Visual Impact Assessment Report

SIYANDA CHROME SMELTING COMPANY PROPOSED NEW FERROCHROME SMELTER

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Newtown Landscape Architects

SIYANDA CHROME SMELTING COMPANY (SCSC), PROPOSED NEW FERROCHROME SMELTER, THABAZIMBI LOCAL MUNICIPALITY, LIMPOPO PROVINCE

Specialist Study Report
VISUAL IMPACT ASSESSMENT

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Acronyms & Abbreviations	
CAD	Computer-aided design
DTM	Digital Terrain Model
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
GIS	Geographic Information System
IFC	International Finance Corporation
ILASA	Institute for Landscape Architecture in South Africa
NEMA	National Environmental Management Act 107 of 1998 as amended
NLA	Newtown Landscape Architects
SACLAP	South African Council for the Landscape Architectural Profession
VIA	Visual Impact Assessment

Glossary	
Aesthetic Value	Aesthetic value is the emotional response derived from the experience of the environment with its particular natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings and attitudes (Ramsay, 1993). Thus aesthetic value encompasses more than the seen view, visual quality or scenery, and includes atmosphere, landscape character and sense of place (Schapper, 1993).
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 virtue of its visibility, must clearly interfere with or reduce (i.e. visual impact) the public's enjoyment and/or appreciation of the appearance of a valued resource e.g. cooling tower blocks a view from a National Park overlook (after New York, Department of Environment 2000).
Cumulative Effects	The summation of effects that result from changes caused by a development in conjunction with the other past, present or reasonably foreseeable actions.
Landscape Character	The individual elements that make up the landscape, including prominent or eye-catching features such as hills, valleys, woods, trees, water bodies, buildings and roads. They are generally quantifiable and can be easily described.
Landscape Impact	Landscape effects derive from changes in the physical landscape, which may give rise to changes in its character and how this is experienced

	(Institute of Environmental Assessment & The Landscape Institute, 1996).
Study area	For the purposes of this report the Project Study area refers to the proposed project footprint / 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 12 km radius surrounding the proposed project footprint.
Project Footprint / Site	For the purposes of this report the Siyanda Chrome Smelter *site* refers to a portion 3 of the farm Grootkuil 409 KQ. The project *footprint* refers to the actual footprint of the project elements as located in the western section of the project site.
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. *Genius loci* literally mean '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 1,8 m 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 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 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.
Worst-case Scenario	Principle applied where the environmental effects may vary, for example, seasonally to ensure the most severe potential effect is assessed.
Zone of Potential Visual	By determining the zone of potential visual influence it is possible to

Influence	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.

SPECIALIST REPORTING REQUIREMENTS AS PER NEMA Appendix 6: Requirements for Specialist Studies (2014)	
1. (1) A specialist report prepared in terms of these regulations must contain – details of:	Refer to Section:
(a) (i) The specialist who prepared the report	Graham A. Young PrLArch and inside cover of report
(a) (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae	Appendix G
(b) a declaration that the specialist is independent in a form as may be specified by the competent authority	Appendix F
(c) an indication of the scope of, and the purpose for which, the report was prepared	1.5
(d) the date and season of the site investigation and the relevance of the season to the outcome of the assessment	2.2
(e) a description of the methodology adopted in preparing the report or carrying out the specialist process	2.1 and 2.2; Figure A
(f) the specific identified sensitivity of the site [study area] related to the activity and its associated structures and infrastructure	4.1, 4.5, 6.1: Figures 15 16, and 17: Tables 3 and 4
(g) an identification of any areas to be avoided, including buffers	N/A
(h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site [study area] including areas to be avoided, including buffers	Figures 15, 16 and 17
(i) a description of any assumptions made and any uncertainties or gaps in knowledge	1.6
(j) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment	6.0, 6.3 and 8.0; Tables 7 and 8
(k) any mitigation measures for inclusion in the EMPr	7.0
(l) any conditions for inclusion in the environmental authorisation	N/A
(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation	N/A
(n) (i) a reasoned opinion - as to whether the proposed activity or portions thereof should be authorised and	9.0
(n) (ii) – if the opinion is that the proposed activity or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan	7.0
(o) a description of any consultation process that was undertaken during the course of the preparing of the specialist report	N/A this work was carried out by a separate specialist and reference made to it – see Section 3.0
(p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	3.0
(q) any other information requested by the competent authority.	N/A

EXECUTIVE SUMMARY

Project Overview

Siyanda Chrome Smelting Company (Pty) Ltd ("SCSC" or "the Client") is a subsidiary of Siyanda Resources (Pty) Ltd ("Siyanda") and a sister company of Siyanda Chrome Investments (Pty) Ltd ("SCI"). Siyanda's focus is on the development and acquisition of mining and beneficiation projects, including management of these assets to ensure optimal performance. SCSC is considering the construction of a FeCr smelter to process the UG2 chrome concentrate from the plant at Union Section Mine as well as the plant at Amendelbult (the Project).

Project Location

The smelter is proposed on portion 3 of the farm Grootkuil 409 KQ located approximately 8 km north-west of Northam in the Thabazimbi Local Municipality, Limpopo Province (the project site). The study area comprises the 'zone of potential influence' (the area defined as a 12km radius about the centre point of the project site beyond which the visual impact of the most visible features will be insignificant). It was within this area that visual impacts of the Project were assessed.

Objective of the Specialist Study

The aim of the study was to determine the aesthetic value of the visual resource (receiving environment) and to rate the project's visual impact on landscape and visual receptors associated with:

- The proposed SCSC smelter project;
- And the cumulative assessment of the project along with adjacent mines.

Findings

The existing visual condition of the landscape that may be affected by the Project has been described. The study area's scenic quality has been rated. The North-western sector of the study area is considered to have a high value; the plains in the north-eastern and western sectors a moderate value; and the mining and power infrastructure in the south-central areas (the Project site is located adjacent to these areas) and the urban areas in the eastern sector are considered to have a low scenic quality value. Alternatives for the project infrastructure area, the powerline and the access road where assessed and preferred options proposed, which were then assessed in terms of their potential visual impact. All public concerns around visual impact issues have been addressed in the report.

It has been determined that during the Construction and Decommissioning Phases the proposed Project will exert a moderate negative impact on the visual and aesthetic environment. The Operational Phase is predicted to exert a high impact (both day and night) without mitigation and a moderate impact with effective mitigation when compared against the baseline. The impact is primarily due to the scale, size and form of the project facilities and the effects of night lighting and the two flares.

Mitigation measures are feasible and can reduce the impact to low at closure, assuming that all infrastructure is removed and rehabilitation of the site is implemented effectively. Should infrastructure not be removed the predicted impact would be remain high.

The Project should be approved provided that the mitigation / management measures are effectively implemented and managed in the long term.

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1.0 INTRODUCTION

1.1 Project Overview

Siyanda Chrome Smelting Company (Pty) Ltd ("SCSC" or "the Client") is a subsidiary of Siyanda Resources (Pty) Ltd ("Siyanda") and a sister company of Siyanda Chrome Investments (Pty) Ltd ("SCI"). Siyanda's focus is on the development and acquisition of mining and beneficiation projects, including management of these assets to ensure optimal performance. SCSC is considering the construction of a FeCr smelter to process the UG2 chrome concentrate from the plant at Union Section Mine as well as the plant at Amendelbult.

1.2 Project Location

The smelter is proposed on portion 3 of the farm Grootkuil 409 KQ located approximately 8 km north-west of Northam in the Thabazimbi Local Municipality, Limpopo Province. Refer to Figure 1. It should be noted that SCSC has purchased portion 3 of the farm Grootkuil 409 KQ, and is hereafter referred to as the SCSC property. For the purposes of this report the *study area* refers to the 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 12 km radius surrounding the proposed project footprint.

The Siyanda Chrome Smelter *site* refers to a portion 3 of the farm Grootkuil 409 KQ and the project *footprint* refers to the actual footprint of the all project elements including the powerline and access road.

1.3 Project Description

In broad terms the proposed Siyanda ferrochrome smelter project will comprise:

- a railway siding;
- a raw materials offloading area;
- two 70 MW DC furnaces;
- crushing and screening plant;
- slag dump;
- baghouse slurry dam
- related facilities such as material stockpiles, workshops, stores and various support infrastructure;
- And services including power line (275 kV) and pipelines.

Refer to Figures 2 and 2a for its layout and images of the various project components.

1.3.1 Site Layout Alternatives

Figure 1a illustrates the proposed site layout alternatives for the project infrastructure area, the preferred power line route and the preferred access road.

Project Infrastructure Area

The two alternatives comprise Option 2, between the Northam main road and the project area and Option 1 immediately south of Option 2 within the project area. Option 1 is the preferred project infrastructure area from a visual impact assessment perspective as it consolidates the required disturbed area with the adjacent Union Section Mine and Swartklip mine village infrastructure, which occur to the west and south of the project area.

Option 2 is removed from the existing mining infrastructure and is located closer to the main road and the Kilkenny farmstead (sensitive viewing areas). Whereas Option 2 would be highly visible from these areas Option 1 would be mostly screened from these viewing points due to the extent of existing savannah vegetation between the viewers and the site.

Powerline

Option 1 is the preferred option from a visual impact point of view as it is routed along an existing power servitude and on the boundary between two farm portions. This would minimize the footprint of the required servitude and reduce the amount of vegetation to be removed. Option 2 cuts diagonally across a 'greenfields' site (the Union Section Mine game farm) and would require the removal of vegetation along the full extent of the proposed route. From a visual perspective it is important to limit the amount of vegetation being removed as the existing savannah would act as an effective screen and buffer to future views of the proposed smelter.

Access Road

Option 2 is the preferred option as it is approximately one third the length of Option 1 and is routed to the immediate west of the existing rail line which will be servicing the project. This consolidates the potential visual impact to a smaller area than Option 1 which is routed along the boundary between the the SCSC property and a game farm property, and lodges, to its immediate south (although it should be noted that the game farm is owned by the Union Section Mine). A third option is also proposed which has been partially built. It however is routed immediately adjacent a homestead and the impact of vehicles travelling along the road in the day and at night would have a materially different impact to either Option 1 or 2. The impact would be significant and therefore is not recommended. Refer to Figures 1A and 2 for the location of these options.

1.4 Aim of the Visual Impact Study

The aim of the study is to determine the aesthetic value of the visual resource (receiving environment) and to rate the project's visual impact on landscape and visual receptors associated with:

- The proposed SCSC smelter project;

- And the cumulative assessment of the project along with adjacent mines.

1.5 Terms and Reference

A specialist study is required to assess the visual impacts arising from the SCSC project (Project) based on the general requirements for a comprehensive Visual Impact Assessment (VIA). The following terms of reference was established:

- Conduct a field survey of the proposed project area and photograph the area from sensitive viewing points about the site;
- Assess the impact of the proposed Project and its cumulative effect along with adjacent mines;
- Rate the project specific impacts; and
- Have input, together with SLR, other specialists and the technical project team, into project management measures.

1.6 Assumptions / Limitations

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

- The study uses the worst case scenario in predicting impacts (day time and night time);
- The viewshed analyses considered only the topography of the area and did not factor in any features such as existing trees and other obstacles. This means that the spatial patterns generated in the analyses are inclined towards the worst case-scenario rather than the actual situation;
- The extent of the study area is determined by the zone of potential influence, which in this study relates to a radius about the project site of 12km. At 12km and beyond the Project would recede into background views.
- The computer model for the 3D depiction of the project components is based on CAD information provided to NLA by the project engineers.
- Only the alternatives provided to the Specialist by the EAP were considered for the plant and associated infrastructure, access road and the 275 kV powerline.

2. APPROACH & METHODOLOGY

2.1 Approach

The assessment of likely effects on a landscape resource and on visual amenity is complex, since it is determined through a combination of quantitative and qualitative evaluations [The Landscape Institute

with the Institute of Environmental Management and Assessment (2002)]. When assessing visual impact the worst-case scenario is considered and in this regard, a precautionary/conservative approach has been adopted. Landscape and visual assessments are separate, although linked, procedures. The approach is common to project specific and cumulative scenarios.

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 particular view or scene). The focus of the report is on the latter.

2.1.1 The Visual Resource

Landscape character, landscape quality (Warnock, S. & Brown, N. 1998) and "sense of place" (Lynch, K. 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. The criteria given in Appendix B are used to assess landscape quality, sense of place and ultimately to determine the aesthetic value and sensitivity of the study area to physical intrusion.

2.1.2 Landscape Impact and visual intrusion

The landscape impact of a proposed intervention is measured as the change to the fabric, character and quality of the landscape caused by the physical presence of the new development. Identifying and describing the nature and intensity 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 scene in as realistic a manner as possible (Van Dortmont in Lange 1994). 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 intervention in its final form within the context of the landscape setting. The resultant change to the landscape can then be observed and an assessment of visual intrusion made i.e. the extent of contrast of the proposed development with the baseline visual environment.

2.1.3 Visual Impact

Visual impacts are a subset of landscape impacts. 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 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 in 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 within a localized area (the site and its immediate surrounds).

2.1.4 Intensity of Visual Impact

The *intensity* (or *severity* – these two words are interchangeable and mean the same thing) of visual impact is determined using visual intrusion, visibility and visual exposure criteria qualified by the sensitivity of viewers (visual receptors) towards the proposed development. The severity of 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.

For a detailed description of the methodology used in this study, refer to Appendices B and C. The diagram, Visual Impact Process, in Figure A below graphically illustrates the assessment process.

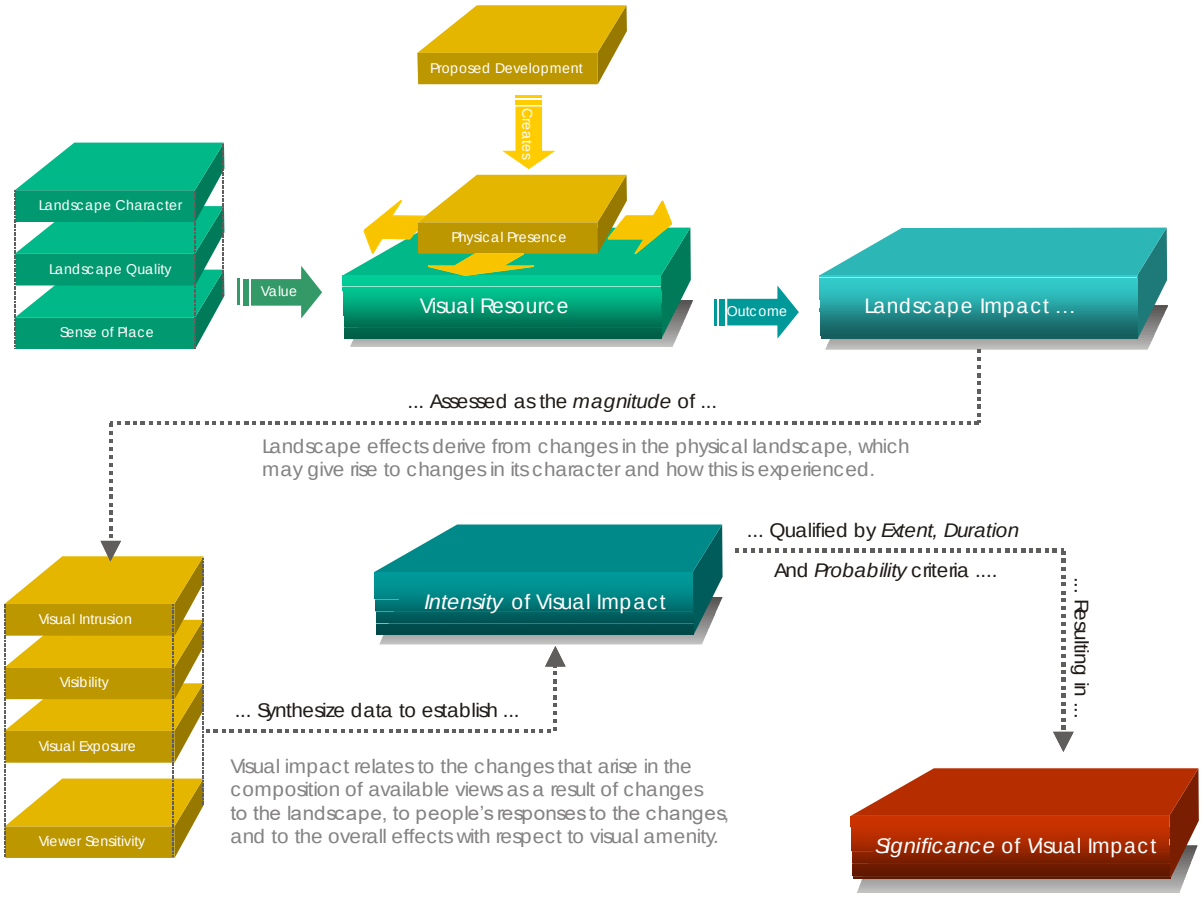

Figure A: Visual Impact Process

2.1.5 Significance of Visual Impact

The significance of impact is determined using a ranking scale, based on terminology from the Department of Environmental Affairs and Tourism's (DEAT) guideline document on EIA Regulations, April 1998 and the methodology referred to Appendix D.

2.2 Methodology

To evaluate the impacts of the SCSC project, the inherent scenic value of the landscape (visual resource) was first determined. Data collected during the site visit allowed for a description and valuation of the receiving environment. The following method was used for the project:

- Site visit which took place on 24 and 25 June 2015 during the winter season. A site visit at this time of year (when there are less leaves on the trees) would constitute a worst case scenario in terms of potential visibility of the project components;

The study area was scrutinized to the extent that the receiving environment could be documented and adequately described and sensitive viewing areas visited (refer to Figure 3 for the location of these);

- Project components - the physical characteristics of the project components were described.
- General landscape characterization – Visual Resource (i.e. receiving environment) - was mapped using field survey data and observations of aerial photographs and other available data;
- Describe the quality and sensitivity of the landscape to intervention. Aesthetic appeal is described using recognized contemporary research in perceptual psychology as the basis.
- Describe the sense of place of the study area as to the uniqueness and distinctiveness of the landscape. The primary informant of these qualities is the spatial form and character of the natural landscape together with the man-made transformations associated with the historic / current use of the land.
- Illustrate, with basic simulations, the proposed project overlaid onto panoramas of the landscape, as seen from sensitive land based viewing points to give the reviewer an idea of the scale and location of the SCSC project within its landscape context.
- Determine visual intrusion (contrast of the proposed project against the visual baseline) using the panoramic simulations.
- Determine the visibility of the proposed project by conducting a series of detailed viewshed analyses.
- Rate the impact on the visual environment of the proposed SCSC project based on accepted international criteria the methods described in Appendices B and C.
- Suggest management measures that could mitigate the negative impacts of the SCSC project.

3.0 VISUAL ISSUES

Typical issues associated with industrial projects of this nature 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 at night?

The following specific issues related to visual impacts were raised by regulatory Authorities and I&APs during the scoping phase and are addressed as terms of reference in this document.

Table 1: Summary of Visual Issues Raised by Regulatory Authorities and I&AP's

Comment	Raised by whom and when:	Response
People who live 28 kms away from the smelter will be able to see it.	Comment raised by Adri Young at scoping meeting, Northam Town Hall, 23 July 2015	In theory this would only be possible if viewed from a high elevation. The smelter is located within a savannah landscape which would effectively block most views to the site as these would be from observation points at ground level. Also, at this distance the smelter complex would be barely visible in the panorama due to its small scale relative to the expanse of the view. The simulations in Figures 25 (day time) and 26 (night time) illustrate how the complex is already being 'absorbed' into the landscape at a distance of 7 km and at an elevated viewing point. Refer also to Sections 6.2.1 and 6.2.3
Visually, the area is already destroyed by the existing mines. Occasionally when taking my clients on game drives I am asked to explain what the infrastructure and lights are in the landscape of the farms	Comment raised by Derik de Jager at scoping meeting, Northam Town Hall, 23 July 2015	The scenic beauty of the study area is already compromised due to exiting mines (refer also to Sections 4.3 and 4.4 as well as Table 3 and Figure 15). I unmitigated the effect of night lights will result in a high impact (refer to Section 9.0)
It has been a very dry year as the rain has been scarce and	Comments raised by Sandy McGill, Mr and Mrs Schoeman at	Refer to Section 4.0 which discusses and rates the scenic

this has resulted in the area looking very barren however it should be noted that it is an extremely beautiful/scenic area during the wet season.	the scoping meeting, Swartklip Rec Centre, 21 July 2015	beauty of the study area, which varies from low (existing mining areas) to high (north-western section of the study area where a series of natural hills occur.
It is common knowledge that a Ferrochrome Smelter is associated with, amongst others: strong lights burning 24 hours. With a chimney 65 m in height, the plant will be visible from all parts of our client's property.	Comment raised by Ernst Burger (on behalf of the Schoeman family, the beneficiaries of a Testamentary Trust) – draft scoping report comments, received on the 04 May 2016	The stack is designed to be 55m in height. This will be visible from extensive areas of the study area (refer to Section 6.2 and Figures 1- to 22). At night the flare will be visible. Lights will also be visible from higher elevations as indicated in Figure 26 (view from a hill on the Oppikoppi property). Refer also to Section 6.2.4. Management measures are proposed to limit the effect of night lights as well as the flare. Refer to Section 7.5.
The use of vehicles on this road will not only be disturbing during the day with many impacts, but also at night with the use of headlights. We will be affected by this	Comment by Vernon Koekemoer at focused meeting, on Johan Young's property (Kameelhoek ptn 9), 26 May 2016	Access road Option 3 will cause disturbance during the day and at night and will have a significant impact that will be greater than Options 1 or 2. We therefore do not support this option. Refer also to Section 1.3.1
Does the proposed smelter look anything like the Hernic smelter in Brits?	Comments raised by Sandy McGill, Mr and Mrs Schoeman at the scoping meeting, Swartklip Rec Centre, 21 July 2015	Dimensionally, in terms of the size of the furnace buildings and associated infrastructure, it would be similar. The visual impact will be assessed in a specialist study, the terms of reference for which are included in Section 8.3.10 of the scoping report.

4.0 VISUAL RESOURCE

4.1 Landscape Character

Landscape character types are landscape units refined from the regional physiographic and cultural data derived from 1:50 000 maps, aerial photographs and information gathered during the site visit. Dominant landform / and use features (e.g., hills, rolling plains, valleys and urban areas) of similar physiographic and visual characteristics, typically define landscape character types and their relative sensitivity. Refer to the diagram in Figure 15 which spatially maps these and the panoramas in Figures 4 to 14 that indicate the general characteristics of the baseline landscape.

4.1.1 Mines

A number of mining operations lie in an arc along the flat plains to the south-west and north north-west of the project site (See Figure 1 – Regional Map). However, these are at least 20km from the site and do not influence the character of the study area. Closer, and to the immediate south-west of the site, is the Union Section Mine and associated infrastructure (Figures 5, 11 and 14); which physically dominates these areas and determines the landscape character of the south-west quadrant of the study area. East of the site, approximately 8km away, is the Northam mine. This landscape type is of low visual quality and sensitivity.

4.1.2 Agriculture and cattle and game farming

The region is generally known for its game and cattle farming and much of the study area comprises farms that have turned to this use and away from cultivated lands. The project site is situated on previously cultivated lands and the farm to its immediate north is also under cultivation. The panoramas in Figures 11 and 13 give an indication of the nature of the landscape and the map in Figure 3 illustrates the spatial distribution of cultivated lands vs the remaining savannah, which is used for game and cattle farming. These landscape types, which mostly occur in the northern half of the study area are of moderate visual quality and sensitivity but where associated with the hills, the value would increase to high.

4.1.3 Communities and farmsteads

The town of Northam is the dominant urban area within the study area. It is located directly east of the site about 8km away. The second largest residential/township is the mining village of Swartklip immediate to the south-west of the project site (Figure 12). Further south of the site are a number of settlements. Sefkile (Figure 6) and Mononono are directly south and Mmantserre (approximately 8km) and Mmopyane is located approximately 9km to the south-west of the site.

Kilkenny/Bierspruit residential area is located to the west of the site (approximately 4km) and in the far east of the study area and south of Northam are a series of small holding residential developments known as the Wildebeeslaagte development.

A number of farmsteads occur dotted around the study area, the closest being the 'Tiramogo lodge' (on portion 4 of Grootkuil) on the Union Section property, approximately 3,5km south-east from the project site and the farmhouse (Kilkenny – Figure 10) (located on portion 2 of the farm Grootkuil) approximately 2,0km north-east of the site. These land uses are considered to be of moderate to low quality and sensitivity, depending of the degraded nature of the land associated with the township developments.

4.1.4 Tourism

Generally, tourism (hunting and scenery) is associated with the game farms that occur in the northern section of the study area (north of the Northam main road and railway line). The most prominent tourism activity in the area is the Oppikoppi Lodge (Figure 14 illustrates a view from the lodge site), located 6,5km north-west of the site. This is the farm associated with the Oppikoppi Music Festival, which attracts thousands of guests on an annual basis. This land use would have high visual quality and sensitivity values when associated with the hilly terrain in the north-western sector of the study area.

4.1.5 Roads, rail and power infrastructure

The main road through the study area is the R510 which runs north south through Northam. A tarred road connecting Kilkenny to Northam (informally known as the Dwallboom road) is routed north of the project area (Figures 7, 8, 9, 13 and 14). A railway line parallels the road (Figures 7, 8 and 14). There is also rail infrastructure associated with the Union Section Mine. An extension of this line is planned into the project site. View 17 in Figure 12 is a photo of the railway line where it passes along the eastern edge of the Swartklip mine village.

The central and southern sections of the study area are dominated by power infrastructure supplying the Union Section Mine from the Spitzkop sub-station approximately 2km west of Northam. The sub-station distributes power to all areas of the study area as is illustrated by the power lines in Figures 4, 5, 6, 7 and 8. The proposed 275kV powerline needed to supply the smelter, will originate at the sub-station. These landscape types are considered to be of low visual quality and sensitivity.

4.2 Landscape Quality / Visual Resource Value

Natural landscapes with greater diversity or containing "distinctive" features are classified as having a higher scenic value than landscapes with low diversity, few distinctive features, or more "common" elements. Generally, the greater the diversity of form, line, texture, and colour in a natural landscape unit or area, the greater the potential for high scenic value (refer also to Appendix A for further elaboration). Scenic quality classifications are:

- High - distinctive landscape and strong sense of place;
- Moderate - common landscape;
- Low - minimal landscape and weak sense of place.

4.3 Visual Resource

The study area landscape, as described in Section 4.1, has many redeeming aesthetic features primarily due to its physical setting, which comprises flat plains with a backdrop of wooded hills in its northern section (View 5 Figure 6). It is located in the Dwaalboom Thornveld (Mucina & Rutherford, 2006), which comprises widely distributed flat plains. The vegetation is dominated by various Acacia species. he Spitzkop koppie, around which the settlement of Sefikile is located, protrudes above the plain and is a geographic focal point in the study area (View 6 Figure 6 and View 21 Figure 14).

The study area, which, in its original natural state would have been considered of high visual value, has in the past, and currently is experiencing a decline in its landscape character value due to the cumulative impact of mining operations and settlements and community activities in the area. The panoramas in Figures 4 to 14 are typical of the various characteristics of the study areas landscape.

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

Prior to mining activities the greater area projected a strong sense of place with great aesthetic value and there still remain areas where a strong sense of place is experienced. This value would also relate to the night time experience of ‘remoteness’ or wilderness which lacked many light sources (Figure 22 illustrates the potential sources of light pollution). However, the advent of mining, settlement and utility

activities has eroded the experience and today the sense of place is being accumulatively impacted upon by cultural activities and the steady growth of informal homesteads and communities. The northern section of the study area still exhibits a strong natural sense of place and this is where a number of tourism activities (hunting and game viewing) are found.

4.5 Landscape Quality and Aesthetic Value Rating

It is difficult to separate out the aesthetic value of a landscape into its component parts as it is always viewed as a composite of them, yet an attempt is made here to also illustrate the sensitivity of the various landscape types to visual intrusion.

Whilst the 'untouched' northern hills and their side slopes are considered to have a high visual quality, the plains and streams flowing to the north-west tend to have a *moderate* rating due to the general flatness of the area (View 1 Figure and View 21 Figure 14). The lower rating is as a consequence of the 'intrusive' nature of man-made elements (mining activities, powerlines and railway lines), which become particularly evident the closer one gets to the project site. The lowest rated land type, and least sensitive to visual intrusion, are the mining, railway and power utility activities (View 2 Figure 4, Views 3 and 4 Figure 5, Views 7 and 8 Figure 7 and Views 15 and 15 Figure 11). Using the criteria and values defined in Appendix A along with the discussion in the previous sections, the overall visual quality of the study area is considered to be *moderate* to *high* in the northern sector (north of the railway line and Northam / Kilkenny Road) and *moderate* to *low* in the southern sector where the proposed project will be developed. Refer also to Figure 15, which illustrates the various landscape types and rates their relative aesthetic value and landscape sensitivity.

The proposed smelter is located in the southern less sensitive landscape where the impact at night of these activities is also evident as they tend to stand out against the otherwise relatively dark night sky. Refer also to Figure 22 which is an indicative map of the effects of light pollution within the study area and View 21 Figure 26, which illustrates this when viewed from a hill at the Oppikoppi farm north-west of the project site.

In determining the aesthetic value and sensitivity of a 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.

Table 3: Value of Visual Resource (refer to Figure 15)

(?The Landscape Institute with the Institute of Environmental Management and Assessment (2002))

High (Distinctive features)	**Moderate** (Common features)	**Low** (Weak features)
The **North-western sector** of the study area is considered to have a *high* value because it is a:	The plains in the **north-eastern and western sectors** of the study area are considered to have a *moderate* value because they are:	The **mining and power infrastructure** in the south-central areas of the study and the urban areas in the eastern sector are considered to have a *low* value because they are:
Landscape that exhibits a very positive character with valued features that combine to give the experience of unity, richness and harmony. It is a landscape that may be considered to 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.	Landscape that exhibits some positive character (savannah covered koppies) but which has evidence of alteration/degradation/'erosion' of features resulting in areas of a 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.	Landscape generally negative in character with few, if any, valued features. Alteration/degradation and 'erosion' of features is prevalent. Scope for positive enhancement would occur.

5.0 LANDSCAPE IMPACT

The *landscape impact* (i.e. the change to the fabric and character of the landscape caused by the physical presence of the intervention) of the SCSC project is predicted to be *moderate* due to effect of the project's activities as described in Section 1.3 on the site. Although these activities are relatively extensive, they will be experienced within close proximity of other mining activities which have already impacted negatively on the original landscape and therefore the contrast between the existing activities and the proposed SCSC project will not appear as 'out of place' as if the project had been located in a greenfield area. The anticipated negative landscape impact will therefore be mostly of a cumulative nature.

As stated in the approach section, the physical change to the landscape at the project site must be understood in terms of its visibility (impact on sensitive views) and its effect on the visual aesthetics of the study area (intensity of impact on the baseline resource). The following sections discuss the effect that the CSCS project could have on the visual and aesthetic environment.

6.0 VISUAL IMPACT

Visual impacts will be caused by activities and infrastructure in all project phases i.e. construction, operational, decommissioning and closure. The activities associated with the smelter, will be visible

(day and night), to varying degrees from varying distances around the project site (refer to Figures 2 and 2a). During construction of infrastructure within the project site this visibility will be influenced by the increase in activities, removal of vegetation, exposure of earth and the construction of the tall elements such as the furnaces and stacks. During operation/decommissioning/closure phases the visual qualities of the project site will be influenced by the success and effectiveness of rehabilitation measures.

The *intensity* of visual impact is determined using visibility, visual intrusion, visual exposure and viewer sensitivity criteria. When the *intensity* of impact is qualified with spatial, duration and probability criteria the significance of the impact can be predicted. Consequence is a function of intensity, spatial extent and duration and significance is the function of consequence and probability. Refer also to Appendix C and Figure A.

6.1 Potential Receptors

Areas and sites considered potentially sensitive to project activities in the study area are, tourist facilities, public roads and settlement areas (residential areas). Figure 16 identifies the these places relative to the project site and rates receptor sensitivity (worst case scenario) in terms of high, medium and low sensitivity. Typically, high receptor sensitivity, includes people using outdoor recreational/tourism facilities, public rights of way and residents of housing areas, whose intention or interest may be focused on the landscape; medium sensitivity relates to people engaged in outdoor sport or recreation (other than appreciation of the landscape i.e. hunting); and low sensitivity would 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). Refer also to Appendix B.

I&APs have raised the issue of potential visual impacts of proposed project on their properties as well as game farming and tourism as they are of the opinion that 'no one wants to visit a game farm next to a large smelter' (Comments raised by Sandy McGill, Mr and Mrs Schoeman at the scoping meeting, Swartklip Rec Centre, 21 July 2015). Most public views to the SCSC project would be experienced by people traveling along the Northam Kilkenny road (potential middleground views of the project site – refer also to Figures 7, 8, 9, 10 and 13) or visiting the nearby settlements (background views), Swartklip Mine Village (foreground views – Figures 12 and 13) and the Kilkenny road (middleground views – Figure 13) and people currently working at the Union Section Mine (middleground views – Figure 11). View 21 in Figure 14, illustrates the only elevated public view to the project site. This is from a viewing platform at the Oppikoppi farm. However, most public viewing points in the study area are from relatively low vantage points as can be ascertained from the panoramas. The combination of flat topography and treed savannah would therefore block most views to the proposed project activities.

Private views from nearby farmsteads/homesteads (north west, north and east of the site) are mostly blocked by vegetation as indicated in View 14 Figure 10, which is taken from the Kilkenny farm immediately north-east of the project site or are distant (View 7 Figure 7) and blocked by vegetation, as in the small holding development (Wildebeestlaagte) south-west of Northam. The Phufane Game Lodge is located approximately 5,5km east of the site and adjacent an existing powerline which runs along its western boundary. However, the plant would not be visible from this location as it would be blocked by foreground and middleground vegetation. The proposed 275kV power line is routed along the existing power line and would be visible from this property.

The Tiramogo Lodge, owned by Union Section Mine, is 3 km directly east of the project site. Although project activities would theoretically be visible from this location, as indicated in the viewshed analyses; the existing tree cover and the fact that the terrain between the lodge and the site is relatively flat, means that most views to the site will be blocked other that those to the very highest elements (i.e. furnace stack).

From elevated positions (such as the Oppikoppi site), a small koppie north of Sefikile village and from the Union Section tailings dams, views to the project site are open and unobstructed, but these vantage points are not accessible to the general public. And the Oppikoppi site is mostly visited for its famous music festival (held once a year), where the attention is directed towards the performing bands and not necessarily the general scenery or landscape (refer to View 5 Figure 6, Views 15 and 16 Figure 11 and View 21 Figure 14).

Night time views towards the project site would be concentration around high post top lights and the tall stacks with their respective flares. These would protrude above the vegetative layer in middleground to distant views (i.e. when there is no immediate foreground vegetation). However these would be seen within the context of existing light pollution sources, as illustrated in Figure 22.

6.2 Visibility, Visual Exposure and Visual Intrusion

The ‘zone of potential influence’ was established at 12.0km. Over 12.0km the impact of the proposed SCSC project and associated activities would have reduced due to the diminishing effect of distance and atmospheric conditions (haze) on visibility. Also, at this distance the project’s features would recede into the background of views, thus being ‘absorbed’ into the landscape setting. Visual exposure is determined by qualifying the view with a distance rating to indicate the degree of intrusion and visual acuity.

At night the above would also be true, however, the project’s light sources would tend to ‘blend’ with the existing light sources generated by current, adjacent, mining operations (refer also to Figure 22). Cumulatively, the lights and gas flares associated with the project and current operations would stand

out against a relatively dark background (see also night-time View 21 Figure 26) and would not be 'absorbed' as easily into the background as would be project activities in a day time view. Therefore the cumulative visual impact would be more severe during night time.

6.2.1 Visibility

In determining the visibility of the SCSC project the heights of the various project components were used. Offsets starting at 5m above ground level (i.e. most project components would be visible) through to 55m (only the stacks would be visible) were used to generate the viewsheds. The offset for the plant and slag dump was 30m. These are evident in Figures 18, 19, 20 and 21. It can be seen from the patterns generated by the viewsheds that the proposed project operations would be highly visible within the study area and that sensitive viewing areas would be impacted. As would be expected, the *potential* visibility of the site increases as the offset is raised. Thus the viewshed depicting the highest elements (the stacks) is the most extensive as illustrated in Figure 21.

However, it must be understood that these patterns represent *potential* viewing sites and illustrate the absolute worst case scenario i.e. the landscape without vegetation. It is therefore imperative that the viewsheds be understood in terms of the site visit findings as illustrated in the panoramas in Figures 4 to 14, the simulations in Figures 23, 24 and 25 and the fact that the study area is very flat. It is also located within a savannah landscape which would effectively block most views to the site as these would be from observation points at ground level. Visibility of the project components, including the 275kV powerlines from sensitive viewing areas is therefore considered *low.*

6.2.2 Visual Exposure and Sensitivity

Table 4 below indicates the potential exposure of the various sensitive viewing areas to the project site. 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. Again it must be realized that although the exposure ratings given below would contribute to the intensity of impact, the effect of vegetation would completely or partially block most of these views. And therefore exposure, generally, would be considered to be moderate to low. Also, the residences in Swartklip Mine village are orientated away from the project site. Table 4 below identifies sensitive receptor areas within the study area.

Table 4: Sensitive Receptors

	Foreground view of the plant site i.e.0 – 1,5km from Project Site – High exposure	Middleground view of the plant site i.e. 1,5 to 5,0km from Project Site – moderate exposure	Background view of the plant site i.e. 5,0km to 12,0km from Project Site – low exposure
Northern section of Swartklip Mine village	**X**		
South eastern section of Swartklip Mine Village, Kilkenny/Bierspruit residential area, Kilkenny farmstead (located north of the project site on portion 2 of Grootkuil) and the Tiramogo lodge on the Unions Section property (south of the SCSC property) and sections of the Northam/Kilkenny road in a north-west to north-east arc above the site		**X**	
Mmantserre, Sefikele, Northam, small holdings south-west and south-east of Northam			**X**

Whilst most sensitive viewing areas would not experience direct views to the site, the very notion of the SCSC project being in close proximity to residential and some tourist properties, makes the sensitivity to the project moderate to high as is borne out in the comments received from the public on visual issues and as captured in Table 1.

6.2.3 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?

The simulations in Figures 23 to 25 illustrate the effect that the SCSC project will have on the visual landscape within its context and when viewed from a variety of sensitive viewing locations about the site. The simulations illustrate the project components at their completed elevations i.e. the worst case scenario. It is evident, when one considers the before (current situation) and after scenarios, that the project will have minimal visual intrusion effects on sensitive viewing areas that are not in elevated viewing position. View 11 illustrates a slightly elevated view (from the railway line) to the site from a distance of 4,0km. Here only the higher project components protrude above the tree line and the project generally fades into the landscape scene. The 275kV powerlines are barely visible in this view. The simulation (view 17) in Figure 24, shows the project from a distance of 1,5km from the viewer and illustrates the screening effects of vegetation in typical close up views from the Swarklip Mine village area.

The most exposed public view is from elevated positions on the Oppikoppi farm. The project components are seen in the distance (6,5km from the viewer) and stand out above the surrounding

landscape. However, the intrusive nature of the smelter from this perspective is reduced due to its proximity to existing mining activities south of the site and the fact that it would be viewed in the distant middleground of the view and that the tallest elements (stacks) barely break the horizon line.

At night, however, the movement of the flares above the stacks and tall lighting structures, would draw the viewers' attention and most likely be considered a nuisance. Again, the lights associated with the SCSC project would be seen within the context of other light pollution emanating from Swartklip Mine village, Kilkenny/Bierspruit, Sefikile, Union Section Mine and Northam as illustrated in Figure 22 and the night-time simulation in Figure 26. Table 3 below consolidates and rates (highlighted column) the potential intrusive nature of the project assuming the worst case scenario (i.e. elevated viewing location and night time views).

Table 5: Visual Intrusion

High	Moderate	Low	Positive
The proposed SCSC Project would have a substantial negative effect on the visual quality (sense of place) of the landscape relative to the existing operations baseline landscape because it would: - Contrast with the patterns or elements that define the structure of the landscape;	**The proposed SCSC project would have a negative effect on sensitive viewing areas described in Table 4 and on the visual quality of the landscape relative to the existing operations because it would:** **- Have a moderate negative effect on the visual quality (sense of place) of the landscape;** **- Contrast moderately with the current patterns or elements that define the structure of the landscape;** **- Be partially compatible with land use (mining), settlement or enclosure patterns of the general area;**	The proposed SCSC project would have a minimal effect on the visual quality (sense of place) of the landscape; - Contrasts minimally with the patterns or cultural elements that define the structure of the landscape; - Is mostly compatible with land use, settlement or enclosure patterns;	The proposed SCSC project would have a beneficial effect on the visual quality (sense of place) of the landscape; - Enhance the patterns or elements that define the structure of the landscape; - Is compatible with land use, settlement or enclosure patterns.
RESULT: Notable change in landscape characteristics over an extensive area and 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:* Imperceptible change resulting in a minor change to key views.	*RESULT:* Positive change in key views.

6.2.4 Night Lighting

The impact of lights at night is a very sensitive issue associated with mines and industrial sites. One of the reasons that tourists go to the study area (northern sections of the study area), is to get away from

the bright lights of the city and to enjoy the darkness of the night sky and the perceived “naturalness” of the landscape. The impact of night lighting is major a concern for the duration of the project (operational phase). At closure all lights associated with the project would be removed.

The negative effect of night lighting against a relatively dark sky would be particularly annoying to tourists and residents visiting the study area and for which interim (i.e. during operations) management measures should be implemented to limit the spillage of light beyond the project’s site boundaries. This however would not be possible for the flares. The study area does however have an increasing light pollution problem, as Northam, villages and the mines in the area expand. Figure 22 illustrates the current sources of light pollution within the study area as well as potential future sources associated with the smelter project (illustrated in a rose colour to differentiate it from existing sources). The combined effect of this is that the darkness of the night sky, that originally would have attracted tourism activities in the area, is slowly being compromised. The SCSC project will contribute to this effect and because the flares move (movement always attracts attention to it) and protrude above the horizon line, the effects of light pollution will be highly visible from the surrounding areas.

6.3 Intensity of Visual Impact

Referring to the discussion in Section 6 above and using the criteria listed in Table 3, the *intensity* of visual impact of the SCSC project is rated in Table 4 below. To assess the intensity of visual impact four main factors were 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. Rated moderate.
- Visibility: The area / points from which project components will be visible. Rated low.
- Visual exposure: Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion. Rated low to moderate.
- Sensitivity: Sensitivity of visual receptors to the proposed development. Considered moderate to high.

In synthesising the criteria used to establish the intensity of visual impact, 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 & The Landscape Institute (1996)).

The *intensity* of visual impact (highlighted column and based on the worst case scenario) is rated in Table 4 below. Refer also the intensity ranking table in Appendix C.

Table 6: Intensity of Visual Impact – Construction, operation and decommissioning phases

High	Moderate	Low	Negligible
There will be a major alteration to key elements / features / characteristics of the baseline (i.e. current baseline scenario) through the introduction of elements considered to be uncharacteristic when set within the attributes of aspects of the current and future receiving landscape. High scenic quality impacts would result as well as impacts on sensitive viewing areas.	**The SCSC project will cause a partial loss of or alteration to key elements / features / characteristics of the visual and landscape baseline.** **I.e. The introduction of project elements that may be prominent but may not necessarily be considered to be substantially uncharacteristic when set within the attributes of the receiving landscape.** **Moderate scenic quality impacts would result.**	Minor loss of or alteration to key elements / features / characteristics of the baseline. I.e. Pre-development landscape or view and / or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape. Low scenic quality impacts would result.	Very minor loss or alteration to key elements / features / characteristics of the baseline. I.e. Pre-development landscape or view and / or introduction of elements that are not uncharacteristic with the surrounding landscape – approximating the 'no change' situation. Negligible scenic quality impacts would result.

The intensity of impact is therefore predicted to be *moderate* (during the Construction, Operational and Decommission phases). The SCSC Project will:

- Have a moderate negative effect on the visual quality of the landscape. It is partially compatible with the patterns (mining) that define the study area's landscape - *the study area's visual resource is rated low (mining areas) to high (northern hills). The site occurs in a moderately rated area. The aesthetic appeal of the study area, which is already compromised by mining and settlement activities, will be further compromised with the presence of the SCSC project. Additional spot light and security lighting, as well as the flares would focus views towards the project site.*
- Have a moderate effect on key views – *From the tourist (Oppikoppi) and residential vantage areas north, south and west of the project. The proposed project activities would appear in the middle to background of most elevated views that already contain mining activities. In some instances (Swartklip Mine Village), the activities could appear foreground of views but due to the density of vegetation they would be mostly screened.*

At Closure the intensity is rated *very low* as there would be a minor loss of or alteration to key elements / features / characteristics of the baseline. The infrastructure will have been removed and the site rehabilitated.

7.0 MITIGATING MEASURES

In considering mitigating measures three rules are taken into account - 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.

General mitigation measures are proposed for all phases of the project as well as the specifics of mitigating the night-time impact of lights the flares. As the site is generally well screened by existing vegetation, the main aim would be to maintain and increase the amount of vegetation around the site and to seek a method of screening the stack flares, which arguably would cause the most significant visual impact. The following general actions are recommended to be implemented:

7.1 Planning and Site Development

With the construction of the smelter and its associated infrastructure, the minimum amount of existing vegetation and topsoil should be removed. Ensure, wherever possible, all natural vegetation is retained and incorporated into the site rehabilitation especially in line of sight from sensitive viewers to the south-west and north-east of the site. All top-soil that occurs within the proposed footprint of an activity must be removed and stockpiled for later use.

7.2 Earthworks

Earthworks should be executed in such a way that only the footprint and a small ‘construction buffer zone’ around the proposed activities is exposed. In all other areas, the natural occurring vegetation, more importantly the indigenous vegetation should be retained, especially along the periphery of the site. Dust suppression techniques should be in place at all times during all phases of the project, where required.

7.3 Landscaping and ecological approach

Vegetation could be introduced to complement existing vegetation and to screen nearby sensitive receptors as mentioned above. An ecological approach to rehabilitation and vegetative screening measures, as opposed to a horticultural approach to landscaping should be adopted. For example communities of indigenous plants enhance biodiversity and blend well with existing vegetation. 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.

7.4 Plant and Associated Infrastructure

Paint buildings and structures with colours that reflect and compliment the natural colours of the surrounding landscape. To further reduce the potential of glare, the external surfaces of buildings and structures should be articulated or textured to create interplay of light and shade.

7.5 Lighting

Light pollution is already a problem in the area and should be seriously and carefully considered and kept to a minimum wherever possible. Light pollution is largely the result of bad lighting design, which allows artificial light to shine outward and upward into the sky, where it's not wanted, instead of focusing the light downward, where it is needed. Ill designed lighting washes out the darkness of the night sky and radically alters the light levels in rural areas where light sources shine as 'beacons' against the dark sky and are generally not wanted.

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

- Install light fixtures that provide precisely directed illumination to reduce light "spillage" beyond the immediate surrounds 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 amount of light fixtures to the bare minimum, including security lighting.
- With the construction of the proposed mineralised waste facilities security lighting should only be used where absolutely necessary and carefully directed, preferably away from sensitive viewing areas.
- Wherever possible, lights should always be directed downwards so as to avoid illuminating the sky.
- Install a 'baffle' at the top of the stacks and around the flares to screen the flame form views.

8.0 SIGNIFICANCE OF IMPACT

The *intensity* of impact, rated in Table 6, is further qualified with *extent*, *duration* and *probability* criteria to determine the *significance* of the visual impact. Table 7 below summarises the *significance* of the visual impact during the Construction and Decommissioning Phases. Table 8 summarises the impact during operation and Table 9 rates the *significance* of impact at Closure. These results are based on the worst-case scenario when the impacts of all aspects of the SCSC project are taken together using the impact criteria in Appendix C.

The unmitigated impact for the Construction and Decommission Phases is rated *moderate* significance. This is when there will be major movement and activities on the site as the structures and infrastructure are being built or decommissioned. Mitigation will be difficult during this period and the rated impact would not drop significantly even with management measures.

During the Operation Phase the significance of unmitigated impact is rated *high*. With effective and ongoing management as described in Section 7, the mitigated impact (specifically for the night-time impacts) can be reduced to *moderate*.

At Closure, when all structures and associated infrastructure is removed and the site effectively managed and rehabilitated, the mitigated would be *low*. In the unmitigated scenario, if infrastructure is to remain, the impact would be rated high, as in the Operational phase.

Table 7: Summary of the cumulatively rated visual impact per phase of the project
CONSTRUCTION AND DECOMMISSIONING PHASES

Potential Visual Impact	ENVIRONMENTAL SIGNIFICANCE											
	Management: Unmitigated						Management: Mitigated					
	Int	D	SP	C	P	SIG	Int	D	SP	C	P	SIG
Alteration to the visual quality of the study area due to the physical presence, scale and size of the SCSC project and its associated infrastructure with a moderate impact on key tourist (Oppikoppi), nearby residential (Swartklip Mine Village) and other public road (Northam/Kilkenny road) views. Mitigation measures are feasible if they are effectively implemented and managed in the long term but due to the nature of the construction and decommission activities the impact will not be significantly reduced.	M	L	H	M	M	**M**	M	L	H	M	M	M

Note:

Int =	Intensity/Nature	D = Duration	Sp = Spatial Scale/Extent
C =	Consequence		
P =	Probability of Occurrence		
SIG =	Significance		

Table 8: Summary of the cumulatively rated visual impact per phase of the project

OPERATION PHASE (assuming duration is between 10 - 20 years)

Potential Visual Impact	ENVIRONMENTAL SIGNIFICANCE											
	Management: Unmitigated						Management: Mitigated					
	Int	D	SP	C	P	SIG	Int	D	SP	C	P	SIG
Alteration to the visual quality of the study area due to the physical presence, scale and size of the SCSC project and its associated infrastructure with a moderate impact on key tourist (Oppikoppi), nearby residential (Swartklip Mine Village) and other public road (Northam/Kilkenny road) views. Mitigation measures are feasible if they are effectively implemented and managed in the long term can reduce the visual impact of the project especially at night.	M	H	H	H	M	**H**	L	H	H	M	**L**	**M**

Note:

Int = Intensity/Nature D = Duration Sp = Spatial Scale/Extent

C = Consequence

P = Probability of Occurrence

SIG = Significance

Table 9: Summary of the cumulatively rated visual impact of the project

CLOSURE PHASE – the assumption here is that the project is deconstructed and rehabiliation is effective

Potential Visual Impact	ENVIRONMENTAL SIGNIFICANCE											
	Management: Unmitigated						Management: Mitigated					
	Int	D	SP	C	P	SIG	Int	D	SP	C	P	SIG
Alteration to the visual quality of the study area due to the physical presence, scale and size of the SCSC project and its associated infrastructure with a moderate impact on key tourist (Oppikoppi), nearby residential (Swartklip Mine Village) and other public road (Northam/Kilkenny road) views. Mitigation measures are feasible if they are effectively implemented and managed in the long term can reduce the visual impact of the project especially at night.	M	H	H	H	**H**	**H**	VL	VL	L	L	**VL**	**L**

Note:

Int = Intensity/Nature D = Duration Sp = Spatial Scale/Extent

C = Consequence

P = Probability of Occurrence

SIG = Significance

9.0 CONCLUSION

During the Construction and Decommissioning Phases the proposed Project will exert a MODERATE negative impact on the visual and aesthetic environment. The Operational Phase is predicted to exert a HIGH impact (both day and night) without mitigation and a MODERATE impact with effective mitigation when compared against the baseline primarily due to the scale, size and form of the project facilities and the effects of night lighting and the two flares.

Mitigation measures are feasible and can reduce the impact to LOW at closure, assuming that all infrastructure is removed and rehabilitation of the site is implemented effectively and managed in the long term. Should infrastructure not be removed the predicted impact would be HIGH.

The Project should be approved provided that the mitigation / management measures are effectively implemented and managed in the long term.

NLA

10.0 REFERENCES and BIBLIOGRAPHY

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APPENDIX A: DETERMINING A LANDSCAPE AND THE VALUE OF THE VISUAL RESOURCE

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

Landscape Elements and Character

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

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

Landscape Value – all encompassing (Aesthetic Value)

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

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

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

Sense of Place

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

Scenic Quality

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

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

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

Scenic Quality - Explanation of Rating Criteria:

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

Landform: Topography becomes more interesting as it gets steeper or more massive, or more severely or universally sculptured. Outstanding landforms may be monumental, as the Fish River or Blyde River Canyon, the Drakensberg or other mountain ranges, or they may be exceedingly artistic and subtle as certain badlands, 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, or massive rock outcrops, or severe surface variation or highly eroded formations including dune systems; or detail features dominant and exceptionally striking and intriguing such as inselbergs. **5**	Steep canyons and 'kloofs'; 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	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, or water. **5**	Some intensity or variety in colours and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**	Subtle colour variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. **5**	Adjacent scenery moderately enhances overall visual quality. **3**	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	One of a kind; or unusually memorable, or very rare within the region. Consistent chance for exceptional wildlife or wildflower viewing, etc. National and provincial parks and conservation areas. **5+**	Distinctive, though somewhat similar to others within the region. **3**	Interesting within its setting, but fairly 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:

Criteria to value a visual Resource
Aesthetic value is the emotional response derived from the experience of the environment with its particular 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.

Studies for perceptual psychology have shown human preference for landscapes with higher visual complexity, for instance scenes with water or topographic interest. On the basis of 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 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.

And conversely, it would be **low** where:

- Limited patterns of grasslands and trees occur;
- Natural landscape decreases and man-made landscape increases;
- And where land use compatibility decreases (after Crawford 1994).

Value of Visual Resource – expressed as Scenic Quality

(After The Landscape Institute with the Institute of Environmental Management and Assessment (2002))

High	Moderate	Low
Areas that exhibit a very positive character with valued features that combine to give the experience of unity, richness and harmony. These are landscapes that may be considered to 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 B: METHOD FOR DETERMINING THE INTENSITY OF LANDSCAPE AND VISUAL IMPACT

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

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

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

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

Landscape Impact

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

Visual Impact

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

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

Visual Intrusion:

- The nature of intrusion or contrast (physical characteristics) of a project component on the visual quality of the surrounding environment and its compatibility/discord with the landscape and surrounding land use.

Visibility:

- The area / points from which project components will be visible.

Visual exposure:

- Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion.

Sensitivity:

- Sensitivity of visual receptors to the proposed development

Visual Intrusion / contrast

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

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

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

Does the physical development concept have a negative, positive or neutral effect on the quality of the landscape?

Does the development enhance or contrast with the patterns or elements that define the structure of the landscape?

Does the design of the project enhance and promote cultural continuity or does it disrupt it?

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

Visual Intrusion

High	Moderate	Low	Positive

If the project: - Has a substantial negative effect on the visual quality of the landscape; - Contrasts dramatically with the patterns or elements that define the structure of the landscape; - Contrasts dramatically with land use, settlement or enclosure patterns; - Is unable to be 'absorbed' into the landscape.	If the project: - Has a moderate negative effect on the visual quality of the landscape; - Contrasts moderately with the patterns or elements that define the structure of the landscape; - Is partially compatible with land use, settlement or enclosure patterns. - Is partially 'absorbed' into the landscape.	If the project: - Has a minimal effect on the visual quality of the landscape; - Contrasts minimally with the patterns or elements that define the structure of the landscape; - Is mostly compatible with land use, settlement or enclosure patterns. - Is 'absorbed' into the landscape.	If the project: - Has a beneficial effect on the visual quality of the landscape; - Enhances the patterns or elements that define the structure of the landscape; - Is compatible with land use, settlement or enclosure patterns.
Result Notable change in landscape characteristics over an extensive area and/or intensive change over a localized area resulting in major changes in key views.	*Result* Moderate change in landscape characteristics over localized area resulting in a moderate change to key views.	*Result* Imperceptible change resulting in a minor change to key views.	*Result* Positive change in key views.

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

Visibility

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

Visibility

High	Moderate	Low
Visual Receptors If the development is visible from over half the zone of potential influence, and / or views are mostly unobstructed and / or 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.

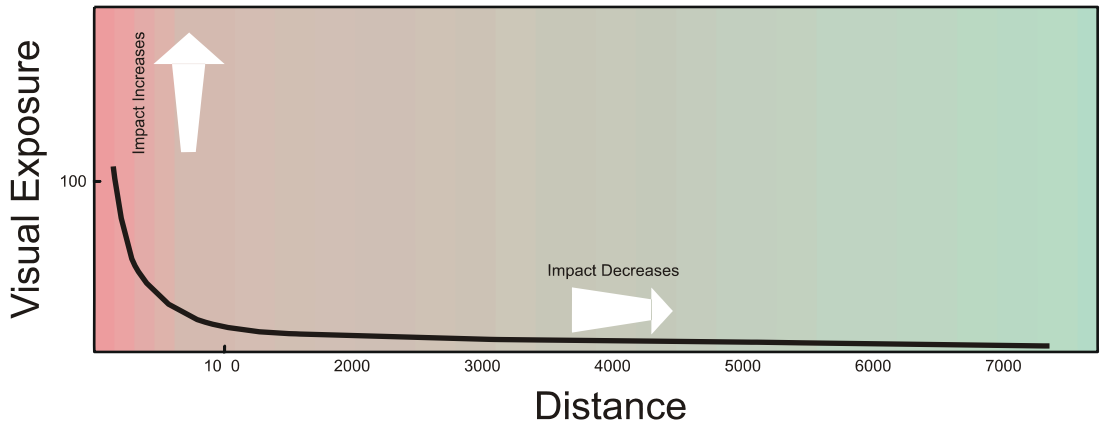
Areas seen from 800m to 5.0km are considered middle ground; vegetation appears as outlines or patterns. Depending on topography and vegetation, middle ground is sometimes considered to be up to 8.0km.

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 Figure below.

Effect of Distance on Visual Exposure



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 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).

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

Magnitude (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)).

Magnitude (Intensity) of Visual Impact

High	Moderate	Low	Negligible
Total loss of or major alteration to key elements/features/characteristics of the baseline.	Partial loss of or alteration to key elements/features/characteristics of the baseline.	Minor loss of or alteration to key elements/features/characteristics of the baseline.	Very minor loss or alteration to key elements/features/characteristics of the baseline.
I.e. Pre-development landscape or view and/or introduction of elements considered to be totally uncharacteristic when set within the attributes of the receiving landscape.	I.e. Pre-development landscape or view and/or introduction of elements that may be prominent but may not necessarily be considered to be substantially uncharacteristic when set within the attributes of the receiving 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 C: CRITERIA FOR SIGNIFICANCE OF IMPACT ASSESSMENT

Note: Part A provides the definition for determining impact consequence (combining intensity, spatial scale and duration) and impact significance (the overall rating of the impact). Impact consequence and significance are determined from Part B and C. The interpretation of the impact significance is given in Part D.

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

M	Beyond the site boundary, affecting immediate neighbours
H	Local area, extending far beyond site boundary.
VH	Regional/National

PART B: DETERMINING CONSEQUENCE

SEVERITY = VL

DURATION	Very long	**VH**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Long term	**H**	**Low**	**Medium**	**Medium**	**Medium**	**High**
	Medium term	**M**	**Low**	**Low**	**Medium**	**Medium**	**Medium**
	Short term	**L**	**Very low**	**Low**	**Low**	**Medium**	**Medium**
	Very short	**VL**	**Very low**	**Low**	**Low**	**Low**	**Medium**

SEVERITY = L

DURATION	Very long	**VH**	**Medium**	**Medium**	**High**	**High**	**High**
	Long term	**H**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Medium term	**M**	**Low**	**Medium**	**Medium**	**Medium**	**High**
	Short term	**L**	**Low**	**Low**	**Medium**	**Medium**	**Medium**
	Very short	**VL**	**Very low**	**Low**	**Low**	**Medium**	**Medium**

SEVERITY = M

DURATION	Very long	**VH**	**Medium**	**High**	**High**	**High**	**Very High**
	Long term	**H**	**Medium**	**Medium**	**High**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Short term	**L**	**Low**	**Medium**	**Medium**	**Medium**	**High**
	Very short	**VL**	**Very low**	**Low**	**Medium**	**Medium**	**Medium**

SEVERITY = H

DURATION	Very long	**VH**	**High**	**High**	**High**	**Very High**	**Very High**
	Long term	**H**	**Medium**	**High**	**High**	**High**	**Very High**
	Medium term	**M**	**Medium**	**Medium**	**High**	**High**	**High**
	Short term	**L**	**Medium**	**Medium**	**Medium**	**High**	**High**
	Very short	**VL**	**Low**	**Medium**	**Medium**	**Medium**	**High**

SEVERITY = VH

DURATION	Very long	**VH**	**High**	**High**	**Very High**	**Very High**	**Very High**
	Long term	**H**	**High**	**High**	**High**	**Very High**	**Very High**
	Medium term	**M**	**Medium**	**High**	**High**	**High**	**Very High**
	Short term	**L**	**Medium**	**Medium**	**High**	**High**	**High**
	Very short	**VL**	**Low**	**Medium**	**Medium**	**High**	**High**
			VL	**L**	**M**	**H**	**VH**
			A portion of the site	Whole site	Beyond the site boundary, affecting immediate neighbours	Local area, extending far beyond site boundary.	Regional/ National
			EXTENT				

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

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

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

APPENDIX D: CRITERIA FOR PHOTO / COMPUTER SIMULATION

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

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

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

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

A scale model of the proposal is built in virtual space, scale 1:1, based on CAD (vector) information as supplied by the engineers. This model is then placed on a virtual landscape, scale 1:1, as produced by means of modelling 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.

Cameras used for photography in this report include:

Nikon D80 Digital with a Nikkor lens AF-S DX Zoom 18mm-70mm f/3.5

Pentax iSTdi Digital with a Pentax Zoom 35mm – 90 mm f/3.5

APPENDIX E: VIEWSHED ANALYSIS

A Digital Terrain Model (DTM) was created by capturing current and most up to date topographic and land use data in digital format. Using the DTM, the programme performs a viewshed analysis on the lattice surface (a fine grid of cells extending over the entire study area). Each cell has stored information relating to x, y (plan) and z (height) co-ordinates. It computes a line of sight analysis across the current lattice from a selected vantage point in a 360 degree arc to define the area from which a vantage point may be seen.

APPENDIX F: DECLARATION OF INDEPENDANCE

I, Graham A Young, hereby declare that Newtown Landscape Architects cc, an independent consulting firm, has no interest or personal gains in this project whatsoever, except receiving fair payment for rendering an independent professional service.
Consultant name: Graham Young

Signature:

Date: 2016 08 12

APPENDIX G: CURRICULUM VITAE OF AUTHOR

Graham Young PrLArch

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Tel: 27 11 462 6967
Fax: 27 11 462-9284
www.newla.co.za graham@newla.co.za

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. During his 30 year plus career he has received numerous Institute of Landscape Architects of South Africa and other industry awards. He has published widely on landscape architectural issues and has had projects published both locally and internationally in design journals and books. In addition to being a founding member of Newtown Landscape Architects he is currently a senior lecturer, teaching landscape architecture and urban design at post and under graduate levels, at the University of Pretoria. He has been a visiting studio critic at the University of Witwatersrand and University of Cape Town and was invited to the University of Rhode Island, USA as their 2011 Distinguished International Scholar. A 'niche' speciality of his is Visual Impact Assessments for which he was cited with an ILASA Merit Award in 1999.

EXPERIENCE:

NEWTOWN LANDSCAPE ARCHITECTS cc. ***Founding Member***

Current — Responsible for project management, landscape design, urban design, and visual impact assessment.
Senior Lecturer: Department of Architecture, University of Pretoria.

1991 - 1994 **GRAHAM A YOUNG LANDSCAPE ARCHITECT -** ***Sole proprietor***

1988 - 1989 — Designed major transit and CBD based urban design schemes; designed commercial and recreational landscapes and a regional urban park; participated in inter-disciplinary consulting teams that produced master plans for various beachfront areas in KwaZulu Natal and a mountain resort in the Drakensberg.

1989 - 1991 **CANADA -** ***Free Lance***

Designed golf courses and carried out golf course feasibility studies (Robert Heaslip and Associates); developed landscape site plans and an end-use plan for an abandoned mine (du Toit, Allsopp and Hillier); conducted a visual analysis of a proposed landfill site.

1980 - 1988 **KDM (FORMERLY DAMES AND MOORE)** - *Started as a Senior Landscape Architect and was appointed Partner in charge of Landscape Architecture and Environmental Planning in 1984*. Designed commercial, corporate and urban landscapes; completed landscape site plans; developed end-use master plans for urban parks, college and technikon sites; carried out ecological planning studies for factories, motorways and a railway line.

1978 - 1980 **DAYSON & DE VILLIERS -** ***Staff Landscape Architect***

Designed various caravan parks; designed a recreation complex for a public resort; conducted a visual analysis for the recreation planning of Pilgrims Rest; and designed and supervised the installation of various private gardens.

EDUCATION:

Bachelor of Landscape Architecture, 1978, (BLArch), University of Toronto, Canada;
Senior Lecturer - Department of Architecture, University of Pretoria.

PROFESSIONAL:

Registered Landscape Architect – South African Council for Landscape Architectural Profession (2001);
Board of Control for Landscape Architects of South Africa (1987) – Vice Chairman 1988 to 1989;
Professional Member - Institute of Landscape Architects Southern Africa (1982) – President 1986 - 1988;
Member Planning Professions Board 1987 to 1989;
Member International Association of Impact Assessment;

AWARDS:

//hapo Freedom Park: ILASA Merit Award (2013)

Intermediate Phase (S'kumbuto, Moshate and Uitspanplek), Freedom Park: ILASA Merit Award (2009)

Corniche Bay Resort, Mauritius: ILASA Merit Award (2009)

Torsanlorenzo International Prize, Landscape design and protection 2nd Prize Section B: Urban Green Spaces, for Intermediate Phase Freedom Park (2009)

Phase 1 and Intermediate Phase Freedom Park: Loerie Awards Gold Statue (2008)

Phase 1 and Intermediate Phase Freedom Park: Special Mention World Architecture Festival, Nature Category (2008)

Moroka Park Precinct, Soweto: ILASA Merit Award for Design (2005) and Gold Medal United Nations Liveable Communities (LivCom) Award (2007)

Isivivane, Freedom Park: ILASA Presidential Award of Excellence Design (2005)

Information Kiosk, Freedom Park: ILASA Merit Award for Design (2005)

Moroka – Mofola Open Space Framework, Soweto: ILASA Merit Award for Planning (2005)

Mpumalanga Provincial Government Complex: ILASA Presidential Award of Excellence (with KWP Landscape Architects for Design (2003)

Specialist Impact Report: Visual Environment, Sibaya Resort and Entertainment World: ILASA Merit Award for Environmental Planning (1999);

Gillooly's Farm, Bedfordview (with Dayson and DeVilliers): ILASA Merit Award for Design;

COMPETITIONS:

Johannesburg Inner City Park Design competition – with MMA architects (2009) Finalist and considered "the strongest concept" by the adjudication panel.

Pan African Parliament International Design competition – with MMA architects (2007) Finalist

Leeuwpan Regional Wetland Park for the Ekurhuleni Metro Municipality (2004) Landscape Architectural Consultant on Department of Trade and Industries Building (2002) – Finalist

Landscape Architecture Consultant on Project Phoenix Architectural Competition, Pretoria (1999): Winner;

Mpumalanga Legislature Buildings (1998): Commissioned;

Toyota Fountain (1985): First Prize - commissioned;

Bedfordview Bike/Walkway System - Van Buuren Road (1982): First Prize - commissioned;

Portland Cement Institute Display Park (1982): Second Prize

CONTRIBUTOR / AUTHOR:

Young, G and Prinsloo, J.N. 2014, ***Corniche Bay Integrated Resort Scheme*** in Van Wyk, l. *Green Building Handbook, South Africa, Vol. 6*, Alive2green, Cape Town (2014).

Young, G. 2013, ***Landscape Architecture_Ecological Consciousness*** in Van Wyk, l. *Green Building Handbook, South Africa, Vol. 4*, Greenbuilding Media, Cape Town (2012).

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2)

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3)

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Young, G. ***"Community factors in the planning and design of parks in South Africa – Thokoza Park, Soweto and three parks in Atteridgeville, Tshwane"*** in Stoffberg, H, Hindes C, and Muller, L (eds). *2012* The South African Landscape Architecture Reader. Pretoria: UNISA Press.

Contributor in Jodido, P. (Ed) ***Landscape Architecture Now!*** Taschen GmbH, Koln (2012)

Contributor in Van Wyk, l. (Ed) ***Green Building Handbook, South Africa, Vol. 2***, Greenbuilding Media, Cape Town (2010).

- *Chapter 4: Landscape Water Management*

Contributor in Phaidon (Ed) ***Phaidon Atlas of 21st Century World Architecture***. Phaidon Press, London. (2010).

Young, G and Barnard, J., ***Newtown Landscape Architects – A Retrospective 1994 – 2009,*** Newtown Landscape Architects cc, Johannesburg (2009).

Young, G, Maxibuko, B., and Muller, L., ***Visual Impacts of Power Lines in Eskom***,

Eskom Research and Innovation Department Technology, Strategy and Planning, Research Report, Report Number RES/RR/08/30193 (2009).

Contributor in Walmsley, B. (ed), ***Impact Assessment Case Studies from Southern Africa***, South African Institute for Environmental Assessment, Namibia (2009): http://www.saiea.com/case_studies09/07%20PeakingPowerPlant.pdf

- *Visual Impact Assessment of a Peaking Power Plant, KwaZuluNatal*

Contributor in Joubert, O, ***10 Years + 100 Buildings – Architecture in a Democratic South Africa*** Bell-Roberts Gallery and Publishing, South Africa (2009)

- Freedom Park Phase 1 and Intermediate Phase (NBGM), Pretoria, Gauteng

Contributor in Galindo, M, ***Collection Landscape Architecture***, Braun, Switzerland (2009)

- *Freedom Park Phase Intermediate Phase* (NBGM), Pretoria, Gauteng

Contributor in Van Ueffelen, C. ***1000 X Landscapes***, Verlagshaus Braun, Germany (2008)

- *Freedom Park Phase 1 and Intermediate Phase* (NBGM), Pretoria, Gauteng
- *Riverside Government Complex* (NLAKWP), Nelspruit, Mpumalanga;
- *Moroka Dam Parks Pre*cinct, Soweto, Gauteng.

Contributor in ***Johannesburg: Emerging/Diverging Metropolis***, Mendrision Academy Press, Italy (2007)

- *Moroka Dam Parks* Precinct, Soweto, Gauteng.

Research panel: Oberholzer, B. ***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. (2005)

Contributor in Malan, C. and McInerney, P (eds) ***The Making of an African Building. The Mpumalanga Provincial Government Complex,*** Johannesburg MPTS Architectural Library, Johannesburg (2001)

- *Riverside Government Complex* (KWPNLA), Nelspruit, Mpumalanga;

Numerous publications in industry journals.

***** NLA *****

APPENDIX F: FIGURES

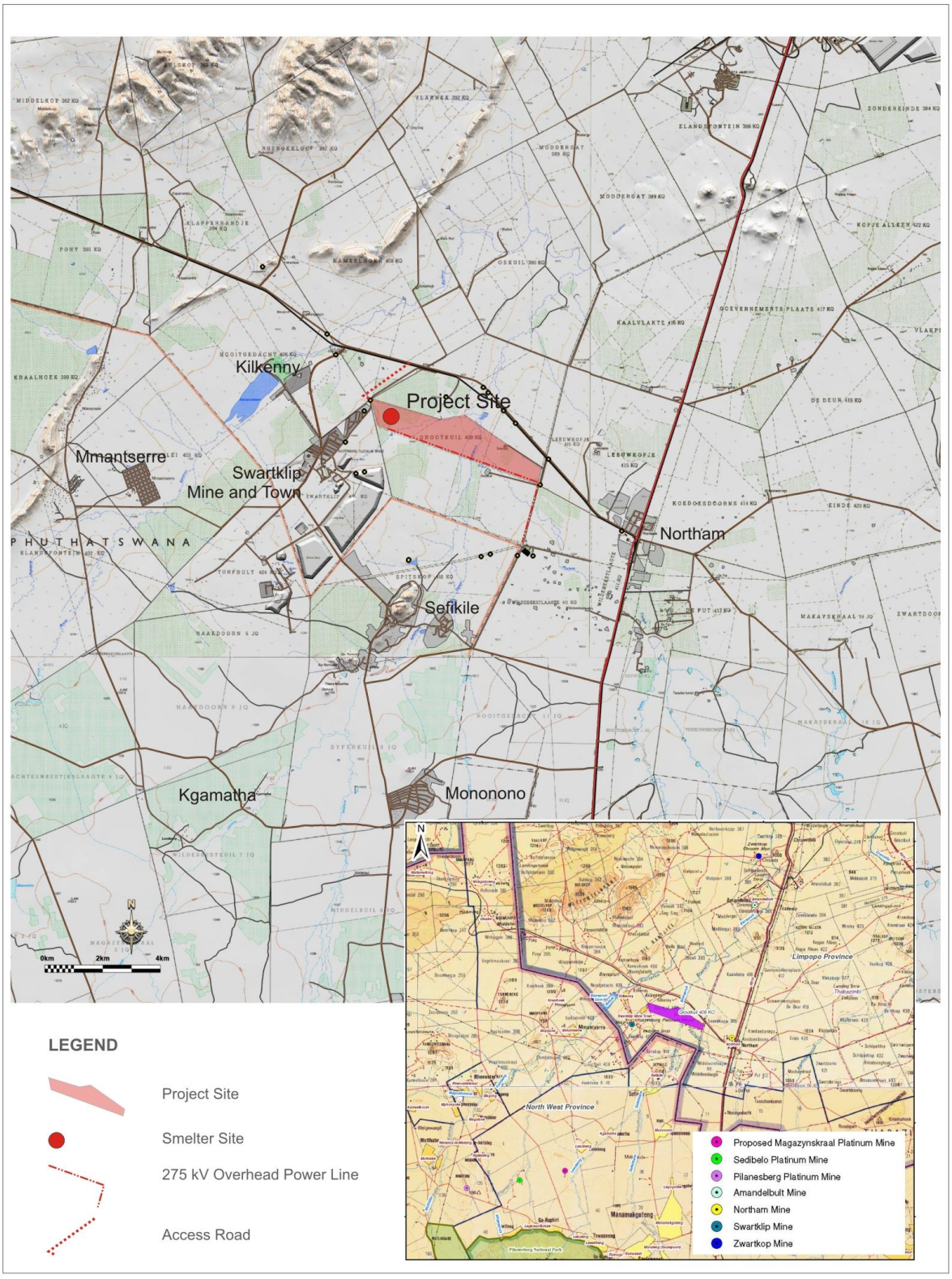


Figure 1: LOCALITY - Siyanda Chrome Smelter

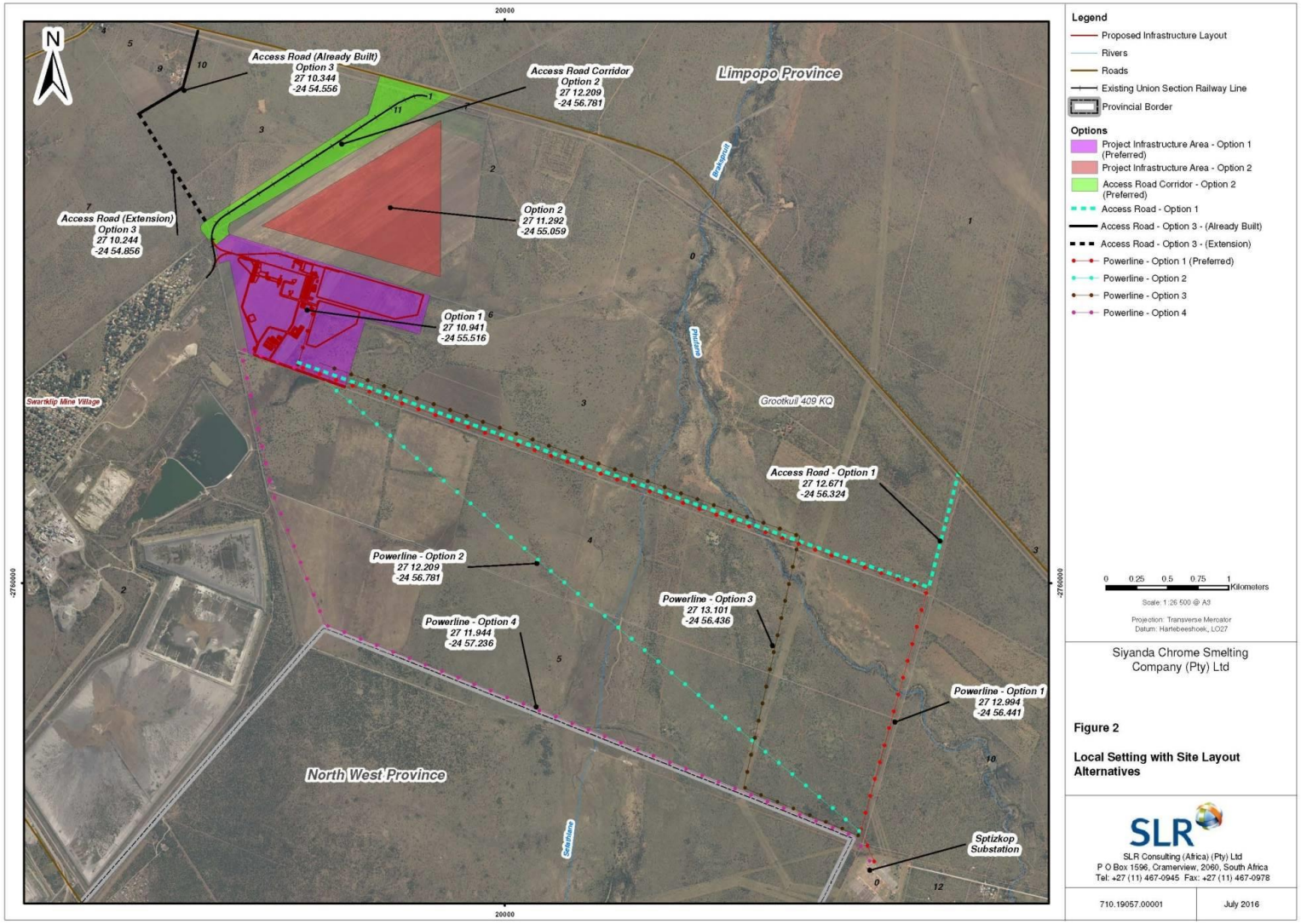


Figure 1A: SITE LAYOUT ALTERNATIVES_ Siyanda Chrome Smelter

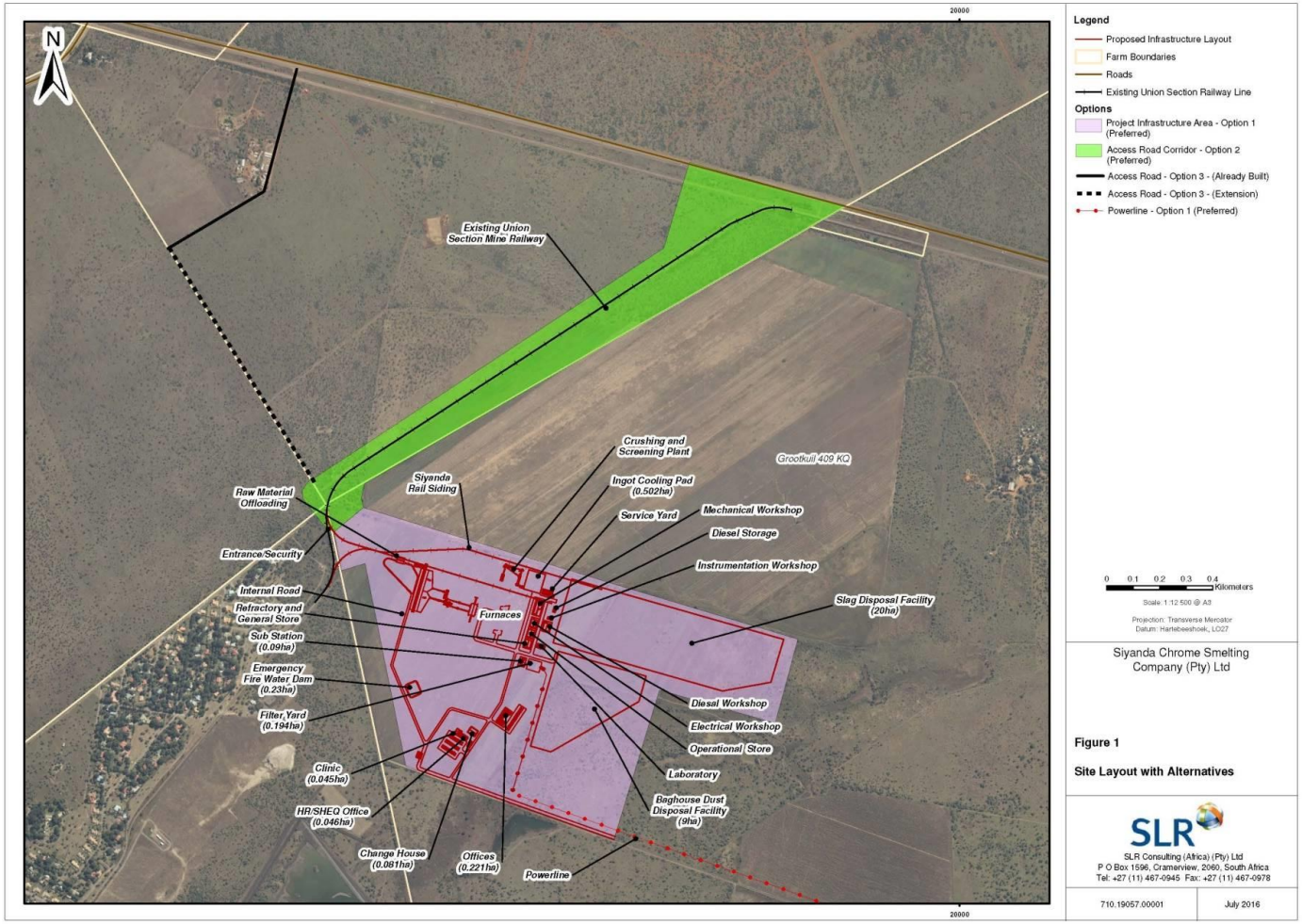


Figure 2: PROJECT LAYOUT - Siyanda Chrome Smelter

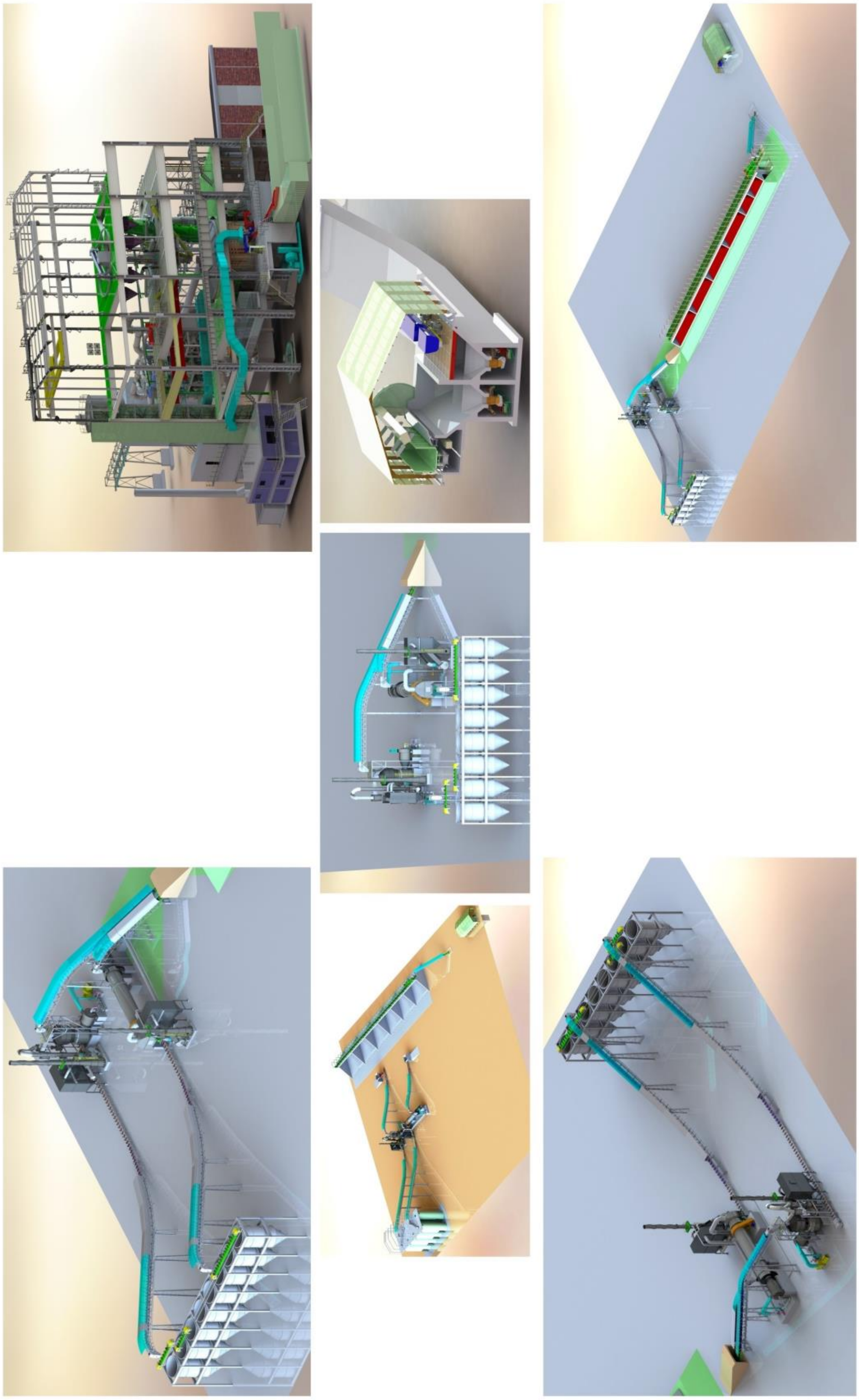


Figure 2a: PROJECT COMPONENTS - Siyanda Chrome Smelter

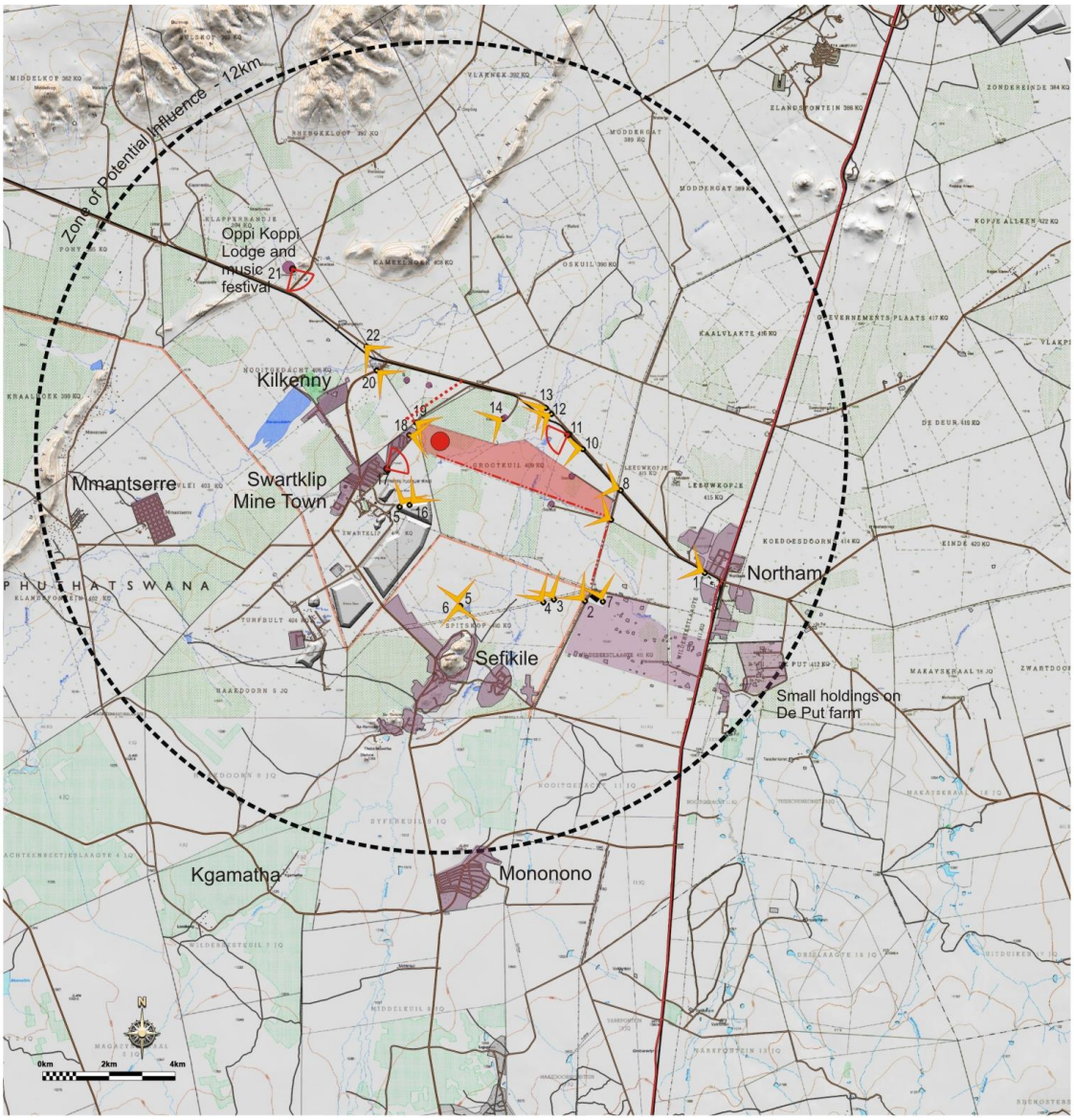


Figure 3: VIEWING POINTS - Siyanda Chrome

View 1: Looking west towards the site from Northam

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 2: Looking west towards the site from the ESKOM sub-station

Figure 4: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 1 and 2)

View 3: Looking west from the power lines to the site

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 4: Looking north west from the power lines to the site

Figure 5: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 3 and 4)

View 5: Looking north from a small koppie north of Sefikile village towards the site

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 6: Looking south from a small koppie north of Sefikile village

Figure 6: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 5 and 6)

View 7: Looking north near ESKOM sub-station at proposed small-holding development site

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 8: Looking south west west from the Northam road

Figure 7: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 7 and 8)

View 9 Looking west from immediately east of Anglo property towards the site:

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 10: Looking south west from Northam Road towards the site

Figure 8: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 9 and 10)

View 11: Looking south west west from railway line which runs north of the site

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 12: Looking south west from Northam road

Figure 9: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 11 and 12)

View 13: Looking south west from the Northam road to the site

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 14: Looking south west from homestead north of the site

Figure 10: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 13 and 14)

View 15: Looking north towards the site from the west side of the Anglo tailings dam

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 16: Looking north towards the site from the east side of the Anglo tailings dam

Figure 11: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 15 and 16)

View 17: Looking north towards the side from the eastern edge of the Swartklip residential areas

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 18: Looking north east towards the site from the northern edge of the Swarklip residential areas

Figure 12: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 17 and 18)

View 19: Looking east to the site from the railway line north of the Swarklip residential area

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 20: Looking east from the Swatklip access road towards the site

Figure 13: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 19 and 20)

View 21: Looking south east from Oppikoppi viewing platform

Refer to Figure 3 for location of views: Photos taken 25 June 2015

View 22: Looking south east towards the site from the Northam road

Figure 14: LANDSCAPE CHARACTER Siyanda Chrome Smelter (Views 21 and 22)

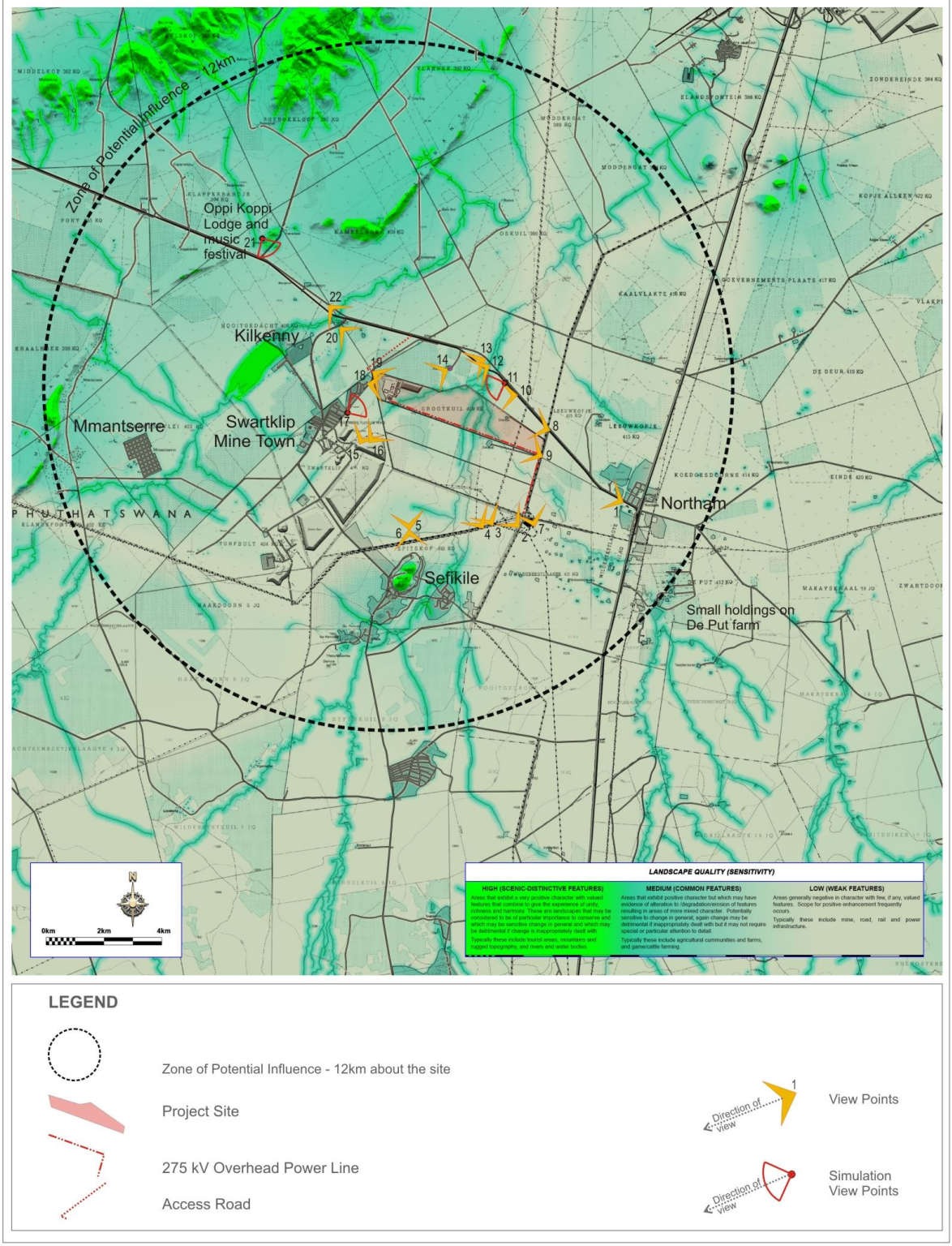


Figure 15: LANDSCAPE TYPES - SENSITIVITY - Siyanda

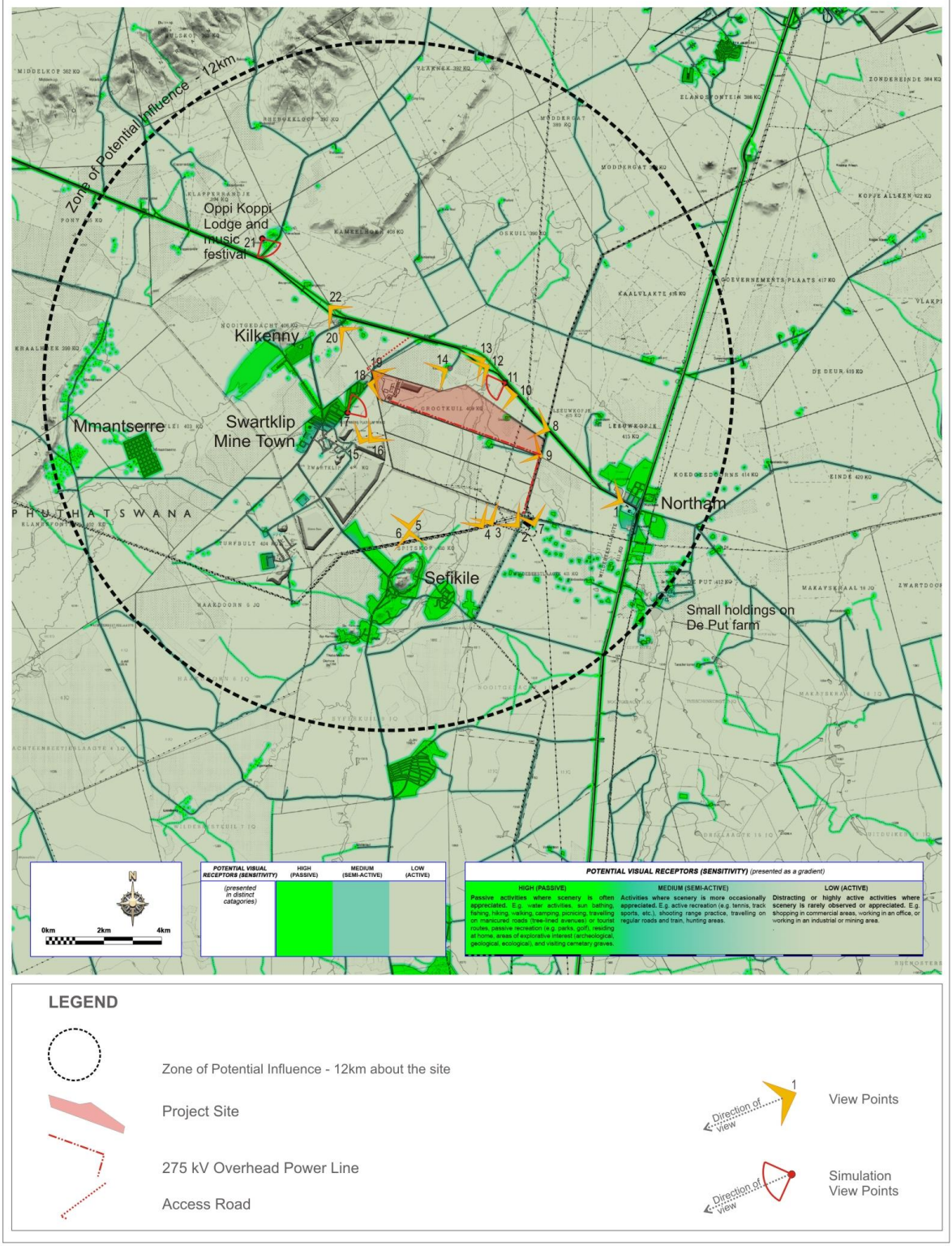


Figure 16: VISUAL RECEPTORS - SENSITIVITY - Siyanda

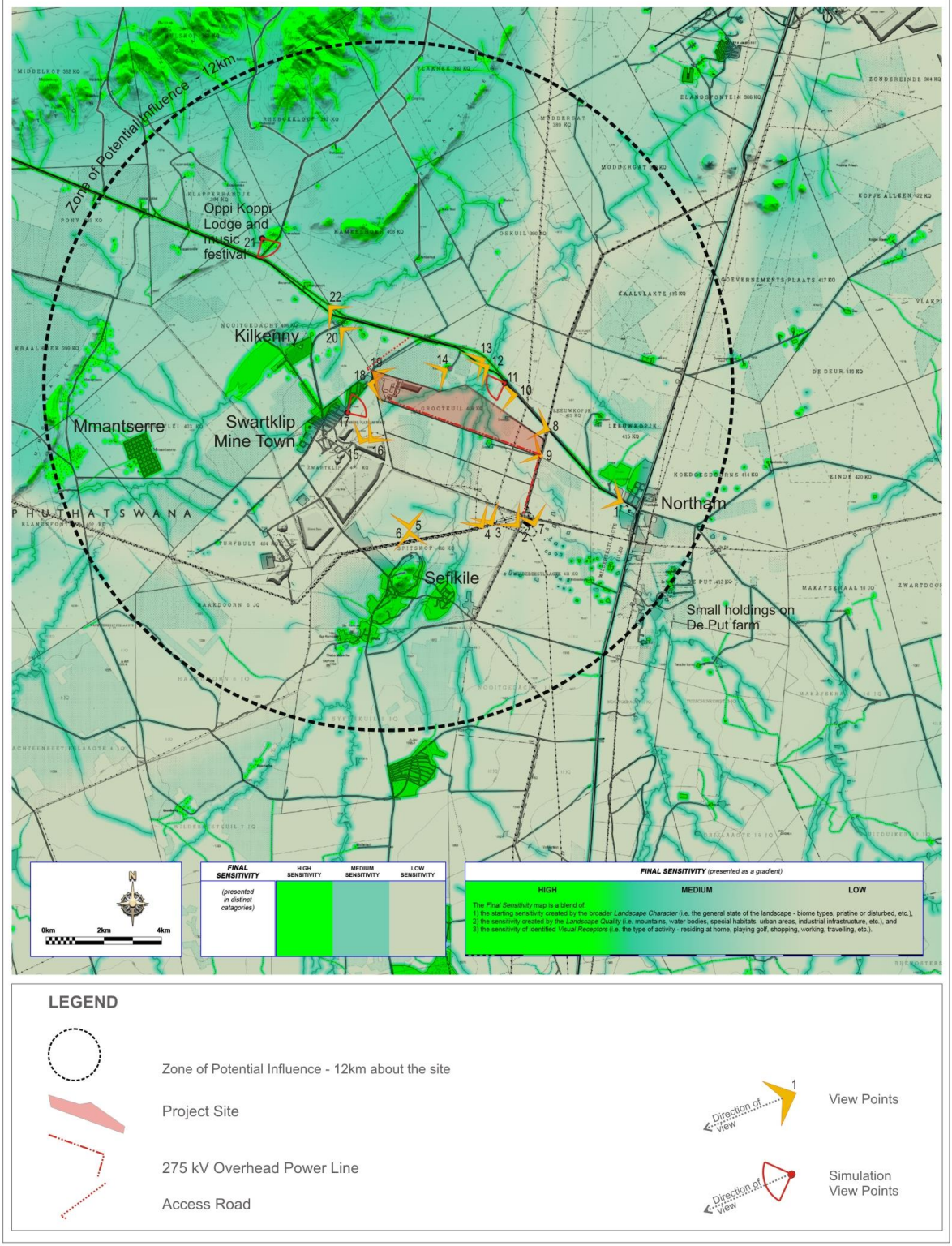


Figure 17: COMBINED - SENSITIVITY - Siyanda

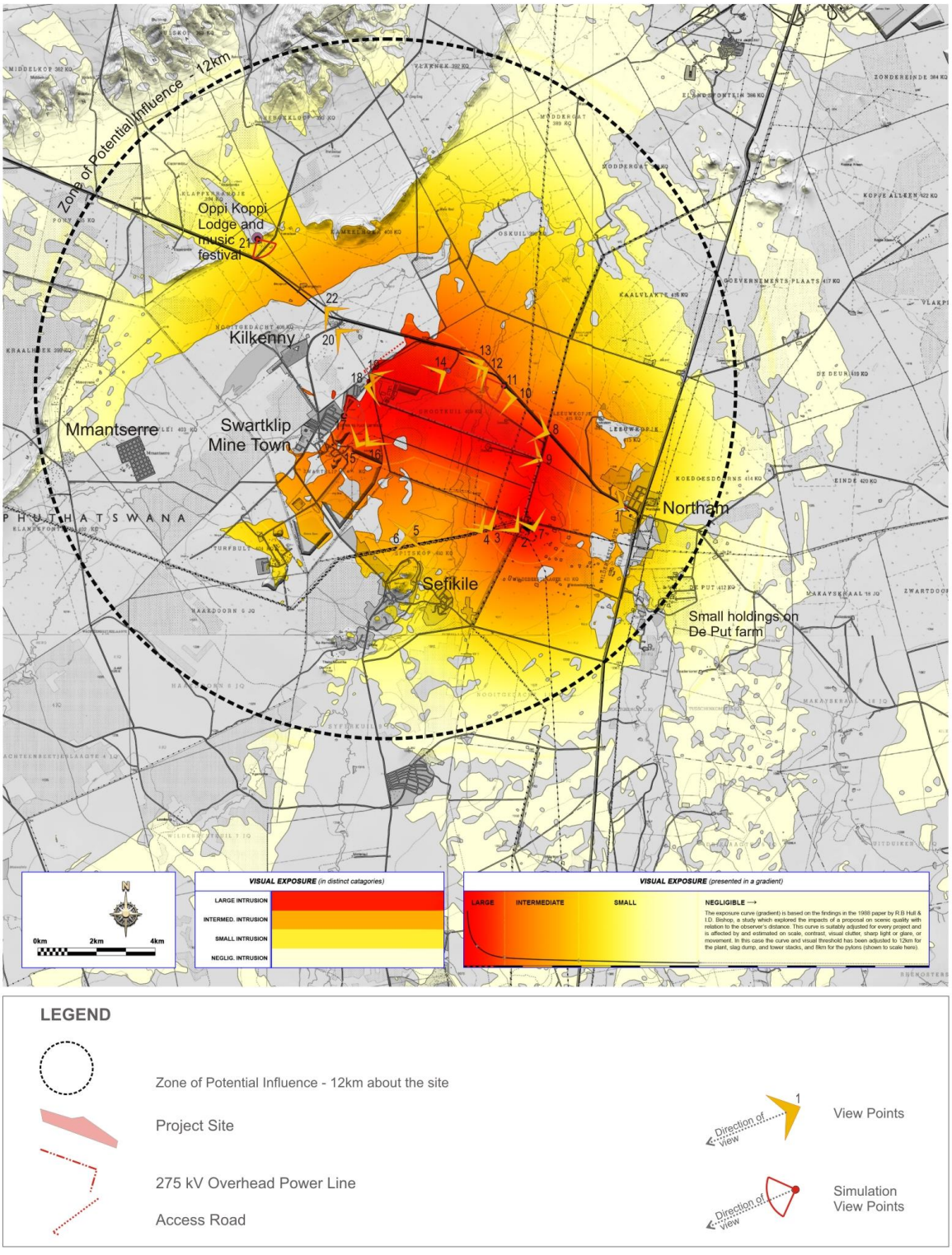


Figure 18: VIEWSHED - 5m Offset - Siyanda

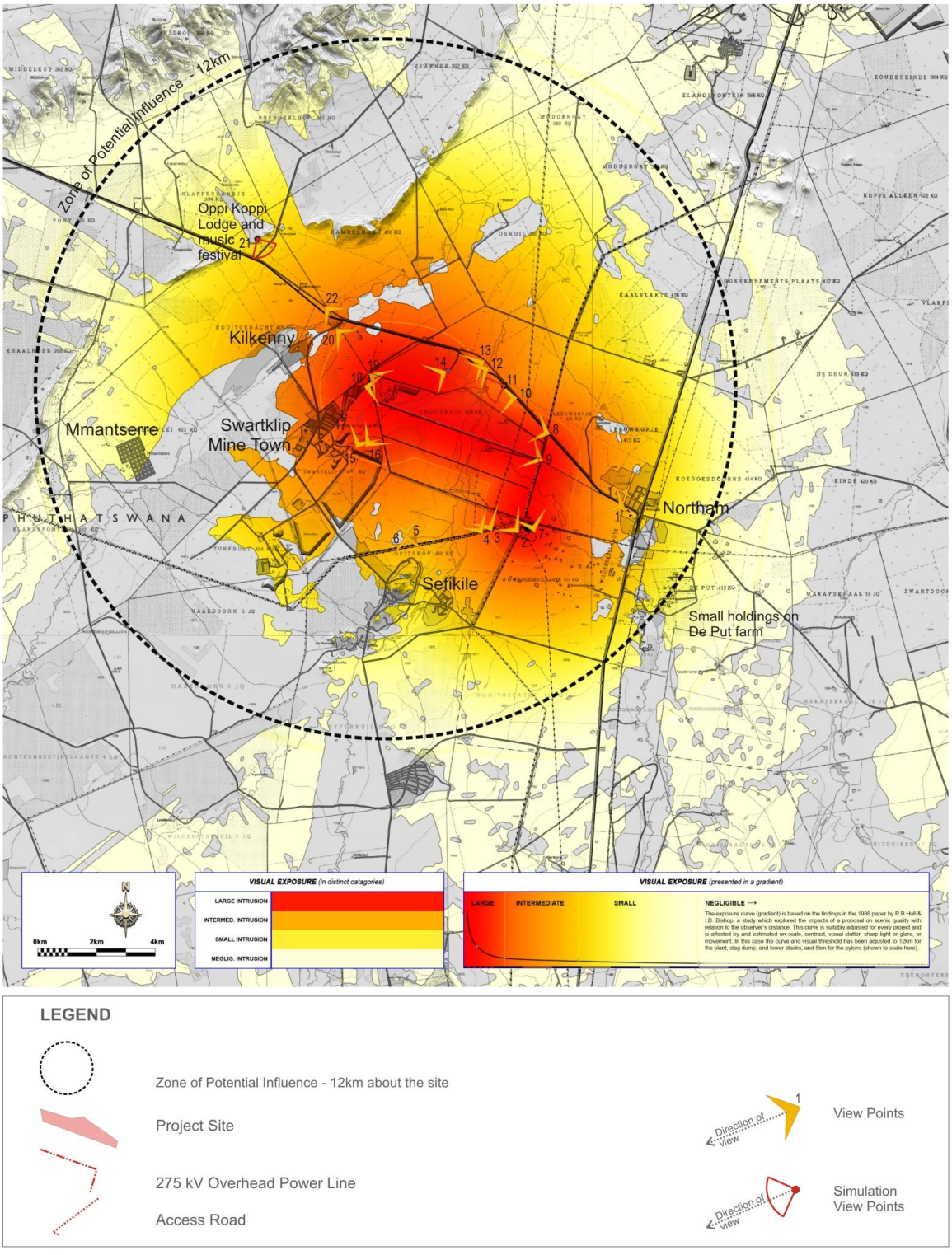


Figure 19: VIEWSHED - 15M Offset - Siyanda

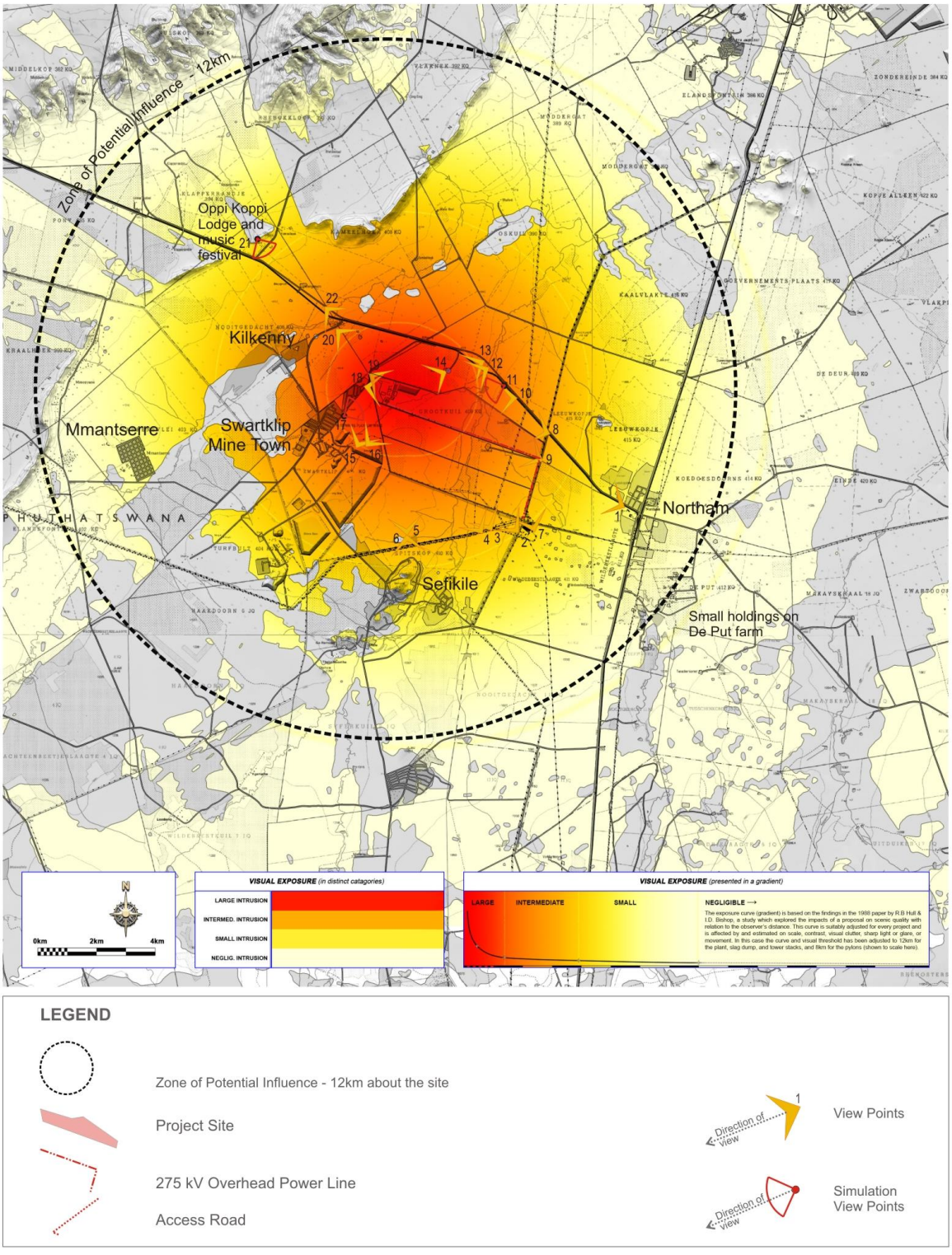


Figure 20: VIEWSHED - 30M Offset - Siyanda

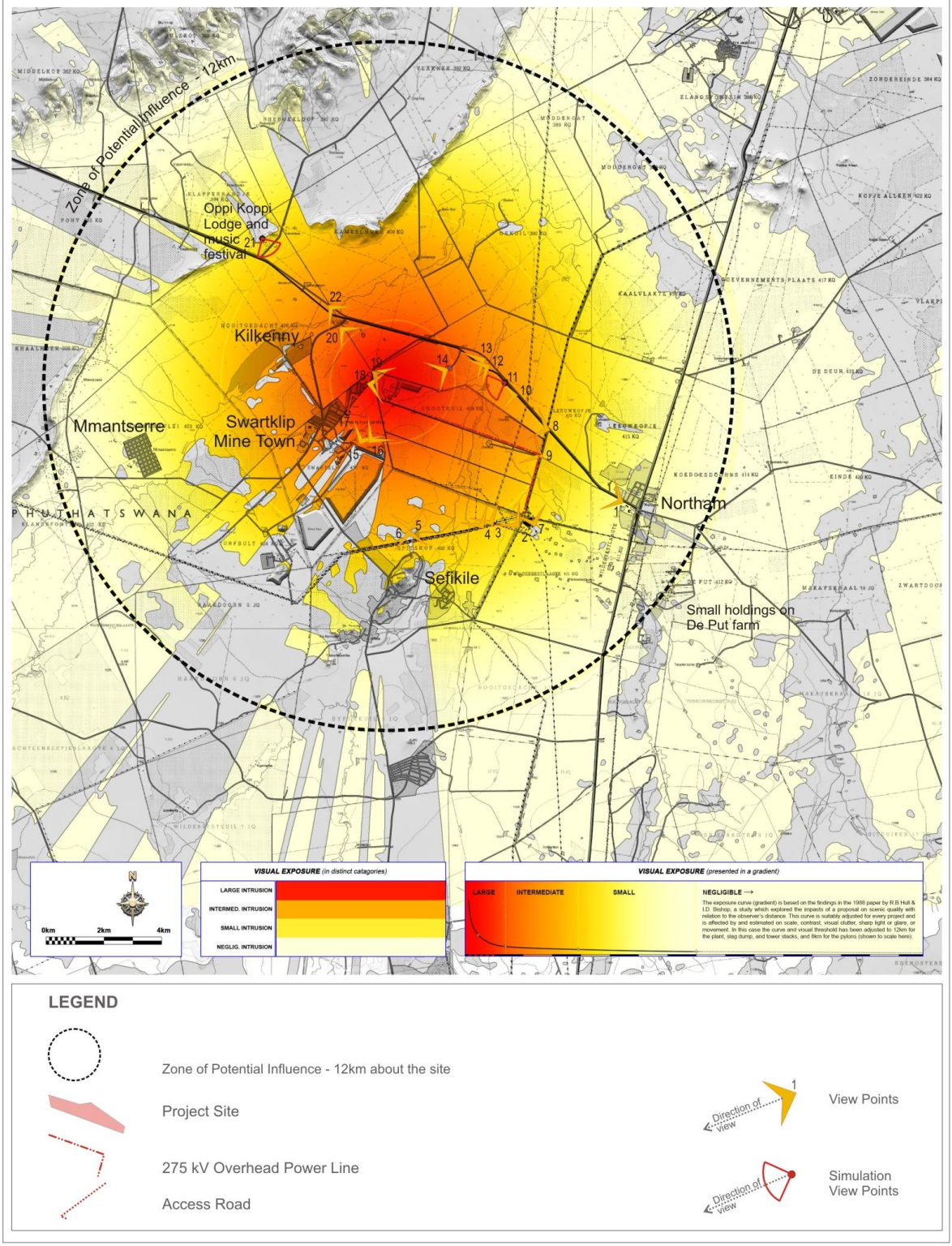
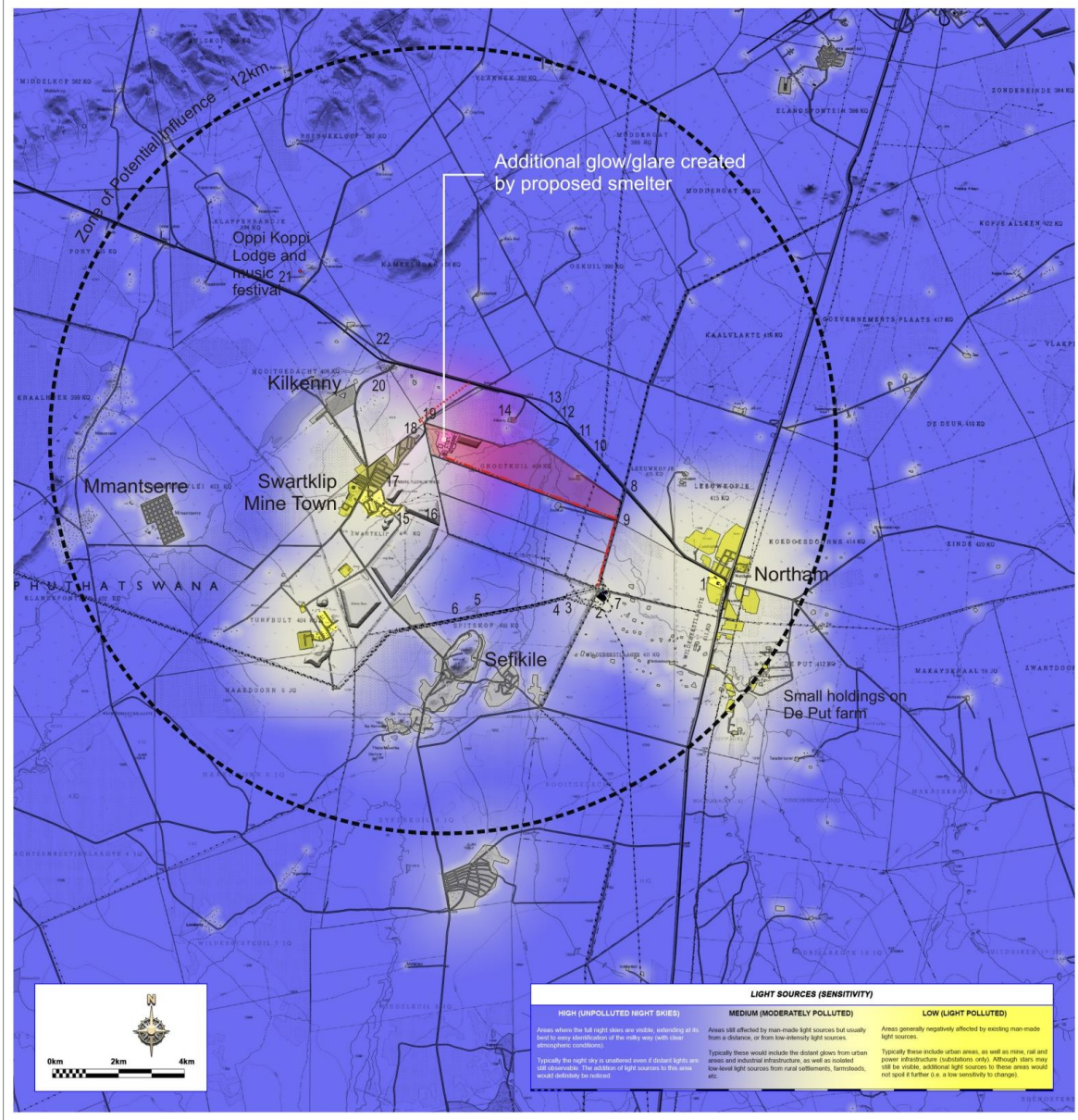


Figure 21: VIEWSHED - 55M Offset - Siyanda

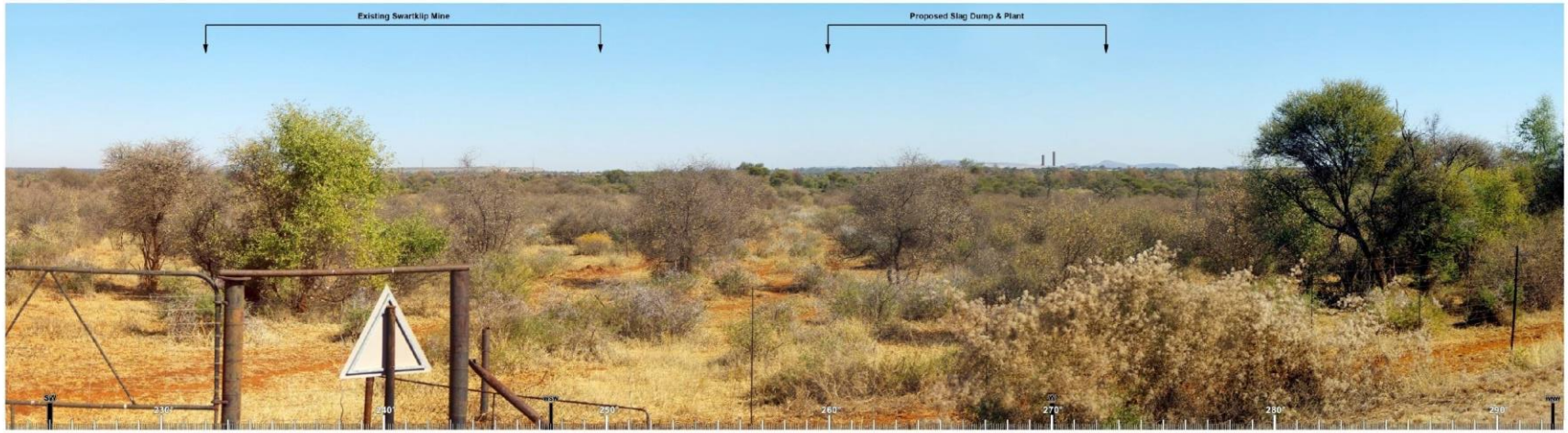


LEGEND

- Zone of Potential Influence - 12km about the site
- Project Site
- 275 kV Overhead Power Line
- Access Road
- View Points
- Simulation View Points

Figure 22: LIGHT POLLUTION - Siyanda

View 11: Looking south west west from railway line which runs north of the site - BEFORE development



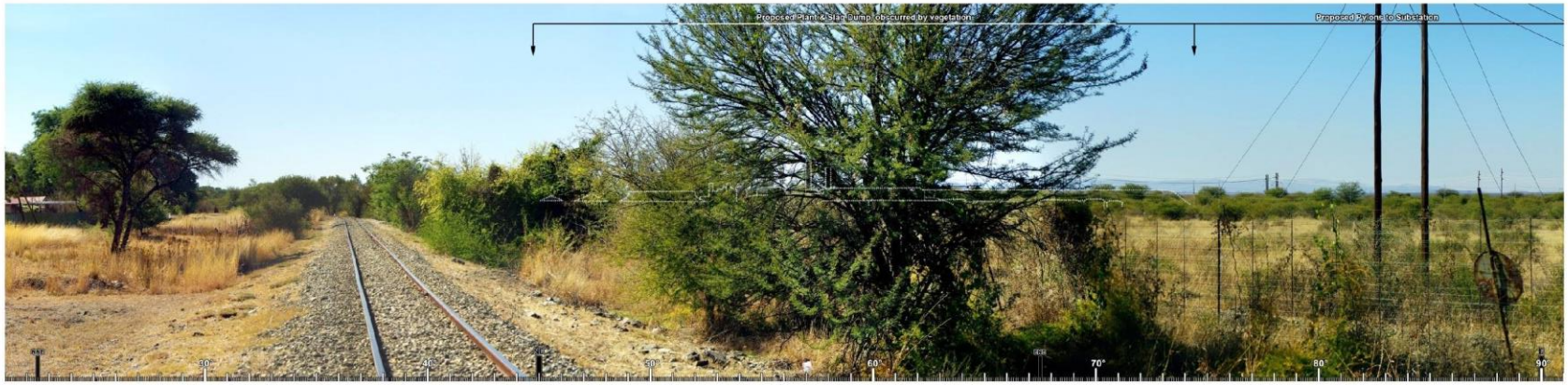
View 11: Looking south west west from railway line which runs north of the site - AFTER development

Refer to Figure 3 for location of views: Photos taken 25 June 2015

Figure 23: SIMULATION Siyanda Chrome Smelter View 11

View 17: Looking north towards the side from the eastern edge of the Swartklip residential areas BEFORE development

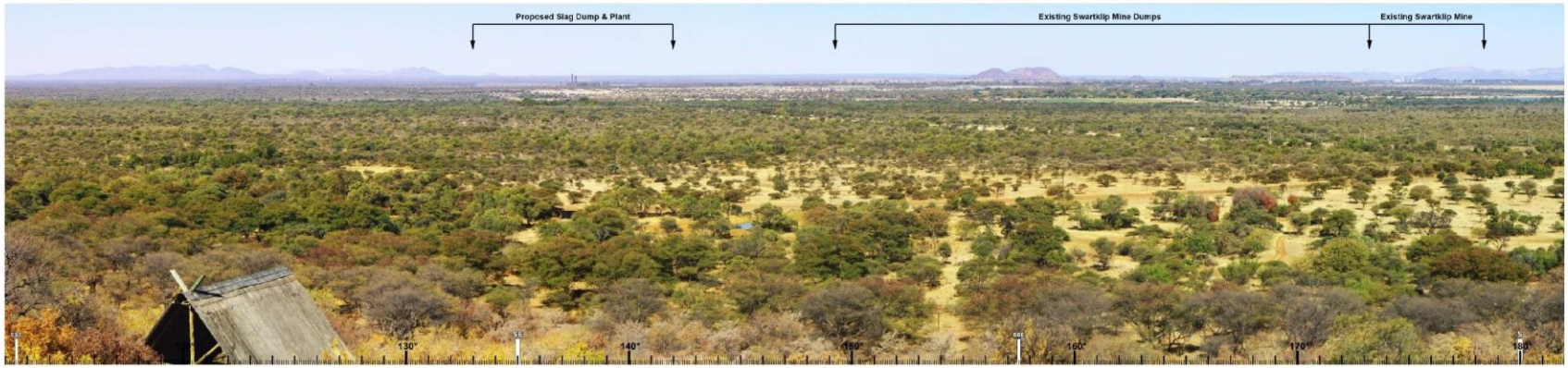
Refer to Figure 3 for location of views: Photos taken 25 June 2015



View 17: Looking north towards the side from the eastern edge of the Swartklip residential areas AFTER development
Vegetation between the site and residential areas screens most views for these residential areas

Figure 24: SIMULATION Siyanda Chrome Smelter View 17

View 21: Looking south east from Oppikoppi viewing platform BEFORE development

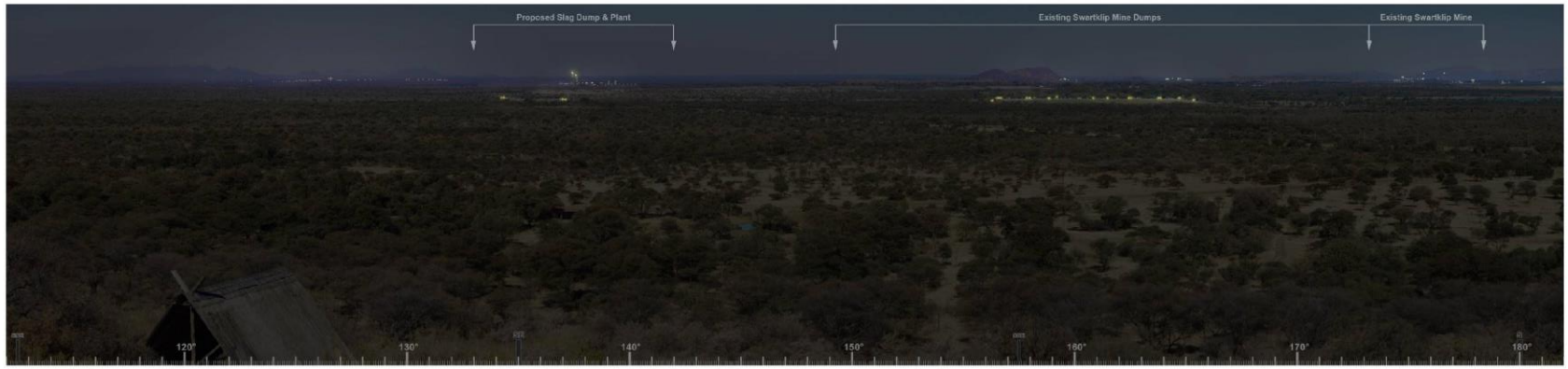


View 21: Looking south east from Oppikoppi viewing platform AFTER development

Refer to Figure 3 for location of views: Photos taken 25 June 2015

Figure 25: SIMULATION Siyanda Chrome Smelter View 21

View 21: Looking south east from Oppikoppi viewing platform BEFORE development



View 21: Looking south east from Oppikoppi viewing platform AFTER development

Refer to Figure 3 for location of views: Photos taken 25 June 2015

Figure 26: SIMULATION Siyanda Chrome Smelter View 21 - NIGHT

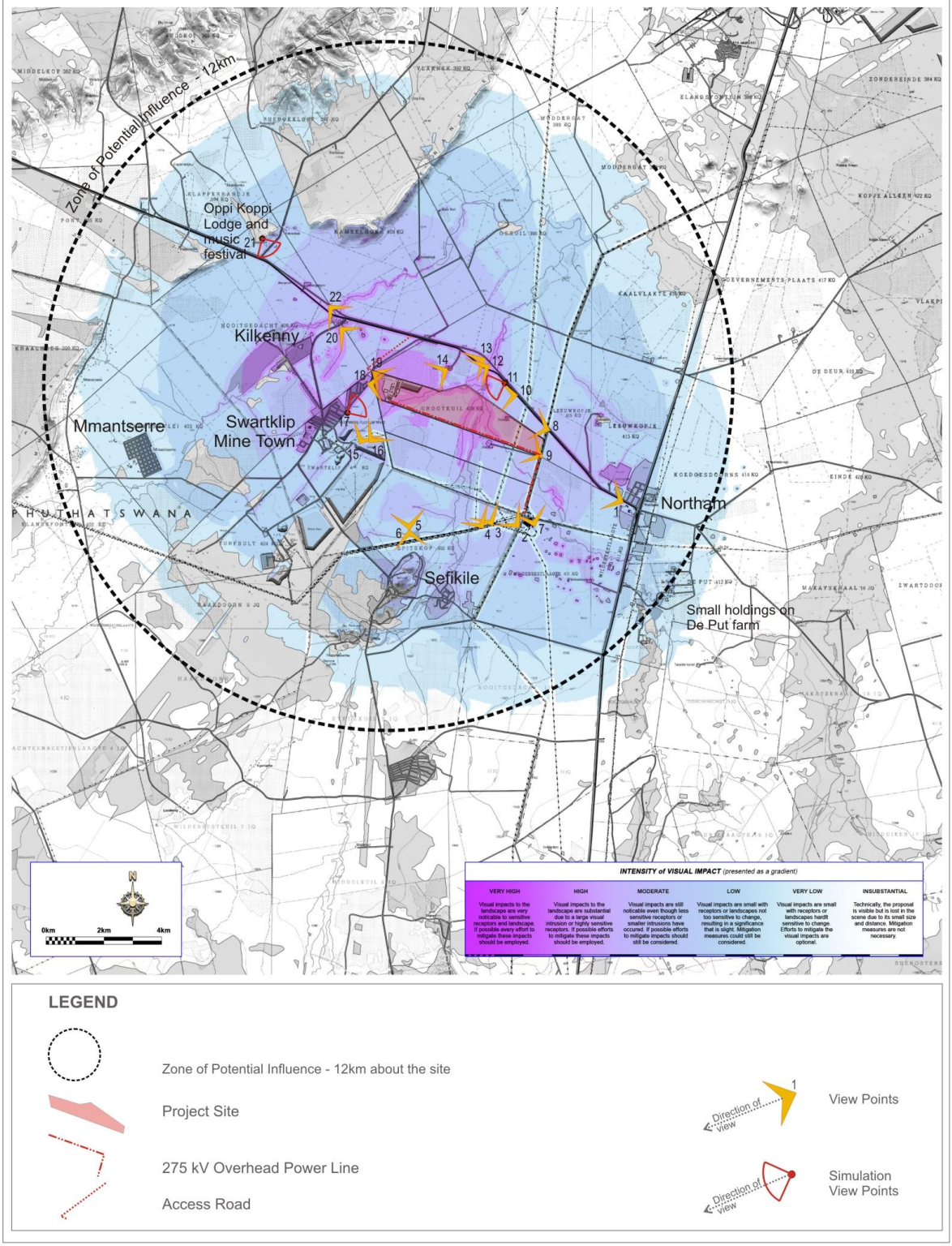


Figure 27: INTENSITY OF IMPACT - Siyanda