APPENDIX I: VISUAL STUDY

Visual Impact Assessment
Final Report

Proposed Pilanesberg Platinum Mine Plant Expansion Project

PROPOSED PILNESBERG PLATINUM MINES PLANT EXPANSION PROJECT,

NORTH WEST PROVINCE

Submitted to:

SLR Africa

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NLA Project No:	1840/V14NW
Report Revision No:	*Final Report – Rev 1*
Date Issued:	16 March 2019
Prepared By:	Yonanda Martin and Graham Young
Reviewed By:	Graham Young (PrLArch)
Reference:	PPM Plant Expansion Project

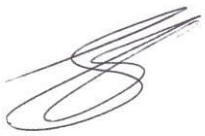
EXPERTISE OF SPECIALISTS

Name:	Graham A Young
Qualification:	BL (Toronto)
Professional Registration:	South African Council for the Landscape Architectural Profession (SACLAP) Fellow Institute of Landscape Architects of South Africa (FILASA)
Experience in Years:	40 years
Experience	Graham is a landscape architect with forty years' experience. He has worked in Southern Africa and Canada and has valuable expertise in the practice of landscape architecture, urban design and environmental planning. He is also a senior lecturer, teaching urban design and landscape architecture at post and under graduate levels at the University of Pretoria. A specialty of his is Visual Impact Assessment for which he was cited with an ILASA Merit Award in 1999. He has completed over 275 specialist reports for projects in South Africa, Canada and other African countries. He was on the panel that developed the *Guideline for Involving Visual and Aesthetic Specialists in EIA Processes* (2005) and produced a research document for Eskom, *The Visual Impacts of Power Lines* (2009). In 2011, he produced '*Guidelines for involving visual and aesthetic specialists'* for the Aapravasi Ghat Trust Fund Technical Committee (they manage a World Heritage Site) along with the *Visual Impact Assessment Training Module Guideline Document.*

DECLARATION OF INDEPENDENCE

I, Graham Young, declare that –

- I am contracted as the Visual Impact Assessment Specialist for the *PPM Plant Expansion Project*;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the National Environmental Management Act (Act 107 of 1998), 2014 Environmental Impact Assessment Regulations (as amended on 7 April 2017), and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will consider, to the extent possible, the matters listed in Regulation 13;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing – any decision to be taken with respect to the application by the competent authority; and – the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 16 (1)(b)(iii).



Graham Young PrLArch FILASA

25 February 2019

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SPECIALIST REPORTING REQUIREMENTS

NEMA Regulations (2014) (as amended) - Appendix 6	Relevant section in report
Details of the specialist who prepared the report	Page ii, Appendix E
The expertise of that person to compile a specialist report including a curriculum vitae	Appendix E
A declaration that the person is independent in a form as may be specified by the competent authority	Page iii
An indication of the scope of, and the purpose for which, the report was prepared	Section 1.3 – 1.4
An indication of the quality and age of base data used for the specialist report	Section 3.2 (data used from site visit)
A description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change	Sections 8.2; 11.0; 11.3.1; 14.0; 14.1 15.0 and Table 7
The duration date and season of the site investigation and the relevance of the season to the outcome of the assessment	Section 3.2
A description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used	Section 3
Details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure inclusive of a site plan identifying site alternatives	Section 11 and 5
An identification of any areas to be avoided, including buffers	Figures 3 and 10
A map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	Figures 3 and 10
A description of any assumptions made and any uncertainties or gaps in knowledge;	Section 1.5
A description of the findings and potential implications of such findings on the impact of the proposed activity or activities	Sections 11, 13, 14 and 15
Any mitigation measures for inclusion in the EMPr	Section 12
Any conditions for inclusion in the environmental authorisation	n/a
Any monitoring requirements for inclusion in the EMPr or environmental authorisation	Section 12

NEMA Regulations (2014) (as amended) - Appendix 6	Relevant section in report
A reasoned opinion as to whether the proposed activity or portions thereof should be authorised and regarding the acceptability of the proposed activity or activities	Section 15
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	Section 12
A description of any consultation process that was undertaken during the course of preparing the specialist report	The process was managed by the EAP (i.e. SLR)
A summary and copies of any comments received during any consultation process and where applicable all responses thereto	Section 6
Any other information requested by the competent authority.	n/a

ACRONYMS, ABBREVIATIONS & GLOSSARY

Acronyms & Abbreviations	
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
IFC	International Finance Corporation
PPM	Pilanesberg Platinum Mine
NLA	Newtown Landscape Architects
SLR	SLR Africa
BRNR	Black Rhino Nature Reserve
PNP	Pilanesberg National Park
SACLAP	South African Council for the Landscape Architectural Profession
TSF	Tailings Storage Facility
VIA	Visual Impact Assessment

Glossary	
Aesthetic Value	Aesthetic value is the emotional response derived from the experience of the environment with its natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings and attitudes (Ramsay, 1993). Thus, aesthetic value encompasses more than the seen view, visual quality or scenery, and includes atmosphere, landscape character and sense of place (Schapper, 1993).
Aesthetically significant place	A formally designated place visited by recreationists and others for the express purpose of enjoying its beauty. For example, tens of thousands of people visit Table Mountain on an annual basis. They come from around the country and even from around the world. By these measurements, one can make the case that Table Mountain (a designated National Park) is an aesthetic resource of national significance. Similarly, a resource that is visited by large numbers who come from across the region probably has regional significance. A place visited primarily by people whose place of origin is local is generally of local significance. Unvisited places either have no significance or are "no trespass" places. (after New York, Department of Environment 2000).
Aesthetic impact	Aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Mere visibility, even startling

	visibility of a project proposal, should not be a threshold for decision making. Instead a project, by 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 includes the proposed project footprint / site as well as the 'zone of potential influence'. It equates to a 10,0km radius surrounding the proposed project site.
Project Footprint / Site	For the purposes of this report the Project *site* / *footprint* refers to the layout of the project's various components.
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 means 'spirit of the place'.
Sensitive Receptors	Sensitivity of visual receptors (viewers) to a proposed development.
Viewshed analysis	The two-dimensional spatial pattern created by an analysis that defines areas (using topographic relief) that contain all possible observation sites from which an object would be visible. The basic assumption for preparing a viewshed analysis is that the observer eye height is 1,8m above ground level.
Visibility	The area from which project components would potentially be visible. Visibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation and distance.
Visual Exposure	Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion and visual acuity, which is also influenced by weather and light conditions.
Visual Impact	Visual effects relate to the changes that arise in the composition of available views 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 Influence	By determining the zone of potential visual influence, it is possible to identify the extent of potential visibility and views which could be affected by the proposed development. Its maximum extent is the radius around an object beyond which the visual impact of its most visible features will be insignificant primarily due to distance. For the scale and nature of this project it is defined as 5,0km around the centre of the project site.

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EXECUTIVE SUMMARY

Newtown Landscape Architects (NLA) was appointed by SLR Consulting (Africa) (Pty) Ltd to conduct the Visual Impact Assessment (VIA) for the proposed Pilanesberg Platinum Mines (PPM) Plant Expansion project (the Project). PPM is an existing open pit mining operation with mineral processing facilities. The current mineral processing facility comprises the following main components: crushing and ore storage facilities; a series of milling and floatation circuits; concentrator plant; tailings storage facility; support infrastructure and services. The project proposes to expand the mineral processing facilities on the farms Tuschenkomst 135 JP and Witkleifontein 136 JP.

The expanded mineral processing facility will include the following facilities:

- UG2 milling and flotation circuit to process ore from the Sedibelo Platinum Mine (SPM) operation;
- hydrometallurgical plant for the extraction of PGMs and base metals (Kell plant).

In addition, the following is planned:

- upgrading of the existing sewage treatment plant; and
- relocation of the waste storage and handling facility from inside the plant to an area outside the plant.

Furthermore, several community-based initiatives have been established at the mine, such as:

- an aggregate crusher and brick making project;
- nursery;
- vegetable garden and composting area; and
- car wash.

The study area, approximately 65km northwest of Rustenburg, North West Province, is immediately north of the Pilanesberg National Park which incorporates parts of the Black Rhino Nature Reserve, located to the south west of the Project site. The study area includes the Project footprint located within the current plant and environs as well as the ‘zone of potential influence’, an area of approximately 10,0km radius around the project site.

The main land-use activities within the study area are mining, tourism, agriculture and residential areas (mainly rural villages), whose landscape types along with the hills of the Pilanesberg National Park and the koppies that are scattered about the savannah plains, define the natural, rural / mining character and sense of place of the study area.

Sensitive receptors have been identified as tourists travelling through the study area and visiting the tourist attractions including the Pilanesberg National Park and Black Rhino Nature Reserve and heritage attractions between Pilanesberg National Park and the Madikwe Game Reserve. Other potentially sensitive receptors include residents and visitors of the nearby villages, particularly Legkraal.

FINDINGS

The impact of the existing PPM mine and other surrounding mining activities already has a high negative effect on the visual environment of the study area. Only the tallest components of the plant expansion i.e. UG2 Milling and Flotation circuit (23m) would be partially visible to sensitive receptors visiting and living in the Black Rhino Nature Reserve (BRNR), the Pilanesberg National Park (PNP) and Legkraal village located to the south west and south of the study area. The Hydrometalurgical Plant (5m) and its stack (15m) would be visible from the PNP and Legkraal village but not BRNR. However, the facilities would be seen in the background of views and would blend with existing structures. The physical presence of these structures would therefore result in a minor increase in visual intrusion and contribute to the cumulative negative effect of the Project on the landscape aesthetics of the study area. Additional lights from the proposed Project will also contribute to the existing negative impact of mining / plant activities at night on sensitive tourist and residential areas.

It is predicted that the Project, given the worst-case scenario (unmitigated), will exert a **MEDIUM** negative incremental impact on the visual and aesthetic environment when compared against the landscape baseline comprised of mining, village and tourist land use activities. The impact will be cumulative in nature as project components will be built into existing mineral processing facilities located on the farms Witkleifontein 136 JP and Tuschenkomst 135 JP. The impact is unlikely to have a real influence on the decision, although limited mitigation is recommended.

Mitigation measures to reduce glare and light pollution are feasible and necessary to reduce the operational incremental impact to **LOW** (i.e. it will not have an influence on the decision) and to ensure that complaints that might arise from I&APs are negligible. This is particularly important as the life of the Project is expected to extend current processing activities for an additional forty years.

At closure, facilities would be removed, and the impact of the proposed Project would reduce to insignificant with the implementation of mitigation measures.

It is the opinion of the author that all aspects of the Project should be approved provided that the mitigation / management measures are effectively implemented, managed and monitored in the long term and that engagement with the community during this process is continued to ensure the success of these measures.

*** NLA ***

1. INTRODUCTION

1.1 Project Overview and Background

Newtown Landscape Architects (NLA) was appointed by SLR Consulting (Africa) (Pty) Ltd to conduct the Visual Impact Assessment (VIA) for the proposed Pilanesberg Platinum Mines (PPM) Plant Expansion project (the Project). PPM is an existing open pit mining operation with mineral processing facilities. The current mineral processing facility comprises the following main components: crushing and ore storage facilities; a series of milling and floatation circuits; concentrator plant; tailings storage facility; support infrastructure and services. The project proposes to expand the mineral processing facilities on the farms Tuschenkomst 135 JP and Witklei 136 JP.

1.2 Proposed Study area

The study area includes the project footprint / site as well as the 'zone of potential influence', and extends in a radius of 10,0km around the centre of the site. It is located approximately 65km northwest of Rustenburg, North West Province, is immediately north of the Pilanesberg National Park which incorporates parts of the Black Rhino Nature Reserve, located to the south west of the Project site. The project site is located within the Moses Kotane Local Municipality of the Bojanala Platinum District Municipality in the North West Province. Refer to Figure 1 below.

1.3 Objective of the Specialist Study

The main objective of the visual impact specialist study is to ensure that the visual / aesthetic consequences of the proposed project are understood and adequately considered in the environmental planning process. Mitigation measures will be proposed, where appropriate.

1.4 Terms and Reference

The extension of the life of PPM's mineral processing facilities by an additional forty years will prolong the visual impacts that are already experienced by IAPs, particularly sensitive receptors such as the eco-tourism industry. Furthermore, the existing impacts could be exacerbated as additional lighting may be required for the proposed project. A specialist study is required to assess the visual impacts arising from the Project based on the general requirements for a comprehensive VIA. The following terms of reference was established:

- Conduct field surveys of the proposed study area and photograph the area from sensitive viewing points;
- Assess the visual impact of the Project and its cumulative effects;
- Rate project specific and cumulative impacts;
- Propose management measures where appropriate; and
- Make a reasoned opinion whether the proposed activity, activities or portions thereof should be authorised.

1.5 Assumption, Uncertainties and Limitations

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

- The study uses the worst-case scenario (unmitigated) 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, structures 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; visibility of the Project is therefore qualified by on-site observations.
- The description of project components is limited to what has been supplied to the author prior to the date of completion of this report; and
- The study focusses on viewing areas from public and tourist zones located within a 10,0km radius of the project site as informed by the viewshed analysis.

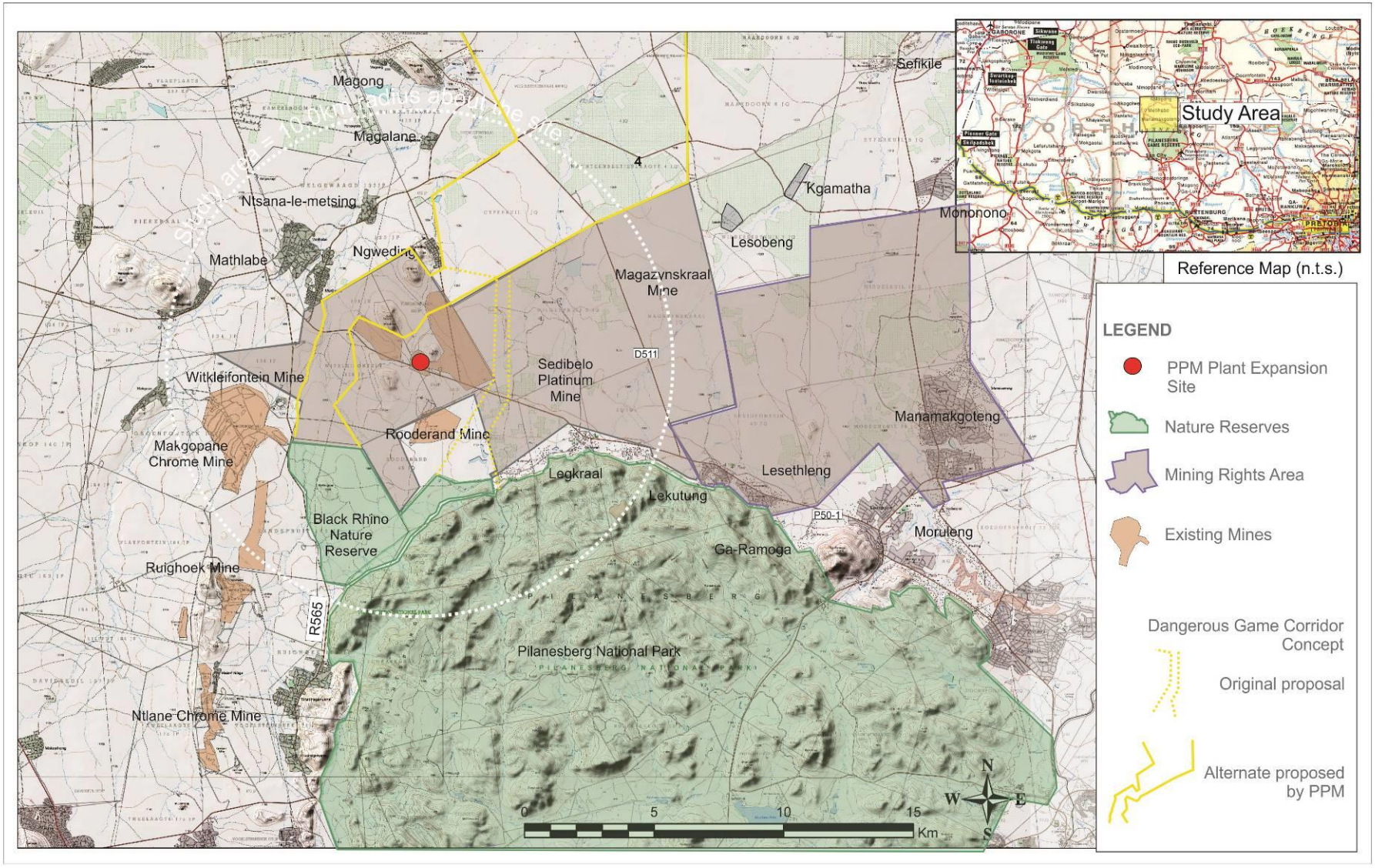

Figure 1: LOCALITY MAP - PPM Plant Expansion Project

November 2018

2. LEGAL REQUIREMENTS AND GUIDELINES

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

2.1 National Guidelines

National Environmental Management Act (Act 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations, 2014

The specialist report has been compiled in accordance with the specification on conducting specialist studies as per Government Gazette (GN) R 982 of the NEMA EIA Regulations 2014, as amended. The mitigation measures as stipulated in the specialist report can be used as part of the Environmental Management Plan (EMP) and will be in support of the EIA.

The NEMA Protected Areas Act (57 of 2003)

The main aim of the Act is to identify and protect natural landscapes. According to the Act there are specific regulations for compilation of specialist report. This VIA report adheres to these specifications.

The National Heritage Resources Act (25 of 1999) (NHRA)

The Act is applicable to the protection of heritage resources and includes the visual resources such as cultural landscapes, nature reserves, proclaimed scenic routes and urban conservation areas. The NHRA states that it aims to promote “good management of the national estate, and to enable and encourage communities to nurture and conserve their legacy so that it may be bequeathed for future generations”. An holistic landscape whose character is a result of the action and interaction and/or human factors has strong cultural associations as societies and the landscape in which they live are affected by one another in many ways;

Section 17 of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEM: PAA) sets out the purposes of the declaration of areas as protected areas which includes the protection of natural landscapes. Landscapes are defined by the natural, visual and subjectively perceived landscape; these aspects of a landscape are intertwined to form a holistic landscape context.

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

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

3. APPROACH AND METHODOLOGY

3.1 Approach

The assessment of likely effects on a landscape resource and on visual amenity is complex, since it is determined through a combination of quantitative and qualitative evaluations (The Landscape Institute with the Institute of Environmental Management and Assessment, 2002). When assessing visual impact, the worst-case scenario is considered. Landscape and visual assessments are separate, although linked, procedures.

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

3.1.1 The Visual Resource

Landscape character, landscape quality (Warnock, 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.

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

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

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

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

- Abstract qualities: such as the presence of vivid, distinguished, uncommon or rare features or abstract attributes;

- Evocative responses: the ability of the landscape to evoke particularly strong responses in community members or visitors;
- Meanings: the existence of a long-standing special meaning to a group of people or the ability of the landscape to convey special meanings to viewers in general;
- Landmark quality: a feature that stands out and is recognized by the broader community.

And conversely, it would be low where:

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

In determining the quality of the visual resource, both the objective and the subjective or aesthetic factors associated with the landscape are considered. Many landscapes can be said to have a strong sense of place, regardless of whether they are scenically beautiful but where landscape quality, aesthetic value and a strong sense of place coincide - the visual resource or perceived value of the landscape is very high. The criteria given by the Environmental Consultant are used to assess landscape quality, sense of place and ultimately to determine the aesthetic value of the study area.

3.1.2 Sensitivity of Visual Resource

The sensitivity of a landscape or visual resource is the degree to which a landscape type or area can accommodate change arising from a development, without detrimental effects on its character. Its determination is based upon an evaluation of each key element or characteristic of the landscape likely to be affected. The evaluation will reflect such factors such as its quality, value, contribution to landscape character, and the degree to which the element or characteristic can be replaced or substituted (Institute of Environmental Assessment & The Landscape Institute, 1996:87).

3.1.3 Sense of Place

Central to the concept of sense of place is that the landscape requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape taken together with the cultural transformations and traditions associated with the historic use and habitation of the area. According to Lynch (1992), sense of place “is the extent to which a person can recognize or recall a place as being distinct from other places – as having a vivid, unique, or at least particular, character of its own”. Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. In some cases, 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.

Because the sense of place of the study area is derived from the emotional, aesthetic and visual response to the environment, it cannot be experienced in isolation. The landscape context must be considered. The combination of the natural landscape (mountains, streams and the vegetation) together with the manmade structures (residential areas, roads, mining activities and power lines) contribute to the sense of place for the study area. It is these land-uses, which define the area and establish its identity.

3.1.4 Sensitive Viewer Locations

The sensitivity of visual receptors and views are dependent on the location and context of the viewpoint, the expectations and occupation or activity of the receptor or the importance of the view. This 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 and heritage sites of cultural importance;
- Communities where 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.

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 traveling through or past the affected landscape in cars or other transport modes;
- People at their place of work.

Views from residences and tourist facilities / routes are typically more sensitive, since views from these are frequent and of long duration.

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

3.1.5 Landscape Impact

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

3.1.6 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 with the absence of visual impacts, for instance where a development is wholly screened from available public views, but nonetheless results in a loss of landscape elements and landscape character within a localized area (the site and its immediate surrounds).

3.1.7 Severity of Visual Impact

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

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

3.1.8 Significance of Visual Impact

A combined quantitative and qualitative methodology, as supplied by the Environmental Practitioner, was used to describe the impacts for: significance, spatial scale, temporal scale, probability and degree of certainty. A summary of each of the qualitative descriptions along with the equivalent quantitative rating scale is given in Annexure D.

For a detailed description of the methodology used in this study, refer to Appendix B, C and D. Image 1 below, graphically illustrates the visual impact process:

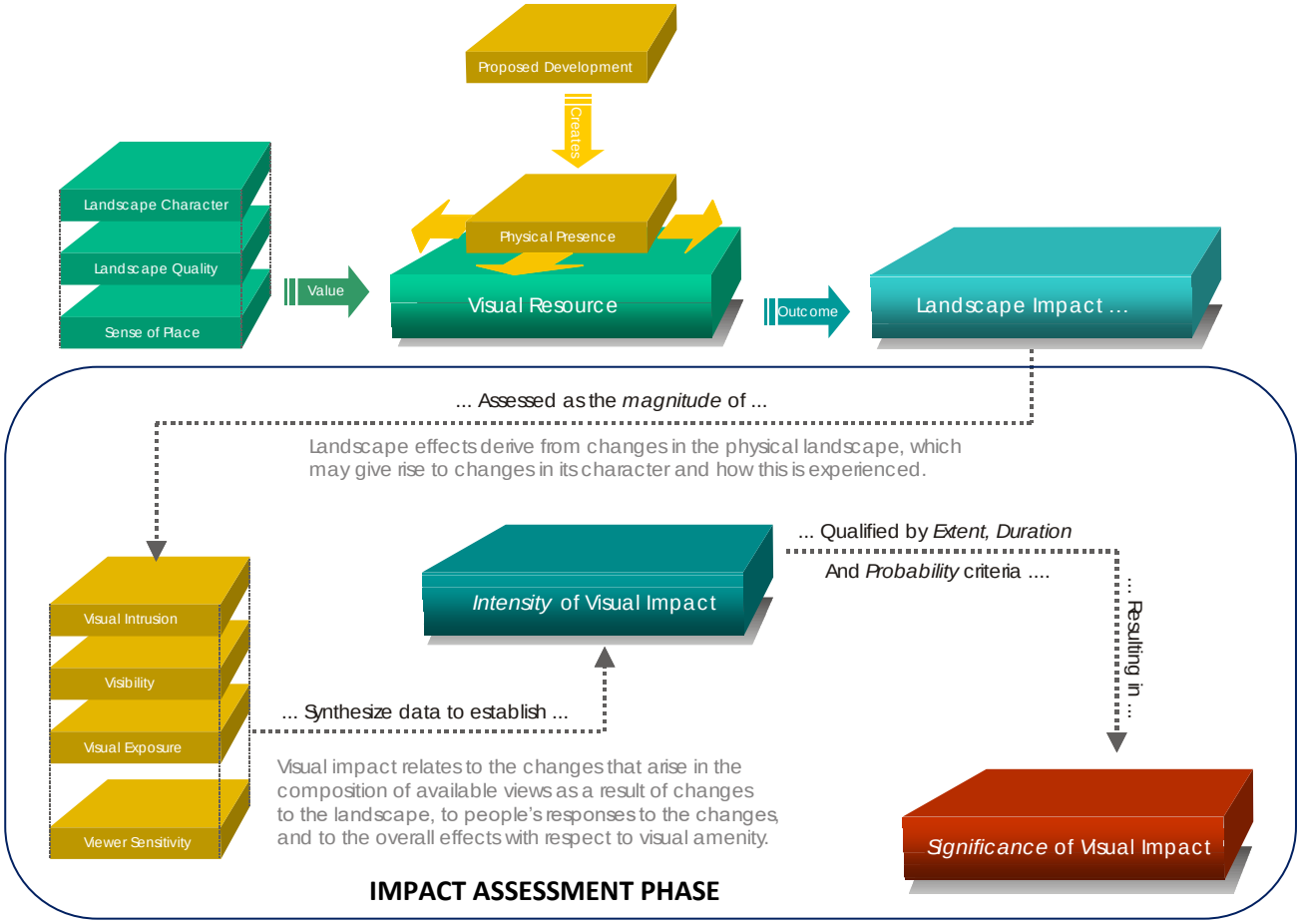

Image 1: Visual Impact Process

3.2 Methodology

The following method was used for the Project:

- Site visit: A field survey was undertaken, and the study area scrutinized to the extent that the receiving environment could be documented and adequately described. The site visit took place on 12 April 2017.
- Project components: The physical characteristics of the project components were described and illustrated;
- General landscape characterization: The visual resource (i.e. receiving environment) was mapped using field survey and GIS mapping technology. The description of the landscape focused on the nature of the land rather than the response of a viewer (refer to Appendix A);
- The landscape character of the study area was described. The description of the landscape focused on the nature and character of the landscape rather than the response of a viewer;
- The quality of the landscape was described. Aesthetic appeal was described using recognized contemporary research in perceptual psychology as the basis;
- The sense of place of the study area was described as to the uniqueness and distinctiveness of the landscape. The primary informant of these qualities was the spatial form and character of the natural landscape together with the cultural transformations associated with the historic / current use of the land;

- Illustrations, in very basic simulations, of the proposed project were overlaid onto panoramas of the landscape, as seen from nearby sensitive viewing points to give the reviewer an idea of the scale and location of the proposed project within their landscape context;
- Visual intrusion (contrast) of the proposed project was determined by simulating its physical appearance from sensitive viewing areas;
- The visibility of the proposed project was determined;
- The impact on the visual environment and sense of place of the proposed project was rated based on a professional opinion and the method described below; and
- Measures that could mitigate the negative impacts of the proposed project were recommended.

4. DESCRIPTION OF THE PROJECT

The proposed expansion project would include the following components:

- UG2 milling and flotation circuit to process ore from the Sedibelo Platinum Mine (SPM) operation;
- hydrometallurgical plant for the extraction of PGMs and base metals (Kell plant);

In addition, the following is planned:

- upgrading of the existing sewage treatment plant; and
- relocation of the waste storage and handling facility from inside the plant to an area outside the plant.

The hydrometallurgical plant will utilize new technology which replaces the conventional platinum smelting and base metal refining operations. Figure 2: Proposed Layout below indicates the location of the proposed new structures relative to existing infrastructure. Figures 2a is a close-up of the plant area and Figure 2b is an aerial of the plant area. Furthermore, several community-based initiatives have been established at the mine, such as:

- an aggregate crusher and brick making project;
- nursery;
- vegetable garden and composting area; and
- car wash.

It is expected that the proposed project will extend the life of PPM's processing facility by an additional 40 years and beyond the life of mine.

4.1 Construction Phase Activities and Timing

It is envisaged that it will take approximately 18 months to establish the UG2 milling and flotation circuit and 24 months to establish the Kell plant. For the remaining components (upgrade of the sewage treatment facility, and new waste storage area) the construction phase is expected to be 1 to 2 months.

4.1.1 Construction phase facilities

The facilities listed below will be established within an already disturbed area during the construction phase:

- surface footprints for the additional processing and supporting infrastructure components;
- contractors' yard;
- temporary storage areas; and
- supporting piping, instrumentation and electrical components.

4.1.2 Construction phase activities

The following significant activities will take place during construction:

- digging of foundations and trenches within existing sites;
- delivery of materials within existing sites; and
- general building/construction activities within existing sites.

4.2 Operational Phase Activities and Timing

The proposed expansion to the processing facilities will have the potential to extend the life of the PPM processing plant from the current 12 years to an additional 40 years. This will also offer an opportunity for future treatment capacity of ore from neighbouring mining operations.

4.2.1 Operational phase activities

Should the proposed project be approved, the following facilities, will be built and operated:

- hydrometallurgical plant for the extraction of PGMs and base metals;
- UG2 milling and flotation circuit to process ore from the SPM operation.

4.3 Closure

Broadly speaking, the decommissioning phase of the plant would include the removal of infrastructure from site and the final rehabilitation of areas.

The short term and long-term rehabilitation objectives are as follows (GCS, 2016):

Short term objectives:

- Backfilling of the open pit to approved void volume;
- Demolish and remove all infrastructure, as per the closure plan, that will not be handed over to the surrounding communities;
- Handover of community water supply scheme, having ensured sufficient technical, financial and managerial skills are transferred as per the EMP;
- Slope all areas to appropriate gradients and ensure runoff flows into the pit (where applicable);
- Establish native pioneer vegetation on slopes;
- Prevent the growth of alien vegetation; and
- Redirect the Wilgespruit River along its original flow path into the remaining void.

Long term objectives:

- Stable landforms that blend into the surrounding environment;
- Sustainable supply of safe drinking water for people or livestock or sustainable supply of irrigation water depending on treatment method and end water quality;
- Return of native flora and fauna;
- Landforms that allow for the desired land uses; and
- Ensure no negative residual impacts are present.

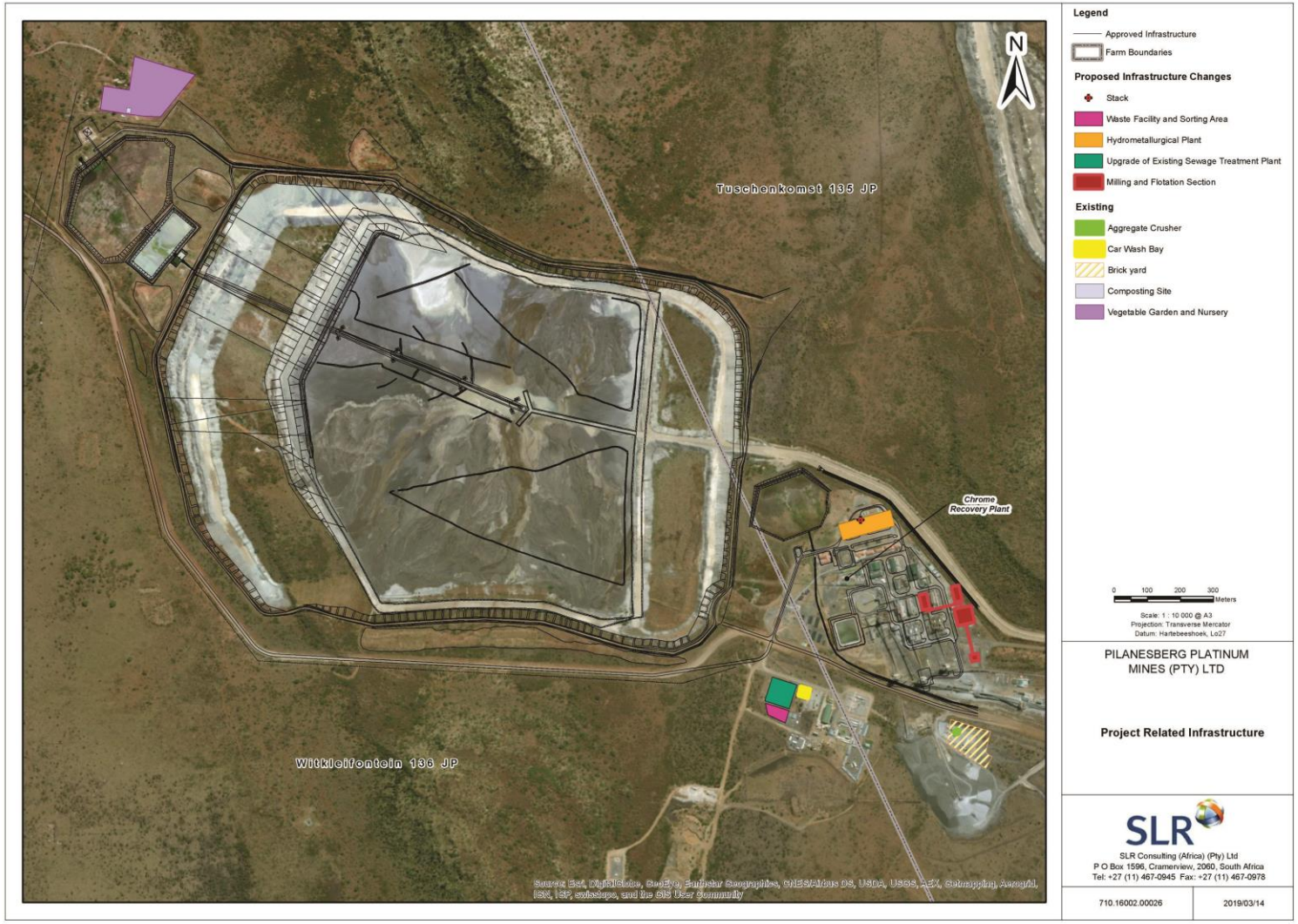

Figure 2: PROJECT SITE AND LAYOUT - PPM Plant Expansion Project

March 2019

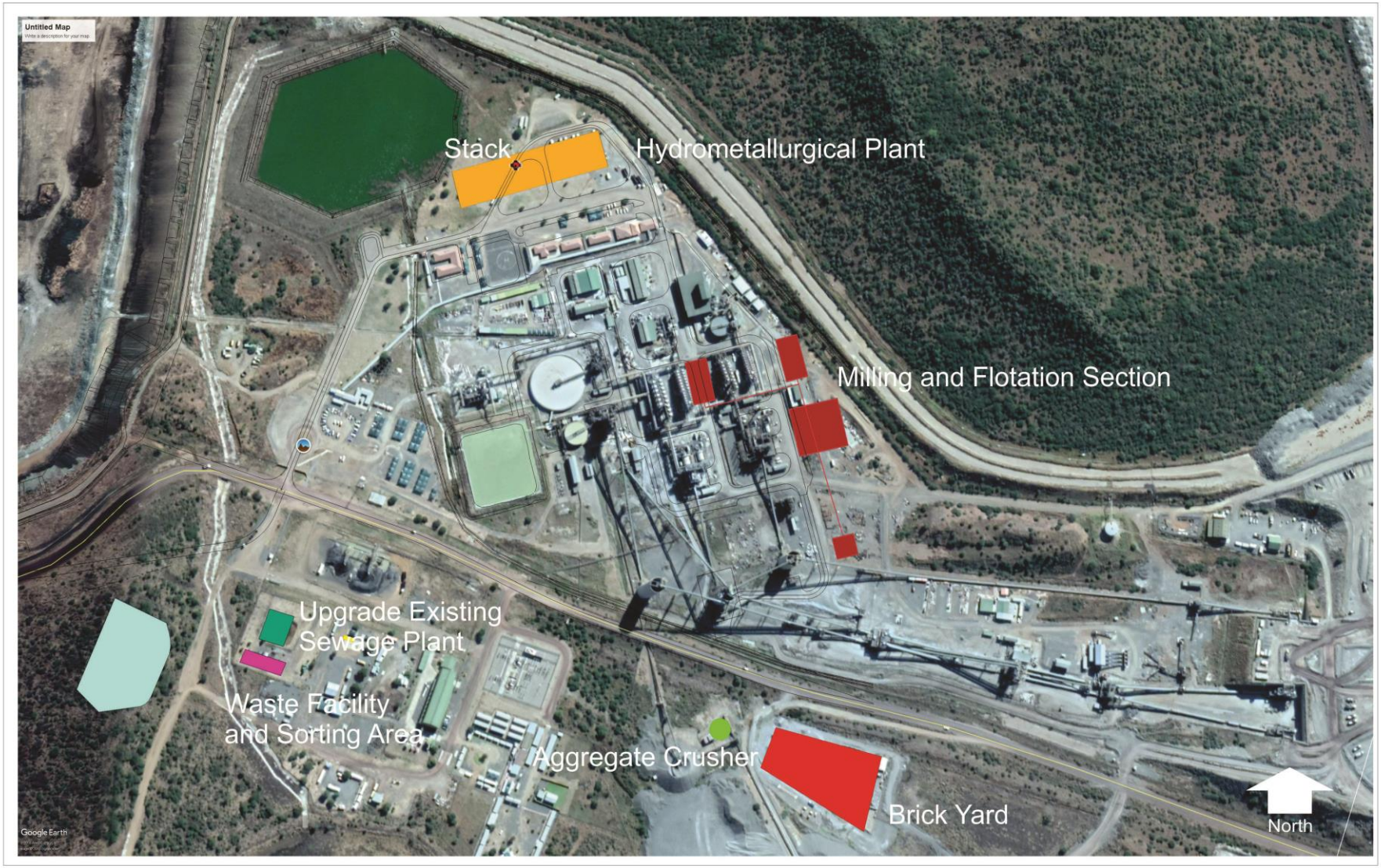

Figure 2a: LAYOUT - PPM Plant Expansion Project

March 2019

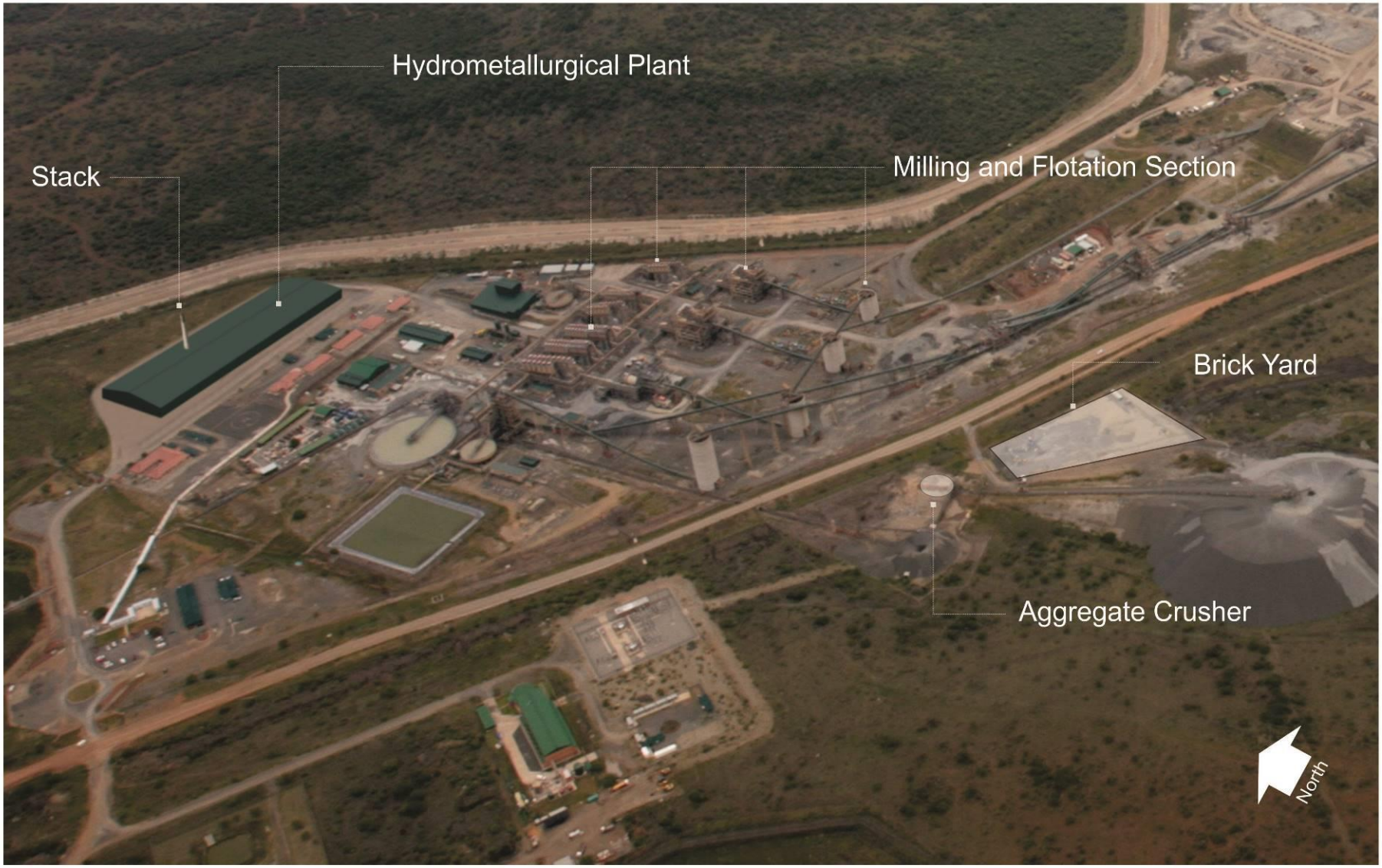

Figure 2b: LAYOUT - PPM Plant Expansion Project: Aerial Main Structures

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5. PROJECT ALTERNATIVES

No infrastructure layout alternatives were considered as the infrastructure will need to be placed within and adjacent to the footprint of the existing infrastructure to allow for the sharing of support services (offices, security etc.) and support infrastructure (workshops, stores, water reticulation and electricity etc.). In addition to this, the hydrometallurgical plant will generate a product of high commercial value and must be located within a highly secure area. The identified site for the hydrometallurgical plant is therefore located in an area which is highly visible, within the project site, and is within proximity to the existing security control points and main office block (SLR 2015).

6. VISUAL ISSUES

Typical issues associated with mining 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?
- What will the cumulative impact be?

The public participation process was carried out by SLR. The following visual related issues were raised:

Visual	Lighting	I am concerned about the effect of additional lighting in the area.	Chris Basson – Black Rhino Game Reserve	Comment raised during focussed group meeting, 7 April 2015

7. THE ENVIRONMENTAL SETTING

7.1 The Study Area

For the following section, refer to Figure 3 which indicates the location of the panoramas in Figures 4 to 9 at the end of this section.

The description of the receiving environment for the proposed PPM project was sourced from desktop studies, aerial photographs, 1:50000 Topographical maps and observations of the specialist during the site visits conducted on the 27 June 2014 and 12 April 2017.

7.2 Landscape Character Types

7.2.1 Residential

The residential component of the study area comprises of various communities. These communities include: Legkraal (approximately 7km southeast of the Project site), Mathlabe (approximately 7km northwest), Ntsana-le-metsing (approximately 8km north), Ngweding (4,5km), and Magalane (approximately 9km north) (hereafter referred to as 'the communities'). Refer to the Land Types Map on Figure 10 for their specific locations.

7.2.2 Agriculture

Historically, large scale agricultural activities occurred within the study area. Current agricultural activities include some crop production but mostly comprise of livestock grazing (cattle, goats and poultry) as well as subsistence farming.

7.2.3 Tourism

Tourism is one of the main activities in the area and includes high prolife conservation areas and tourist destinations such as Pilanesberg National Park and Black Rhino Nature Reserve. The Pilanesberg National Park is a major, internationally known, tourist attraction and it has attracted some tourist activity along its edges including the Black Rhino Nature Reserve which currently accommodates several lodges. The closest is approximately 6,0km southwest of the Project site.

A tourism initiative to integrate the Pilanesberg National Park and Madikwe Game Reserve has been proposed. This master plan envisages a dispersal corridor between the two reserves and eventually a corridor stretching into the southern parts of Botswana which will form the Heritage Park incorporating an area of 275 000ha. The original corridor is proposed to the east of the mine, between it and Sedibelo Platinum Mine. This project is a long-term vision and according to the Heritage Park's media statements, agreements between mineral rights owners and the Heritage Park will be negotiated in order to find mutually acceptable mining practices within these areas. Refer to Figure 3 for extent of the proposed corridors.

7.2.4 Infrastructure, Industries and Mining

Mining forms an integral part of the study area. These are in an 'arc' west to north, following the periphery of the Pilanesberg 'crater' from west to north as illustrated in Figure 3 below.

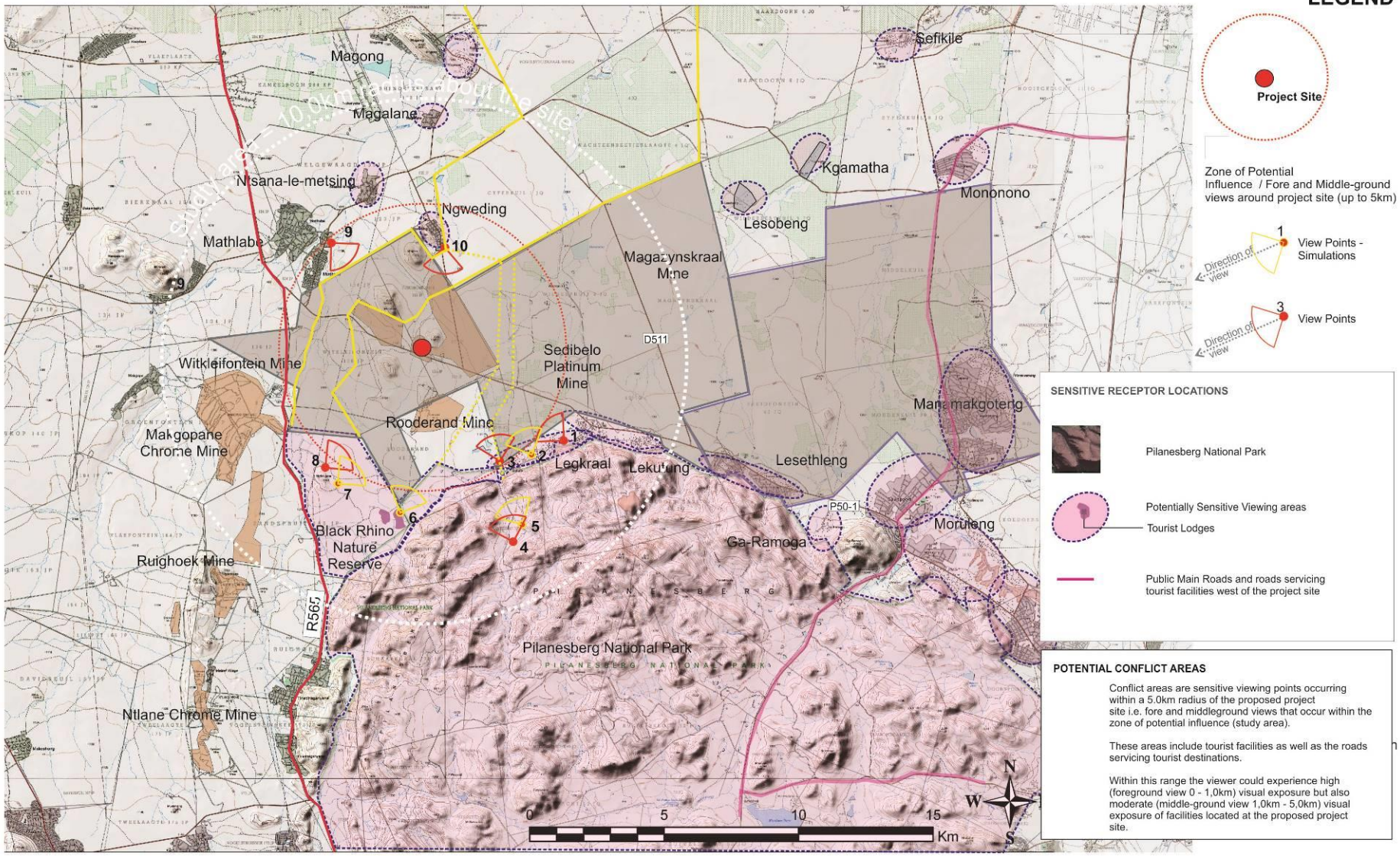

Figure 3: SENSITIVE VIEWING AREAS AND VIEWPOINTS - PPM Plant Expansion Project

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7.2.5 Transportation systems

Major tarred routes include the P50, running east-west through the study area, and the R565, (partially tarred) running north-south through the study area. Other roads include local distribution roads, mostly dirt, servicing the communities and reserves.

7.3 Landscape Character

Landscape character types are landscape units refined from the regional physiographic and cultural data derived from 1:50 000 topographical maps, aerial photographs and information gathered during the site visit. Dominant landform and land use features (e.g., hills, rolling plains, valleys and urban areas) of similar physiographic and visual characteristics, typically define landscape character types.

The plains in the northern part of the study area are covered with various Acacia species and other woody species in varying densities. Due to the clay soils however, most tree species are 'stunted'. The deterioration (probably due to overgrazing) of the grass sward has caused an increase in cover of the woody species, giving the study area north of the Pilanesberg its 'low bushveld' or savannah character.

A series of small hills or koppies are distributed in the general arc west and north-west of the Pilanesberg. Vegetation on the koppies comprises mostly of mixed bushveld tree species with a relatively dense cover and are seemingly in better condition than the plain vegetation. The combination of topographic relief and healthy vegetation cover give these hills an aesthetic appeal that contributes positively to the sense of place of the study area. The Project site is set amongst a series of three of these koppies as indicated in Figure 10. Some of these koppies have archaeological sites and artefacts of the late iron age.

Impressive hills, just south as well as to the south-east and south-west of the site, are associated with the Pilanesberg National Park. These are the dominant natural features in the area and can been seen from over 10 kilometres away due to the surrounding flat plains. Their obvious scenic beauty contributes greatly to the sense of place of the study area. Refer also to the panoramas in Figures 4 – 9 below.

Figure 4: LANDSCAPE CHARACTER Views 1 and 2 - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

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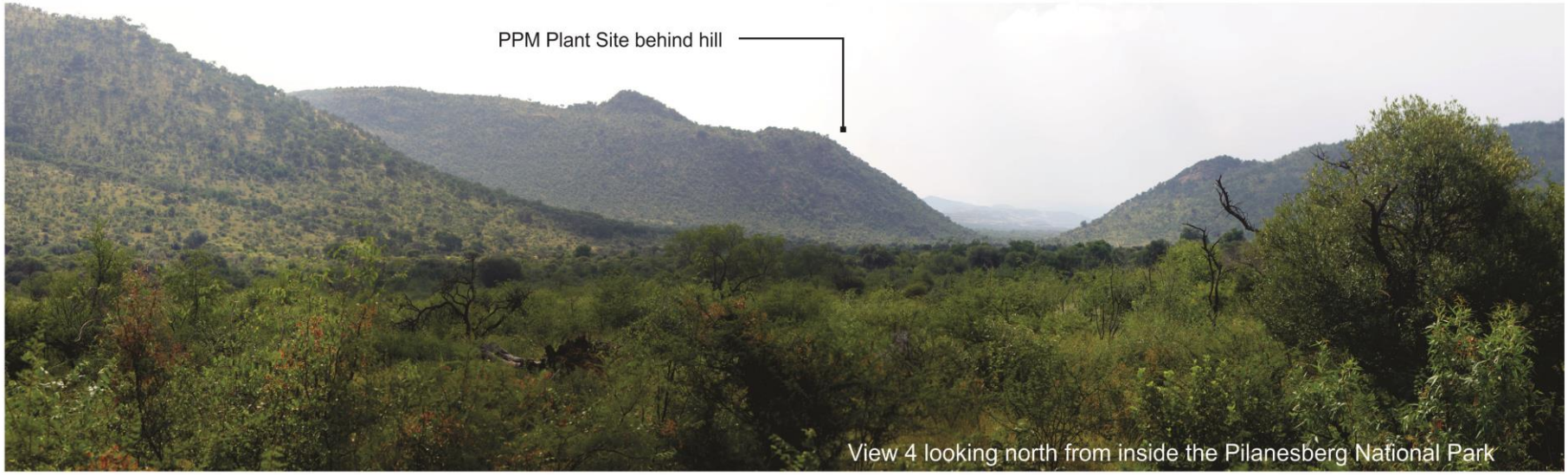

Figure 5: LANDSCAPE CHARACTER Views 3 and 4 - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

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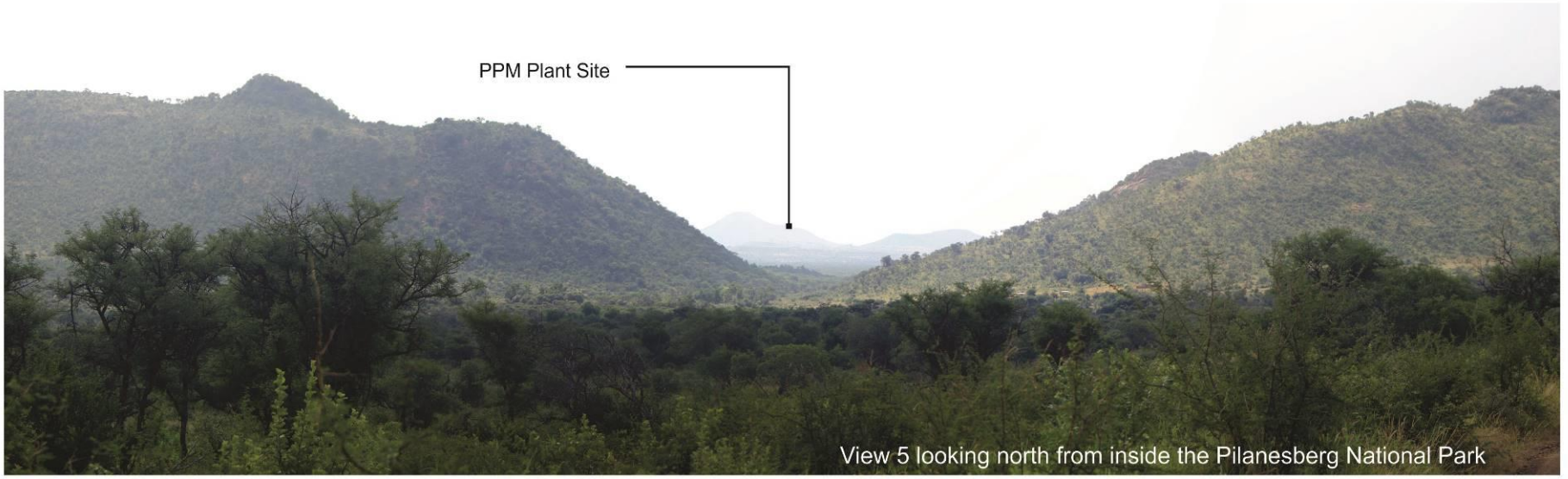

Figure 6: LANDSCAPE CHARACTER Views 5 and 6 - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

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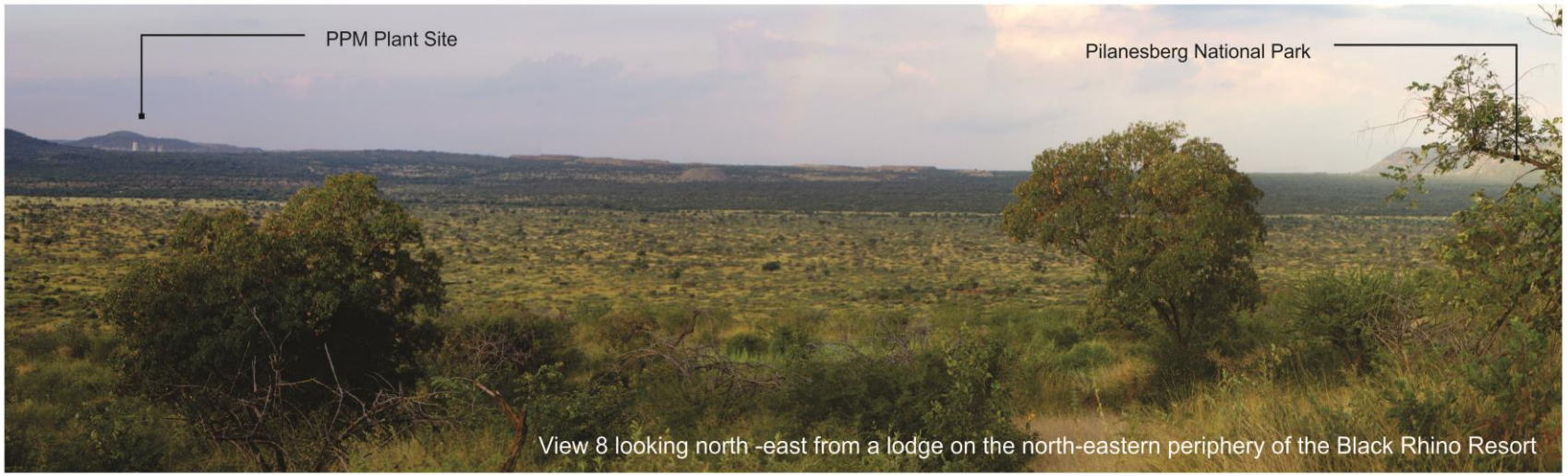

Figure 7: LANDSCAPE CHARACTER Views 7 and 8 - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

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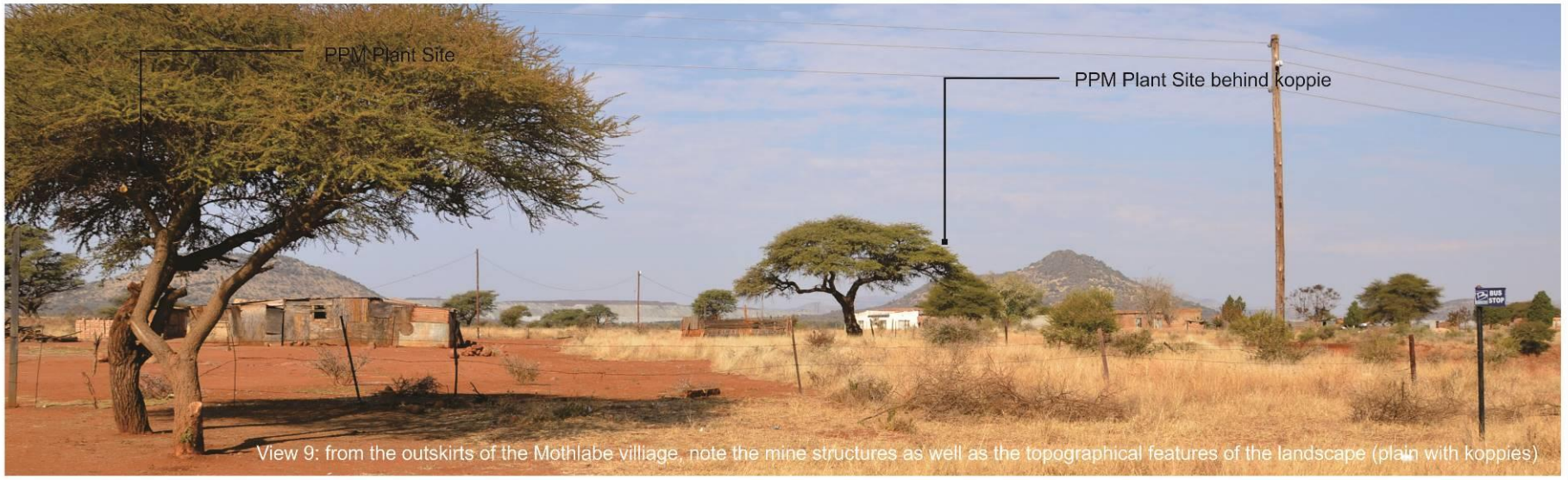

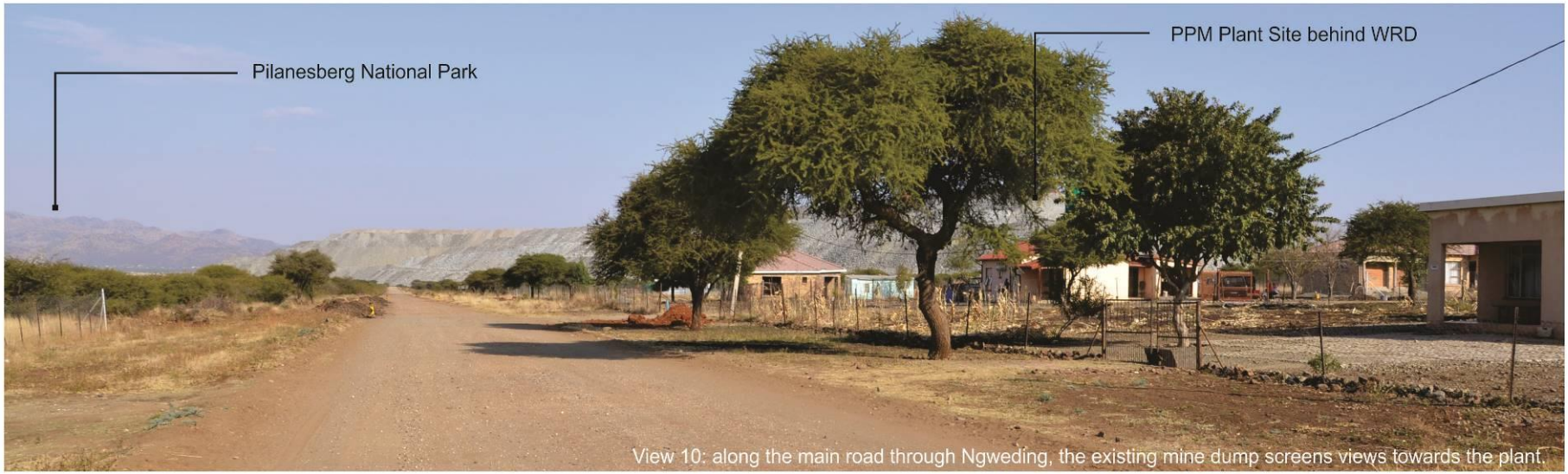

Figure 8: LANDSCAPE CHARACTER Views 9 and 10 - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

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Figure 9: LANDSCAPE CHARACTER Views 6 Night-time - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

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8. VISUAL RESOURCE

8.1 Visual Resource Value / Scenic Quality

The spatial distribution of the landscape types discussed in Section 7 are illustrated on Figure 10 Visual Resource. The figure also rates the relative scenic quality of each type and its landscape sensitivity. The highest value is assigned to the mountains, koppies and nature reserves. The agricultural fields, water bodies and water courses as well as the communities and settlements were assigned with a moderate rating and the roads and mining activities with a low rating using the criteria listed in Table 1 below.

The project site has a low scenic value rating due to its location relative to current mining operations. When the full extent of the study area is considered (i.e. a visual envelope that incorporates most landscape types in any given view) a moderate to high value is assigned with a relative strong sense of place. The original natural beauty of the area has been compromised by the existing mining and settlement activities. The impact of these (particularly the mining activities) is particularly evident at night when the bright lights are noticeable against the otherwise dark night sky.

Table 1: Value of the Visual Resource
(After The Landscape Institute with the Institute of Environmental Management and Assessment (2002))

High mountains, koppies, reserves, water bodies and water courses	**Moderate** agricultural fields, and settlements	**Low** roads, mining activities
This landscape type is considered to have a *high* value because it is a: Distinct landscape that exhibits a very positive character with valued features that combine to give the experience of unity, richness and harmony. It is a landscape that may be of importance to conserve and which has a strong sense of place.	This landscape type is considered to have a *moderate* value because it is a: Common landscape that exhibits some positive character, but which has evidence of alteration /degradation/erosion of features resulting in areas of more mixed character.	This landscape type is considered to have a *low* value because it is a: Minimal landscape generally negative in character with few, if any, valued features.
Sensitivity: It is sensitive to change in general and will be detrimentally affected if change is inappropriately dealt with.	Sensitivity: It is potentially sensitive to change in general and change may be detrimental if inappropriately dealt with.	Sensitivity: Low sensitivity to change

Whilst the natural hills of the Pilanesberg National Park and their associated side slopes are considered to have a high visual quality, the plain tends to have a *moderate* (where mining and settlement activities become obvious) rating. The lower rating is because of the intrusive nature of these man-made elements. The lowest rated land type is mining and utilities (power lines) elements. Using the criteria and values defined in Appendix B along with the discussion in the previous sections, the overall scenic quality of the study area is *moderate to high* (south and south eastern section incorporating the Pilanesberg National Park).

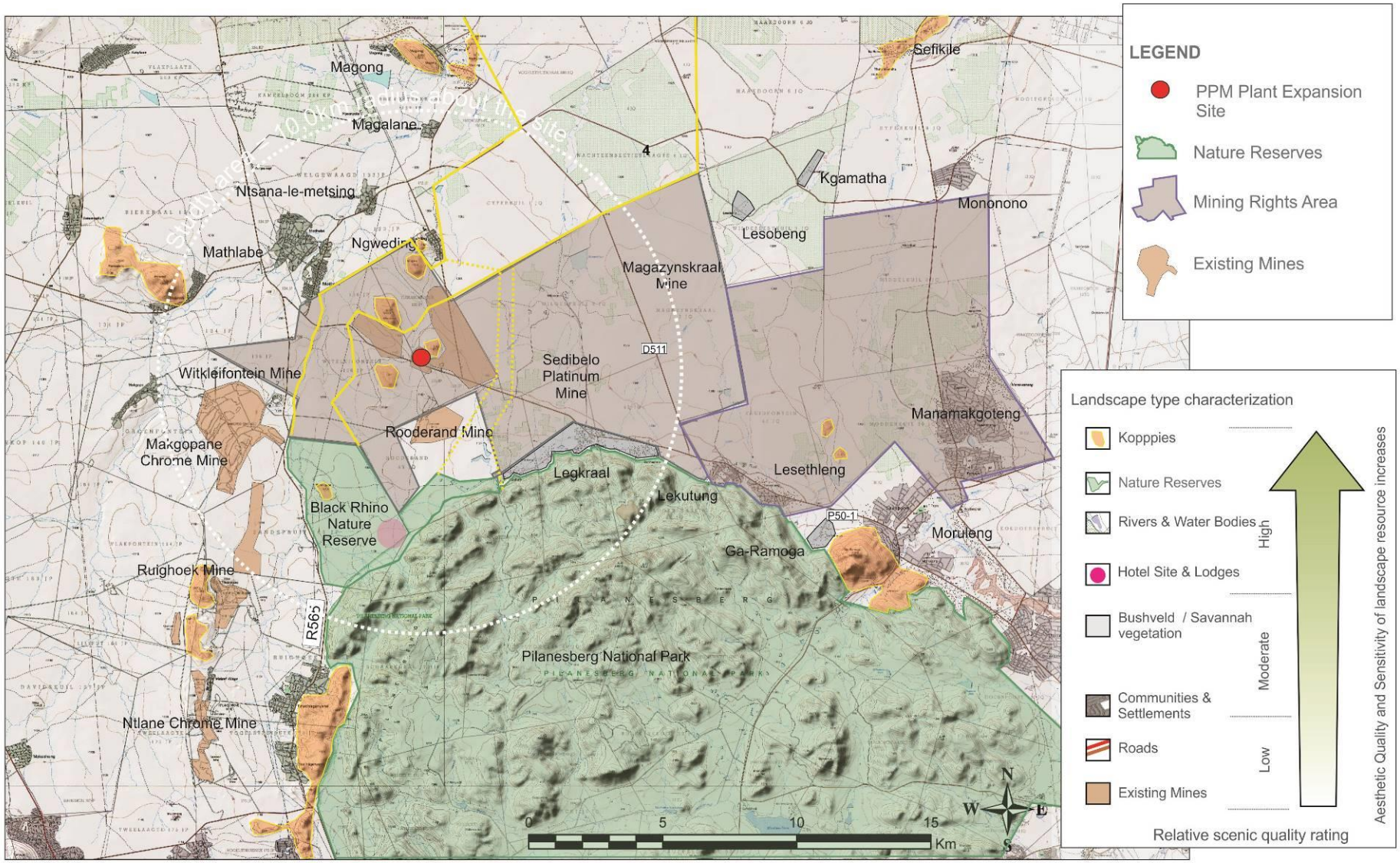

Figure 10: VISUAL RESOURCE - PPM Plant Expansion Project

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8.2 Sense of Place

According to Lynch (1992) sense of place "is the extent to which a person can recognize or recall a place as being distinct from other places - as having a vivid, or unique, or at least particular, character of its own".

The reason for tourism to be attracted to the area, in addition to game viewing, is the scenic beauty and sense of place of sections of the study area. Prior to mining activities, the area projected a strong sense of place with great aesthetic value. This value also related to the night time experience of 'remoteness' or wilderness which lacked many light sources. The advent of mining activities has eroded this experience and today the sense of place is being accumulatively impacted upon by mining activities and the steady growth of informal homesteads and communities. The current combination of mining activities, villages, tourist activities, the Pilanesberg mountains and the koppies, present a mixed mining / rural / natural character to the study area. The panoramas in Figures 4 – 9 illustrated the landscape character which underpins this sense of place, which has a certain appeal but is not unique in terms of the sub-region.

9. VISUAL RECEPTORS

9.1 Views

The Project's structures most likely to be visible from the surrounding areas, due to their scale and size are:

- The UG2 milling and floatation section (approximately 23m in height).
- And the Hydrometallurgical plant (Kell Plant) will be housed inside a building approximately 5m high and the stack will be approximately 15m in height.

Other activities i.e. two tailings treatment plants (approximately 10m) and the chrome recovery facility (10m), are relatively small compared with existing plant structures and would not be prominent from sensitive viewing areas (Black Rhino Nature Reserve (BRNR), Pilanesberg National Park (PNP) and nearby villages south of the Project site i.e. Legkraal and Lekutung. Views from Mathalabe and Ngwedeng would mostly be blocked by the koppies north of the Project site as is evident in Views 9 and 10 in Figure 8. Community-based activities i.e. an aggregate crusher and brick making project, composting area, nursery, vegetable garden, waste handling facility, and car wash, similarly will be absorbed into the scene by existing structures.

Most views of the proposed larger and tall structures would originate in the BRNR (higher elevations), PNP (through the 'poort' access to the park), along the P50 road running past Legkraal and the R565 west of the site. However, most views of the structures from these locations would be partially obstructed by existing mining and plant structures, topography and other landscape features as illustrated in the panoramas in Figures 4 – 8 and the simulations in Figures 12 – 15. The proposed new the structures would also merge with existing structures as is evident in the aerial simulation in Figure 2b.

9.1.1 Sensitive Viewers and Sensitive Viewer Locations

Viewers with a potentially *high* sensitivity to the project include people living in and visiting residences, heritage and tourist facilities i.e. BRNR, PNP and Legkraal. During the public participation process visual issues were mentioned as a concern of the I&APs particularly by people associated with eco-tourism activities (refer also to Section 6.0 which highlights these concerns). People with a sensitivity to a project, will be more likely to notice and be affected by changes in the visual environment.

Visual receptors with a *moderate* sensitivity would be people travelling through the study area. Visual receptors with a *low* sensitivity, would include employees in the mining and related industries. Figure 10 indicates the areas where high sensitivity would occur based on these criteria.

Table 2: Potential Sensitivity of Visual Receptors

High Tourists visiting BRNR and PNP and Residents of Legkraal	**Moderate** People travelling through the study area on the R565, P50, and other local roads	**Low** Employees of the mining and related industries
Visitors of tourist attractions and travelling whose intention or interest is 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.	Visitors and people working within the study area and travelling along local roads whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

10. LANDSCAPE IMPACT

10.1 Landscape Impact

The incremental *landscape impact* (i.e. the change to the fabric and character of the landscape caused by the physical presence of the intervention) of the proposed Project will be ***low*** because the Project activities as described in Section 4 would be located in already disturbed areas within the existing plant area. Refer to Figures 2, 2a and 2b which indicate the location of the proposed new structures / activities.

The development / construction of Project activities would be seen within the context of existing mining and industrial activities which have already impacted negatively on the original landscape. Therefore, the contrast between existing activities and proposed new Project activities will be minimal as will be the impact on the landscape.

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

11. VISUAL IMPACT

Visual impacts will be caused by the physical presence of activities/structures associated with the Project in all phases i.e. construction, operational, decommissioning and closure. The most prominent structures (UG2 Milling and Flotation (approximately 23m) and the Kell Plant (5m) and its stack (15m)) will be visible (day and night), to varying degrees and from varying distances around the Project site. During the construction phase (2 years) the Project's visibility will be influenced due to the increase in activities i.e. construction of the structures. During operation, visibility will be influenced by the physical presence of the structures (the proposed expansion to the processing facilities have the potential to extend the life of the PPM processing plant from the current 12 years to an additional 40 years) and night lighting located on the upper levels of the structures. During the decommissioning / closure phases the visibility of the Project will be influenced by activities associated with the disassembly of structures. The most significant contribution (accumulative impact as plant infrastructure already exists) to visibility of the Project, is the scale and bulk of the structures during the construction and operational phases as well as additional night lighting. However, the expansion Project's visibility must be understood within the context of the current plant's most prominent structures i.e. the silos and the DMS plant are approximately 42m and 36m respectively,

It has been established (Section 9) that viewer sensitivity is moderate to high towards the project, During the public participation process the only issue raised by I&APs relates to the potential impact of additional night lighting on residents and tourists visiting the BRNR. However, the moderate to high sensitivity rating is due to the ongoing issues that tourist operations have with PPM and that visual issues were again highlighted in the public participation process.

It is also assumed that residents of Legkraal and tourist travelling or on walking trails in the PNP could be sensitive to visual impacts originating from the expansion project, based on generic sensitivity potentials discussed in section 9. The *intensity* and ultimately the *significance* of the visual impact of the Project will therefore focus on views from these geographic areas.

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 (refer also to Appendix C).

11.1 Visibility

The 'zone of potential influence' was established at 10,0km, primarily due to the flatness of the study area. Over 10,0km the impact of the Project would have diminished substantially. Its structures and activities will recede into a mining / industrial background comprised of existing activities and infrastructure and many views to the project site would be partially or completely screened by existing vegetation, structures and topography, thus significantly reducing the potential for visual impact.

In determining the visibility of the Project (day and night) the heights of the most prominent Project structures, i.e. the proposed UG2 milling and flotation plant (23m) and the Hydrometallurgical Plant (Kell Plant – 5m) and its stack (15m), were used.

Offsets equivalent to the heights of existing structures (silos at 42m and the DMS plant at 36m) were used to create the viewshed illustrated in Figure 11 – Existing Viewshed. The viewshed in Figure 11a – Proposed Structures indicates the visibility of the proposed new structures. When comparing the two viewsheds (Figure 11b) it is evident that there is a minimal, (additional) increased area (the dark black areas in the figure) from which the Proposed project would be visible i.e. visibility remains much the same as for the existing plant although more structures would be seen, resulting in a minor incremental effect on visibility. Figure 11c indicates only the areas where increased visibility will occur.

The viewshed illustrates that the tallest aspects (as described above) of the Project would be visible for most areas within the 'zone of potential influence', primarily due to the plant's new structures being in a slightly raised position on a low ridge line between two natural koppies. The partially screened structures will be visible from many viewing points within the study area and they will blend with existing structures. The simulations in Figures 12 to 15 indicate this as it is difficult to make out where the new structures are in the panorama. The visibility (assuming the worst-case scenario i.e. clear atmosphere with no haze and good lighting conditions - early morning and late afternoon) of the Project's most prominent structures is therefore reduced resulting in a moderate to low visibility rating.

11.2 Visual Exposure

Visual exposure is determined by qualifying visibility with a distance rating to indicate the degree of intrusion and visual acuity. Table 3 specifies the potential exposure of the various sensitive viewing areas south and south west of 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 due to the exponential area of the viewing envelope as well as atmospheric haze. In all instances the Projects tallest structures will be partially to mostly obscured from sensitive views and they will occur in the background of views. The Project's visual exposure is therefore rated *low*.

Table 3: Sensitive Receptors – Visual Exposure

Receptor areas	Foreground view i.e. 0 – 800m from Project Site	Middle-ground view i.e. 800m to – 3,0km from Project Site	Background view i.e. > 3,0km from Project Site
Black Rhino Nature Reserve (BRNR) and Lodges			X Views partially obstructed (at 5,5km from koppie to 6,5km from closest lodge to Project site)
Pilanesberg National Park access road from BRNR			X Views mostly obstructed (at 7,5km from access road to Project site)
Residences in Legkraal			X Views partially obstructed (at 5,0km to 7,0km to

			Project site)
R565 west of the site			X Some open views but 90 degrees to direction of travel

11.3 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 12 and 15 illustrate the effect that the Project will have on views from a variety of locations south and south west of the site (refer to Figure 10 for locations).

As was established in the section above, the Project's most visible and tallest components will always appear in the background and adjacent to existing plant infrastructure. Visual intrusion will therefore reduce dramatically. This is evident in the aerial image, Figure 2b and specifically the simulations where it is difficult to identify the new structures. Visual intrusion is therefore rated *low*.

11.3.1 Night lighting

The impact of lights at night is a sensitive issue associated with mines in the area. One of the reasons that tourists go to nature conservation areas such as the BRNR and PNP, is to get away from the bright lights of the city and to enjoy the darkness of the night sky. The impact of night lighting is consistently raised by I&APs as it is an impact that would continue for the remainder of the mine's life. At closure all lights associated with the current mining activities and the Project would be removed.

The negative effect of night lighting against a relatively dark sky is particularly annoying to tourists and residents visiting the BRNR and the PNP and for which management measures should be implemented to limit the spillage of light beyond the mine's site boundaries.

The study area does however have an increasing light pollution problem, as villages and other mines in the area expand. The combined effect of this is that the darkness of the night sky, associated with nature tourism, is slowly being compromised in the area north of the PNP. The Project will contribute to the current negative effects of light pollution (Figure 14 View 6 Dusk), however, the cumulative effect, which will be relatively minor, must be competently managed. Refer also to Figure 14 – After Development.

11.3.2 Visual Intrusion Rating

Visual intrusion (day and night) on the BRNR, PNP and Legkraal is rated *low* as indicated in Table 4 below.

Table 4: Visual Intrusion

High	Moderate	Low
When the Project would have a substantial negative effect on the visual quality (sense of place) of the landscape relative to the baseline landscape because it would:	When the Project would have a moderate negative effect on the visual quality (sense of place) of the landscape;	Because the Project would have a minimal effect on the visual quality (sense of place) of the landscape; And would contrast minimally with

And contrast with the patterns or elements that define the structure of the landscape;	And contrast moderately with the current patterns or elements that define the structure of the landscape; And be partially compatible with land use (industrial), settlement or enclosure patterns of the general area;	the patterns or cultural elements that define the existing structure of the landscape; And the proposed new activities are mostly compatible with land use, settlement or enclosure patterns (i.e. they occur within the existing footprint of the PPM plant;
The RESULT: Being a notable change in landscape characteristics over an extensive area and an intensive change over a localized area resulting in major changes in key views.	*The RESULT:* Being a moderate change in landscape characteristics over localized area resulting in a moderate change to key views.	*The RESULT:* Is a minimal causing minor changes to key views from the tourist and residential areas in BRNR, PNP and Legkraal village

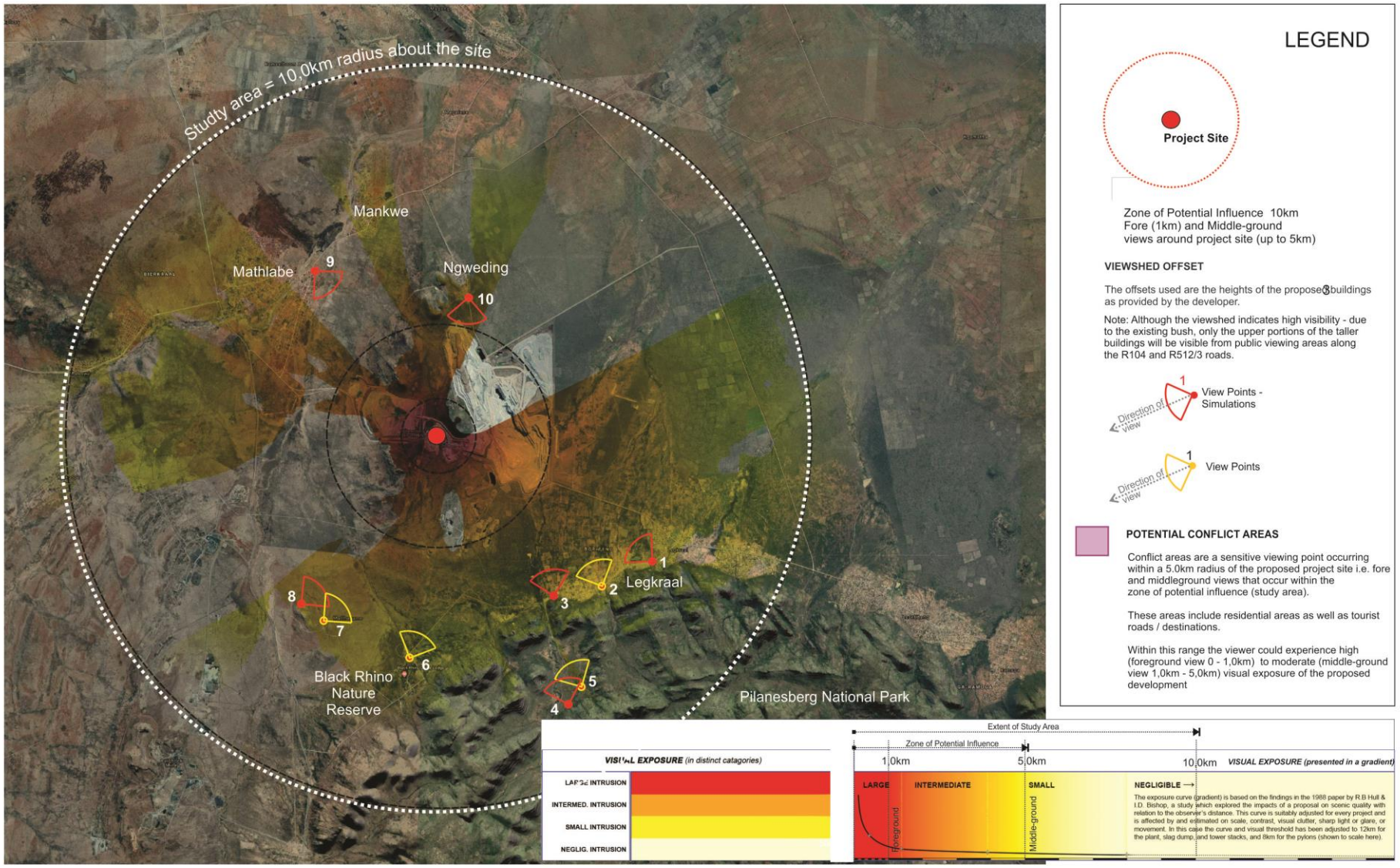

Figure 11: VIEWSHED ANALYSES - EXISTING PPM PLANT

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

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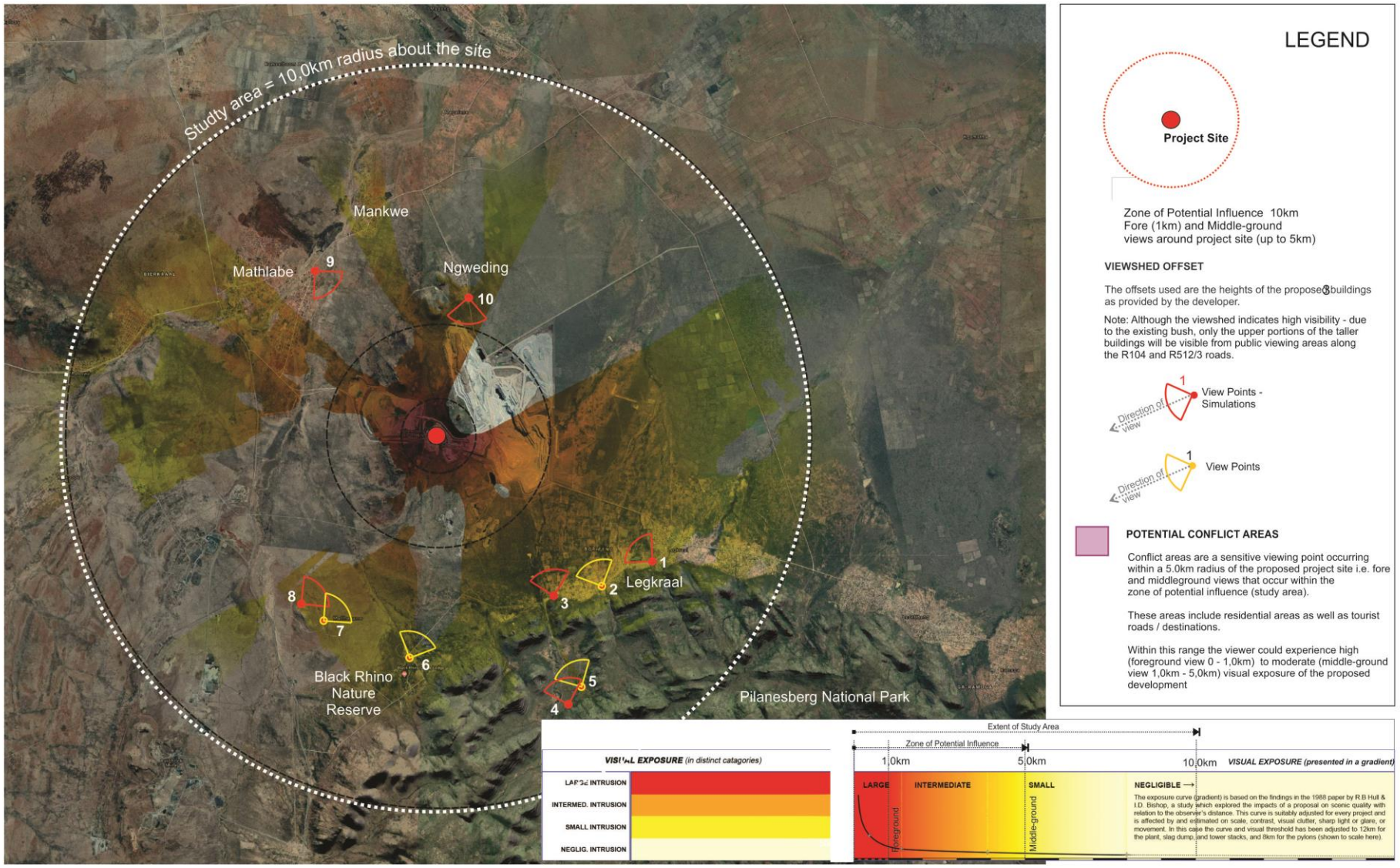


Figure 11a: VIEWSHED ANALYSES - EXPANSION INFRASTRUCTURE

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

November 2018

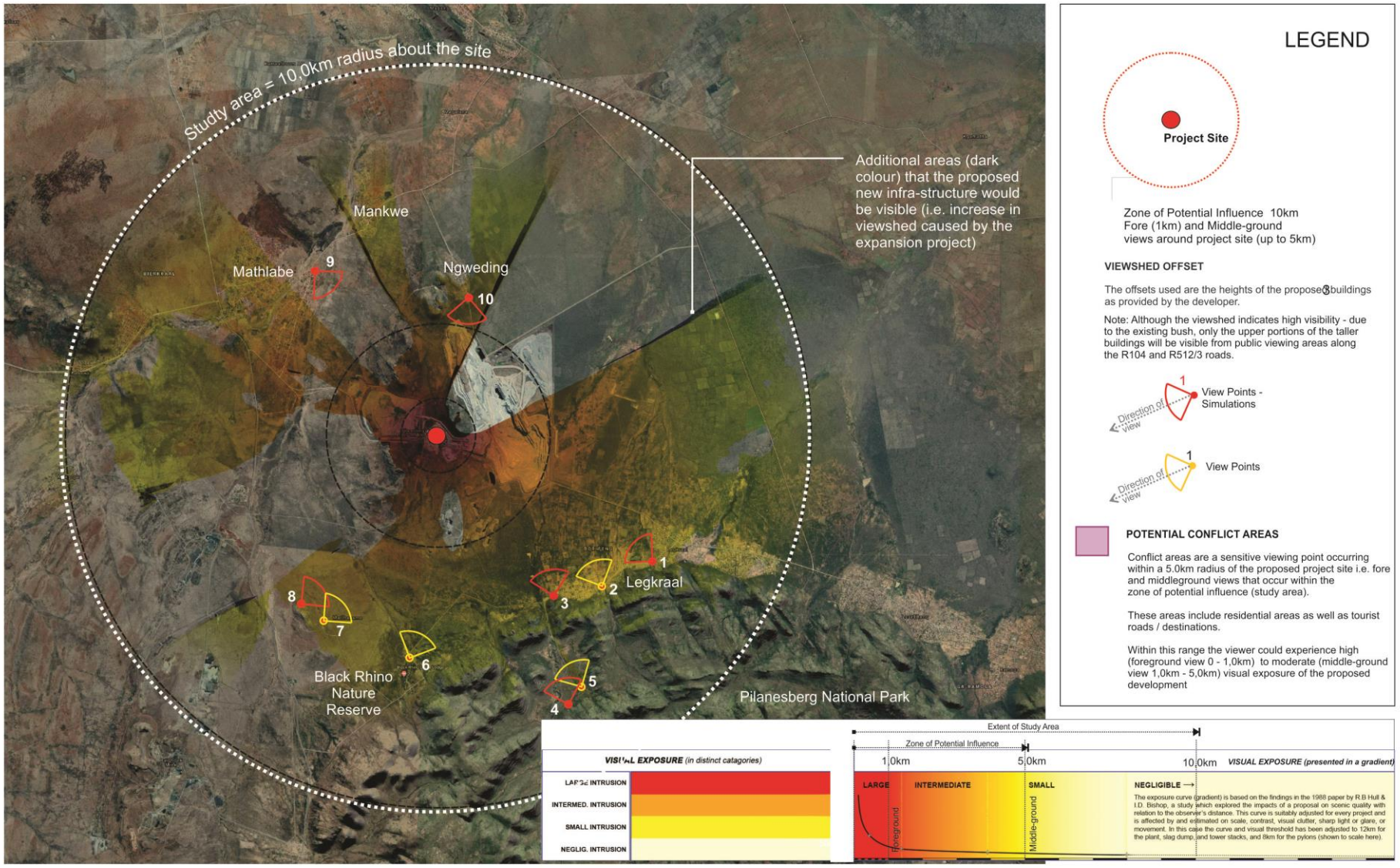


Figure 11b: VIEWSHED ANALYSES - EXISTING PLANT and EXPANSION OVERLAID

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

November 2018

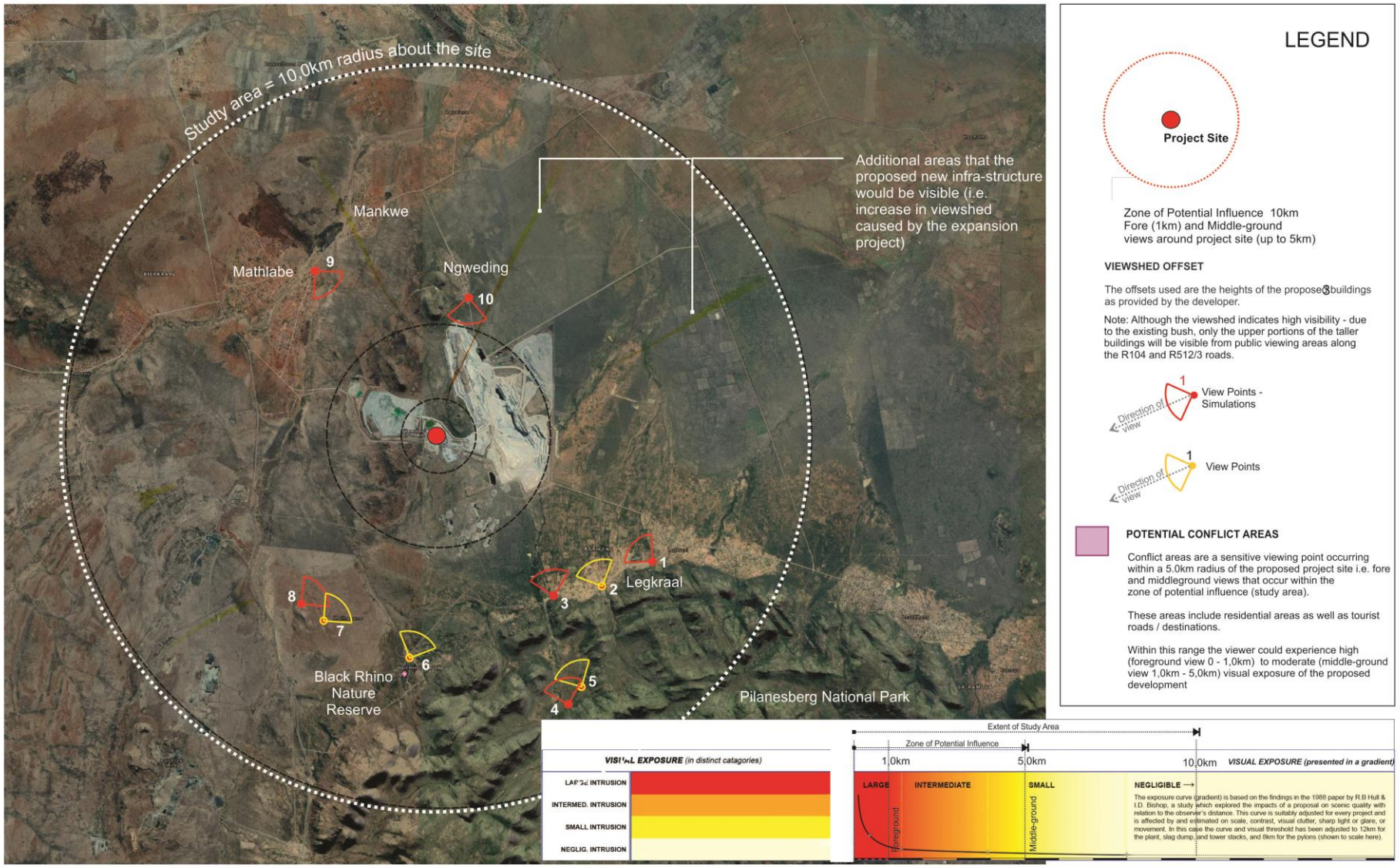


Figure 11c: VIEWSHED ANALYSES - DIFFERENCE IN VIEWSHEDS

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

November 2018

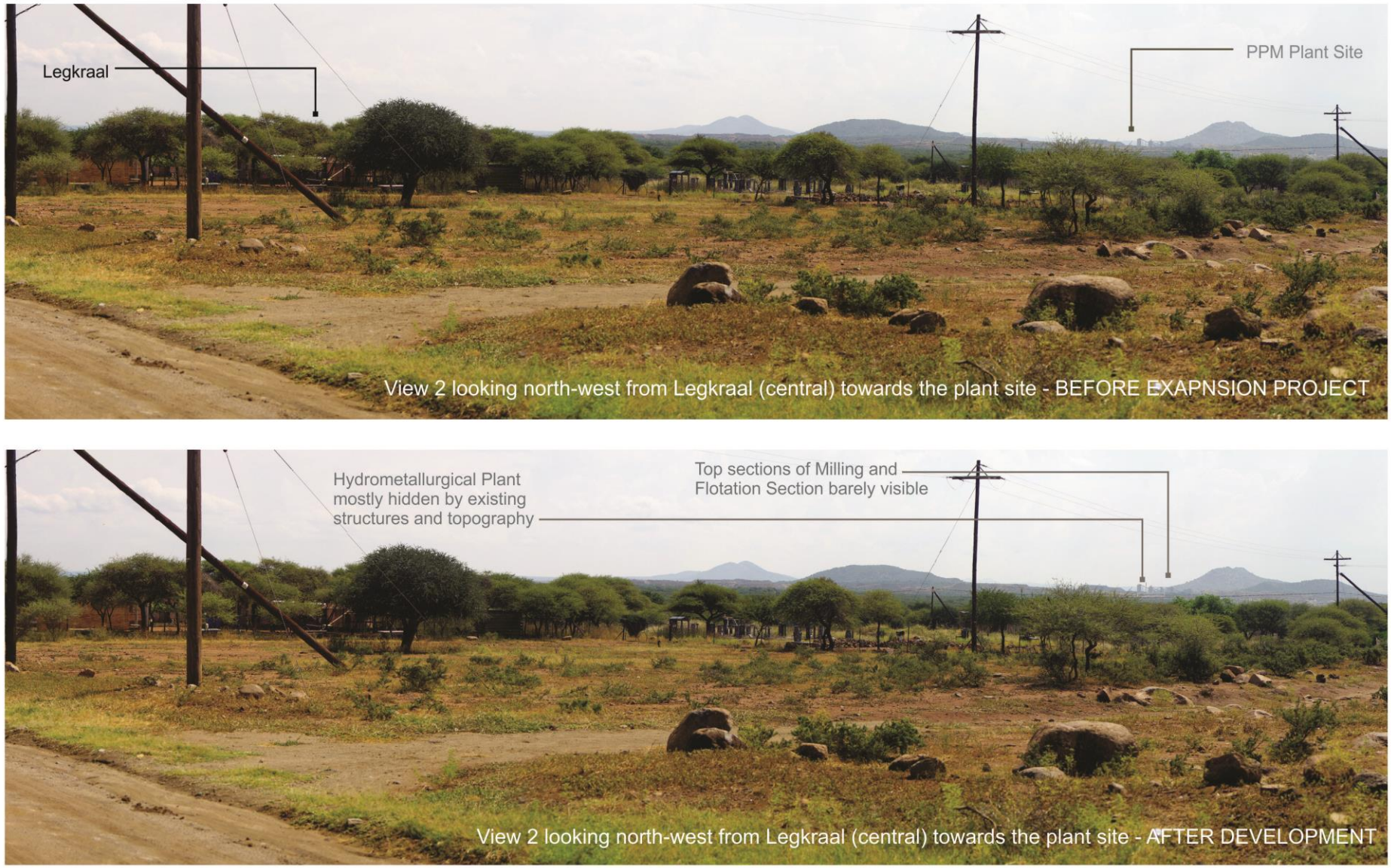
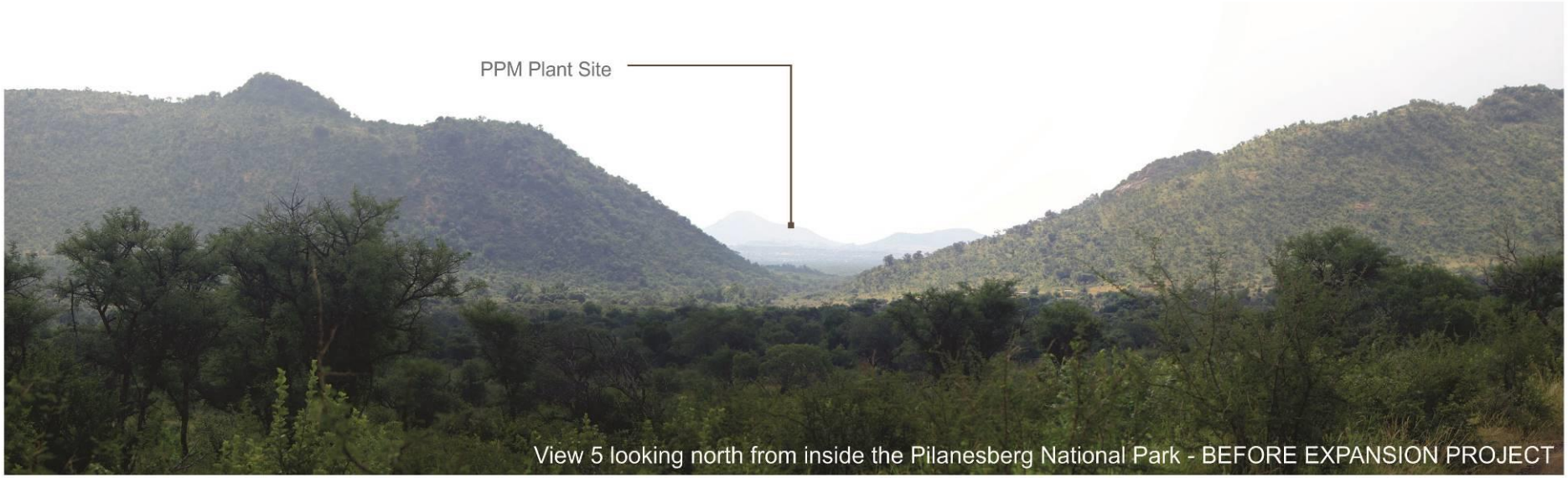


Figure 12: SIMULATION View 2 - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

November 2018



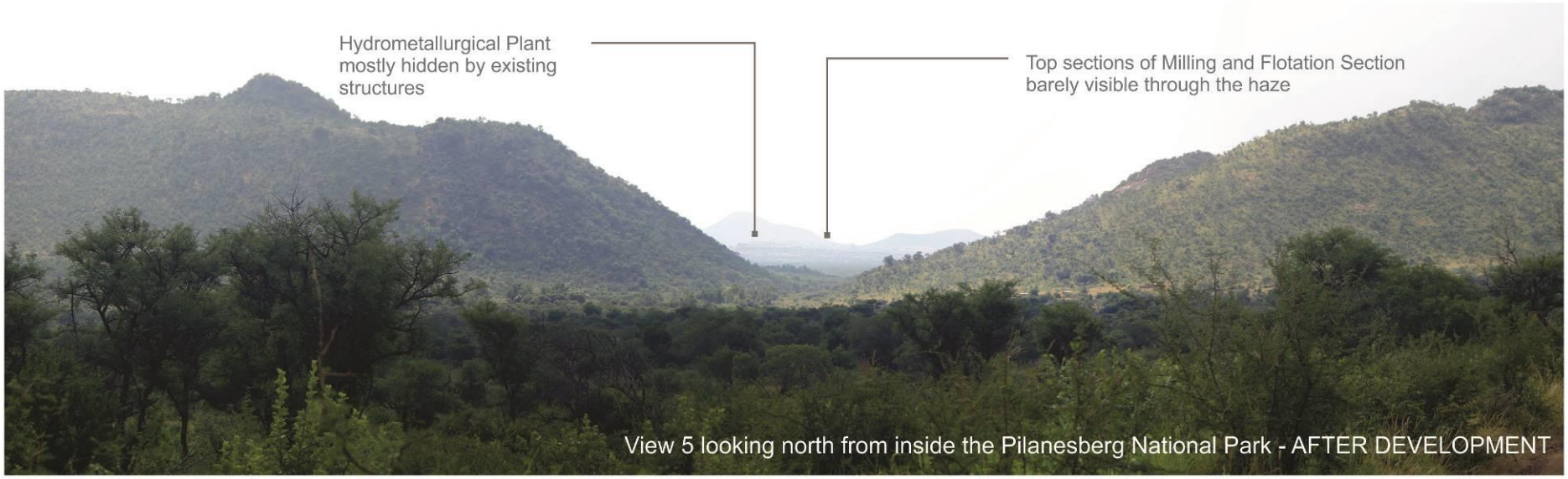
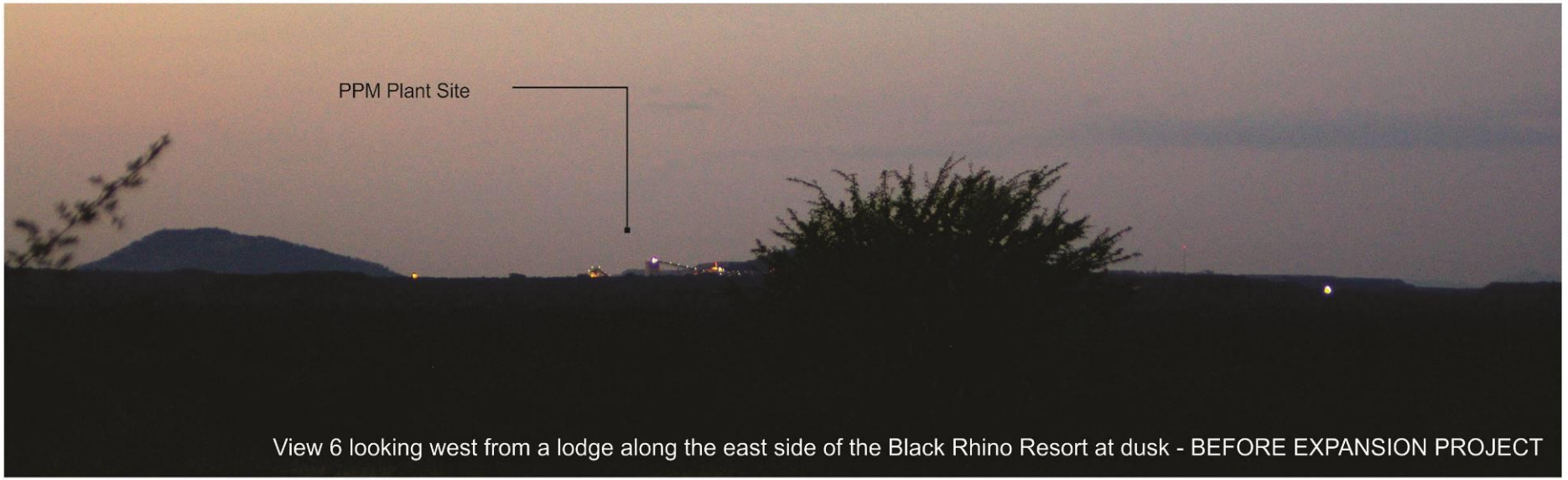


Figure 13: SIMULATION View 5 - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

November 2018



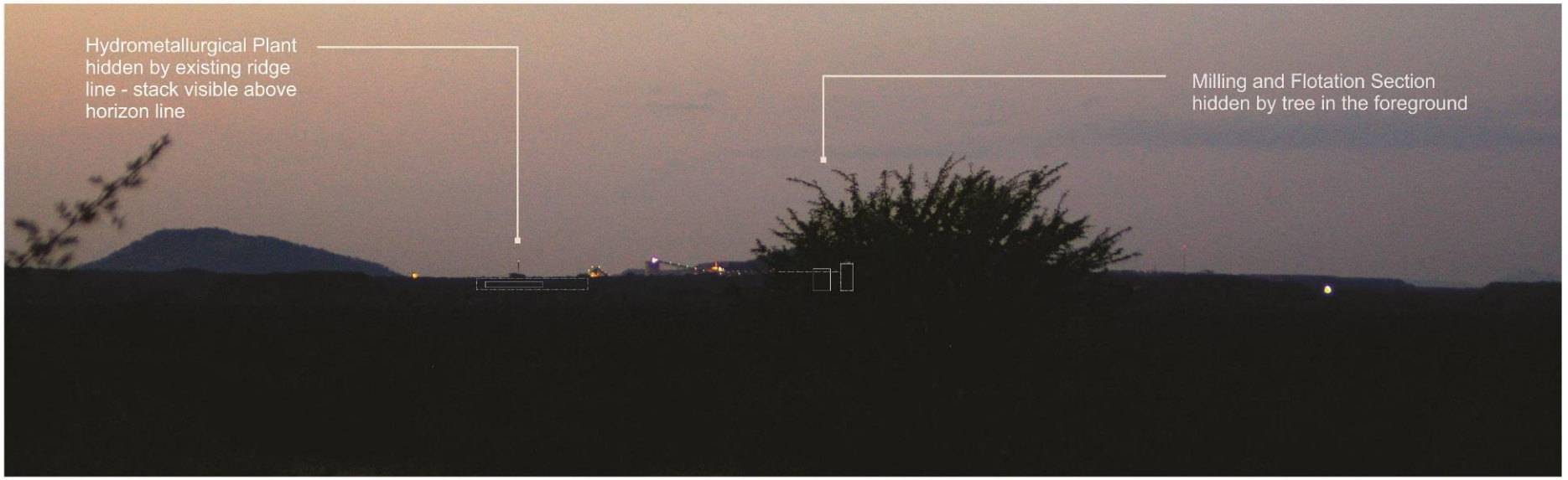


Figure 14: SIMULATION View 6 EVENING - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

November 2018

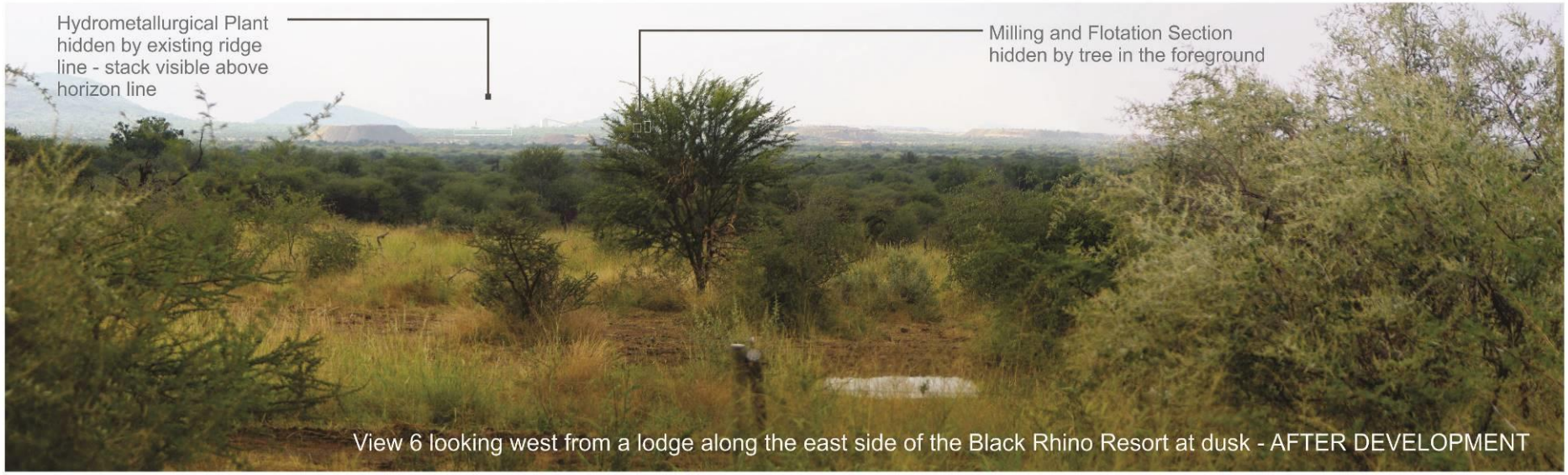
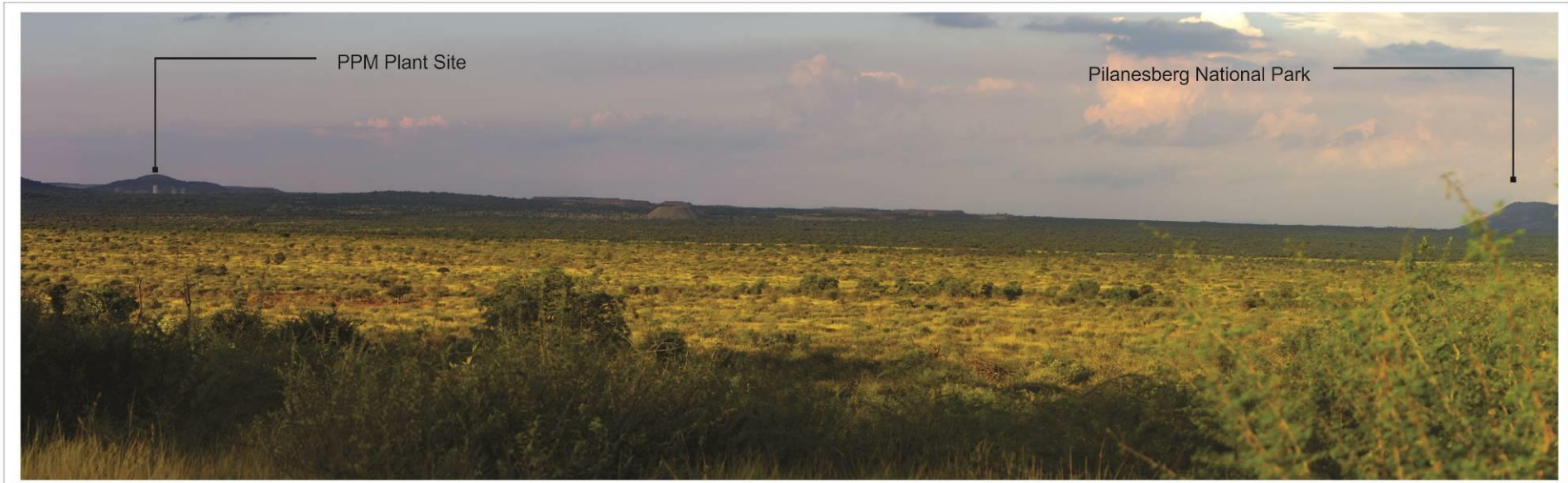


Figure 14a: SIMULATION View 6 - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

November 2018



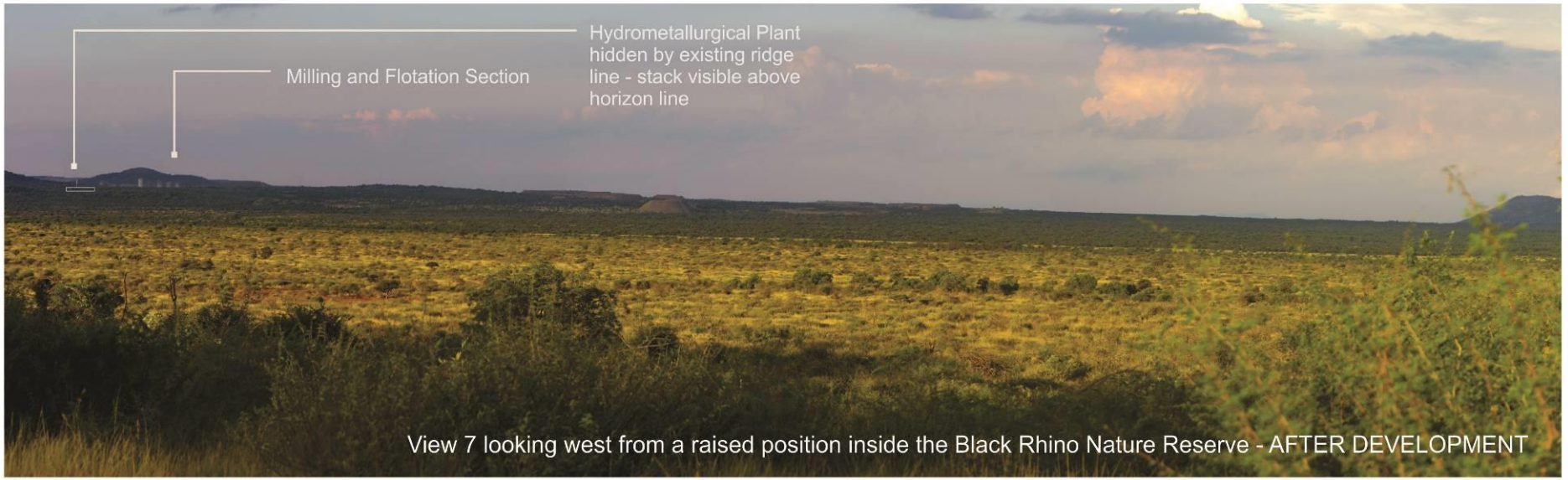


Figure 15: SIMULATION View 7 - PPM Plant Expansion Project

Refer to Figure 3 for location of view points. Photos taken on 12 April 2017 except for views 9 and 10 taken on 27 June 2014

November 2018

11.4 Intensity of Impact

Referring to discussions above and using the criteria listed in Table 4, the intensity of visual impact is rated in Table 5 below. To assess the intensity of 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. *Visual Intrusion was rated low*.
- *Visibility:* The area / points from which project components will be visible. *Visibility was rated moderate.*
- *Visual exposure:* Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion. *Visual exposure was rated low.*
- *Sensitivity:* Sensitivity of visual receptors to the proposed development. *Sensitivity is rated high due to the ongoing issues that tourist operations have with PPM and that visual issues were again highlighted in the public participation process.*

In synthesising these criteria a numerical 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)). According to the results tabulated in Table 5 and using the criteria discussed above and elaborated on in Appendix B, the intensity of visual incremental impact will be *low* as the Project will cause a minor loss or alteration to key elements, features and characteristics of the baseline environment. i.e. a minor change and disturbance associated with real but not substantial consequences would occur. Targets, limits and thresholds of concern may occasionally be exceeded and are likely to require intervention from time to time. It can be expected that occasional complaints could be expected, primarily to the increasing effect of lights on the night sky.

Table 5: *Intensity* of Impact of the Project

High	Moderate	Low	Negligible
Total loss of or major alteration to key elements / features / characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements considered to be totally uncharacteristic when set within the attributes of the receiving landscape. High scenic quality impacts would result.	Partial loss of or alteration to key elements / features / characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that may be prominent but may not necessarily be substantially uncharacteristic when set within the attributes of the receiving landscape. Moderate scenic quality impacts would result	Minor loss of or alteration to key elements / features / characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that may not be uncharacteristic when set within the attributes of the receiving landscape. Low scenic quality impacts would result.	Very minor loss or alteration to key elements/features/characteristics of the baseline. i.e. Pre-development landscape or view and / or introduction of elements that is not uncharacteristic with the surrounding landscape – approximating the 'no change' situation. Negligible scenic quality impacts would result.

12. MITIGATION MEASURES

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

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

The following mitigation measures are suggested and should be included as part of the Environmental Management Programme (EMPr).

12.1 Project Area Development

- It is proposed that as little vegetation as possible be removed during the construction phase.
- Ensure, wherever possible, all existing natural vegetation is retained and incorporated into the project site rehabilitation plan.

12.2 Earthworks

- Dust suppression techniques should always be in place during the construction, operational, the decommissioning / closure phases.
- Only the footprint and a small ‘construction buffer zone’ around Project activities should be exposed. In all other areas, the natural vegetation should be retained.

12.3 Construction Roads

During construction, operation, rehabilitation and closure of the Project, roads will require an effective dust suppression management programme, such as the use of non-polluting chemicals to retain moisture in the road surface.

12.4 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 appear as ‘beacons’ against the dark sky and are generally not wanted. Of all the pollutions we face, 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 recommended measures that must be considered in the lighting design of the Project:

- Install light fixtures that provide precisely directed illumination to reduce light “spillage” beyond the immediate surrounds of the new activity;

- Avoid high pole top security lighting along the periphery of the various sites;
- Minimise the number of light fixtures to the bare minimum, including security lighting;
- Security lighting should only be used where necessary and carefully directed, preferably away from sensitive viewing areas such as the BRNR, PNP and Legkraal;
- Wherever possible, lights should always be directed downwards so as to avoid illuminating the sky;
- If possible avoid using spot lights on the hydrometallurgical plant stack.

13. SIGNIFICANCE

The *intensity* of impact, rated in Table 5 is further qualified with *extent*, *duration* and *probability* criteria to determine the *significance* of the visual impact. The following tables summarise the consequence and significance of the visual impact of Project activities highlighted in Section 4. These results are based on the worst-case scenario (unmitigated) when the impacts of all aspects of the Project are taken together using the SLR impact criteria in Appendix C. Significance = consequence x probability and Consequence is a function of severity, spatial extent and duration

Table 6: Determining the CONSEQUENCE

Project Activity	**Before Mitigation**				**After Mitigation:**			
	Intensity (from Table 5)	**Spatial Extent**	**Duration**	**Conse-quence**	**Intensity(from Table 5)**	**Spatial Extent**	**Duration**	**Conse-quence**
Construction: of facilities in an already disturbed area	L	M	L	**Low**	L	M	L	**Low**
Operational: of Kell Plant, and UG2 milling and flotation plant	L	M	H	**Medium**	L	L	L	**Low**
Closure / Decommissioning: removal of all facilities	L	L	L	**Low**	L	L	L	**Low**

The consequence of impact is qualified by probability of impact to establish the significance of visual impact in Table 7 below. The following abbreviations are use:

- C = Consequence;
- P = Probability and
- Sig = Significance

Table 7: SIGNIFICANCE of Visual Impact

Description of the Potential Visual Impact	ENVIRONMENTAL SIGNIFICANCE							
	Before mitigation				After mitigation:			
	C	x	P	SIG	C	x	P	SIG
Proposed Project – Construction (2 years)								
Minor accumulative alteration to the visual quality of the study area in the short term due to the physical presence of construction activities (see Section 4), dust and additional light sources. The Project will have a medium incremental impact on key residential (Legkraal) and tourist views (BRNR and PNP) in the area. Mitigation measures are feasible and would maintain a medium incremental impact during construction	L		M	**Medium**	L		M	**Medium**
Proposed Project – Operational (extend current 12 years to an additional 40 years)								
Minor accumulative alteration to the visual quality of the study area in the very long-term (i.e. over 20 years) due to the physical presence of operational activities and additional light sources. The Project will have a medium incremental impact on key residential (Legkraal) and tourist views (BRNR and PNP) in the area. Mitigation measures are feasible and would reduce the impact to a low incremental impact	M		M	**Medium**	L		L	**Low**
Proposed Project – Decommissioning / Closure (2 years)								
Alteration to the visual quality of the study area by removing structures, light sources and creating dust. Mitigation measures are feasible and would result in a reduction in incremental impact at closure if measures are effectively implemented and managed in the long term.	L		L	**Low**	L		L	**Low**

14. CUMULATIVE IMPACT

Cumulative landscape and visual effects (impacts) result from additional changes to the landscape or visual amenity caused by the proposed development in conjunction with other developments (associated with or separate to it), or actions that occurred in the past, present or are likely to occur in the foreseeable future. They may also affect the way in which the landscape is experienced. Cumulative effects may be positive or negative. Where they comprise a range of benefits, they may be considered to form part of the mitigation measures. Cumulative effects can also arise from the intervisibility of a range of developments and /or the combined effects of individual components of the proposed development occurring in different locations or over a period of time. The separate effects of such individual components or developments may not be significant, but together they may create an unacceptable degree of adverse effect on visual receptors within their combined visual envelopes. Intervisibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation and distance, as this affects visual acuity, which is also influenced by weather and light conditions (Institute of Environmental Assessment and The landscape Institute (1996)).

14.1 Cumulative effect of the proposed Project

The impact of the existing PPM mine and other surrounding mining activities already has a high negative effect on the visual environment. The physical presence of the proposed Project will have a minor increase in the visibility and visual intrusion of PPM plant activities and will therefore contribute to the cumulative negative effect on the landscape aesthetics of the area. Additional lights from the proposed Project will contribute to the existing negative impact of mining / plant activities at night on sensitive tourist and residential areas in the study area.

15. CONCLUSION

The tallest components of the plant expansion i.e. UG2 milling and Flotation circuit and the Kell Plant and its stack would be visible to sensitive receptors visiting and living in the Black Rhino Nature Reserve, the Pilanesberg National Park and Legkraal village located to the south west and south of the study area. However, the facilities would be seen in the background of views and within the context of existing infrastructure. It is predicted that the Project, given the worst-case scenario (unmitigated), will exert a **MEDIUM** negative incremental impact on the visual and aesthetic environment when compared against the landscape baseline comprised of mining, village and tourist lands use activities. The impact, mostly the night-time impact of additional lighting will be cumulative in nature as project components will be built into existing mineral processing facilities located on the farms Witkleifontein 136 JP and Tuschenkomst 135 JP. The impact is unlikely to have a real influence on the decision; however mitigation is required to bring the Project into acceptable levels of change.

Mitigation measures to reduce glare and the impact of light pollution are feasible and necessary to reduce the incremental impact to **LOW** (i.e. it will not have an influence on the decision) for the duration of the operational phase, and to ensure that complaints that might arise from I&APs are negligible. This is particularly important as the life of the project is expected to extend current processing activities for an additional forty years.

At closure facilities would be removed and the impact of the proposed Project would reduce to insignificant.

It is the opinion of the author that all aspects of the Project, from a potential visual impact perspective, should be approved provided that the mitigation / management measures are effectively implemented, managed and monitored in the long term and that engagement with the community during this process is continued to ensure the success of these measures.

****NLA****

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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 combinations of natural (physical and biological) and cultural (land use) factors and how people perceive these. The visual dimension of the landscape reflects 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 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 group of people or the ability of the landscape to convey special meanings to viewers in general;
- *Landmark quality*: a feature that stands out and is 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. Based on contemporary research landscape quality increases when:
Topographic ruggedness and relative relief increase;
Where water forms are present;
Where diverse patterns of grasslands and trees occur;
Where natural landscape increases and man-made landscape decreases;
And where land use compatibility increases and land use edge diversity decreases (Crawford 1994).

Scenic Quality - Explanation of Rating Criteria:

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

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

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

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

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

Adjacent Scenery: Degree to which scenery outside the scenery unit being rated enhances the overall impression of the scenery within the rating unit. The distance which adjacent scenery will influence scenery within the rating unit will normally range from 0-8 kilometres, depending upon the characteristics of the

topography, the vegetative cover, and other such factors. This factor is generally applied to units which would normally rate very low in score, but the influence of the adjacent unit would enhance the visual quality and raise the score.

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

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

Scenic Quality Inventory and Evaluation Chart

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

Key factors	Rating Criteria and Score		
Landform	High vertical relief as expressed in prominent cliffs, spires, or massive rock outcrops, or severe surface variation or highly eroded formations including major badlands or dune systems; or detail features dominant and exceptionally striking and intriguing such as glaciers. **5**	Steep canyons, mesas, buttes, cinder cones, and drumlins; or interesting erosional patterns or variety in size and shape of landforms; or detail features which are interesting though not dominant or exceptional. **3**	Low rolling hills, foothills, or flat valley bottoms; or few or no interesting landscape features. **1**
Vegetation and landcover	A variety of vegetative types as expressed in interesting forms, textures, and patterns. **5**	Some variety of vegetation, but only one or two major types. **3**	Little or no variety or contrast in vegetation. **1**
Water	Clear and clean appearing, still, or cascading white water, any of which are a dominant factor in the landscape. **5**	Flowing, or still, but not dominant in the landscape. **3**	Absent, or present, but not noticeable. **0**
Colour	Rich colour combinations, variety or vivid colour; or pleasing contrasts in the soil, rock, vegetation, water	Some intensity or variety in colours and contrast of the soil, rock and vegetation, but not a dominant scenic	Subtle colour variations, contrast, or interest; generally mute tones.

	or snow fields. **5**	element. **3**	 **1**
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. **5**	Adjacent scenery moderately enhances overall visual quality. **3**	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. National and provincial parks and conservation areas *** 5+**	Distinctive, though somewhat similar to others within the region. **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 scenically beautiful but where landscape quality, aesthetic value and a strong sense of place coincide - the visual resource or perceived value of the landscape is considered to be very high.

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

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

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

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

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

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

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

Landscape Impact

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

Visual Impact

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

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

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

Visual Intrusion / contrast

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

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

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

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

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

Visual Intrusion

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

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

Visibility

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

Visibility

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

Visual Exposure

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

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

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

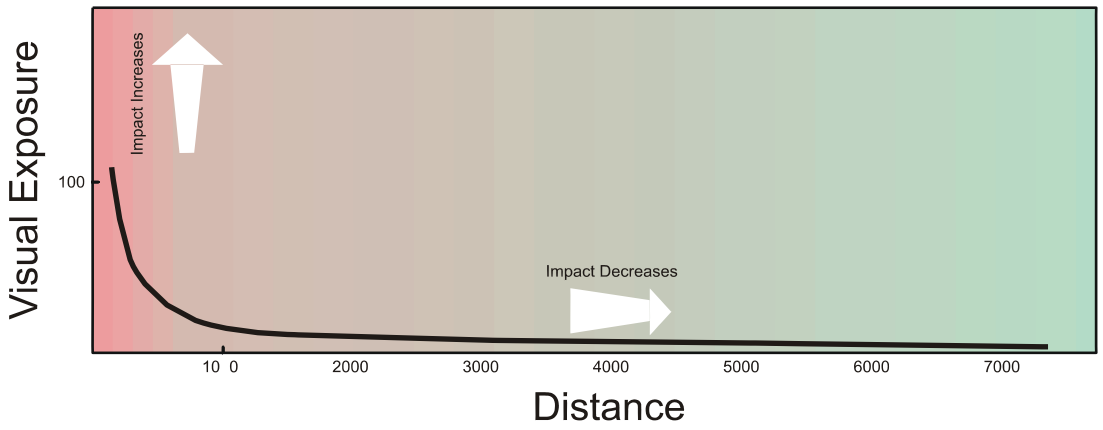
Areas seen from 800m to 5.0km are considered middle ground; vegetation appears as outlines or patterns. Depending on topography and vegetation, middle ground is sometimes considered to be up to 8.0km.

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

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

The impact of an object diminishes at an exponential rate as the distance between the observer and the object increases. Thus, the visual impact at 1000 m would be 25% of the impact as viewed from 500 m. At 2000 m it would be 10% of the impact at 500 m. The inverse relationship of distance and visual impact is well recognised in visual analysis literature (e.g.: Hull and Bishop (1988)) and is used as an important criteria for the study. This principle is illustrated in the 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 is popularity or numbers of people affected, its appearance in guidebooks, on tourist maps, and in the facilities provided for its enjoyment and references to it in literature or art).

The most sensitive receptors may include:

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

Other receptors include:

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

The least sensitive receptors are likely to be people at their place of work, or engaged in similar activities,

whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

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

Sensitivity of Visual Receptors

High	Moderate	Low
Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape;	People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value);	The least sensitive receptors are likely to be people at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view (i.e. office and industrial areas).
Communities where the development results in changes in the landscape setting or valued views enjoyed by the community;	People travelling through or past the affected landscape in cars, on trains or other transport routes;	Roads going through urban and industrial areas
Occupiers of residential properties with views affected by the development.		

Severity 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

PART A: DEFINITION AND CRITERIA*		
Definition of SIGNIFICANCE		**Significance = consequence x probability**
Definition of CONSEQUENCE		**Consequence is a function of severity, spatial extent and duration**
Criteria for ranking of the SEVERITY of environmental impacts	**H**	Substantial deterioration (death, illness or injury). Recommended level will often be violated. Vigorous community action.
	M	Moderate/ measurable deterioration (discomfort). Recommended level will occasionally be violated. Widespread complaints.
	L	Minor deterioration (nuisance or minor deterioration). Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	L+	Minor improvement. Change not measurable/ will remain in the current range. Recommended level will never be violated. Sporadic complaints.
	M+	Moderate improvement. Will be within or better than the recommended level. No observed reaction.
	H+	Substantial improvement. Will be within or better than the recommended level. Favourable publicity.
Criteria for ranking the DURATION of impacts	**L**	Quickly reversible. Less than the project life. Short term
	M	Reversible over time. Life of the project. Medium term
	H	Permanent. Beyond closure. Long term.
Criteria for ranking the SPATIAL SCALE of impacts	**L**	Localised - Within the site boundary.
	M	Fairly widespread – Beyond the site boundary. Local
	H	Widespread – Far beyond site boundary. Regional/ national

PART B: DETERMINING CONSEQUENCE

SEVERITY = L

DURATION	Long term	**H**	**Medium**	**Medium**	**Medium**
	Medium term	**M**	**Low**	**Low**	**Medium**
	Short term	**L**	**Low**	**Low**	**Medium**

SEVERITY = M

DURATION	Long term	**H**	**Medium**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Low**	**Medium**	**Medium**

SEVERITY = H

DURATION	Long term	**H**	**High**	**High**	**High**
	Medium term	**M**	**Medium**	**Medium**	**High**
	Short term	**L**	**Medium**	**Medium**	**High**
			L	**M**	**H**
			Localised Within site boundary Site	Fairly widespread Beyond site boundary Local	Widespread Far beyond site boundary Regional/ national
			SPATIAL SCALE		

PART C: DETERMINING SIGNIFICANCE

PROBABILITY (of exposure to impacts)	Definite/ Continuous	**H**	**Medium**	**Medium**	**High**
	Possible/ frequent	**M**	**Medium**	**Medium**	**High**
	Unlikely/ seldom	**L**	**Low**	**Low**	**Medium**
			L	**M**	**H**
			CONSEQUENCE		

PART D: INTERPRETATION OF SIGNIFICANCE	
Significance	**Decision guideline**
High	It would influence the decision regardless of any possible mitigation.
Medium	It should have an influence on the decision unless it is mitigated.
Low	It will not have an influence on the decision.

***H = high, M= medium and L= 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 architect / designers. This model is then placed on a virtual landscape, scale 1:1, as produced by means of GIS software. The accuracy of this depends on the contour intervals.

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

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Graham is a landscape architect with forty years' experience. He has worked in Southern Africa and Canada and has valuable expertise in the practice of landscape architecture, urban design and environmental planning. He is also a senior lecturer, teaching urban design and landscape architecture at post and under graduate levels at the University of Pretoria. He also specializes in Visual Impact Assessments.

EXPERIENCE: **NEWTOWN LANDSCAPE ARCHITECTS cc.** ***Associate***

Current — Associate – Visual Impact Assessment

1994 - 2016 — Member: Founding member 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;
Completing a master's degree in Landscape Architecture, University of Pretoria; Thesis: Visual Impact Assessment;
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:

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: 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:

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:

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

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

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

In *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 Precinct, Soweto, Gauteng.

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

- Moroka Dam Parks Precinct, Soweto, Gauteng.

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B.Sc Degree in Environmental Science from the University of North West, Potchefstroom Campus (2003). M.Sc Degree in Ecological Remediation and Sustainable Utilization from the University of North West, Potchefstroom Campus (2007). She is currently employed by Newtown Landscape Architects working on the following projects.

EXPERIENCE: Environmentalist: Newtown Landscape Architects

Responsible for the environmental work, which includes Basic Assessments, Environmental Impact Assessments (Scoping & EIA), Environmental Management Plans (EMP), Environmental Auditing as well as Visual Impact Assessments.

Current Projects:

Orchards Extension 49-53, Pretoria - Environmental Impact Assessment and Environmental Management Plan

Tanganani Ext 8, Johannesburg - Environmental Impact Assessment and Environmental Management Plan

Diepsloot East Development, Diepsloot **-** Environmental Impact Assessment and Environmental Management Plan

Klerksoord Ext 25 & 26, Pretoria – Environmental Impact Assessment

Ennerdale Ext 16, Johannesburg - Environmental Impact Assessment and Environmental Management Plan

Glen Marais Ext 102 & 103, Kempton Park - Basic Assessment and Environmental Management Plan

Princess Plot 229, Princess - Environmental Assessment (S24G Application)

Uthlanong Drive Upgrade – Mogale City Local Municipalty project in Kagiso, Basic Assessment for the upgrade of the stormwater and the roads

Luipaardsvlei Landfill Site – Mogale City Local Municipalty project in Krugersdorp, the expansion of the existing landfill site.

MCLM Waste Water Treatment Works – Mogale City Local Municipalty project in Magaliesburg, the expansion of the existing facility.

Rand Uranium (Golder Associates Africa (Pty) Ltd), Randfontein – VIA

Dorsfontein West Expansion (GCS (Pty) Ltd), Kriel – VIA

Mine Waste Solutions (GCS (Pty) Ltd), Stilfontein – VIA

Ferreira Coal Mining (GCS (Pty) Ltd), Ermelo – VIA

De Wittekrans Mining (GCS (Pty) Ltd), Hendrina – VIA

EDUCATION:

May 2009	Public Participation Course, International Association for Public Participation, Golder Midrand
May 2008	Wetland Training Course on Delineation, Legislation and Rehabilitation, University of Pretoria.
April 2008	Environmental Impact Assessment: NEMA Regulations – A practical approach, Centre for Environmental Management: University of North West.
Feb 2008	Effective Business Writing Skills, ISIMBI
Oct 2007	Short course in Geographic Information Systems (GIS), Planet GIS
Jan 2004 – April 2007	M.Sc Degree in Ecological Remediation and Sustainable Utilization, University of North West, Potchefstroom Campus. Thesis: Tree vitality along the urbanization gradient in Potchefstroom, South Africa.
Jan 2001 – Dec 2003	B.Sc Degree in Environmental Science, University of Potchefstroom

PROFESSIONAL REGISTRATION:

Sep 2009	Professional National Scientist – 400204/09