Final

Visual Impact Assessment

PROPOSED BALGRAY COLLIERY PROJECT

BALGRAY COLLIERY, DUNDEE

KWAZULU-NATAL

Submitted to:

Agreenco Environmental

PO Box 19896

Noordbrug

2522

www.agreencogroup.com

Prepared by:

Newtown Landscape Architects cc

www.newla.co.za

Report Status:	*FINAL: Visual Impact Assessment Report*
Date Issued:	19 August 2019
Prepared By:	Graham Young PrLArch, FILASA
Reviewed By:	Graham Young PrLArch, FILASA
Reference:	Balgray Colliery VIA, KZN Province

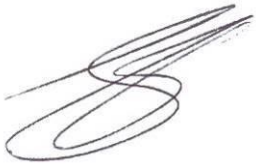
EXPERTISE OF SPECIALIST

Name:	Graham A Young
Qualification:	BLArch (Toronto)
Professional Registration:	South African Council for the Landscape Architectural Profession (SACLAP) Fellow Institute of Landscape Architects of South Africa (FILASA)
Experience in Years:	40 years
Experience	Graham is a landscape architect with forty years' experience. He has worked in Southern Africa and Canada and has valuable expertise in the practice of landscape architecture, urban design and environmental planning. He is also a senior lecturer, teaching urban design and landscape architecture at post and under graduate levels at the University of Pretoria. A specialty of his is Visual Impact Assessment for which he was cited with an ILASA Merit Award in 1999. He has completed over 275 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.*

DECLARATION OF INDEPENDENCE

I, Graham Young, declare that –

- I am contracted as the Visual Impact Assessment Specialist for the Balgray Colliery Project;
- 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 National Environmental Management Act (Act 107 of 1998), 2014 Environmental Impact Assessment Regulations (as amended on 7 April 2017), and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will consider, to the extent possible, the matters listed in Regulation 13;
- 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 16 (1)(b)(iii).



Graham A. Young FILASA PrLArch Reg. No. 87001

10 July 2019

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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 3.2
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Section 13
The duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Section 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 9
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 3 and 5
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.5
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities;	Section 10 and 14
Any mitigation measures for inclusion in the EMPr;	Section 11
Any conditions for inclusion in the environmental authorisation	Section 11
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	N/A
A reasoned opinion whether the proposed activity, activities or portions thereof should be authorised regarding the acceptability	Section 14

of the proposed activity or activities; and	
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 11
A description of any consultation process that was undertaken during the course of carrying out the study	N/A this activity is being carried out by Agreenco Environmental
A summary and copies of any comments that were received during any consultation process	N/A
Any other information requested by the competent authority.	N/A

ACRONYMS, ABBREVIATIONS & GLOSSARY

Acronyms & Abbreviations	
BAR	Basic Assessment Report
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
NLA	Newtown Landscape Architects
IWMF	Integrated Waste Management Facility
SACLAP	South African Council for the Landscape Architectural Profession
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 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 probably has regional significance. A place visited primarily by people whose place of origin is local is generally of local significance. Unvisited places either have no significance or are "no trespass" places. (after New York, Department of Environment 2000).
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 clearly 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 a development in conjunction with the other past, present or reasonably 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 generally 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 the purposes of this report the Isanti Project 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 3,0km radius surrounding the proposed project footprint / site.
Project Footprint / Site	For the purposes of 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 literally 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 that defines areas, which contain all possible 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 Exposure	Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion and visual acuity, which is also influenced by weather and light conditions.
Visual Impact	Visual effects relate to the changes that arise in the composition of available views because of changes to the landscape, to people's responses to the changes, and to the overall effects with respect to 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 transformation in its visual character and quality. The landscape's ability to absorb change ranges from low capacity areas, in which the location of an activity is likely to cause visual change in the character of the area, to high capacity areas, in which the visual impact of development will be minimal (Amir & Gidalizon 1990).
Worst-case Scenario	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

Introduction

Newtown Landscape Architects (NLA) was commissioned by Agreenco Environmental to carry out a Visual Impact Assessment (VIA) of the Balgray Colliery, Dundee, KZN ("the Project"). The VIA focuses on the physical aspects of the proposed Project (form, scale and bulk), within its local landscape context.

Project, project site and study area

Zinoju Coal owns the Balgray Colliery, which is located within the approved Aviemore Mining Right. Zinoju Coal is planning to re-commission the old Balgray Colliery in Dundee, as part of the company's anthracite growth strategy. The proposed colliery plans to target the Gus Coal Seam which has an estimated anthracite coal reserve of 2.6 million tonnes, and once refurbished, the mine will have a production rate of approximately 45 000 tonnes per month with life-of-mine (LoM) estimated at five (5) years. A conventional drill-and-blast mining method will be used for underground coal extraction. The old Balgray Adit, which is proposed to be used for access to the underground workings, ventilation and coal extraction, is located on the steep southern slopes of the Impati Mountain. Coalfields is the central railage and product dispensing facility for Zinoju's mining projects. It currently processes all the coal from Aviemore and will be the site that will be used for the processing of all the coal from Balgray as well as the future Aviemore North project.

Objective of the Specialist Study

The main aim of the study is to document the baseline and to ensure that the visual / aesthetic consequences of the proposed project are understood. The report, therefore, aims to identify scenic resources, and visually sensitive areas or receptors. It also aims to identify key concerns or issues relating to potential visual impacts arising from the project, and to determine boundaries and parameters for visual input in the assessment phase of the project.

Terms and Reference

A specialist study is required to establish the visual baseline and to identify and assess the visual impacts arising from the Project based on the general requirements for a comprehensive VIA. The following terms of reference was established:

- Data collected during the site visit will allow for a description and characterization of the receiving environment;
- Identify issues that must be addressed in the impact assessment phase;
- Describe the landscape character, quality and assess the visual resource of the study area;
- Describe the visual characteristics of the components of the project;
- Rate the significance of visual impact;
- Establish management measures for the project.

Findings

The existing visual condition of the landscape that may be affected by the proposed Project has been described. The study areas scenic quality has been rated *low* (industrial and urban areas) to *moderate* (residential areas) and *high* (mountain, river areas and the Talana Hill and Museum precinct) within the context of the sub-region and sensitive viewing areas and landscape types identified and mapped indicating

potential sensitivity from residential areas to the west and south west of to the proposed Balgray Colliery within a 5 km radius of the project site. The project site in proposed within a landscape type rated as high.

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 travel routes, and important cultural features and historic sites, especially in foreground views.

The Project and its activities will be highly visible from sensitive viewing areas immediately west of the project site (in particular two residences within 1,0km of the site, which will experience high exposure). It will also be visible from sensitive areas in a general arc from the south-west through to the south-east of the project site, although, exposure will be moderate to low as the closest residences are 1,5km from the site. The significance of impact (without mitigation) is *high* for the area immediately west of the site and *moderate* to *low* for the remainder of the study area. The impact on the main tourist attraction in the study area, the Talana Museum would be *insignificant* due to its distance from the site (4,6km).

Mitigation to partially screen views to the site and to blend the Project into the landscape are feasible and will reduce the impact to from *high* to *moderate* during the operational phase for the most affected receptors immediately west of the project and from *moderate* to *low* generally for sensitive receptors throughout the remainder of the study area. At closure and decommissioning the impact will reduce to *low* for all aspects of the project, as the site will be rehabilitated and structures and infrastructure removed. This however, assumes all mitigation measures are effectively implemented and managed.

Author's Opinion

It is the opinion of the author that all aspects of the Project, from a potential visual impact perspective, should be approved provided that the mitigation/management measures are effectively implemented, managed and monitored in the long term.

****NLA****

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 Project Overview and Background

Newtown Landscape Architects (NLA) was commissioned by Agreenco Environmental to carry out a Visual Impact Assessment (VIA) of the Balgray Colliery, Dundee, KZN ("the Project"). The VIA focuses on the physical aspects of the proposed Project (form, scale and bulk), within its local landscape context.

1.2 Project, project site and study area

Zinoju Coal owns the Balgray Colliery, which is located within the approved Aviemore Mining Right. Zinoju Coal is planning to re-commission the old Balgray Colliery in Dundee, as part of the company's anthracite growth strategy. The proposed colliery plans to target the Gus Coal Seam which has an estimated anthracite coal reserve of 2.6 million tonnes, and once refurbished, the mine will have a production rate of approximately 45 000 tonnes per month with life-of-mine (LoM) estimated at five (5) years. A conventional drill-and-blast mining method will be used for underground coal extraction. The old Balgray Adit, which is proposed to be used for access to the underground workings, ventilation and coal extraction, is located on the steep southern slopes of the Impati Mountain. Coalfields is the central railage and product dispensing facility for Zinoju's mining projects. It currently processes all the coal from Aviemore and will be the site for processing all the coal from Balgray as well as the future Aviemore North project. The study area comprises a visual envelope of 5,0km around the site as indicated in Figure 1.

1.3 Objective of the Specialist Study

The main aim of the study is to document the baseline and to ensure that the visual / aesthetic consequences of the proposed project are understood. The report therefore aims to identify scenic resources, and visually sensitive areas or receptors. It also aims to identify key concerns or issues relating to potential visual impacts arising from the project.

1.4 Terms and Reference

A specialist study is required to establish the visual baseline and to identify and assess the visual impacts arising from the Project based on the general requirements for a comprehensive VIA. The following terms of reference was established for the Scoping Phase:

- Data collected during the site visit will allow for a description and characterization of the receiving environment;
- Identify issues that must be addressed in the impact assessment phase;
- Describe the landscape character, quality and assess the visual resource of the study area;
- Describe the visual characteristics of the components of the project; and
- Rate the significance of impact of the project;
- Proposed mitigation measures 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 extent of the study area is determined by the zone of potential influence, which in this study relates to a radius of 5,0km around the Project site. At 5,0km and beyond the Project would recede

into background views and or be screened by topography, existing buildings, vegetation or infrastructure;

- The description of project components is limited to what has been supplied to the author prior to the date of completion of this report;
- No alternatives to the Project layout and site have been proposed;

Figure 1: LOCALITY and STUDY AREA - Balgray Colliery

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 to 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 specifically compiled for the Province of the Western Cape, they provide guidance that is appropriate for any EIA process. The Guideline document also seeks to clarify instances when a visual specialist should get involved in the EIA process.

3. APPROACH AND METHODOLOGY

3.1 Approach

The assessment of likely effects on a landscape resource and on 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 assessment of impacts on the landscape all contribute to the baseline for visual impact assessment studies. The assessment of the potential impact on the landscape is carried out as an impact on an environmental resource, i.e. the physical landscape. Visual impacts, on the other hand, are assessed as one of the interrelated effects on people (i.e. the viewers and the impact of an introduced object into a view or scene).

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 essentially a subjective matter. In this study, the aesthetic evaluation of the study area is determined by the professional opinion of the author based on site observations and the results of contemporary research in perceptual psychology.

Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response is usually to both visual and non-visual elements and can embrace sound, smell and any other factor having a strong impact on 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 B for further elaboration.

Studies for perceptual psychology have shown 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 special 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;
- 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 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 very high. The criteria given in Appendix B are used to assess landscape quality, sense of place and ultimately 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 a development, without detrimental effects on its character. Its determination is based upon an evaluation of each key elements or characteristics 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).

3.1.3 Sense of Place

Central to the concept of sense of place is that the landscape requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historic use and habitation of the area. 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, 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 (highveld) together with the man-made structures (residential areas, roads, and utilities) contribute to the sense of place for the study area. It is this combination that define the study area, and which establish its visual and aesthetic identity.

3.1.4 Sensitive Viewer Locations

The sensitivity of visual receptors and views are 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 with respect to 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:

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

Views from residences and tourist facilities/routes are typically the most sensitive, since they are 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 traveling through or past the affected landscape in cars or other transport modes;
- 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 (scoping or baseline phase) used in this project.

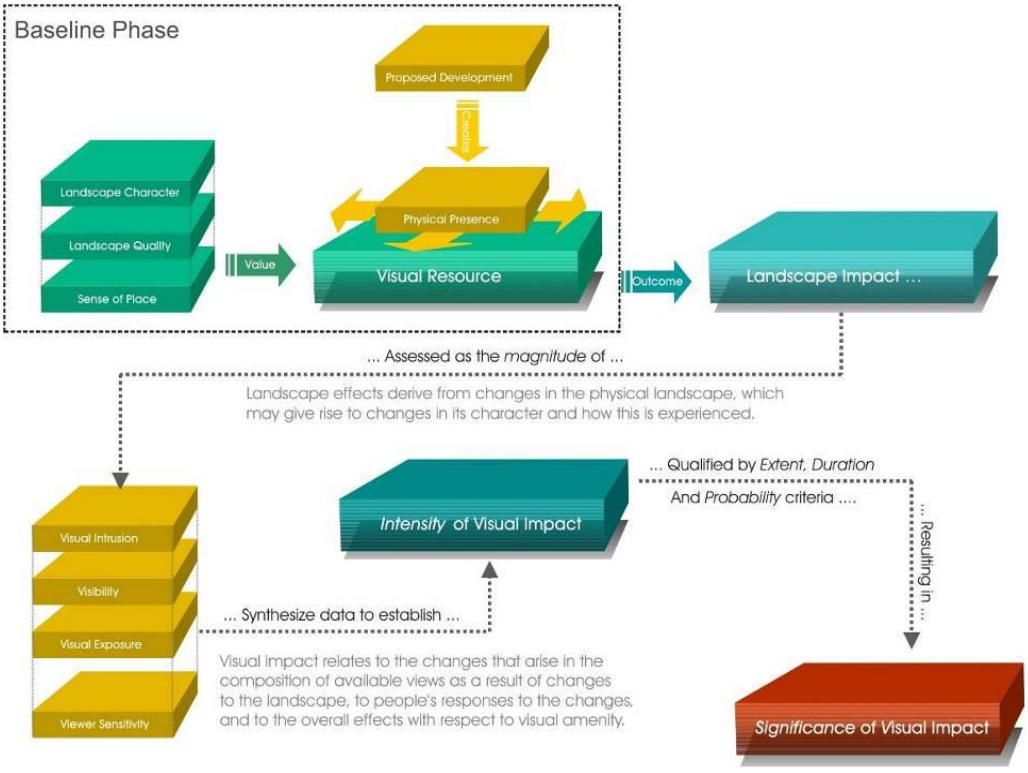

Image 1: Visual Impact Process

3.2 Methodology

The following method was used:

- Site visit: A field survey was undertaken on the 01 June 2019 when the study area was scrutinized to the extent that the receiving environment could be documented and adequately described;
- Project components: The physical characteristics of the project components were described and illustrated based on information supplied by Agreenco Environmental;
- The landscape character of the study area was described base on the findings during the field survey. The description of the landscape focused on the nature and character of the landscape rather than the response of a viewer;
- The quality of the landscape was described using recognized contemporary research in perceptual psychology as the basis;
- The sense of place of the study area was described as to the uniqueness and distinctiveness of the landscape;
- Potential sensitive viewing areas, where identified;
- Visual impact issues that must be investigated and rated in the assessment phase, where identified.

4. DESCRIPTION OF THE PROJECT

Figure 2 illustrates the layout the Project and indicates the various components associated with the Balgray Colliery.

A conventional drill-and-blast mining method will be used for underground coal extraction. The old Balgray Adit, which is proposed to be used for access to the underground workings, ventilation and coal extraction, is located on the southern slopes of the Impati Mountain. The adit and portals will need to be refurbished, and new surface infrastructure will be developed as part of the recommissioning of the mine. This includes an adit conveyor to transfer mined coal to a run-or-mine (ROM) stockpile, from where it will be loaded onto road-going haul trucks for distribution to the existing Coalfields Coal Processing Plant, located approximately 5.5km to the south-east of Dundee. No coal processing will take place on site.

Supporting infrastructure includes the construction of a service platform to support maintenance buildings and facilities, bulk service infrastructure, operations support buildings and general logistics management areas. An access and/or haul road will connect the mine with the P727 provincial road leading into the town of Dundee. This road will cross the Sterkstroom River along its proposed route, requiring the construction of a river crossing structure.

Mining will require dewatering. Water from the underground workings will be used for dust suppression during underground workings as well as dust suppression of the roads and materials handling areas. Underground water will also be discharged to the pollution control dam (if required). Mine residue will be disposed of at the Magdelena Mine and fine coal slurry will be disposed of in existing slurry paddock facilities at the Coalfields Processing Plant. Both the latter being offsite facilities and not part of the project. An existing historic discard dump was constructed down-gradient of the adit portal during the early years of operation. This discard dump is, however, owned by the land owner (not Zinoju Coal) and will not form part of the Zinoju Coal proposed Balgray operations.

The life of mine is expected to be 6 years.

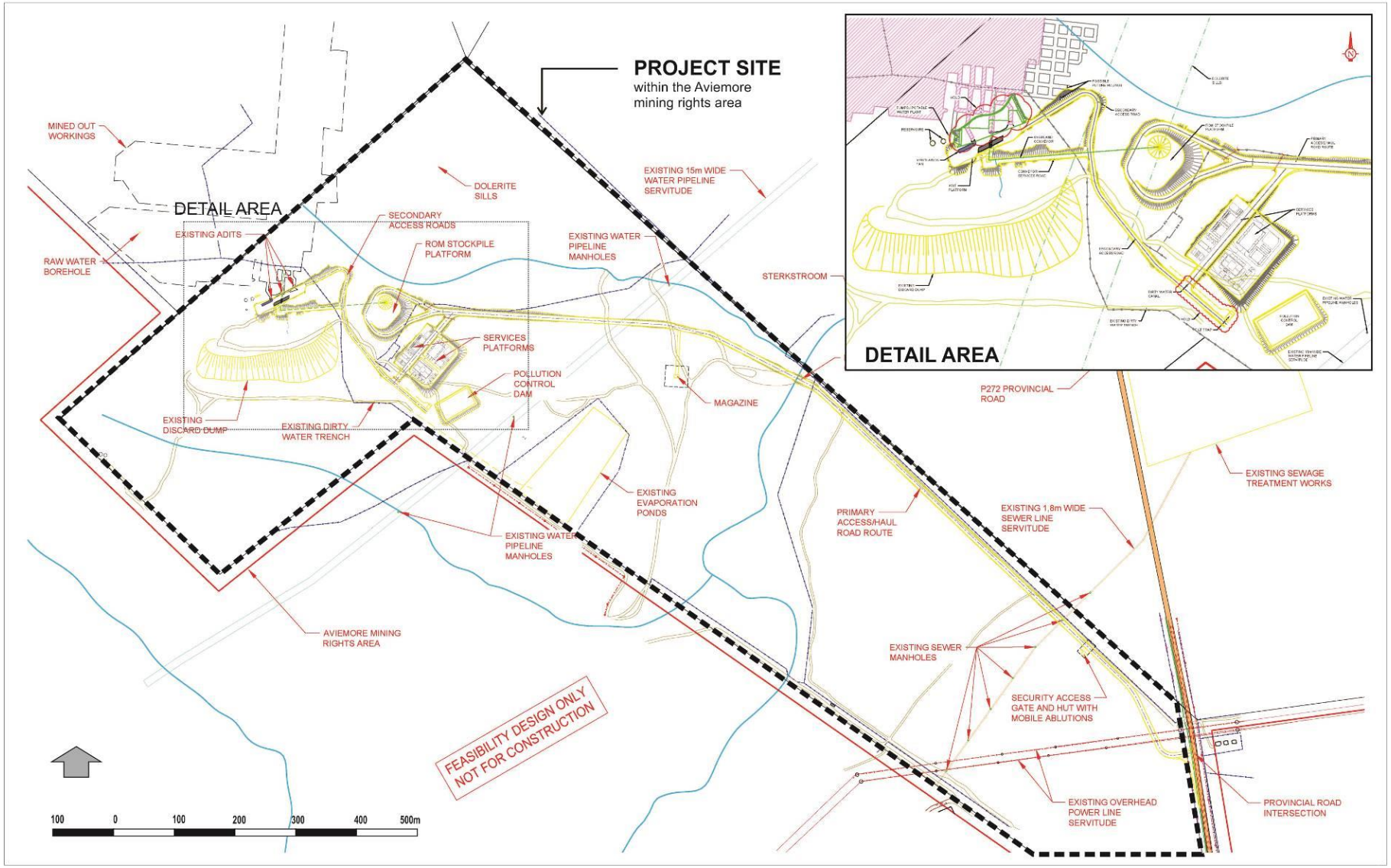

Figure 2: LAYOUT - Balgray Colliery

5. PROJECT ALTERNATIVES

No project alternatives to the layout or site have been considered.

6. POTENTIAL VISUAL ISSUES

Mining projects typically include large-scale infrastructure that can cause change to the fabric and character of an area, and possible visual intrusion in the landscape.

Typical issues associated with mining projects 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?

These potential impacts will be considered and rated in the assessment section of the report. At the time of writing the public participation process had not been completed and it is, therefore, not known if visual issues would be raised by the public, and potentially indicating a sensitivity to visual and aesthetic concerns.

7. THE ENVIRONMENTAL SETTING

7.1 Project Site and Study Area

The project site is on the southern slopes of Impati Mountain approximately 1,5km north-west of the northern extend of the suburbs of Dundee. The study area, a 5,0km radius about the project site, comprises the Balgray Colliery, open land, residential areas (to the south and south east of the site and peri-urban residential areas west of the site), and industrial areas to the south of the site as indicated in Figures 1 and 3. Refer also to Figures 4-1 to 4-5 for panoramas illustrating the character and nature of the study area and Figure 3 which indicates the location of the viewpoints. The visual character of the study area is a balanced mixture of these various land uses with no one activity dominating. A visual divide is created by Impati Mountain that extends south-west to north-east across the study area. All areas north of the visual divide will not be able to see the project site.

7.2 Land Use

Land use activities are described below. See also Figures 4-1 to 4-5.

7.2.1 Residential

The northern residential areas of Dundee occur primarily to the south-east of the project site with a small sub-division directly south of the site. Beyond this to the south and west is a golf club and additional residential areas. Immediately west of the site are peri-urban residential units, which occur mostly behind a small ridgeline west of the site. To the far south-east of the site are also residential units

7.2.2 Industrial and urban

Industrial areas occur immediately south of the side associated with the main urban area of Dundee. To the far south-south-east of the study area are more industrial areas.

7.2.3 Infrastructure and roads

Main roads in the study area which all converge on the town are the R33, R68, R621, R602 and the P727. Rail infrastructure is routed through the southern areas of the study area and power lines run east-west across the site immediately south of the Project site, between it and the residential areas.

7.2.4 Conservation, recreation and tourism

The most prominent conservation/tourism area is associated with the Talana hill and museum, approximately 4,5km south-east of the site. The Dundee Golf Club and Course is located south-west of the site.

7.3 Open Land and Agriculture

The largest land-use in the study is open land with agricultural lands in the far eastern sector of the study area.

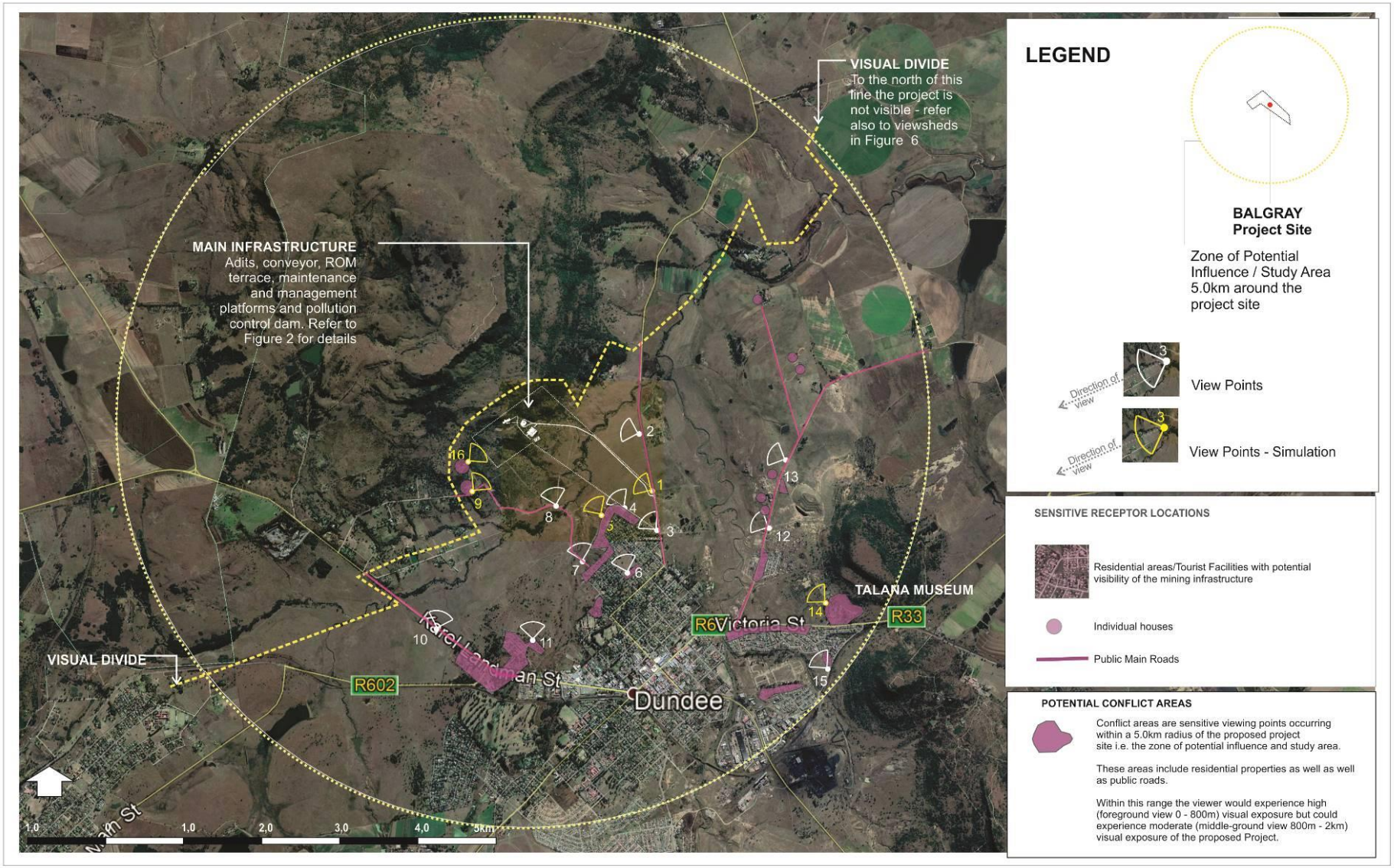

Figure 3: VIEWS AND VISUAL RECEPTORS - Balgray Colliery

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

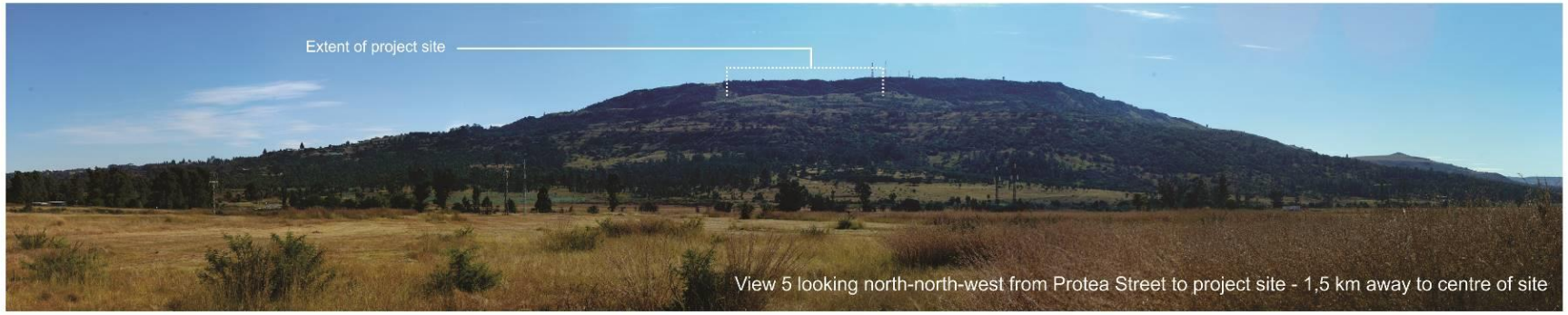

Figure 04-2: LANDSCAPE CHARACTER - Balgray Colliery: Views 4, 5 and 6

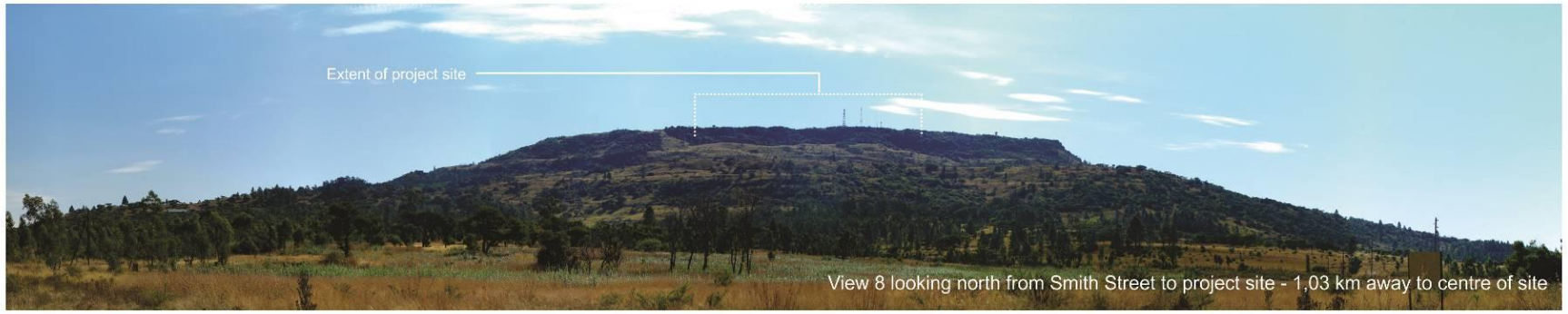

Figure 04-3: LANDSCAPE CHARACTER - Balgray Colliery: Views 7, 8 and 9

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

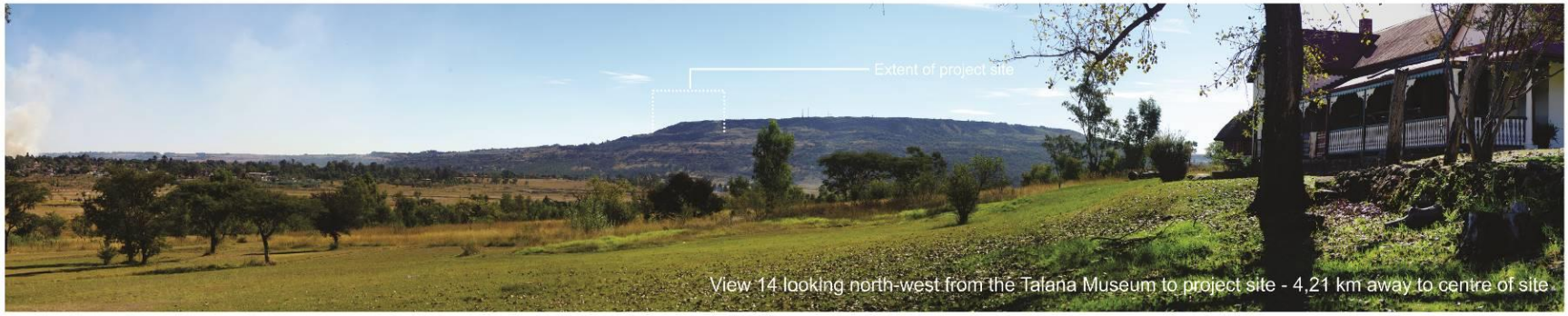

Figure 04-5: LANDSCAPE CHARACTER - Balgray Colliery: Views 13, 14 and 15

8. VISUAL RESOURCE

8.1 Visual Resource Value / Scenic Quality

The scenic quality (using the scenic quality rating criteria described in Appendix A) of the study area is primarily derived from the combination of land-uses described above with Impati Mountain being the dominating feature, which also forms a backdrop to most views to the site. Only the southern section of the study area, Dundee town, is urban and built up, with the remainder being open grassland and a rural landscape with some agriculture along the eastern edge. The Sterkstroom and Steenkool rivers flow through the areas south and east of the site along with their respective floodplains. These flat open areas form the 'foreground' to views to the site. The panoramas views in Figures 4-1 to 4-5 illustrate this effect. The area immediately west of the site is dominated with small-holdings located along the south facing slopes of the mountain and on the flat plains associated with Sterkstroom river and its tributaries.

When the criteria listed in Appendix A are taken into account, a visual resource value of *low* (industrial and urban areas) to moderate (residential areas) and *high* (mountain, river areas and the Talana Hill and Museum) is allocated to various landscape types within the study area. The project site occurs within a landscape type rated high. A summary of these values is provided in Table 1 below, which differentiates between the various landscape character types defined in Figure 5 below.

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

High Impati Mountain, Talana Hill and Museum	**Moderate** Residential areas, riverine areas open land, agricultural holdings and land and Dundee Golf Course	**Low** Industrial and utility (power) and rail areas
This landscape type is considered to have a *high* value because it is a: Distinct landscape that exhibits a very positive character with valued features that combine to give the experience of unity, richness and harmony. It is a landscape that may be of particular importance to conserve and which has a strong sense of place. Sensitivity: It is sensitive to change in general and will be detrimentally affected if change is inappropriately dealt with.	This landscape type is considered to have a *moderate* value because it is a: Common landscape that exhibits some positive character, but which has evidence of alteration / degradation/ erosion of features resulting in areas of more mixed character. Sensitivity: It is potentially sensitive to change in general and change may be detrimental if inappropriately dealt with	This landscape type is considered to have a *low* value because it is a: Minimal landscape generally negative in character with few, if any, valued features. Sensitivity: It is not sensitive to change in general and change

8.2 Sense of Place

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. The sense of place for the study area derives from the combination of all landscape types and their impact on the senses. As already mentioned, the activities and land-uses in the study area are a common occurrence within the sub-region, which shows signs of visual and aesthetic deterioration due to the presence of urban, industrial, mining and utility activities in the southern sections of the study area. The northern areas are dominated by Impati Mountain and when the total landscape of the study area is taken into account, a mixed aesthetic and sense of place is evident, which evokes a relatively strong, and somewhat positive sense of place. However, there are some specific areas as described above, which detract quite dramatically from this response.

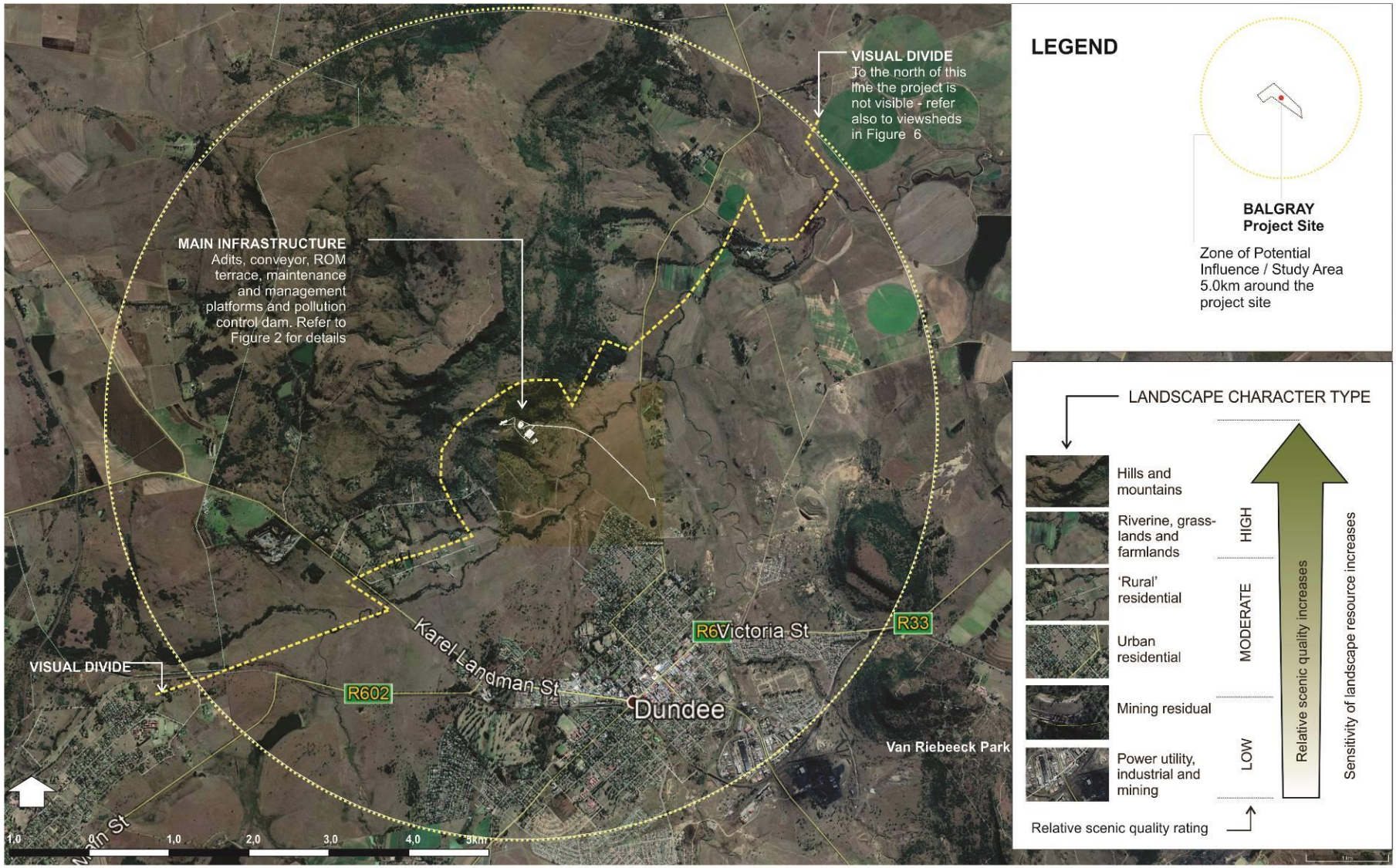

Figure 5: LANDSCAPE TYPES AND SENSITIVITIES - Balgray Colliery

9. LANDSCAPE IMPACT

The *landscape impact* (i.e. the change to the fabric and character of the landscape caused by the physical presence of the intervention) of the proposed Project is considered ***moderate.*** The development of the proposed Project will be seen within the context of the side slopes of the Impati Mountain. The landscape context, therefore, has moderate visual absorption capacity (VAC i.e. the existing landscape's ability to absorb physical changes (proposed project) without transformation in its visual character and quality is limited). The clearing of vegetation and exposure of soil during the establishment period will tend to contrast with the dark green hues of the site's landscape.

As stated in the approach section, the physical change to the landscape at the Project site must be understood in terms of the Project's visibility (impact on sensitive viewers and viewing areas) and its effect on the visual aesthetics of the area (impact on the baseline resource). The following sections discuss the effect the Project may have on the visual and aesthetic environment.

10. VISUAL IMPACT

Visual impacts will be caused by activities and infrastructure in all Project phases i.e. establishment, operational and closure. Activities associated with the Project will be visible (day and night), to varying degrees from varying distances around the project site. During the establishment phase the Project's visibility will be influenced due to these preparatory. During operation and closure phases the visibility of the Project will reduce as the side slopes and terraces are rehabilitated and ultimately the infrastructure is removed. The movement of trucks within and to and from the site will also influence visibility.

The *magnitude* of visual impact is determined using visibility, visual intrusion, visual exposure and viewer sensitivity criteria. When the *magnitude* of impact is qualified with spatial, duration and probability criteria the significance of the impact can be predicted (refer to Appendix C).

10.1 Sensitive Viewers and Locations

Figure 3 identifies receptor locations where people may be sensitive to negative changes in the landscape caused by the physical presence of the Project. For the most part, people living in or visiting the northern sections of residential areas in a general arc from the south-west to the south-east of the project site, will have open views of project activities due to the nature of the terrain and the fact that the site is located half way up the mountain. Refer also to the viewshed in Figure 6 and Figure 3, which indicates the location of sensitive viewing areas which would be able to see project activities.

Table 2: Potential Sensitivity of Visual Receptors

High	**Moderate**	**Low**
Residential small holdings (two homesteads the remainder are screened by a small ridge line west of the site) west of the site	Residential areas in an arc from the south-west to south-east of the site and travellers on the R621 (west of the site) and P727 (east of the site)	Employees of the utility, mining and industries in the study area
Occupiers of residential properties with views affected by the development.	Occupiers of residential properties and people travelling through or past the affected landscape in cars and other modes of transport.	Visitors and people working within the study area and travelling along local roads whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

10.2 Visibility

The 'zone of potential influence' for the Project was established at 5,0km and south of Impati Mountain. Over 5,0km, the impact of project activities would have diminished as they will recede into the background and/or views to the site would be screened by existing vegetation and structures. The mountain blocks all views from the north.

In determining the visibility of the Project, the proposed heights of project activities were used to model the viewshed in Figure 6. Offsets equivalent to these were used to generate the viewshed (i.e. Adit terrace

(1306m; Conveyor tower 1307m; Top of conveyor at ROM stockpile 1293m; Structures on management terrace 1268m and PCD 1252m). The viewshed in Figure 6 indicates the spatial extent of the area where potential views to the Project (for both phases) would be visible when based on topographic relief. This is a theoretical model, which was tested on site, where it became clear that many views to the site from within the areas indicated a potentially visible, would be blocked by structures (industrial area to the east of the site and tall vegetation to the west, north and south of the site). Based on site verification during the visit to the study area, the areas highlighted in purple in Figure 3, will have views to the site, all other areas the view will either be slightly or completely blocked. Refer to the simulations in Figures 7-1 to 7-5 which illustrates this.

Generally, the impact on exposed views, will be greatly diminished due to distance (evident in the simulations), and that project components would only occur in the middle-ground of some views and background of most views. A topographic ridgeline west of the site blocks views to the small holdings. However, two homesteads east of the ridgeline would have foreground views of the project site, with the northern most homestead having unobstructed views.

10.3 Visual Exposure

Visual exposure is determined by qualifying the visibility with a distance rating to indicate the degree of intrusion and visual acuity.

Table 3 below indicates the exposure of the low to high sensitive viewing areas as identified in Section 10.1. Distance from a viewer to a viewed object or area of the landscape influences how visual changes are perceived in the landscape (see also Appendix B, which illustrates this point). Generally, changes in form, line, colour, and texture in the landscape become less perceptible with increasing distance. Refer also to Figures 3 and 6 for location of areas.

Table 3: Sensitive Receptors – Visual Exposure

	Foreground view i.e. 0 – 800m from Project Site	Middle-ground view i.e. 800m to – 2,0km from Project Site	Background view i.e. > 2,0km from Project Site
Two homesteads immediately west of the site.	**X** mostly obstructed to partially blocked by vegetation		
Residential areas south and south west of the site			**X** open to mostly blocked by other structures
Residential areas south east of the site		**X** open for northern sections of the residential areas	**X** open for western sections of the residential areas
R68		**X** open view	
P727		**X** open view	
Talana Museum			**X** open

10.4 Visual Intrusion

Visual intrusion deals with the notion of contextualism i.e. how well does a project component fit with or disrupt / enhance the ecological and cultural aesthetic of the landscape as a whole? And ties in with the concept of visual absorption capacity (VAC), which for the project site is *moderate*. The simulations in Figures 7-1 to 7-6 illustrate the effect that project components will have on views and the landscape when seen from a variety of viewing areas of locations around the project site. When visible, the Project will mostly appear in middle-ground to background views in a landscape with a moderate VAC, resulting in a mostly *moderate* to *low* visual intrusion as indicated in the simulations. Views that are open are from the homesteads west of the site will experience high visual intrusion of valued views. Table 4 elaborates on these ratings.

Table 4: Visual Intrusion

High None	**Moderate** For the two residences west of the site and for the northern section of residential areas south west of the site as well as sections of the R68 and P727	**Low** For residential areas south west and south east of the as well as Talana Museum
• The Project would have a substantial negative effect on the visual quality (sense of place) of the landscape relative to the baseline landscape because it would: • Contrast dramatically with the patterns or elements that define the structure of the landscape;	• The Project would have a moderate negative effect on the visual quality (sense of place) of the landscape; • Contrast with the current patterns or elements that define the structure of the landscape; • Be partially compatible with land use (industrial), settlement or enclosure patterns of the general area;	The Project would have a minimal effect on the visual quality (sense of place) of the landscape; - Contrasts minimally with the patterns or cultural elements that define the structure of the landscape; - Is mostly compatible with land use, settlement or enclosure patterns;
RESULT: Notable change in landscape characteristics over an extensive area and an intensive change over a localized area resulting in major changes in key views.	*RESULT:* Moderate change in landscape characteristics over localized area resulting in a moderate change to key views.	*RESULT:* Minimal change resulting in a minor change to key views sensitive viewing areas.

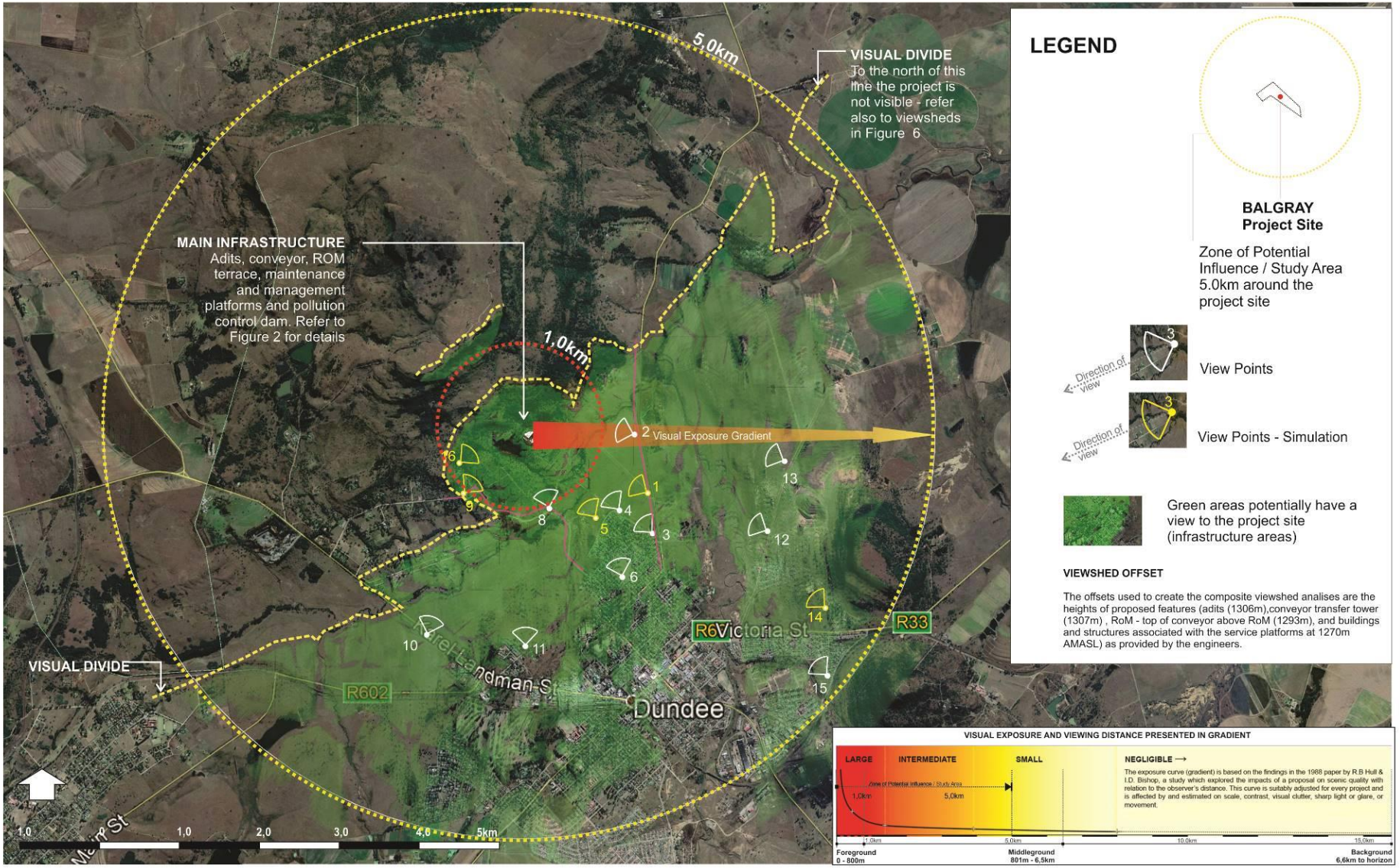

Figure 6: VIEWSHED ANALYSIS - Balgray Colliery

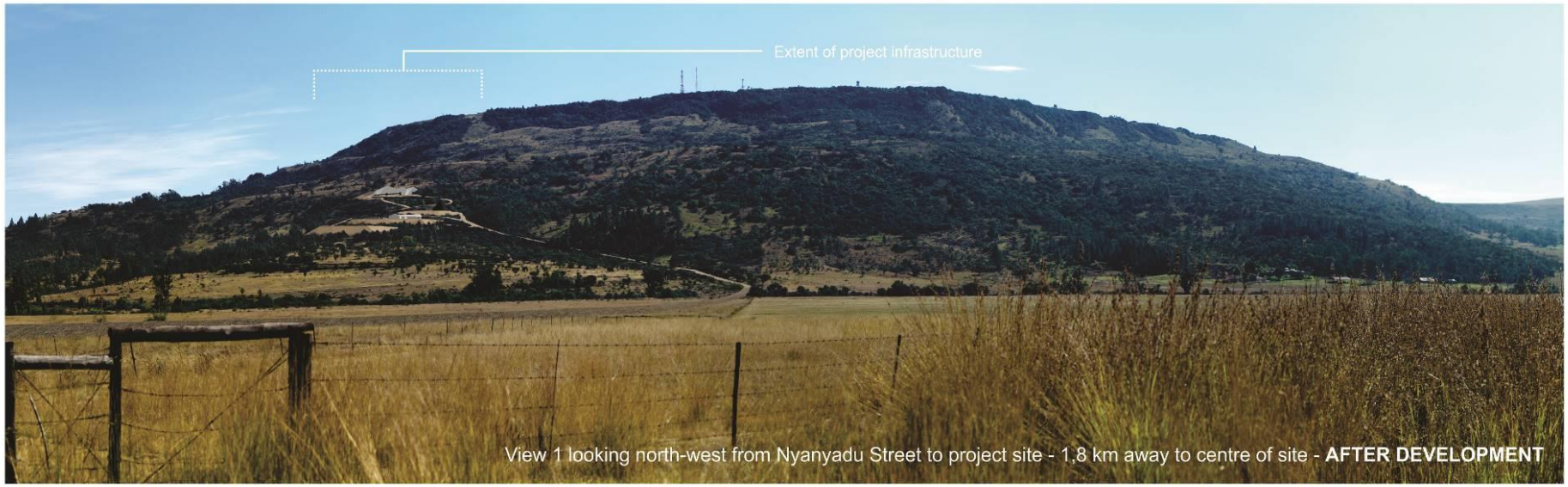

Figure 7-1: SIMULATION - Balgray Colliery: View 1

Figure 7-2: SIMULATION - Balgray Colliery: View 5

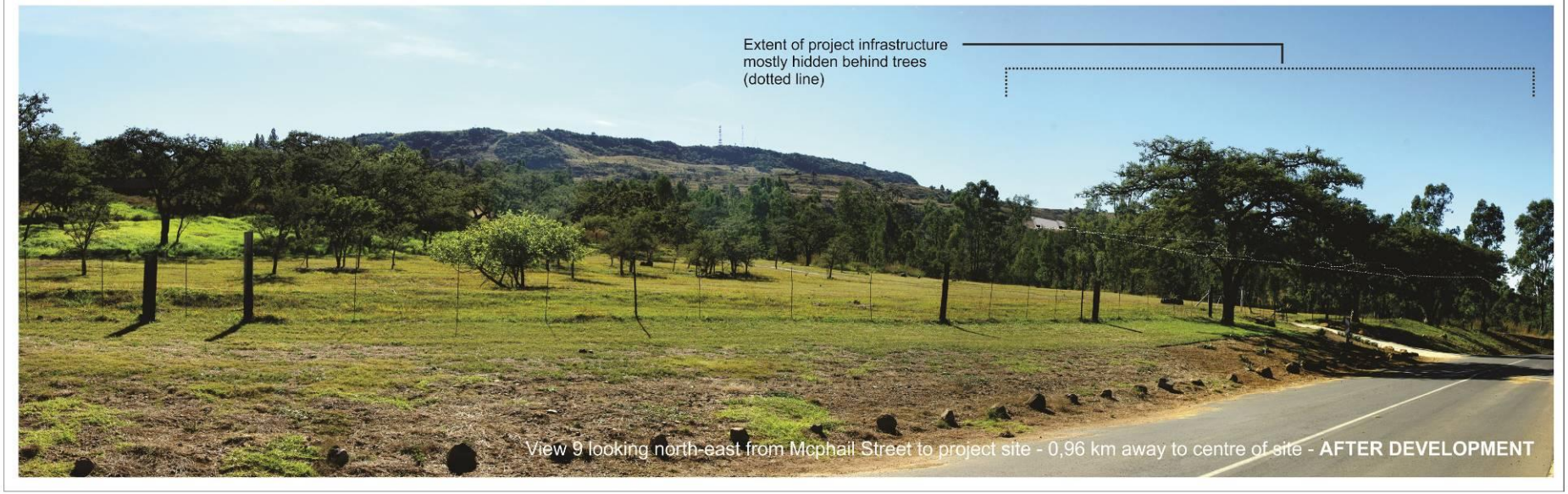

Figure 7-3: SIMULATION - Balgray Colliery: View 9

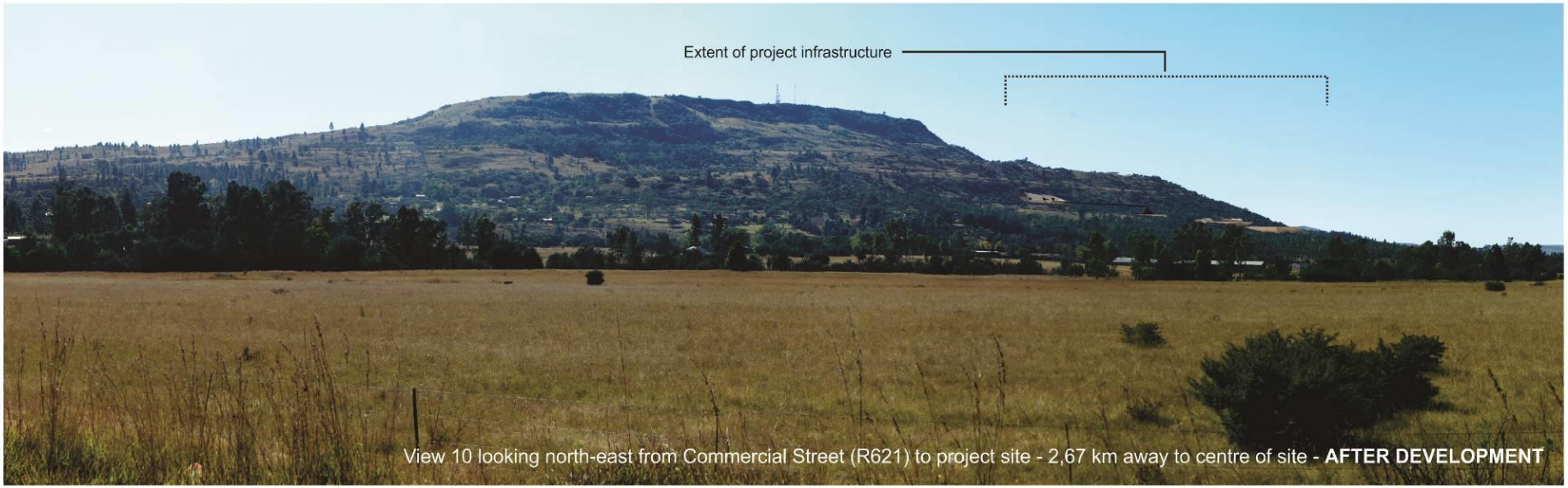

Figure 7-4: SIMULATION - Balgray Colliery: View 10

Figure 7-5: SIMULATION - Balgray Colliery: View 14

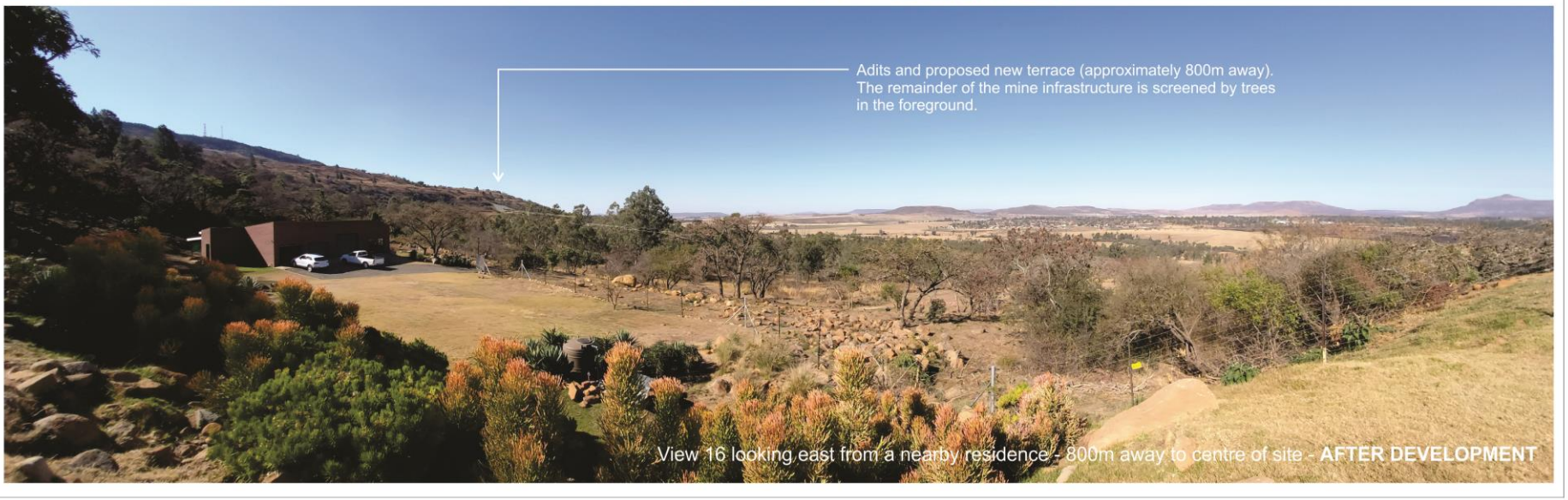

Figure 7-6: SIMULATION - Balgray Colliery: View 16

10.5 Intensity of Impact

Referring to discussions above and using the criteria listed in Appendix B, the *magnitude* of visual impact of the Project is rated in Table 5 below for all phases of the project. To assess the magnitude of 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).

According to the results tabulated below the magnitude of visual impact (based on the worst-case scenario) of the proposed Project will be *moderate* (general for the study area and for residences immediately west of the project site).

Table 5: *Magnitude* of impact of the proposed Project (without mitigation)

High Residences immediately west of the project site	**Moderate** General for the study area	**Low**	**Negligible**
Major loss of 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 uncharacteristic when set within the attributes of the receiving landscape. High scenic quality impacts would result.	Partial loss of or alteration to key elements / features / characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic when set within the attributes of the receiving landscape. Moderate scenic quality impacts would result	Minor loss of or alteration to key elements / features / characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape. Low scenic quality impacts would result.	Very minor loss or alteration to key elements/features/characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that is not uncharacteristic with the surrounding landscape – approximating the 'no change' situation. Negligible scenic quality impacts would result.

11. MANAGEMENT MEASURES

In considering mitigating measures 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, the following principles have been established:

- Mitigation measures should be designed to suit the existing landscape character and needs of the locality. They should respect and build upon landscape distinctiveness.
- It should be recognized that many mitigation measures, especially the establishment of planted screens and rehabilitation, are not immediately effective.

There are three main areas where management efforts should be focussed and are essential during the operation phase of the mine:

- Screening the mine during the operational phase where possible using existing vegetation that must remain in place – it should however be noted that the proposed life of mine is only 6 years, so the effectiveness of new tree screens would be reduced (see section 11.3 below which describes an alternative method of screening);
- Ensuring that cut to fill areas are revegetated with indigenous species as soon as possible after the establishment of terraces;
- Good housekeeping to reduce dust to an absolute minimum in all working areas and the access roads
- At closure all terraced areas should be formed and contoured to appear natural and blend with the surrounding topographic features.

The following generic mitigation measures are suggested for the Project and should be included as part of the Environmental Management Programme (EMPr). The following general actions are recommended:

11.1 Planning and site development

- With the preparation of the portions of land onto which activities will take place the minimum amount of existing vegetation and topsoil should be removed.
- Ensure, wherever possible, natural indigenous vegetation is retained and incorporated into the site rehabilitation.
- All top-soil 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. 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;
- Specifications with regards to the placement of construction camps (if required), 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;

- Construction activities should be limited to between 08:00 and 17:00 or in conjunction with the ECO.
- Adopt responsible construction practices aimed at containing the construction/establishment activities to specifically demarcated areas.
- Building or waste material discarded should be undertaken at an authorised location, which should not be within any sensitive areas.
- Reduce the height and extent of the retaining wall(s) associated with the adit (portal area) as it is the most visible from sensitive viewing areas west of the site.
- All existing trees that can screen operations (specifically from views west of the mine) and are not required to be removed due to infrastructure development, should be retained.

11.2 Earthworks

- Earthworks should be executed in such a way that only the footprint and a small 'construction buffer zone' around the proposed activities is exposed. In all other areas, the natural occurring vegetation, should be retained, especially along the periphery of the sites.
- All cut and fill slopes and areas affected by construction work should be progressively top soiled and re-vegetated as soon as possible;
- Cut and fill slopes should mimic the shapes and angles found in the adjacent area;
- Any 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.

11.3 Landscaping and ecological approach

- Where new vegetation is proposed to be introduced to the site, an ecological approach to rehabilitation, as opposed to a horticultural approach should be adopted. For example, communities of indigenous plants enhance biodiversity, a desirable outcome for the area. This approach can significantly reduce long term costs as less maintenance would be required over conventional landscaping methods as well as the introduced landscape being more sustainable.
- Establish a vegetated earth berm screen (approximately 3 m high) along the western terrace of the adit (portal) area to screen sensitive views from residences immediately west of the site.
- Progressive rehabilitation of all cut to fill embankments should be carried out immediately after they have been established.

11.4 Structures and associated infrastructure

- Paint all structures with colours that reflect and compliment the colours of the surrounding landscape. To further reduce the potential of glare, the external surfaces of structures should be articulated or textured to create interplay of light and shade. Avoid pure whites and blacks.

11.5 Good house-keeping

- During operation, all roads will require an effective dust suppression management programme, such as regular wetting and/or the use of non-polluting chemicals that will retain moisture in the road surface.

11.6 Lighting

Light pollution is largely the result of bad lighting design, which allows artificial light to shine outward and upward into the sky, where it's not wanted, instead of focusing the light downward, where it is needed. Ill 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 and are generally not wanted.

Of all the pollutions faced, light pollution is perhaps the most easily remedied. Simple changes in lighting design and installation yield immediate changes in the amount of light spilled into the atmosphere. The following are measures that must be considered in the lighting design of the Project, particularly at the management and service platforms:

- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds of the site i.e. lights are to be aimed away from residential areas (south and west of the site) towards the mountain.
- 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.

12. SIGNIFICANCE OF IMPACT

The following tables summarise the consequence and significance of the visual impact for both phases. These results are based on worst-case scenario (i.e. views from nearby residential sites west of the site and the general impact within the study area) when the impacts of all aspects of the Project are taken together using the impact criteria in Appendix C. The *magnitude* of impact, rated in Table 4, is further qualified with *duration*, *extent* and *probability* criteria to determine the *significance.* According to these criteria *significance* of impact is a function of (Magnitude + Duration + Extent) x Probability[1].

Table 5-1: Significance of Visual Impact

RESIDENCES IMMEDIATELY WEST OF PROJECT SITE

POTENTIAL VISUAL IMPACT	Magnitude	Duration	Extent	Probability	Significance	Status
ESTABLISHMENT PHASE (without mitigation) Alteration to the visual quality of aspects of the study area due the removal of vegetation, topsoil and earthworks to create the working platforms. The erection of structures to be located on the platforms and the development of the new adits. The result is an impact on the visual aesthetics and sense of place of the study area from a sensitive viewing area. Activities will be visible from adjacent residential units.	6	1	2	5	**45 (M)**	Negative
ESTABLISHEMENT PHASE (with mitigation) *Mitigation measures are feasible during this phase but due to the nature of the activities the impact would not be reduced significantly. However, management measures as proposed in Section 11.0 must be implemented.*	6	1	2	4	**36 (M)**	Negative

1

Points	Significance Weighting	Description
< 30 points	Low	Where this impact would not have a direct influence on the decision to develop in the area
31-60 points	Medium	Where the impact could influence the decision to develop in the area unless it is effectively mitigated
> 60 points	High	Where the impact must have an influence on the decision process to develop in the area

OPERATIONAL PHASE (without mitigation) Alteration to the visual quality of aspects of the study area due the presence of structures and the movement and haulage of materials on and off the site. The result is an impact on the visual aesthetics and sense of place of the study area from a sensitive viewing area west of the site. Activities will be visible from adjacent residential units with a high visual exposure i.e. activities would occur in the foreground of views (< 1,0km).	8	3	2	5	**65 (H)**	Negative
OPERATIONAL PHASE (with mitigation) *Mitigation measures are feasible during the operational phase. Due to the nature of the activities the impact could be reduced when the measures proposed in Section 11 are implemented and effectively managed.*	6	3	2	4	**44 (M)**	Negative
CLOSURE (REHABILITATION) At closure all structures will be removed and the landscape shaped and formed to blend with the existing topography. Rehabilitation measures to prevent erosion and achieve rapid plant growth and colonization are implemented and effectively managed.	2	1	2	2	**10 (L)**	Neutral

Table 5-2: Significance of Visual Impact

GENERAL FOR MOST AREAS WITHIN THE STUDY AREA

POTENTIAL VISUAL IMPACT	Magnitude	Duration	Extent	Probability	Significance	Status
ESTABLISHMENT PHASE (without mitigation) Alteration to the visual quality of aspects of the study area due the removal of vegetation, topsoil and earthworks to create the working platforms. The erection of structures to be located on the platforms and the development of the new adits. The result is an impact on the visual aesthetics and sense of place of the study area from a sensitive viewing area. Activities will be visible from adjacent residential units.	6	1	2	3	**27 (L)**	Negative

ESTABLISHEMENT PHASE (with mitigation) *Mitigation measures are feasible during this phase but due to the nature of the activities the impact would not be reduced significantly. However, management measures as proposed in Section 11.0 must be implemented.*	4	1	2	3	**21 (L)**	Negative
OPERATIONAL PHASE (without mitigation) Alteration to the visual quality of aspects of the study area due the presence of structures and the movement and haulage of materials on and off the site. The result is an impact on the visual aesthetics and sense of place of the study area from a sensitive viewing area west of the site. Activities will be visible from adjacent residential units with a high visual exposure i.e. activities would occur in the foreground of views (< 1,0km).	8	3	2	4	**52 (M)**	Negative
OPERATIONAL PHASE (with mitigation) *Mitigation measures are feasible during the operational phase. Due to the nature of the activities the impact could be reduced when the measures proposed in Section 11 are implemented and effectively managed.*	5	3	2	3	**30 (L)**	Negative
CLOSURE (REHABILITATION) At closure all structures will be removed and the landscape shaped and formed to blend with the existing topography. Rehabilitation measures to prevent erosion and achieve rapid plant growth and colonization are implemented and effectively managed.	2	1	2	2	**10 (L)**	Neutral

13. CUMULATIVE EFFECT

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 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 (LI-IEMA (2013)).

13.1 Cumulative effect of the Project

The current impact of the remnants of the old mine is relatively low. The introduction of the proposed mine and its infrastructure will result in a further general deterioration of the study area's visual landscape. The visibility of proposed project activities will increase visual exposure and intrusion, particularly on views from the west and immediately south-west of the site adding a cumulative visual impact to these sensitive viewing areas. Additional lights from the Project could also contribute to the negative impact of light pollution on night view from these residential areas.

14. CONCLUSION

The existing visual condition of the landscape that may be affected by the proposed Project has been described. The study areas scenic quality has been rated *low* (industrial and urban areas) to *moderate* (residential areas) and *high* (mountain, river areas and the Talana Hill and Museum precinct) within the context of the sub-region and sensitive viewing areas and landscape types identified and mapped indicating potential sensitivity from residential areas to the west and south west of to the proposed Balgray Colliery within a 5 km radius of the project site. The project site in proposed within a landscape type rated as high.

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 travel routes, and important cultural features and historic sites, especially in foreground views.

The Project and its activities will be highly visible from sensitive viewing areas immediately west of the project site (in particular two residences within 1,0km of the site, which will experience high exposure). It will also be visible from sensitive areas in a general arc from the south-west through to the south-east of the project site, although, exposure will be moderate to low as the closest residences are 1,5km from the site. The significance of impact (without mitigation) is *high* for the area immediately west of the site and *moderate* to *low* for the remainder of the study area. The impact on the main tourist attraction in the study area, the Talana Museum would be *insignificant* due to its distance from the site (4,6km).

Mitigation to partially screen views to the site and to blend the Project into the landscape are feasible and will reduce the impact to from *high* to *moderate* during the operational phase for the most affected receptors immediately west of the project and from *moderate* to *low* generally for sensitive receptors throughout the remainder of the study area. At closure and decommissioning the impact will reduce to *low* for all aspects of the project, as the site will be rehabilitated and structures and infrastructure removed. This however, assumes all mitigation measures are effectively implemented and managed.

Author's Opinion

It is the opinion of the author that all aspects of the Project, from a potential visual impact perspective, should be approved provided that the mitigation/management measures are effectively implemented, managed and monitored in the long term.

****GYLA****

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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 generally quantifiable and can be easily described.

Landscape character is therefore the description of pattern, resulting from particular combinations of natural (physical and biological) and cultural (land use) factors and how people perceive these. The visual dimension of the landscape is a reflection of the way in which 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 particular natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace 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 recognised 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. On the basis of 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 generally 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 of the scenic features that appear to be relatively unique or rare within one physiographic region. There may also be cases where a separate evaluation of each of the key factors does not give a true picture of the overall scenic quality of an area. Often it is a number of not so spectacular elements in the proper combination that produces the most pleasing and memorable scenery - the scarcity factor can be used to recognize this type of area and give it the added emphasis it needs.

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

Scenic Quality Inventory and Evaluation Chart

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

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

		3	**1**
Cultural modifications	Modifications add favourably to visual variety while promoting visual harmony. **2**	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**	Modifications add variety but are very discordant and promote strong disharmony. **4**

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

In determining the quality of the visual resource both the objective and the subjective or aesthetic factors associated with the landscape are considered. Many landscapes can be said to have a strong sense of place, regardless of whether they are considered to be 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 considered to be 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 a very 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 generally negative in character with few, if any, valued features. Scope for positive enhancement frequently occurs.

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

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

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

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

Landscape Impact

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

Visual Impact

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

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

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

Visual Intrusion / contrast

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

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

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

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

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

Visual Intrusion

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

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

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

Visibility

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

Visibility

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

Visual Exposure

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

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

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

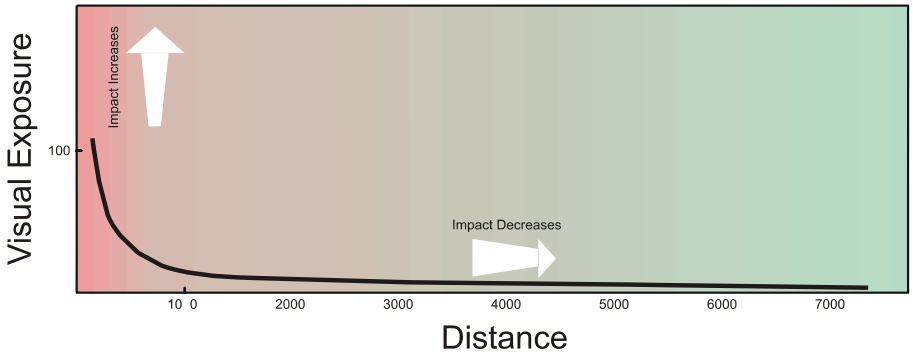
Areas seen from 800m to 5.0km are considered middle ground; vegetation appears as outlines or patterns. Depending on topography and vegetation, middle ground is sometimes considered to be up to 8.0km.

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

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

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

Effect of Distance on Visual Exposure




View from 10 000 metres


View from 5 000 metres


View from 3 000 metres


View from 1 000 metres

Sensitivity of Visual Receptors

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

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

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

The most sensitive receptors may include:

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

Other receptors include:

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

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

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

Sensitivity of Visual Receptors

High	Moderate	Low
Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape;	People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value);	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).
Communities where the development results in changes in the landscape setting or valued views enjoyed by the community;	People travelling through or past the affected landscape in cars, on trains or other transport routes;	Roads going through urban and

Occupiers of residential properties with views affected by the development.	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.	I.e. Pre-development landscape or view and/or introduction of elements that may be prominent but may not necessarily be considered to be substantially uncharacteristic when set within the attributes of the receiving	I.e. Pre-development landscape or view an/or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape.	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.

	landscape.		
High scenic quality impacts would result.	Moderate scenic quality impacts would result	Low scenic quality impacts would result.	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: CRITERIA FOR SIGNIFICANCE OF IMPACT ASSESSMENT (KSEMS 2019)

Environmental issues and potential impacts will be assessed using recognised qualitative impact assessment methodology. The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise as a result of the proposed upgrading of the road. The process of assessing the impacts of the project encompasses the following four activities:

1. Identification and assessment of potential impacts

2. Prediction of the nature, magnitude, extent and duration of potentially significant impacts

3. Identification of mitigation measures that could be implemented to reduce the severity or significance of the impacts of the activity

4. Evaluation of the significance of the impact after the mitigation measures have been implemented i.e. the significance of the residual impact.

Impacts are assessed in terms of the following criteria:

<table>
<tr><th>Criteria</th><th>Indicator</th></tr>
<tr><td>The nature</td><td>A description of what causes the effect, what will be affected and how it will be affected</td></tr>
<tr><td>The physical extent</td><td>Wherein it is indicated whether:

<table><tr><td>1.</td><td>The impact will be limited to the site</td></tr><tr><td>2.</td><td>The impact will be limited to the local area</td></tr><tr><td>3.</td><td>The impact will be limited to the region</td></tr><tr><td>4.</td><td>The impact will be national</td></tr><tr><td>5.</td><td>The impact will be international</td></tr></table></td></tr>
<tr><td>The duration</td><td>Wherein it is indicated whether the lifetime of the impact will be of:

<table><tr><td>1</td><td>A very short duration (0–1 years)</td></tr><tr><td>2</td><td>A short duration (2-5 years)</td></tr><tr><td>3</td><td>Medium-term (5–15 years)</td></tr><tr><td>4</td><td>Long term (> 15 years)</td></tr><tr><td>5</td><td>Permanent</td></tr></table></td></tr>
<tr><td>The magnitude of impact on ecological processes</td><td>Impacts quantified on a scale from 0-10, where a score is assigned:

<table><tr><td>0</td><td>Small and will have no effect on the environment</td></tr><tr><td>2</td><td>Minor and will not result in an impact on processes</td></tr><tr><td>4</td><td>Low and will cause a slight impact on processes</td></tr><tr><td>6</td><td>Moderate and will result in processes continuing but in a modified way</td></tr><tr><td>8</td><td>High (processes are altered to the extent that they temporarily cease)</td></tr><tr><td>10</td><td>Very high and results in complete destruction of patterns and permanent cessation of processes</td></tr></table></td></tr>
</table>

The probability of occurrence/ likelihood of the impact actually occurring	Probability is estimated on a scale where: 1 – Very improbable (probably will not happen) 2 – Improbable (some possibility, but low likelihood) 3 – Probable (distinct possibility) 4 – Highly probable (most likely) 5 – Definite (impact will occur regardless of any prevention measures)

Significance is assessed in terms of:

- The significance, which is determined through a synthesis of the characteristics described above (refer formula below) and can be assessed as low, medium or high
- The status, which is described as either positive, negative or neutral
- The degree to which the impact can be reversed
- The degree to which the impact may cause irreplaceable loss of resources
- The degree to which the impact can be mitigated

The significance is determined by combining the criteria in the following formula:

Significance Points = (Magnitude + Duration + Extent) x Probability. The maximum value is 100 Significance Points.

The significance weightings for each potential impact are outlined in the table below

Points	Significance Weighting	Description
< 30 points	**Low**	Where this impact would not have a direct influence on the decision to develop in the area
31-60 points	**Medium**	Where the impact could influence the decision to develop in the area unless it is effectively mitigated
> 60 points	**High**	Where the impact must have an influence on the decision process to develop in the area

APPENDIX D: 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.

Graham Young PrLArch FILASA

PO Box 331, Groenkloof, 0027
Tel: +27 0(82) 462 1491
grahamyounglandarch@gmail.com

Visual Impact Assessments

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 under graduate 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. Recently, Graham sold his shares in 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.*

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