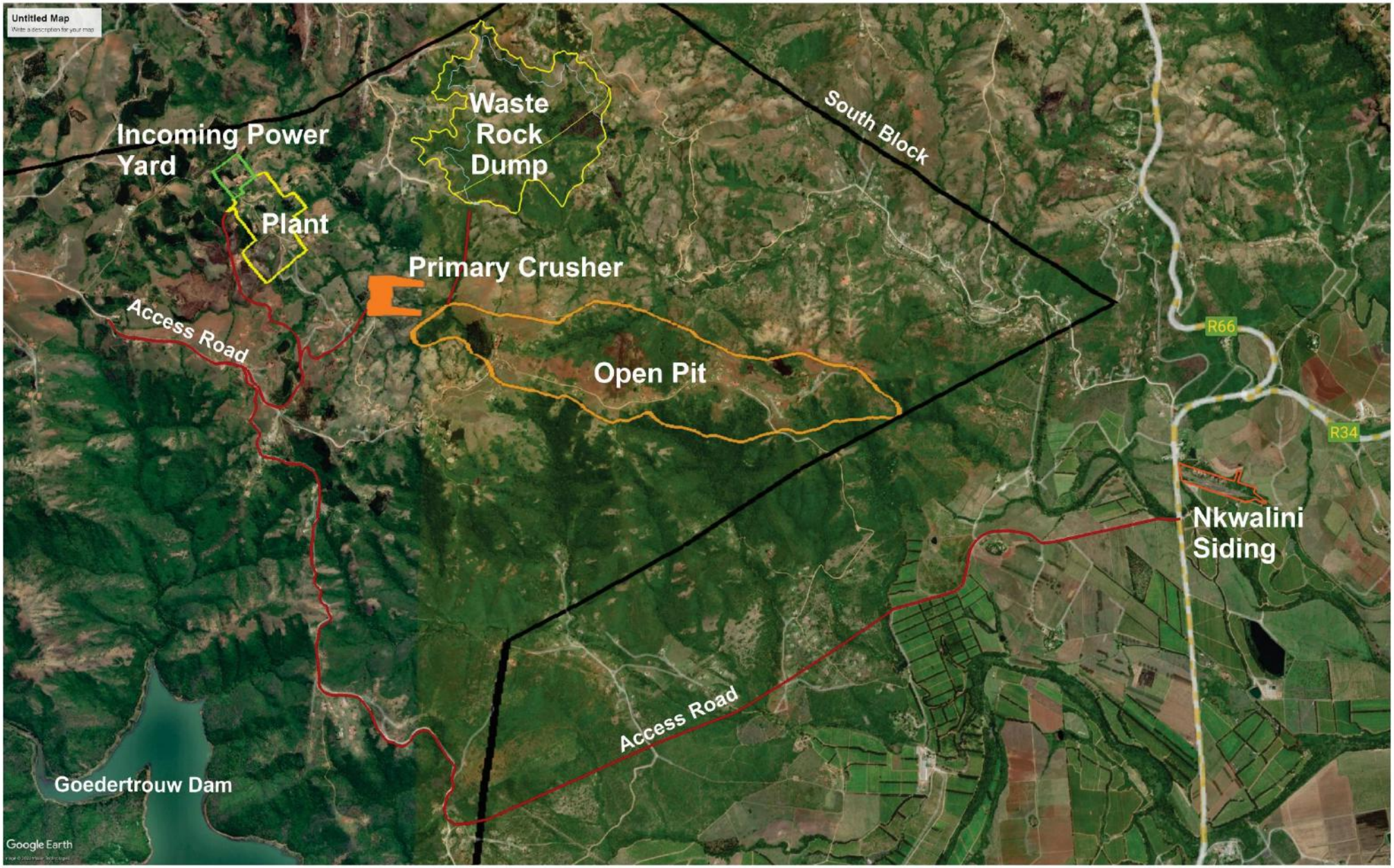


Figure 02: LAYOUT - Mine and Infrastructure

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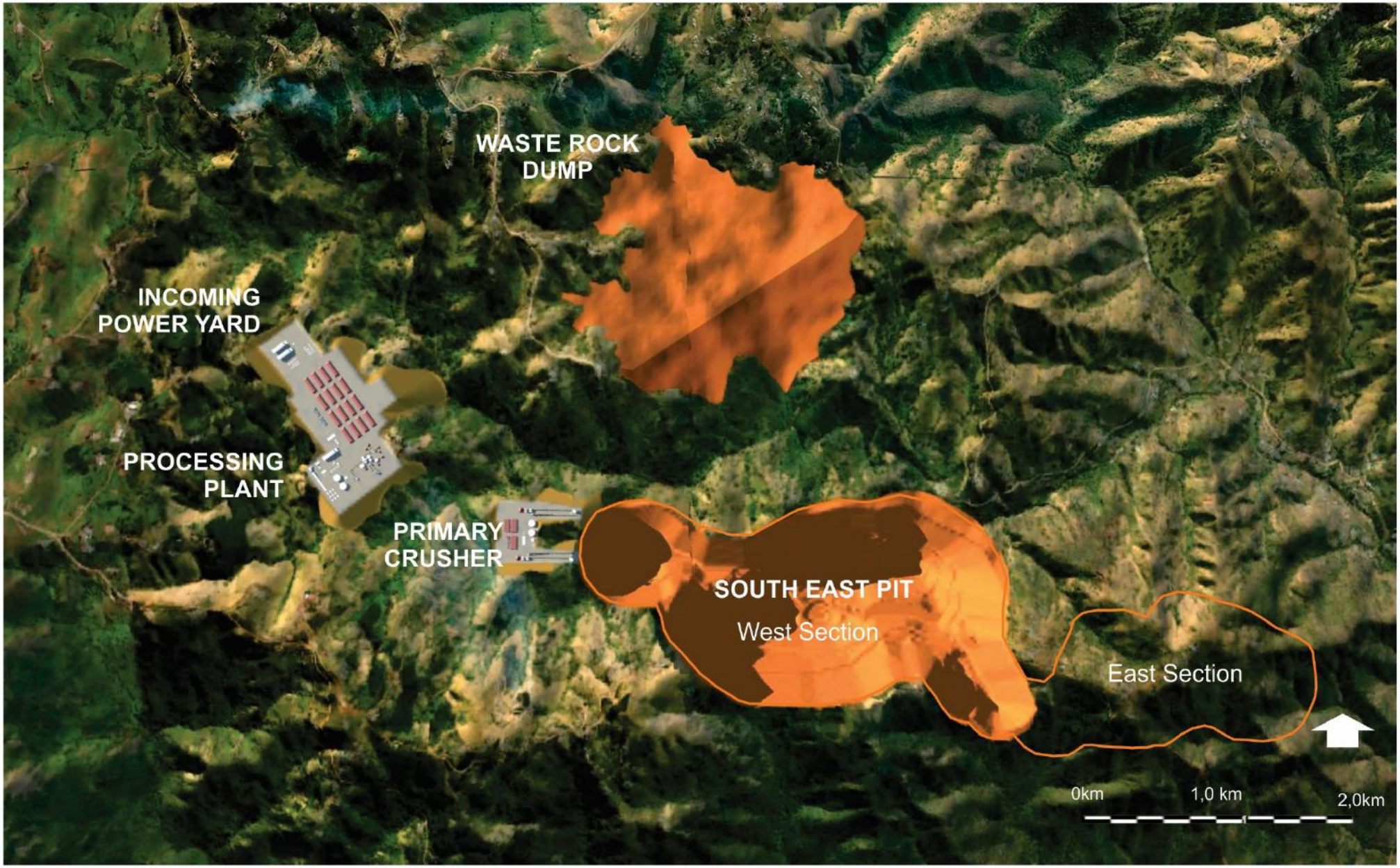


Figure 02-1: LAYOUT - Mine and Infrastructure

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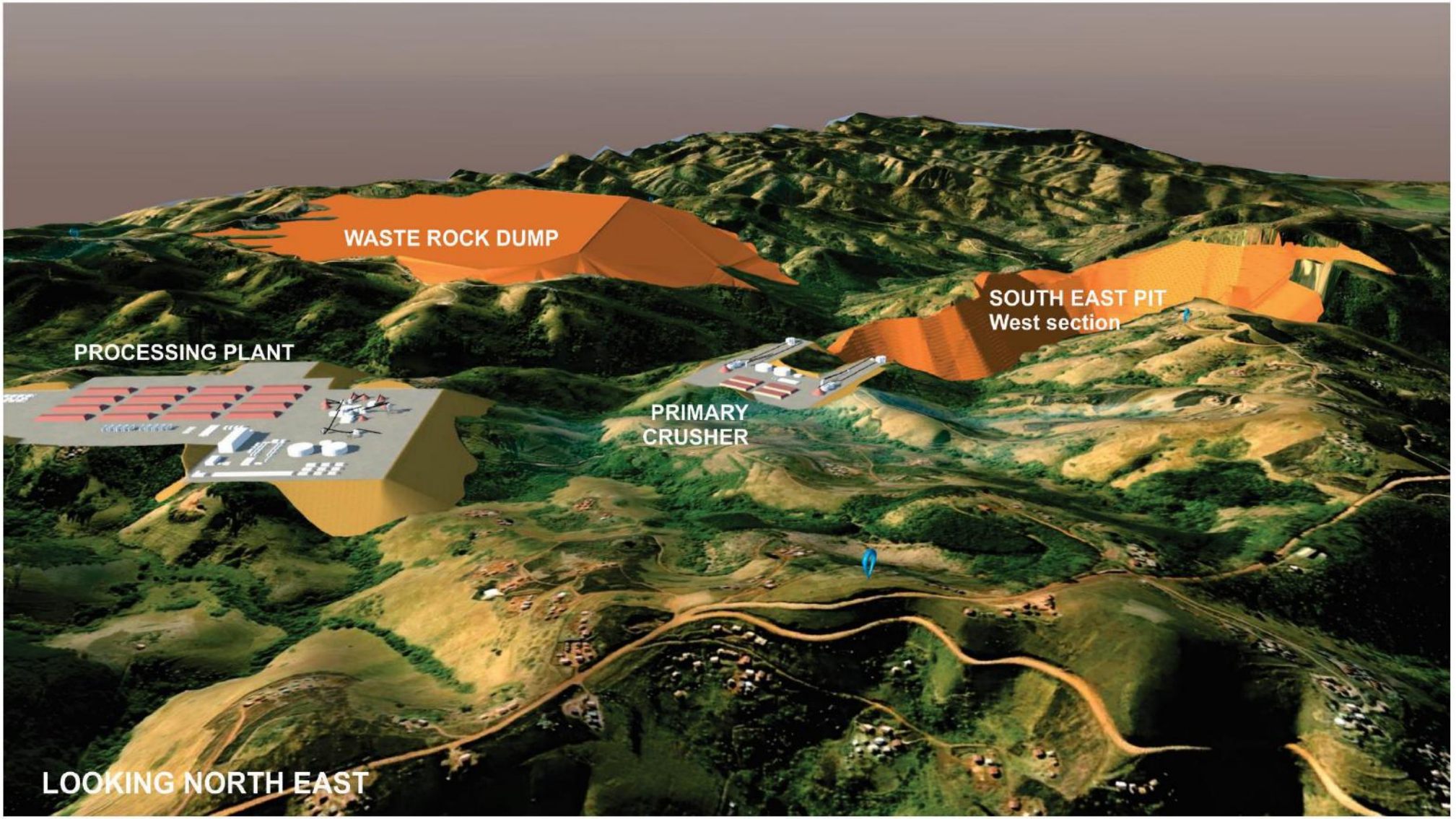


Figure 02-2: LAYOUT AERIAL - Mine and Infrastructure

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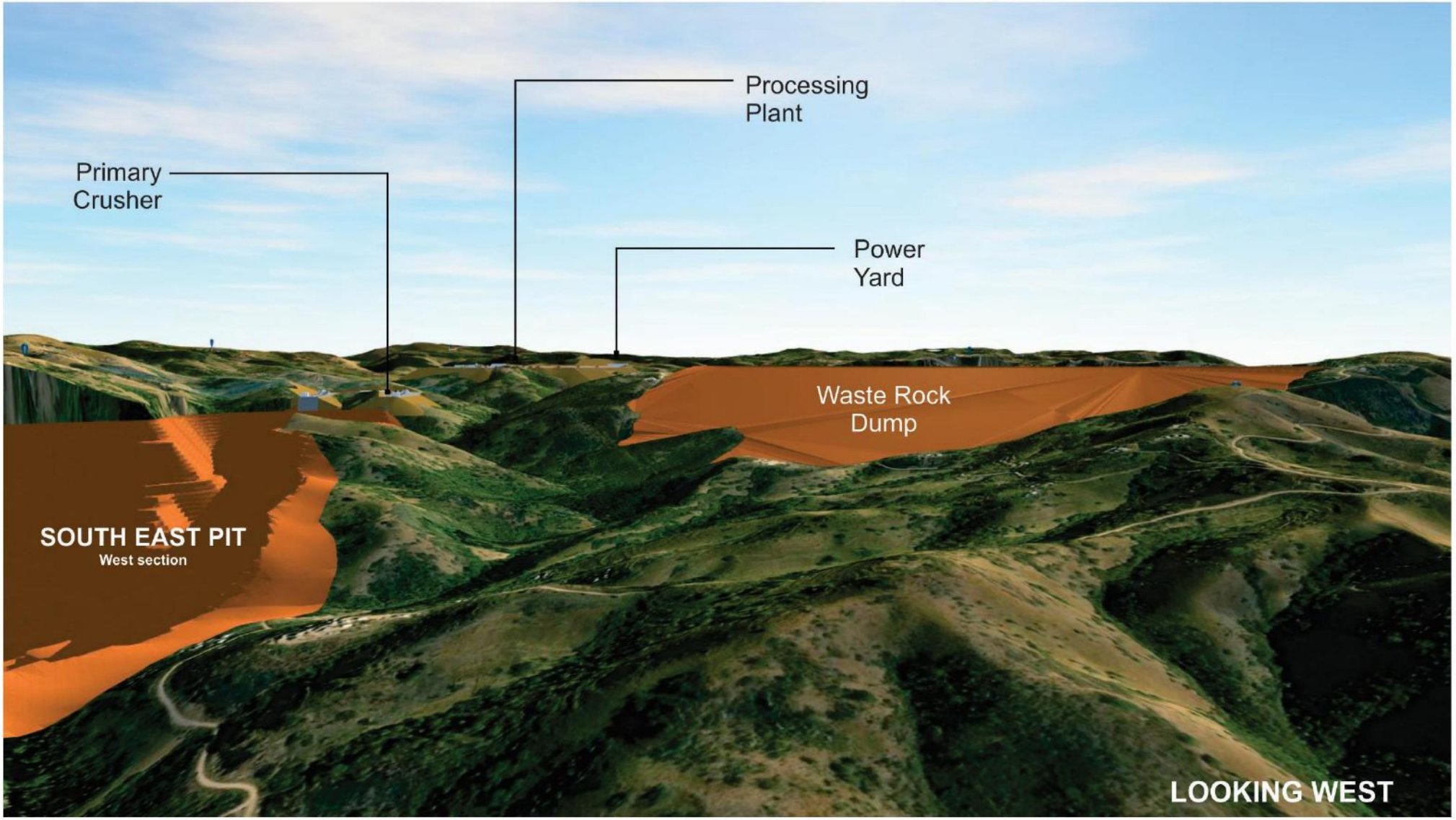


Figure 02-3: LAYOUT AERIAL - Mine and Infrastructure

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# 5. ENVIRONMENTAL SETTING

## 5.1 Landscape Character

The study area, a 10,0km radius about the North and South Blocks, comprises mostly hilly terrain initially dominated by Ngongoni Veld of the Sub-Escarpment Savanna Bioregion (Mucina and Rutherford 2006:510). This vegetation unit features dense, tall grassland. Wooded areas (thornveld) are found in the valleys at lower altitudes where this vegetation unit grades into KwaZulu-Natal Hinterland Thornveld. Typically this vegetation unit is associated with the rolling hills south of the Goedertrouw Dam. The Mhlatuze River valley and the tributaries that feed it are associated with Eastern Valley Bushveld (Mucina and Rutherford 2006:512), semi-deciduous savanna vegetation in a mosaic of thickets. Much of this vegetation is compromised through commercial agriculture (citrus and sugar cane), forestry, and rural development. However, remnants of the original vegetation are scattered throughout the study area.

Figure 3 locates the viewing point of the panoramas in Figures 4-1 to 4-10, which illustrate the natural and cultural characteristics of the study area's landscape, divided into six landscape character types of varying levels of quality and scenic value. These landscape character areas derivative of topography, landscape habitats, cultural landscape, and visual and sensory aspects. Figure 5 shows the spatial distribution of these types and their associated scenic quality and sensitivities as they occur today.

## 5.2 Landscape Character Types

### 5.2.1 Goedertrouw Dam and Environs

The Goedertrouw Dam is focal element of this landscape type as evidenced in View 15 (Figure 4-5) and View 17 (Figure 4-6) that illustrate the rugged terrain associated with it and its environs. Although tourism was once associated with the dam, it seems that the infrastructure to support this has not been maintained and is in a state of disrepair. Nevertheless, this landscape type, with its wooded valleys and hills along with the dammed up Mhlatuze River, represents a landscape type that is intact and exhibits a very positive character with distinctive features. It is considered the most scenic area within the study area, and culturally, this type of landscape would be valued as a tourist area and destination and would be sensitive to change.

### 5.2.2 Rivers and valley systems

The study area is typical of the KZN region with deep valley systems and grassed hills. Several river systems cross the study area. In the south, they are mostly associated with the Mhlatuze System, specifically upstream of the Goedertrouw Dam. For the most part, they remain intact; however, downstream of the dam, the valleys are associated with commercial citrus and sugarcane farming. This landscape type also exhibits positive character with some distinct and valued features that combine to give the experience of unity, richness, and harmony and is also sensitive to change if inappropriately dealt with.

### 5.2.3 Grassland and Associated Open Bush on Hills and in Valleys

This landscape type is the most widespread within the study area, and the proposed mine and associated infrastructure occur within it, as illustrated in Figure 5. The panoramas in Figures 4-2, 4-7 to 4-10 show the nature of this landscape type. Typically the hills contain villages and homesteads with some introduced tree species. The valleys contain some woodland and exotic species which have begun to take hold. Some of the original grasslands remain intact, but it is slowly being compromised with the growth of the villages and

homesteads and overgrazing in some areas. Nevertheless, within the context of the sub-region, and the combination of cultural and natural elements, the areas exhibit positive characteristics but with evidence of degradation and erosion of the original natural features, resulting in areas of mixed character. Due to the rugged topography and streams, this landscape type would be potentially sensitive to change in general and could be detrimental if inappropriately dealt with.

#### 5.2.4 Rural Villages and Homesteads

This landscape type is associated with the previous type, specifically within the North and South Blocks as illustrated in Figure 5. Culturally, it is rich and exhibits valued features that combine with the ruggedness of the natural landscape to create an experience of unity and harmony. Refer to Figures 4-7 to 4-9. However, with densities increasing, there is evidence of degradation and erosion of features resulting in areas of a mixed character, particularly in the south and southeast of the study area.

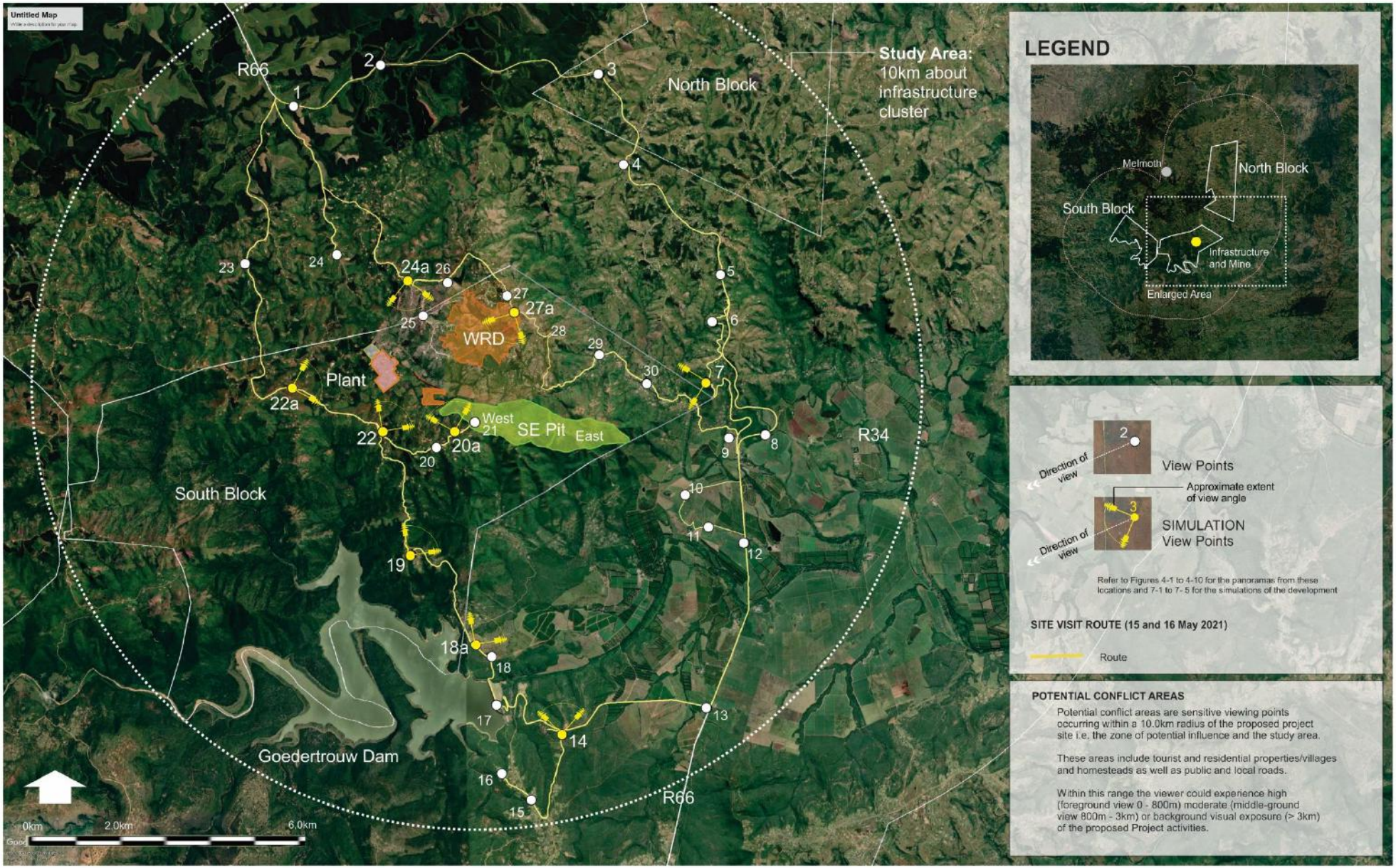
#### 5.2.5 Industrial Agriculture and Forestry

Large sections of the study area have been converted to industrial agriculture and forestry, as illustrated in Figure 5. Forestry and sugarcane fields dominate the area south of Melmoth. The Mhlatuze River valley downstream of the dam is dominated by citrus and sugar cane
, and in the far south of the study area, sugar cane fields have been cultivated (refer to views 1 and 2 in Figure 4-1 and the views in Figure 4-4). This is a typical landscape type within the sub-region, exhibiting some positive characteristics.

#### 5.2.6 Urban Areas and Power Utilities

The only urban development within the study area is Melmoth (central west of the study area), with the lowest scenic value and the least sensitive to change.

Two ESKOM transmission lines run through the study area and pass immediately west of the proposed mine and primary crusher and plant sites. These corridors are considered to have the lowest scenic valley within the study area.




# Figure 03: VIEW SITES

Refer to Figure 3 for location of viewing points and homesteads

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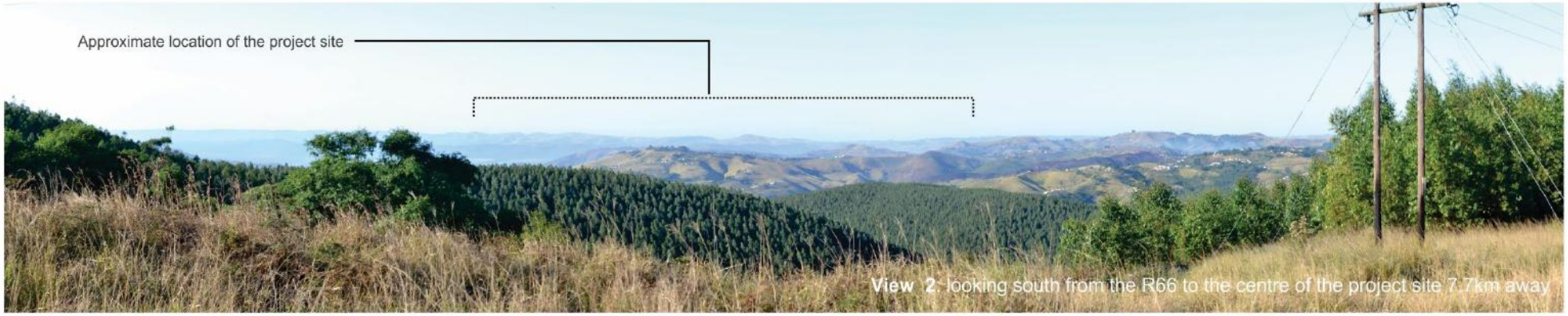


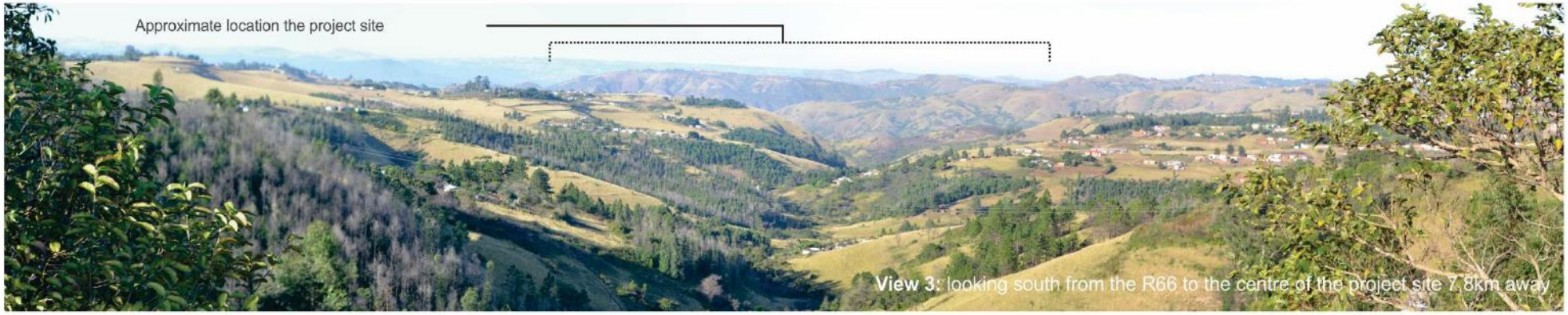


Figure 04-1: LANDSCAPE CHARACTER - Views 1, 2 and 3

Refer to Figure 3 for location of viewing points

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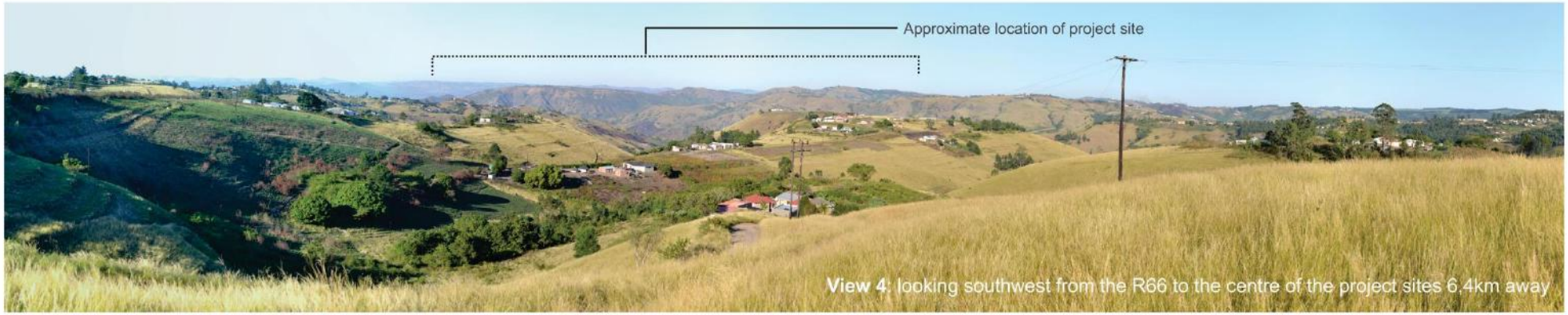



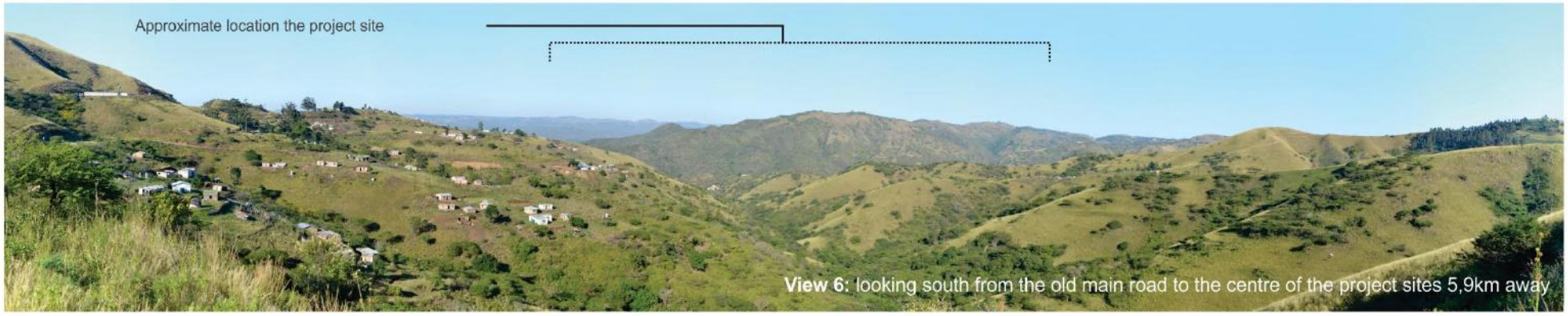


Figure 04-2: LANDSCAPE CHARACTER - Views 4, 5 and 6

Refer to Figure 3 for location of viewing points

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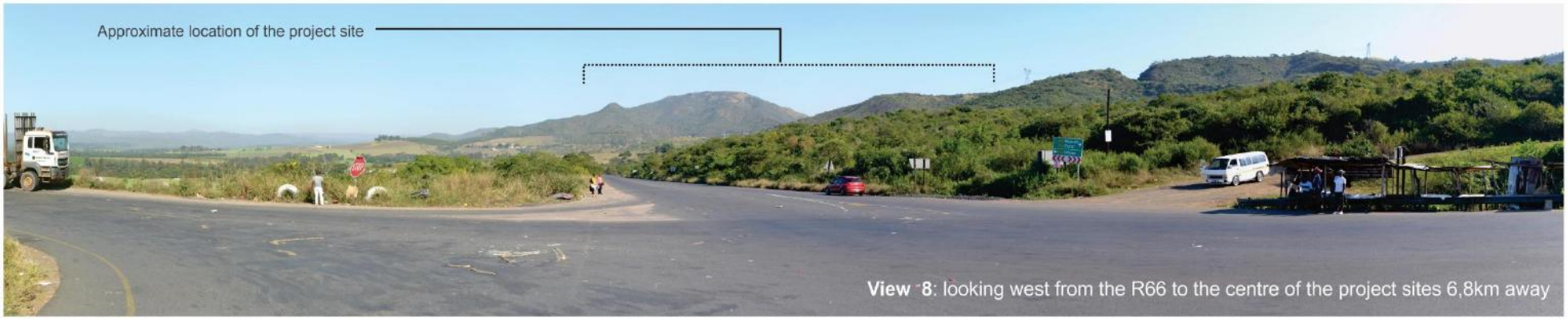



Figure 04-3: LANDSCAPE CHARACTER - Views 7, 8 and 9

Refer to Figure 3 for location of viewing points

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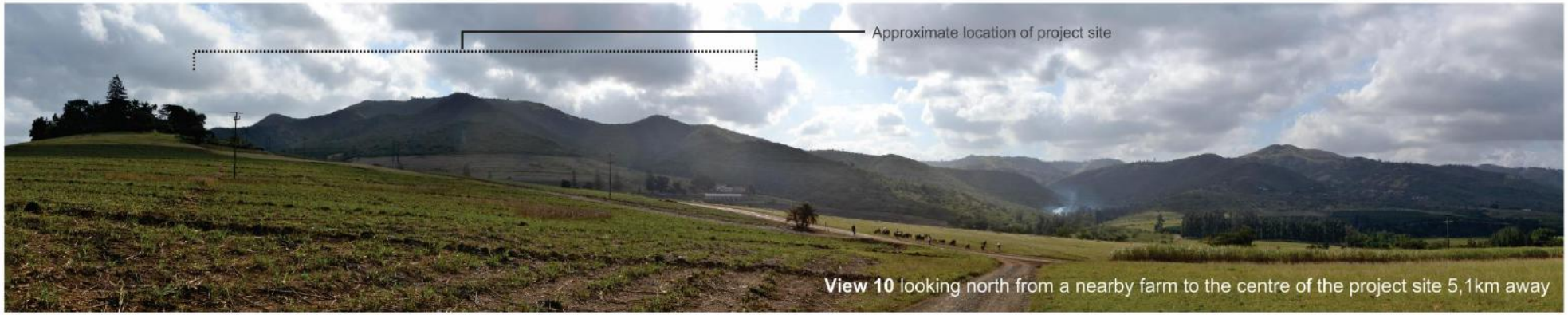


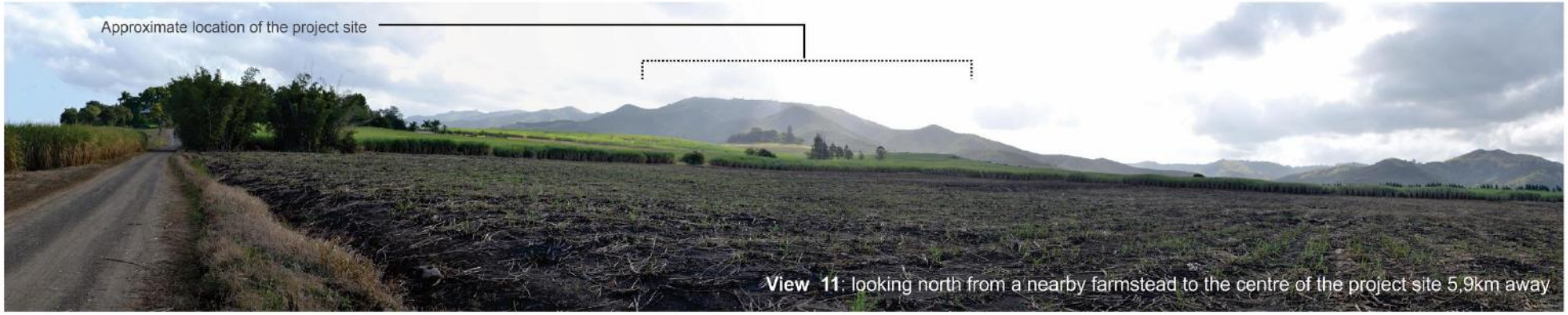


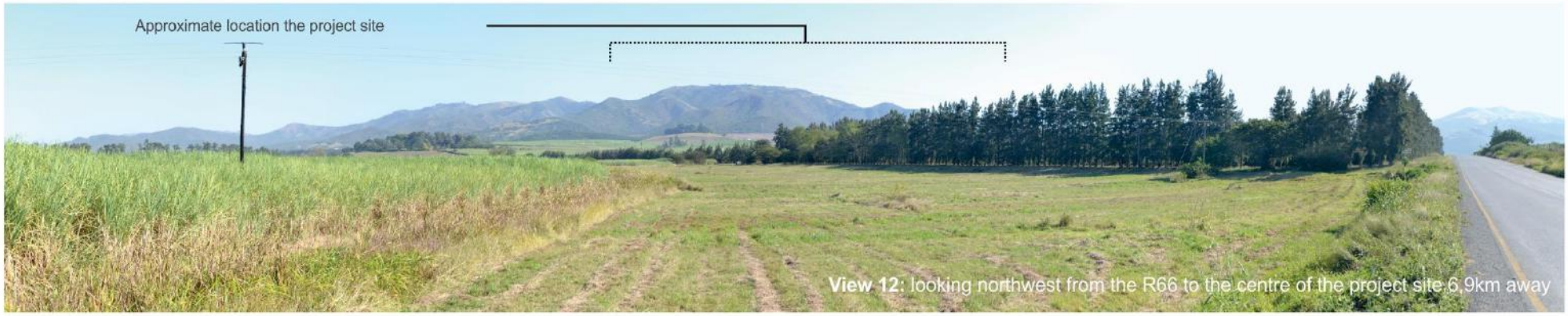


Figure 04-4: LANDSCAPE CHARACTER - Views 10, 11 and 12

Refer to Figure 3 for location of viewing points

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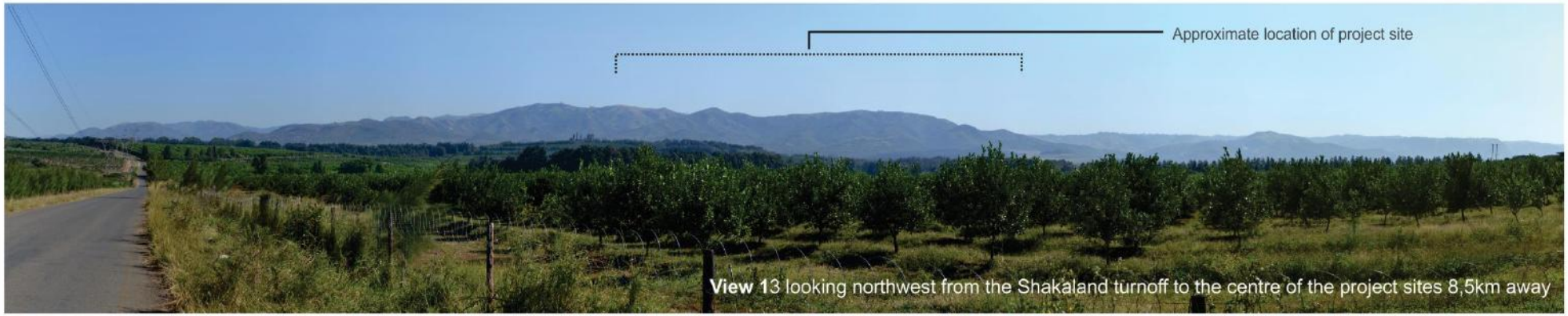


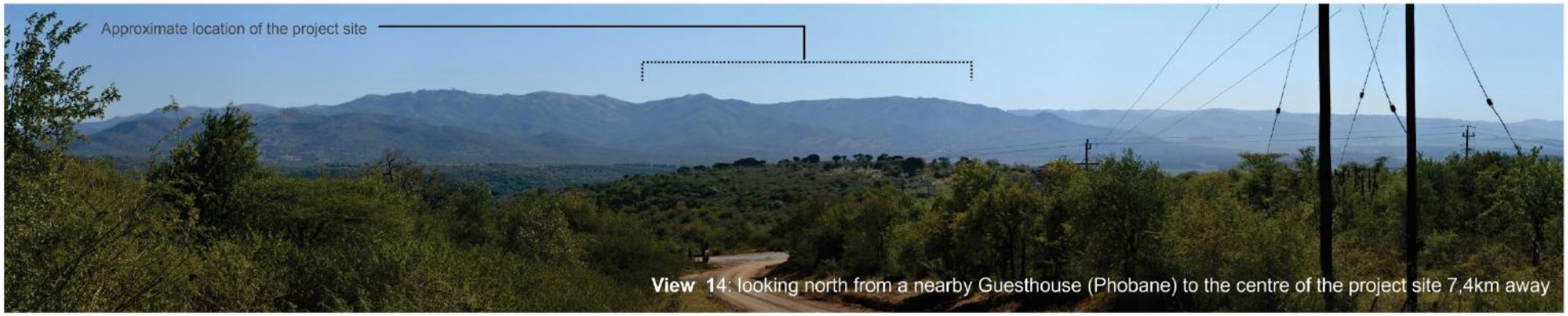


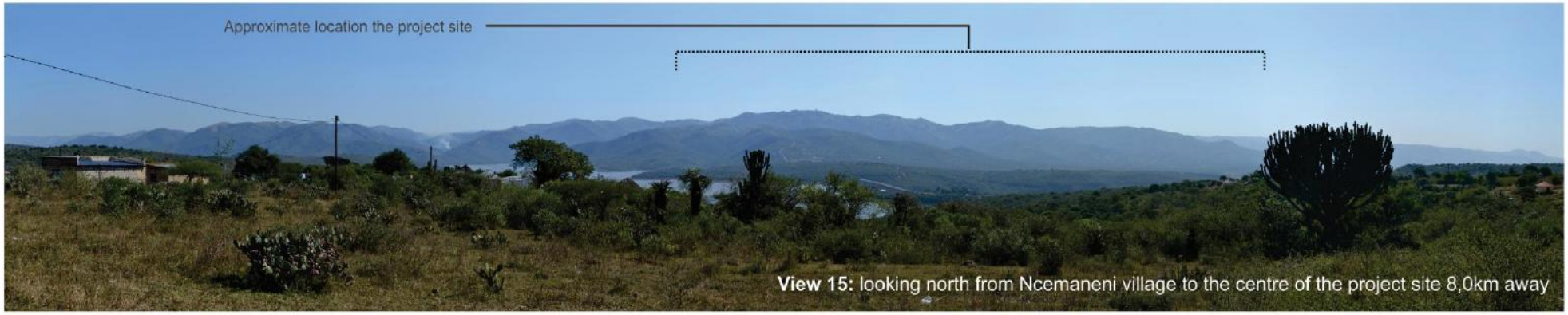


Figure 04-5: LANDSCAPE CHARACTER - Views 13, 14 and 15

Refer to Figure 3 for location of viewing points

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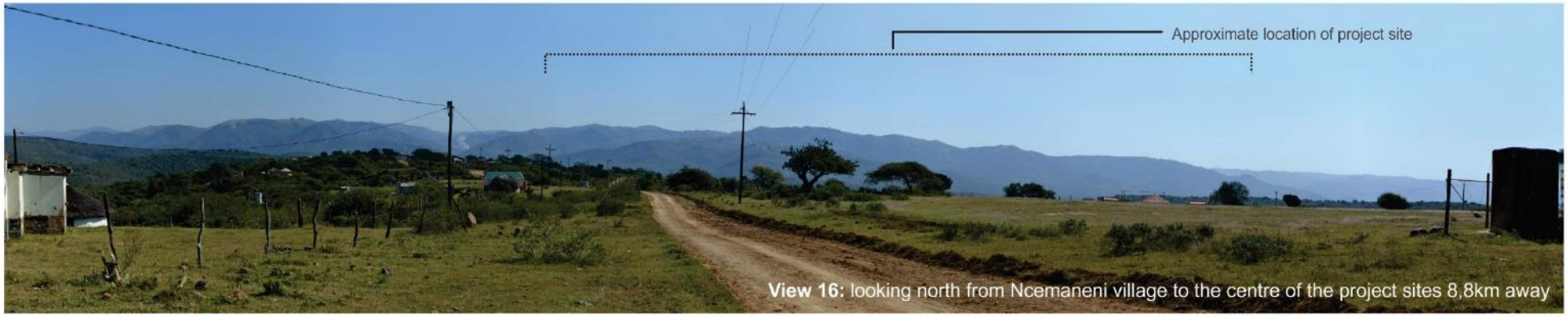



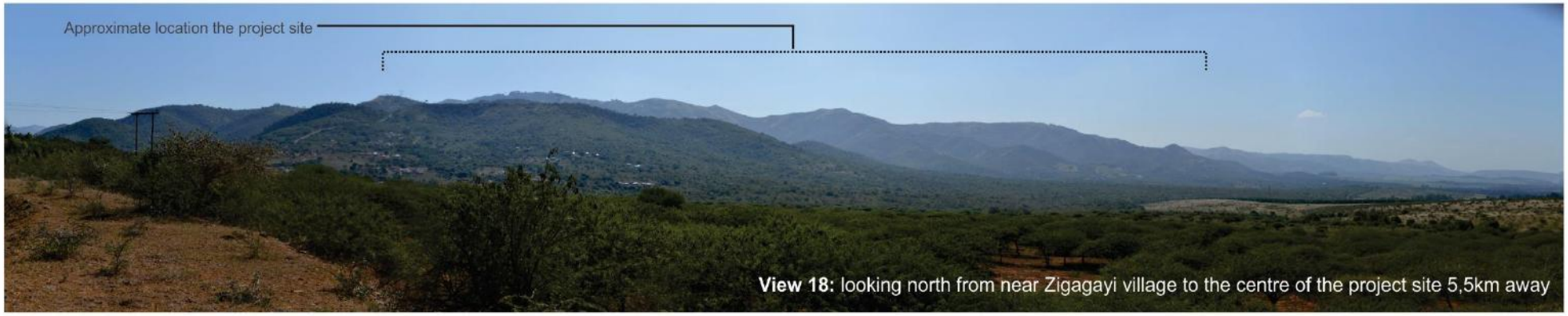


Figure 04-6: LANDSCAPE CHARACTER - Views 16, 17 and 18

Refer to Figure 3 for location of viewing points

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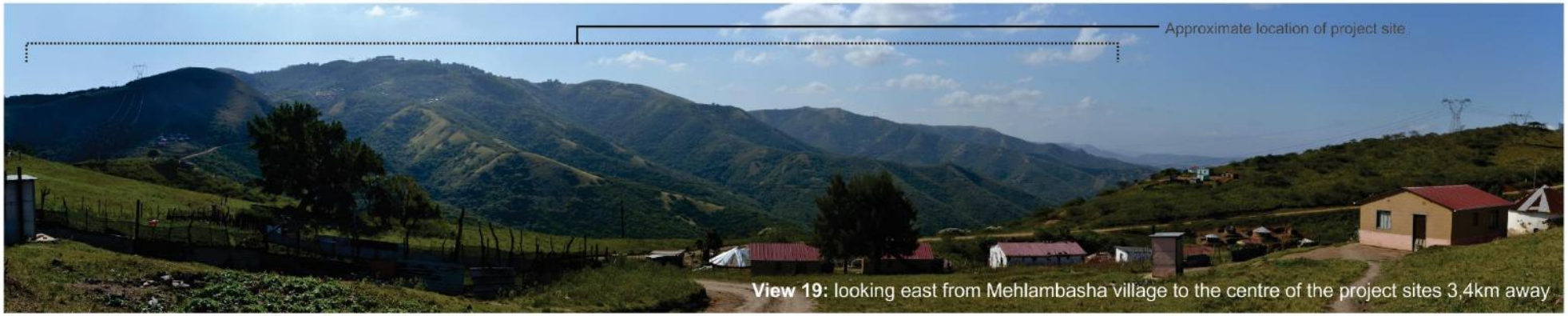


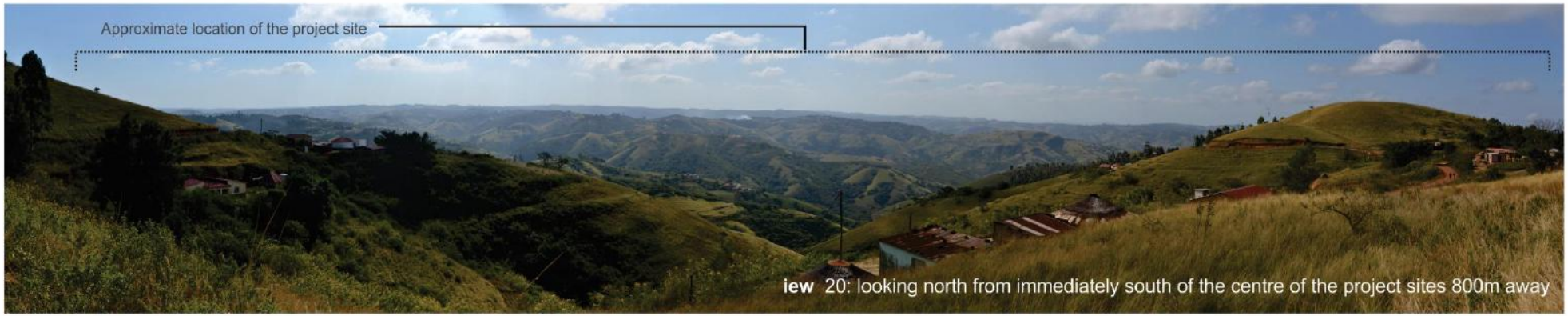


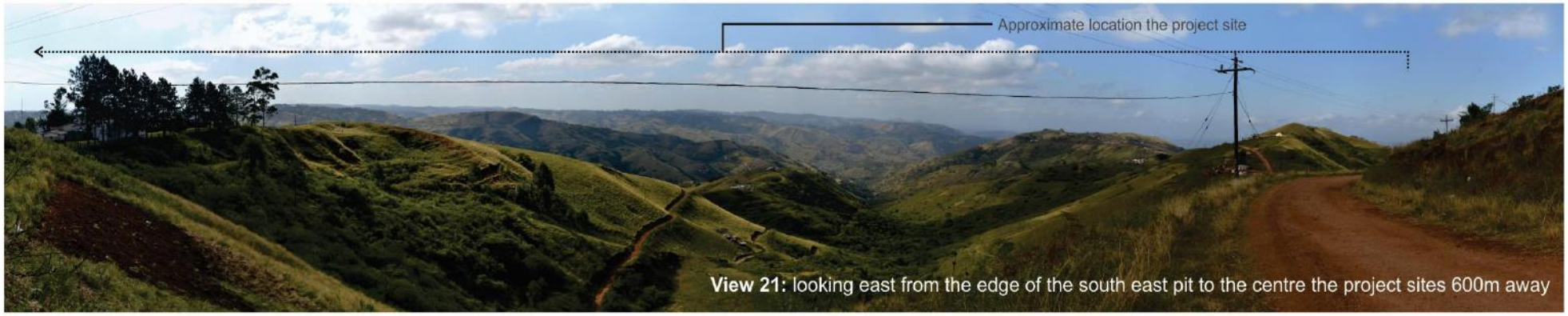


Figure 04-7: LANDSCAPE CHARACTER - Views 19, 20 and 21

Refer to Figure 3 for location of viewing points

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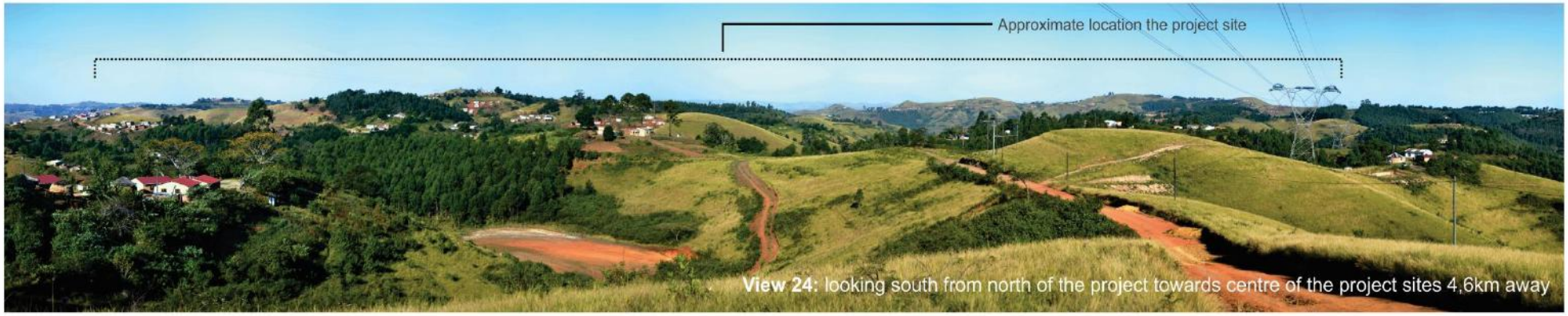


Figure 04-8: LANDSCAPE CHARACTER - Views 22, 23 and 24

Refer to Figure 3 for location of viewing points

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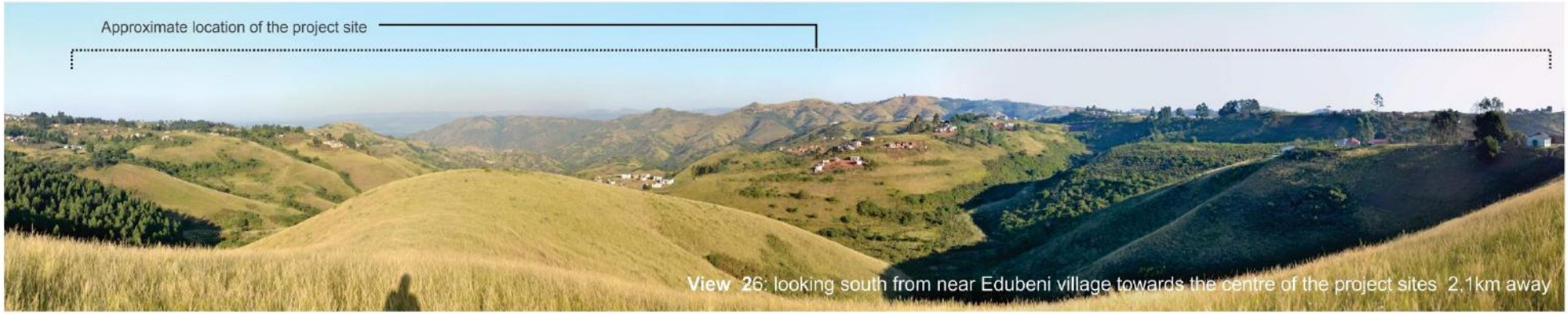


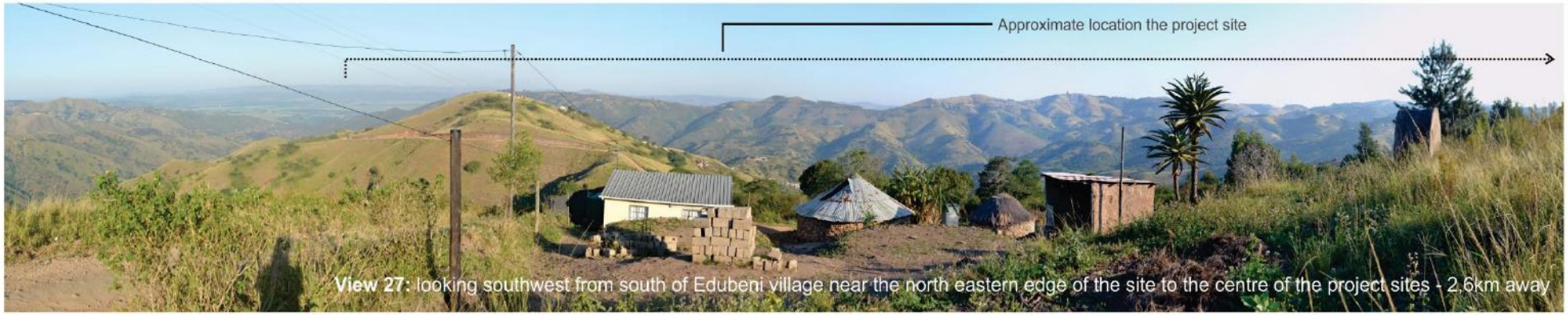


Figure 04-9: LANDSCAPE CHARACTER - Views 25, 26 and 27

Refer to Figure 3 for location of viewing points

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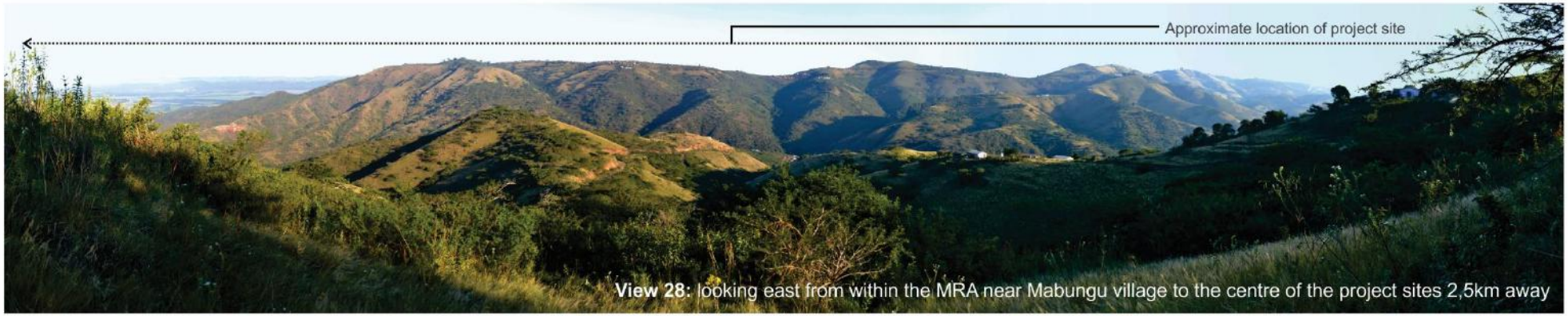


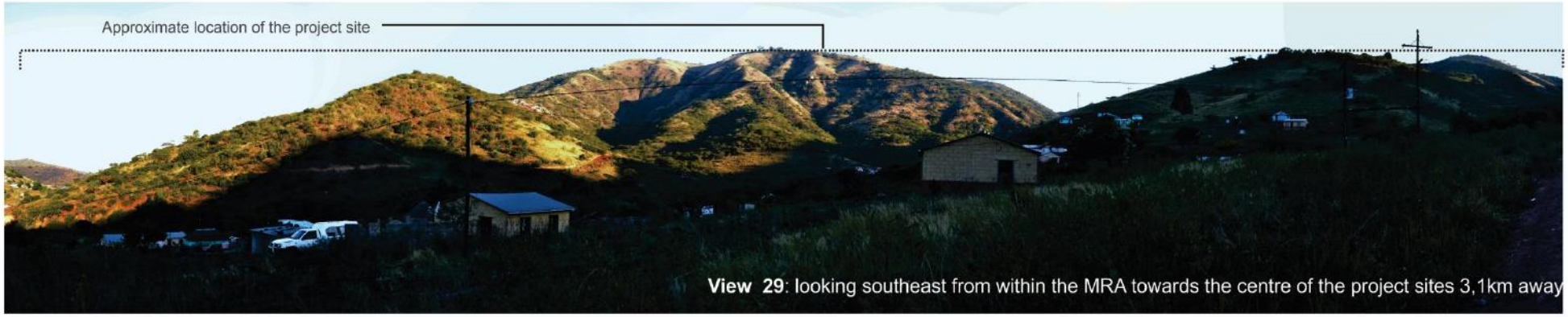


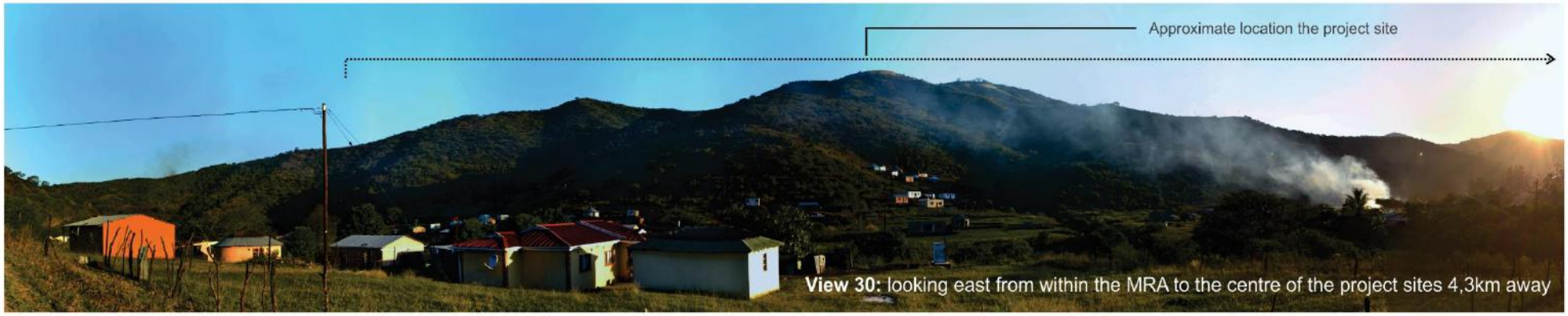


Figure 04-10: LANDSCAPE CHARACTER - Views 28, 29 and 30

Refer to Figure 3 for location of viewing points

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# 6. VISUAL RESOURCE, LANDSCAPE SENSITIVITY AND SENSE OF PLACE

## 6.1 Visual Resource Value, Scenic Quality, and Landscape Sensitivity

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.

The sensitivity of the study area's landscape can be defined as high, medium, or low (as indicated below and in Figure 5 for each of the landscape character types), and 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).

When the criteria listed in Appendix A are considered and understood within the context of the sub-region, a visual resource value of *low* (power utility and urban areas), *moderate* (agriculture, villages, and homesteads on hills and grassland hills and open bush on low lying hills), and *high* for the Goedertrouw Dam and environs and other river and valley systems.

The mine and associated infrastructure occur within a moderate landscape type with nearby power line infrastructure, rated *low*. Generally, because most of the areas surrounding the site are rated *moderate* to *moderately high* in scenic value, the area is potentially sensitive to change if the change is inappropriately dealt with. Table 1 summarises the various local landscape character types and their consequent sensitivities. Refer also to Figure 5.

**Table 1: Value of the Visual Resource**
(After LiEMA 2013)

| High | Moderate | Low |
|---|---|---|
| Goedertrouw Dam and surrounding woodland valleys and hills; other River and Valley systems | Natural grassland on hills and open bush on low lying hills; villages and homesteads on hills; Agricultural lands and forestry<br><br>. | Urban development and power infrastructure |

| High | Moderate | Low |
|---|---|---|
| This landscape type is considered to have a *high* value because it is a:<br>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.<br>Sensitivity:<br>It is sensitive to change in general and will be detrimentally affected if the change is inappropriately dealt with. | This landscape type is considered to have a *moderate* value because it is a:<br>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.<br>Sensitivity:<br>It is potentially sensitive to change in general and change may be detrimental if inappropriately dealt with | This landscape type is considered to have a *low* value because it is a:<br>Minimal landscape, negative with few, if any, valued features.<br>Sensitivity:<br>It is not sensitive to change in general and scope for positive enhancement frequently occurs |

### 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. Although the activities and land use in the study area are expected within the sub-region, the areas immediately adjacent to the Goedertrouw Dam are considered potential tourist destinations. Shakaland and the Phobane Guest House and nature area are currently located near the dam. The tourists potentially treasure these areas from within the region and may visit the area for recreational and tourist activities. However, Shakaland appears to be either abandoned or non-operational because of COVID restrictions on tourism and travel.[**]

The combination of the cultural and agricultural/forestry activities, the distinctiveness of the rugged incised topography, and the relative intactness of the original landscape give the study area a relatively strong sense of place. One, in which new development needs to be carefully managed such that the combination of mining and development activities associated with the Project and the landscape are not entirely at odds with each other.

[**] Base on the fact that their website doesn't function, and emails are not being answered, it is assumed that the facility has indeed ceased to operate.

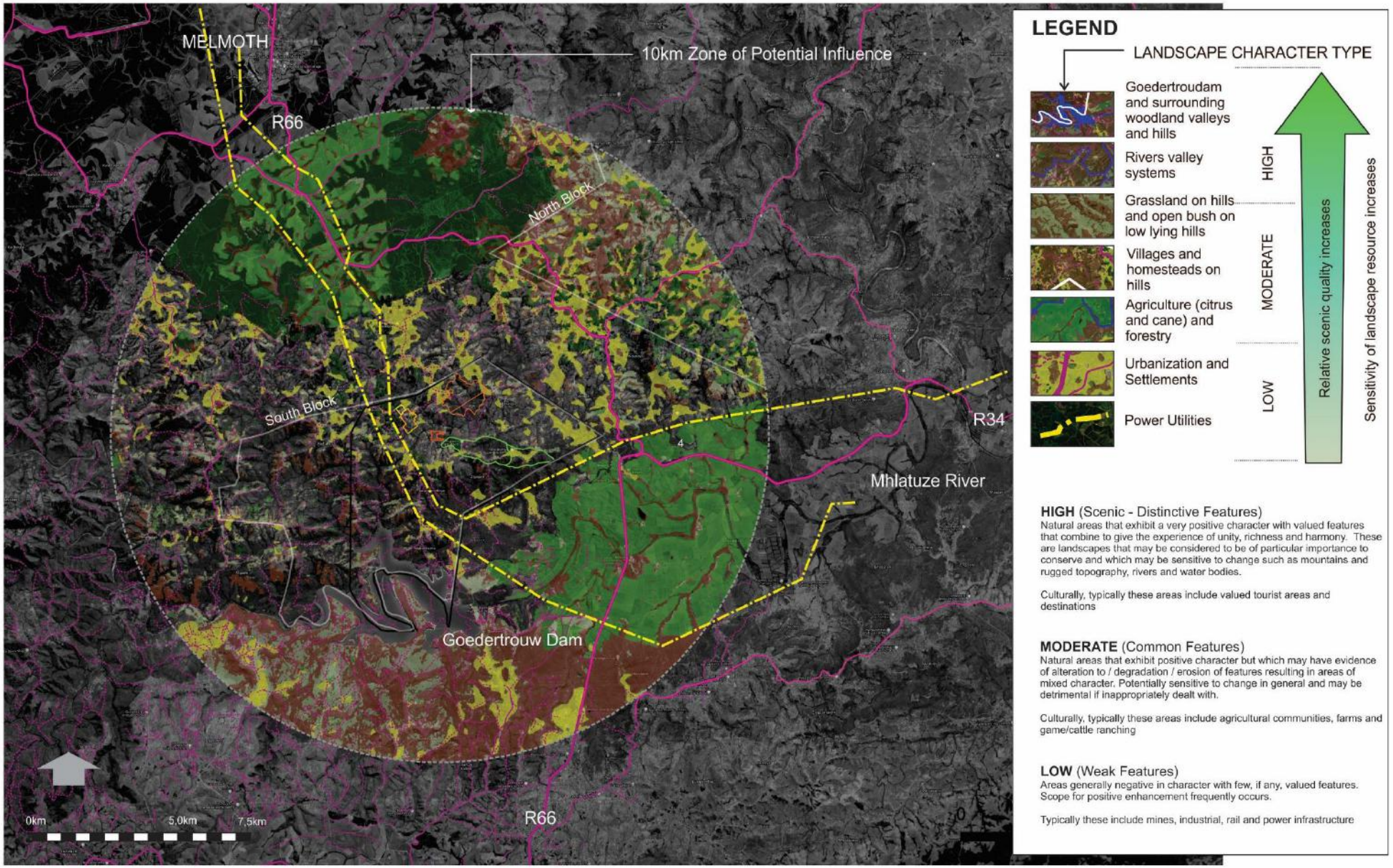


Figure 05: LANDSCAPE CHARACTER SENSITIVITIES

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## 7. LANDSCAPE IMPACT

The proposed mining activities occur in moderate[6] to high[7] rated landscape character types, i.e. Grassland hills and open bush and villages and homesteads on grassland hills (Figure 5). The Southeast pit (up to 4,0km long and 1,0km at its widest), the deposit of materials at the WRD (approximately 420 ha) and the development of the processing plant, power yard and primary crusher, will cause major changes to the existing natural and cultural landscape through the loss of features and perceptual aspects that contribute to the existing character and distinctiveness of the landscape described in Section 5.

In addition, sizeable portions of the study area's landscape have a low visual absorption capacity (VAC). The existing landscape's ability to absorb physical changes caused by the project without transforming its visual character and quality is limited. This transformation is evident in the aerial perspectives in Figures 2-1 to 2-3. The clearing of vegetation and major earthworks during the construction period, along with the extraction and transportation of materials from the southeast pit in the operational phase, will contrast dramatically with the natural hues, characteristics, and topography of the study area's landscape.

The landscape impact is rated HIGH**.**

[6] Features that exhibit a positive character, but which have evidence of degradation resulting in areas of mixed character.
[7] Features that exhibit positive character with valued features that combine to give an experience of unity, richness and harmony.

## 8. INTENSITY OF VISUAL IMPACT

It has been established that the landscape impact of the proposed project would be high. Concurrently, visual impacts will result from the activities and infrastructure in all Project phases, i.e. establishment, operational, and decommissioning/closure.

Activities associated with the Project will be visible to varying degrees and from varying distances around the project sites. During the establishment phase, the Project's visibility will be influenced by preparatory activities, primarily earthworks, infrastructure establishment, and the excavations associated with the southeast pit. During the operational phase, the processing plant, primary crusher, substation (power yard), and the southeast pit will be the focus of views from within the study area.

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?

The results of the Comments and Response Report (CRR) dated 25 April 2022 indicate that visual issues are a concern to some of the I&APs. A few people raised the issue as:

- 'Open cast mining itself is a scar on the landscape' (CRR:30),
- [the mine will cause] pollution and aesthetic altering of the landscape …" (CRR: 31 and 34)
- '[the mine will] 'permanently alter the natural landscape' (CRR:176)

The Project is in a 'Greenfields' area, surrounded by rural residential development and a few tourism facilities, which would also raise sensitivity towards it (refer to Figure 5). Typically, sensitive receptors include:

- Users of all outdoor recreational facilities including public rights of way, whose intention or interest is on the landscape i.e. nature reserves.
- Communities where development results in negative 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 traveling through recognized nature reserves or areas of declared scenic beauty (i.e. tourist routes)

Viewing areas, typically from residences and tourist facilities/routes are 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 appreciating 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 that recognized areas of scenic beauty.
- People at their place of work.

### 8.1 Sensitive Viewers and Locations

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

- Residential properties associated with rural development on the hills in and around the Project site north and east of the ridgeline are indicated in Figure 7-1.
- Residential/homestead, farming and tourist facilities south of the ridgeline and associated with the Goedertrouw Dam and environs, including Shakaland.
- Travellers along the R66 main road.

Sensitive viewing locations occur throughout the study area and across the proposed mining area, making the development highly susceptible to visual and aesthetic impacts (refer to Figure 6). In the worst-case scenario, people living and passing through the study area will experience significant changes and loss of existing positive views (refer to the simulations in Figures 8-1 to 8-9), notably due to the scale and extent of the mine's activities. Also, due to the low VAC of the study area surrounding the mine's activities, elevated views to the development will be open and unobstructed (i.e. project components would dominate the view) as they would comprise a significant portion of any given view.

### 8.2 Visibility

Project components are planned within moderate to highly rated landscape types that have a low VAC making the Project potentially highly visible to people living within a 5 km radius of project components and along the R66 and local roads. However, the ridgeline south of the mine acts as a visual divide between views from the far south and west. The screening effect of the ridgeline is evident in the viewsheds presented in Figures 7-1 to 7-3. The most visible aspect of the mine is the open pit, as it would be visible from both north and south of the ridgeline, as indicated in Figure 7-4. Viewers from the south towards the mine would, however, only observe a receding ridgeline as it's mined away. Refer to the simulations in Figures 8-2 to 8-4. Views from east of the mine are mostly screened by topography, as illustrated in the viewshed in Figure 7-5. Although, the WRD would be visible from areas associated with the citrus farms in the Mhlatuze valley and on the hills east and north east of the it as illustrated in the viewshed in Figure 7-3.

A high visual impact is expected for sections of the study area immediately surrounding the site up to distances of 3 km to 5 km in an arc from the southwest through to the northeast of the mine as indicated in Figure 7-5.

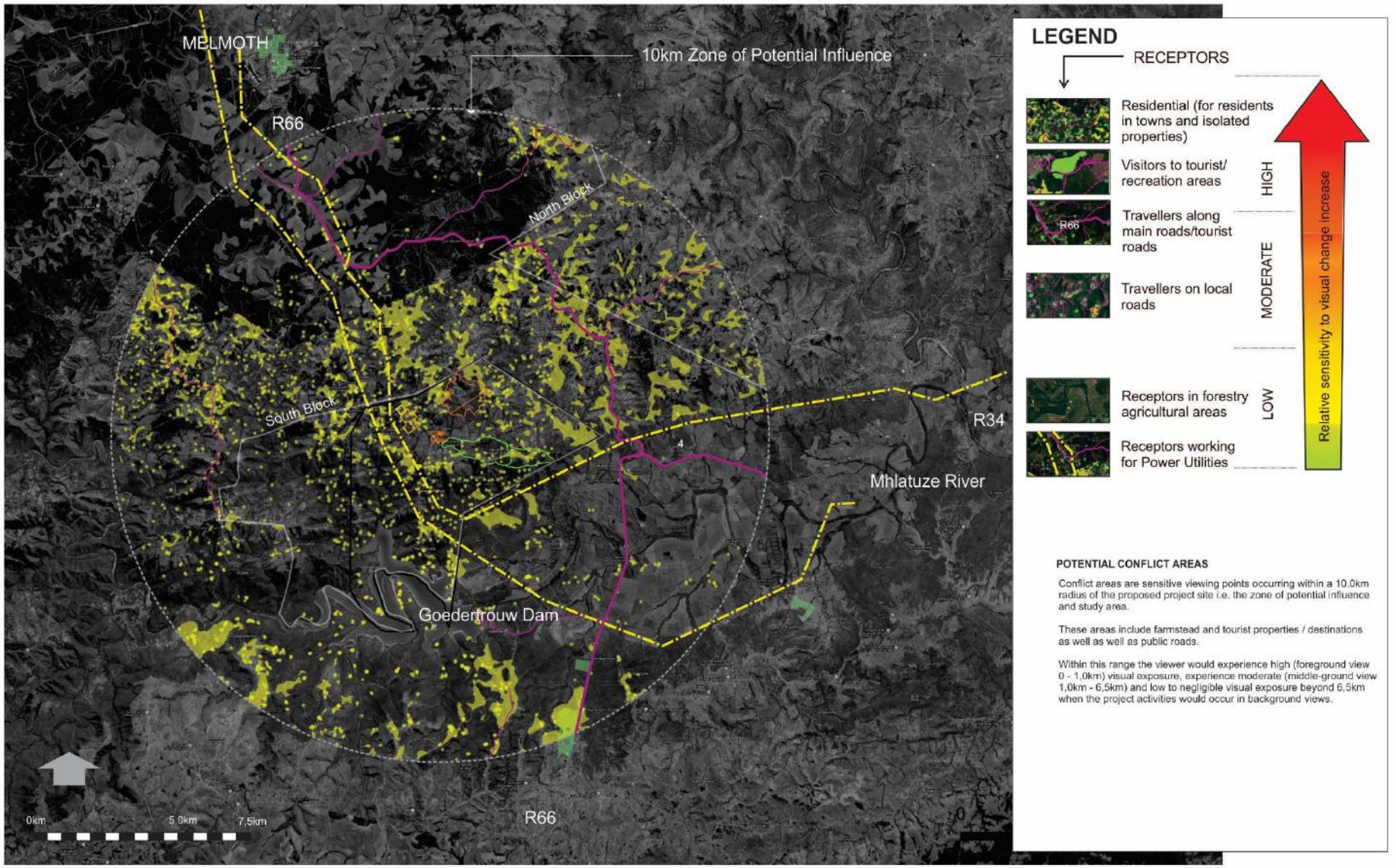


Figure 06: RECEPTOR SENSITIVITIES

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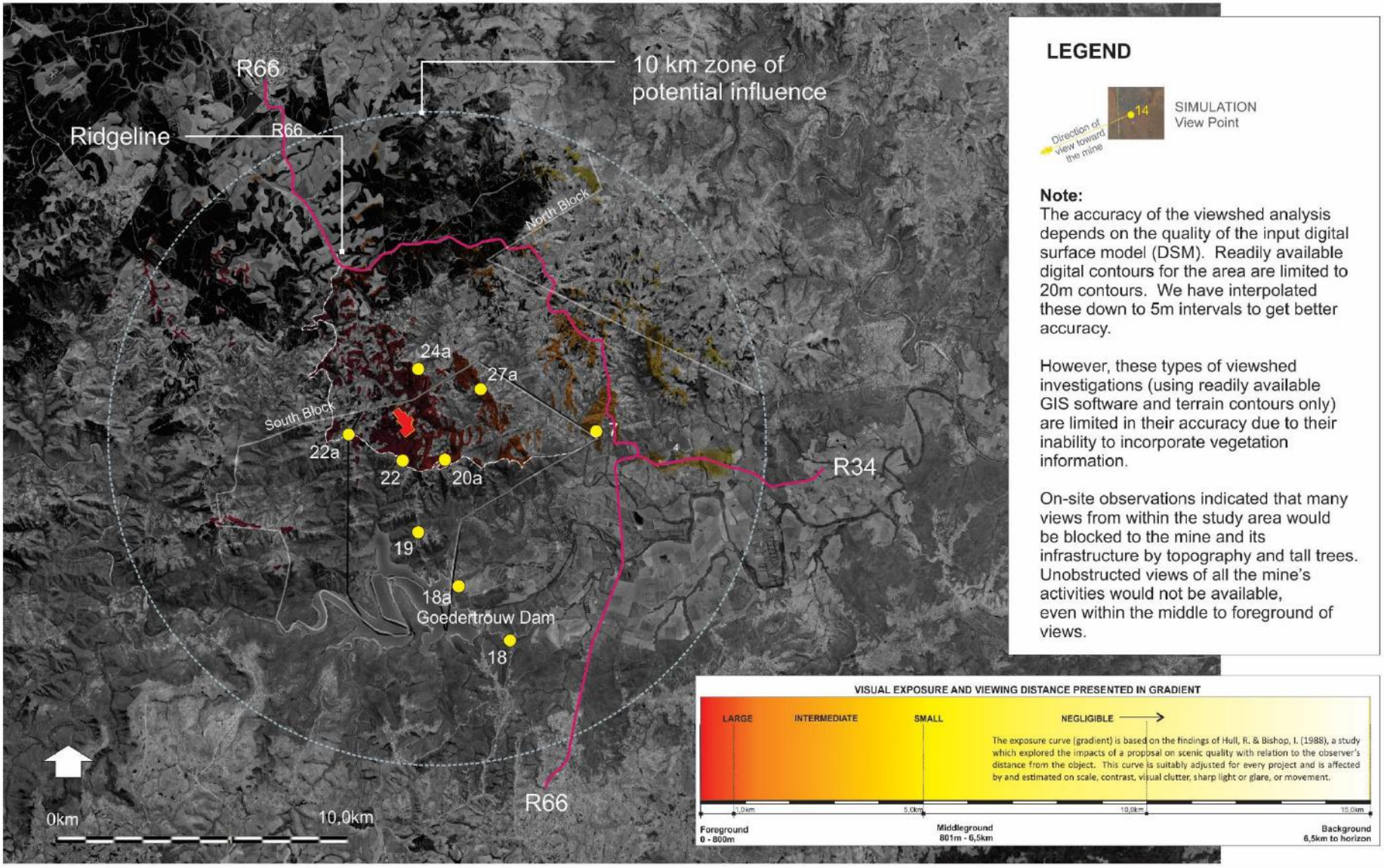


Figure 07-1: VIEWSHED ANALYSES - PROCESSING PLANT and POWER YARD

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

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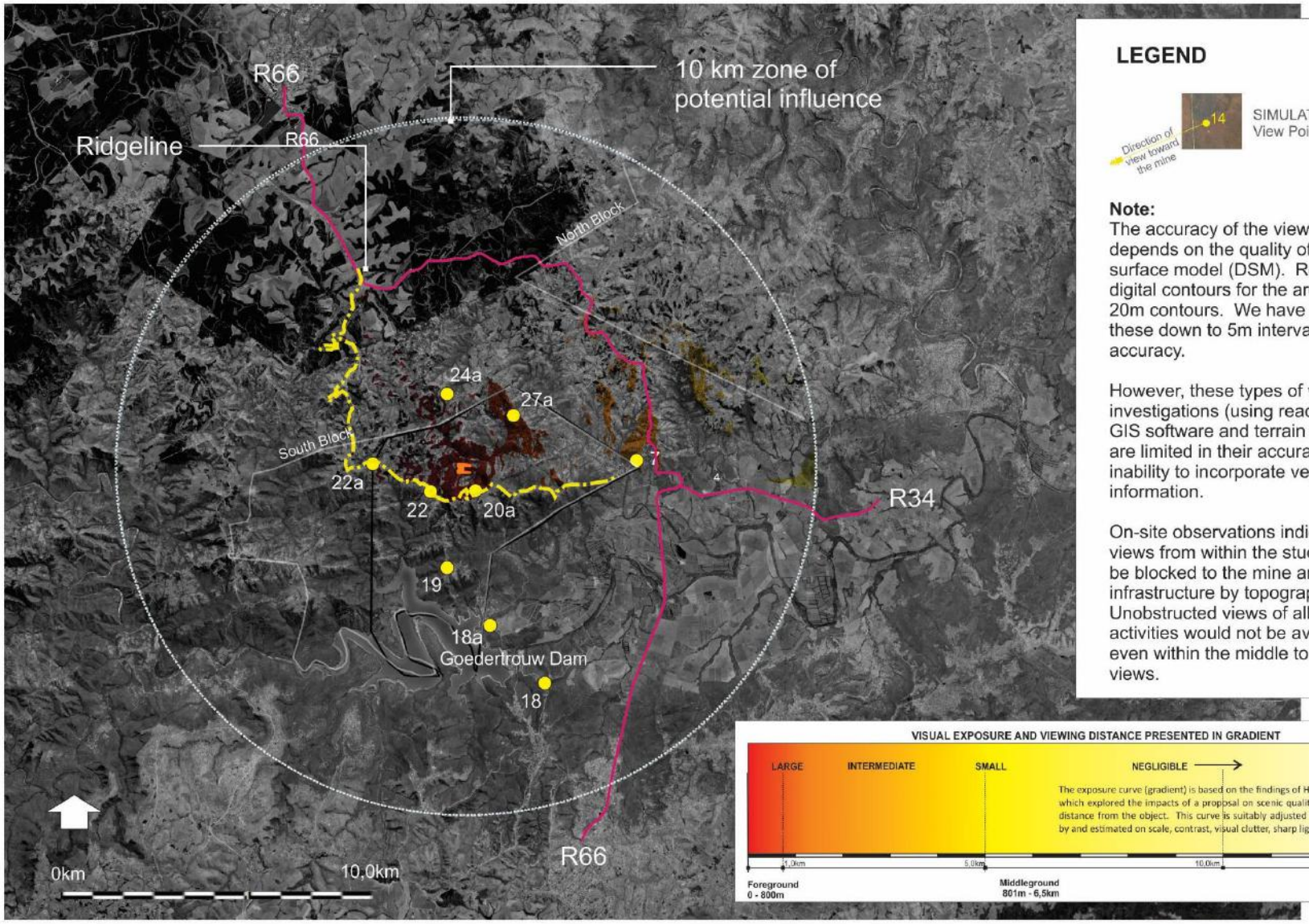


Figure 07-2: VIEWSHED ANALYSES - PRIMARY CRUSHER

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

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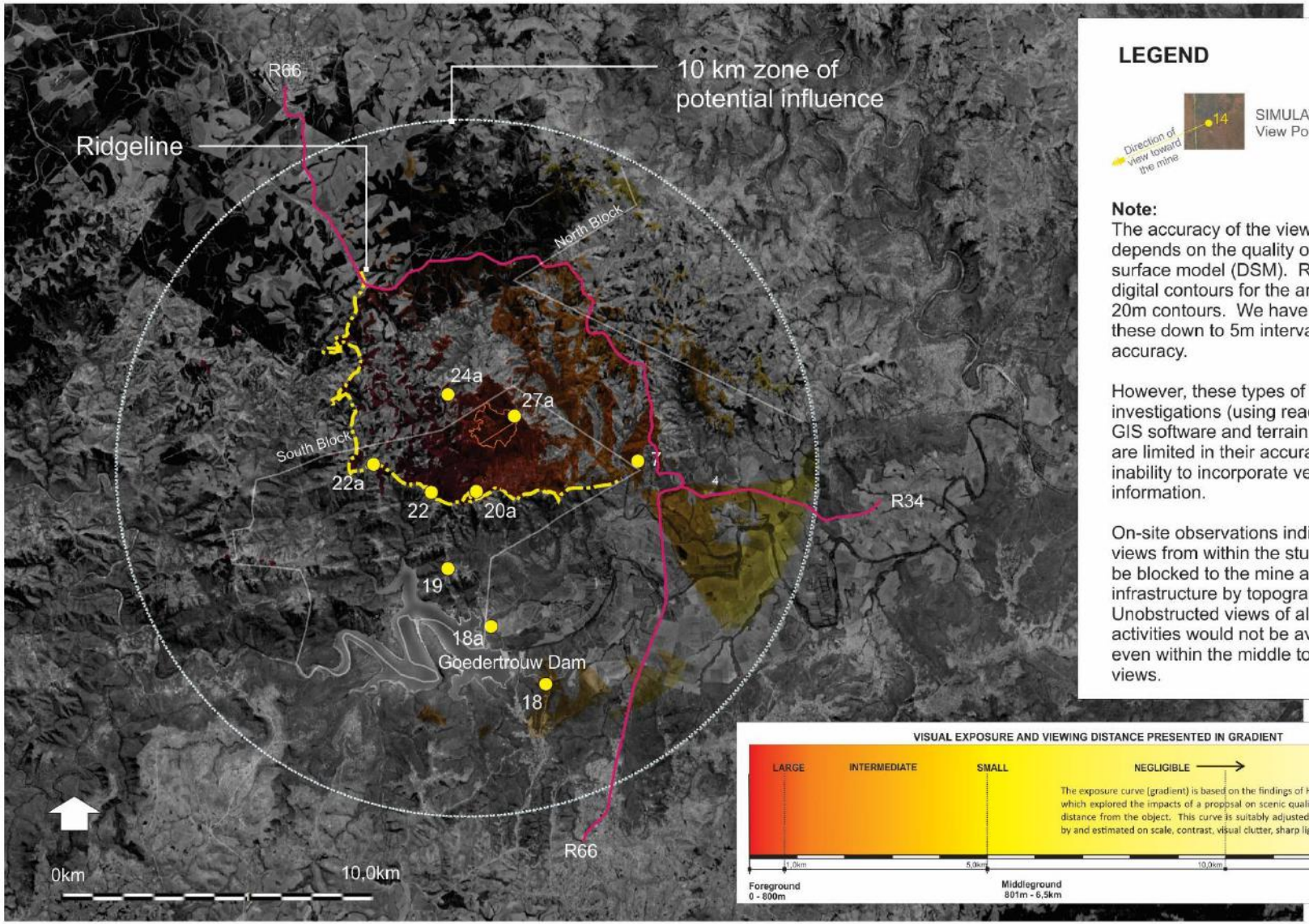


Figure 07-3: VIEWSHED ANALYSES - WASTE ROCK DUMP

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

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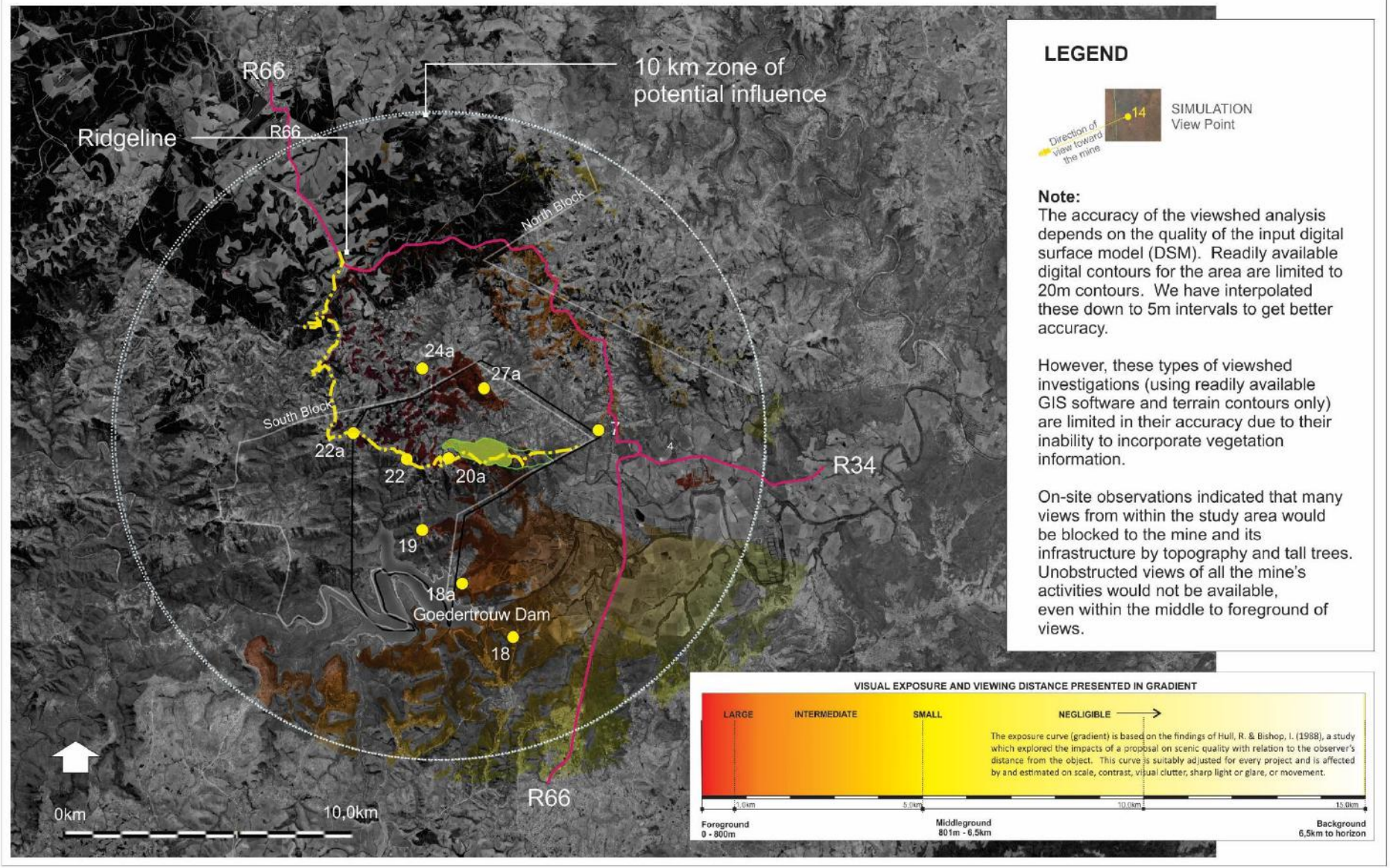


Figure 07-4: VIEWSHED ANALYSES - WESTERN SECTION OF PIT

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

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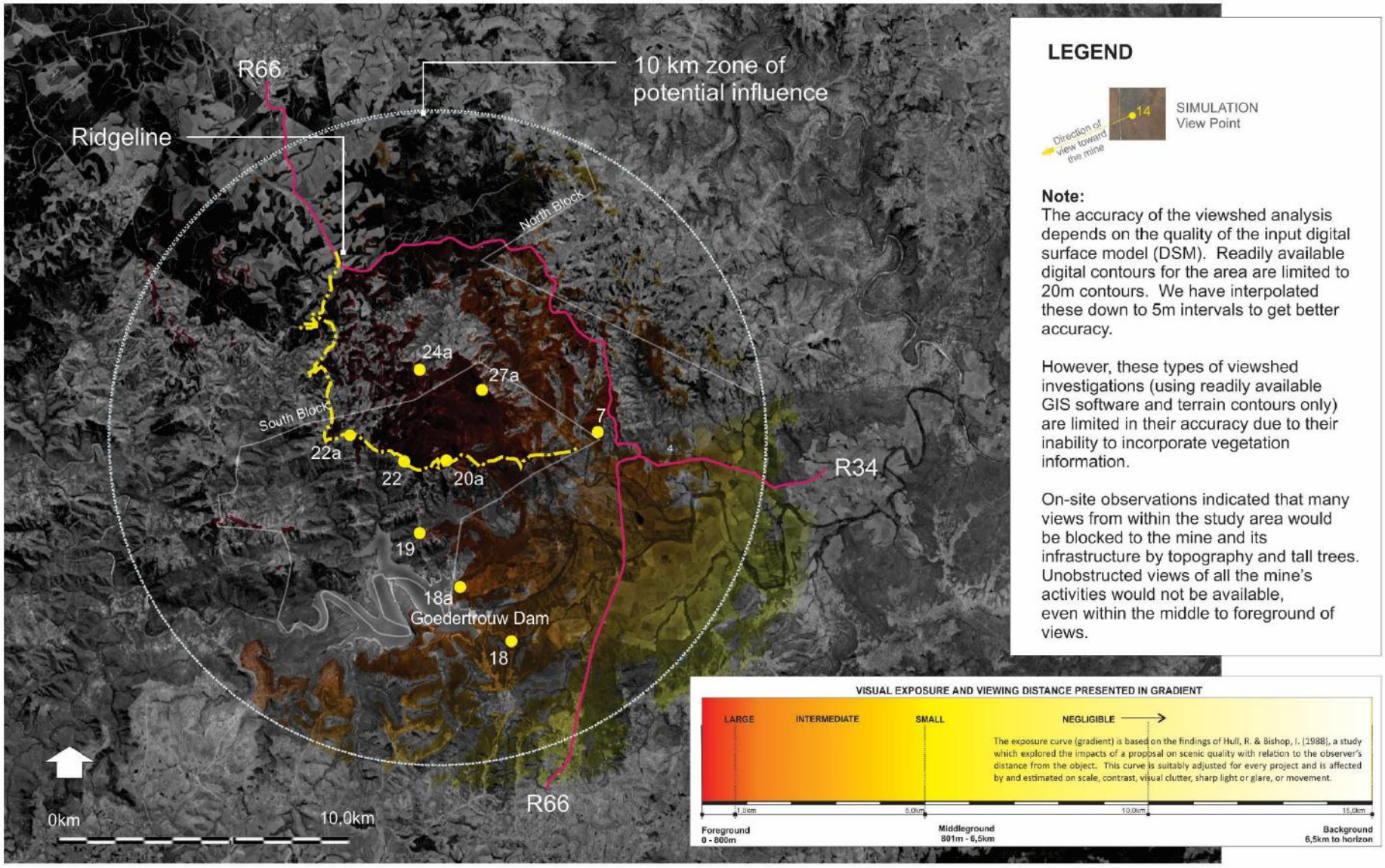


Figure 07-5: VIEWSHED ANALYSES - ALL INFRASTRUCTURE AND PIT

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

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### 8.3 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.

Table 2 below indicates the anticipated visual exposure of the three main sensitive viewing areas and affected receptors discussed in Sections 8.1 and 8.2 and illustrated in Figure 6.

**Table 2: Visual Exposure of Project Components**

| | **HIGH EXPOSURE** Foreground view, i.e. 0 – 800m from Project activities | **MODERATE EXPOSURE** Middle-ground view, i.e. 800m to – 3,0km from Project Activities | **LOW EXPOSURE** Background view i.e. > 3,0km from Project Activities |
|---|---|---|---|
| Residential properties associated with rural development on the hills in and around the Project site north, south and west of the mine | **X** Open unobstructed views | **X** Partially obstructed views caused by vegetation and topography or diminished due to distance | **X** Mostly obstructed to completely screened views due to tall vegetation, topography and distance from the observer. |
| Residential, farming activities and tourist facilities south of the mine beyond the ridgeline and areas associated with the Goedertrouw Dam and environs, including Shakaland. | . | | **X** Mostly obstructed to completely screened views due to tall vegetation, ridgeline topography and distance from the observer. |
| Travellers along the R66 main road and village homesteads east of the mine. | | | **X** Mostly obstructed or diminished due to distance and topography |

### 8.4 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 simulations in Figures 8-1 to 8-9 illustrate the effect that Project activities will have on views experienced from various viewing points indicative of typical views of the mining activities. The activities will appear in foreground and middle-ground views in areas to the north and west of the mine and appear highly intrusive, as illustrated in Figures 8-5, 8-6, 8-8 and 8-9. Visual intrusion would diminish for receptors from the south of the mine, as only small sections of the pit excavations would be visible behind a receding ridgeline. This effect is simulated in Figures 8-2, 8-3 and 8-4.

Most views from east of the mine are screened by topography, and visual intrusion, from this perspective, is moderated by distance. Figure 8-1, which shows the mine from 4,0km away, illustrates this point.

**Table 3: Visual Intrusion**

| HIGH INTRUSION | MODERATE INTRUSION | LOW INTRUSION |
|---|---|---|
| From residential properties associated with rural development on the hills in and around the Project site north, south and west of the mine | From short sections of the R66, and village homesteads east of the mine. | For residential, farming activities and tourist facilities south of the mine beyond the ridgeline, and areas associated with the Goedertrouw Dam and environs, including Shakaland. |
| The Project would:<br>• Have a substantial negative effect on the visual quality (sense of place) of the landscape relative to the baseline landscape.<br>• Contrast dramatically with the patterns or elements that define the structure of the landscape. | The Project would:<br>• Have a moderate negative effect on the visual quality and sense of place of the landscape.<br>• Contrast with the current patterns or elements that define the structure of the landscape. | The Project would:<br>• Have a minimal to insignificant effect on the visual quality and sense of place of the landscape.<br>• Contrasts minimally with the patterns or cultural elements that define the structure of the landscape. |
| *RESULT:*<br>An intensive change over a localized area resulting in major changes in key views. | *RESULT:*<br>Moderate change in landscape characteristics over localized area resulting in a moderate change to key views. | *RESULT:*<br>Minimal to insignificant change resulting in a minor change to key views sensitive viewing areas. |

### 8.5 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 tourist and residential sites and when the effect would continue for the life of the mine. The negative effect of night lighting against what is currently a dark rural sky would be particularly detrimental to locals living near the mine. Due to the glare of static and moving lights. Areas south of the mine would experience a light glow in the sky above the ridgeline, especially during low cloud conditions.

Over the life of the mine, the negative effect of night-lighting would vary depending on the location of activities in the pit and on haul roads/conveyor systems. Lights associated with the processing plant and primary crusher would be static spotlights. The potential for fixed and mobile lights being visible from a wide area surrounding the Project sites is highly likely and would negatively impact the current night-time baseline.

Stringent management measures to limit light spillage beyond the mine's site boundaries are proposed in Section 9.0 below.

### 8.6 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 Figure 4 and rated:

- *High* for residential properties/homesteads north, south and west of the mine during the construction and operational phases.
- *Moderate* for short sections of the R66 and village homesteads east of the mine.
- *Low* for residences/homesteads, farming activities and tourist facilities south of the mine beyond the ridgeline, and areas associated with the Goedertrouw Dam and environs.
- *Negligible* for the remainder of the study area.

**Table 4: *Intensity* of Visual Impact [8]**

| **High**<br>For residential properties north, south and west of the mine during the construction and operational phases | **Moderate**<br>From sections of the R66 and homesteads east of the mine. | **Low**<br>*For* residences, farming activities and tourist facilities south of the mine beyond the ridgeline, and areas associated with the Goedertrouw Dam and environs. | **Negligible**<br>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.<br><br>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.<br><br>**High visual impacts would result.** | Partial loss of or alteration to key elements / features / characteristics of the baseline.<br><br>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.<br><br>**Moderate visual impacts would result** | Minor loss of or alteration to key elements / features / characteristics of the baseline.<br><br>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.<br><br>**Low visual impacts would result.** | Very minor loss or alteration to key elements/features/characteristics of the baseline.<br><br>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.<br><br>**Negligible scenic quality impacts would result.** |

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


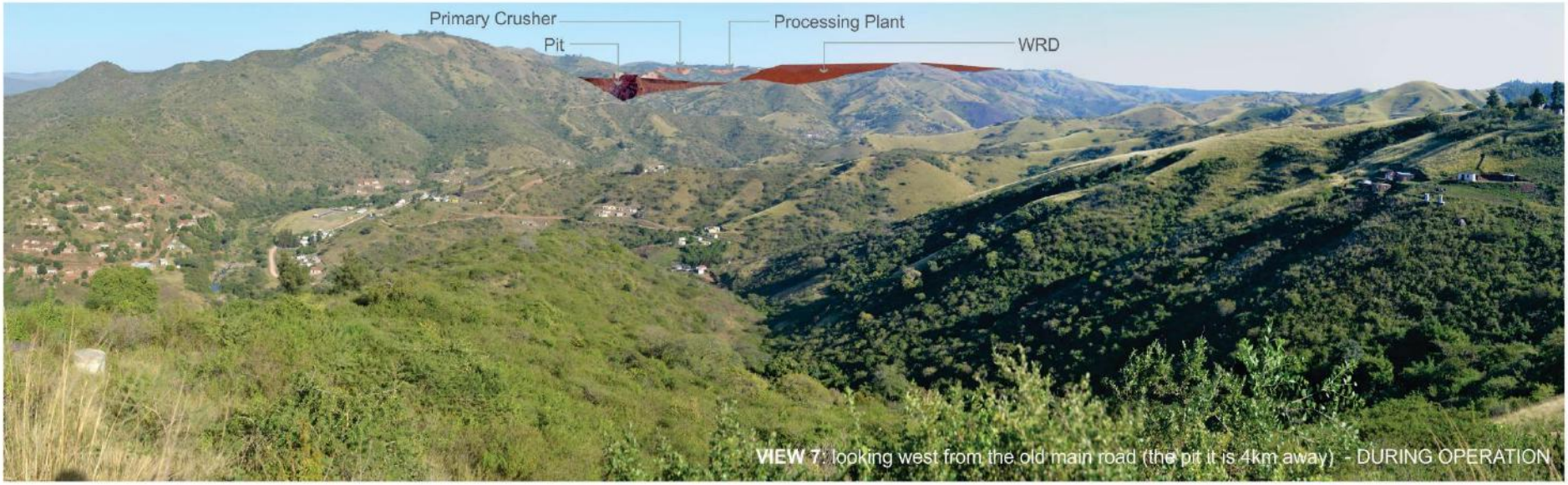


Figure 08-1: SIMULATION VIEW 7 - JINDAL IRON ORE MINE

Refer to Figure for the location of the view points

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Figure 08-2: SIMULATION VIEW 14 - JINDAL IRON ORE MINE

Refer to Figure for the location of the view points

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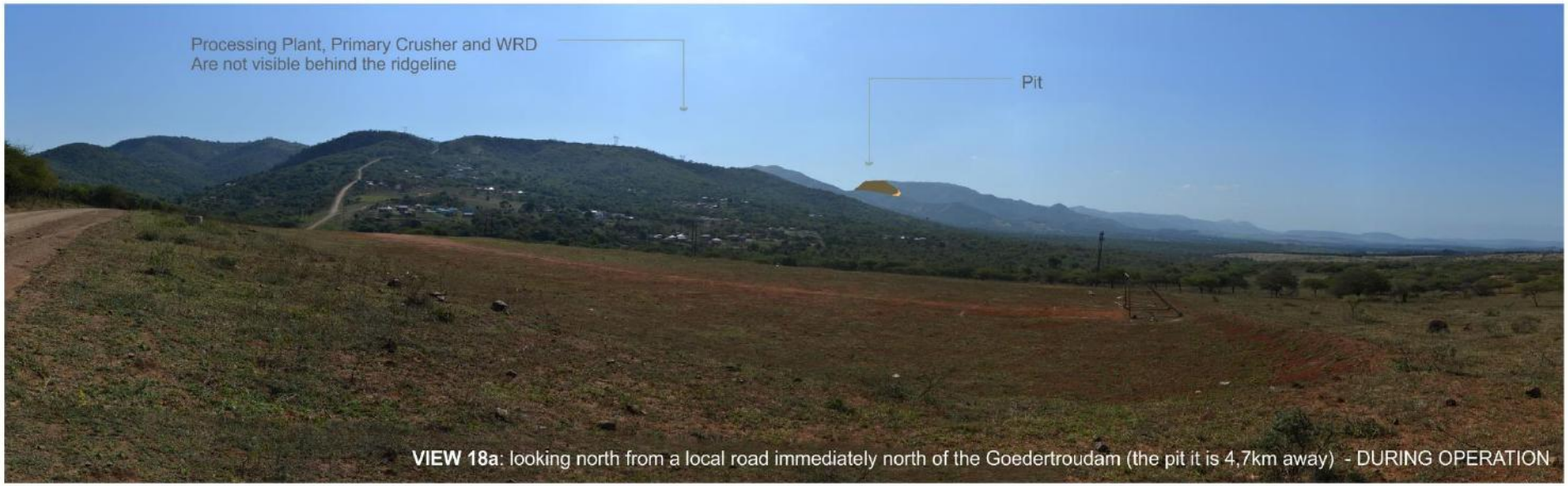


Figure 08-3: SIMULATION VIEW 18a - JINDAL IRON ORE MINE

Refer to Figure for the location of the view points

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Figure 08-4: SIMULATION VIEW 19 - JINDAL IRON ORE MINE

Refer to Figure for the location of the view points

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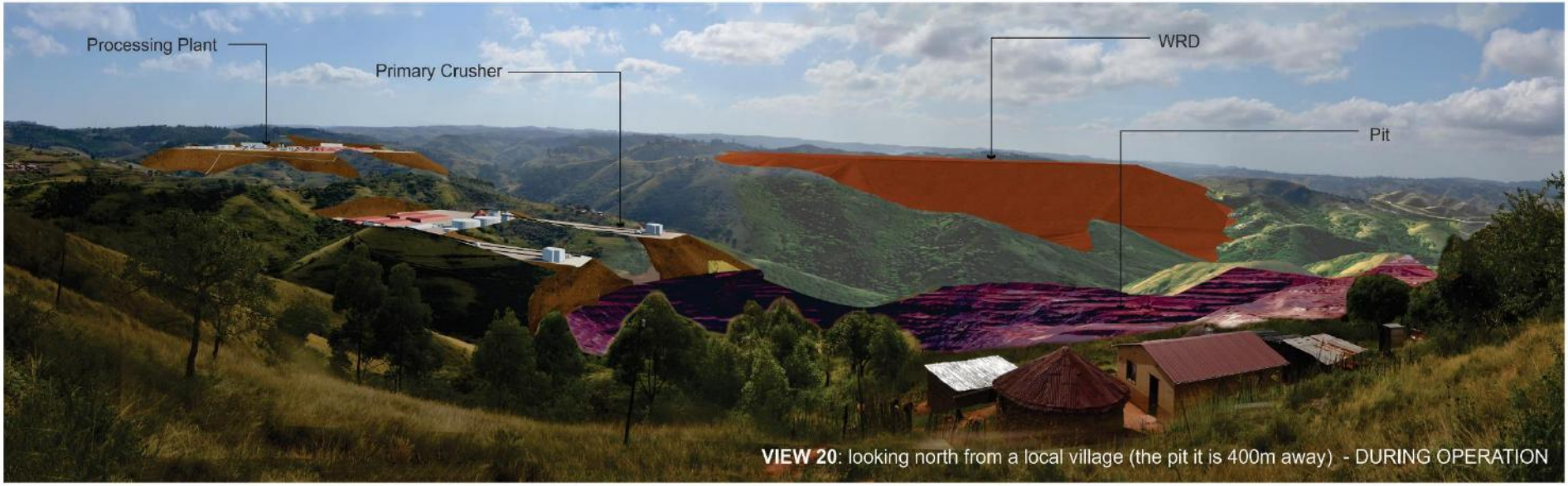


Figure 08-5: SIMULATION VIEW 20a - JINDAL IRON ORE MINE

Refer to Figure for the location of the view points

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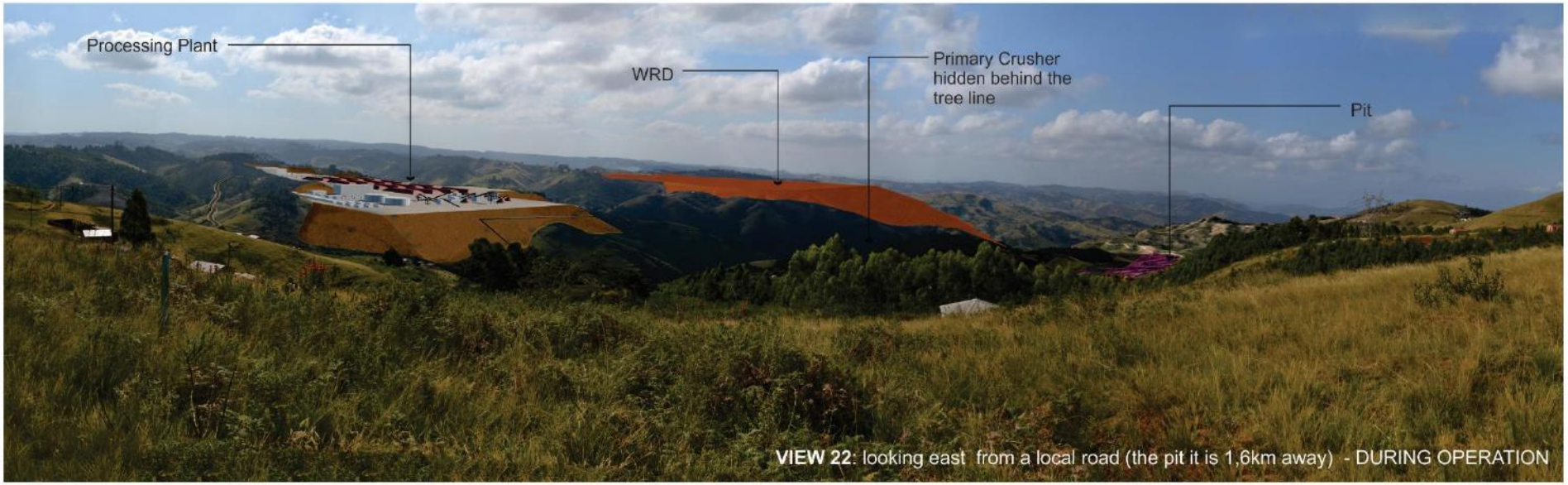


Figure 08-6: SIMULATION VIEW 22 - JINDAL IRON ORE MINE

Refer to Figure for the location of the view points

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Figure 08-7: SIMULATION VIEW 22a - JINDAL IRON ORE MINE

Refer to Figure for the location of the view points

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Figure 08-8: SIMULATION VIEW 24a - JINDAL IRON ORE MINE

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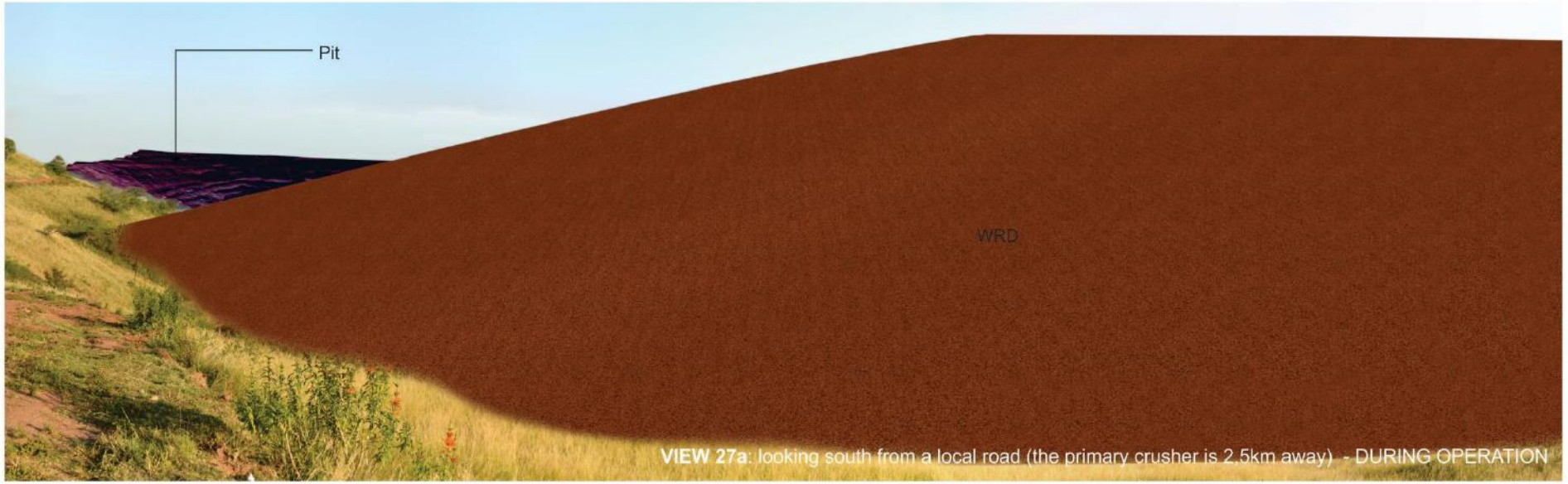


Figure 08-9: SIMULATION VIEW 27a - JINDAL IRON ORE MINE

Refer to Figure for the location of the view points

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# 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

- Apply dust suppression methods to limit the dust generated along haul roads and at the crushing and processing plant areas
- 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.
- Activities during the construction phase should be limited to between 08:00 and 17:00, where possible. It is recommended that discussions are undertaken with local landowners who would be affected by the project to determine what would be a reasonable time to carry out construction activities, given the relative location of households to the proposed project activities.
- During construction, temporary fences surrounding the material storage yards and laydown areas should be draped with ‘shack’ cloth (khaki coloured).
- Adopt responsible construction practices aimed at strictly containing the construction/ establishment activities to specifically demarcated areas.
- Discarded waste and building material should only be done at an authorised location, not within any sensitive areas.
- Ensure that the mine’s design utilises 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 site.
- All cut and fill slopes affected by construction work should be progressively top soiled and re-vegetated as soon as possible.
- 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 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 that the introduced landscape is more sustainable.

### 9.4 Structures and associated infrastructure

- Paint structures (primary crusher and processing plant) with colours that reflect and compliment the hues of the surrounding landscape. To further reduce glare potential, external surfaces should be painted with matt paints. Avoid pure blacks and whites. Although not of a mining situation, the image below illustrates these principles.

(Photo Credit: BLM 2013:198)

### 9.5 Lighting

Light pollution is often the result of bad lighting design, which allows artificial light to shine outward and upward into the sky, where it is not wanted, instead of focusing the light downward, where it is needed. Poorly designed lighting washes out the darkness of the night sky and radically alters the light levels in rural areas where light sources shine as 'beacons' against the dark sky or create a glow on the horizon. Simple

changes in lighting design and installation yield immediate changes in the amount of light spilled into the atmosphere. 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 site, i.e. lights (spotlights) are pointed away from sensitive viewing areas.
- 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 I&APs, social and political norms, and the public's interest (SLR 2021).

Several sources in all project phases have the potential to negatively affect the visual environment, particularly in the unmitigated scenario. In the absence of mitigation, the impacts would be high, adverse, and long-term when considering the worst-case scenario, particularly to those people living within a 3,0km radius, west and north on the hills surrounding the various project activities.

The following tables summarise the consequence and significance of the Project's visual impact. 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 Construction Phase

*Potential Impacts*

Construction activities include the removal of vegetation, extensive earthworks required to create building haul and access roads as well as terraces for offices, the processing plant, the primary crusher and the power yard and would continue with the erection of these infrastructural activities. Construction activities would negatively affect the landscape's visual quality and sense of place relative to its baseline. They would contrast with the patterns that define the structure of the landscape and cause an intense change over a localized area, resulting in a significant change to key views.

The impact on the visual environment during the construction phase is assessed to have a very high intensity and would occur over the short term (less than five years). The unmitigated impact would be localized but extend beyond the site boundary (at least 3,0km) and is predicted to be HIGH. The implementation of mitigation measures would not significantly reduce the anticipated impact, which would remain HIGH. Refer to Table 5.

**Table 5 Impact Summary**

**Change of landscape characteristics and key views in the Construction Phase**

| **Issue: Change to the landscape characteristics and key views during the construction phase** | | |
|---|---|---|
| **Phases: Construction Phase** | | |
| Criteria | Without Mitigation | With Mitigation |
| **Intensity** | Severe change (Very high) | Severe change (Very high) |
| **Duration** | Short-term (Low) | Short-term (Low) |
| **Extent** | Far beyond site (High) | Far beyond site (High) |
| **Consequence** | High | High |

| | | |
|---|---|---|
| **Probability** | Definite / Continuous | Definite / Continuous |
| **Significance** | **High -** | **High -** |
| | | |
| **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** | High as there would be a major loss of or alteration to key elements/features/ characteristics of the baseline causing an intensive change over a localized area resulting in a major change in key views. | |

*Mitigation Measures*

The following measures should be implemented:

- Apply dust suppression methods to limit the dust generated on haul roads and at the primary crusher and processing plant areas
- With the preparation of the portions of land on which activities will take place, the minimum amount of existing vegetation and topsoil should be removed just before they are required for construction.
- Progressive rehabilitation, where feasible, of disturbed areas should be carried out to minimise the amount of time bare soils are exposed, creating a sharp contrast with the existing landscape
- All topsoil that occurs within the proposed footprint of an activity must be removed and stockpiled for later use in accordance with a Topsoil Management Plan. The construction contract must include the stripping and stockpiling of topsoil. Topsoil would be used later during the rehabilitation phase. The presence of degraded areas and disused construction roads, which are not rehabilitated, will increase the overall visual impact.
- Construction activities should be limited to between 08:00 and 17:00, where possible. It is recommended that discussions are undertaken with local landowners who would be affected by the project during the construction phase to determine what would be a reasonable time to carry out construction activities, given the relative location of households to the proposed project activities.
- During construction, temporary fences surrounding the material storage yards and laydown areas should be draped with ‘shack’ cloth (khaki coloured).
- All construction/establishment activities must remain within specifically demarcated areas
- Building or waste material should be discarded at an authorised/ licensed location, which should not be within any sensitive areas.
- Earthworks should be executed so that only the footprint and a small ‘construction buffer zone’ around the proposed activities are exposed. In all other areas, the naturally occurring vegetation should be retained, especially along the periphery of the project sites.
- Paint all structure with colours that reflect and compliment the colours of the surrounding landscaped. This can be achieved by painting rooftops and walls of buildings in the hues and

tones of the surrounding grasslands. To further reduce glare potential, the external surfaces of structures should be painted with matt paints and pure whites and blacks should be avoided.

*Monitoring and Reporting*

Monitoring or reporting of adherence to the proposed management measures should be conducted by the Environmental Control Officer (ECO) on a weekly basis during the construction phase.

### 10.2 Operational Phase

*Potential Impacts*

Operational activities include the removal of vegetation, topsoil and soft overburden from the pit area as the mine advances, excavation of the mine areas, trucks moving overburden to the WRD and material being transferred to the processing plant, graders maintaining the haul roads and water tankers wetting the roads, expansion of the WRD and product stockpiles as the mining progresses and light from the plant and crusher areas, including security and other lighting associated with the movement of vehicles at night.

The impact on the visual environment during the operational phase is assessed to have a very high intensity and would occur over the long term (anticipated to be twenty-five years). The unmitigated impact would be localized but would extend beyond the site boundary (at least 3,0km) and is assessed to be VERY HIGH. Mitigation measures are possible and could reduce the visual impact of the mine and its infrastructure to HIGH. Refer to Table 6

**Table 6 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** | Severe change (Very high) | Prominent change (High) |
| **Duration** | Permanent (Very Long) | Long-term (High) |
| **Extent** | Far beyond site (High) | Far beyond site (High) |
| **Consequence** | Very high | High |
| **Probability** | Definite / Continuous | Probable |
| **Significance** | **Very high -** | **High -** |
| | | |
| **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** | High as there would be a major loss of or alteration to key elements/features/ characteristics of the baseline causing an intensive change over a localized area resulting in a major change in key views. | |

*Mitigation Measures*

The following measures should be implemented:

- Apply dust suppression methods to limit the dust generated on haul roads and at the crushing and processing plant areas

- 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 as per the approved Rehabilitation Plant. 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.
- Progressive rehabilitation, where feasible, of disturbed areas should be carried out to minimise the amount of time bare soils are exposed, creating a sharp contrast with the existing landscape
- 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 monthly basis.

### 10.3 Decommissioning and Closure Phases

*Potential Impacts*

Decommissioning and closure activities include the dismantling and removal of infrastructure and the rehabilitation and shaping of the WRD, building terraces and the pit.

The impact on the visual environment during the decommissioning and closure phases is assessed to have a moderate intensity and would occur over the long term. The unmitigated impact would be localized but extend beyond the site boundary (at least 3,0km) and is assessed to be HIGH. However, after decommissioning and closure, when the rehabilitation of disturbed areas takes hold, the impact could reduce significantly to MEDIUM. As the landscape recovers, there would be a loss of the original key elements and features of the baseline and will not be considered problematic when set within the attributes of the receiving environment.

**Table 7 Impact Summary**

**Change of landscape characteristics and key views in Decommissioning and Closure Phases**

| **Issue: Change to the landscape characteristics and key views during the decommissioning and closure phases** | | |
|---|---|---|
| **Phases: Construction Phase** | | |
| Criteria | Without Mitigation | With Mitigation |
| **Intensity** | Moderate change (Medium) | Minor change (Low) |
| **Duration** | Long-term (High) | Long-term (High) |
| **Extent** | Far beyond site (High) | Beyond site (Medium) |
| **Consequence** | High | Medium |
| **Probability** | Probable | Probable |
| **Significance** | **High -** | **Medium -** |
| | | |
| **Degree to which impact can be reversed** | Moderate as the reversal of the change to key elements/features/ characteristics of the baseline landscape and sensitive viewing areas is moderately feasible. Buildings/structures will be removed, the WRD will be rehabilitated to some extent and the pit would remain. | |
| **Degree to which impact may cause irreplaceable loss of resources** | Moderate for some aspects of the mine, i.e. the pit and WRD will remain as a topographic anomaly in the landscape, albeit that they are revegetated and contoured to fit with the existing topography where possible. | |

*Mitigation Measures*

The following measures should be implemented:

- Progressive rehabilitation, where feasible, of disturbed areas should be carried out to minimise the amount of time bare soils are exposed, creating a sharp contrast with the existing landscape
- At closure, all remaining exposed terraced areas should be formed, contoured, and revegetated to appear natural and blend with the surrounding topographic features in conformance with the Rehabilitation Plan.
- Where areas are required to be rehabilitated and vegetation is proposed to be introduced to the site, an ecological approach, as opposed to a horticultural approach should be adopted. Communities of indigenous plants will enhance biodiversity which is 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 carried out by the Environmental Control Officer (ECO) on a monthly basis.

# 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 mine project would be a new land-use introduced to the sub-region, and as such, there is no cumulative effect with respect to other mining projects. However, the cumulative effect of individual components of the mine, including the proposed tailings storage facility (TSF) which occur in distinct locations in the study area, has been discussed and rated in terms of the anticipated effect of the project on the landscape and key views of the area.

## 12. CONCLUSION

The existing visual condition of the landscape that may be affected by the proposed Project has been described. Most of the study area's scenic quality has been rated *moderate* to *high* 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. Project sites are in landscape types rated as *moderate* to *high*.

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. The results of the Comments and Response Report (CRR) dated 25 April 2022 indicate that visual issues are a concern to some of the I&APs. A few people raised the issue as:

- 'Open cast mining itself is a scar on the landscape' (CRR:30),
- '[the mine will] 'permanently alter the natural landscape' (CRR:176)
- [the mine will cause] pollution and aesthetic altering of the landscape …" (CRR: 31 and 34)

The Project will introduce a land use currently not occurring in the sub-region and will cause a significant loss of and alteration to the baseline's key features and characteristics. The pre-development landscape and views will be affected by the introduction of elements considered uncharacteristic when set within the attributes of the receiving landscape. High visual and sense of place impacts would result.

The Project would negatively affect receptors travelling through the study area on the R66, local roads, and most importantly, living in homesteads and visiting tourist facilities within a 3,0km radius of project activities.

The impact on the visual environment during the construction phase is assessed to have a very high intensity and would occur over the short term (less than five years). The unmitigated impact would be localized but extend beyond the site boundary (at least 3,0km) and is predicted to be HIGH. The implementation of mitigation measures would not significantly reduce the anticipated impact, which would remain HIGH.

The impact on the visual environment during the operational phase is assessed to have a very high intensity and would occur over the long term (anticipated to be twenty-five years). The unmitigated impact would be localized but would extend beyond the site boundary (at least 3,0km) and is assessed to be VERY HIGH. Mitigation measures are possible and could reduce the visual impact of the mine and its infrastructure to HIGH.

The impact on the visual environment during the decommissioning and closure phases is assessed to have a moderate intensity and would occur over the long term. The unmitigated impact would be localized but extend beyond the site boundary (at least 3,0km) and is assessed to be HIGH.

Mitigation measures cannot significantly reduce the visual impact of the mine and its infrastructure, specifically during the construction and operational phases when the impact after mitigation would be HIGH.

However, substantial mitigation should be rigorously applied and maintained throughout the life of mine. At closure, effective mitigation could reduce the impact to MEDIUM. Before commencing operations, a post-closure Rehabilitation Plan designed for acceptable topographic and ecological conditions should be developed.

### Visual Impact Statement

It is the opinion of GYLA that the visual impacts associated with the proposed Project are of a high significance given the nature, scale and duration of project activities with the context of a greenfields receiving environment. Substantial mitigation will be required to lower the impacts at closure from HIGH to MEDIUM

***** GYLA *****

## REFERENCES


Amir, S. & Gidalizon, E. 1990. Expert-based method for the evaluation of visual absorption capacity of the landscape. *Journal of Environmental Management.* Vol. 30, Issue 3: 251 – 263.

Crawford, D., 1994. Using remotely sensed data in landscape visual quality assessment. *Landscape and Urban Planning.* 30: 71-81.

Golder Associates. 2015. *Final Assessment Report – Environmental and Social Impact Assessment (ESIA) for an Iron Ore Mine being investigated by Jindal Mining KZN (Pty) Ltd near Melmoth, Northern KwaZulu-Natal*. Unpublished Report March 2015. Golder Associates. Johannesburg.

Golder Associates. 2013. *Final Flaw Analysis, Fatal Flaw Analysis for Iron Ore and Coal Mining for Jinal Africa.* Unpublished Report. February 2013. Golder Associates. Johannesburg.

Hull, R.B. & Bishop, I.E., 1988. Scenic Impacts of Electricity Transmission Towers: The Influence of Landscape Type and Observer Distance. *Journal of Environmental Management.* 27: 99-108.

Ittelson, W.H., Proshansky, H.M., Rivlin, L.G. and Winkel, G.H., 1974. *An Introduction to Environmental Psychology.* Holt, Rinehart and Winston, New York.

Landscape Institute – Institute of Environmental Management and Assessment (LI-IEMA), 2013. *Guidelines for Landscape & Visual Impact Assessment*. 3rd Edition, Routledge, London.

Lange, E., 1994. Integration of computerized visual simulation and visual assessment in environmental planning. *Landscape and Environmental Planning.* 30: 99-112.

Llobera, Marcos (2007). 'Modelling visibility through vegetation', *International Journal of Geographical Information Science*, 21:7, 799 – 810 To link to this article: DOI: 10.1080/13658810601169865 URL: http://dx.doi.org/10.1080/13658810601169865

Lynch, K., 1992. *Good City Form*, The MIT Press, London. (131)

Mucina, L. & Rutherford, M.C. (eds) 2006. The vegetation of South Africa, Lesotho, and Swaziland. *Strelitzia 19*. South African National Biodiversity Institute, Pretoria.

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

Ramsay, J. (October 1993), Identification and assessment of aesthetic values in two Victorian forest regions. *More than meets the eye: identifying and assessing aesthetic value.* Report of the Aesthetic Value Workshop held at the University of Melbourne.

Sama, J. (2000), Program Policy, *Assessing and Mitigating Visual Impact,* Department of Environmental Conservation. New York.

Sheppard, S.R.J. (2005). Validity, reliability, and ethics in visualisation. In Bishop, I. & Lange, E. (Eds.) *Visualisation in Landscape and Environmental Planning: Technology and Applications*. Taylor and Francis, London.

Schapper, J. (October 1993), The importance of aesthetic value in the assessment of landscape heritage. *More than meets the eye: identifying and assessing aesthetic value.* Report of the Aesthetic Value Workshop held at the University of Melbourne.

United States Department of the Interior. 2013. Best Management Practices for Reducing Visual Impacts of Renewable Energy Facilities on BLM-Administered Lands. Bureau of Land Management. Cheyenne, Wyoming. 342 pp, April. First Edition.

Warnock, S. & Brown, N., 1998. Putting Landscape First. *Landscape Design.* 268: 44-46.

# 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 different 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, strong 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 several 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.<br>**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.<br>**3** | Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features.<br>**1** |
| Vegetation and landcover | A variety of vegetative types as expressed in interesting forms, textures, and patterns.<br>**5** | Some variety of vegetation, but only one or two major types.<br>**3** | Little or no variety or contrast in vegetation.<br>**1** |
| Water | Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape.<br>**5** | Flowing, or still, but not dominant in the landscape.<br>**3** | Absent, or present, but not noticeable.<br>**0** |
| Colour | Rich colour combinations, variety, or vivid colour; or pleasing contrasts in the soil, rock, vegetation, water or snow fields.<br>**5** | Some intensity or variety in colours and contrast of the soil, rock, and vegetation, but not a dominant scenic element.<br>**3** | Subtle colour variations, contrast, or interest; mute tones.<br>**1** |
| Influence of adjacent scenery | Adjacent scenery enhances visual quality.<br>**5** | Adjacent scenery moderately enhances overall visual quality.<br>**3** | Adjacent scenery has little or no influence on overall visual quality.<br>**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<br>*** 5+** | Distinctive, though like others within the region.<br>**3** | Interesting within its setting, but common within the region.<br>**1** |
| Cultural modifications | Modifications add favourably to visual | Modifications add little or no visual variety to the | Modifications add variety but are very discordant |

| | | | |
|---|---|---|---|
| | variety while promoting visual harmony.<br>**2** | area and introduce no discordant elements.<br>**0** | and promote strong disharmony.<br>**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 particular attention to detail. | 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:<br><br>- Has a substantial negative effect on the visual quality of the landscape.<br><br>- Contrasts dramatically with the patterns or elements that define the structure of the landscape.<br><br>- Contrasts dramatically with land use, settlement or enclosure patterns.<br>- Is unable to be 'absorbed' into the landscape. | If the Project:<br><br>- Has a moderate negative effect on the visual quality of the landscape.<br><br>- Contrasts moderately with the patterns or elements that define the structure of the landscape.<br><br>- Is partially compatible with land use, settlement or enclosure patterns.<br><br>- Is partially 'absorbed' into the landscape. | If the Project:<br><br>- Has a minimal effect on the visual quality of the landscape.<br><br>- Contrasts minimally with the patterns or elements that define the structure of the landscape.<br><br>- Is mostly compatible with land use, settlement or enclosure patterns.<br>- Is 'absorbed' into the landscape. | If the Project:<br><br>- Has a beneficial effect on the visual quality of the landscape.<br><br>- Enhances the patterns or elements that define the structure of the landscape.<br><br>- Is compatible with land use, settlement or enclosure patterns. |

| | | | |
|---|---|---|---|
| *Result*<br>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*<br>Moderate change in landscape characteristics over localized area resulting in a moderate change to key views. | *Result*<br>Imperceptible change resulting in a minor change to key views. | *Result*<br>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*<br><br>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*<br><br>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*<br><br>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

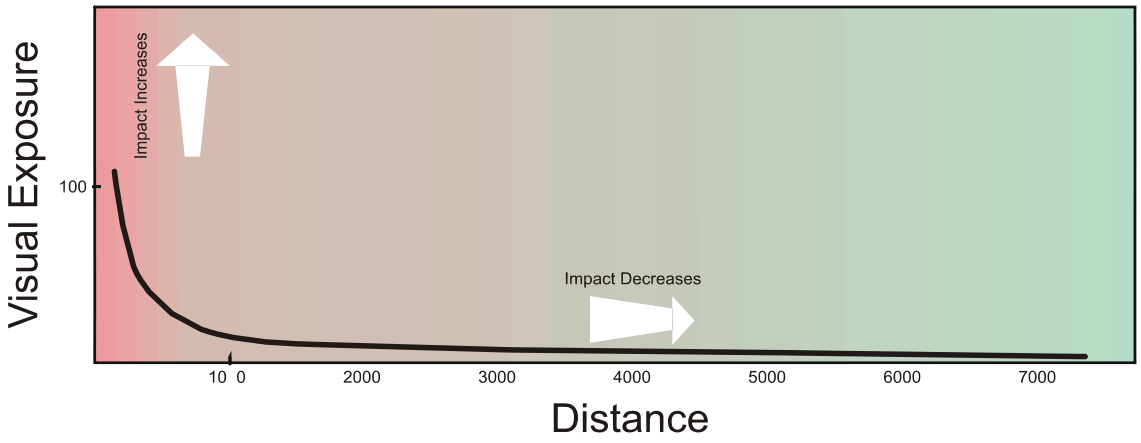
8.0km.

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.

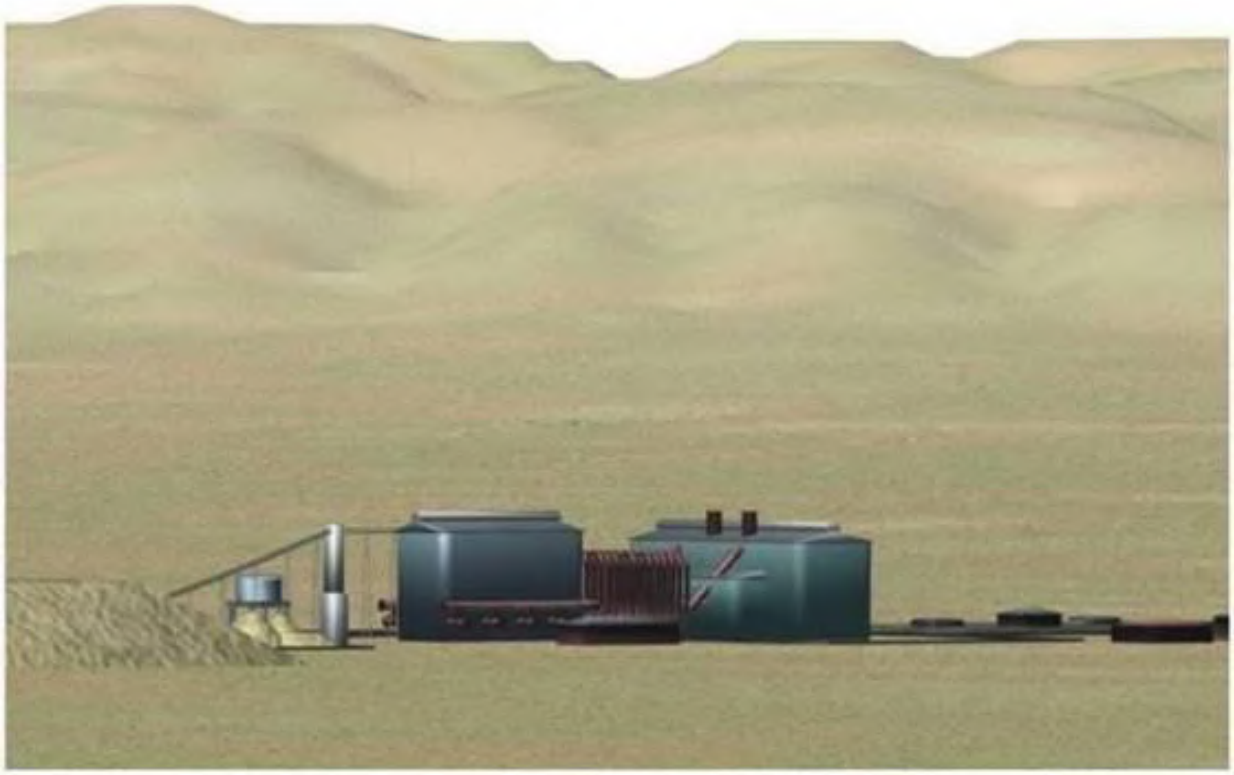
**Effect of Distance on Visual Exposure**



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.<br><br>Communities where the development results in changes in the landscape setting or valued views enjoyed by the community.<br><br>Occupiers of residential properties with views affected by the development. | People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value).<br><br>People travelling through or past the affected landscape in cars, on trains or other transport routes. | 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 (i.e. office and industrial areas).<br><br>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. | Partial loss of or alteration to key elements/features/characteristics of the baseline. | Minor loss of or alteration to key elements/features/characteristics of the baseline. | 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 considered to be totally uncharacteristic when set within the attributes of the receiving landscape.<br><br>High scenic quality impacts would result. | I.e. Pre-development landscape or view and/or introduction of elements that may be prominent but may not necessarily be uncharacteristic when set within the attributes of the receiving landscape.<br><br>Moderate scenic quality impacts would result | I.e. Pre-development landscape or view and/or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape.<br><br>Low scenic quality impacts would result. | I.e. Pre-development landscape or view and/or introduction of elements that are not uncharacteristic with the surrounding landscape – approximating the 'no change' situation.<br><br>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** |

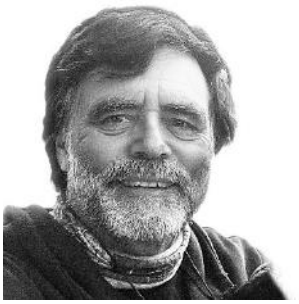
| **VL** | **L** | **M** | **H** | **VH** |
|---|---|---|---|---|
| A part of the site/ property | Whole site | Beyond the site, affecting neighbours | Extending far beyond site but localised | Regional/ National |
| **EXTENT** | | | | |

| 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



# Graham Young PrLArch FILASA

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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.