VISUAL IMPACT REPORT

Mainstream Scafell Cluster Project

August 2021

VISUAL IMPACT REPORT

Mainstream Scafell Cluster Project, Free State

Submitted to:

SLR Consulting (South Africa) (Pty) Ltd

PO Box 1596

Cramerview

2060

Tel: +27(0) 11 467 0978

Prepared by:

GYLA

Graham A Young Landscape Architect

PO Box 331

Groenkloof

0027

+27 (0)82 462 1491

Report Revision No:	*Final*
Date Issued:	24 August 2021
Prepared By:	Graham Young PrLArch, FILASA
Reviewed By:	Graham Young PrLArch, FILASA
Signed:	
Reference:	070_2021: Mainstream Scafell Cluster PV Solar Park, Free State

EXPERTISE OF SPECIALIST

Name:	Graham A Young
Qualification:	BL (Toronto) ML (Pretoria)
Professional Registration:	South African Council for the Landscape Architectural Profession (SACLAP) Reg. No. 87001 Fellow Institute of Landscape Architects of South Africa (FILASA)
Experience in Years:	Over 40 years
Experience	Graham Young is a registered landscape architect with interest and experience in landscape architecture, urban design, and environmental planning. He holds a degree in landscape architecture from the Universities of Toronto (BL) and Pretoria (ML). He has carried out visual impact assessments in Canada and throughout 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. He is a Fellow of the ILASA and a professionally registered landscape architect in South Africa (SACLAP). He is Secretary-General for the International Federation of Landscape Architect, Africa Region (IFLA Africa). He runs his practice, Graham A Young Landscape Architect (GYLA). A specialty is Visual Impact Assessments for which he has been cited with an Institute of Landscape Architects of South Africa (ILASA), Merit Award (1999). Aspects of this work also include landscape characterization studies, end-use studies for quarries, and computer modelling and visualization. He has completed over 300 specialist reports for Projects and conducted several VIA reviews. He has served as a specialist witness in legal cases involving visual impact issues. Mr Young helped develop the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes* (Oberholzer 2005) and produced a research document for Eskom, *The Visual Impacts of Power Lines* (2009). In 2011 he produced '*Guidelines for involving visual and aesthetic specialists'* for the Aapravasi Ghat Trust Fund Technical Committee, which manages a World Heritage Site in Mauritius, along with the *Visual Impact Assessment Training Module Guideline Document* for the same client.

DECLARATION OF INDEPENDENCE

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

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

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

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

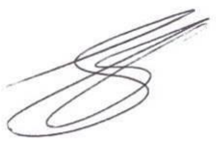
PROJECT TITLE

Mainstream Scafell Cluster PV Solar Park - Visual Impact Report

Specialist Company Name:	Graham Young Landscape Architect			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	4	Percentage Procurement recognition	100%
Specialist name:	Graham Albert Young			
Specialist Qualifications:	BL (Toronto), ML (Pretoria)			
Professional affiliation/registration:	PrLArch Reg. No. 87001 FILASA			
Physical address:	608 Leyds Street, Muckleneuk, 0002			
Postal address:	PO Box 331, Groenkloof			
Postal code:	0027	Cell:	082 462 1491	
Telephone:	082 462 1491	Fax:		
E-mail:	grahamyounglandarch@gmail.com			

I, Graham Albert Young declare that –

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the Specialist

Graham Young Landscape Architect

Name of Company:

24 August 2021

Date

COPYRIGHT

Copyright to the text and other matters, including the manner of presentation, is exclusively the property of Graham Young Landscape Architect (GYLA). It is a criminal offense to reproduce and/or use, without written consent, any matter, technical procedure, and/or technique contained in this document. Criminal and civil proceedings will be taken as a matter of strict routine against any person and/or institution infringing the copyright of the author and/or proprietors.

.

PROTECTION OF PERSONAL INFORMATION ACT

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

- Any personal information provided herein has been provided exclusively for use as part of the public participation registration process, and may therefore not be utilised for any purpose, other than that for which it was provided.
- No additional copies may be made of documents containing personal information unless permission has been obtained from the owner of said information.
- All documentation containing personal information must be destroyed as soon as the purpose for which the information was collected has run out.

SPECIALIST REPORTING REQUIREMENTS

Specialist Reporting Requirements According to Appendix 6 of the National Environmental Management Act (Act 107 of 1998), Environmental Impact Assessment Regulation 2014 (as amended on 7 April 2017)	
Requirement	**Relevant section in report**
Details of the specialist who prepared the report	Pg iii and Appendix A
The expertise of that person to compile a specialist report including a curriculum vitae	Pg iii and Appendix A
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 12
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	Sections 6 and 7
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;	Sections 8, 11 and 12
Any mitigation measures for inclusion in the EMPr;	Section 10
Any conditions for inclusion in the environmental authorisation	Section 10
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 13

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**
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 10
A description of any consultation process that was undertaken during the carrying out the study	This activity was being carried out by SLR the EAP
A summary and copies of any comments that were received during any consultation process	There was no comment on the potential visual impact
Any other information requested by the competent authority.	N/A

ACRONYMS, ABBREVIATIONS AND GLOSSARY

Acronyms & Abbreviations	
BAR	Basic Assessment Report
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
GYLA	Graham Young Landscape Architect
SACLAP	South African Council for the Landscape Architectural Profession
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment

Glossary	
Aesthetic Value	Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace 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.
Glare	The sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted, which causes annoyance, discomfort, or loss in visual performance and visibility. *See* Glint. (USDI 2013:314)
Glint	A momentary flash of light resulting from a spatially localized reflection of sunlight. *See* Glare. (USDI 2013:314)
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 this Project the study area refers to the proposed Project footprint / Project site as well as the 'zone of potential influence' (the area defined as the radius about the centre point of the Project beyond which the visual impact of the most visible features will be insignificant) which is a 5,0km radius surrounding the proposed Project footprint / site.
Project Footprint / Site	For 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 or collectively 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

Graham Young Landscape Architect was commissioned by SLR Consulting (South Africa) (Pty) Ltd to carry out a Visual Impact Assessment (VIA) of the proposed Mainstream Scafell Cluster Photovoltaic Solar Project near Parys, Free State ("the Project"). The VIA focuses on the potential impact of the physical aspects of the proposed developments (i.e. form, scale, and bulk), and their potential impact within the local landscape and receptor context.

Project, Project site, and Study Area

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the development of a cluster of four proposed solar photovoltaic (PV) developments, including associated grid connection infrastructure, namely, Scafell (150 MW_{ac}), Vlakfontein (150 MW_{ac}), Ilikwa (75 MW_{ac}) and Damlaagte (150 MW_{ac}). The Project sites are located immediately west on the N1 national road, south of the Vaal River, and north of the R59, which connects Parys (21km southwest of the sites) and Sasolburg (18km to the east). The study area[1] is defined as 10km about the four Project sites. The study area is located outside of a Renewable Energy Development Zone (REDZ), but within the Central Strategic Transmission Corridor – a node for the development and expansion of large – scale electricity/grid connection infrastructure, i.e., transmission lines and substations, etc. The Project sites for the proposed Projects are located 2 km from the existing Scafell Main Transmission Substation (MTS). Existing grid connection infrastructure present within the vicinity of the substation include the following:

- Mercury – Zeus 1 765 kV Transmission Line
- Olympus – Scafell 1 275 kV Transmission Line
- Scafell – Snowdown 1 275 kV Transmission Line
- Makalu – Scafell 1 275 kV Transmission Line

The grid connection infrastructure proposed for the solar PV facilities for the Scafell Cluster Project will be connected to the Scafell MTS via overhead transmission lines of up to 132 kV from each of the solar PV facilities.

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 and to rate issues relating to potential visual impacts arising from the Project.

[1] The extent of the study area is determined by the zone of potential influence, which in this study relates to a radius of 10,0km around the centre of the Project sites. At 10,0km and beyond the development would recede into background views and or be screened by topography, vegetation or existing or proposed (approved) power infrastructure.

Terms and Reference

A specialist study is required to establish the visual baseline and to identify and potential 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 a site visit (carried out on 19 December 2020) which allows for a description and characterization of the receiving environment.
- Describe the landscape character, quality and assess the visual resource of the study area.
- Describe the visual characteristics of the components of the Project.
- Identify issues and rate the visual impact of the Project.
- Propose mitigation measures to reduce the potential impact of the Project.

Assumptions, Uncertainties and Limitations

The following assumptions limitations have been made in the study:

- The description of Project components is limited to what has been supplied to the author prior to the date of completion of this report.
- Site photos were taken at the beginning of summer (19 December 2020) and do not reflect the complete landscape character of the area as experienced through all seasons. However, due to the relative openness of the study area, this is not a major concern in assessing potential visual impacts.
- The Project report uses the concept of ‘worst case scenario’ to identify issues and rate visual impacts. In this regard it is assumed that the various Projects, Scafell, Damlaagte, Vlakfontein and Ilikwa would be constructed at the same time and therefore their physical presence as a total unit, is being assessed.

Baseline

The four Project sites are located adjacent to each other and therefore the baseline study applies to all.

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 *moderate* within the context of the sub-region, and sensitive viewing areas and landscape types identified and mapped indicating potential sensitivity to the Project. The site itself is in a landscape type rated as *moderate*.

Visual impacts will be caused by activities associated with the Scafell Cluster Project. The significance of visual impact is based on the worst-case scenario. This scenario assumes that all facilities along with the associated grid infrastructure and sub-stations would be constructed at the same time. At the time of writing there was no evidence to the contrary. This assumption is also based on the nature of visual impact and the fact that receptors would experience all facilities (i.e. all projects and transmission lines) with in the same visual envelope from their respective locations or as they travel along adjacent roads.

Impacts on 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. The visual impact of the Project will cause changes in the landscape that are noticeable to viewers experiencing the study area from the N1, Boundary Road, local roads to the north, west, and south of the site, and homesteads also in this general area. Visual impacts that would potentially result from Project activities are likely to be moderately adverse, long-term, and will most likely cause loss of landscape and visual resources. The visual impact on properties along the Vaal River is anticipated to be low, primarily because the properties are orientated to the river and the screening effect of large trees growing on the adjacent embankments.

The cause of these anticipated visual impacts would be:

Construction Phase:

- Removal of vegetation, the building of access roads, earthworks, and exposure of earth to establish the areas to be developed.
- Physical presence of construction camps and the movement of construction vehicles within the site and along local roads.
- Generation of dust by construction activities.

Operational Phase

- Physical presence of the solar arrays and a minor potential of glint and glare.
- Reduction in the rural sense of place for the study area.
- Light pollution.

Decommissioning Phase

- Physical presence of the activities associated with removing the structures and rehabilitating the site.

Post Closure

- The sites will be rehabilitated back to pre-Project conditions.

The predicated[2] *moderate* negative impact of the Project will cause a partial loss of or alteration to key landscape elements and visual characteristics of the baseline. i.e. the impact will cause a moderate alteration (cumulative) to the visual quality of the study area due to the physical presence, scale, and size of the Project infrastructure. Targets, limits, and thresholds of concern may occasionally be exceeded and will require some intervention. Occasional complaints can be expected from the nearby homesteads. Mitigation is required to contain the negative impact of the worst-case (unmanaged) scenario.

With mitigation the impact can be reduced to *low* after approximately 5 years when the proposed tree screens along the northern and southern edges, begin to mature.

[2] This rating applies to all four projects and transmission lines as receptors would experience all the facilities (i.e. solar PV projects, transmission lines and battery systems) with in the same visual envelope from their respective locations or as they travel along adjacent roads

Cumulative Effects

The cumulative impact of the Project, all facilities and infrastructure taken together, is significant, along with the exiting power infrastructure (ESKOM sub-station and Transmission lines emanating from it), that exists in the study area. Intervisibility for the proposed Project and the existing infrastructure would be evident. The visual absorption capacity for the greater parts of the study area is relatively low, and the combined effect over time of these developments would result in the study area being impacted upon in a moderate manner beyond the anticipated negative impacts of the proposed Project alone.

Opinion of the author

It is the opinion of the author that all aspects of the Scafell Cluster 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 ***

TABLE OF CONTENT

LIST OF FIGURES

LIST OF TABLES

1. INTRODUCTION

1.1 Project Overview and Background

Graham Young Landscape Architect was commissioned by SLR Consulting (South Africa) (Pty) Ltd to carry out a Visual Impact Assessment (VIA) of the proposed Mainstream Scafell Cluster Photovoltaic Solar Project, comprising four separate, yet connected facilities and associated grid connection infrastructure, near Parys, Free State ("the Project"). The VIA focuses on the potential impact of the physical aspects of the proposed developments (i.e. form, scale, and bulk), and their potential impact within the local landscape and receptor context.

1.2 Project, Project site and study area

South Africa Mainstream Renewable Power Developments (Pty) Ltd is proposing the development of a cluster of four proposed solar photovoltaic (PV) developments namely, Scafell (150 MW_{ac}), Vlakfontein (150 MW_{ac}), Ilikwa (75 MW_{ac}) and Damlaagte (150 MW_{ac}). The Project sites are located immediately west on the N1 national road, south of the Vaal River, and north of the R59, which connects Parys (21 km southwest of the sites) and Sasolburg (18 km to the east). The study area[3] is defined as 10 km about the four Project sites as indicated in Figure 1. The study area is located outside of a Renewable Energy Development Zone (REDZ), but within the Central Strategic Transmission Corridor – a node for the development and expansion of large – scale electricity / grid connection infrastructure, i.e., transmission lines and substations, etc. The Project sites for the proposed Projects is located 2 km from the existing Scafell Main Transmission Substation (MTS). Existing grid connection infrastructure present within the vicinity of the substation include the following

- Mercury – Zeus 1 765 kV Transmission Line
- Olympus – Scafell 1 275 kV Transmission Line
- Scafell – Snowdown 1 275 kV Transmission Line
- Makalu – Scafell 1 275 kV Transmission Line

The grid connection infrastructure proposed for the solar PV facilities for the Scafell Cluster Project will be connected to the Scafell MTS via overhead transmission lines of up to 132 kV from each of the solar PV facilities.

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, and which must be addressed in the assessment phase.

[3] The extent of the study area is determined by the zone of potential influence, which in this study relates to a radius of 10,0km around the Project sites. At 10,0km and beyond the development would recede into background views and or be screened by topography, vegetation or existing or proposed (approved) power infrastructure.

1.4 Terms and Reference

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

- Data collected during a site visit (carried out on 19 December 2020) allows for a description and characterization of the receiving environment.
- Describe the landscape character, quality and assess the visual resource of the study area.
- Describe the visual characteristics of the components of the Project.
- Identify issues that must be addressed in the impact assessment phase.
- Propose mitigation options to reduce the potential impact of the Project.

1.5 Assumption, Uncertainties, and Limitations

The following assumptions limitations have been made in the study:

- The description of Project components is limited to what has been supplied to the author before the date of completion of this report.
- Site photos were taken at the beginning of summer (19 December 2020) and do not reflect the complete landscape character of the area as experienced through all seasons. However, due to the relative openness of the study area, this is not a major concern in assessing potential visual impacts.
- Visual issues were not mentioned during the public participation process, and therefore it is assumed that there is a low receptor toward the Project.
- The Project report uses the concept of 'worst case scenario' to identify issues and rate visual impacts. In this regard it is assumed that the various projects, Scafell, Damlaagte, Vlakfontein and Ilikwa would be constructed the same time and along with the grid connections to the existing ESKOM sub-station. The significance of visual impact is therefore based on the worst-case scenario. This scenario assumes that all facilities along with the associated grid infrastructure and sub-stations would be constructed at the same time. At the time of writing there was no evidence to the contrary. This assumption is also based on the nature of visual impact and the fact that receptors would experience all facilities with in the same visual envelope from their respective locations or as they travel along adjacent roads.

1.6 Baseline

The four Project sites are located adjacent to each other and therefore the baseline is applicable to all of them.

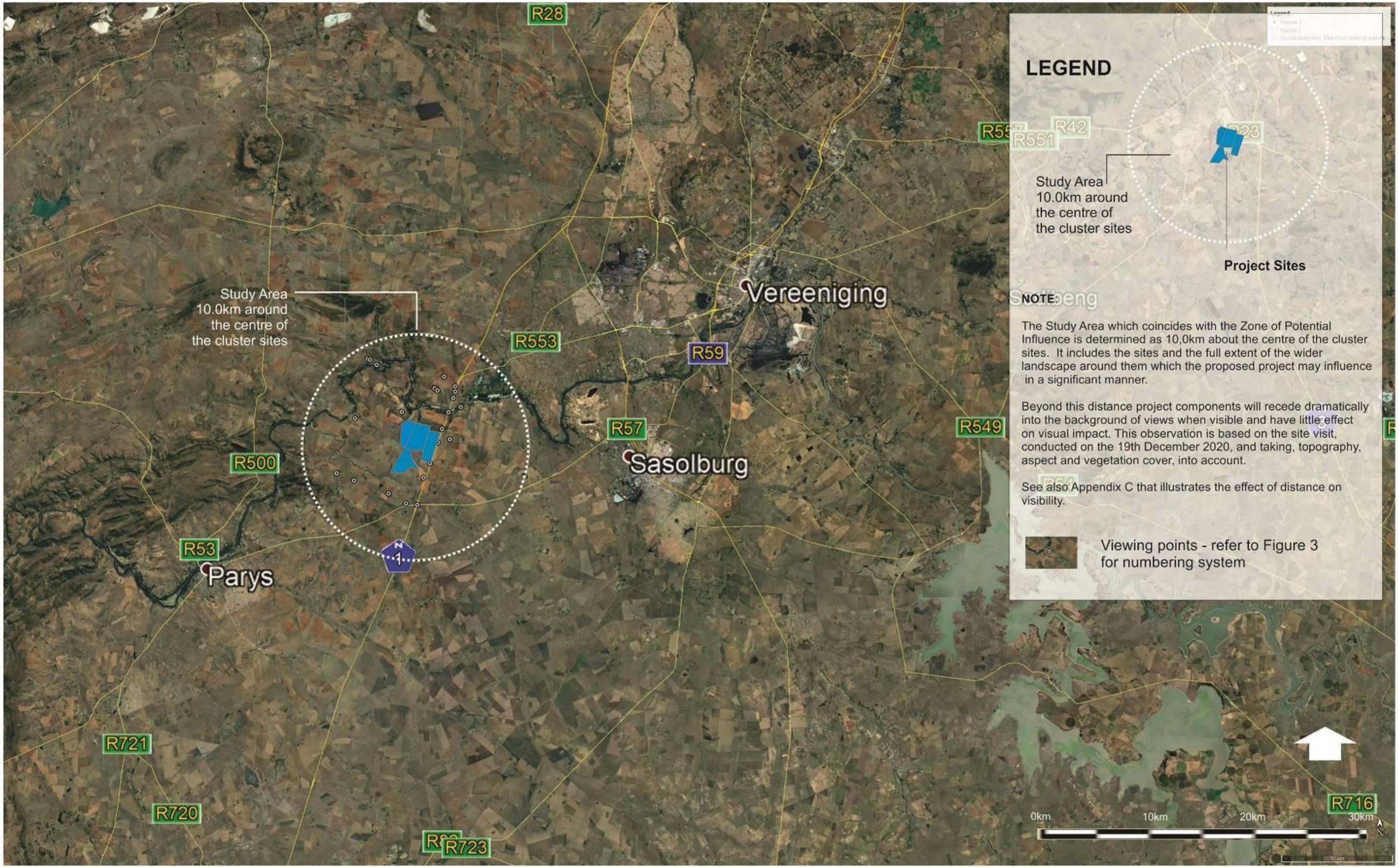


Figure 01: LOCALITY - Scaffel Solar PV Project Cluster

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

2. LEGAL REQUIREMENTS AND GUIDELINES

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

2.1 National Legislation and Guidelines

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

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

Specialist Screening Protocols are also required by the 2014 EIA Regulations. These were taken into consideration for each of the four projects. However, the Landscape (Solar) Theme Sensitivity was referenced as there is no specific 'visual' protocol.

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[4], 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.

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

3. APPROACH AND METHODOLOGY

3.1 Approach

The assessment of likely effects on a landscape resource and visual amenity is complex since it is determined through a combination of quantitative and qualitative evaluations. When assessing visual impact, the worst-case scenario is considered. Landscape and visual assessments are separate, although linked, procedures. The landscape, its analysis, and the 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 A for further elaboration. Aesthetic value is not easy to measure but it can be assumed that some places, such as declared nature reserves by their very definition, evoke emotional connections with the land due to the already defined importance of the area i.e. that it is declared a nature reserve and by implication is therefore worth saving in its most pristine condition.

Studies for perceptual psychology have shown 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 causing major contrast/discord between the natural and cultural landscape.
- And where land use compatibility decreases (Crawford 1994).

In determining the quality of the visual resource for the Project site, both the objective and the subjective or aesthetic factors (determined by the specialist) associated with the landscape are considered. Many landscapes can be said to have a keen sense of place, regardless of whether they are scenically beautiful. However, where landscape quality, aesthetic value, and a powerful sense of place coincide, the visual resource or perceived value of the landscape is extremely high. The criteria given in Appendix 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 element or characteristic of the landscape likely to be affected. The evaluation will reflect such factors as its "quality, value, contribution to landscape character, and the degree to which the particular element or characteristic can be replaced or substituted" (LiEMA 2013).

3.1.3 Sense of Place

Central to the concept of a sense of place is that the landscape requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historic use and habitation of the area. According to Lynch (1992), a 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 together with the man-made structures and features contribute to the sense of place for the study area. It is this combination that defines the study area and establishes its visual and aesthetic identity.

3.1.4 Sensitive Receptors

The sensitivity of visual receptors and viewing areas is dependent on the location and context of the viewpoint, the expectations and occupation or activity of the receptor, or the importance of the view, which may be determined concerning 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 i.e. nature reserves.
- Communities where development results in negative changes in the landscape setting or valued views enjoyed by the community.
- Occupiers of residential/tourist properties with views negatively affected by the development i.e. game lodges.
- People traveling through recognized nature reserves or areas of declared scenic beauty (i.e. tourist routes)

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

Other, less sensitive, receptors include:

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

Landscape sensitivity, on the other hand, relates to the nature and character of the study area's landscape to the potential to accept change (VAC) caused by the proposed development.

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

3.1.5 Landscape Effects

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

3.1.6 Visual Effects

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

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

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

3.1.7 *Intensity* of Visual Impact

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

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

3.1.8 Significance of Visual Impact

A combined quantitative and qualitative methodology, as supplied by the Environmental Practitioner, was used to describe the significance of impacts. Significance of impact is rated as *consequence* of impact X the *probability* of the impact occurring. Consequence is determined using intensity, spatial scale, and duration criteria. A summary of each of the qualitative descriptions along with the equivalent quantitative rating scale is given in Annexure C.

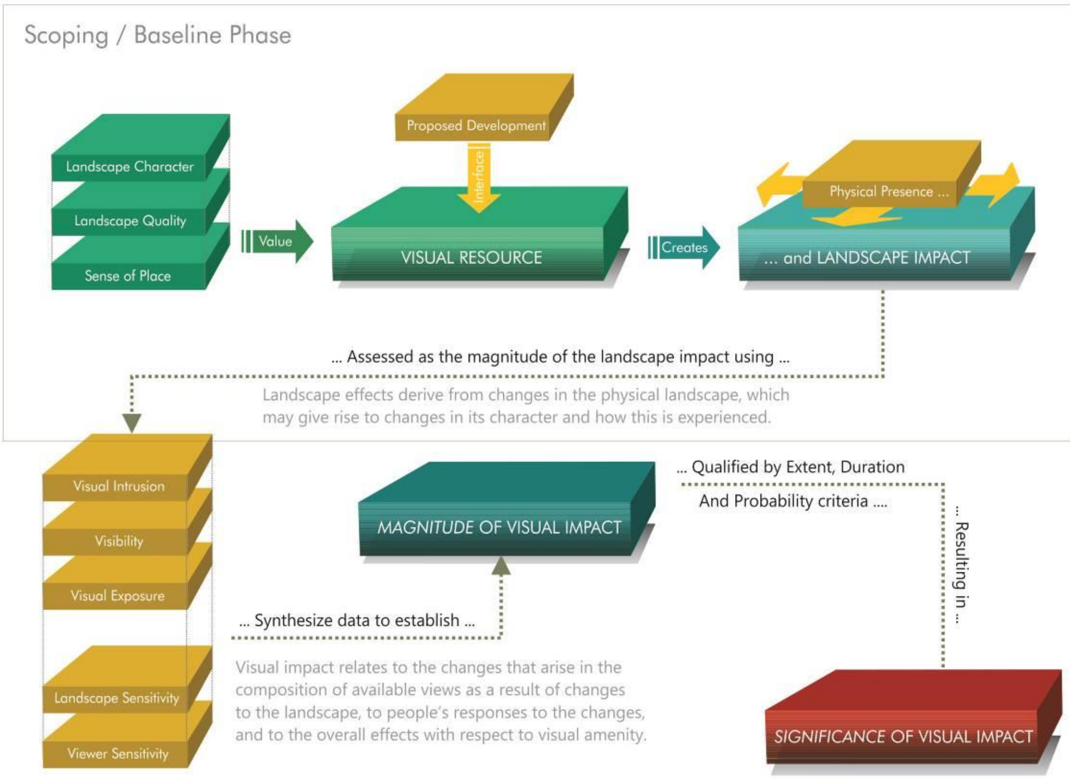


Image 1: Visual Impact Process

3.2 Methodology

The following method was used:

- Site visit: A field survey was undertaken on 19 December 2020 when the study area was visited to the extent that the receiving environment could be documented and adequately described. The climate conditions were mostly sunny with some cloud cover.
- Project components: The physical characteristics of the Project components were described and illustrated based on information supplied by SLR.
- General landscape characterization: The visual resource (i.e. receiving environment) was mapped using the field survey, Google Earth imagery, and Mucina and Rutherford's (2006) reference book, *The Vegetation of South Africa, Lesotho, and Swaziland*. The description of the landscape focused on the nature of the land rather than the response of a viewer (refer to Appendix A).
- The character of the landscape was described and rated in terms of its aesthetic appeal using recognized contemporary research in perceptual psychology as the basis, and its sensitivity as a landscape receptor.
- The sense of place of the study area was described as to its uniqueness and distinctiveness. The primary informant of these qualities was the spatial form and character of the natural landscape together with the cultural transformations associated with the historic/current use of the land.
- The potential impact on the visual environment of the proposed Projects were identified; and rated according to SLR significance rating criteria.
- Measures to mitigate the negative impacts of the proposed Project were recommended.

4. DESCRIPTION OF THE PROJECT

4.1 Project Facilities

The Scafell Cluster Project consists of four separate solar PV facilities with a total generating capacity of up to 550 MW_{ac}. Figure 2 identifies the proposed site locations. The development footprint of each facility is:

- Ilikwa – 132 Ha. with a capacity of 100 MW_{ac}
- Damlaagte – 166 Ha with a capacity of 150 MW_{ac}
- Scafell – 257 Ha with a capacity of 150 MW_{ac} and
- Vlakfontein – 169 Ha with a capacity of 150 MW_{ac}.

The development, the Photovoltaic (PV) facilities and their connection infrastructure, consist of the installation of the following equipment:

- Bifacial / monofacial photovoltaic modules (mono-crystalline, poly-crystalline, or thin-film modules);
- Mounting systems for the PV arrays (single-axis horizontal trackers or fixed structures) and related foundations;
- Inverters and transformers that will be housed with an inverter station located within the array field
- Internal cabling and string boxes;
- Medium voltage stations, hosting DC/AC inverters and LV/MV power transformers;
- Medium voltage receiving station(s);
- Workshops & warehouses;
- One on-site high-voltage substation with high-voltage power transformers;
- Up to four (4) 132 kV circuits and associated distribution lines from the Project substation to the Eskom Scafell Main Transmission Substation (MTS) located nearby;
- A battery storage facility (comprising Lithium-ion, or Redox flow batteries) may be constructed;
- Electrical system and UPS (Uninterruptible Power Supply) devices;
- Lighting system;
- Grounding system;
- Internal roads; and
- Fencing of the site and alarm and video-surveillance system.

Table 1 and 2 include technical information associated with the solar PV facilities and the grid connection infrastructure, as well as associated infrastructure for the proposed Project. The anticipated operational life of the plant is approximately 20 years. Beyond this duration, the proposed Project may continue to operate subject to further approvals or be decommissioned. In this assessment, it is assumed that it would be decommissioned. The construction and commissioning duration of the PV facilities and grid connection infrastructure will be approximately 12 – 18 months.

Table 1: Scafell Cluster Project Technical Details for the Solar PV Facilities

Component	Damlaagte Solar PV Facility	Scafell Solar PV Facility	Vlakfontein Solar PV Facility	Ilikwa Solar PV Facility
Farm name & portion number:	Damlaagte 229 Remaining Extent	Willow Grange 246 Portion 3	Vlakfontein 161 Portion 6	Proceederfontein 100 Portion 5
Property size:	282.22 ha	521.05 ha	299.95 ha	276.86 ha
Project Site size:	173 ha	361 ha	255 ha	195 ha
Development footprint size:	166 ha	257 ha	169 ha	132 ha
Centre coordinates of site:	26°47'29.47"S 27°37'43.58"E	26°47'46.97"S 27°38'20.00"E	26°48'10.41"S 27°39'0.92"E	26°48'55.45"S 27°37'35.52"E
Capacity	Up to 150 MW_{ac}	Up to 150 MW_{ac}	Up to 150 MW_{ac}	Up to 100 MW_{ac}
Installed PV panel height	Up to 3 m			
Number of PV panels	Up to 304 452	Up to 304 252	Up to 304 252	Up to 154 440
IPP Substation capacity	Up to 33 kV / 132 kV			
Substation footprint	Up to 2.5 ha			
Grid Connection	• 132 kV power line from the 33 kV / 132 kV from the on-site substation to the Scafell MTS • 132 kV power line from the 33 kV / 132 kV on-site substation via Loop-in / Loop-out connection into the existing Bernina – Leeudoring Shaft / Scafell 132 kV power lines.	• 132 kV power line from the 33 kV / 132 kV from the on-site substation to the Scafell MTS • 132 kV power line from the 33 kV / 132 kV on-site substation via Loop-in / Loop-out connection into the existing Scafell – West Wits 2 132 kV power lines.	• 132 kV power line from the 33 kV / 132 kV from the on-site substation to the Scafell MTS • 132 kV power line from the 33 kV / 132 kV on-site substation via Loop-in / Loop-out connection into the existing Scafell / Tahiti 132 kV power lines or the Lochvaal Rural / Scafell 132 kV	• 132 kV power line from the 33 kV / 132 kV from the on-site substation to the Scafell MTS • 132 kV power line from the 33 kV / 132 kV on-site substation via Loop-in / Loop-out connection into the existing Scafell / Tahiti 132 kV power lines or the Lochvaal Rural / Scafell 132 kV

Component	Damlaagte Solar PV Facility	Scafell Solar PV Facility	Vlakfontein Solar PV Facility	Ilikwa Solar PV Facility
Grid Connection Corridor Length & Width	Up to 2 km long and 150 m (and up to 500 m wide at the footprint of each Switching Station)			
BESS footprint	Up to 2 ha			
BESS technology	Lithium-ion or Redox Flow Batteries			
Size of laydown area	Up to 3 ha			
Operation and maintenance buildings	• Offices • Operations and Control Centre • Operation and Maintenance Area / Warehouse / Workshop • Ablution Facilities • Security and Guard House			
Main access road	Gravel, 2.5 km long and 8 m wide			
Internal access road	Gravel,12 km long and 5 m wide			

Table 2: Scafell Cluster Project Technical Details for the grid connection infrastructure

Component	Damlaagte Solar PV Facility Grid Connection	Scafell Solar PV Facility Grid Connection	Vlakfontein Solar PV Facility Grid Connection	Ilikwa Solar PV Facility Grid Connection
Property details:	Damlaagte 229 Remaining Extent Willow Grange 246 Portion 3 Proceederfontein 100 Portion 5 Scafell 448 Remaining Extent	Willow Grange 246 Portion 3 Damlaagte 229 Remaining Extent Proceederfontein 100 Portion 5 Scafell 448 Remaining Extent	Vlakfontein 161 Portion 6 Willow Grange 246 Portion 3 Proceederfontein 100 Portion 5 Scafell 448 Remaining Extent	Proceederfontein 100 Portion 5 Willow Grange 246 Portion 3 Scafell 448 Remaining Extent
Grid connection corridor length and width:	**Alternative 1:** 150 m wide and up to 5 km long **Alternative 2:** 150 m wide and up to 5 km long	**Alternative 1:** 150 m wide and up to 5 km long **Alternative 2:** 150 m wide and up to 5 km long	**Alternative 1:** 150 m wide and up to 5 km long **Alternative 2:** 150 m wide and up to 5 km long	**Alternative 1:** 150 m wide and up to 5 km long **Alternative 2:** 150 m wide and up to 5 km long
Servitude width:	Up to 31 m			
Switching Station capacity:	33 / 132 kV			
Transmission Line capacity:	Up to 132 kV			
Transmission Line length:	Up to 2 km			
Transmission Line pylons:	Monopole or Lattice pylons, or a combination of both where required.			
Transmission line pylon height:	Up to 40 m			
Access to transmission servitude:	A 4 m wide and 2 km long jeep track will be required and constructed during the construction phase of the proposed Project. Existing roads and jeep tracks within existing servitudes in the study area will be used as far as possible to gain access to the grid connection corridor during the construction and operation phase of the proposed Project.			

4.2 Alternatives

Alternatives have been identified and assessed for the grid connection corridors (for each of the solar PV facilities), battery energy storage systems, monofacial and bifacial PV panel modules and PV panel mounting technologies. Each of the alternatives being considered and assessed in this Visual Assessment Report are described in detail in the following sections.

4.3 Project Phases and activities

Activities to be undertaken during each of the phases are described in the following sections:

4.3.1 Site Preparation Phase

This phase would include the clearance of vegetation, installation of perimeter fencing and levelling of the site and preliminary earthworks. Thereafter the Project site will be marked out, a construction camp set up and the access road to the site be constructed. The clearance of vegetation is not anticipated to be site wide and will depend on the detailed layout of the proposed Project.

4.3.2 Construction Phase

The construction phase of the proposed Project will be initiated following the completion of the site preparation activities. The construction phase will include the following:

- Excavation of cable trenches;
- Ramming or drilling of the mounting structure frames;
- Installation of the PV modules onto the frames;
- Installation of measuring equipment;
- Laying of cables between the module rows to the inverter stations;
- Optionally laying of gravel or aggregate from nearby quarries placed in the rows between the PV panel array for enhanced reflection onto the panels, assisting in vegetation control and drainage;
- Construction of foundations for the inverter stations and installation of the inverters;
- Construction of the substation and BESS foundations and installation of the substation components and placement of BESS;
- Construction of operations and maintenance buildings;
- Undertaking of rehabilitation on cleared areas where required;
- Testing and commissioning; and
- Removal of equipment and disassembly of construction camp.

The construction phase of the proposed Project will be for a period of up to 12 – 18 months.

4.3.3 Construction Phase

The proposed Project will be operated on a 24 hour, 7 days a week basis. The operation phase of the proposed Project will comprise the following activities:

- Regular cleaning of the PV modules by trained personnel;

- Vegetation management under and around the PV modules and within the transmission line servitude to allow maintenance and operation at full capacity;
- Maintenance of all components including PV modules, mounting structures, trackers, inverters, substation transformers, BESS, and equipment;
- Office management and maintenance of operations and maintenance buildings;
- Supervision of the solar PV facility operations; and
- Site security monitoring.

4.3.4 Decommissioning Phase

The proposed Project is expected to operate for at least 20 years. Once the solar PV facility reaches the end of its life, the facility and the grid connection infrastructure will be decommissioned or continue to operate following the issuance of a new Power Purchase Agreement (PPA) by Eskom. If decommissioned, all components will be removed, and the site rehabilitated. Where possible all materials will be recycled, otherwise they will be disposed of in accordance with local regulations and international best practice.

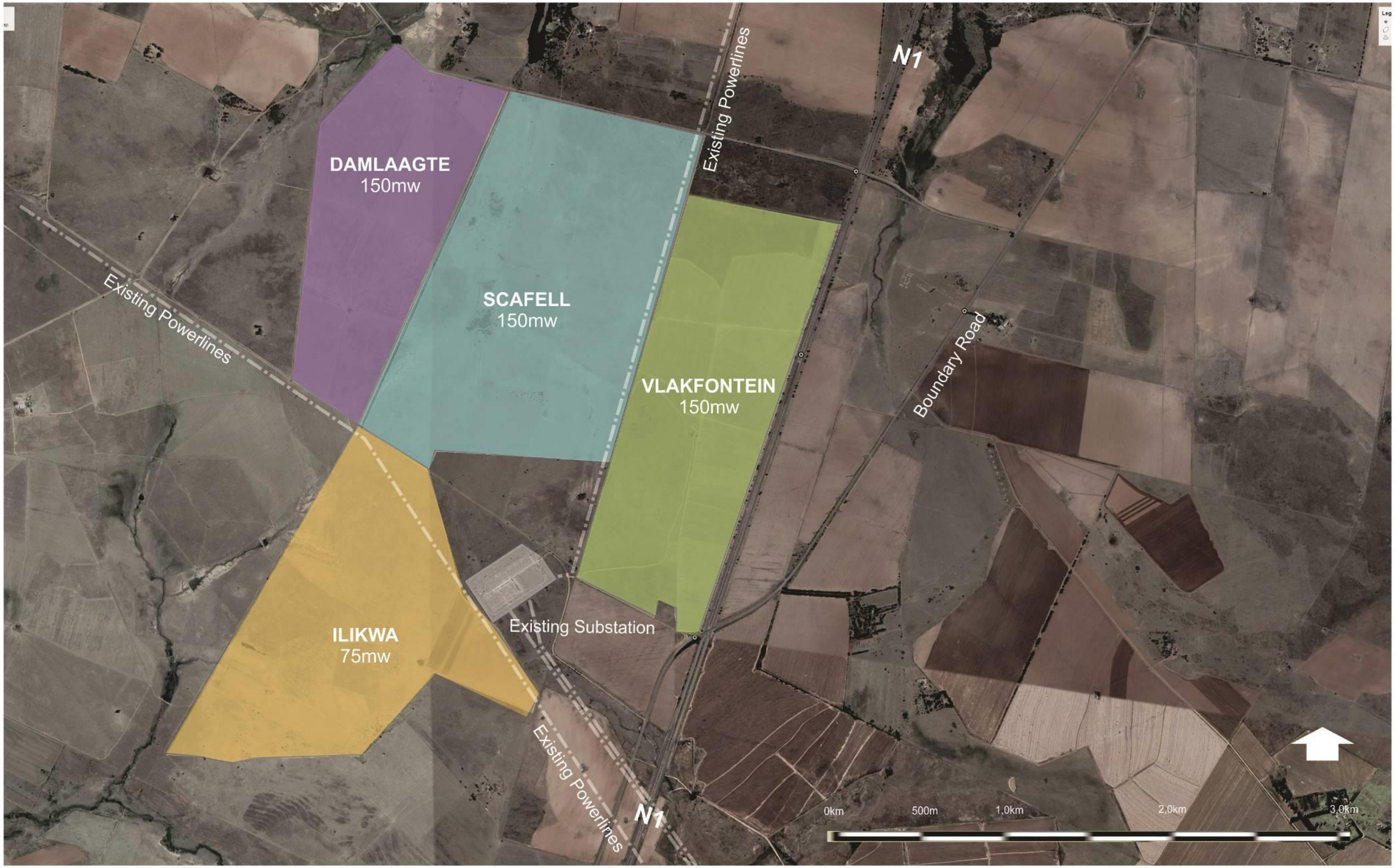


Figure 02: LAYOUT - Scafell Solar PV Cluster

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

5. PROJECT ALTERNATIVES

Various alternatives are being considered for the proposed Project. These include location and technology alternatives. Location alternatives being considered are for the grid connection infrastructure. Two 150 m wide (and up to 500 m wide at the footprint for each switching station) and up to 5 km long grid connection corridors are being assessed and considered for each solar PV facility. Other alternatives identified include battery energy storage systems, monofacial and bifacial PV panel modules and PV panel mounting technologies. The alternatives considered for the Scafell Cluster Project are described in the following sections:

5.1 Location / Site Alternatives

5.1.1 Damlaagte Solar PV Facility Grid Connection Corridor Alternatives

Two grid connection corridors have been identified and assessed in this Report for the placement of grid connection infrastructure for the Damlaagte Solar PV Facility (refer to 2-1). These corridors are described as follows:

- **Grid Connection Corridor Alternative 1**
  This corridor is 150 m wide and is approximately 2.0 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Damlaagte Solar Facility located on Damlaagte RE/229 and extends for about 1 km in an easterly direction across Willow Grange 3/246 before turning about 90° south for 0.6 km across Scafell RE/448, then turning slightly southeast for 0.3 km before terminating at the Scafell Eskom MTS. This is the shortest most direct route to connect to the Scafell Eskom MTS.

- **Grid Connection Corridor Alternative 2**
  This corridor is 150 m wide and is also approximately 2.5 km in length. This proposed grid connection starts at the on-site substation (Switching Station) of the proposed Damlaagte Solar Facility located on Damlaagte RE/229 and extends for about 0.6 km in an easterly direction across Willow Grange 3/246, then turns about 90° southwest for 0.7 km and then southeast for 0.9 km onto Procedeerfontein 5/100, and then turns northeast for 0.2 km before terminating at the Scafell Eskom MTS located on Scafell RE/448.

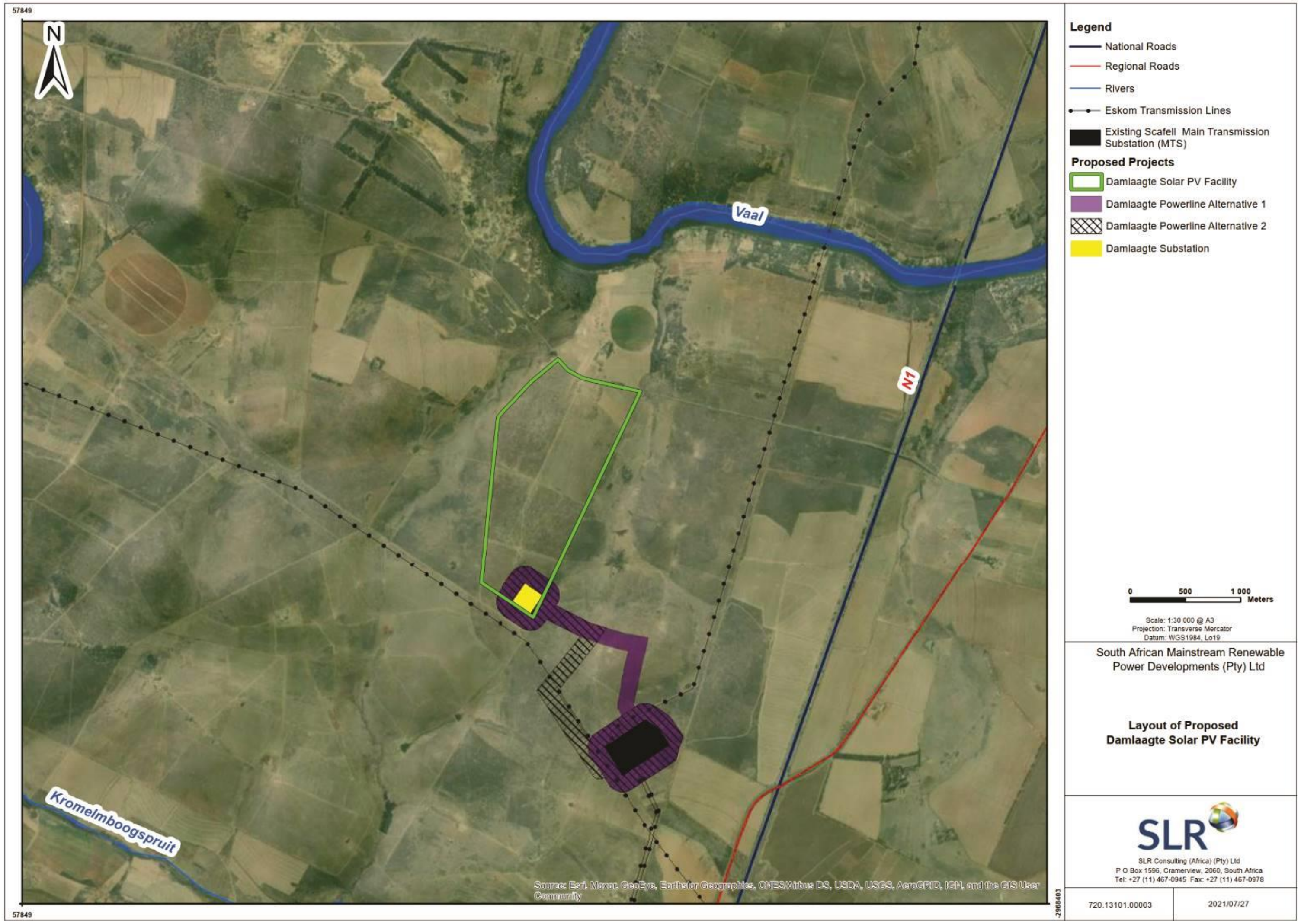


Figure 02-1: ALTERNATIVE GRID CONNECTION CORRIDOR LAYOUT - Damlaagte

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

5.1.2 Scafell Solar PV Facility Grid Connection Corridor Alternatives

Two grid connection corridors have been identified and assessed in this Report for the placement of grid connection infrastructure for the Scafell Solar PV Facility (refer to Figure 2-2). These corridors are described as follows:

- **Grid Connection Corridor Alternative 1**
  This corridor is 150 m wide and is approximately 0.9 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Scafell Solar Facility located on Willow Grange 3/246 and extends for about 0.6 km south across Scafell RE/448, then turning slightly southeast for 0.3 km, terminating at the Scafell Eskom MTS. This is the shortest most direct route to connect to the Scafell Eskom MTS.

- **Grid Connection Corridor Alternative 2**
  This corridor is 150 m wide and is also approximately 2.2 km in length. This proposed grid connection starts at the on-site substation (Switching Station) of the proposed Scafell Solar Facility located on Willow Grange 3/246 and extends for about 0.4 km in a westerly direction across Willow Grange 3/246, then turns southwest for 0.7 km and then southeast for 0.9 km onto Procedeerfontein 5/100, and then turns northeast for 0.2 km before terminating at the Scafell Eskom MTS located on Scafell RE/448.

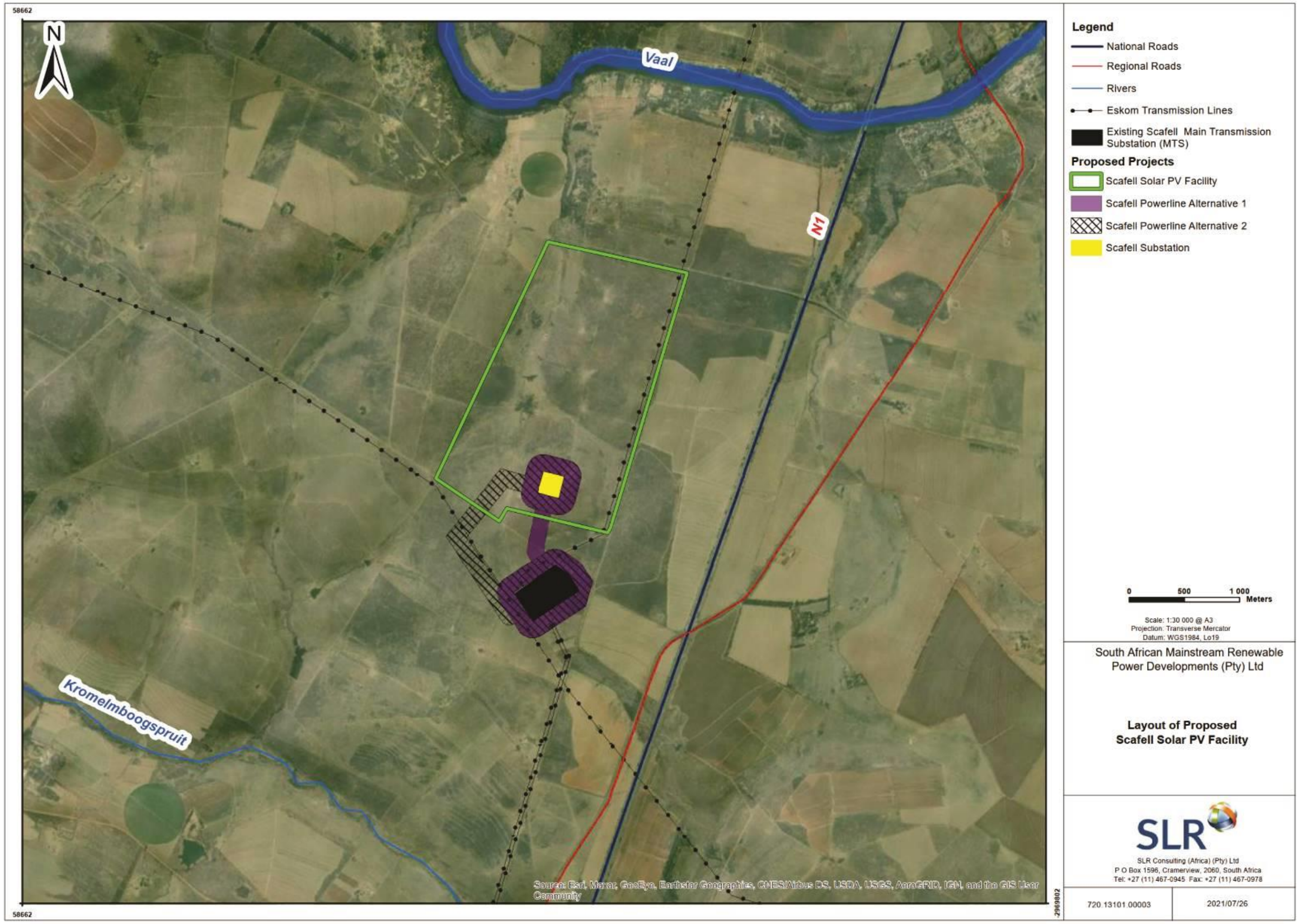


Figure 02-2: ALTERNATIVE GRID CONNECTION CORRIDOR LAYOUT - Scafell

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

5.1.3 Vlakfontein Solar PV Facility Grid Connection Corridor Alternatives

Two grid connection corridors have been identified and assessed in this Report for the placement of grid connection infrastructure for the Vlakfontein Solar PV Facility (refer to Figure 2-3). These corridors are described as follows:

- **Grid Connection Corridor Alternative 1**

  This corridor is 150 m wide and is approximately 2.0 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Vlakfontein Solar Facility located on Vlakfontein 6/161 and extends for about 0.8 km in a westerly direction across Willow Grange 3/246 before turning about 90° south for 0.6 km across Scafell RE/448, then turning slightly southeast for 0.3 km, terminating at the Scafell Eskom MTS. This is the shortest most direct route to connect to the Scafell Eskom MTS.

- **Grid Connection Corridor Alternative 2**

  This corridor is 150 m wide and is approximately 3.0 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Vlakfontein Solar Facility located on Vlakfontein 6/161 and extends for about 1.2 km in a westerly direction across Willow Grange 3/246, then 0.7 km in a south-westerly direction across Procedeerfontein 5/100, a further 0.9 km in a south-easterly direction and then turns northeast for 0.2 km before terminating at the Scafell Eskom MTS located on Scafell RE/448.

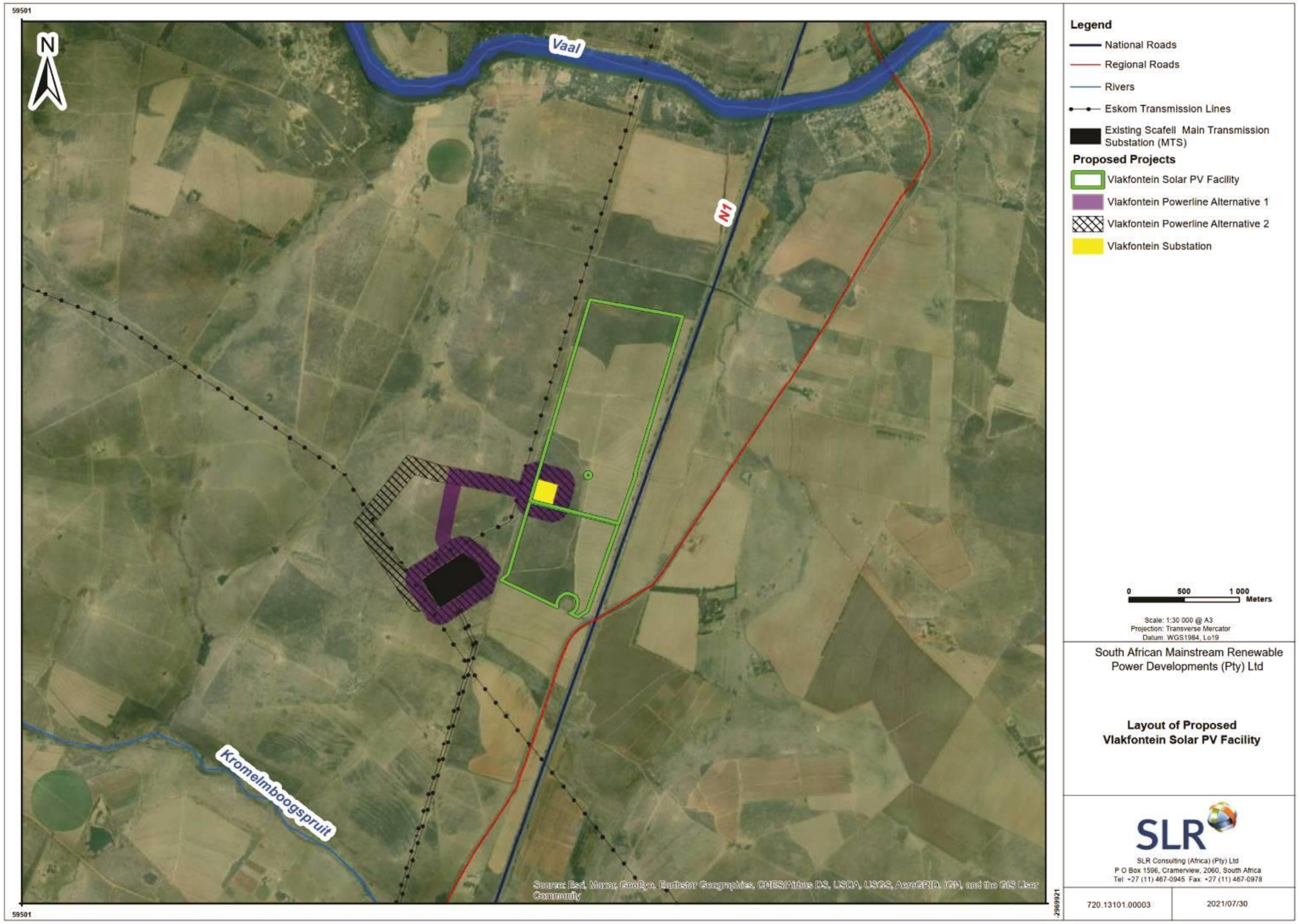


Figure 02-3: ALTERNATIVE GRID CONNECTION CORRIDOR LAYOUT - Vlakfontein

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

5.1.4 Ilikwa Solar PV Facility Grid Connection Corridor Alternatives

Two grid connection corridors have been identified and assessed in this Report for the placement of grid connection infrastructure for the Vlakfontein Solar PV Facility (refer to Figure 2-4). These corridors are described as follows:

- **Grid Connection Corridor Alternative 1**

  This corridor is 150 m wide and is approximately 2.3 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Ilikwa Solar Facility located on Procedeerfontein 5/100 and extends for about 0.3 km in a south-easterly direction before moving north-easterly for 0.7 km across Willow Grange 3/246, then turning east for 0.4 km then directly south for 0.6 km crossing Scafell RE/448, then a further 0.3 km in a south easterly direction, before terminating at the Scafell Eskom MTS.

- **Grid Connection Corridor Alternative 2**

  This corridor is 150 m wide and is approximately 1.4 km in length. The proposed grid connection is from the on-site substation (Switching Station) of the proposed Ilikwa Solar Facility located on Procedeerfontein 5/100 and extends for about 1.2 km in a south-easterly direction before at 90° northeast for 0.2 km into the Scafell Eskom MTS located on Scafell RE/448.

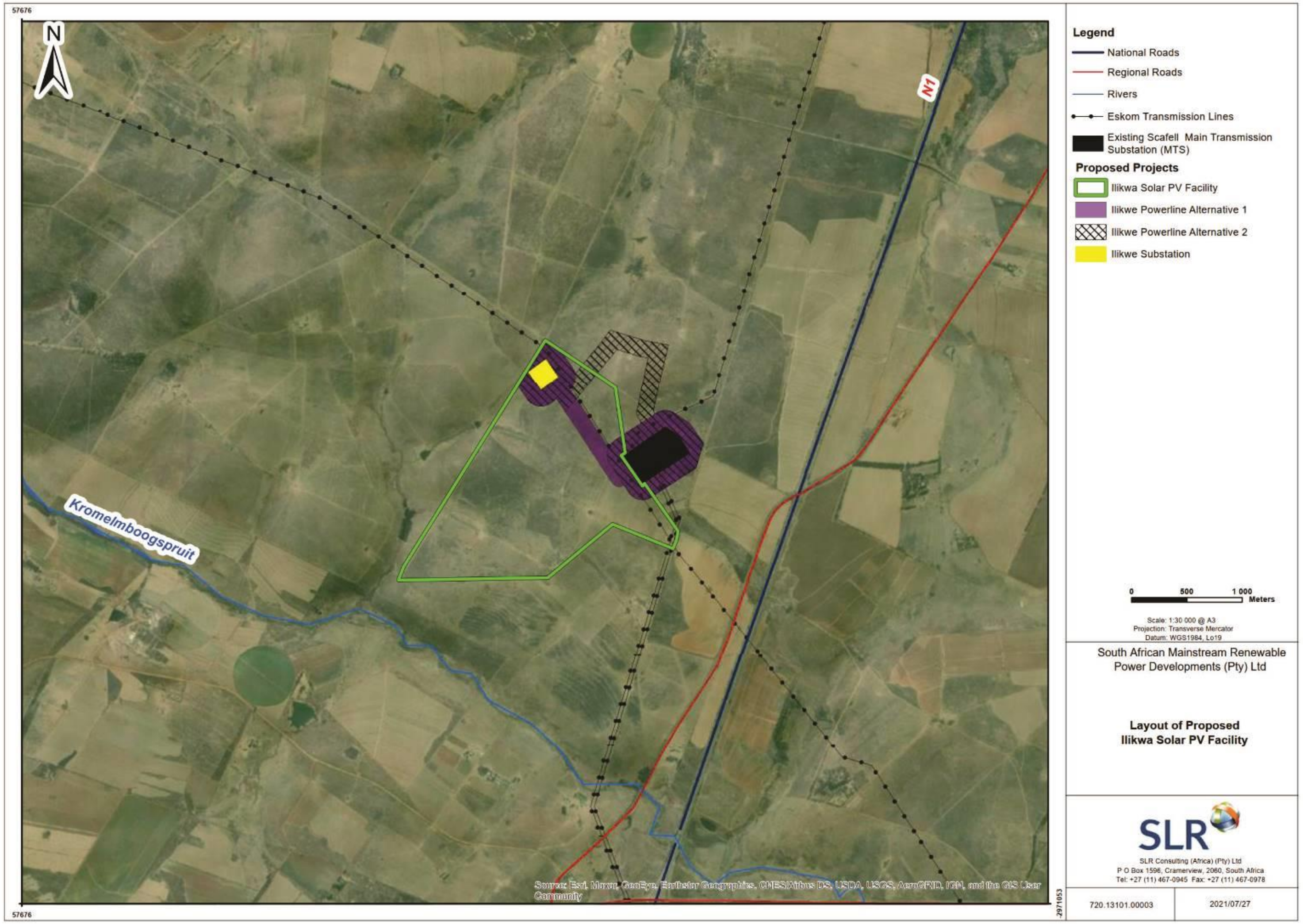


Figure 02-4: ALTERNATIVE GRID CONNECTION CORRIDOR LAYOUT - Ilikwa

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

5.2 Technology Alternatives

5.2.1 Photovoltaic Panels / Modules

Three types of photovoltaic panels / modules are being considered and would be utilised for the proposed Project. These include the following:

- **Monocrystalline Modules** are made from pure silicon crystal ingots melted down and drawn out into a solid silicon crystal. The cells are then cut from the silicon crystal. The cells are rigid and mounted on a rigid frame. The modules are covered in glass to protect the cells from being damaged. The advantages and disadvantages of monocrystalline modules are made from pure silicon. The advantage of monocrystalline modules is that the modules are highly efficient. The disadvantage is that they are expensive to produce.
- **Polycrystalline Modules** are made with silicon along with added impurities. It is melted down and cut up into wafers which make up the blocks in a module. The cells are then cut from the silicon crystal with added impurities. The cells are rigid and mounted on a rigid frame. The modules are covered in glass to protect the cells from being damaged. The advantages of polycrystalline modules are that they are silicon-based, however, they contain impurities. The advantage of this is that the modules are cheaper to produce. The disadvantage is that they are not as efficient as monocrystalline modules.
- **Thin Film Modules** are cells manufactured from a chemical ink compound that has similar properties to that of silicon cells. The ink compound gets printed onto a sheet metal to form the base of the module. This sheet is heated to turn into a semiconductor (like silicon). A layer of glass is also added to cover the cell surface. This allows thin-film modules to match the lifespan of silicon modules, allowing them to be competitive with silicon-based module technologies. The main advantage of thin-film modules is that, due to the manufacturing process of the modules, they are cheaper to produce and therefore cheaper to purchase compared to silicon-based modules. The disadvantage of thin-film modules is that they are slightly less efficient than silicon-based modules.

5.2.2 Photovoltaic Panel-Type

Mainstream is considering the use of Monofacial and Bifacial PV panel modules for the proposed solar PV facilities. Monofacial PV panel modules generate electricity from one side of the module, whereas bifacial PV panel modules generate electricity from the front and rear side of the module thus providing more output. Bifacial PV panel modules are regarded as having a higher energy yield in comparison to monofacial PV panel modules. Thus, the utilisation of bifacial PV panel modules will require the placement of reflective material beneath the PV panel module such as concrete to enhance the albedo effect from the rear surface of the module.

5.2.3 Mounting Structures

Mainstream is considering the use of either fixed tilt or dual tracking (single or dual axis) mounting structures for the proposed solar PV facilities. The mounting structures alternatives are described below:

- **Single-axis tracking** – this system has a single degree of flexibility that serves as an axis of rotation and is usually aligned along a North-South path. The advantages of this system are that it is cheaper, more reliable, and has a longer lifespan than dual-axis systems. The disadvantages are that the system has a lower energy output and fewer technological advancements.
- **Dual-axis tracking** – this system allows for two degrees of flexibility, offering a wider range of motion. The primary and secondary axes work together to allow these trackers to point the solar panels at specific points in the sky. The advantages of the dual axis include a higher degree of flexibility, allowing for a higher energy output and a higher degree of accuracy in directional pointing. The disadvantages of this system are that the system is mechanically complex making it more likely for something to go wrong, has a lower lifespan and reliability, and is unreliable during cloudy or overcast weather. Directions moves on a dual axis, meaning it can move in two different directions.
- **Fixed axis** – a fixed-tilt system positions the modules at a “fixed” tilt and orientation.

5.2.4 Battery Energy Storage Systems

Mainstream is considering the use of either Solid State or Redox Flow Batteries for the Battery Energy Storage Systems (BESS) for each of the solar PV facilities. Each of the BESS-type technologies are described in detail below:

- **Solid State Batteries**

  Solid State Batteries are energy storage units that are associated with a range of containerised systems ranging from 500 kWh to 4 MWh. For a 150 MWac renewable energy facility, a total footprint area of up to 2 ha will be required for the placement of containerised solid-state batteries within each footprint of the proposed solar PV facilities. In general, solid-state batteries consist of numerous battery cells that collectively form modules. Each cell contains an anode, cathode, and an electrolyte. The modules will be assembled and packed inside shipping-size containers (i.e., 17 m long, 3.5 m wide and 4 m high) and delivered to the study area for placement within each of the solar PV facilities proposed for the Scafell Cluster Project. Each container will be placed on a raised concrete plinth of up to 30 cm and may be stacked on top of each other to a maximum height of approximately 15 m. Additional infrastructure associated with the modules include inverters and temperature control equipment which will be positioned inside the containers.

- **Redox Flow Batteries**

  Redox Flow Batteries (RFB) are also being considered as an alternative for the proposed solar PV facilities. For this technology, energy is stored as an electrolyte in the flow cells. Specific options include Sodium polysulfide / bromine (PSB) flow batteries, Vanadium Redox (VRB) flow batteries, and Zinc-Bromine (ZNBR) flow batteries which would be contained in small bunded areas. RFBs generally consist of two half-cells containing liquid electrolyte systems. Once supplied with electrical energy a reduction - oxidation (redox) reaction between ions of the two electrolytes, separated by a membrane, charge the electrodes (i.e., cathode and anode) with energy. Energy discharge from an RFB is achieved by a reversed redox reaction between ions resulting in the potential for electrical energy to be drawn from the electrodes. The footprint of a RFB system is approximately 150 x 100 m, with a height of 15 m. The system consists of two electrolyte storage tanks that are contained within a 2.5 m high berm wall which prevents leakage of the electrolyte chemical into the surrounding environment.

An assessment of the potential impacts anticipated from the alternatives considered for the Scafell Cluster Project is included in Chapter 11 of this Report.

6. ENVIROMENTAL SETTING

6.1 Landscape Character

The study area, a 10,0 km radius about the Project sites, comprises mostly rolling agricultural land, with low hills occurring in the western and southern western parts of the study area. The Vaal River is the dominant landscape feature in the northern section of the study area. Figure 3 locates the viewing point of the panoramas in Figures 4-1 to 4-8, which illustrate the natural and cultural characteristics of the study area and Figure 5 categorizes the landscape character types and their associated scenic quality and sensitivities.

The only natural occurring landscape type is the hills, which are covered with Andesite Mountain Bushveld (most western hills) and Goldreef Mountain Bushveld (southwestern hills) (Mucina and Rutherford 2011). The study area's dominant landscape type is agricultural land being used, either for grazing or is under cultivation. The Project sites all occur within this type. The Vaal River is the focus of recreation tourism activities that stretch along both embankments.

The general land character and overall visual impression of the study area is open land, punctuated with bosques of tall trees (mostly exotic) associated with farmsteads (Figures 4-1 to 4-8). The land slopes gently to the Vaal River system, where a concentration of tall trees is evident, as illustrated in View 10 Figure 4-4. A major drainage line, which flows into the Vaal River, drains the southwestern sector of the study area. Wetlands and small on-stream dams are associated with this system.

6.2 Land Use

6.2.1 Residential

Residential is mostly associated with either recreation-type activities along the Vaal River, or homesteads and Agricultural Holdings that are scattered across the study area (Figure 3). A small resort community, Vaal Oewer, is in the far north-western section of the study area immediately north of the Vaal River on a promontory of land, which affords panoramic views over the north-western section of the study area.

6.2.2 Agriculture

Agricultural land is by far the dominant land use, with approximately ninety percent of the study area utilized for grazing and cultivated lands.

6.2.3 Industrial and Mining

There are no major industrial uses within the study area. Some sand mining occurs south of the Vaal River and mostly the northwest of the Project sites.

6.2.4 Urban

The major urban areas in the region are Parys (southwest of the sites), Sasolburg (east), and Vanderbijlpark (northeast). However, they all occur outside the study area.

6.2.5 Infrastructure and roads

The main roads in the study area are the N1 (immediately east of the site); the R59 that passes through the southern portion of the study area; and the R42 that connects the N1 to Vanderbijlpark. Boundary Road passes south and east of the sites and several local roads that service the properties along the Vaal River and the farming community crisscross the central parts of the study area. Potchefstroom Road passes through the extreme northern section of the study area.

The study area is also traversed with existing powerline infrastructure, that emanates from Eskom substation south of the Scafell site as indicated in Figure 5. This substation will form part of the system that the Project will connect to.

6.2.6 Recreation and Tourism

The sub-region is well known for its tourist activities, primarily associated with the Vaal River. Tourist destinations within the study area include Pont de Val Boutique Hotel and Spa, River Lodge Estate, Westvaal Holiday Resort, Kamdebo-on-Vaal, Eden Manor, Bishop's Bay, Club Milos, all north and east of the sites. To the northwest and along the Vaal is the resort village of Vaal Oewer, and downstream of it is Vaal – Eden and many B&B type establishments along the banks of the river.

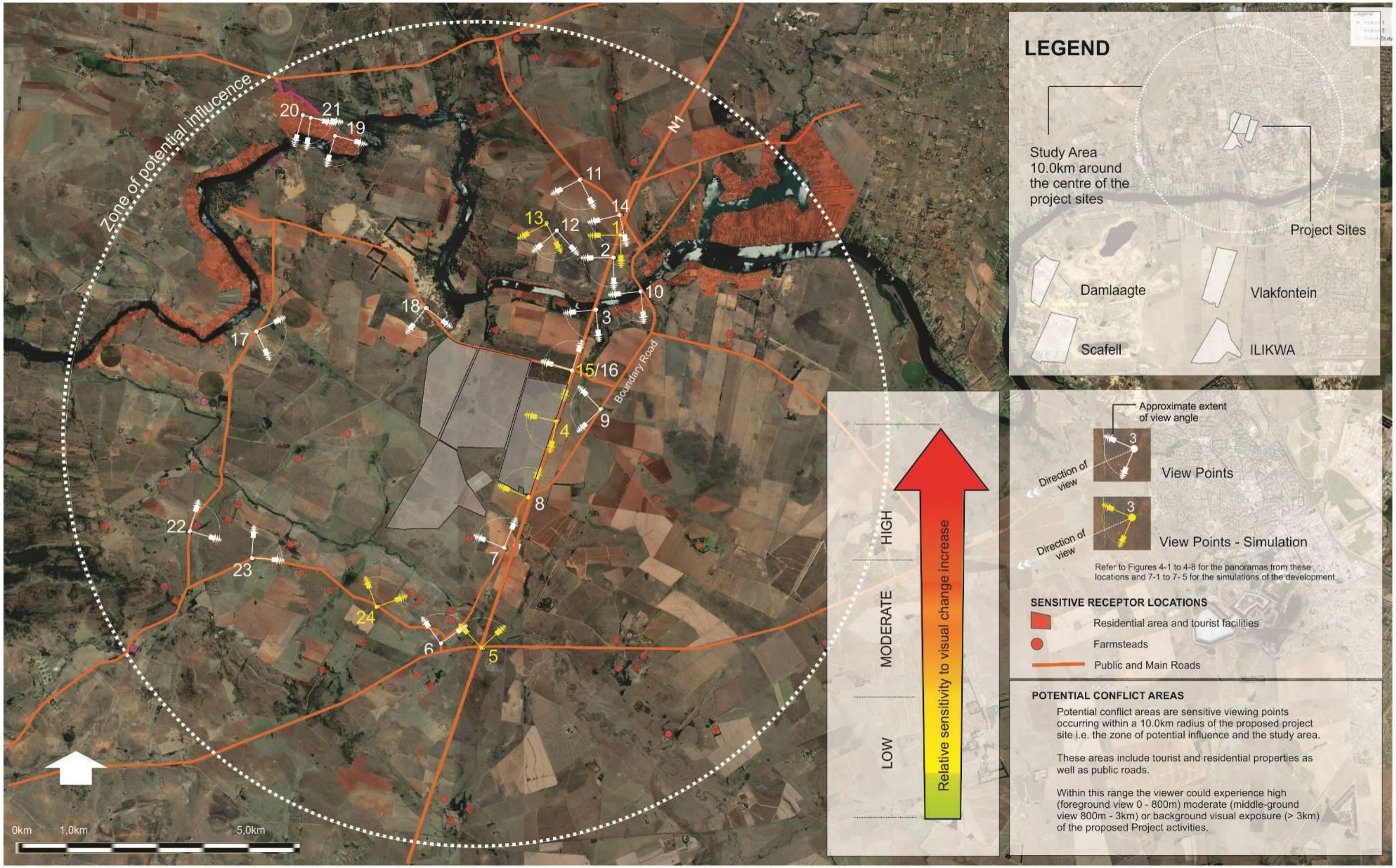


Figure 03: VIEW SITES AND SENSITIVE RECEPTORS

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

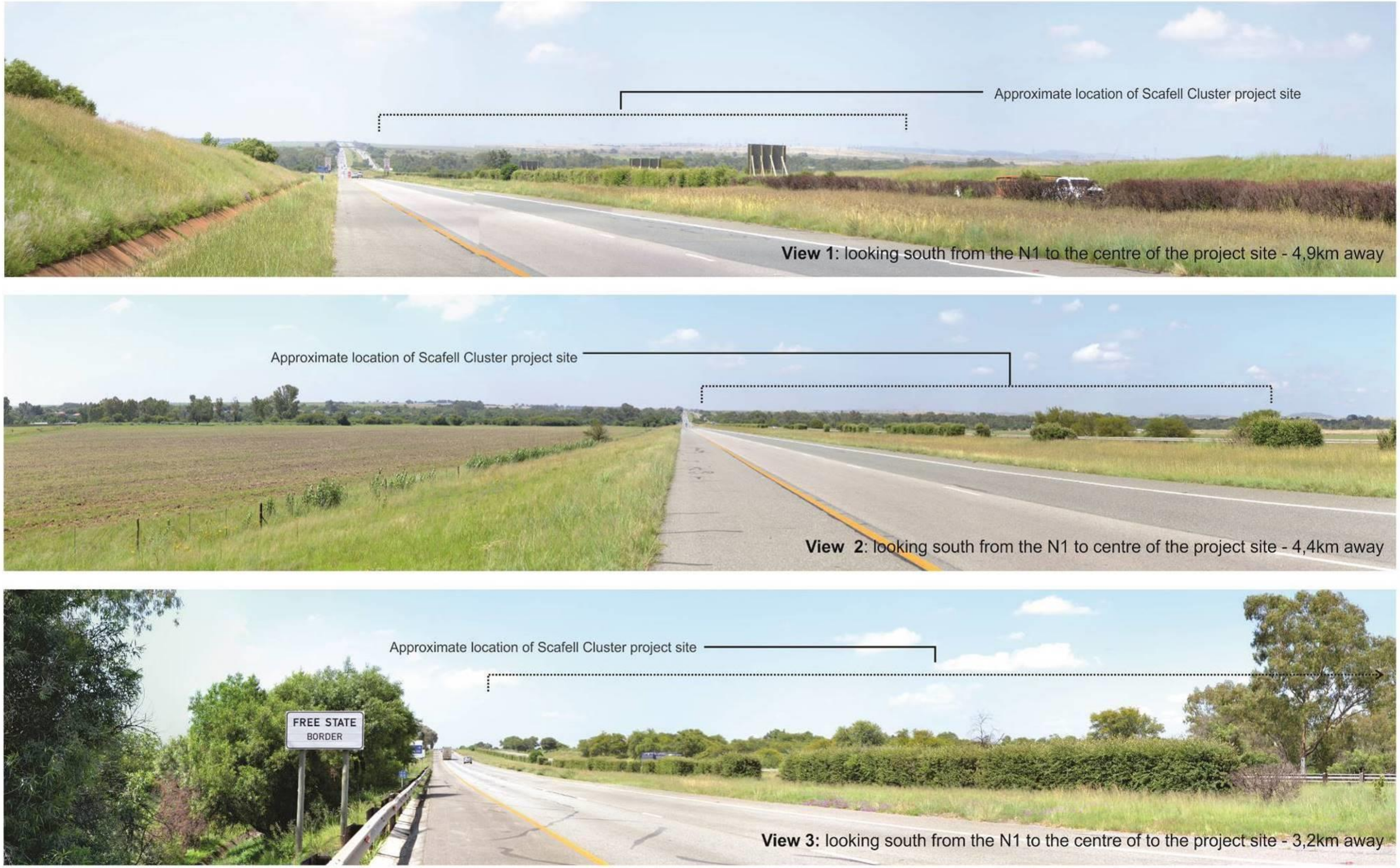


Figure 04-1: LANDSCAPE CHARACTER - Views 1, 2 and 3

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

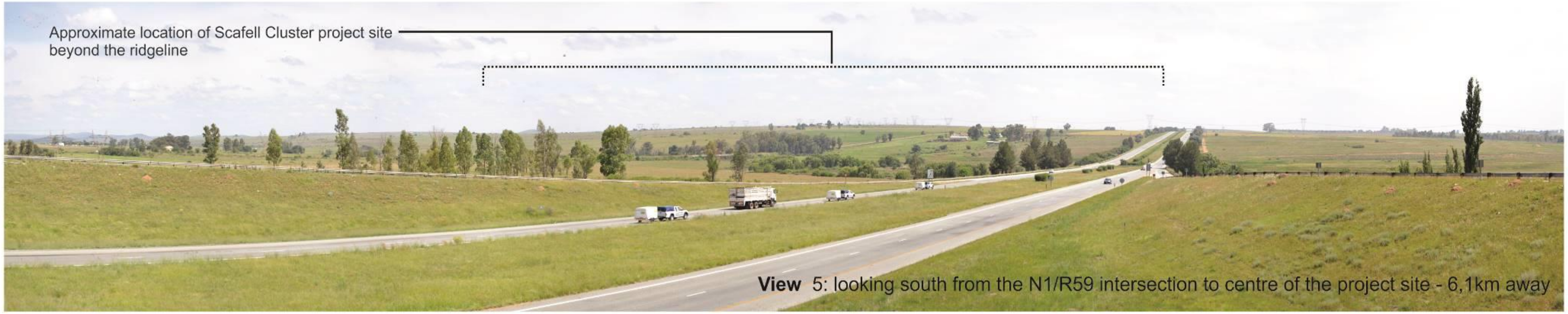
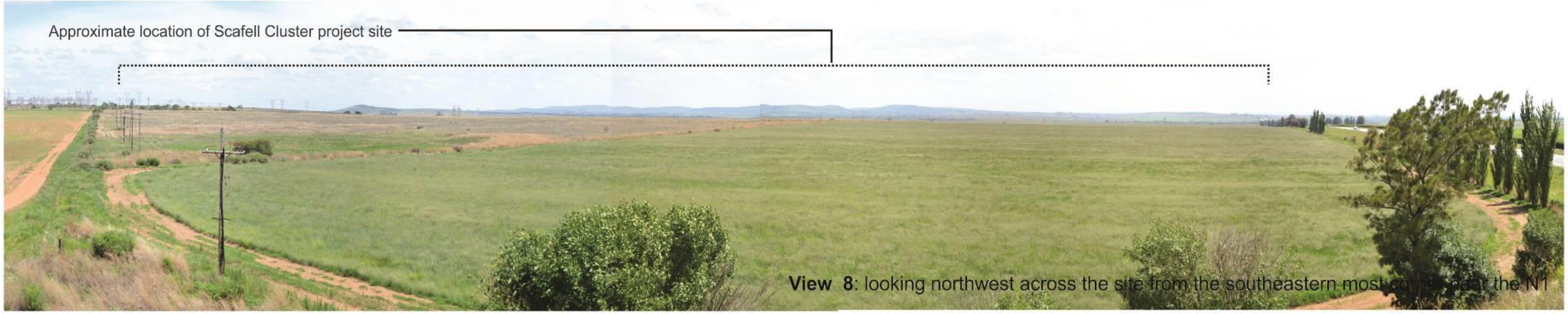


Figure 04-2: LANDSCAPE CHARACTER - Views 4, 5 and 6

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

View 7: looking north from Boundary Road to the centre of the project sites - 4,0 km away



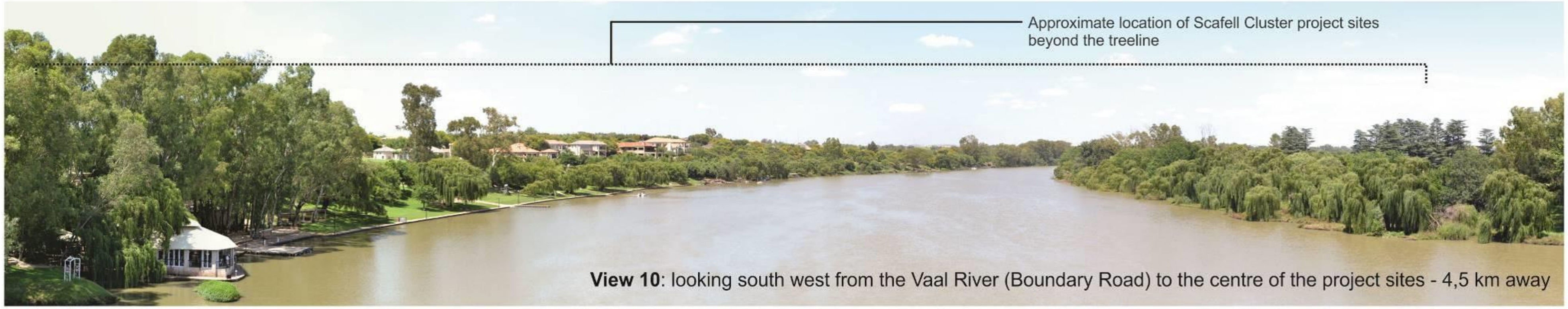
View 8: looking northwest across the site from the southeastern most corner near the N1

View 9: looking west from Boundary Road to the centre of to the project sites - 2,81km away

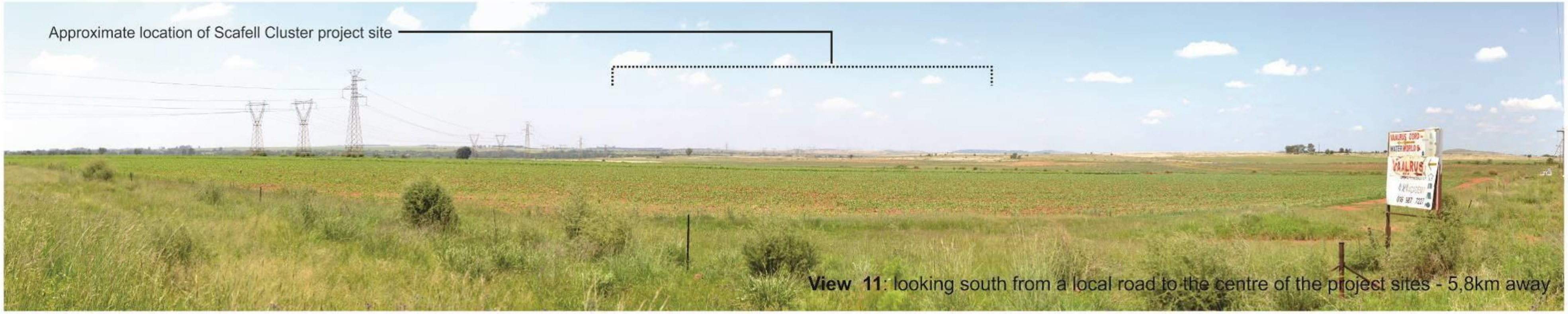
Figure 04-3: LANDSCAPE CHARACTER - Views 7, 8 and 9

Refer to Figure 3 for location of viewing points and homesteads

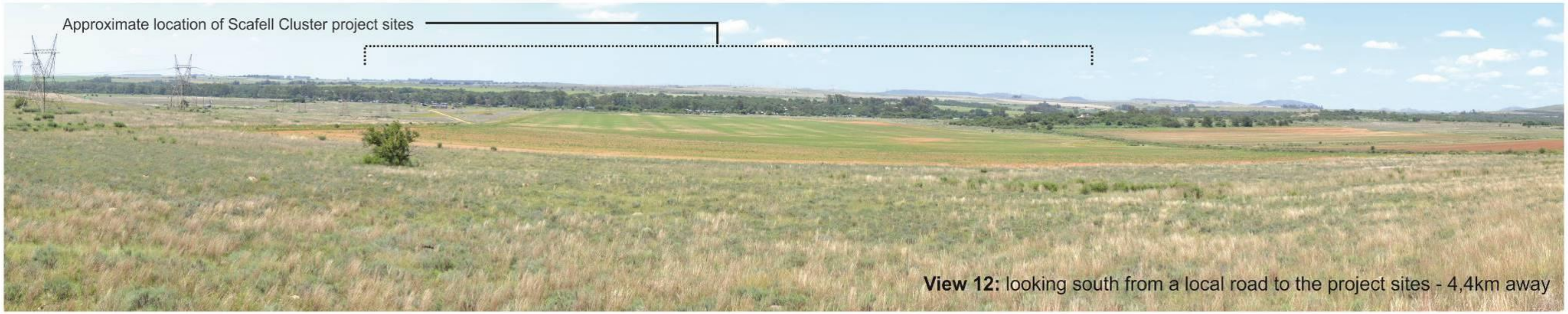
GYLA
Graham A Young
Landscape Architect
082 462 1491



View 10: looking south west from the Vaal River (Boundary Road) to the centre of the project sites - 4,5 km away



View 11: looking south from a local road to the centre of the project sites - 5,8km away



View 12: looking south from a local road to the project sites - 4,4km away

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

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

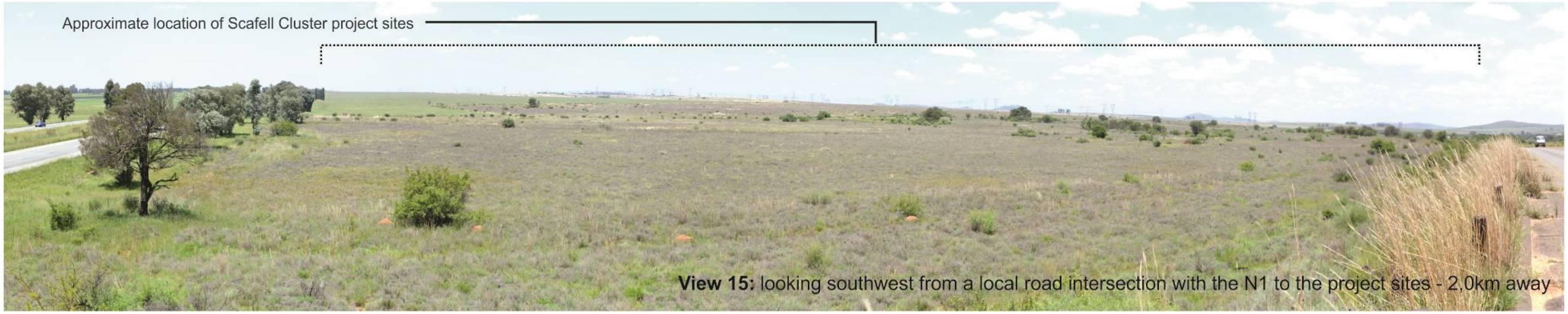
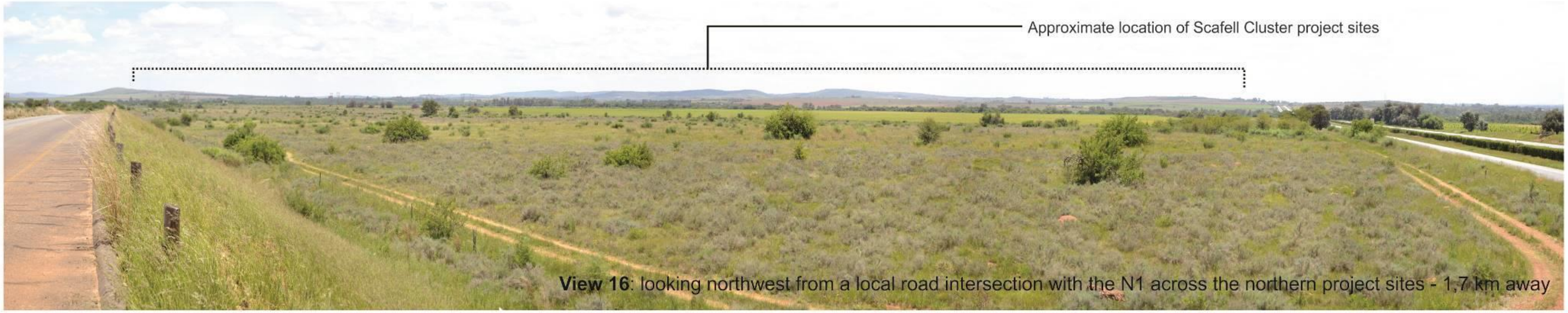
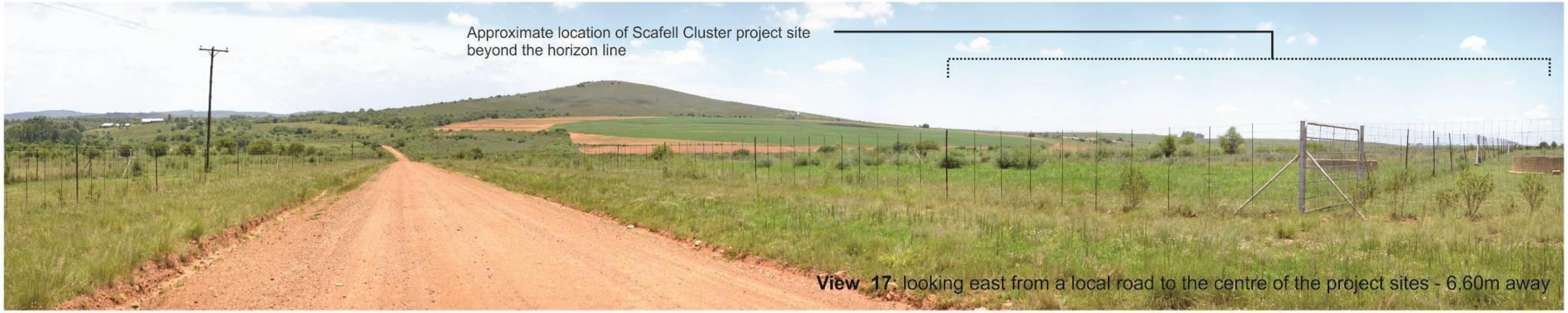


Figure 04-5: LANDSCAPE CHARACTER - Views 13, 14 and 15

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491





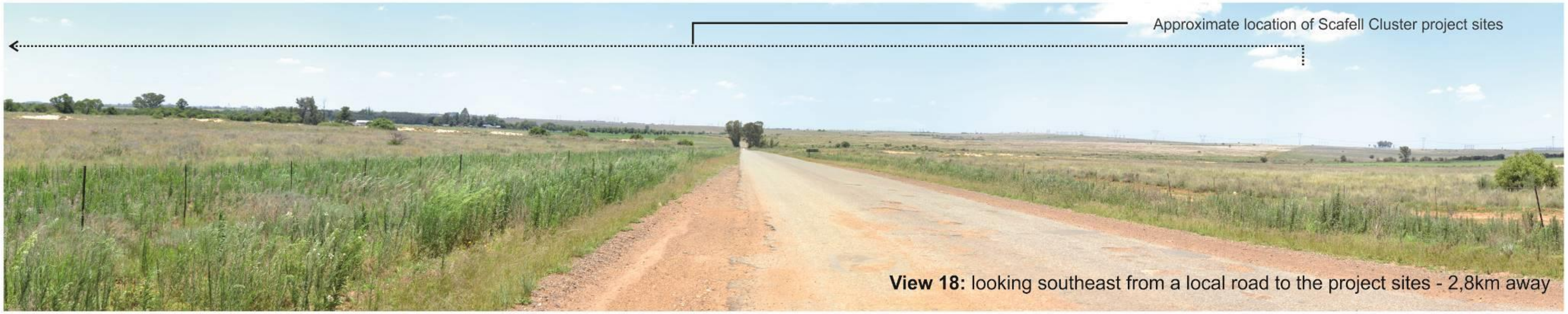
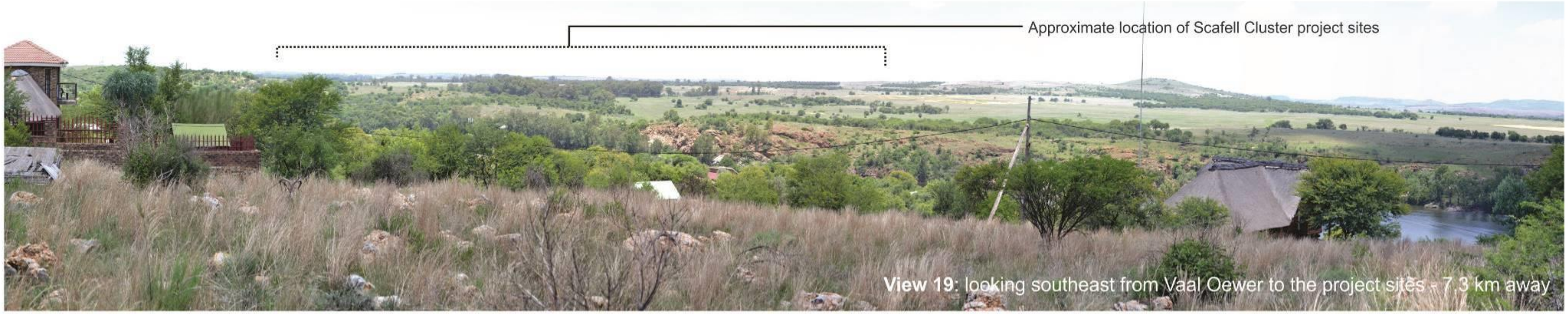


Figure 04-6: LANDSCAPE CHARACTER - Views 16, 17 and 18

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491



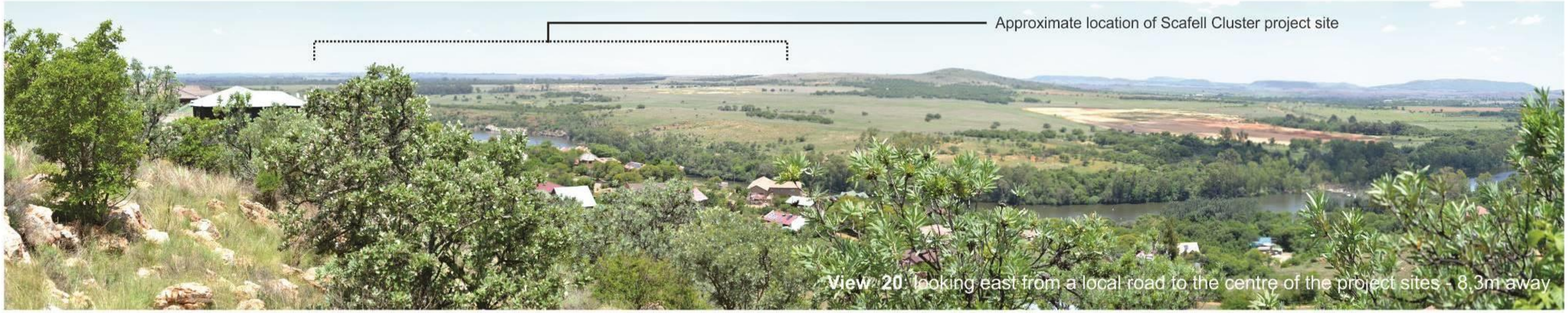


Figure 04-7: LANDSCAPE CHARACTER - Views 19, 20 and 21

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

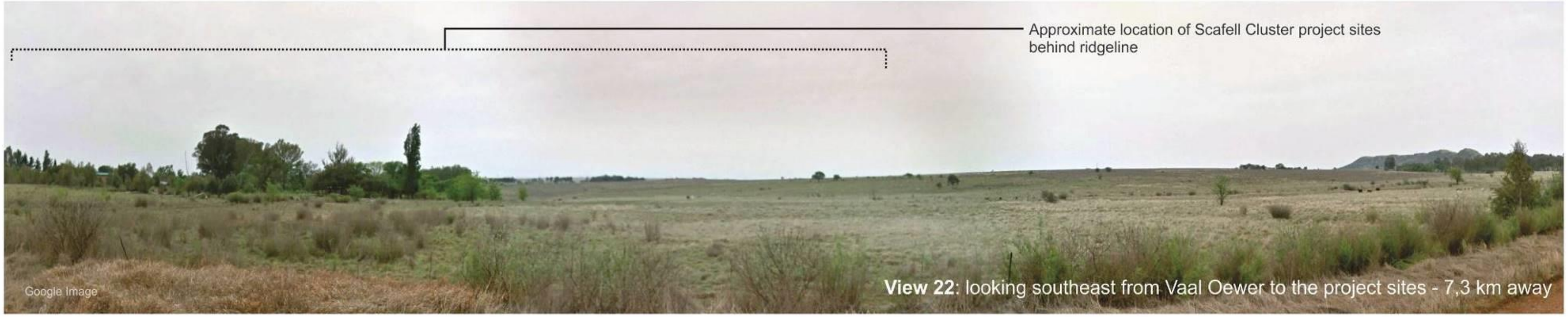


Figure 04-8: LANDSCAPE CHARACTER - Views 22, 23 and 24

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

7. VISUAL RESOURCE

7.1 Visual Resource Value, Scenic Quality and Landscape Sensitivity

The value of the visual resource and its associated scenic quality (using the scenic quality rating criteria described in Appendix A) are primarily derived from the combination of land-uses described above overlaid onto an open rolling topography, which slopes gently to the Vaal River. These are the primary features that give the area is general characteristics and a sense of place. The panoramic views in Figures 4-1 to 4-8 illustrate this effect.

The sensitivity of the study area's landscape can be defined as high, medium, or low (as indicated below and in Figure 5), and is dependent on the character (does it contribute to the area's sense of place and distinctiveness?); quality – in what condition is the existing landscape; Value – is the landscape valued by people, local community, visitors, and is the landscape recognised, locally, regionally, or nationally; and Capacity – what scope is there for change (either negative or positive) in the existing landscape character?

When the criteria listed in Appendix A are considered and understood within the context of the sub-region, a visual resource value of *low* (power utility and sand mining areas), *moderate* (drainage lines, open farmland, and urban recreation development), and *high* for the bush-covered low hills and the Vaal River and its associated embankments, is allocated.

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

Table 3: Value of the Visual Resource
(After: LiEMA 2013)

High Vaal River and its adjacent embankment and bushveld covered low hills	**Moderate** Drainage lines and small bodies of water, open expansive farmland, and urban recreation development.	**Low** Utility (power) and sand mining
This landscape type is considered to have a *high* value because it is a: Distinct landscape that exhibits an extremely positive character with valued features that combine to give the experience of unity, richness, and harmony. It is a landscape that may be of particular importance to conserve,	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.	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.

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.	Sensitivity: It is potentially sensitive to change in general and change may be detrimental if inappropriately dealt with	Sensitivity: It is not sensitive to change in general and change

7.2 Sense of Place

According to Lynch (1992), a 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 a combination of the local landscape types described above, their relative 'intactness', and their impact on the senses. Although, the activities and land-uses in the study area common within the sub-region, the areas immediately adjacent to the Vaal River are recognized as tourist destinations. These areas are treasured by the many tourists, from within the region, who visit the area for recreational and tourist activities. Refer to View 10 in Figure 4-4, which illustrates the strong sense of place derived from the river and its treed embankments.

However, the sub-region is also recognised as a major agricultural area. The combination of the land and farming activities, along with the distinctiveness of the rolling open land, give the study area a mixed sense of place. One, in which new development needs to be carefully managed such that the combination of development activities associated with the Project and the landscape are not at odds with each other.

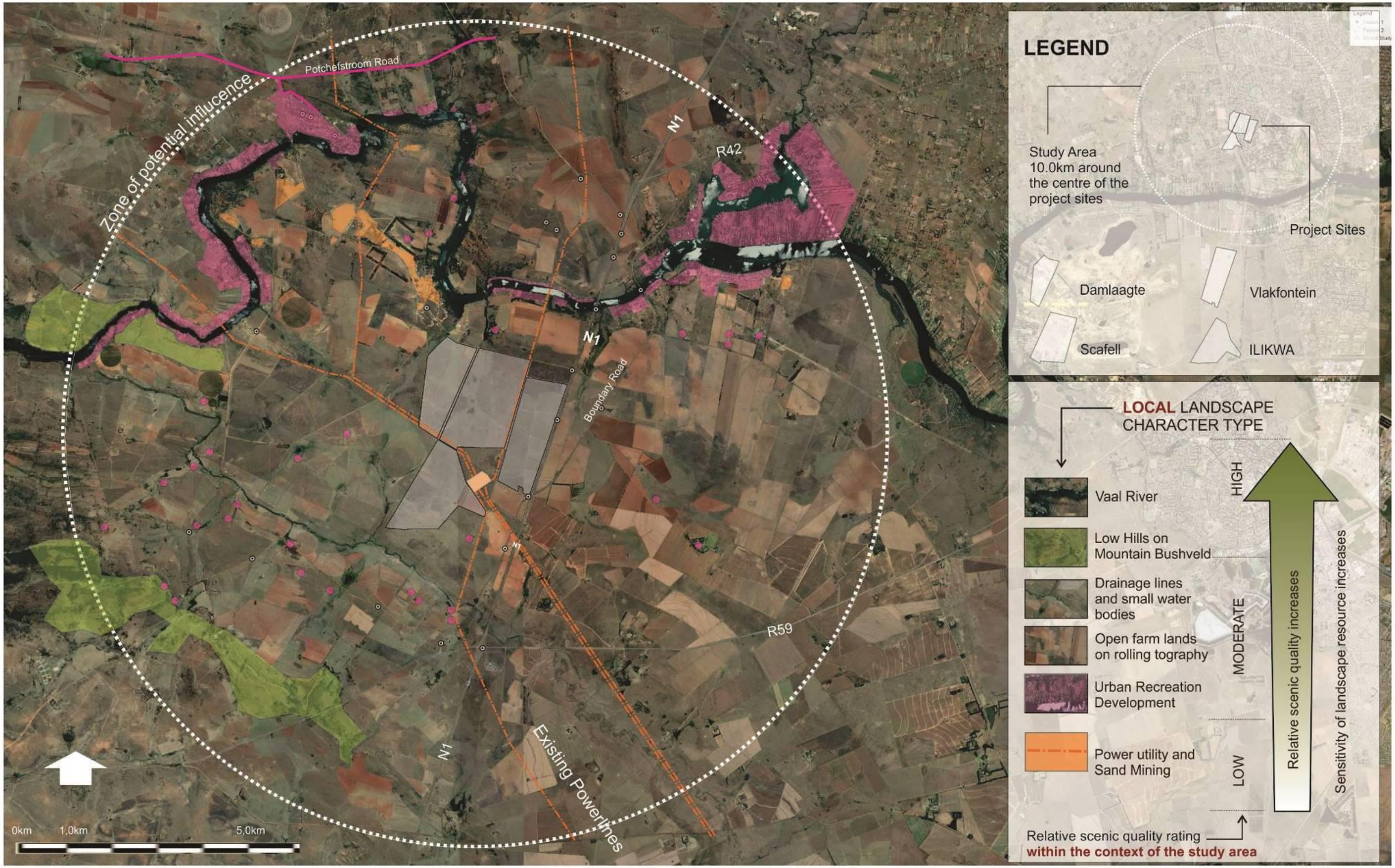


Figure 05: LANDSCAPE CHARACTER and SENSITIVITIES

GYLA
Graham A Young
Landscape Architect
082 462 1491

8. LANDSCAPE IMPACT

The development of the four proposed solar power plants will require approximately 724ha of land. The preparation (earthworks and infrastructure development) will cause a major local contrast with the existing open land as soil is exposed to create service roads, trenches, erecting structures for the arrays, distribution lines and sub-stations etc. The study area's landscape, generally, has a low visual absorption capacity (VAC i.e. the existing landscape's ability to absorb physical changes caused by a Project without transformation in its visual character and quality is limited) as is evident in the panoramas in Figures 4-1 to 4-8. The clearing of vegetation and exposure of soil during the establishment period will contrast dramatically with the natural hues of the site's vegetation. Once the solar PV arrays have been installed, they will also contrast with the existing landscape hues to their dark appearance. Refer to the aerial images in Figures 7-1 to 7-5 and the simulations in Figures 8-1 to 8-8

The *landscape impact* (i.e. the change to the fabric and character of the landscape caused by the physical presence of the Project) is therefore considered ***moderate*** because Project activities will cause a partial loss of features that contribute to the existing landscape by the introduction of new elements and structures. The combined effects of these changes will negatively affect the overall character of the landscape.

9. INTENSITY OF VISUAL IMPACT

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

In assessing the intensity of visual impact the study assumes the worst-case scenario, i.e. that all four facilities (PV and Grid Connections) will be built at the same time. Figure 2 shows that the facilities and grid connection infrastructure are located immediately adjacent to each other, resulting in all Project components being observed within the same visual envelope (to a greater or lesser degree) from the sensitive viewing areas identified in Figure 3 and discussed in Section 9.2 below. The significance of visual impact of the Scafell Cluster is discussed in Section 11, where the impact of each facility along with its grid connection are rated.

It is anticipated that visual impacts will result from the activities and infrastructure in all Project phases i.e. construction, operational, and closure. Activities associated with the Project will be visible, to varying degrees from varying distances around the Project site. During the establishment phase, the Project's visibility will be influenced due to the preparatory activities, primarily earthworks and infrastructure establishment. During the operation phase, the visibility of the Project will be the result of the established PV arrays, the substation, and associated powerline infrastructure (grid connections).

Typical issues associated with solar PV 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 if any?

These potential impacts will be considered and rated in the following sections.

During the public participation process SLR, who conducted the process, did not receive comments regarding the potential visual impact from the proposed Project. However, it is in a 'Greenfields' location, and near tourist/residential activities, which, could raise sensitivity towards it.

9.1 Glint and Glare[5]

In addition to these typical visual issues, the potential of glint and glare can be of concern. However, PV panel surfaces are designed absorb the sunlight as much as possible, therefore substantially reducing the potential for glint and glare. The glass layer which covers the PV modules is made of high transmission tempered glass with anti-reflective (AR) coating. Consequently, the percentage of the reflected light from PV modules is less than the 2% of the incident light. This amount is extremely low: by comparison, a mirror can reflect a percentage of the incident light above 98% (Tata 2015:3).

---

[5] Glint – a momentary flash of bright light typically received by moving receptors of from moving reflectors. and Glare – a continuous source of bright light typically received by static receptors or from large reflective surfaces. (PagerPower 2020: 12)

However, other components that do reflect light that result in some glinting (but only at small angles), and glare depending on panel orientation, sun angle, viewing angle, viewer distance, and other visibility factors (USDI 2013:77). The images in Figure 6 illustrate this effect, where the arrays can vary in colour from black, to blue, to a silvery bright sheen[6]. The effect can also be distributed across a single Project site when differing sky conditions exist as is illustrated in the images of a solar park near Touws Rivier (Figure 6). The southern section of the Touws Rivier solar park is in sun, causing a silver sheen, while the northern section of the park, which is in cloud shade, appears dull grey. The effect of glint (a sharp focus of light) is not normally associated with PV arrays, however, glare can occur with certain climatic and orientation conditions, as has been illustrated in the referenced figures.

The Applicant commissioned a Solar Photovoltaic Glint and Glare Study (PagerPower 2020) for the Project that assessed the possible effects of glint and glare from the Project components. The focus of the study was, however, on the possible impact on aviation activity associated with Parys Airport, Vanderbijlpark Airport, and Star Landing Ground. The analysis included modelling of a single-axis tracking system that optimises the pane angle throughout the day.

The airports and landing ground occur outside the study area of the Visual Impact Assessment. However, it is noted that,

> No impacts are predicted upon personnel within the assessed ATC Tower and no significant impacts are predicted towards pilots along any of the assessed approach paths at Parys Airport. No impacts are predicted towards pilots along any of the assessed approach paths at Vanderbijlpark Airport and no ATC Tower was identified. Star Landing Ground is no longer in operation so the possibility for glint and glare effects at this location was not assessed. It is recommended that the results of this assessment should be made available to Parys Airport and Vanderbijlpark Airport. (Pager Power 2020: 3).

The study does not discuss the potential of glint and glare from ground-level observations within the study area as defined for this study. However, the images in Figure 2-6 below illustrate the potential for glare to occur.

[6] In this report, the simulations have assumed a dark blue colour.


Showing dark grey colour


Showing blue colour


Showing silvery white (glare) that could be the cause of a nuisance

Apparent colour changes with differing sun angles and viewing geometry at a PV facility. (USDI 2013:78)
Credit: Robert Sullivan, Agganne National Laboratory.


PV Solar Park near Touws Rivier taken from the N1 - 1,2km to the PV arrays

PV panel surfaces are not designed to reflect light and therefore have reduced potential for glint and glare; however, the panels and other components do reflect light that may result in glinting, glare and other visual effects that would vary depending on panel orientation, sun angle, viewing angle, viewer distance, and other visibility factors (USDI 2013:77)


PV Solar Park near Touws Rivier taken from the N1 - Zoomed in to section showing glare

Figure 06: POTENTIAL GLINT AND GLARE - Scafell Solar PV Cluster

Refer to Figure 3 for location of viewing points and homesteads

GYLA
Graham A Young
Landscape Architect
082 462 1491

9.2 Sensitive Viewers and Locations

Figure 3 identifies receptor locations where people would most likely be sensitive to negative changes in the landscape caused by the physical presence of the Project. There are three basic areas of concern.

1. The public roads including the N1 arterial road, the R59 and R42 connector roads, Boundary Road, and local roads generally servicing the farms and tourist facilities throughout the study area.
2. The tourist facilities associated with the Vaal River; and
3. The residential (mostly farmsteads) areas surrounding the Project sites.

Most of these sensitive viewing locations occur in a general arc from the north to west to the southern sectors of the study area as is evident in Figure 3. Within this general area, people living in or visiting the study area could have open, partially obstructed, and, in many instances along the Vaal River, screened views of the proposed development from varying angles. Table 2 identifies potential receptor sensitivities towards the Project.

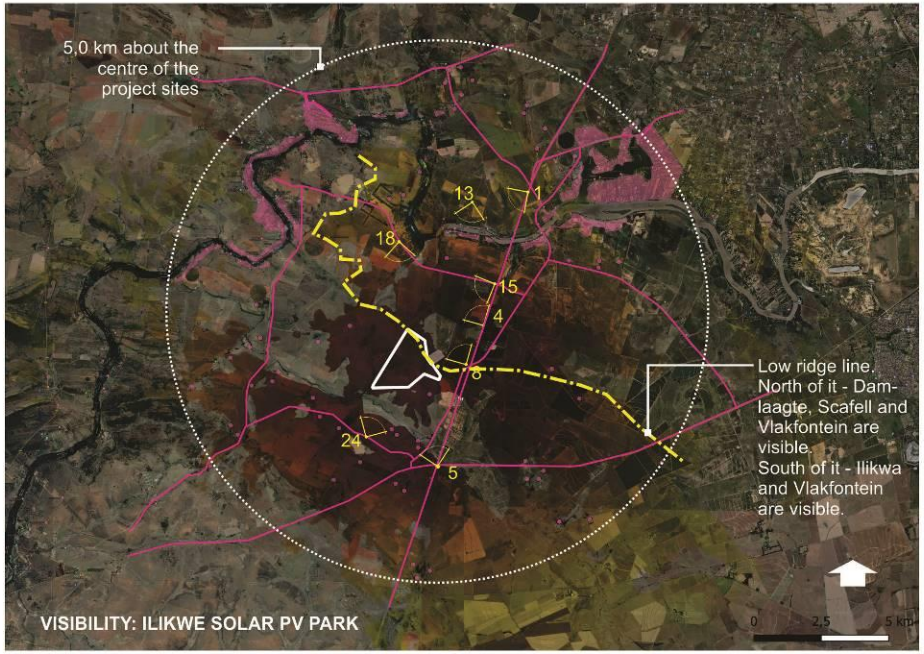
Table 4: Sensitivity - Visual Receptors

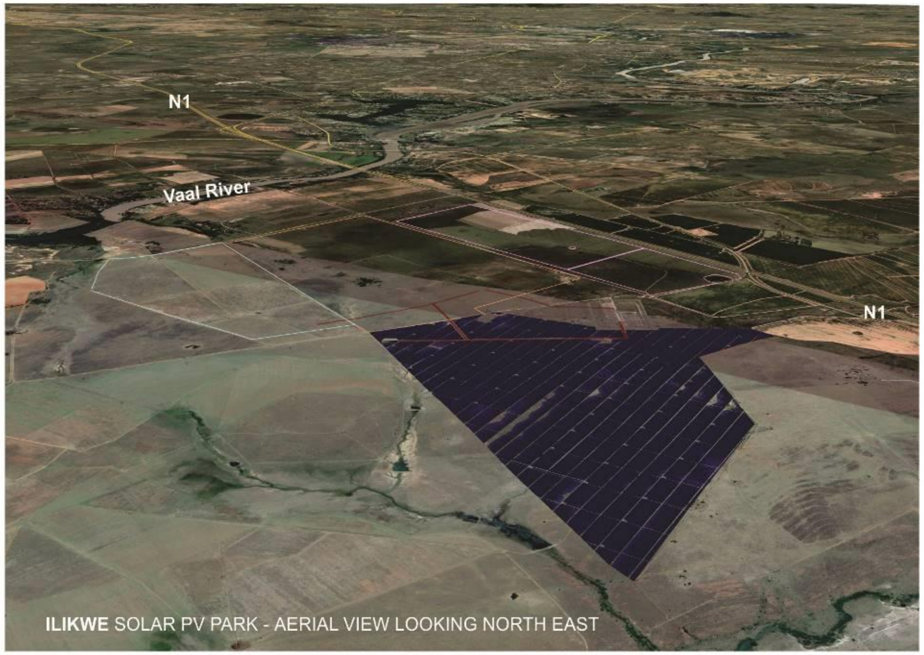
High	Moderate	Low
For occupiers of residential/tourist properties with views affected by the development i.e.: Location: Tourists visiting facilities located along the Vaal River and its environs, travellers using the R57 and homesteads/farmsteads surrounding the project site to its south, east and north...	For occupiers of residential properties and people traveling through or past the affected landscape in cars and other modes of transport i.e.: Location: Residential units, and users of the N1, R59, and other boundary roads.	For visitors and people working within the study area and traveling 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. i.e.: Location: Employees of the farms, utility, and mining activities in the study area and some homesteads/farmsteads to the far south-west of the Project sites

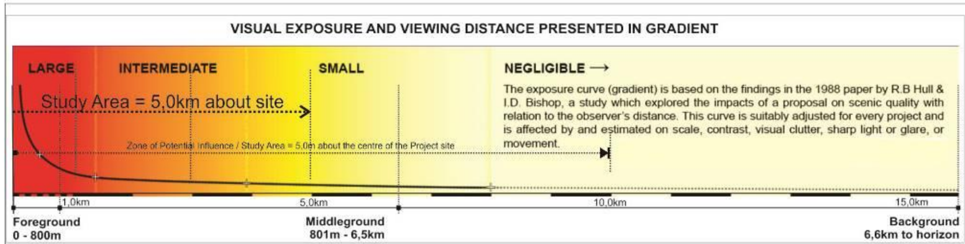
9.3 Visibility

Visual sensitivities would arise from receptors living in and visiting the study area (refer to Figure 3 which locates these areas/routes) and observing changes to the aesthetic baseline, currently rated moderate within the context of the sub-region. Project facilities within a landscape type which has a low visual absorption capacity making the facilities potentially highly visible to people travelling along the N1 and within a 3km radius west, south, and east of the sites. Beyond 3,0km, the low strung nature of the arrays (approximately 4m above natural ground level) mitigates visibility to an extent. Visibility from the Vaal River and its environs would however be *low*, due to the density of large tree species growing along its banks, the relative low aspect of these viewing locations, and the fact that most views from these areas would most likely be focused on the river itself (i.e. the main reason for the development along its banks).

The viewsheds in the following in Figures 7-1 to 7- 4 illustrate potential visibility of each of the facilities separately and in Figure 7-5 a consolidated (cumulative viewshed) is presented.





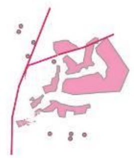


te:

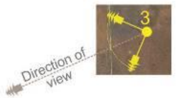
The accuracy of the viewshed analysis depends on the quality of the input digital surface model (DSM). Readily available digital contours for the area are limited to 20m contours. GYLA has interpolated these down to 1m intervals to get better accuracy. However, these types of viewshed investigations (using readily available GIS software and terrain contours only) are limited in their accuracy due to their inability to incorporate vegetation information. On-site observations indicated that many views to the proposed development from within the study area, would be blocked due to topographic relief and the low height of the arrays.

The viewshed analyses have therefore presented as a comparative analysis between the visibility of the site as it currently exists (without development) and with the proposed visibility of the site with development.

LEGEND



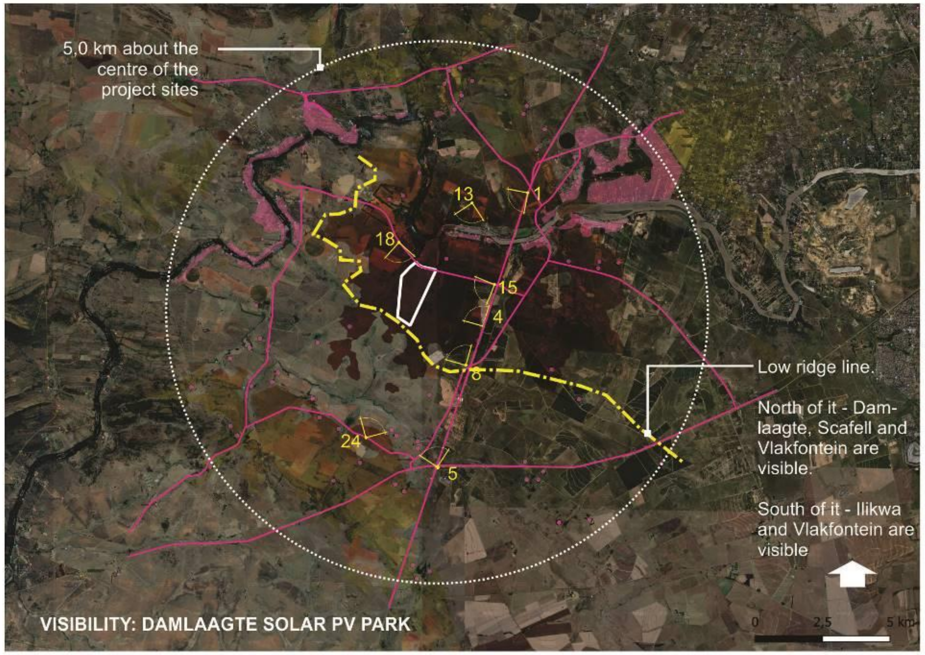
Sensitive viewing areas

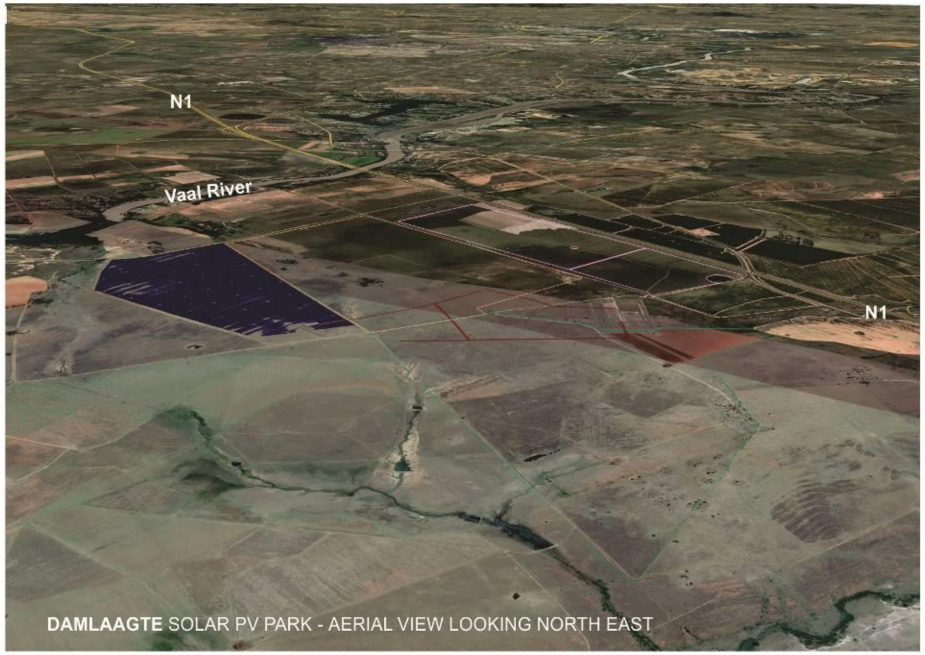


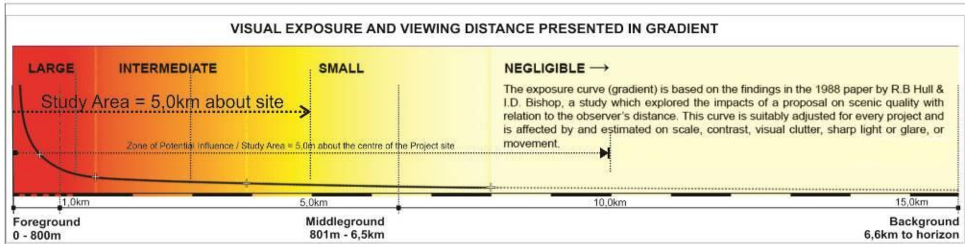
Viewing points of simulations

Figure 7- 1: VIEWSHED ANALYSIS - ILIKWA, Scafell Solar PV Cluster

GYLA
Graham A Young
Landscape Architect
082 462 1491





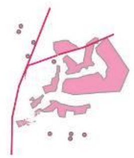


te:

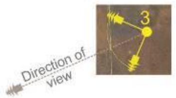
The accuracy of the viewshed analysis depends on the quality of the input digital surface model (DSM). Readily available digital contours for the area are limited to 20m contours. GYLA has interpolated these down to 1m intervals to get better accuracy. However, these types of viewshed investigations (using readily available GIS software and terrain contours only) are limited in their accuracy due to their inability to incorporate vegetation information. On-site observations indicated that many views to the proposed development from within the study area, would be blocked due to topographic relief and the low height of the arrays.

The viewshed analyses have therefore presented as a comparative analysis between the visibility of the site as it currently exists (without development) and with the proposed visibility of the site with development.

LEGEND



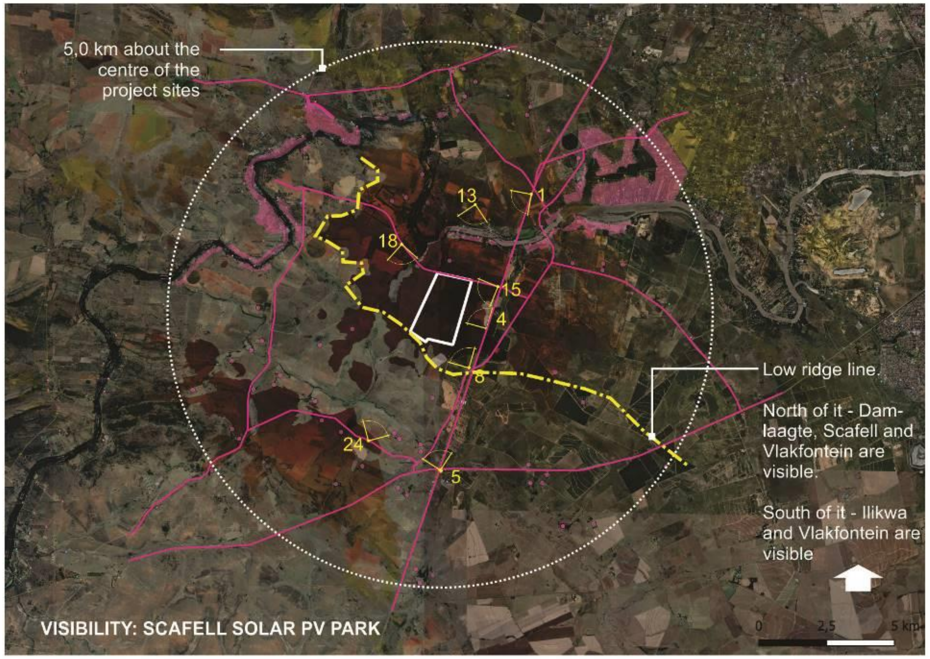
Sensitive viewing areas

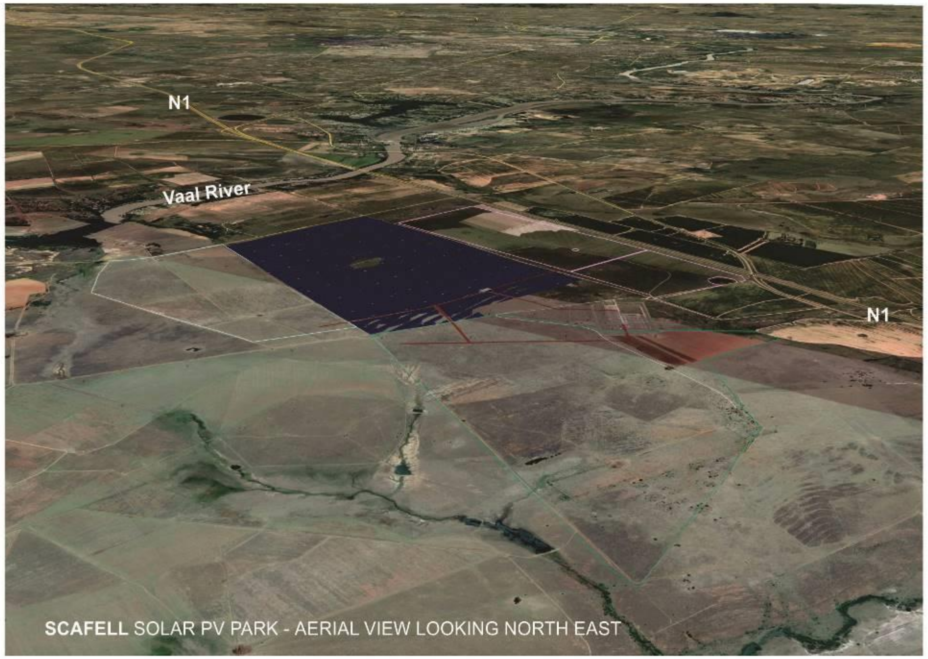


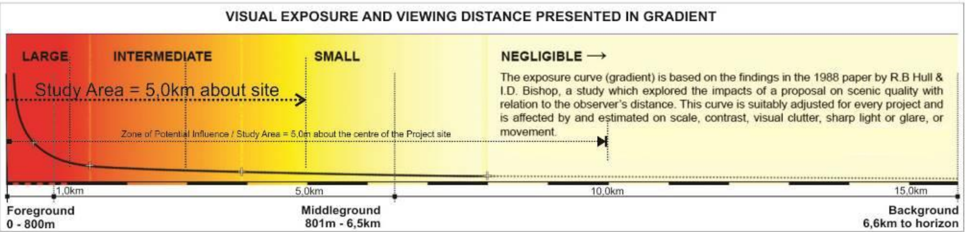
Viewing points of simulations

Figure 7- 2: VIEWSHED ANALYSIS - DAMLAAGTE, Scafell Solar PV Cluster

G Y L A
Graham A Young
Landscape Architect
082 462 1491





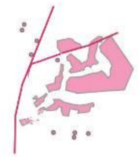


te:

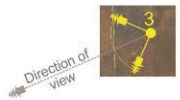
The accuracy of the viewshed analysis depends on the quality of the input digital surface model (DSM). Readily available digital contours for the area are limited to 20m contours. GYLA has interpolated these down to 1m intervals to get better accuracy. However, these types of viewshed investigations (using readily available GIS software and terrain contours only) are limited in their accuracy due to their inability to incorporate vegetation information. On-site observations indicated that many views to the proposed development from within the study area, would be blocked due to topographic relief and the low height of the arrays.

The viewshed analyses have therefore presented as a comparative analysis between the visibility of the site as it currently exists (without development) and with the proposed visibility of the site with development.

LEGEND



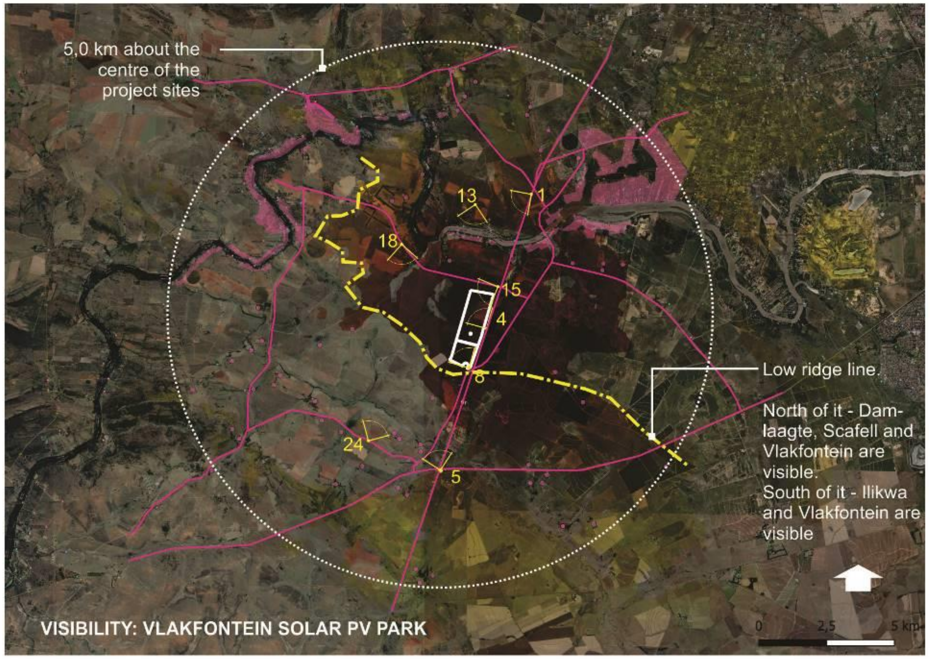
Sensitive viewing areas



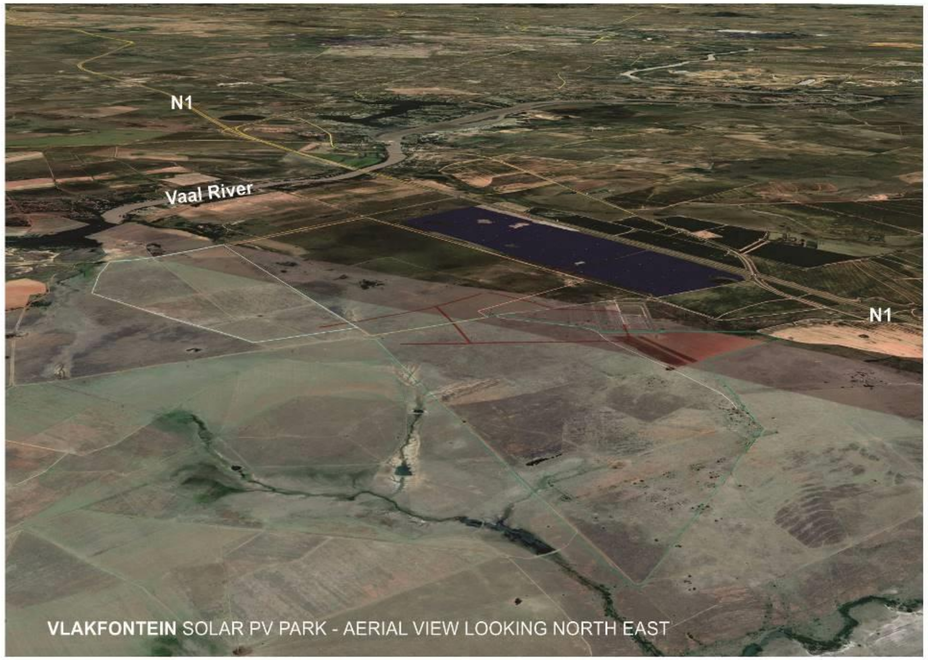
Viewing points of simulations

Figure 7- 3: VIEWSHED ANALYSIS - SCAFELL Scafell Solar PV Cluster

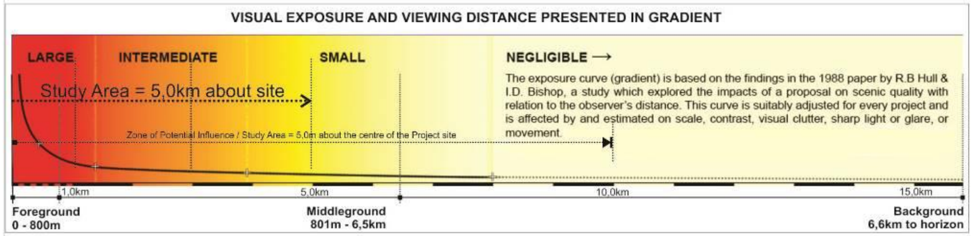
GYLA
Graham A Young
Landscape Architect
082 462 1491



VISIBILITY: VLAKFONTEIN SOLAR PV PARK



VLAKFONTEIN SOLAR PV PARK - AERIAL VIEW LOOKING NORTH EAST

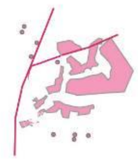


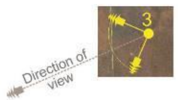
te:

The accuracy of the viewshed analysis depends on the quality of the input digital surface model (DSM). Readily available digital contours for the area are limited to 20m contours. GYLA has interpolated these down to 1m intervals to get better accuracy. However, these types of viewshed investigations (using readily available GIS software and terrain contours only) are limited in their accuracy due to their inability to incorporate vegetation information. On-site observations indicated that many views to the proposed development from within the study area, would be blocked due to topographic relief and the low height of the arrays.

The viewshed analyses have therefore presented as a comparative analysis between the visibility of the site as it currently exists (without development) and with the proposed visibility of the site with development.

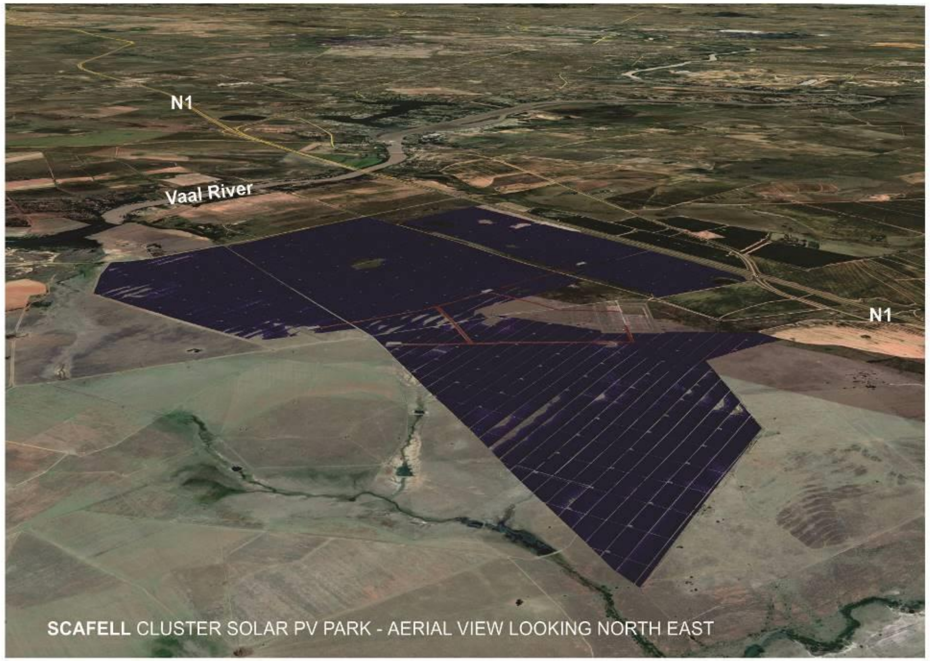
LEGEND

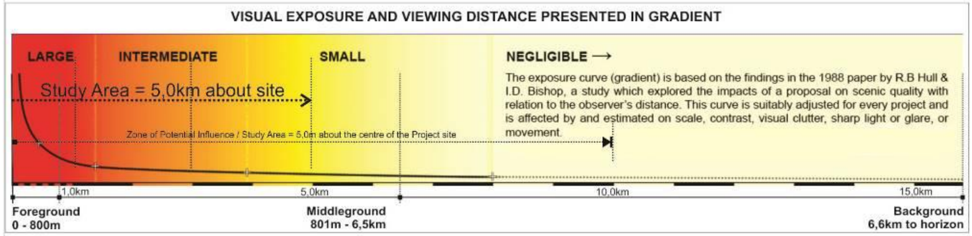

Sensitive viewing areas



Viewing points of simulations

Figure 7- 4: VIEWSHED ANALYSIS - VLAKFONTEN, Scafell Solar PV Cluster



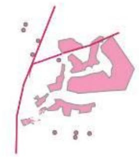


te:

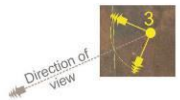
The accuracy of the viewshed analysis depends on the quality of the input digital surface model (DSM). Readily available digital contours for the area are limited to 20m contours. GYLA has interpolated these down to 1m intervals to get better accuracy. However, these types of viewshed investigations (using readily available GIS software and terrain contours only) are limited in their accuracy due to their inability to incorporate vegetation information. On-site observations indicated that many views to the proposed development from within the study area, would be blocked due to topographic relief and the low height of the arrays.

The viewshed analyses have therefore presented as a comparative analysis between the visibility of the site as it currently exists (without development) and with the proposed visibility of the site with development.

LEGEND



Sensitive viewing areas



Viewing points of simulations

Figure 7- 5: VIEWSHED ANALYSIS - CLUSTER, Scafell Solar PV Cluster

Of the four solar PV facilities and their associated grid connections and sub-stations, Ilikwa would be the most visible (it has the largest viewshed footprint) due to its location on a low east west orientated ridge line. However, due to its location on a low ridgeline and relative to sensitive viewing areas, only a small 'sliver' of the arrays is visible (refer to Figure 8-3) and not the full extent as would be seen, for example, from the area as illustrated in Figures 7-1. Figure 7-1 also indicates that the facility would be visible on both the northern and southern sloping aspects of the study area. Damlaagte, Scafell and Vlakfontein, are slightly more visible in views from the north and east but have a smaller visual envelope than Ilikwa, as indicated in Figures 7-2 to 7-4 (refer also to Figures 8-1, 8-5, 8-6 and 8-7). However, when considering the worst-case scenario, i.e. that all facilities (the cluster and its associated infrastructure) would appear collectively and cannot be isolated from each other due to their proximity, the viewshed in Figure 7-5 is the most representative of the solar PV cluster's visibility. This viewshed indicates that the Project is potentially highly visibility as the visual envelop covers most of the study area.

However, site observations confirm that Project components would effectively be screened from some sensitive viewing sites along the Vaal River and its environs by tall trees. Visibility is also affected by the landscape's VAC, which, has been established as low for the study area, due primarily to its openness and lack of tall vegetation other than along the river. The remainder of the study area is generally open and topographic relief would therefore only screen views in the far northern, western and eastern sections of the study area as indicated in Figure 7-5. The Project sites would be visible from Vaal Oewer but at approximately 8,0km and at a low angle, greatly diminishing its visibility. Visibility must also be understood in terms of exposure and instruction, discussed in the following sections.

9.4 Visual Exposure

Visual exposure is determined by qualifying the visibility of an object, with a distance rating to indicate the degree of intrusion and visual acuity. As distance between the viewer and the object increases, the visual perception of the object reduces exponentially as, generally, changes in form, line, colour, and texture in the landscape become less perceptible with increasing distance. Appendix C illustrates this point.

Table 3 below indicates the worst case scenario for sensitive viewing areas and affected receptors as discussed in Sections 9.1 and 9.2 and illustrated in Figure 3. The three basic areas of concern are:

- The public roads including the N1 arterial road, the R59 and R42 connector roads, Boundary Road, and local roads generally servicing the farms and tourist facilities throughout the study area.
- The tourist facilities associated with the Vaal River; and
- The residential (mostly farmsteads) areas surrounding the Project sites.

Table 5: Visual Exposure of Project Components

	Foreground view i.e. 0 – 800m from Project Sites	Middle-ground view i.e. 800m to – 3,0km from Project Sites	Background view i.e. > 3,0km from Project Sites
Travellers along the arterial road N1 and local connector roads; Boundary Road and the unnamed road immediately north of the cluster site.	**X** Moving and open to partially obstructed views (trees along the N1).	**X** Moving and Mostly obstructed or diminished due to distance	**X** Moving with some open distant views from south and north of the cluster
Two farmsteads to the immediate south, north of the cluster.	**X** Open unobstructed views.		
Farmsteads to the south, west, north and east of the cluster;		**X** Low angle views partially obstructed by topography and clumps of trees.	**X** Mostly obstructed or diminished due to distance
Boundary Road; and the local roads north and south of the cluster; and the R59		Moving and mostly obstructed or diminished due to distance	Moving with some open distant views from south and north of the cluster
Tourist facilities along the Vaal River including Vaal Oewer		**X** Mostly obstructed, completely screened views.	**X** No exposure or greatly diminished due to distance

9.5 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 *low*. The simulations in Figures 7-1 to 7-8 illustrate the effect that Project components will have on views experienced from a variety of viewing points, indicative of typical views, to the Project site.

The Project will appear in some foreground views and be *highly* intrusive, from sections of the adjacent local roads north and east of the site, and for two farmsteads immediately north and south of the cluster site (refer to Figures 8-4, 8-6 and 8-7). *Moderate* intrusion will result when Project components appear in the middleground of views from the N1 and farmsteads to the south, west, north and east of the site, Boundary Road and the two local roads immediately north and south of the cluster site (refer to Figures 8-2 and 8-5). In all other views, Project components would appear in the background and not appear intrusive (refer to Figures 8-1 and 8-3).

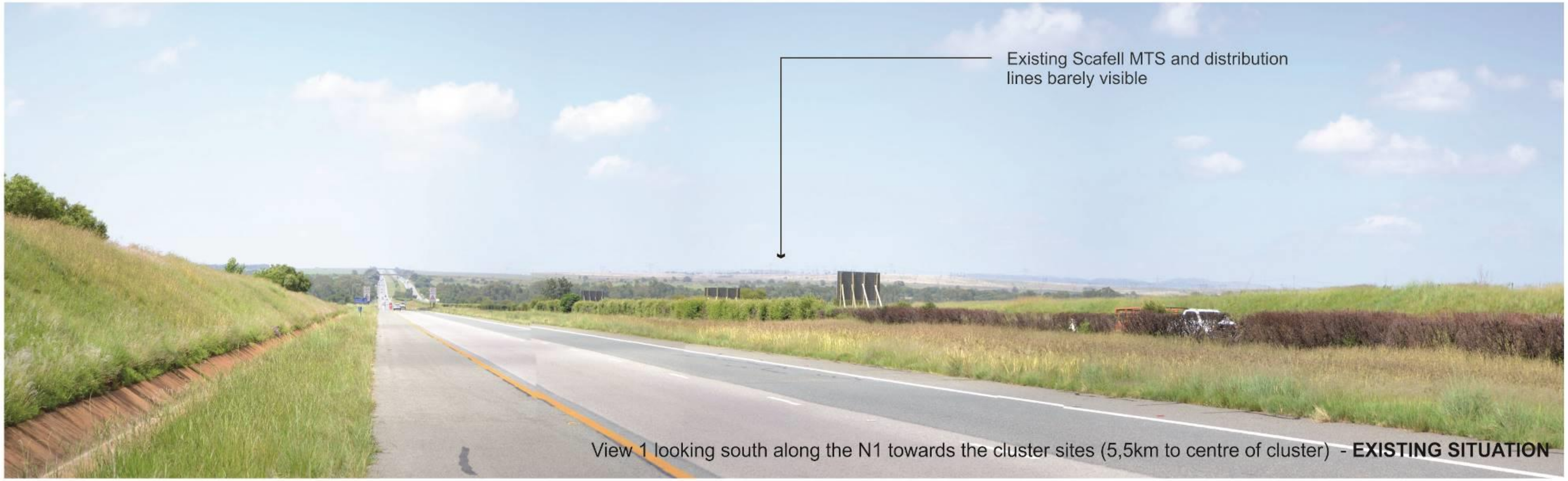
A *low* to *insignificant* intrusion would be experienced by visitors to the tourist facilities along the Vaal River. Table 4 summarizes these ratings.

Table 6: Visual Intrusion

HIGH	MODERATE	LOW
From sections of Boundary Road and the local road immediately north of the site and the two farmsteads immediately north and south of the cluster site	From sections of the N1, Boundary Road, and the local road south of the site as well as farmsteads to the south and west of the site.	For all other sensitive viewing areas including Vaal Oewer, the farmsteads, north, east, south and west of the Project site.
• The Project would: • Have a substantial negative effect on the visual quality (sense of place) of the landscape relative to the baseline landscape. • Contrast dramatically with the patterns or elements that define the structure of the landscape.	The Project would: • Have a moderate negative effect on the visual quality and sense of place of the landscape. • Contrast with the current patterns or elements that define the structure of the landscape.	The Project would: • Have a minimal to insignificant effect on the visual quality and sense of place of the landscape. • Contrasts minimally with the patterns or cultural elements that define the structure of the landscape.
RESULT: An intensive change over a localized area resulting in major changes in key views.	*RESULT:* Moderate change in landscape characteristics over localized area resulting in a moderate change to key views.	*RESULT:* Minimal to insignificant change resulting in a minor change to key views sensitive viewing areas.

9.6 Night Lighting

The impact of night lighting is consistently raised by I&APs, specifically when they can be seen from tourist or residential sites and when the impact would continue for the Project's life. The negative effect of night lighting against a relatively dark sky (although the glow from Vanderbijlpark and Sasolburg contribute to light pollution within the study area) would be particularly detrimental to people visiting the area and locals living in proximity to the Project, specifically the farmsteads within 3,0km of the site. Stringent management measures, as proposed in Section 10, should therefore be implemented to limit the spillage of light beyond the Project's site boundaries.



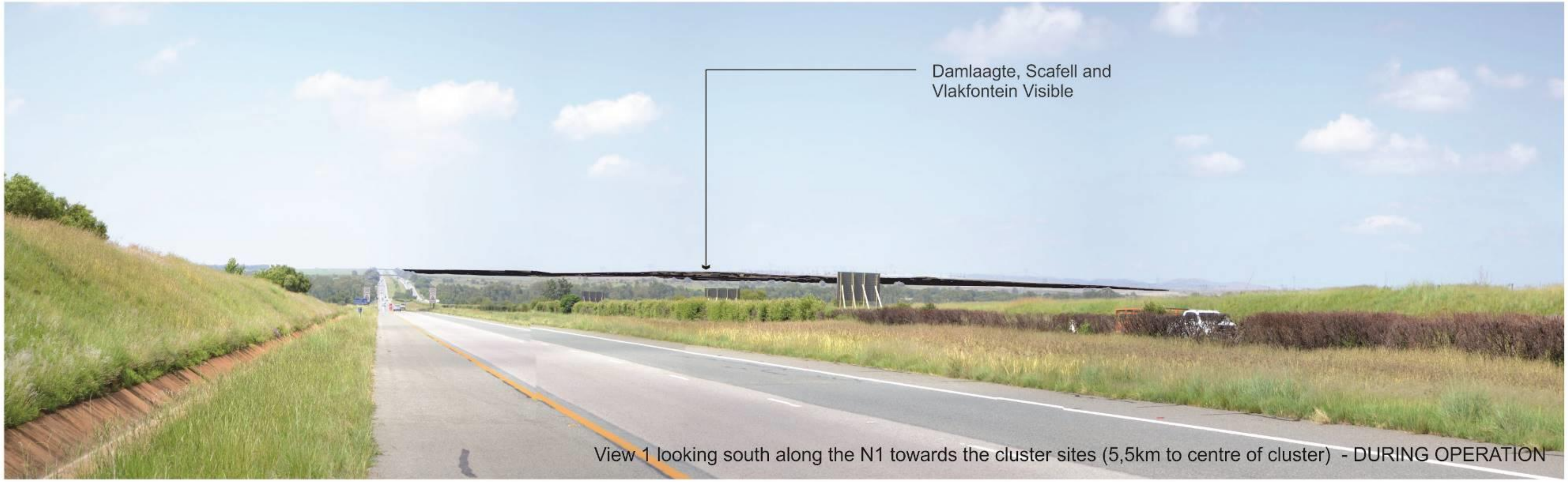


Figure 08-1: SIMULATION VIEW 1 - Mainstream Scafell Solar PV Cluster

Refer to Figure for the location of the view points

GYLA
Graham A Young
Landscape Architect
082 462 1491

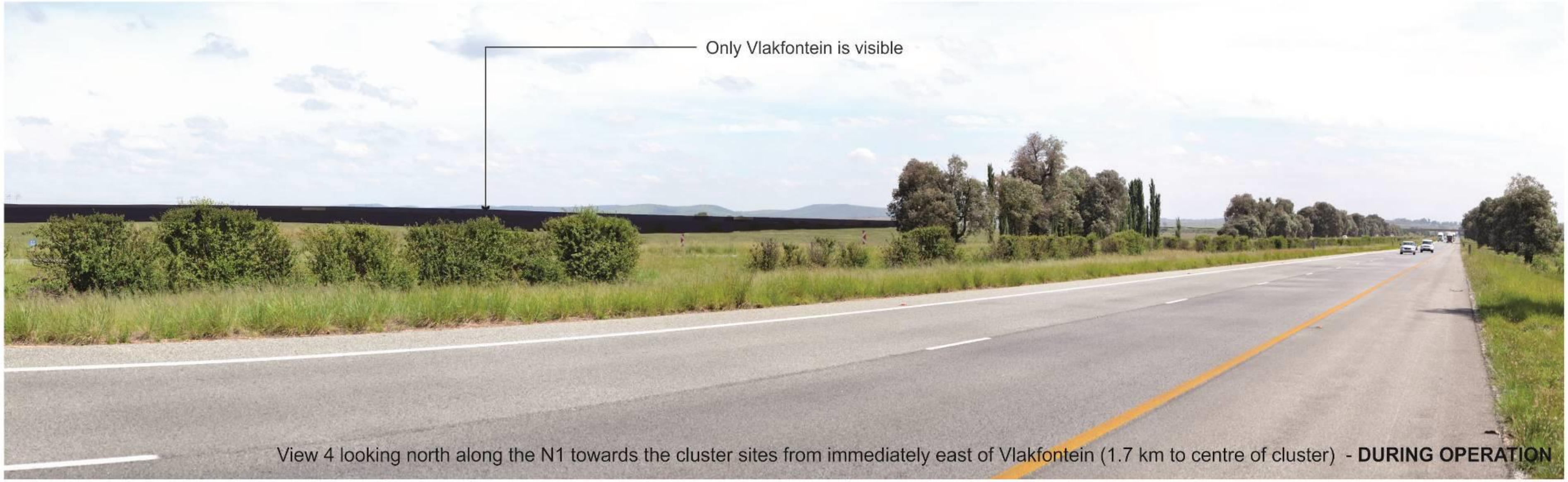
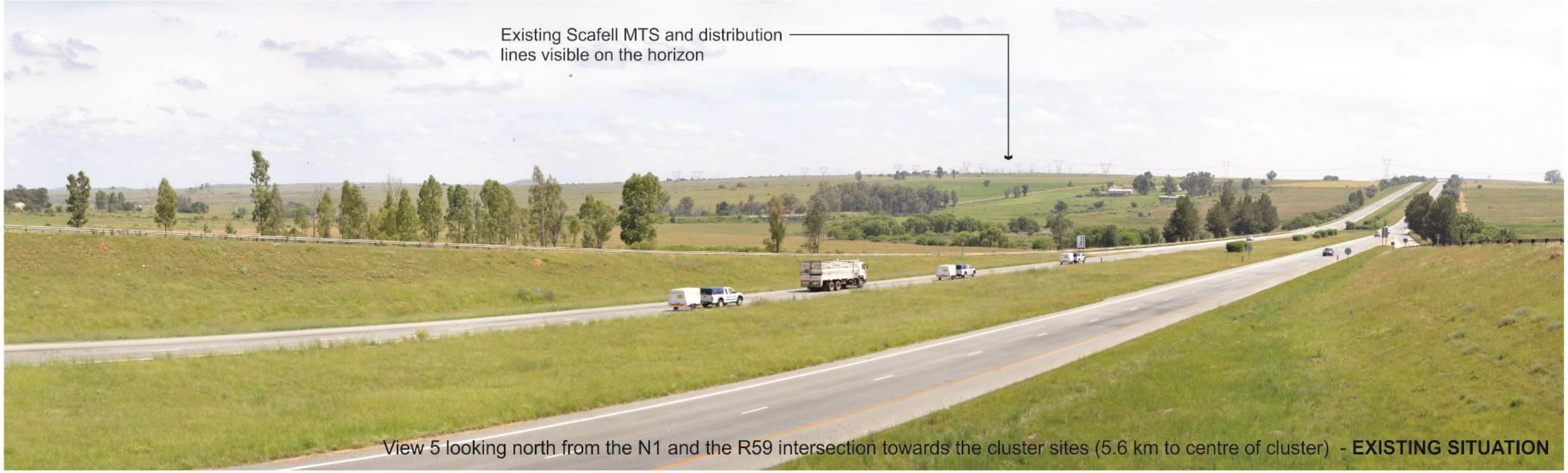


Figure 08-2: SIMULATION VIEW 4 - Mainstream Scafell Solar PV Cluster

Refer to Figure for the location of the view points

GYLA
Graham A Young
Landscape Architect
082 462 1491



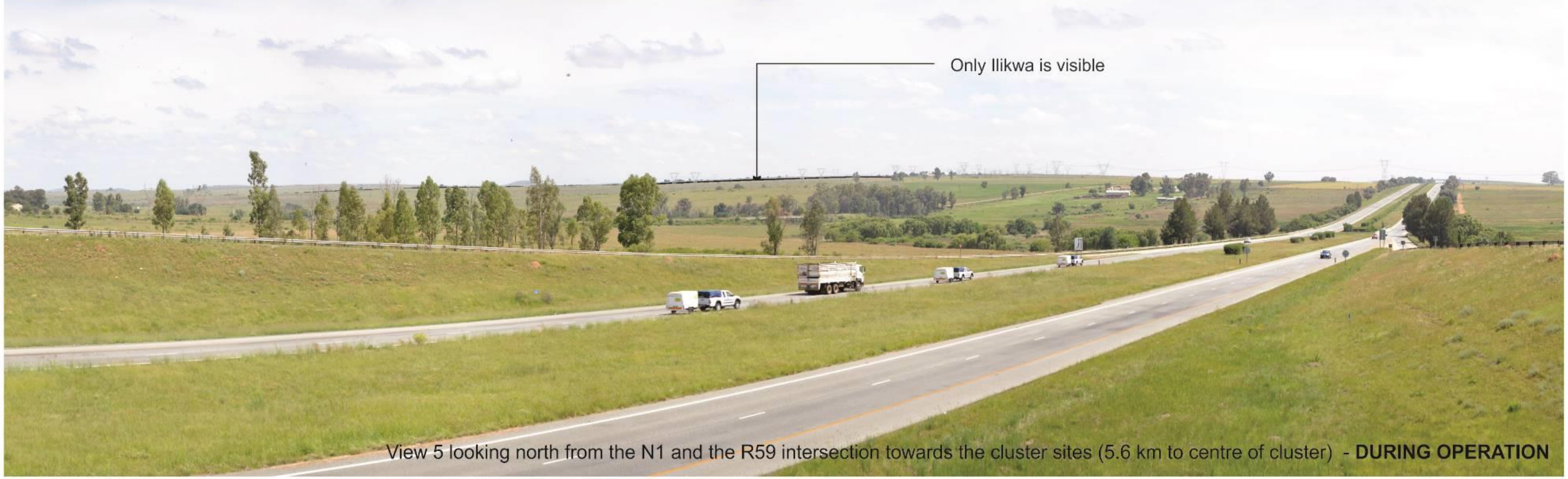
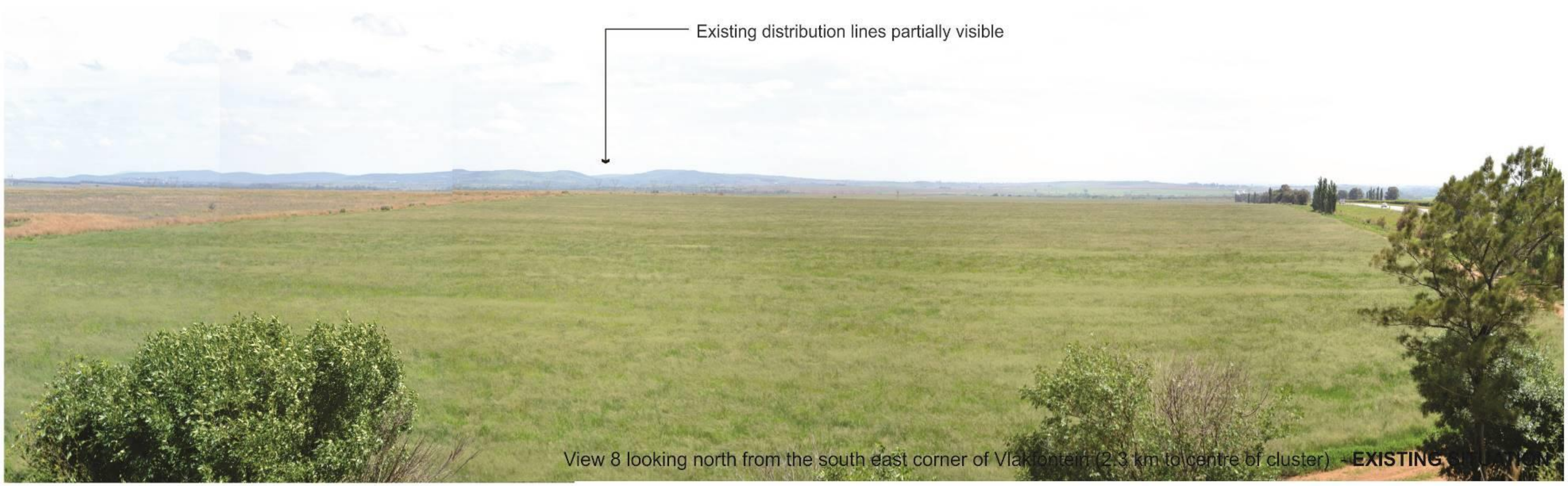


Figure 08-3: SIMULATION VIEW 5 - Mainstream Scafell Solar PV Cluster

Refer to Figure for the location of the view points

GYLA
Graham A Young
Landscape Architect
082 462 1491



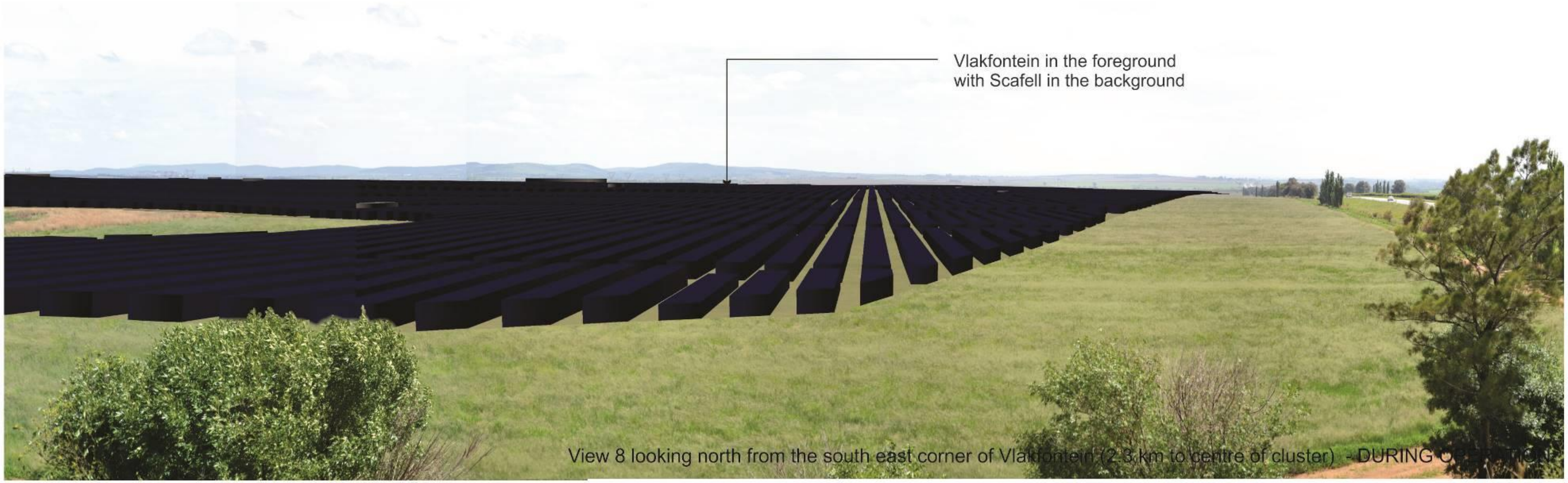
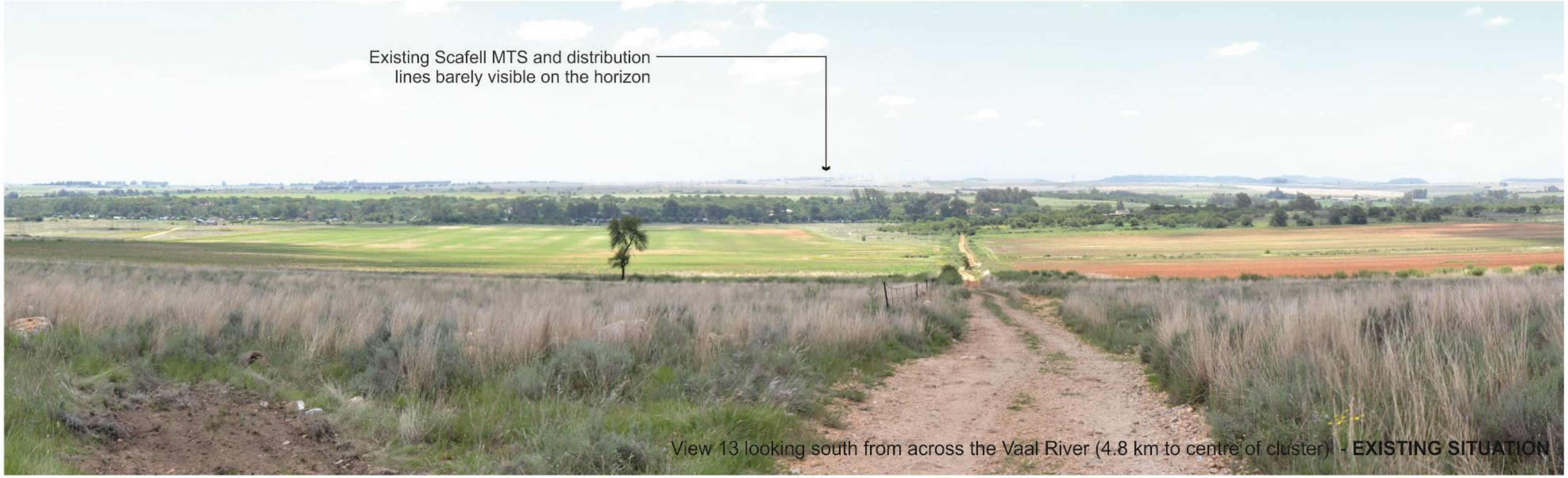


Figure 08-4: SIMULATION VIEW 8 - Mainstream Scafell Solar PV Cluster

Refer to Figure for the location of the view points

GYLA
Graham A Young
Landscape Architect
082 462 1491



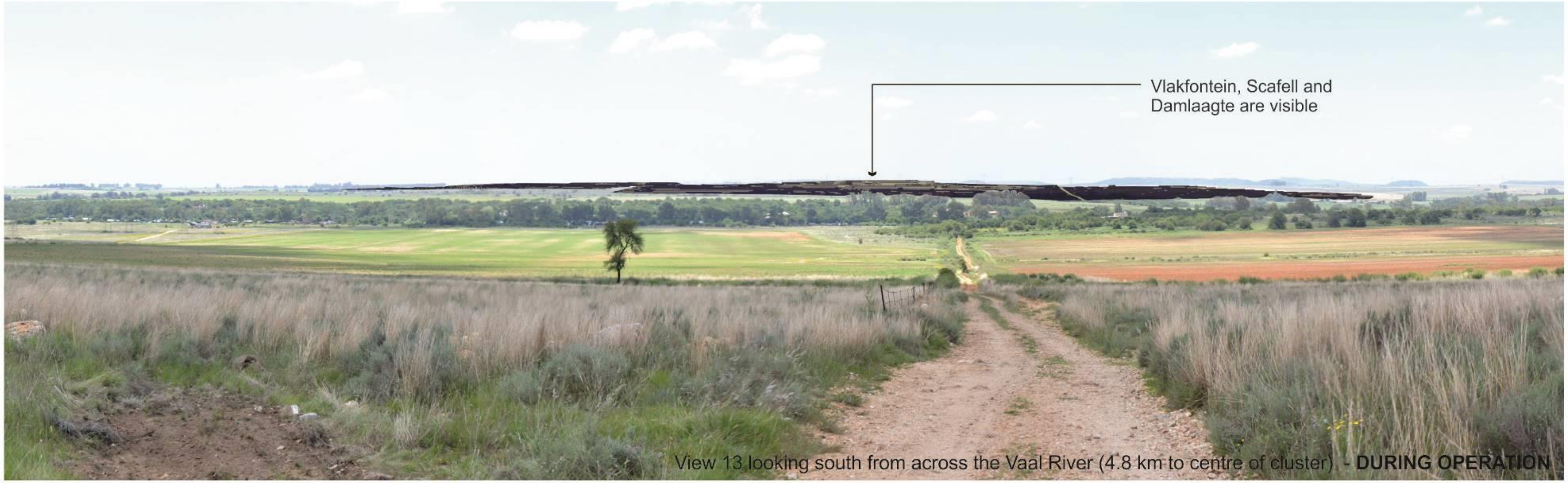
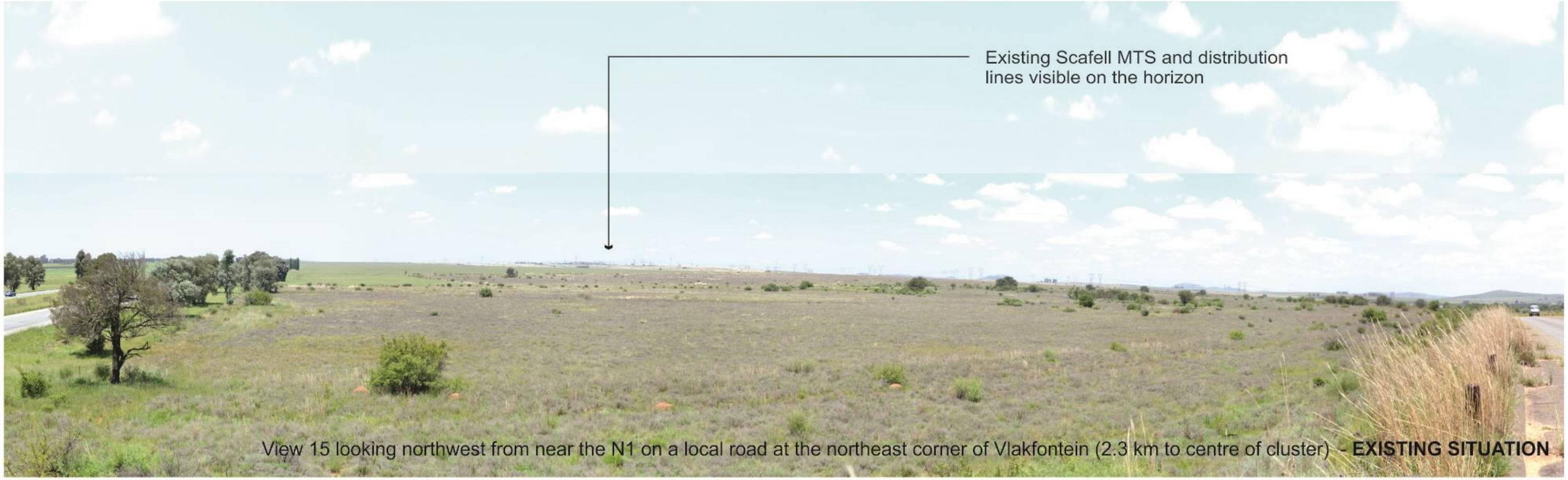


Figure 08-5: SIMULATION VIEW 13 - Mainstream Scafell Solar PV Cluster

Refer to Figure for the location of the view points

GYLA
Graham A Young
Landscape Architect
082 462 1491



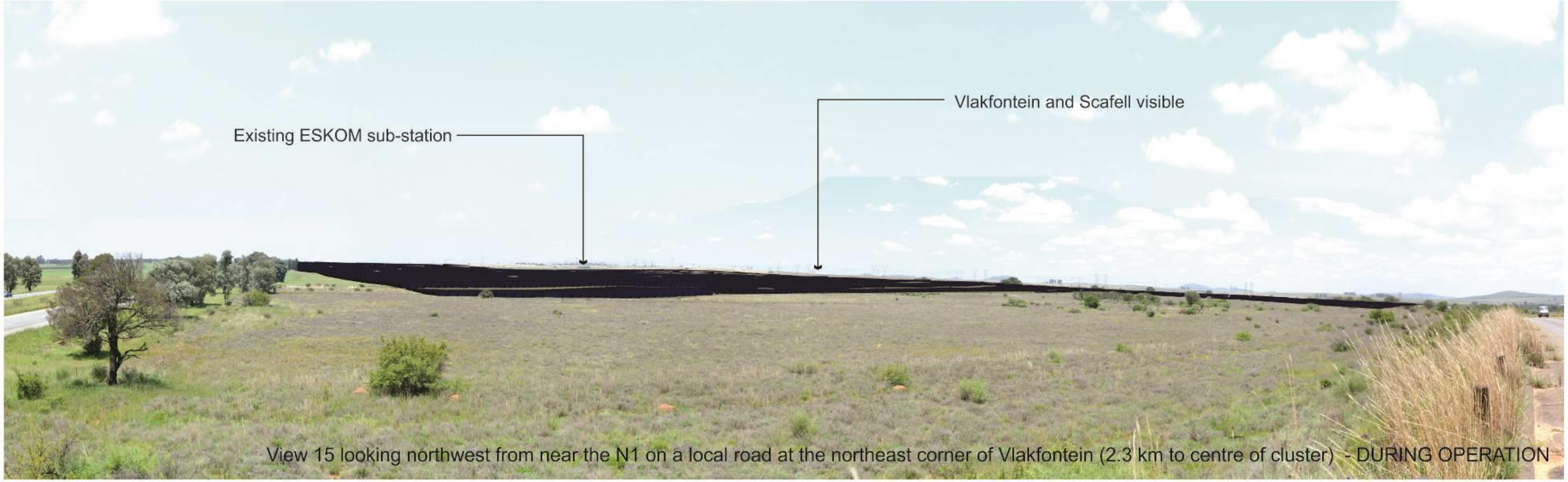
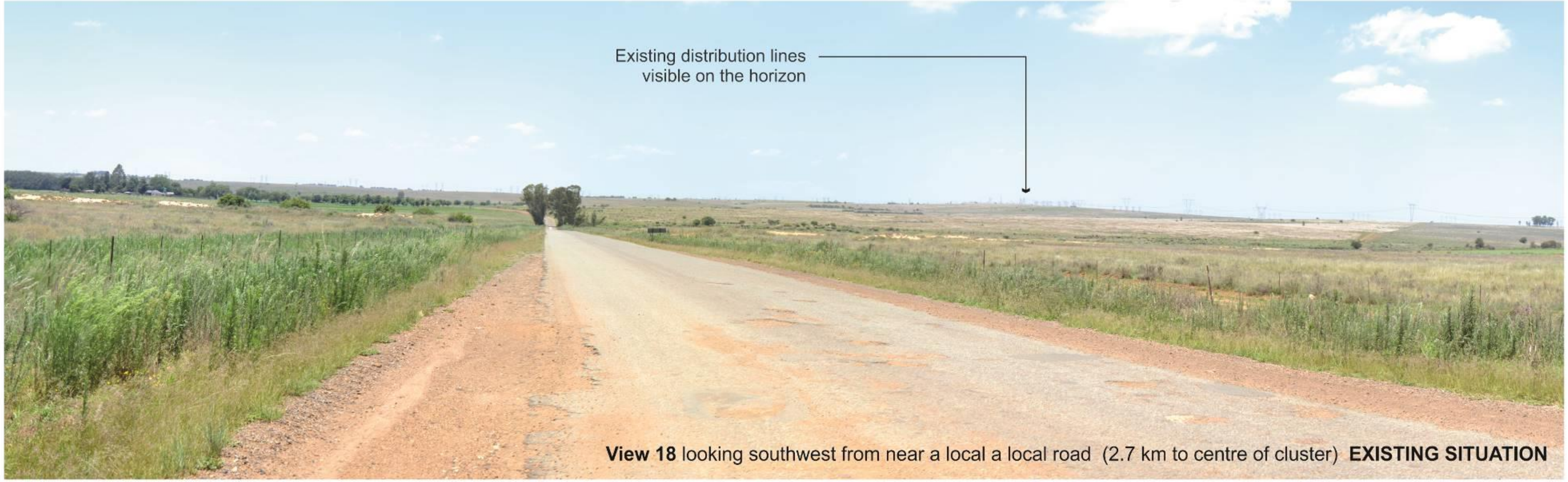


Figure 08-6: SIMULATION VIEW 15 - Mainstream Scafell Solar PV Cluster

Refer to Figure for the location of the view points

GYLA
Graham A Young
Landscape Architect
082 462 1491



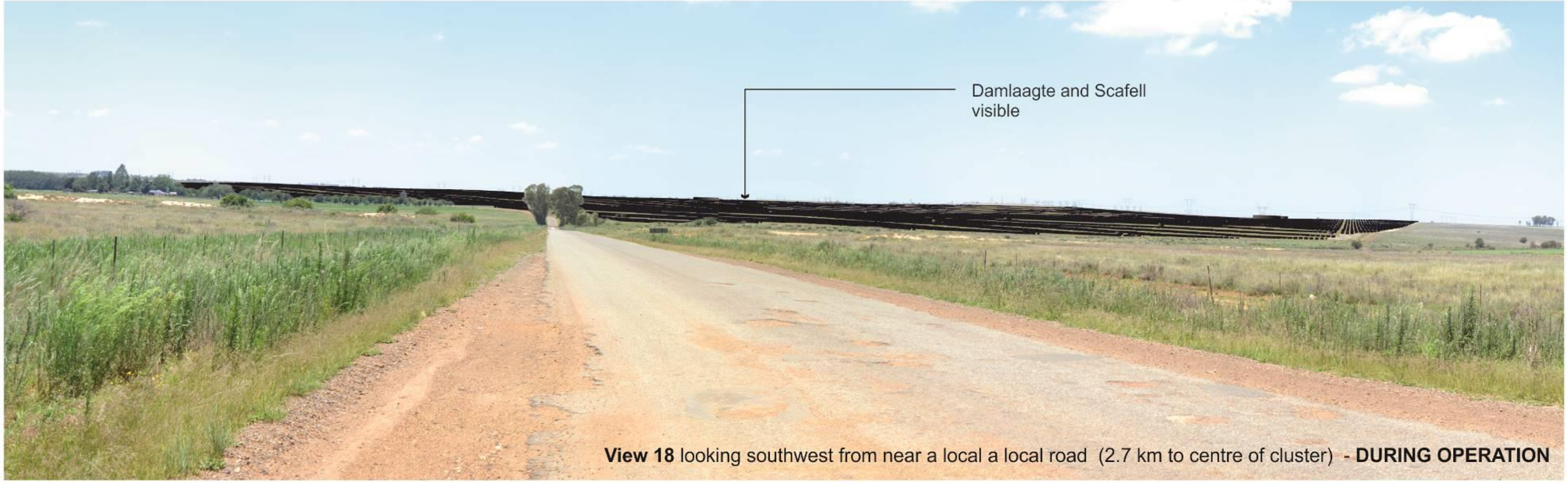


Figure 08-7: SIMULATION VIEW 18 - Mainstream Scafell Solar PV Cluster

Refer to Figure for the location of the view points

GYLA
Graham A Young
Landscape Architect
082 462 1491

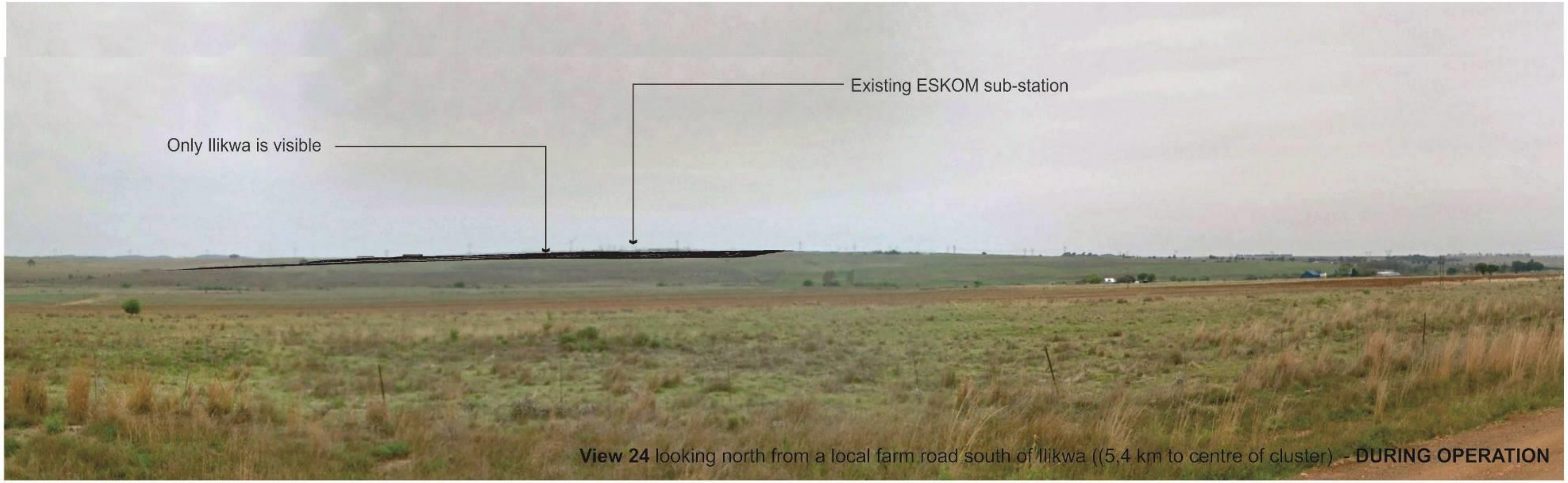


Figure 08-8: SIMULATION VIEW 24 - Mainstream Scafell Solar PV Cluster

Refer to Figure for the location of the view points

GYLA
Graham A Young
Landscape Architect
082 462 1491

9.7 Intensity of Impact

Referring to discussions in the previous sections and using the criteria listed in Appendix C, the *intensity* of visual impact (worst-case scenario – all facilities combined) of the Project, for the sensitive areas illustrated in Figure 3, is rated in Table 5 below for all phases of the Project. To assess the intensity of visual impact four main factors are considered.

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

In synthesizing the criteria a numerical or weighting system is avoided. Attempting to attach a precise numerical value to qualitative resources is rarely successful, and should not be used as a substitute for reasoned professional judgement (LI-IEMA 2013).

According to the results tabulated below in Table 5, the intensity of visual impact of the proposed Project will be *high* (for sections Boundary Road and the local road immediately north of the site and the two farmsteads immediately north and south of the cluster site during the construction and operational phases), *moderate* (for sections of the N1, Boundary Road, and the local road south of the site as well as farmsteads to the south and west of the site that are less than 3,km from the site during the construction and operational phase), and *low* to *negligible (none)* for Vaal Oewer, farmsteads over 3,0km of the Project site and for the remaining areas of the study area, including most tourist sites along the Vaal River.

Table 7: *Intensity* of impact of the proposed Project (refer also to SLR Appendix D)

High No areas	**Moderate** Sections of the N1, Boundary Road, the local road south of the site as well as farmsteads to the immediate south and north, and farmsteads east and west of the site that are less than 3,0km from the site.	**Low** Vaal Oewer, the farmsteads, over 3,0km north, east, south and west of the Project site	**Negligible** The remainder of the study area including most tourist sites along the Vaal River
Major loss of or alteration to key elements / features / characteristics of the baseline in the immediate vicinity of the site. i.e. Pre-development landscape or view and / or introduction of elements considered to be uncharacteristic when set within the attributes of the receiving landscape. **High 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 problematic 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 problematic 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 problematic with the surrounding landscape – approximating the 'no change' situation. **Negligible scenic quality impacts would result.**

10 MITIGATION 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.

The following general actions are recommended:

10.1 Preparatory Works and Construction Concerns

- 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. Large trees should be saved were possible, specifically along the N1 east of the Vlakfontein site.
- Ensure, wherever possible, natural indigenous vegetation is retained and incorporated into the site rehabilitation.
- All topsoil that occurs within the proposed footprint of an activity must be removed and stockpiled for later use. The construction contract must include the stripping and stockpiling of topsoil. Topsoil would be used later during the rehabilitation phase of disturbed areas. 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, 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 strictly 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.

10.2 Earthworks

- Earthworks should be executed in such a way that only the footprint and a small ‘construction buffer zone’ around the proposed activities are exposed. In all other areas, the naturally occurring vegetation should be retained, especially along the periphery of the sites.

- All cut and fill slopes (if any) and areas affected by construction work should be progressively top soiled and re-vegetated as soon as possible.

- 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.

10.3 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 will enhance biodiversity, a desirable outcome for the area. This approach can significantly reduce long-term costs as less maintenance would be required over conventional landscaping methods as well as the introduced landscape being more sustainable.
- Progressive rehabilitation of all construction areas should be carried out immediately after they have been established.
- Undertake planting of screening vegetation along the eastern and northern boundaries of the Project sites.

10.4 Mounting Structures and associated infrastructure

- Paint the mounting structures with colours that reflect and compliment the colours of the surrounding landscape. See the image below which is an indicative example of this approach.

- Ensure the perimeter fence is of a ‘see through’ variety and that its colour blends with the environment.

(Photo Credit: BLM 2013:198)

10.5 Good housekeeping

- “Housekeeping” procedures should be developed for the Project to ensure that the Project site and lands adjacent to the Project site are kept clean of debris, garbage, graffiti, fugitive trash, or waste generated onsite; procedures should extend to control of “track out” of dirt on vehicles leaving the active construction site and controlling sediment in stormwater runoff and the proposed wetlands.

- During construction, temporary fences surrounding the material storage yards and laydown areas should be covered with ‘shack’ cloth (khaki coloured).
- Operating facilities should be actively maintained during operation.

10.6 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 is 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 (specifically spotlights) are to be aimed away from the N1 and R59 road and areas south and west of the site.
  - 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.

10.7 Branding and Marketing

The applicants may wish to give consideration, where appropriate, to the development and installation of viewing areas, interpretation panels, visitor, or educational facilities as part of the development proposal. This may appeal to tourists visiting the area who may be curious about renewable energy Projects.

11 SIGNIFICANCE OF VISUAL IMPACT

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the proposed Project. The process involves consideration of, *inter alia*: the purpose and need for the Project; views and concerns of interested and affected parties (I&APs); social and political norms, and the public's interest (SLR 2021).

The following tables summarise the consequence and significance of the visual impact of the Project. These results are based on **worst-case scenario** when the impacts of all aspects of the Project are taken together (PV facilities , grid connection and battery systems) using the impact criteria in Appendix D. Consequence of impact is a function of intensity, duration, and spatial extent (SLR 2020). Intensity of impact is taken from the worst-case situation as described in Table 7 Intensity of Visual Impact above. These facilities are rated together, from a visual impact perspective, as the one would not exist without the other and they must be understood as the collective/cumulative.

Table 8: Determining the CONSEQUENCE of Visual Impact - Solar PV Cluster, Associated Grid Infrastructure and Battery Energy Storage Systems

Project Activity	***Unmitigated*** **summary of the cumulative rated visual impact per phase of the Project**				***Mitigated*** **summary of the cumulative rated visual impact per phase of the Project**			
	Intensity	**Spatial Scale**	**Duration**	**Conse-quence**	**Intensity**	**Spatial Scale**	**Duratio n**	**Conse-quence**
Construction, and decommissioning phases	High	Local	Short Term	**L**	High	Local	Short Term	**L**
Operational Phase	Moderate	Local	Long Term	**M**	Moderate	Local	Medium Term	**L**
Post Closure	Zero to Very Low	Local	Short	**VL**	Zero to Very Low	Local	Short	**VL**

The intensity of impact, rated in Table 7, is further qualified with *consequence* (Table 8) and *probability* criteria (SLR 2020 Appendix C) to determine the *significance* (Tables 9-1 to 9-5) of the visual impact. i.e. Significance = consequence x probability.

11.1 ILIKWA: PV Facility, Grid Connection and Battery Systems

Table 9-1: SIGNIFICANCE of Visual Impact and CONFIDENCE RATINGS – ILIKWA

Potential Visual Impact	**ENVIRONMENTAL SIGNIFICANCE**							
	Unmitigated				**Mitigated**			
	Con	**x**	**Prob**	**SIG**	**Con**	**x**	**Prob**	**SIG**
Construction and decommissioning	Low		Probable	**L**	Low		Definite	**L**
Operational[7]	Moderate		Probable	**M**	Low		**Definite**	**L**
Post Closure	Zero to Low		Improbable	**Insig**	Zero to Low		Improbable	**Insig**
CONFIDENCE RATINGS								
Degree of Confidence of the significance assessment[8]	At the time of writing the report, the outcome of the I&AP process was not known. If sensitives of the local community is extremely high, the impact rating may be modified, particularly the rating with mitigation.							**Med**
Degree to which the impact can be mitigated	Assuming the tree screens are successfully established							**Low**
Loss of resources								**Med**
Reversibility	After decommissioning the site will be rehabilitated back to its original topography and vegetative cover							**Fully rev.**

11.2 DAMLAAGTE: PV Facility, Grid Connection and Battery Systems

Table 9-2: SIGNIFICANCE of Visual Impact and CONFIDENCE RATINGS – DAMLAAGTE

Potential Visual Impact	**ENVIRONMENTAL SIGNIFICANCE**							
	Unmitigated				**Mitigated**			
	Con	**x**	**Prob**	**SIG**	**Con**	**x**	**Prob**	**SIG**
Construction and decommissioning	Low		Probable	**L**	Low		Probable	**L**
Operational	Moderate		Probable	**M**	Low		**Probable**	**L**

[7] Significance ratings are based on largely professional judgement and transparent defined criteria. In some instances, therefore, whilst the significance rating of potential impacts might be "low", the importance of these impacts to local communities or individuals might be extremely high. The importance/value which interested and affected parties attach to impacts will be highlighted, and recommendations should be made as to ways of avoiding or minimising these perceived negative impacts through Project design, selection of appropriate alternatives and / or management.

[8] Once the significance of the impact has been determined, the degree of confidence in the assessment will be qualified. Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact. If sensitives of the local community are extremely high, the impact rating may be modified, particularly the rating with mitigation.

Post Closure	Zero to Low		Improbable	**Insig**	Zero to Low		Improbable	**Insig**
CONFIDENCE RATINGS								
Degree of Confidence of the significance assessment	At the time of writing the report, the outcome of the I&AP process was not known. If sensitives of the local community is extremely high, the impact rating may be modified, particularly the rating with mitigation.							**Med**
Degree to which the impact can be mitigated	Assuming the tree screens are successfully established							**Low**
Loss of resources								**Med**
Reversibility	After decommissioning the site will be rehabilitated back to its original topography and vegetative cover							**Fully rev.**

11.3 SCAFELL: PV Facility, Grid Connection and Battery Systems

Table 9-3: SIGNIFICANCE of Visual Impact and CONFIDENCE RATINGS – SCAFELL

Potential Visual Impact	**ENVIRONMENTAL SIGNIFICANCE**							
	Unmitigated				**Mitigated**			
	Con	**x**	**Prob**	**SIG**	**Con**	**x**	**Prob**	**SIG**
Construction and decommissioning	Low		Probable	**L**	Low		Probable	**L**
Operational	Moderate		Probable	**M**	Low		**Probable**	**L**
Post Closure	Zero to Low		Improbable	**Insig**	Zero to Low		Improbable	**Insig**
CONFIDENCE RATINGS								
Degree of Confidence of the significance assessment	At the time of writing the report, the outcome of the I&AP process was not known. If sensitives of the local community is extremely high, the impact rating may be modified, particularly the rating with mitigation.							**Med**
Degree to which the impact can be mitigated	Assuming the tree screens are successfully established							**Low**
Loss of resources								**Med**
Reversibility	After decommissioning the site will be rehabilitated back to its original topography and vegetative cover							**Fully rev.**

11.4 VLAKFONTEIN: PV Facility, Grid Connection and Battery Systems

Table 9-4: SIGNIFICANCE of Visual Impact and CONFIDENCE RATINGS – VLAKFONTEIN

Potential Visual Impact	ENVIRONMENTAL SIGNIFICANCE							
	Unmitigated				Mitigated			
	Con	x	Prob	SIG	Con	x	Prob	SIG
Construction and decommissioning	Low		Probable	L	Low		Probable	L
Operational[9]	Moderate		Probable	M	Low		**Probable**	L
Post Closure	Zero to Low		Improbable	**Insig**	Zero to Low		Improbable	**Insig**
CONFIDENCE RATINGS								
Degree of Confidence of the significance assessment[10]	At the time of writing the report, the outcome of the I&AP process was not known. If sensitives of the local community is extremely high, the impact rating may be modified, particularly the rating with mitigation.							**Med**
Degree to which the impact can be mitigated	Assuming the tree screens are successfully established							**Low**
Loss of resources								**Med**
Reversibility	After decommissioning the site will be rehabilitated back to its original topography and vegetative cover							**Fully rev.**

11.5 SCAFELL CLUSTER: Solar PV Facilities, Grid Connections and Battery Systems

Table 7-5: SIGNIFICANCE of Visual Impact and CONFIDENCE RATINGS – SCAFELL CLUSTER

Potential Visual Impact	ENVIRONMENTAL SIGNIFICANCE							
	Unmitigated				Mitigated			
	Con	x	Prob	SIG	Con	x	Prob	SIG
Construction and decommissioning	Low		Probable	L	Low		Probable	L

[9] Significance ratings are based on largely professional judgement and transparent defined criteria. In some instances, therefore, whilst the significance rating of potential impacts might be "low", the importance of these impacts to local communities or individuals might be extremely high. The importance/value which interested and affected parties attach to impacts will be highlighted, and recommendations should be made as to ways of avoiding or minimising these perceived negative impacts through Project design, selection of appropriate alternatives and / or management.

[10] Once the significance of the impact has been determined, the degree of confidence in the assessment will be qualified. Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact. At the time of writing the report, the outcome of the I&AP process was not known. If sensitives of the local community is extremely high, the impact rating may be modified, particularly the rating with mitigation.

Operational	Moderate		Probable	**M**	Low		**Probable**	**L**
Post Closure	Zero to Low		Improbable	**Insig**	Zero to Low		Improbable	**Insig**
CONFIDENCE RATINGS								
Degree of Confidence of the significance assessment	At the time of writing the report, the outcome of the I&AP process was not known. If sensitives of the local community is extremely high, the impact rating may be modified, particularly the rating with mitigation.							**Med**
Degree to which the impact can be mitigated	Assuming the tree screens are successfully established							**Low**
Loss of resources								**Med**
Reversibility	After decommissioning the site will be rehabilitated back to its original topography and vegetative cover							**Fully rev.**

11.5 Assessment of Alternatives

It is understood that Mainstream will consider the use of various technology alternatives for the PV panel modules, mounting structures and the BESS. From a visual perspective, the technically preferred alternatives for the PV panel modules, mounting structures and the BESS are acceptable for the proposed Project. The selection of the technically preferred alternatives will not pose additional and significant impacts on visual resources because of the proposed Project and as rated above.

Furthermore, the selection of either grid connection corridor as the preferred alternative will not pose significant visual impacts within the study area as the grid connection infrastructure will be viewed in the context of the existing transmission lines (refer to Figures 8-1 to 8-8). Thus, both grid connection corridor alternatives are acceptable from a visual perspective. Therefore, taking the above into consideration, the technically preferred corridor is selected as the preferred grid connection corridor from a visual perspective.

12 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 how 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 some 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)).

12.1 Cumulative effect of the Project

The cumulative impact of the Project, all facilities and infrastructure taken together, is significant, along with the existing power infrastructure (ESKOM sub-station and transmission lines emanating from it - Refer to Figure 5 and Figures 8-1 to 8-8), that exists in the study area. Intervisibility for the proposed Project and the existing infrastructure would be evident. The VAC for the study area is relatively low, and the combined effect over time of these developments would result in the study area being impacted upon in a moderate manner beyond the anticipated negative impacts of the proposed Project alone.

13 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 *moderate* within the context of the sub-region, and sensitive viewing areas and landscape types identified and mapped indicating potential sensitivity to the Project. The site itself is in a landscape type rated as *moderate*.

Visual impacts will be caused by activities associated with the Scafell Solar Cluster Project. The significance of visual impact is based on the worst-case scenario. This scenario assumes that all facilities along with the associated grid infrastructure and sub-stations would be constructed at the same time. At the time of writing there was no evidence to the contrary. This assumption is also based on the nature of visual impact and the fact that receptors would experience all facilities in the same visual envelope from their respective locations or as they travel along adjacent roads.

Impacts on 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. The visual impact of the Project will cause changes in the landscape that are noticeable to viewers experiencing the study area from the N1, Boundary Road, local roads to the north, west, and south of the site, and homesteads also in this general area. Visual impacts that would potentially result from Project activities are likely to be moderately adverse, long-term, and will most likely cause loss of landscape and visual resources. The visual impact on properties along the Vaal River is anticipated to be low, primarily because the properties are orientated towards the river, along with the screening effect of large trees growing on the adjacent embankments.

The cause of these anticipated visual impacts would be:

Construction Phase:

- Removal of vegetation, the building of access roads, earthworks, and exposure of earth to establish the areas to be developed.
- Physical presence of construction camps and the movement of construction vehicles within the site and along local roads.
- Generation of dust by construction activities.

Operational Phase

- Physical presence of the solar arrays and a minor potential of glint and glare.
- Reduction in the rural sense of place for the study area.
- Light pollution.

Decommissioning Phase

- Physical presence of the activities associated with removing the structures and rehabilitating the site.

Post Closure

- The sites will be rehabilitated back to pre-Project conditions.

The predicated *moderate* negative impact will cause a partial loss of or alteration to key landscape elements and visual characteristics of the baseline. i.e. the impact will cause a moderate alteration (cumulative) to the visual quality of the study area due to the physical presence, scale, and size of the Project infrastructure. Targets, limits, and thresholds of concern may occasionally be exceeded and will require some intervention. Occasional complaints can be expected from the nearby homesteads. Mitigation is required to contain the negative impact of the worst-case (unmanaged) scenario.

With mitigation the impact can be reduced to *low* after approximately 5 years when the proposed tree screens along the northern and southern edges, begin to mature.

Opinion of the author

It is the opinion of the author that all aspects of the Scafell Cluster 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 ***

REFERENCES - BIBLIOGRAPHY

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

BRE National Solar Centre. 2013. Planning guidance for the development of large-scale ground-mounted solar PV systems. Cornwall, UK. October 2013. Report available at www.bre.co.uk/nsc.

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

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

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

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

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

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

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

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

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

PagerPower. *Solar Photovoltaic Glint and Glare Study, SA Mainstream Renewable Power Developments Ltd Scafell Cluster Solar Development*. Report 10268A, December 2020.

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

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

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

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

Tata. *A Brief on Tempered Glass with Anti-Reflective Coating (ARC) on Solar Modules,* Tata Power Solar 25 November 2015.

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

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

Graham Young PrLArch FILASA

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

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

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

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

*** GYLA ***

APPENDIX B: DETERMINING THE VISUAL RESOURCE VALUE OF A LANDSCAPE

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

Landscape Elements and Character

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

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

Landscape Value – all-encompassing (Aesthetic Value)

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

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

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

Sense of Place

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

Scenic Quality

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

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

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

Scenic Quality - Explanation of Rating Criteria:

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

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

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

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

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

Adjacent Scenery: Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-8 kilometres, depending upon the characteristics of the topography, the vegetative cover, and other such factors. This factor is 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 exceedingly rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. National and provincial parks and conservation areas *** 5+**	Distinctive, though somewhat like others within the region. **3**	Interesting within its setting, but common within the region. **1**

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

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

In determining the quality of the visual resource both the objective and the subjective or aesthetic factors associated with the landscape are considered. Many landscapes can be said to have a strong sense of place, regardless of whether they are 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 an incredibly positive character with valued features that combine to give the experience of unity, richness, and harmony. These are landscapes that may be of particular importance to conserve and which may be sensitive change in general and which may be detrimental if change is inappropriately dealt with.	Areas that exhibit positive character, but which may have evidence of alteration to /degradation/erosion of features resulting in areas of more mixed character. Potentially sensitive to change in general; again, change may be detrimental if inappropriately dealt with, but it may not require special or particular attention to detail.	Areas generally negative in character with few, if any, valued features. Scope for positive enhancement frequently occurs.

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

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

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

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

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

Landscape Impact

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

Visual Impact

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

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

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

Visual Intrusion / contrast

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

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

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

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

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

Visual Intrusion

High	Moderate	Low	Positive
If the Project: - Has a substantial negative effect on the visual quality of the landscape; - Contrasts dramatically with the patterns or elements that define the structure of the landscape; - Contrasts dramatically with land use, settlement or enclosure patterns; - Is unable to be	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'	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.

'absorbed' into the landscape.	into the landscape.		
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.

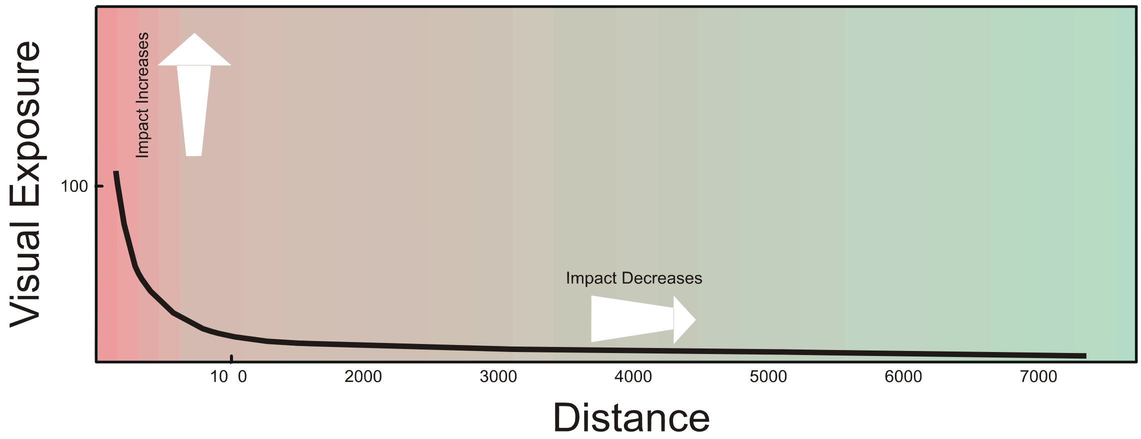
Areas seen from 800m to 5.0km are considered middle ground; vegetation appears as outlines or patterns. Depending on topography and vegetation, middle ground is sometimes considered to be up to 8.0km.

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.

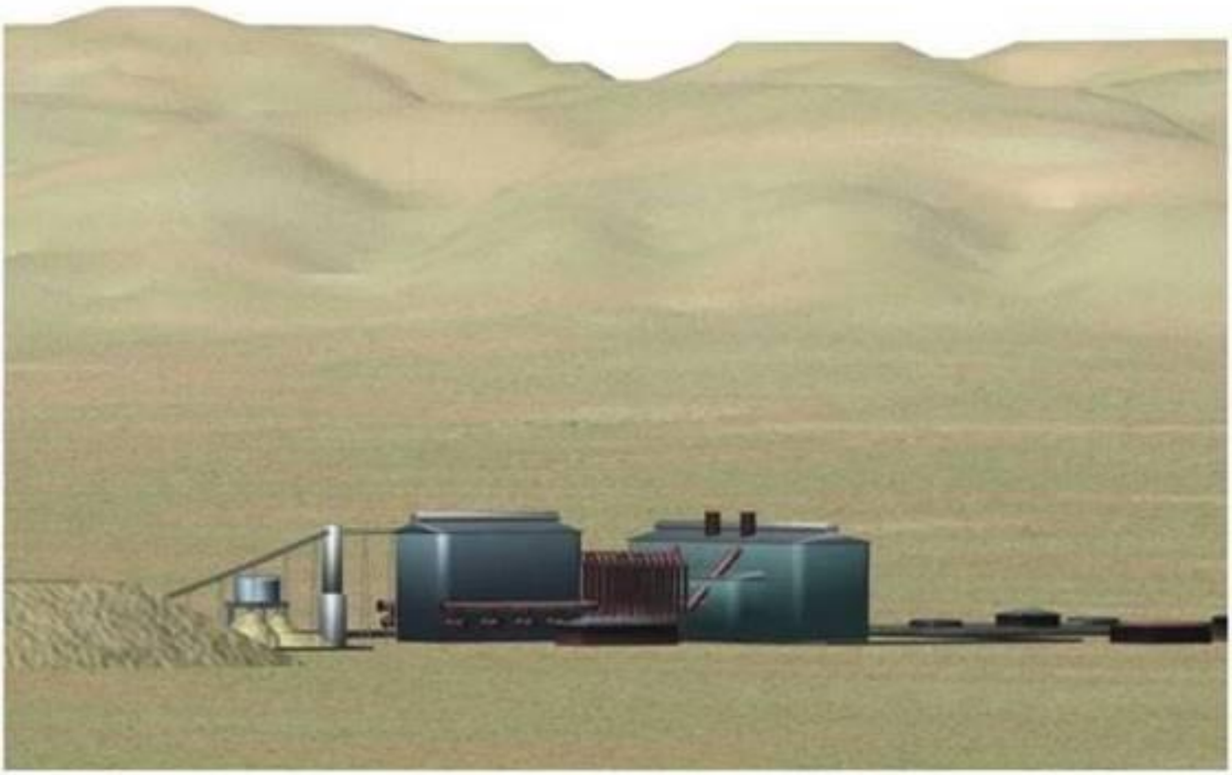
Effect of Distance on Visual Exposure



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. 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.	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.	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). Roads going through urban and industrial areas

Intensity of the Visual Impact

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

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

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

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

Intensity (Intensity) of Visual Impact

High	Moderate	Low	Negligible
Total loss of or major alteration to key elements/features/chara cteristics of the baseline.	Partial loss of or alteration to key elements/features/chara cteristics of the baseline.	Minor loss of or alteration to key elements/features/chara cteristics of the baseline.	Very minor loss or alteration to key elements/features/chara cteristics 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 substantially uncharacteristic when set within the attributes of the receiving landscape.	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.
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 D: SIGNIFICANCE OF ENVIRONMENTAL IMPACTS (SLR methodology)

Method for Impact Identification and Evaluation

The identification and assessment of environmental impacts is a multi-faceted process, using a combination of quantitative and qualitative descriptions and evaluations. It involves applying scientific measurements and professional judgement to determine the significance of environmental impacts associated with the proposed Project. The process involves consideration of, *inter alia*: the purpose and need for the Project; views and concerns of interested and affected parties (I&APs); social and political norms, and general public interest.

1 Identification and Description of Impacts

Identified impacts are described in terms of the nature of the impact, compliance with legislation and accepted standards, receptor sensitivity and the significance of the predicted environmental change (before and after mitigation). Mitigation measures may be existing measures or additional measures that were identified through the impact assessment and associated specialist input. The impact rating system considers the confidence level that can be placed on the successful implementation of mitigation.

2 Evaluation of Impacts and Mitigation Measures

2.1 INTRODUCTION

Impacts are assessed using SLR's standard convention for assessing the significance of impacts, a summary of which is provided below.

In assigning significance ratings to potential impacts before and after mitigation the approach presented below is to be followed.

1. **Determine the impact consequence rating:** This is a function of the "intensity", "duration" and "extent" of the impact (see Section 2.2). The consequence ratings for combinations of these three criteria are given in Section 0.
2. **Determine impact significance rating:** The significance of an impact is a function of the consequence of the impact occurring and the probability of occurrence (see Section 2.2). Significance is determined using the table in Section 2.4.
3. **Modify significance rating (if necessary):** Significance ratings are based on largely professional judgement and transparent defined criteria. In some instances, therefore, whilst the significance rating of potential impacts might be "low", the importance of these impacts to local communities or individuals might be extremely high. The importance/value which interested and affected parties attach to impacts will be highlighted, and recommendations should be made as to ways of avoiding or minimising these perceived negative impacts through Project design, selection of appropriate alternatives and / or management.
4. **Determine degree of confidence of the significance assessment:** Once the significance of the impact has been determined, the degree of confidence in the assessment will be qualified (see Section 2.2). Confidence in the prediction is associated with any uncertainties, for example, where information is insufficient to assess the impact.

2.2 CRITERIA FOR IMPACT ASSESSMENT

The criteria for impact assessment are provided below.

Criteria	Rating	Description
Criteria for ranking of the INTENSITY (SEVERITY) of environmental impacts	**ZERO TO VERY LOW**	Negligible change, disturbance or nuisance. The impact affects the environment in such a way that natural functions and processes are not affected. People / communities are able to adapt with relative ease and maintain pre-impact livelihoods.
	LOW	Minor (Slight) change, disturbance or nuisance. The impact on the environment is not detectable or there is no perceptible change to people's livelihood.
	MEDIUM	Moderate change, disturbance or discomfort. Where the affected environment is altered, but natural functions and processes continue, albeit in a modified way. People/communities are able to adapt with some difficulty and maintain pre-impact livelihoods but only with a degree of support.
	HIGH	Prominent change, disturbance or degradation. Where natural functions or processes are altered to the extent that they will temporarily or permanently cease. Affected people/communities will not be able to adapt to changes or continue to maintain-pre impact livelihoods.
Criteria for ranking the DURATION of impacts	**SHORT TERM**	< 5 years.
	MEDIUM TERM	5 to < 15 years.
	LONG TERM	> 15 years, but where the impact will eventually cease either because of natural processes or by human intervention.
	PERMANENT	Where mitigation either by natural processes or by human intervention will not occur in such a way or in such time span that the impact can be considered transient.
Criteria for ranking the EXTENT / SPATIAL SCALE of impacts	**LOCAL**	Impact is confined to Project or study area or part thereof, e.g. limited to the area of interest and its immediate surroundings.
	REGIONAL	Impact is confined to the region, e.g. catchment, municipal region, etc.
	NATIONAL	Impact is confined to the country as a whole, e.g. South Africa, etc.
	INTERNATIONAL	Impact extends beyond the national scale.
Criteria for determining the PROBABILITY of impacts	**IMPROBABLE**	Where the possibility of the impact to materialise is very low either because of design or historic experience, i.e. ≤ 30% chance of occurring.
	POSSIBLE	Where there is a distinct possibility that the impact would occur, i.e. > 30 to ≤ 60% chance of occurring.
	PROBABLE	Where it is most likely that the impact would occur, i.e. > 60 to ≤ 80% chance of occurring.
	DEFINITE	Where the impact would occur regardless of any prevention measures, i.e. > 80% chance of occurring.
Criteria for determining the DEGREE OF CONFIDENCE of the assessment	**LOW**	≤ 35% sure of impact prediction.
	MEDIUM	> 35% and ≤ 70% sure of impact prediction.
	HIGH	> 70% sure of impact prediction.

Criteria	Rating	Description
Criteria for the DEGREE TO WHICH IMPACT CAN BE MITIGATED - the degree to which an impact can be reduced / enhanced	**NONE**	No change in impact after mitigation.
	VERY LOW	Where the significance rating stays the same, but where mitigation will reduce the intensity of the impact.
	LOW	Where the significance rating drops by one level, after mitigation.
	MEDIUM	Where the significance rating drops by two to three levels, after mitigation.
	HIGH	Where the significance rating drops by more than three levels, after mitigation.
Criteria for LOSS OF RESOURCES - the degree to which a resource is permanently affected by the activity, i.e. the degree to which a resource is irreplaceable	**LOW**	Where the activity results in a loss of a particular resource but where the natural, cultural and social functions and processes are not affected.
	MEDIUM	Where the loss of a resource occurs, but natural, cultural and social functions and processes continue, albeit in a modified way.
	HIGH	Where the activity results in an irreplaceable loss of a resource.
Criteria for REVERSIBILITY - the degree to which an impact can be reversed	**IRREVERSIBLE**	Where the impact is permanent.
	PARTIALLY REVERSIBLE	Where the impact can be partially reversed.
	FULLY REVERSIBLE	Where the impact can be completely reversed.

2.3 DETERMINING CONSEQUENCE

Consequence attempts to evaluate the importance of a particular impact, and in doing so incorporates extent, duration and intensity. The ratings and description for determining consequence are provided below.

Rating	Description *
VERY HIGH	Impacts could be EITHER: of ***high intensity*** at a ***regional level*** and endure in the ***long term***; OR of ***high intensity*** at a ***national level*** in the ***medium term***; OR of ***medium intensity*** at a ***national level*** in the ***long term.***
HIGH	Impacts could be EITHER: of ***high intensity*** at a ***regional level*** and endure in the ***medium term***; OR of ***high intensity*** at a ***national level*** in the ***short term***; OR of ***medium intensity*** at a ***national level*** in the ***medium term;*** OR of ***low intensity*** at a ***national level*** in the ***long term***; OR of ***high intensity*** at a ***local level*** in the ***long term***; OR of ***medium intensity*** at a ***regional level*** in the ***long term.***
MEDIUM	Impacts could be EITHER: of ***high intensity*** at a ***local level*** and endure in the ***medium term***; OR of ***medium intensity*** at a ***regional level*** in the ***medium term***; OR of ***high intensity*** at a ***regional level*** in the ***short term***; OR of ***medium intensity*** at a ***national level*** in the ***short term***; OR of ***medium intensity*** at a ***local level*** in the ***long term***;

Rating	Description *
	OR of ***low intensity*** at a ***national level*** in the ***medium term****;*
	OR of ***low intensity*** at a ***regional level*** in the ***long term.***
LOW	Impacts could be EITHER
	of ***low intensity*** at a ***regional level*** and endure in the ***medium term***;
	OR of ***low intensity*** at a ***national level*** in the ***short term***;
	OR of ***high intensity*** at a ***local level*** and endure in the ***short term***;
	OR of ***medium intensity*** at a ***regional level*** in the ***short term***;
	OR of ***low intensity*** at a ***local level*** in the ***long term***;
	OR of ***medium intensity*** at a ***local level*** and endure in the ***medium term.***
VERY LOW	Impacts could be EITHER
	of ***low intensity*** at a ***local level*** and endure in the ***medium term***;
	OR of ***low intensity*** at a ***regional level*** and endure in the ***short term***;
	OR of ***low to medium intensity*** at a ***local level*** and endure in the ***short term.***
	OR **Zero to very low intensity** with any combination of extent and duration.

* Note: For any impact that is considered to be "Permanent" or "International" apply the "Long-Term" and "National" ratings, respectively.

2.4 DETERMINING SIGNIFICANCE

The consequence rating is considered together with the probability of occurrence in order to determine the overall significance using the table below.

		PROBABILITY			
		IMPROBABLE	POSSIBLE	PROBABLE	DEFINITE
CONSEQUENCE	VERY LOW	INSIGNIFICANT	INSIGNIFICANT	VERY LOW	VERY LOW
	LOW	VERY LOW	VERY LOW	LOW	LOW
	MEDIUM	LOW	LOW	MEDIUM	MEDIUM
	HIGH	MEDIUM	MEDIUM	HIGH	HIGH
	VERY HIGH	HIGH	HIGH	VERY HIGH	VERY HIGH

In certain cases it may not be possible to determine the significance of an impact. In these instances the significance is **UNKNOWN**.

APPENDIX E: CRITERIA FOR PHOTO / COMPUTER SIMULATION

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

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

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

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

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

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