Annex G.11

Visual Specialist Report

Proposed Gamsberg Zinc Mine & Associated Infrastructure near Aggenys, Northern Cape

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ACRONYMS, ABBREVIATIONS & GLOSSARY

Acronyms & Abbreviations	
CSIR	Council for Scientific and Industrial Research
EIA	Environmental Impact Assessment
IFC	International Finance Corporation
SACLAP	South African Council for the Landscape Architectural Profession
VIA	Visual Impact Assessment
WRD	Waste Rock Dump

Glossary	
Aesthetic Value	Aesthetic value is the emotional response derived from the experience of the environment with its particular natural and cultural attributes. The response can be either to visual or non-visual elements and can embrace sound, smell and any other factor having a strong impact on human thoughts, feelings and attitudes (Ramsay, 1993). Thus aesthetic value encompasses more than the seen view, visual quality or scenery, and includes atmosphere, landscape character and sense of place (Schapper, 1993).
Aesthetically significant place	A formally designated place visited by recreationists and others for the express purpose of enjoying its beauty. For example, tens of thousands of people visit Table Mountain on an annual basis. They come from around the country and even from around the world. By these measurements, one can make the case that Table Mountain (a designated National Park) is an aesthetic resource of national significance. Similarly, a resource that is visited by large numbers who come from across the region probably has regional significance. A place visited primarily by people whose place of origin is local is generally of local significance. Unvisited places either have no significance or are "no trespass" places. (after New York, Department of Environment 2000).
Aesthetic impact	Aesthetic impact occurs when there is a detrimental effect on the perceived beauty of a place or structure. Mere visibility, even startling visibility of a project proposal, should not be a threshold for decision

	making. Instead a project, by virtue of its visibility, must clearly interfere with or reduce (i.e. visual impact) the public's enjoyment and/or appreciation of the appearance of a valued resource e.g. cooling tower blocks a view from a National Park overlook (after New York, Department of Environment 2000).
Cumulative Effects	The summation of effects that result from changes caused by a development in conjunction with the other past, present or reasonably foreseeable actions.
Landscape Character	The individual elements that make up the landscape, including prominent or eye-catching features such as hills, valleys, woods, trees, water bodies, buildings and roads. They are generally quantifiable and can be easily described.
Landscape Impact	Landscape effects derive from changes in the physical landscape, which may give rise to changes in its character and how this is experienced (Institute of Environmental Assessment & The Landscape Institute, 1996).
Study area	For the purposes of this report the Gamsberg Zinc Mine Study area refers to the proposed project footprint / project site as well as the 'zone of potential influence' (the area defined as the radius about the centre point of the project beyond which the visual impact of the most visible features will be insignificant) which is a 10km radius surrounding the proposed project footprint / site.
Project Footprint / Site	For the purposes of this report the Gamsberg Zinc Mine Project *site* / *footprint* refers to the actual layout of the mine.
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, which contain all possible observation sites from which an object

	would be visible. The basic assumption for preparing a viewshed analysis is that the observer eye height is 1,8m above ground level.
Visibility	The area from which project components would potentially be visible. Visibility depends upon general topography, aspect, tree cover or other visual obstruction, elevation and distance.
Visual Exposure	Visibility and visual intrusion qualified with a distance rating to indicate the degree of intrusion and visual acuity, which is also influenced by weather and light conditions.
Visual Impact	Visual effects relate to the changes that arise in the composition of available views 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.

EXECUTIVE SUMMARY

Newtown Landscape Architects (NLA) were commissioned by Environmental Resource Management (Pty) Ltd to carry out a Visual Impact Assessment (VIA) for the proposed Gamsberg Zinc Mine and Associated Infrastructure Project, Northern Cape ("the Project"). The proposed Project will consist of an open pit mine, concentrator plant, tailings dam and waste rock dump as well as support infrastructure and services including a power line.

The Project is located on the farms Bloemhoek 61 Portion 1, Gams 60 Portion 1, Gams 60 Portion 4 and Aroams 57 RE. The Project site is located along the N14 between Pofadder and Springbok, approximately 6km south-east of the town of Aggeneys. Refer to Figure 1 for the project locality.

It was be concluded that the study area has a *high* visual quality and a strong sense of place even though it may be common within the region. The desolate, arid plains, punctuated by rugged koppies against the striking blue sky backdrop creates a sense of expansive vastness that can easily be recalled, especially by touristic travellers that would generally be interested in their surroundings.

Existing mining activities towards the west of the proposed project, degrades the landscape character, however to a lesser extent than what is anticipated from the proposed mine, since the existing mine is located further away from the N14 than the proposed project.

The change to be brought on by the proposed Gmasberg Zinc Mine Project would be quite prominent and highly exposed since it would be located along adjacent to the N14, which is a major artery and well used tourist route. It is anticipated that impacts would result from the construction, operation and decommissioning of the proposed Gamsberg Zinc Mine.

Conflict will most likely occur between sensitive viewing areas and activities associated with the proposed mine i.e. important, or valued views will be impacted upon. The sensitive viewing areas will include farmsteads and settlements as well as roads.

The following issues should therefore be considered for the Assessment Phase of the EIA:

- Establish public concern for scenic quality of the study area and their perception of what constitutes a sensitive viewing area;
- Determine the visibility of the Sasol Mafutha project by conducting viewshed analyses from sensitive viewing areas – especially the farmsteads and tourist locations;
- Determine visual intrusion (contrast) of the proposed Sasol Mafutha project by simulating its physical appearance from sensitive viewing areas;
- Rate the impact of the proposed Sasol Mafutha project on views from sensitive viewing areas;
- Rate the impact on the scenic quality and sense of place of the study area;
- Establish management measures (mitigation) to reduce the impact of the associated structures where appropriate.

Based on recent discussions with the Applicant and design engineers subsequent to the completion of the Draft Visual Impact Assessment, the following changes to the project layout have been suggested. The changes are as follows:

1. Relocation of the explosives magazine area from the top of the inselberg to an area located between the N14 and inselberg. Due to the impacts to three watercourses on the inselberg, this relocation was requested by the Specialist Team.
2. Increase in size of the waste rock dump from to 270 hectares to 490 hectares. In order to reduce the slope angle of the waste rock dump (i.e. from 450 – 350 degree slope) ,the footprint of the waste rock dump has increased. This design refinement was in response to DMR requirements for a waste rock dump.

Please refer to Figure 2-1, which illustrates the updated Project Layout Plan.

The scale and impact of the proposed mining activities as described in the body of this report is predicted to be high negative. The changes to the layout of the mine as described above will increase the cumulative impact of the project's activities, specifically on views from the N12 road. The impact on sensitive viewing areas to the south of the mine will however remain the same.

The findings, given the proposed new layout, will remain high negative.

Management recommendations will essentially remain as proposed in the body of the report i.e.:

- Plant and other visible structures, including the explosives magazine, should be painted with colours that reflect and complement the natural colour of the surrounding landscape.
- An earth berm should be constructed between the plant, explosives magazine and the N14 to buffer the 'clutter' of the lower sections of these structures. A similar solution should be considered adjacent the construction camp.
- Waste dumps should be implemented such that the final horizon of the dumps does not exceed height of the Gamsberg and that the existing profile of the mountain is articulated to resemble the existing topographic profile.
- Harsh steep engineered slopes should be avoided as these could impose an additional impact on landscape.

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1. INTRODUCTION

1.1 Project Overview

Newtown Landscape Architects (NLA) were commissioned by Environmental Resource Management (Pty) Ltd to carry out a Visual Impact Assessment (VIA) for the proposed Gamsberg Zinc Mine and Associated Infrastructure Project, Northern Cape ("the Project"). The proposed Project will consist of an open pit mine, concentrator plant, tailings dam and waste rock dump as well as support infrastructure and services including a power line.

1.2 Proposed Study area

The Project is located on the farms Bloemhoek 61 Portion 1, Gams 60 Portion 1, Gams 60 Portion 4 and Aroams 57 RE. The Project site is located along the N14 between Pofadder and Springbok, approximately 6km south-east of the town of Aggenys. Refer to Figure 1 for the project locality.

1.3 Terms and Reference

A specialist study is required to assess the visual impacts arising from the proposed Project. This report will establish the baseline for the VIA, the following terms of reference were established:

- Define the visual resource and sense of place of the area;
- Identify the sensitive viewers.

1.4 Assumption, Uncertainties and Limitations

Project description and identification of sensitive viewers is based on the available information at the time of writing the report.

2. LEGAL REQUIREMENTS AND GUIDELINES

2.1 National Guidelines

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

The specialist report is in accordance to the specification on conducting specialist studies as per Government Gazette (GN) R 543 of the National Environmental Management Act (NEMA) Act 107 of 1998. The mitigation measures as stipulated in the specialist report can be used as part of the Environmental Management Plan (EMP) and will be in support of the Environmental Impact Assessment (EIA).

The NEMA Protected Areas Act (57 of 2003)

The main aim of the Act is to identify and protect natural landscapes.

The National Heritage Resources Act (25 of 1999)

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.

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 it provides guidance that will be appropriate for any EIA process. The Guideline document also seeks to clarify instances when a visual specialist should get involved in the EIA process.

2.2 International Guidelines

World Bank's IFC Standards

The World Bank's IFC Standards: Environmental, Health and Safety Guidelines for Mining refers to Visual Impact Assessments by stating that:

"Mining operations, and in particular surface mining activities, may result in negative visual impacts to resources associated with other landscape uses such as recreation or tourism. Potential contributors to visual impacts include high walls, erosion, discoloured water, haul roads, waste dumps, slurry ponds, abandoned mining equipment and structures, garbage and refuse dumps, open pits, and deforestation. Mining operations should prevent and minimize negative visual impacts through consultation with local communities about potential post-closure land use, incorporating visual impact assessment into the mine reclamation process. Reclaimed lands should, to the extent feasible, conform to the visual aspects of the surrounding landscape. The reclamation design and procedures should take into consideration the proximity to public viewpoints and the visual impact within the context of the viewing distance. Mitigation measures may include strategic placement of screening materials including trees and use of appropriate plant species in the reclamation phase as well as modification in the placement of ancillary facilities and access roads."

The specialists study is in accordance to the IFC Performance Standards (Performance Standard 1: Social and Environmental Assessment and Management Systems) for the undertaking of Environmental Assessments and contributes to the EIA for the proposed Project.

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 taken into account. 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 particular view or scene).

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

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

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

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

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

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

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

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

3.3 Sensitivity of Visual Resource

The sensitivity of a landscape or visual resource is the degree to which a particular landscape type or area can accommodate change arising from a particular 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 particular element or characteristic can be replaced or substituted (Institute of Environmental Assessment & The Landscape Institute, 1996:87).

3.3.1 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. With this in mind, 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.

3.3.2 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;
- 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 considered to be frequent and of long duration.

3.3.3 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.

3.3.4 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).

3.3.5 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.

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:

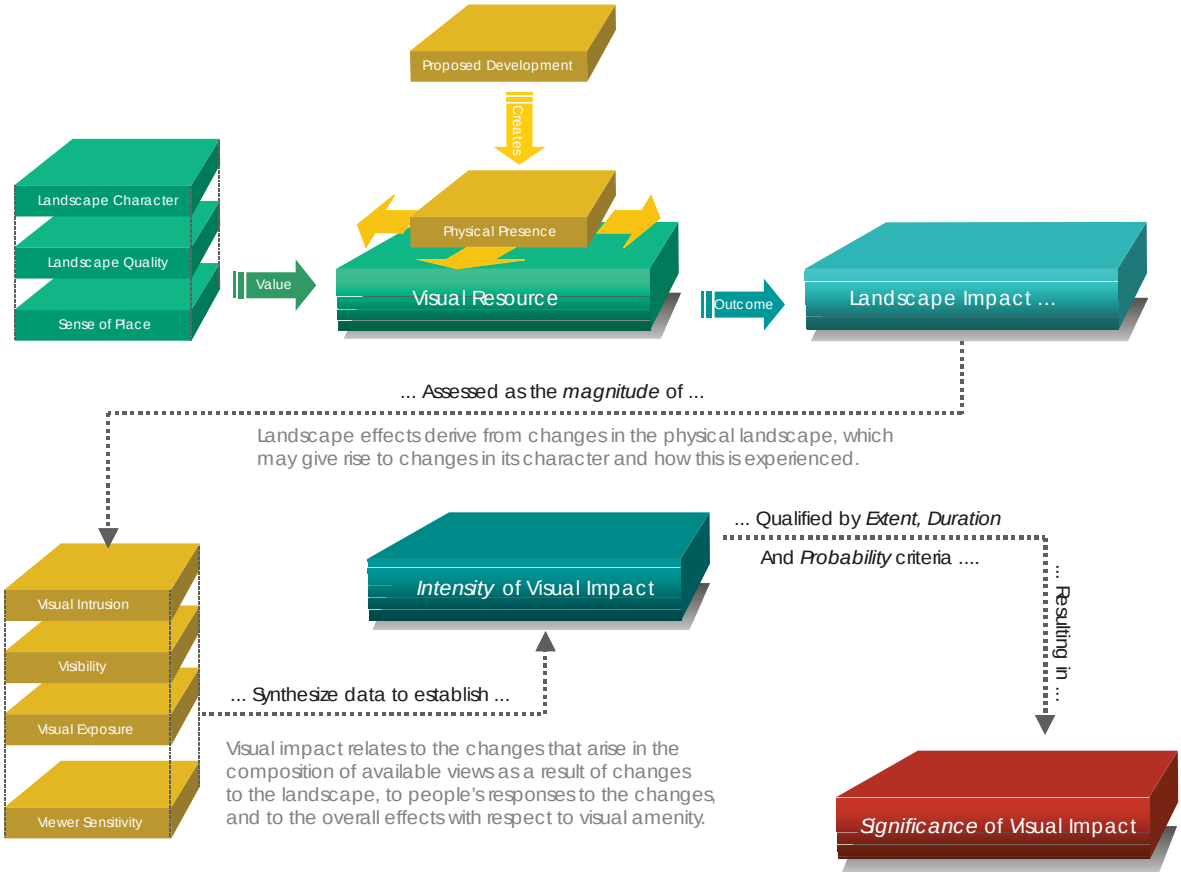

Image 1: Visual Impact Process

3.3.6 Significance of Visual Impact

The significance of impact was determined based on the Hacking method of determination of the significance of impacts. This method was provided by Metago Environmental Engineers.

Significance = consequence x probability

Consequence is a function of severity, spatial extent and duration

Severity, based on

- Intensity of impact (will the impact be of High, Moderate or Low intensity?) and

Scale/ spatial extent of impact

- Will the impact affect the national, regional or local environment, or only that of the site?

Occurrence duration, based on

- Duration of occurrence (how long may it last).

A detailed description of the significance rating criteria is included as Appendix D.

This report will only follow the process up to 3.1.5, to provide a baseline study for the proposed Project.

3.4 Methodology

The following method was used:

- 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;
- 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 B);
- The landscape character of the study area was described. The description of the landscape focussed 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. BACKGROUND AND DESCRIPTION OF THE PROJECT

In 1971, zinc deposits were discovered at Gamsberg by O'okiep Copper Company (Newmont). In 1988 Goldfield bought Newmont's interest in Gamsberg, however the mine was not developed due to unfavourable market conditions. In 1988, Anglo American Corporation acquired the site and completed the prefeasibility and feasibility investigations in order to explore the viability of mining the zinc deposits. The feasibility investigations included an ASIA which addressed the open pit mine development together with all associated infrastructure.

Vedanta identified available approach to mining the relatively low grade but large zinc ore body. Due to the relatively low grade zinc present in the region, Vedanta has confirmed that the ore would need to be concentrated before transporting it to Saldanha Bay Port, for export purposes. An EIA process was previously undertaken in 2000 and approval was received for the proposed project in 2001. However, as the validity period of the authorisation has expired, it is the intention of Black Mountain Mining to recommence the ESIA process. An amendment to this EMPr was approved in 2003 to mine a small part of the deposit underground. This amended EMPr was expanded in 2005 to include the current authorised extraction volumes and concentrate processing at Black Mountain Processing Plant. An additional amendment was made to the EMPr and an EIA and EMP amendment submitted in 2009 for surface exploration along the north eastern section of Gamsberg was subsequently approved.

Vedanta is currently investigating two potential transport options, which will be investigated and assessed during the ESIA process. In addition, based on the isolated nature of the proposed mine site, bulk service requirements in terms of water and energy will need to be supplied to the site. Lastly, based on the expected increase in employment opportunities, Vedanta has committed to providing the necessary housing to accommodate construction and operational phase staff.

The proposed project will include the following project components:

- Establishment of the Gamsberg Zinc Mine with an expected output capacity of approximately 10 million tons per year (beneficiation tonnage). The proposed mine is expected to have a life span of approximately 20 years (assuming open pit mining technique).
- Construction of a Zinc Concentrator Plant with a total processing capacity of 10 million tons per year.
- In order to manage the waste streams generated from the mining process, Vedanta intends to construct 1 tailings dam and 1 waste rock dump.
- In order to fulfil the water requirements of the proposed zinc mine, Vedanta intend to upgrade the existing water pipeline from the Pella abstraction point along the Orange River to the proposed mine. The expected water requirements for the entire project (including housing, mining, concentrator etc.) are approximately 9,125 m3/ annum.
- In order to meet the energy requirements of the proposed project, Vedanta intends to either construct a 220 kv/ 66kv substation along the northern border of the N14 and a 66 kV/ 11 kV substation along the southern border of the N14. The two substations will be connected with two new 66 kV distribution lines. Alternatively, Vedanta intends to construct two 66 kV distribution lines from the existing Aggeneys substation to a new 66 kV/ 11 kV substation at the proposed mine.
- The proposed project is expected to result in the creation of construction and operational phase employment opportunities. In order to house the expected workforce, Vedanta intends to construct additional housing in the town of Aggeneys (refer to Locality Map for location).
- To ensure project viability, Vedanta needs to transport the proposed zinc concentrate from the proposed mine to the Saldanha Bay Port for exportation to global markets. Vedanta have confirmed that two potential transport options will be explored during the ESIA process, which are as follows:
    - Transport Option 1: Zinc concentrate to be transported via an existing gravel road from the proposed mine to Loop 10 of the existing Sishen - Saldanha railway line. At Loop 10, the concentrate will be loaded and transported by rail via the railway line to Saldanha Bay Port; or
    - Transport Option 2: Load zinc concentrate onto trucks and transport the zinc concentrate via the existing N14 National Road to the Saldanha Bay Port.

Refer to Figure 2 for Layout.

The following indicate the infrastructure on the directly affected properties:

Project Component:	**Affected Properties**
Upgrading of Existing Water Pipeline	• Aroams 57 RE • Aroams 57 RE (Registered Servitude: land owned by Black Mountain, servitude owned by Pella Drift Water Board) • Bloemhoek 61 Portion1 • Gams 60 Portion 1

	• Gams 60 Protion4
Distribution Line and Associated Sub-stations	• Aroams 57 RE • Aroams 57 RE (Registered Servitude: land owned by Black Mountain, servitude owned by Eskom) • Bloemhoek 61 Portion1 • Gams 60 Portion 1 • Gams 60 Protion4 • Gams 60 Portion 4 (Registered Servitude: land owned by Black Mountain, servitude owned by Eskom)
Additional Housing	• Aggeneys 56 RE • Housing location in Springbok, Aggeneys or Pofadder to be confirmed in ESIA Report
Transport Option 1 (N14 to Port of Saldanha)	• N14 National Road (Owned by SANRAL)
Transport Option 2 (Road to Loop 10, load onto Sishen – Saldanha Railway Line to Port of Saldanha)	• Uitkyk 889 Portion 3 • F 197/Portion 15 • Aroams 57 RE (Proclaimed Road RL (P) 5/2002: land owned by Black Mountain, servitude owned by PD Carstens)

5. THE ENVIRONMENTAL SETTING

5.1 The Study Area

In broader terms the proposed project is centred on the northern areas of the Gamsberg massif with waste rock dump, primary crusher and process plant between the Gamsberg massif and the N14 national road and the tailings dam right across the N14, to the north. The open pit is situated on top of the Gamsberg mountain in its northern-western section and the explosives magazine on top in the south-eastern section.

5.2 Surrounding Land Use

5.2.1 Residential

The residential component includes the farmstead of the farm Achab, approximately 5.5km to the south-east of the Gamsberg mountain and the mining town of Aggeneys, approximately 8km to the west of the mountain.

5.2.2 Agriculture

Agricultural activities in the Northern Cape province consists mainly of stock farming including cattle, sheep, goat and game farming. Since water is scarce, crop farming is rarely explored Generally the farming activities in the area have a low impact on the natural environment, since farms needs to be large as carrying capacity is low.

5.2.3 Tourism

The N14 is a well known tourist artery serving the whole northern Cape and linking South Africa with Namibia and Botswana. The North Cape is well known for its tourist destinations including the Kgalagadi Transfrontier Park, which was South Africa's first transfrontier game park, located crossing the border between South Africa and Botswana.

5.2.4 Infrastructure and mining

Infrastructure includes power lines and mining infrastructure both at Aggeneys and on site, to extract the zinc deposits in the area.

5.2.5 Transportation systems

The transportation system consist of the major artery, the tarred N14 national road, as well as other distribution and local farm roads which are all dirt roads.

5.3 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 on 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. Refer to the views in Figure 5, which illustrate the nature and character of the study area. The viewpoint locations are indicated in Figure 4: Sensitivity and Views.

The study area is characterised by two broad landscape types. A flat expansive plain with gentle rolling topography and the inselberg along a series of other koppies that protrude above the plain. These landscape types are typical of large portions of the Northern Cape. The panorama photographs in Figure 5 illustrate the striking and vast nature of the landscape when viewed from the N14 and a small koppie to the north of the road. The lack of tall vegetation and the flatness of the plain emphasizes the ruggedness and the verticality of the inselberg and the surrounding koppies. The southern slopes of the inselberg support a greater variety of vegetation than the northern slopes. These slopes also have a rugged beauty which is typical of the landscape character of the Northern Cape.

The interior of the Gamsberg inselberg is a rocky terrain characterised by bowl shaped topography covered with low growing grasses and shrubs. This is also the location of a rare occurrence, a kokerboom forest. These trees dot the landscape and are a conspicuous feature of the landscape.

Figure 3: Visual Resource, illustrates the spatial distribution of the various landscape character types and the section below will rate the relative value of these types.

6. VISUAL RESOURCE

6.1 Visual Resource Value / Scenic Quality

The spatial distribution of the landscape types discussed in 5.3 is illustrated in Figure 3: Visual Resource. The figure also rates the relative scenic quality of each type and its landscape sensitivity.

Scenic quality ratings (using the scenic quality rating criteria described in Appendix C) were assigned to each of the landscape types defined in Figure 2: Visual Resource. The highest value is assigned to the topographical features including the koppies and the Gamsberg mountain as well as the dry water courses. The farmstead and town of Aggeneys were are rated as being moderate. The lowest scenic quality rating were assigned to the mining infrastructure and power lines.

The overall study area can be regarded as having a high visual resource value with its relatively unspoilt, vast, arid pains and rugged, rocky koppies contrasting dramatically with the striking blue skies.

A summary of the visual resource values is tabulated in Table 1 below.

Table 1: Value of the Visual Resource

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

High	**Moderate**	**Low**
Koppies and Gamsberg	Farmstead and town of Aggeneys	Mining infrastructure and power lines.
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 considered to be of particular importance to conserve and which has a strong sense of place.** Sensitivity: **It is sensitive to change in general and will be detrimentally affected if change is inappropriately dealt with.**	This landscape type is considered to have a *moderate* value because it is a: **Common landscape that exhibits some positive character but which has evidence of alteration /degradation/erosion of features resulting in areas of more mixed character.** Sensitivity: **It is potentially sensitive to change in general and change may be detrimental if inappropriately dealt with.**	This landscape type is considered to have a *low* value because it is a: **Minimal landscape generally negative in character with few, if any, valued features**.

Sections that are placed in bold are applicable to the study area.

6.2 Sense of Place

The sense of place for the proposed study area derives from the combination of all landscape types and their impact on the senses. Most people who live near or pass through the study area approach it along the N14 national road. They travel through an open dry landscape that is frequently 'punctuated' by curious koppies. It is this vast , desolate landscape with its hues of brown and backdrop of magnificent skies that give the area its unique character. It is this image that will leave a visual impression that can easily be recalled, in the mind. Although the study are evokes a distinct sense of place, it is not unique to the district or region. Nevertheless, the landscape quality or visual resource of the study area is considered to be *high*.

7. VISUAL RECEPTORS

7.1 Views

The vast majority of the views to the proposed project will be experienced from the N14 as motorists travel past the site in an easterly or westerly direction. One of the tourist attractions of the Northern Cape Province, one that would increase the volume of traffic on the N14, is the natural spring flower display that extends up the west coast and inland to the east of Springbok. This makes views from the N14 road important and perhaps the most sensitive to the proposed intervention. The total volume of the N14 is however relatively low. Other views of the proposed project would be from the mining town of Aggeneys, to the west of the proposed project, and the farmstead of Achab, to the east of the proposed project.

7.1.1 Sensitive Viewer Locations

Sensitive viewer locations would be views from tourist type travellers along the N14 and views from the farmstead of the farm Achab. Views from the town of Aggeneys would not be regarded as being sensitive since it is a mining town and most residents are employed by a mining company.

From Table 2 below, the potential sensitivity of visual receptors have be rated as *high*.

Table 2: Potential Sensitivity of Visual Receptors

High	Moderate	Low
Visitors of Game Farms / Lodges and travelling along local routes, whose intention or interest may be focused on the landscape; **Communities where the development results in changes in the landscape setting or valued views enjoyed by the community;** **Occupiers of residential properties with views affected by the development.**	People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value); People travelling through or past the affected landscape in cars, on trains or other transport routes.	Visitors and people working in mining / prospecting activities and travelling along local mining roads whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view.

Highlighted sections are applicable to the study area.

8. LANDSCAPE IMPACT

The *landscape impact* (i.e. the change to the fabric and character of the landscape caused by the physical presence of a development) of the proposed project will be ***high*** as the physical impact of the construction, operation, decommissioning and closure of the mining activities will disturb a great percentage of the proposed study site. The main disturbance would be during the construction, operational and decommissioning phase of the project.

9. PROFESSIONAL OPINION ON REVISED LAYOUT

Based on recent discussions with the Applicant and design engineers subsequent to the completion of the Draft Visual Impact Assessment, the following changes to the project layout have been suggested. The changes are as follows:

1. Relocation of the explosives magazine area from the top of the inselberg to an area located between the N14 and inselberg. Due to the impacts to three watercourses on the inselberg, this relocation was requested by the Specialist Team.
2. Increase in size of the waste rock dump from to 270 hectares to 490 hectares. In order to reduce the slope angle of the waste rock dump (i.e. from 450 – 350 degree slope) ,the footprint of the waste rock dump has increased. This design refinement was in response to DMR requirements for a waste rock dump.

Please refer to Figure 2-1, which illustrates the updated Project Layout Plan.

The scale and impact of the proposed mining activities as described in the body of this report is predicted to be high negative. The changes to the layout of the mine as described above will increase the cumulative impact of the project's activities, specifically on views from the N12 road. The impact on sensitive viewing areas to the south of the mine will however remain the same.

The findings, given the proposed new layout, will remain high negative.

Management recommendations will essentially remain as proposed in the body of the report i.e.:

- Plant and other visible structures, including the explosives magazine, should be painted with colours that reflect and complement the natural colour of the surrounding landscape.
- An earth berm should be constructed between the plant, explosives magazine and the N14 to buffer the 'clutter' of the lower sections of these structures. A similar solution should be considered adjacent the construction camp.
- Waste dumps should be implemented such that the final horizon of the dumps does not exceed height of the Gamsberg and that the existing profile of the mountain is articulated to resemble the existing topographic profile.
- Harsh steep engineered slopes should be avoided as these could impose an additional impact on landscape.

10. CONCLUSION

It can be concluded that the study area has a *high* visual quality and a strong sense of place even though it may be common within the region. The desolate, arid plains, punctuated by rugged koppies against the striking blue sky backdrop creates a sense of expansive vastness that can easily be recalled, especially by touristic travellers that would generally be interested in their surroundings.

Existing mining activities towards the west of the proposed project, degrades the landscape character, however to a lesser extent than what is anticipated from the proposed mine, since the existing mine is located further away from the N14 than the proposed project.

The change to be brought on by the proposed Gmasberg Zinc Mine Project would be quite prominent and highly exposed since it would be located along adjacent to the N14, which is a major artery and well used tourist route. It is anticipated that impacts would result from the construction, operation and decommissioning of the proposed Gamsberg Zinc Mine.

Conflict will most likely occur between sensitive viewing areas and activities associated with the proposed mine i.e. important, or valued views will be impacted upon. The sensitive viewing areas will include farmsteads and settlements as well as roads.

The following issues should therefore be considered for the Assessment Phase of the EIA:

- Establish public concern for scenic quality of the study area and their perception of what constitutes a sensitive viewing area;
- Determine the visibility of the Sasol Mafutha project by conducting viewshed analyses from sensitive viewing areas – especially the farmsteads and tourist locations;
- Determine visual intrusion (contrast) of the proposed Sasol Mafutha project by simulating its physical appearance from sensitive viewing areas;
- Rate the impact of the proposed Sasol Mafutha project on views from sensitive viewing areas;
- Rate the impact on the scenic quality and sense of place of the study area;
- Establish management measures (mitigation) to reduce the impact of the associated structures where appropriate.

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APPENDIX A: LIST OF FIGURES

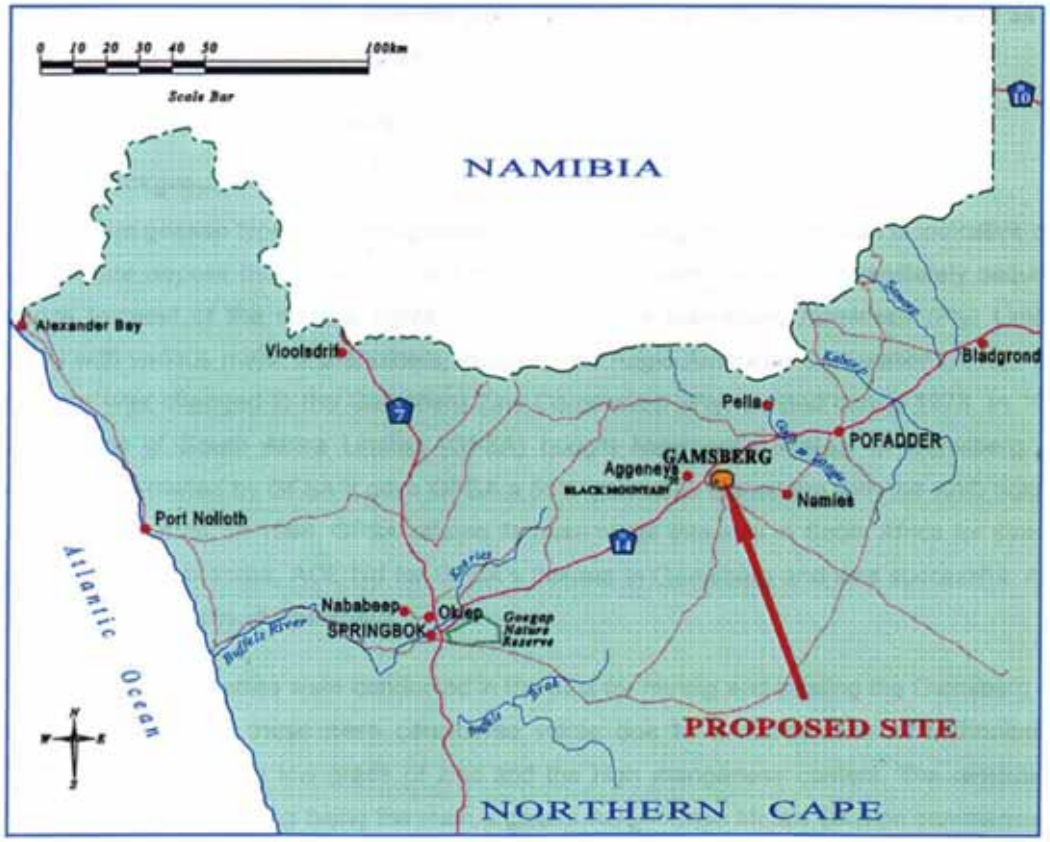


Figure1: LOCALITY - Gamsberg Mine

January 2013

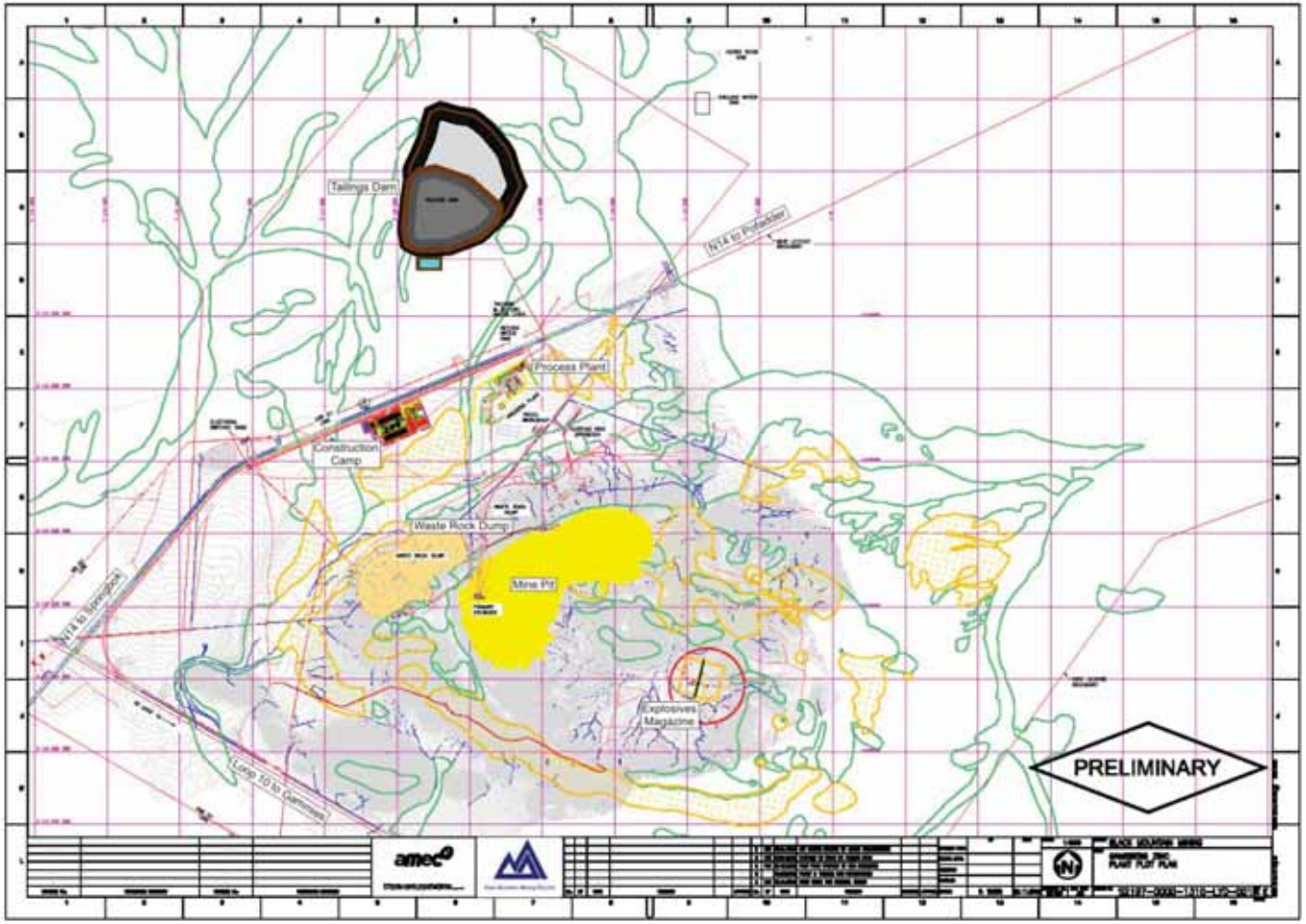


Figure 2: LAYOUT - Gamsberg Mine

January 2013

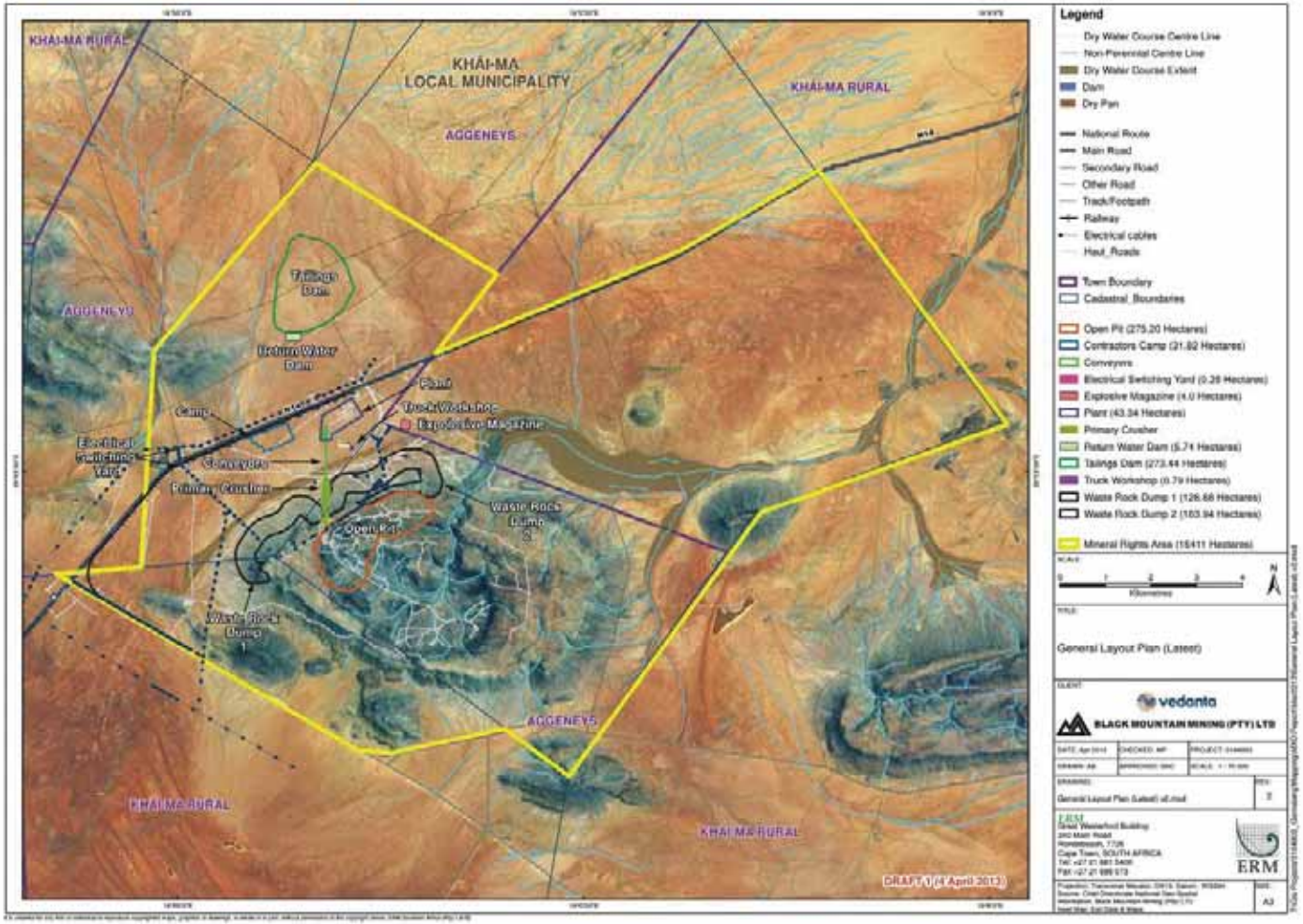


Figure 2-1: REVISED LAYOUT - Gamsberg Mine

April 2013

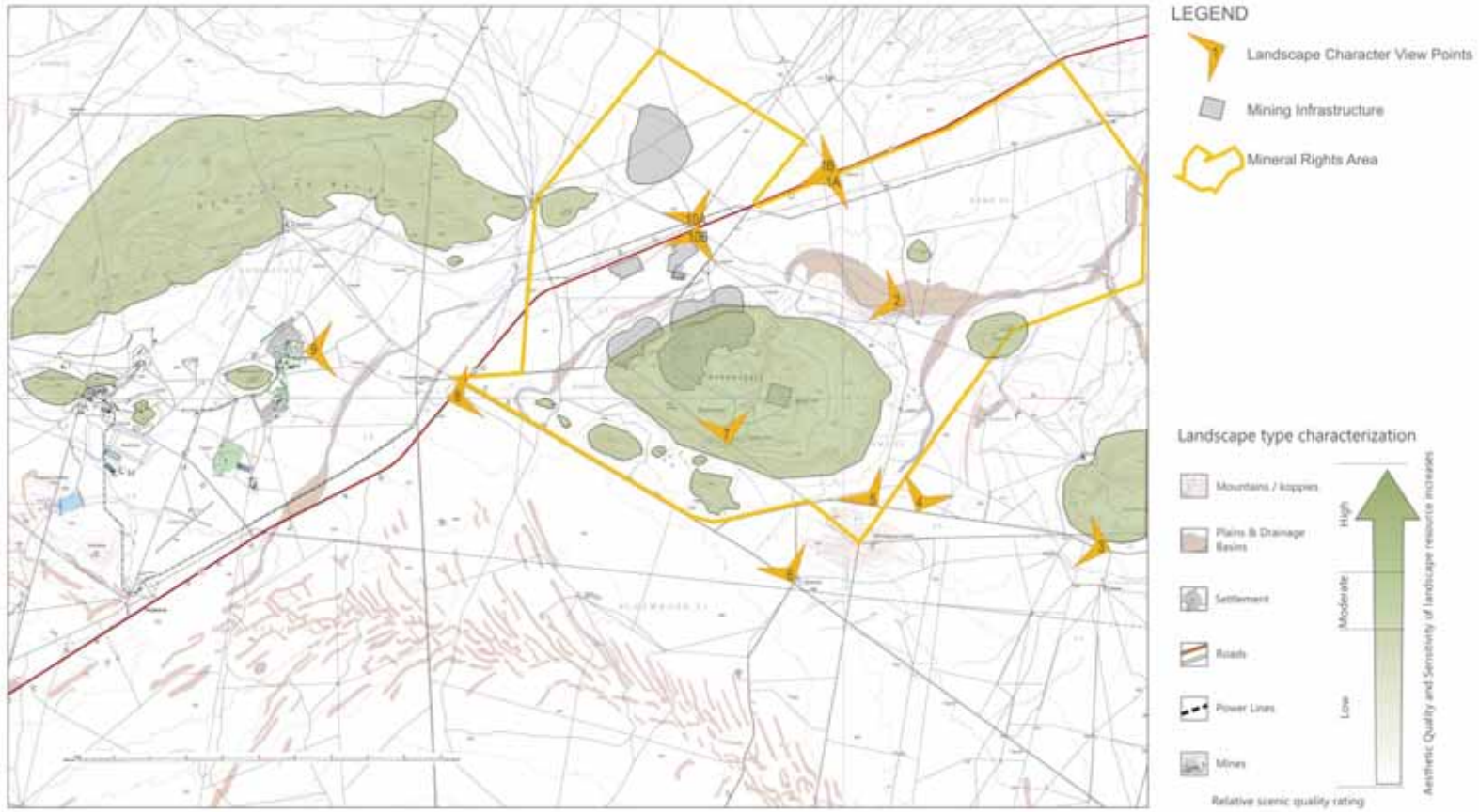


Figure 3: VISUAL RESOURCE & VIEWS - Gamsberg Mine

January 2013

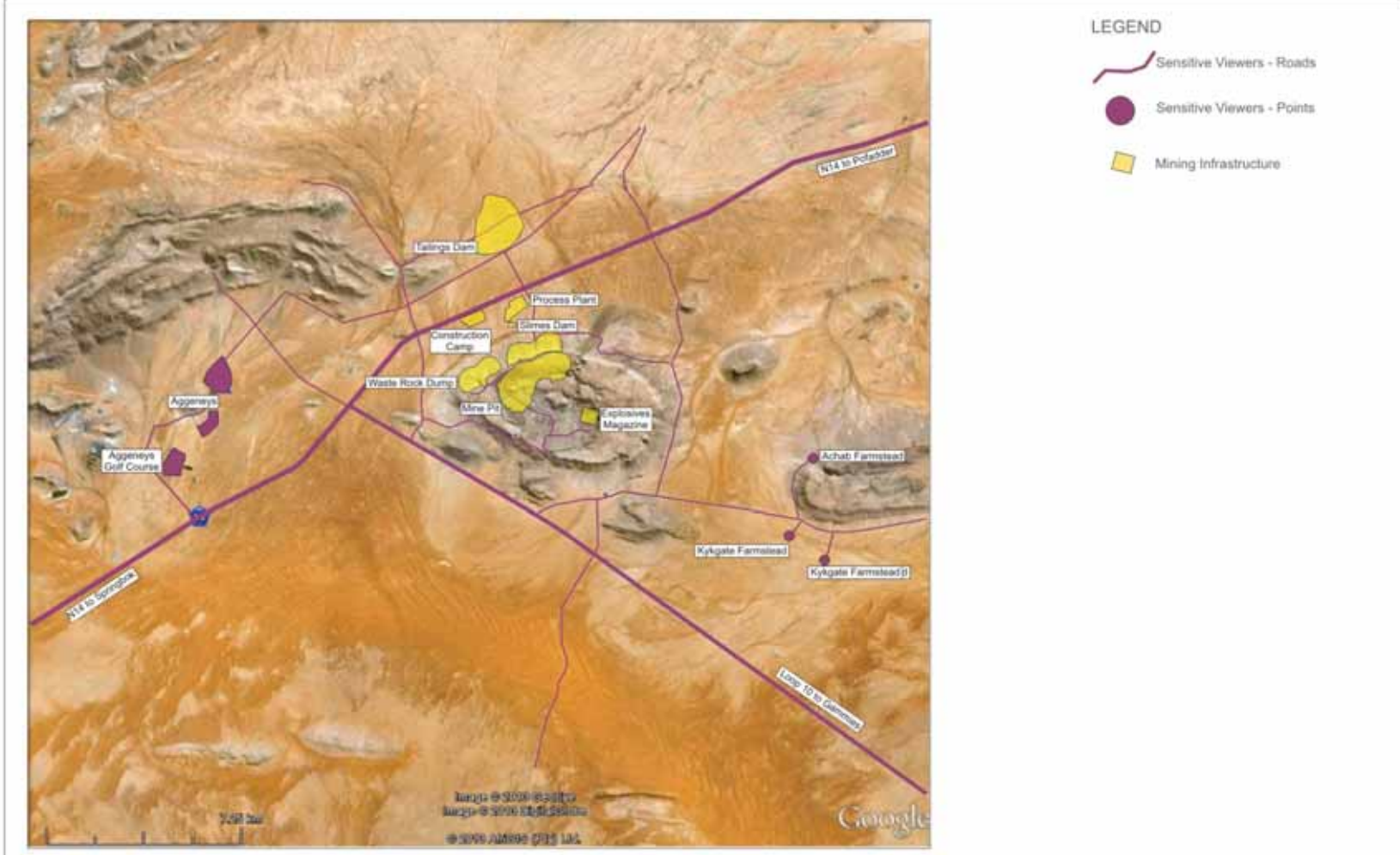


Figure 4: SENSITIVE VIEWERS - Gamsberg Mine

January 2013

View 1A: Along N14 looking south-west towards Gamsberg, the proposed plant would be in the foreground

View 1B: Along N14, looking north-west towards proposed tailings dam location

Figure 5: LANDSCAPE CHARACTER - Gamsberg Mine

January 2013

View 2: Along local dirt road connecting N14 with Loop 10, looking north-west towards proposed project site

View 3: Along local dirt road, looking west towards Gamsberg, note the rugged koppies and sparse vegetation

Figure 6: LANDSCAPE CHARACTER - Gamsberg Mine

January 2013

View 4: Along local dirt road looking north, note the open, flat plains with koppies and sparse vegetation

View 5: Along local dirt road, looking north-west, note the rugged koppies and sparse vegetation

Figure 7: LANDSCAPE CHARACTER - Gamsberg Mine

January 2013

View 6: Along Loop 10 road, looking north-west, note flat plains topography with koppies

View 7: On top of Gamsberg, looking north-west towards open pit mining area

Figure 8: LANDSCAPE CHARACTER - Gamsberg Mine

January 2013

View 8: Along N14, looking north-east towards proposed project site

View 9: From Aggeneys, looking north-east towards proposed project the, note the rugged koppies and sparse vegetation

Figure 9: LANDSCAPE CHARACTER - Gamsberg Mine

January 2013

View 10A: Along N14, looking north towards area where tailings dam is proposed, note falt plains and low height of vegetation

View 10B: Along N14, looking south-west towards proposed project site

Figure 10: LANDSCAPE CHARACTER - Gamsberg Mine

January 2013

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

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

Landscape Elements and Character

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

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

Landscape Value – all encompassing (Aesthetic Value)

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

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

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

Sense of Place

Central to the concept of a sense of place is that the place requires uniqueness and distinctiveness. The primary informant of these qualities is the spatial form and character of the natural landscape together with the cultural transformations and traditions associated with historic use and habitation. According to Lynch (1992) sense of place "is the extent to which a person can recognize or recall a place as being distinct from other places - as having a vivid, or unique, or at least particular, character of its own".

Sense of place is the unique value that is allocated to a specific place or area through the cognitive experience of the user or viewer. In some cases these values allocated to the place are similar for a wide spectrum of users or viewers, giving the place a universally recognized and therefore, strong sense of place.

Scenic Quality

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

Studies for perceptual psychology have shown human preference for landscapes with a higher visual complexity particularly in scenes with water, over homogeneous areas. On the basis of contemporary research landscape quality increases when:
Topographic ruggedness and relative relief increase;
Where water forms are present;
Where diverse patterns of grasslands and trees occur;
Where natural landscape increases and man-made landscape decreases;
And where land use compatibility increases and land use edge diversity decreases (Crawford 1994).

Scenic Quality - Explanation of Rating Criteria:

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

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

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

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

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

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

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

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

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

Scenic Quality Inventory and Evaluation Chart
(After The Visual Resource Management System, Department of the Interior of the USA Government, Bureau of Land Management)

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

Colour	Rich colour combinations, variety or vivid colour; or pleasing contrasts in the soil, rock, vegetation, water or snow fields. **5**	Some intensity or variety in colours and contrast of the soil, rock and vegetation, but not a dominant scenic element. **3**	Subtle colour variations, contrast, or interest; generally mute tones. **1**
Influence of adjacent scenery	Adjacent scenery greatly enhances visual quality. **5**	Adjacent scenery moderately enhances overall visual quality. **3**	Adjacent scenery has little or no influence on overall visual quality. **0**
Scarcity	One of a kind; or unusually memorable, or very rare within region. Consistent chance for exceptional wildlife or wildflower viewing, etc. National and provincial parks and conservation areas *** 5+**	Distinctive, though somewhat similar to others within the region. **3**	Interesting within its setting, but fairly common within the region. **1**
Cultural modifications	Modifications add favourably to visual variety while promoting visual harmony. **2**	Modifications add little or no visual variety to the area, and introduce no discordant elements. **0**	Modifications add variety but are very discordant and promote strong disharmony. **-4**

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

In determining the quality of the visual resource both the objective and the subjective or aesthetic factors associated with the landscape are considered. Many landscapes can be said to have a strong sense of place, regardless of whether they are considered to be scenically beautiful but where landscape quality, aesthetic value and a strong sense of place coincide - the visual resource or perceived value of the landscape is considered to be very high.

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

Value of Visual Resource – expressed as Scenic Quality

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

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

APPENDIX C: METHOD FOR DETERMINING THE MAGNITUDE (SEVERITY / INTENSITY) OF LANDSCAPE AND VISUAL IMPACT

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

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

Landscape impact assessment includes a combination of objective and subjective judgments, and it is therefore important that a structured and consistent approach is used. It is necessary to differentiate between judgments 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). Judgment 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 out as an effect on an environmental resource, i.e. the landscape. Visual effects are assessed as one of the interrelated effects on populations.

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 10m 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 – 5.0km) which, in turn is greater than the impact of the object in the background (greater than 5.0km) 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.

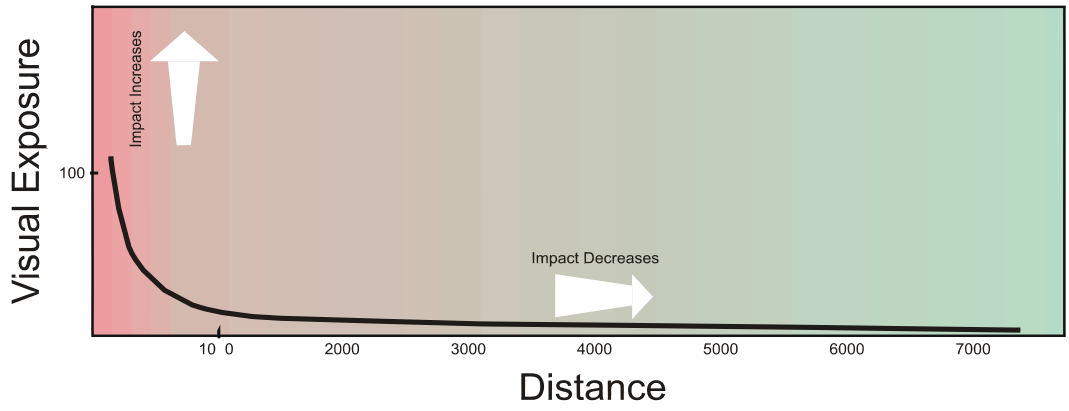
Areas seen from 800m to 5.0km are considered middle ground; vegetation appears as outlines or patterns. Depending on topography and vegetation, middle ground is sometimes considered to be up to 8.0km.

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 1000m would be 25% of the impact as viewed from 500m. At 2000 m it would be 10% of the impact at 500m. 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 important criteria for the study. This principle is illustrated in the figure below.

Effect of Distance on Visual Exposure



Sensitivity of Visual Receptors

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

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

The most sensitive receptors may include:

- Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape;
- Communities where the development results in changes in the landscape setting or valued views enjoyed by the community;
- Occupiers of residential properties with views affected by the development.
- These would all be high (5)

Other receptors include:

- People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value); (3)
- People travelling through or past the affected landscape in cars, on trains or using other transport modes; (0)
- People at their place of work. (0)

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 (5)	Moderate (3)	Low (0)
Users of all outdoor recreational facilities including public rights of way, whose intention or interest may be focused on the landscape; Communities where the development results in changes in the landscape setting or valued views enjoyed by the community; Occupiers of residential properties with views affected by the development.	People engaged in outdoor sport or recreation (other than appreciation of the landscape, as in landscapes of acknowledged importance or value); People travelling through or past the affected landscape in cars, on trains or other transport routes;	The least sensitive receptors are likely to be people at their place of work, or engaged in similar activities, whose attention may be focused on their work or activity and who therefore may be potentially less susceptible to changes in the view (i.e. office and industrial areas). Roads going through urban and industrial areas

Magnitude (Severity / Intensity) of the Visual Impact

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

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

For instance, the fact that visual intrusion and exposure diminishes significantly with distance does not necessarily imply that the relatively small impact that exists at greater distances is unimportant. The

level of impact that people consider acceptable may be dependent upon the purpose they have in viewing the landscape. A particular development may be unacceptable to a hiker seeking a natural experience, or a household whose view is impaired, but may be barely noticed by a golfer concentrating on his game or a commuter trying to get to work on time (Ittleson *et al.,* 1974).

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

Magnitude (Severity / Intensity) of Visual Impact

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

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 F: DECLERATION OF INDEPENDENCE

Declaration of Independence

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

Signature: 

Date: 7 April 2013

APPENDIX G: CURRICULUM VITAE

Since 1994

Graham Young PrLArch

PO Box 36, Fourways, 2055

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Fax: 27 11 462-9284

www.newla.co.za graham@newla.co.za

Graham is a landscape architect with thirty 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. *Member*

Current — Responsible for project management, landscape design, urban design, and visual impact assessment.

Senior Lecturer: Department of Architecture, University of Pretoria.

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

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

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

Designed golf courses and carried out golf course feasibility studies (Robert Heaslip and Associates); developed landscape site plans and an end-use plan for an

abandoned mine (du Toit, Allsopp and Hillier); conducted a visual analysis of a proposed landfill site. .

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

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

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

EDUCATION:

Bachelor of Landscape Architecture, 1978, (BLArch), University of Toronto, Canada;
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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Yonanda Martin

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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

Since 1994

Mitha Cilliers

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Mitha is a landscape architect with seven years experience. She has worked as Landscape Architect in South Africa and Angola and has valuable expertise in the practice of landscape architecture and environmental planning. She currently focuses on gaining experience in Visual Impact Assessments subcontracting for NLA, she also subcontracts as Landscape Architect for other Landscape Architectural firms, as Landscape Designer for Landscape Contractors as well as undertaking private projects.

EXPERIENCE:

2008 to present: *Consultant*:

NEWTOWN Landscape Architects cc.
Visual Impact Assessments
KWP Landscape Architects & Environmental Consultants
Landscape Maintenance Auditing
Landscape Design and draughting
REAL Landscapes
Landscape Design

2005 – 2007 *Landscape Architect:*

KWP Landscape Architects & Environmental Consultants

Landscape design for various types of projects ranging from residential garden design to industrial landscaping, including the landscape upgrade of the SASOL plant in Secunda.
General project administration and documentation including Bill of Quantities, Tender Evaluation and site inspections.
Landscape Maintenance Auditing at the Nelspruit Riverside Government Offices
Preparation of Environmental Impact Assessment Reports for proposed housing developments.
Environmental Control Officer on various residential housing developments.

2003 – 2004 *Candidate Landscape Architect:*

Sigma Gibb – part of the GIBB Africa Group

Co-Landscape Architect on a residential housing estate in Luanda, Angola.
Design and draughting for various projects in Angola.

2003 *Candidate Landscape Architect:*

NEWTOWN Landscape Architects cc.

Design and draughting various projects ranging from private residential gardens to public parks.
Project administration including Bills of Quantities and Tender Evaluation and site inspections

PROFESSIONAL:

Registered Landscape Architect – South African Council for Landscape Architectural Profession (2007)
Committee Member – South African Council for Landscape Architectural Profession (2009 & 2011- - 2012)

EDUCATION:

Bachelor of Landscape Architecture, 2001, (BLArch), University of Pretoria.