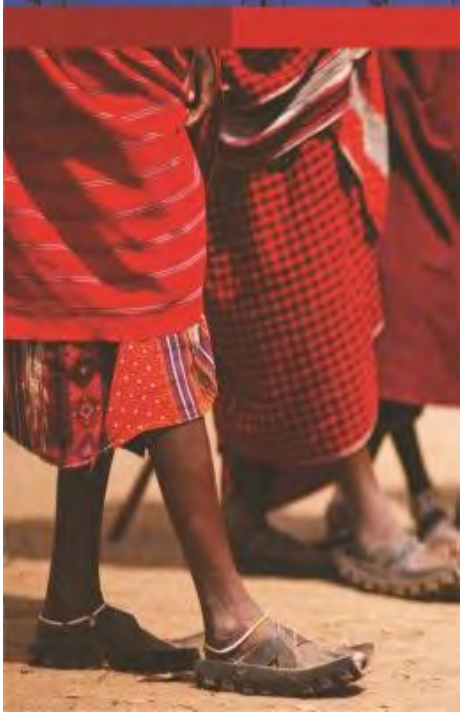

DIGBY WELLS
ENVIRONMENTAL

Visual Impact Assessment for De Groote Boom Mining Permit

Visual Impact Assessment

Project Number:

UAR2967

Prepared for:

De Groote Boom Minerals (Pty) Limited

April 2015

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EXECUTIVE SUMMARY

Digby Wells Environmental (hereafter Digby Wells) has been requested by De Groote Boom Minerals (Pty) Ltd (hereafter De Groote Boom), to compile and submit an Environmental Management Plan (EMP), pursuant to an application for a mining permit, in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) to the Limpopo Department of Mineral Resources (DMR). This Visual Impact Assessment is one of the specialist investigations undertaken in support of the Mining Permit Application.

The proposed De Groote Boom Project is situated on the Eastern Limb of the Bushveld Igneous Complex in the Sekhukhuneland region of the Limpopo Province. The project area and surrounds are characterised by traditional authorities consisting of numerous rural settlements. Several mining operations exist in the vicinity of the project area. The closest of these is the Motomolo Mine located to the south-west, Dwars River Mine to the east and the Eastern Chrome Mines to the north. Plan 1 illustrates the regional setting of the project area.

Ridges occur in the south-west of the prospecting area along the banks of the Dwars River and there is a ridge in the north-eastern part of the prospecting area. The mining permit area is on this ridge in the north-western part of the prospecting area. The topographical model indicates that the elevation of the mining permit area decreases from 1340 metres above mean sea level (mamsl) in the north-east to 1040 mamsl in the south-west. The mining permit area is located on a ridge and the majority of the slopes are between 19° and 42°.

A viewshed is a geographical area, defined by the topography, within which a particular feature will be visible (Oberholzer, 2005). The viewshed model for the proposed De Groote Boom Project was refined to a buffer of 8 km around the proposed infrastructure and divided into areas that are likely to experience different categories of visual exposure. Due to the nature of the receiving environment it is unlikely that the proposed infrastructure will be visible beyond this 8 km buffer. The viewshed model depicts the area from which the proposed Project is likely to be visible. This viewshed covers an area of 8274 ha.

The proposed De Groote Boom Project has a moderate visibility and moderate visual exposure as it will be visible from a large area and will be recognisable to the viewer. The proposed project has a moderate visual intrusion as it partially fits into the surroundings, but will be clearly noticeable. The receiving environment has a moderate visual absorption capacity because there is partial screening by the topography or vegetation. The proposed De Groote Boom Project will therefore have a moderate visual impact on the receiving environment.

These impacts can be reduced by implementing various mitigation measures. The most important of these is rehabilitation with the emphasis being on re-vegetation of the site. The success of this rehabilitation will influence the overall long term impact of the proposed project on the visual / aesthetic character of the receiving environment.

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Abbreviations and Acronyms

CD: NGI	Chief Directorate: National Geospatial Information
CV	Curriculum Vitae
DMR	Department of Mineral Resources
ELC	European Landscape Convention
EMP	Environmental Management Plan
EMPr	Environmental Management Programme
GIS	Geographic Information System
IFC	International Finance Corporation
km	Kilometres
m	Metres
mamsl	Metres above mean sea level
MPRDA	Mineral and Petroleum Resources Development Act 28 of 2002
NEMA	National Environmental Management Act 107 of 1998
NEM: PAA	National Environmental Management: Protected Areas Act 57 of 2003
NHRA	National Heritage Resources Act 25 of 1999
PCD	Pollution Control Dam
PPP	Public Participation Process
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment

1 Introduction

Topography is the study of the earth's surface. It includes both natural and man-made features. The Collins English Dictionary (2003) describes topography as:

- The study or detailed description of the surface features of a region (Earth Sciences / Physical Geography);
- The detailed mapping of the configuration of a region (Earth Sciences / Physical Geography);
- The landforms or surface configuration of a region (Earth Sciences / Physical Geography);
- The surveying of a region's surface features (Mathematics & Measurements / Surveying); and
- The study or description of any object.

For the purpose of this study, the topography will be conceptualised as the landforms and surface configuration of the landscape.

"Visual, scenic and cultural components of the environment can be seen as a resource, much like any other resource, which has a value to individuals, to society and to the economy of the region" (Oberholzer, 2005). A Visual Impact Assessment (VIA) is a specialist study performed to identify the visual impacts of the proposed project on the receiving environment.

This report describes the current topography and visual / aesthetic character of the receiving environment and the expected visual impacts of the proposed De Groote Boom Mining Operation (De Groote Boom Project). The impacts are described and rated, and mitigation measures to reduce the negative impacts and enhance the benefits of the proposed project are also discussed in this VIA.

2 Project Description

De Groote Boom currently holds an approved Prospecting Right valid for three years and it now proposes to mine primarily chromite covering an extent of not more than 5 ha on the farm De Grooteboom 373 KT (refer Plan 1 and Plan 2). It is possible that after completing work under the mining permit, De Groote Boom will commence with full scale mining of Chromite in terms of a mining right that would be applied for at that stage. Mining will be undertaken by open cut methods and the ore may be transported to a portable plant for crushing and screening. The ore will be stockpiled until transported off site by truck. The mining permit area is adjacent to the Bulk Sample area and the operational and related infrastructure areas are depicted on the infrastructure plan (refer Plan 3).

The project entails a construction phase, operational phase and possibly a decommissioning phase. The decommissioning phase will only be applicable if the project does not prove to be viable.

3 Terms of Reference

Digby Wells Environmental (hereafter Digby Wells) has been requested by De Groote Boom Minerals (Pty) Ltd (hereafter De Groote Boom), to compile and submit an Environmental Management Plan (EMP), pursuant to an application for a mining permit, in terms of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA) to the Limpopo Department of Mineral Resources (DMR).

The Mining Permit Application has been accepted by the Regional Manager, Limpopo Region, of the DMR under Reference LP 10656 MP and De Groote Boom has been instructed to prepare an EMP, which will include various specialist investigations, and a Public Participation Process (PPP) will be undertaken. One part of the PPP relates to consultation with the Land Claims Commissioner and the Department of Rural Development and Land Reform.

This VIA is one of the specialist investigations undertaken in support of the Mining Permit Application.

4 Relevant Legislation and Guidelines

The following international, national and regional documents form part of the legislative and guideline framework of the VIA.

4.1 National Legislation and Policy

At a national level, the following legislative documents potentially apply to the VIA:

- Regulations in Chapter 5 (Integrated Environmental Management) of the NEMA and the Act in its entirety. The Act states that “the State must respect, protect, promote and fulfil the social, economic and environmental right of everyone…” Landscape is both moulded by, and moulds, social and environmental features;
- Section 23(1)(d) of the MPRDA, where it is mentioned that a mining right will be granted if “the mining will not result in unacceptable pollution, ecological degradation or damage to the environment”. Visual pollution is a form of environmental pollution and therefore needs to be considered under this section. Holders of rights granted in terms of the MPRDA must at all times give effect to the general objectives of integrated environmental management laid down in Chapter 5 of the NEMA. The Regulations promulgated in terms of the NEMA, with which holders of rights must comply, provide for the assessment and evaluation of potential impacts, and the setting of management plans to mitigate such impacts.

- The National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA) and related provincial regulations – in some instances there are policies or legislative documents that give rise to the protection of listed sites. 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". A 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; and
- 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.

4.2 International Conventions

There is no regional or local scale legislation pertaining to mining activities and Visual Impact Assessments (VIAs) exclusively but VIAs are relevant to the International Finance Corporation's (IFC) Performance Standards and this will be treated as a best practice guideline for the purposes of the proposed De Groote Boom Project.

The European Landscape Convention (ELC) created by the Council of Europe, was the first international convention to focus exclusively on landscapes. The purpose of this convention is to promote effective management and planning of landscapes. It was signed by the United Kingdom government in 2006 and became binding from 2007. Public documents that explore the impacts of large scale developments, as defined in the ELC, on any landscape should take into account the effects of these developments. A landscape means "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors" i.e. the natural, visual and subjectively perceived landscape, (Contesse, 2011; European Landscape Convention, 2007).

IFC Performance Standard 3: Resource Efficiency and Pollution Prevention is applicable to the VIA. Performance Standard 3 recognises that increased economic activity and urbanisation often generate increased levels of pollution to air, water and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional and global levels. For the purposes of this Performance Standard, the term 'pollution' is used to refer to both hazardous and non-hazardous chemical pollutants in the solid, liquid, or gaseous phases, and includes other components such as pests, pathogens, thermal discharge to water, GHG emissions, nuisance odours, noise, vibration, radiation, electromagnetic energy and the creation of potential visual impacts including light (IFC, 2012).

The Environmental, Health and Safety Guidelines for Mining therefore need to be considered (World Bank, 2007):

"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 minimise 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 of the placement of ancillary and access roads."

5 Study Area

The proposed De Groote Boom Project is situated on the Eastern Limb of the Bushveld Igneous Complex in the Sekhukhuneland region of the Limpopo Province. The study area and surrounds are characterised by traditional authorities consisting of numerous rural settlements.

Several mining operations exist in the vicinity of the study area. The closest of these is the Motomolo Mine located to the south-west, Dwars River Mine to the east and the Eastern Chrome Mines to the north. Plan 1 illustrates the regional setting of the study area.

The mining operations area is situated in the north-western corner of the prospecting area and covers an area of approximately 5 ha.

The topographical model indicates that the elevation of the mining permit area decreases from 1320 metres above mean sea level (mamsl) in the north-east to 1040 mamsl in the south-west.

The prospecting area and surrounds have an undulating topography. There are ridges running along the eastern side of the prospecting area. Ridges also occur in the south-west of the prospecting area along the banks of the Dwarsrivier River and there is a ridge in the north-eastern part of the prospecting area. The mining permit area is on this ridge in the north-western part of the prospecting area. The Dwarsrivier River flows in a north-westerly direction through the south-western corner of the prospecting area. Several non-perennial streams drain the prospecting area in a westerly and south-westerly direction towards the Dwarsrivier River.

The mining permit area is located on a ridge and the majority of the mining permit area has steep slopes of between 19° and 68° and isolated slopes are between 19° and 41° (refer to Plan 5).

Due to the undulating topography, the slope aspect / direction of the mining operations area is not in any specific direction. The sides of the ridges and valleys slope in various different directions (refer Plan 6).

6 Expertise of the Specialist

A Curriculum Vitae (CV) and declaration of independence is attached in Appendix B.

7 Aims and Objectives

The VIA will be conducted at a desktop level. Aerial imagery will be analysed to determine the topographical features (natural and man-made) and visual resources of the area. A Digital Elevation Model (DEM) for the study area and surrounds will be created using ArcGIS 3D Analyst extension and will be used to create slope and aspect models. The DEM, slope and aspect models will provide an understanding of the current topography. Viewshed modelling will be conducted to determine the degree of visibility that the proposed infrastructure is likely to have on visual receptors.

The following are objectives for the VIA study:

- Examine aerial imagery (if available) for the study area and surrounds, in order to determine the landscape units and to identify potential visual receptors that may be impacted on by the proposed project;
- Examine the viewshed models created in ArcGIS 3D Analyst extension;
- Identify the impacts that the mine infrastructure will have on the visual landscape, and rate the scale, duration, severity and probability of the impacts occurring;
- Describe the current and post mining visual aspects of the study area in a specialist report; and
- Provide mitigation measures and recommendations in an attempt to reduce the potential visual impacts.

8 Knowledge Gaps

A VIA is open to subjectivity. This subjectivity is due to the different opinions receptors may have of a proposed project. A receptor may be partial to the fact that the proposed project is occurring in an area, which becomes a source of economic upliftment for a community, whereas another receptor may view a proposed project as a negative factor which could hamper tourism or recreational activities.

Many factors can enhance or reduce the visual impact of the proposed project. Vegetation near a receptor's viewpoint can greatly reduce that receptor's view of the proposed project. Other factors such as weather / climatic conditions and seasonal change can also affect a receptor's view of the proposed project. It is, therefore, difficult to determine the visual impact of the proposed project from the viewpoint of each individual receptor. Consequently, this report focuses on the size of the viewshed area.

9 Methodology

9.1 Characterisation of Visual Impacts

The expected visual impact of the proposed De Groote Boom Project was categorised based on the type of receiving environment and the type of development as detailed in Table 1 (Oberholzer, 2005). This table provides an indication of the visual impacts that can typically be expected for different types of developments in relation to the nature of the receiving environment. According to Oberholzer (2005), the proposed De Groote Boom Project is classified as a Category 5 development (Table 2). The receiving environment can be described as having medium scenic, cultural or historical significance and it is therefore expected that the proposed De Groote Boom Project will have a high visual impact on the environment. This will be verified in the investigation to follow.

Table 1: Categorisation of Expected Visual Impact (adapted from Oberholzer, 2005)

Type of Environment	Type of Development (Low to High Intensity)				
	Category 1 Development	**Category 2 Development**	**Category 3 Development**	**Category 4 Development**	**Category 5 Development**
Protected / wild areas of international, national or regional significance	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected	Very high visual impact expected
Areas or routes of high, scenic, cultural or historical significance	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	High visual impact expected	Very high visual impact expected
Areas or routes of medium scenic, cultural or historical significance	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected	**High visual impact expected**
Areas or routes of low scenic, cultural or historical significance	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected	High visual impact expected

Type of Environment	Type of Development (Low to High Intensity)				
	Category 1 Development	Category 2 Development	Category 3 Development	Category 4 Development	Category 5 Development
Disturbed or degraded sites / run down urban areas / wasteland	Little or no visual impact expected. Possible benefits	Little or no visual impact expected. Possible benefits	Little or no visual impact expected	Minimal visual impact expected	Moderate visual impact expected

Table 2: Key to Categorisation of Development (adapted from Oberholzer, 2005)

Type of Development	Examples of Development
Category 1	Nature reserves, nature related recreation, camping, picnicking, trails and minimal visitor facilities
Category 2	Low-key recreation / resort / residential type development, small-scale agriculture / nurseries, narrow roads and small-scale infrastructure
Category 3	Low density resort / residential type development, golf or polo estates, low to medium-scale infrastructure
Category 4	Medium density residential development, sports facilities, small-scale commercial facilities / office parks, one-stop petrol stations, light industry, medium-scale infrastructure
Category 5	High density township / residential development, retail and office complexes, industrial facilities, refineries, treatment plants, power stations, wind energy farms, power lines, freeways, toll roads, large-scale infrastructure generally. Large-scale development of agricultural land and commercial tree plantations. **Quarrying and mining activities with related processing plants**

9.2 Visual / Aesthetic Character and Topography

A desktop study was conducted to evaluate the topography of the receiving environment and Chief Directorate: National Geospatial Information (CD: NGI) aerial photography (flown in 2012) of the area was examined to determine the surface features. The available vector GIS data were used to determine the relative location of the features surrounding the study area.

A topographical model was created using ArcGIS 3D Analyst Extension. The model was created using 5 metre contour relief data with spot height data to increase the accuracy of the topographical model.

The resultant topographical model was then used to create a slope intensity model using the Slope Tool of the ArcGIS 3D Analyst Extension. The slope model indicates the slope degree and was classified using the Jenks Natural Breaks method.

9.3 Viewshed Analysis

The resultant topographical model was used to create a viewshed model using the Viewshed Tool of the ArcGIS 3D Analyst Extension. This viewshed model illustrates the areas from which the proposed project will potentially be visible taking into account the estimated height of the proposed infrastructure (Table 3).

Table 3: Infrastructure Height Assumptions for Viewshed Modelling

Infrastructure Description	Assumed Height
Crusher	10 m
Brake Test Ramp	2 m
Stockpile (15 000t)	5 m
Offices and workshops	3 m
Power line	7 m
Pollution Control Dam	1 m

The concept of viewshed modelling is depicted in Figure 1. The topography denotes whether or not a development will be visible from a receptor. In Figure 1 below the development is only visible from the receptors within the valley and on the slopes of the hills facing it. The development will be hidden from all receptors beyond the first hills.

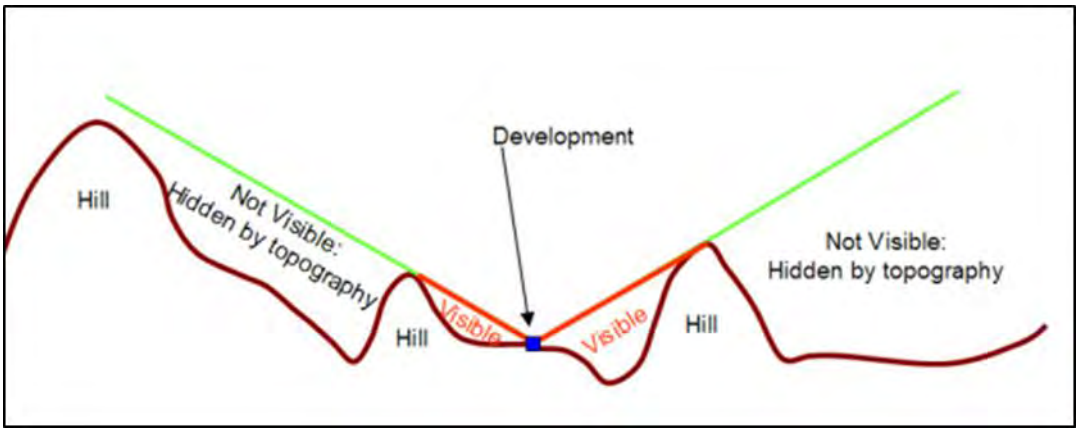

Figure 1: Theoretical Background of Viewshed Modelling

A practical viewshed model was created. This viewshed model is based on the topography only and does not take the screening effect of vegetation into account. The natural Sekhukhuneland Mountain Bushveld is not expected to provide noticeable screening of the proposed development.

10 Findings

10.1 Visual / Aesthetic Character and Topography

This section provides the results obtained from the analysis of the topographical, slope intensity and slope aspect models created in ArcGIS.

Ridges also occur in the south-west of the prospecting area along the banks of the Dwars River and there is a ridge in the north-eastern part of the prospecting area. The mining permit area is on this ridge in the north-western part of the prospecting area. The topographical model indicates that the elevation of the mining permit area decreases from 1340 mamsl in the north-east to 1040 mamsl in the south-west.

The mining permit area is located on a ridge and the majority of the slopes are between 19° and 42°.

Due to the undulating topography, the slope aspect / direction of the mining permit area is not in any specific direction. The ridge however slopes predominately in a south-westerly direction.

The undulating topography is expected to only provide partial screening of the proposed development. Figure 2 illustrates the view mid-way up the hill marked for mining. From this photograph it is evident that relatively large distances are visible within the landscape. The vegetation is generally low with some trees providing partial screening of the surrounding hills from the main road (Figure 3).

Figure 2: View Mid-way Up Hill Marked for Mining

Figure 3: Low Vegetation Provides Partial Screening of Hills.

10.2 Viewshed Model

A viewshed is a geographical area, defined by the topography, within which a particular feature will be visible (Oberholzer, 2005). The theoretical viewshed model for the proposed De Groote Boom Project is illustrated in Plan 7. This model depicts the area from which the proposed De Groote Boom Project will potentially be visible. The theoretical viewshed model does not take into account the screening effect of vegetation. The implications of this are negligible as the natural vegetation is largely degraded and will therefore only provide moderate screening of the proposed development.

The practical viewshed model for the proposed De Groote Boom Project was refined to a buffer of 8 km around the proposed infrastructure and divided into areas that are likely to experience different categories of visual exposure. Due to the nature of the receiving environment it is unlikely that the proposed infrastructure will be visible beyond this 8 km buffer. The practical viewshed model depicts the area from which the proposed Project is likely to be visible. This viewshed covers an area of 8 274.2 ha. The categories of visual exposure and associated areas include:

- 5 - 8 km: Low Visual Exposure - 2624.36 ha;
- 2 - 5 km: Moderate Visual Exposure - 2989.70 ha; and
- 0 - 2 km: High Visual Exposure - 2660.14 ha.

10.3 Sensitive Receptors

The receptors identified within the viewshed model include residents of surrounding settlements, recreational areas, and road users. The number of sensitive receptors (those that potentially would see the proposed Project) per each category of visual exposure are as follows:

- 18 out of 82 receptors are in the 0 2 km buffer and are located on Farm De Grooteboom 373; and
- 64 out of 82 receptors are in the 2 - 5 km buffer and are located on Farm Frischgewaagd 359.
- No sensitive receptors are located in the 6 – 8 km buffer zone.

11 Discussion

The proposed De Groote Boom Project will have a negative visual impact on the receiving environment. The greatest visual impact will be from the mining area and stockpiles. The mining area is on the side of a hill and a portion of the hill will be removed increasing the visual impact of the proposed project. The height of the stockpiles will also increase the visual impact as the stockpiles are located in a flatter low lying area and will therefore contrast against the immediate surrounds. The construction of surface infrastructure will have a lesser visual impact as it only covers a small part of the study area.

11.1 Visibility of the Project

The visibility of the project refers to the viewshed area. Oberholzer (2005) describes this as “the geographic area from which the project will be visible”. The visibility of the project is also related to the number of receptors affected. As the mining permit area is located on a ridge is more visible than if it were located in a valley. The proposed Project has a **high visibility** as it is visible from a large area (practical viewshed of approximately 8724 ha) with numerous visual receptors.

11.2 Visual Exposure

Visual exposure is “based on the distance from the project area to selected viewpoints” and “tends to diminish exponentially with distance” (Oberholzer, 2005). The proposed De Groote Boom Project is limited to a small area but the removal of a portion of the hill will have a visual impact and thus a **moderate exposure** level as it will be recognisable to the viewer.

11.3 Visual Sensitivity of the Area

The visual sensitivity of the area refers to “the inherent visibility of the landscape, usually determined by a combination of topography, landform, vegetation cover and settlement pattern” (Oberholzer, 2005). The receiving environment of the proposed Project has a **moderate visual sensitivity** as there are moderately visible areas in the landscape.

11.4 Visual Sensitivity of Receptors

The visual sensitivity of receptors is dependent on the nature of the receptors. Receptors in residential areas or nature reserves have a high sensitivity while receptors in industrial or mining areas have a low sensitivity. The identified receptors of the proposed De Groote Boom Project have a **moderate sensitivity** as there is a combination of natural, industrial, mining and degraded areas situated in moderately scenic areas.

11.5 Visual Absorption Capacity (VAC)

The visual absorption capacity (VAC) refers to "the potential of the landscape to conceal the proposed project" (Oberholzer, 2005). The receiving environment of the proposed De Groote Boom Project has a **moderate VAC** because there is partial screening by the topography or vegetation.

11.6 Visual Intrusion

The visual intrusion of the project refers to "the level of compatibility or congruence of the project with the particular qualities of the area, or its sense of place". Visual intrusion is "related to the idea of context and maintaining the integrity of the landscape or townscape" (Oberholzer, 2005). The proposed Project has a **moderate visual intrusion** as it is in close proximity to the surrounding mines therefore resulting in minimal changes to the receiving environment.

12 Impact Assessment

12.1 Assessment Methodology

The methodology utilised to assess the significance of potential social and heritage impacts is discussed in detail below. The significance rating formula is as follows:

Significance = Consequence x Probability

Where

Consequence = Type of Impact x (Intensity + Spatial Scale + Duration)

And

Probability = Likelihood of an Impact Occurring

In addition, the formula for calculating consequence:

Type of Impact = ***+1*** *(Positive Impact) or* ***-1*** *(Negative Impact)*

The weight assigned to the various parameters for positive and negative social and heritage impacts is provided for in the formula and is presented in Table 4. The probability consequence matrix for social and heritage impacts is displayed in Table 5, with the impact significance rating described in Table 6.

Table 4: Impact Assessment Parameter Ratings

Rating	Intensity		Spatial scale	Duration	Probability
	Negative Impacts (Type of Impact = -1)	***Positive Impacts (Type of Impact = +1)***			
7	Very significant impact on the environment. Irreparable damage to highly valued species, habitat or ecosystem. Persistent severe damage. Irreparable damage to highly valued items of great cultural significance or complete breakdown of social order.	Noticeable, on-going social and environmental benefits which have improved the livelihoods and living standards of the local community in general and the environmental features.	International The effect will occur across international borders.	Permanent: No Mitigation The impact will remain long after the life of the Project.	Certain/ Definite. There are sound scientific reasons to expect that the impact will definitely occur.
6	Significant impact on highly valued species, habitat or ecosystem. Irreparable damage to highly valued items of cultural significance or breakdown of social order.	Great improvement to livelihoods and living standards of a large percentage of population, as well as significant increase in the quality of the receiving environment.	National Will affect the entire country.	Beyond Project Life The impact will remain for some time after the life of a Project.	Almost certain/Highly probable It is most likely that the impact will occur.

Rating	Intensity		Spatial scale	Duration	Probability
	Negative Impacts ***(Type of Impact = -1)***	***Positive Impacts*** ***(Type of Impact = +1)***			
5	Very serious, long-term environmental impairment of ecosystem function that may take several years to rehabilitate. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread positive benefits to local communities which improves livelihoods, as well as a positive improvement to the receiving environment.	Province/ Region Will affect the entire province or region.	Project Life The impact will cease after the operational life span of the Project.	Likely The impact may occur.
4	Serious medium term environmental effects. Environmental damage can be reversed in less than a year. On-going serious social issues. Significant damage to structures / items of cultural significance.	Average to intense social benefits to some people. Average to intense environmental enhancements.	Municipal Area Will affect the whole municipal area.	Long term 6-15 years.	Probable Has occurred here or elsewhere and could therefore occur.

Rating	Intensity		Spatial scale	Duration	Probability
	Negative Impacts ***(Type of Impact = -1)***	***Positive Impacts*** ***(Type of Impact = +1)***			
3	Moderate, short-term effects but not affecting ecosystem function. Rehabilitation requires intervention of external specialists and can be done in less than a month. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some.	Local Extending across the site and to nearby settlements.	Medium term 1-5 years.	Unlikely Has not happened yet but could happen once in the lifetime of the Project, therefore there is a possibility that the impact will occur.
2	Minor effects on biological or physical environment. Environmental damage can be rehabilitated internally with/ without help of external consultants. Minor medium-term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experience by very few of population.	Limited Limited to the site and its immediate surroundings.	Short term Less than 1 year.	Rare/ improbable Conceivable, but only in extreme circumstances and/ or has not happened during lifetime of the Project but has happened elsewhere. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures.

Rating	Intensity		Spatial scale	Duration	Probability
	Negative Impacts (Type of Impact = -1)	***Positive Impacts (Type of Impact = +1)***			
1	Limited damage to minimal area of low significance that will have no impact on the environment. Minimal social impacts, low-level repairable damage to commonplace structures.	Some low-level social and environmental benefits felt by very few of the population.	Very limited Limited to specific isolated parts of the site.	Immediate Less than 1 month.	Highly unlikely/None Expected never to happen.

Table 5: Probability Consequence Matrix for Social and Heritage Impacts

Probability	Significance																																					
7	-147	-140	-133	-126	-119	-112	-105	-98	-91	-84	-77	-70	-63	-56	-49	-42	-35	-28	-21	21	28	35	42	49	56	63	70	77	84	91	98	105	112	119	126	133	140	147
6	-126	-120	-114	-108	-102	-96	-90	-84	-78	-72	-66	-60	-54	-48	-42	-36	-30	-24	-18	18	24	30	36	42	48	54	60	66	72	78	84	90	96	102	108	114	120	126
5	-105	-100	-95	-90	-85	-80	-75	-70	-65	-60	-55	-50	-45	-40	-35	-30	-25	-20	-15	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105
4	-84	-80	-76	-72	-68	-64	-60	-56	-52	-48	-44	-40	-36	-32	-28	-24	-20	-16	-12	12	16	20	24	28	32	36	40	44	48	52	56	60	64	68	72	76	80	84
3	-63	-60	-57	-54	-51	-48	-45	-42	-39	-36	-33	-30	-27	-24	-21	-18	-15	-12	-9	9	12	15	18	21	24	27	30	33	36	39	42	45	48	51	54	57	60	63
2	-42	-40	-38	-36	-34	-32	-30	-28	-26	-24	-22	-20	-18	-16	-14	-12	-10	-8	-6	6	8	10	12	14	16	18	20	22	24	26	28	30	32	34	36	38	40	42
1	-21	-20	-19	-18	-17	-16	-15	-14	-13	-12	-11	-10	-9	-8	-7	-6	-5	-4	-3	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
	-21	**-20**	**-19**	**-18**	**-17**	**-16**	**-15**	**-14**	**-13**	**-12**	**-11**	**-10**	**-9**	**-8**	**-7**	**-6**	**-5**	**-4**	**-3**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**	**15**	**16**	**17**	**18**	**19**	**20**	**21**
	Consequence																																					

Table 6: Significance Threshold Limits

Score	Description	Rating
109 to 147	A very beneficial impact which may be sufficient by itself to justify implementation of the Project. The impact may result in permanent positive change.	**Major (positive)**
73 to 108	A beneficial impact which may help to justify the implementation of the Project. These impacts would be considered by society as constituting a major and usually a long-term positive change to the (natural and/or social) environment.	Moderate (positive)
36 to 72	An important positive impact. The impact is insufficient by itself to justify the implementation of the Project. These impacts will usually result in positive medium to long-term effect on the social and/or natural environment.	Minor (positive)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the social and/or natural environment.	Negligible (positive)
-3 to -35	An acceptable negative impact for which mitigation is desirable but not essential. The impact by itself is insufficient even in combination with other low impacts to prevent the development being approved. These impacts will result in negative medium to short term effects on the social and/or natural environment.	Negligible (negative)
-36 to -72	An important negative impact which requires mitigation. The impact is insufficient by itself to prevent the implementation of the Project but which in conjunction with other impacts may prevent its implementation. These impacts will usually result in negative medium to long-term effect on the social and/or natural environment.	Minor (negative)
-73 to -108	A serious negative impact which may prevent the implementation of the Project. These impacts would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment and result in severe effects.	Moderate (negative)

Score	Description	Rating
-109 to -147	A very serious negative impact which may be sufficient by itself to prevent implementation of the Project. The impact may result in permanent change. Very often these impacts are immitigable and usually result in very severe effects.	Major (negative)

13 Potential Impacts

13.1 Identification of Project Activities

The project activities are listed in Table 7 below. The activities highlighted in red are applicable to this VIA.

Table 7: Project Activities

Activity	Description
Construction Phase	
1	Augmenting existing roads
2	Construction of pollution control dam (PCD)
3	Transport of construction material, mobile plant and equipment to the site; and movement of haul trucks and excavator on haul roads
4	Storage of material / diesel at site in temporary facilities
5	Site clearing and topsoil removal for mining operation area; and construction of mining cut
6	Preparing an area of approximately 2-3 ha for portable plant and infrastructure (crushing, screening, workshops, ablution and offices etc.) and stockpiling
7	Use of existing drilled / new boreholes
Operational Phase	
8	Storage of fuel and lubricants in temporary facilities
9	Topsoil removal and stockpiling; and extraction and transportation of ore;
10	Vehicular activity on haul roads; and operation of mining equipment
11	Crushing and screening of ore in mobile plant
12	Stockpiling material
13	Water management
14	Waste generation and disposal (including sewage)
Decommissioning Phase	
15	Demolition / removal of portable and related infrastructure (if applicable)

16	Vehicular activity: removal of mobile plant / equipment and vehicles
17	Rehabilitation of site (As per surface use agreement roads, buildings etc. need not be rehabilitated)
It should be noted: There may be no decommissioning phase as the mining area will remain for subsequent mining should the project be viable.	

13.2 Visual Impact Assessment

The project activities listed in Table 7 will be rated according to the impact they will have on the receiving environment, i.e. the environment before development. Negative visual impacts decrease the visual character of the pre-development environment while positive visual impacts increase the visual character of the pre-development environment. Neutral visual impacts assist to minimise the negative visual impacts of a development but don't result in a positive visual impact. A positive visual impact only occurs when an area is rehabilitated to a state that is better than the state of the pre-development environment, e.g. a mining area on previously agricultural land is rehabilitated to an area of natural vegetation and all visible signs of agriculture and mining area removed. Positive visual impacts rarely occur.

13.2.1 Construction Phase

The construction phase is characterised by site development and infrastructure construction. This includes transportation of construction material, temporary storage of material / diesel, site clearance and topsoil removal, construction of surface infrastructure. The establishment of infrastructure and the related construction activities will draw attention to the project area making receptors aware of the development. The construction phase will have negative visual impacts on the receiving environment. The transportation of construction material and the temporary storage of material / diesel will have a minor visual impact. The site clearance and topsoil removal will have a moderate visual impact.

Activity No. 1: Augmenting existing roads.					
Criteria	**Details / Discussion**				
Description of impact	The augmentation of the existing roads will have a negative visual impact on the receiving environment as natural vegetation will be cleared altering the landscape and changing the sense of place from a rural sense of place to a mining dominated sense of place.				
Mitigation required	■ Do not create numerous roads alongside each other; and ■ Construction of vegetation berms must be implemented close to roads so that vegetation can be established.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	1	2	(-) 3	6	-36

Post-Mitigation	1	2	(-) 2	5	-25
Activity No. 2: Construction of pollution control dam (PCD).					
Criteria	**Details / Discussion**				
Description of impact	The construction of the PCD will have a negative visual impact as vegetation will be cleared and the PCD will be visible throughout the duration of the project.				
Mitigation required	■ Limit the footprint area of the PCD where possible.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	1	3	(-) 3	6	-42
Post-Mitigation	1	3	(-) 2	5	-30
Activity No. 3: Transport of construction material, mobile plant and equipment to the site, and movement of haul trucks and excavator on haul roads					
Criteria	**Details / Discussion**				
Description of impact	The transportation of construction material will have a negative visual impact on the receiving environment. Vehicular activity and the resulting dust will draw attention to the project area. These visual impacts are temporary and will only occur during the construction phase.				
Mitigation required	■ Roads should be wetted frequently by means of a water bowser to suppress dust; and ■ Vehicles must be roadworthy and obey the recommended speed limits at all times.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	3	2	(-) 3	6	-48
Post-Mitigation	3	2	(-) 2	5	-35
Activity No. 4: Storage of material / diesel at site in temporary facilities.					
Criteria	**Details / Discussion**				
Description of impact	The temporary storage of material / diesel will have a negative visual impact on the receiving environment. These visual impacts are temporary and will only occur during the construction phase.				
Mitigation required	■ Limit the footprint area of the temporary storage facilities where possible.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	1	2	(-) 3	6	-36
Post-Mitigation	1	2	(-) 2	5	-25

Activity No. 5: Site clearing and topsoil removal for mining operation area; and construction of mining cut					
Criteria	**Details / Discussion**				
Description of impact	The removal of vegetation and topsoil for site clearing will have a negative visual impact on the receiving environment. The project area will become noticeable to the nearby receptors as it will contrast the surrounding areas.				
Mitigation required	■ Vegetation and topsoil should only be removed when and where necessary; and ■ Topsoil stockpiles should be vegetated and positioned to reduce visual disturbance where possible.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	2	2	(-) 4	6	-48
Post-Mitigation	1	2	(-) 4	5	-35
Activity No. 6: Preparing an area of approximately 2-3ha for portable plant and infrastructure (crushing, screening, workshops, ablution and offices etc.) and stockpiling					
Criteria	**Details / Discussion**				
Description of impact	The erection of surface infrastructure will have a negative visual impact on the receiving environment. This surface infrastructure includes offices, mobile plant, workshops etc. The surface infrastructure will change the sense of place of the project area from a rural sense of place to an industrial sense of place. These visual impacts will occur for the life of the project. Infrastructure and mine area lighting will be visible at night resulting in a negative visual impact on the receiving environment. This visual impact will occur for the life of the project.				
Mitigation required	■ Do not create numerous roads alongside each other; ■ Limit the height and footprint area of surface infrastructure where possible; ■ Surface infrastructure should be painted natural hues so as to blend into the surrounding landscape where possible; ■ Pylons and metal structures should be galvanised so as to weather to a matt grey finish rather than be painted silver. If the pylons and metal structures are painted, it is recommended that a neutral matt finish be used; ■ Avoid construction activities at night if possible, thereby avoiding the use of infrastructure and mine area lighting. If construction activities take place at night, down lighting should be implemented to minimise light pollution; and ■ Construction of vegetation berms must be implemented close to infrastructure so that vegetation can be established.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	1	2	(-) 4	6	-42

Post-Mitigation	1	2	(-) 3	5	-30

13.2.2 Operational Phase

The operational phase is characterised by mining of material, water management, waste management and crushing and screening. This phase will have moderate negative Impacts on the visual landscape. Waste management will have a minor visual impact.

The most significant visual impact during the operational phase is the extraction of material.

Activity No. 8: Storage of fuel and lubricants in temporary facilities					
Criteria	**Details / Discussion**				
Description of impact	The temporary storage of fuel, lubricants and material will have a negative visual impact on the receiving environment. These visual impacts are temporary and will only occur during the operational phase.				
Mitigation required	■ Limit the footprint area of the temporary storage facilities where possible.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	1	3	(-) 3	5	-35
Post-Mitigation	1	3	(-) 2	4	-24
Activity No. 9: Topsoil removal and stockpiling; and extraction and transportation of ore					
Criteria	**Details / Discussion**				
Description of impact	Stockpiling topsoil and extraction of material will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact. These visual impacts will occur for the life of the project.				
Mitigation required	■ Topsoil should only be removed when and where necessary; ■ Limit the height of soil stockpiles to 3-4 metres to prevent the soil from becoming compacted and to reduce the visual impact; ■ Topsoil stockpiles should be vegetated so as to blend into the surrounding landscape; ■ Topsoil and material stockpiles should be positioned to reduce visual disturbance where possible; ■ Reduce the height and footprint area of topsoil and material stockpiles where possible; ■ Apply dust suppression techniques to limit the dust from stockpiles; ■ Plant fast-growing endemic vegetation in areas where it can conceal the stockpiles; and ■ Ensure vegetation screens are built and maintained.				

Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	2	3	(-) 4	6	-54
Post-Mitigation	2	3	(-) 3	5	-40

Activity No. 10: Vehicular activity on haul roads; and operation of mining equipment					
Criteria	**Details / Discussion**				
Description of impact	Vehicular activity on the haul roads will have a negative visual impact on the receiving environment. Dust from vehicular activity will also have a negative visual impact. These visual impacts will occur for the life of the project.				
Mitigation required	■ Do not create numerous haul roads alongside each other; ■ Roads should be wetted frequently by means of a water bowser to suppress dust; and ■ Vehicles must be roadworthy and obey the recommended speed limits at all times.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	2	3	(-) 4	7	-54
Post-Mitigation	2	3	(-) 3	6	-40

Activity No. 11: Crushing and screening of ore in mobile plant					
Criteria	**Details / Discussion**				
Description of impact	The crushing and screening of ore may generate dust which will have a visual impact.				
Mitigation required	■ Limit the footprint area of the temporary storage facilities where possible; and ■ Apply dust suppression techniques where necessary.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	1	3	(-) 3	6	-42
Post-Mitigation	1	3	(-) 2	5	-30

Activity No. 12: Stockpiling material	
Criteria	**Details / Discussion**
Description of impact	The stockpiling of material will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact. These visual impacts will occur for the life of the project.
Mitigation required	■ Material stockpiles should be positioned to reduce visual disturbance where possible;

	■ Reduce the height and footprint area of material stockpiles where possible; ■ Apply dust suppression techniques to limit the dust from stockpiles; ■ Plant fast-growing endemic vegetation in areas where it can conceal the stockpiles; and ■ Ensure vegetation screens are built and maintained.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	1	2	(-) 3	6	-36
Post-Mitigation	1	2	(-) 2	5	-25
Activity No. 14: Waste generation and disposal (including sewage)					
Criteria	**Details / Discussion**				
Description of impact	Waste storage on site will have a negative visual impact on the receiving environment. This visual impact will occur until the waste is removed from the site.				
Mitigation required	■ Limit the footprint area of the waste storage area where possible; and ■ Limit the quantity and time of waste stored on site.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	2	3	(-) 2	5	-35
Post-Mitigation	2	3	(-) 1	4	-24

13.2.3 Decommissioning Phase

The decommissioning phase is characterised by demolition of infrastructure and rehabilitation including the re-contouring of the disturbed areas. This phase will have mainly neutral visual impacts on the receiving environment. The surface infrastructure is relatively small scale and its demolition and removal will have a minor neutral impact. The spreading of topsoil, profiling and contouring, and re-vegetation will have a moderate neutral impact.

Activity No. 15: Demolition / removal or portable and related infrastructure (if applicable)					
Criteria	**Details / Discussion**				
Description of impact	Demolition and removal of infrastructure will have a neutral visual impact on the receiving environment. This will help to reverse some of the changes that occurred when the infrastructure was constructed.				
Mitigation required	■ Ensure that all unnecessary infrastructure is demolished and removed from the site.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	1	2	(-) 3	6	-36

Post-Mitigation	*This is a positive impact with a neutral net benefit.*				
Activity No. 16: Vehicular activity: removal of mobile plant/equipment and vehicles					
Criteria	**Details / Discussion**				
Description of impact	Vehicular activity on the haul roads will have a negative visual impact on the receiving environment. Dust from vehicular activity will also have a negative visual impact. These visual impacts will occur for the life of the project.				
Mitigation required	■ Do not create numerous haul roads alongside each other; ■ Roads should be wetted frequently by means of a water bowser to suppress dust; and ■ Vehicles must be roadworthy and obey the recommended speed limits at all times.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	2	2	(-) 2	6	-36
Post-Mitigation	1	2	(-) 2	5	-25
Activity No. 17: Rehabilitation of site (as per surface use agreement roads, buildings etc. need not be rehabilitated)					
Criteria	**Details / Discussion**				
Description of impact	Rehabilitation by replacement of topsoil and re-contouring of the disturbed areas will have a neutral visual impact on the receiving environment. The aim of rehabilitation is to return the study area to a state similar to the pre-mining state. Rehabilitation will assist to reduce the negative visual impact of mining on the receiving environment.				
Mitigation required	■ Re-contouring disturbed areas to create a free-draining topography; ■ Spread topsoil over the disturbed area; and ■ Re-vegetate the disturbed area.				
Parameters	*Spatial*	*Duration*	*Intensity*	*Probability*	*Significant rating*
Pre-Mitigation	2	3	(-) 4	6	-54
Post-Mitigation	*This is a positive impact with a neutral net benefit.*				

14 Cumulative Impacts

The proposed De Groote Boom Project is situated in the Sekhukhuneland region. Several mining operations exist in this area, the closest of which are the Motomolo Mine, Thorncliff Mine, Dwarsriver Mine and Eastern Chrome Mines as well as the Helena Mine.

These existing operations have visual impacts on the receiving environment and have begun altering the agricultural sense of place to one of mining and industry. The proposed Project will add to these existing visual impacts (Plan 8).

15 Mitigation Measures and Management Programme

The Environmental Management Plan (EMP) has been described according to the project activities to provide an understanding of what objectives and recommended management measures are required to minimise the environmental impacts arising from these activities. The management measures are described in Table 8.

15.1 General Mitigation

According to Bush et al (1979), vegetation screening is the best mitigation measure to conceal a development. Figure 4 illustrates the screening effect of vegetation. It is recommended that any vegetation which may potentially conceal the proposed development be left undisturbed, especially on the project boundary and around infrastructure. Vegetation left undisturbed along the perimeter of the project has the ability to conceal the proposed infrastructure from nearby receptors. Figure 5 illustrates the effect of cleared vegetation allowing direct views of the proposed infrastructure.

Figure 4: Screening Effect of Vegetation

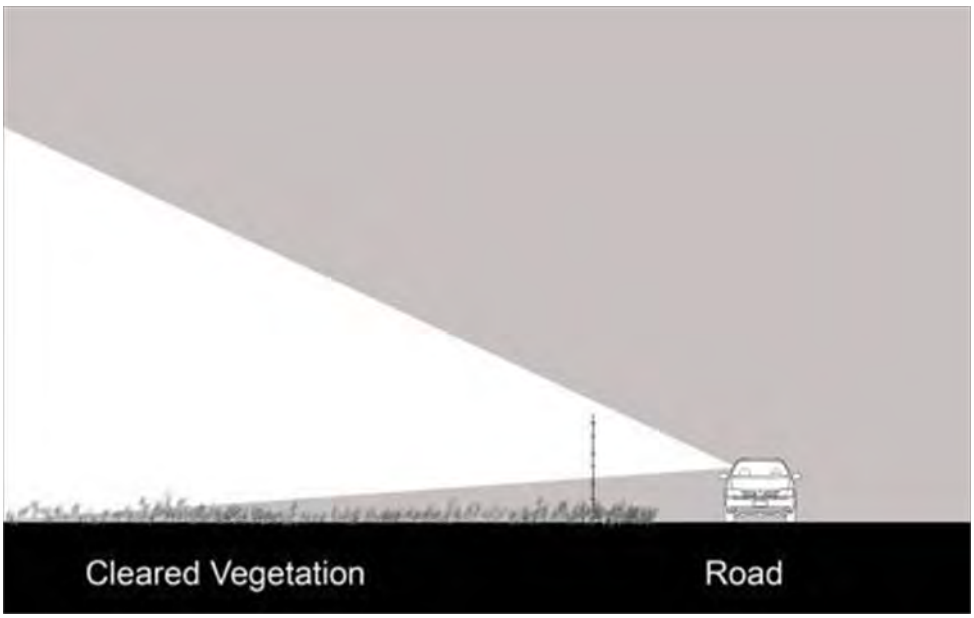

Figure 5: Effect of Cleared Vegetation

Other general mitigation measures that should be implemented where possible include:

- As much existing vegetation as possible should be retained, specifically bushes and trees if present. This will assist to conceal the development;
- Areas susceptible to dust should be frequently wetted by means of a water bowser. It is extremely important to suppress the visual aspects of dust to avoid creating the impression of a polluting industry;
- Vehicles should keep to the recommended speed limit, so as to reduce the creation of dust and attention;
- Down lighting should be implemented to minimise light pollution at night; and
- Grievances from receptors relating to topographical and visual aspects should be monitored and addressed.

Table 8: Mitigation and Management Plan

Project Activities	Receiving Environment	Objectives	Management and Mitigation Measures	Frequency	Legal Requirements	Recommended Action Plans	Duration	Responsible Person
Construction Phase								
Activity 1: Augmenting existing roads	Visual	To minimise the negative visual impact caused by augmentation of the existing roads.	■ Do not create numerous roads alongside each other; and ■ Construction of vegetation berms must be implemented close to roads so that vegetation can be established.	Weekly	N/A	Mining Plan	Construction	Mining Contractor
Activity 2: Construction of PCD	Visual	To minimise the negative visual impact caused by the construction of the PCD.	■ Limit the footprint area of the PCD where possible.	Weekly	N/A	Mining Plan	Construction	Mining Contractor
Activity 3: Transport of construction material, mobile plant and equipment to the site; and movement of haul trucks and excavator on haul roads	Visual	To minimise the negative visual impact caused by vehicular activity to transport construction material.	■ Roads should be wetted frequently by means of a water bowser to suppress dust; and ■ Vehicles must be roadworthy and obey the recommended speed limits at all times.	Weekly	N/A	Mining Plan	Construction	Mining Contractor
Activity 4: Storage of material / diesel at site in temporary facilities.	Visual	To minimise the negative visual impact caused by temporary storage of materials and diesel.	■ Limit the footprint area of the temporary storage facilities where possible.	Weekly	N/A	Mining Plan	Construction	Mining Contractor
Activity 5: Site clearing and topsoil removal for mining operation area; and construction of mining cut	Visual	To minimise the negative visual impact caused by site clearing and topsoil removal.	■ Vegetation and topsoil should only be removed when and where necessary; and ■ Topsoil stockpiles should be vegetated and positioned to reduce visual disturbance where possible.	Weekly	N/A	Mining Plan	Construction	Mining Contractor

Project Activities	Receiving Environment	Objectives	Management and Mitigation Measures	Frequency	Legal Requirements	Recommended Action Plans	Duration	Responsible Person
Activity 6: Preparing an area of approximately 2-3 ha for portable plant and infrastructure (crushing, screening, workshops, ablution and offices etc.) and stockpiling	Visual	To minimise the negative visual impact caused by erection of portable plant and associated infrastructure.	■ Do not create numerous roads alongside each other; ■ Limit the height and footprint area of surface infrastructure where possible; ■ Surface infrastructure should be painted natural hues so as to blend into the surrounding landscape where possible; ■ Pylons and metal structures should be galvanised so as to weather to a matt grey finish rather than be painted silver. If the pylons and metal structures are painted, it is recommended that a neutral matt finish be used; ■ Avoid construction activities at night if possible, thereby avoiding the use of infrastructure and mine area lighting. If construction activities take place at night, down lighting should be implemented to minimise light pollution; and ■ Construction of vegetation berms must be implemented close to infrastructure so that vegetation can be established.	Weekly	N/A	Mining Plan	Construction	Mining Contractor
Operational Phase								
Activity 8: Storage of fuel and lubricants in temporary facilities	Visual	To minimise the negative visual impact caused by temporary storage of fuel and lubricants.	■ Limit the footprint area of the temporary storage facilities where possible.	Weekly	N/A	Mining Plan	Operational	Mining Contractor

Project Activities	Receiving Environment	Objectives	Management and Mitigation Measures	Frequency	Legal Requirements	Recommended Action Plans	Duration	Responsible Person
Activity 9: Topsoil removal and stockpiling; and extraction and transportation of ore	Visual	To minimise the negative visual impact caused by material extraction. .	■ Topsoil should only be removed when and where necessary; ■ Limit the height of soil stockpiles to 3-4 metres to prevent the soil from becoming compacted and to reduce the visual impact; ■ Topsoil stockpiles should be vegetated so as to blend into the surrounding landscape; ■ Topsoil and material stockpiles should be positioned to reduce visual disturbance where possible; ■ Reduce the height and footprint area of topsoil and material stockpiles where possible; ■ Apply dust suppression techniques to limit the dust from stockpiles; ■ Plant fast-growing endemic vegetation in areas where it can conceal the stockpiles; and ■ Ensure vegetation screens are built and maintained.	Weekly	N/A	Mining Plan	Operational	Mining Contractor
Activity 10: Vehicular activity on haul roads; and operation of mining equipment	Visual	To minimise the negative visual impact caused by operation of mining equipment and vehicular activity.	■ Do not create numerous haul roads alongside each other; ■ Roads should be wetted frequently by means of a water bowser to suppress dust; and ■ Vehicles must be roadworthy and obey the recommended speed limits at all times.	Weekly	N/A	Mining Plan	Operational	Mining Contractor
Activity 11: Crushing and screening of ore in mobile plant	Visual	To minimise the negative visual impact caused by crushing and screening of ore.	■ Limit the footprint area of the temporary storage facilities where possible; and ■ Apply dust suppression techniques where necessary.	Weekly	N/A	Mining Plan	Operational	Mining Contractor

Project Activities	Receiving Environment	Objectives	Management and Mitigation Measures	Frequency	Legal Requirements	Recommended Action Plans	Duration	Responsible Person
Activity 12: Stockpiling material	Visual	To minimise the negative visual impact caused by stockpiling of material.	■ Material stockpiles should be positioned to reduce visual disturbance where possible; ■ Reduce the height and footprint area of material stockpiles where possible; ■ Apply dust suppression techniques to limit the dust from stockpiles; ■ Plant fast-growing endemic vegetation in areas where it can conceal the stockpiles; and ■ Ensure vegetation screens are built and maintained.	Weekly	N/A	Mining Plan	Operational	Mining Contractor
Activity 14: Waste generation and disposal (including sewage)	Visual	To minimise the negative visual impact caused by waste management activities.	■ Limit the footprint area of the waste storage area where possible; and ■ Limit the quantity and time of waste stored on site.	Weekly	N/A	Mining Plan	Operational	Mining Contractor
Decommissioning Phase								
Activity 15: Demolition / removal of portable and related infrastructure	Visual	To minimise the negative visual impact caused by removal of portable plant and associated infrastructure.	■ Ensure that all unnecessary infrastructure is demolished and removed from the site.	Weekly	N/A	Mining Plan	Decommissioning	Mining Contractor
Activity 16: Vehicular activity: removal of mobile plant / equipment and vehicles	Visual	To minimise the negative visual impact caused by vehicular activity during decommissioning.	■ Do not create numerous haul roads alongside each other; ■ Roads should be wetted frequently by means of a water bowser to suppress dust; and ■ Vehicles must be roadworthy and obey the recommended speed limits at all times.	Weekly	N/A	Mining Plan	Decommissioning	Mining Contractor
Activity 17: Rehabilitation of the site	Visual	To create a neutral visual impact by rehabilitating disturbed areas.	■ Re-contouring disturbed areas to create a free-draining topography; ■ Spread topsoil over the disturbed area; and ■ Re-vegetate the disturbed area.	Weekly	N/A	Mining Plan	Decommissioning	Mining Contractor

16 Monitoring Programme

The following monitoring activities should be undertaken on a monthly basis for the life of the project:

- Dust monitoring as per the Air Quality Monitoring Plan;
- Vegetation screens need to be maintained and protected against fire and utilisation of the vegetation for fire wood, etc.; and
- Grievances from receptors must be monitored and addressed through a Grievance Mechanism.

17 Recommendations

It is recommended that the mitigation measures detailed in Table 8 above are implemented to reduce the impact that the proposed De Groote Boom Project will have on the visual character of the receiving environment. Vegetation and topsoil should only be removed when and where necessary to avoid exposing larger areas for longer periods of time which could result in soil erosion and increase the visual disturbance. Infrastructure and operations should be kept out of surface water and drainage lines as far as possible.

The stockpiles will stand out in the surrounding area and will have a long term visual impact. If the stockpiles could be spread to reduce the height, the visual impact could be reduced. In addition, rehabilitation (vegetating) of these large features can significantly reduce the visual impacts.

The most important mitigation aspect is the rehabilitation of the site. The success of this rehabilitation will influence the overall long term impacts of the project.

18 Conclusion

The proposed De Groote Boom Project will have negative visual impacts on the receiving environment, but these impacts can be reduced by implementing various mitigation measures. The most important of these is rehabilitation with the emphasis being on re-vegetation of the site. The success of this rehabilitation will influence the overall long term impact of the proposed project on the visual / aesthetic character of the receiving environment.

The receiving environment of the proposed De Groote Boom Project has a moderate visual sensitivity as there are moderately visible areas in the landscape. The topography of the project area and surrounds is undulating with numerous small ridges and valleys. The receiving environment is characterised by a mixture of natural vegetation and rural characteristics combined with mining. The proposed project is expected to partially blend in with the surrounding mining activity. The natural vegetation will only provide minimal screening of the proposed development.

The viewshed model for the proposed De Groote Boom Project was refined to a buffer of 8 km around the proposed infrastructure and divided into areas that are likely to experience different categories of visual exposure. Due to the nature of the receiving environment it is unlikely that the proposed infrastructure will be visible beyond this 8 km buffer.

The proposed De Groote Boom Project has a moderate visibility and moderate visual exposure as it is will be visible from a large area and will be recognisable to the viewer. The proposed project has a moderate visual intrusion as it partially fits into the surroundings, but will be clearly noticeable. The receiving environment has a moderate VAC because there is partial screening by the topography or vegetation. The proposed De Groote Boom Project will therefore have a moderate visual impact on the receiving environment.

19 References

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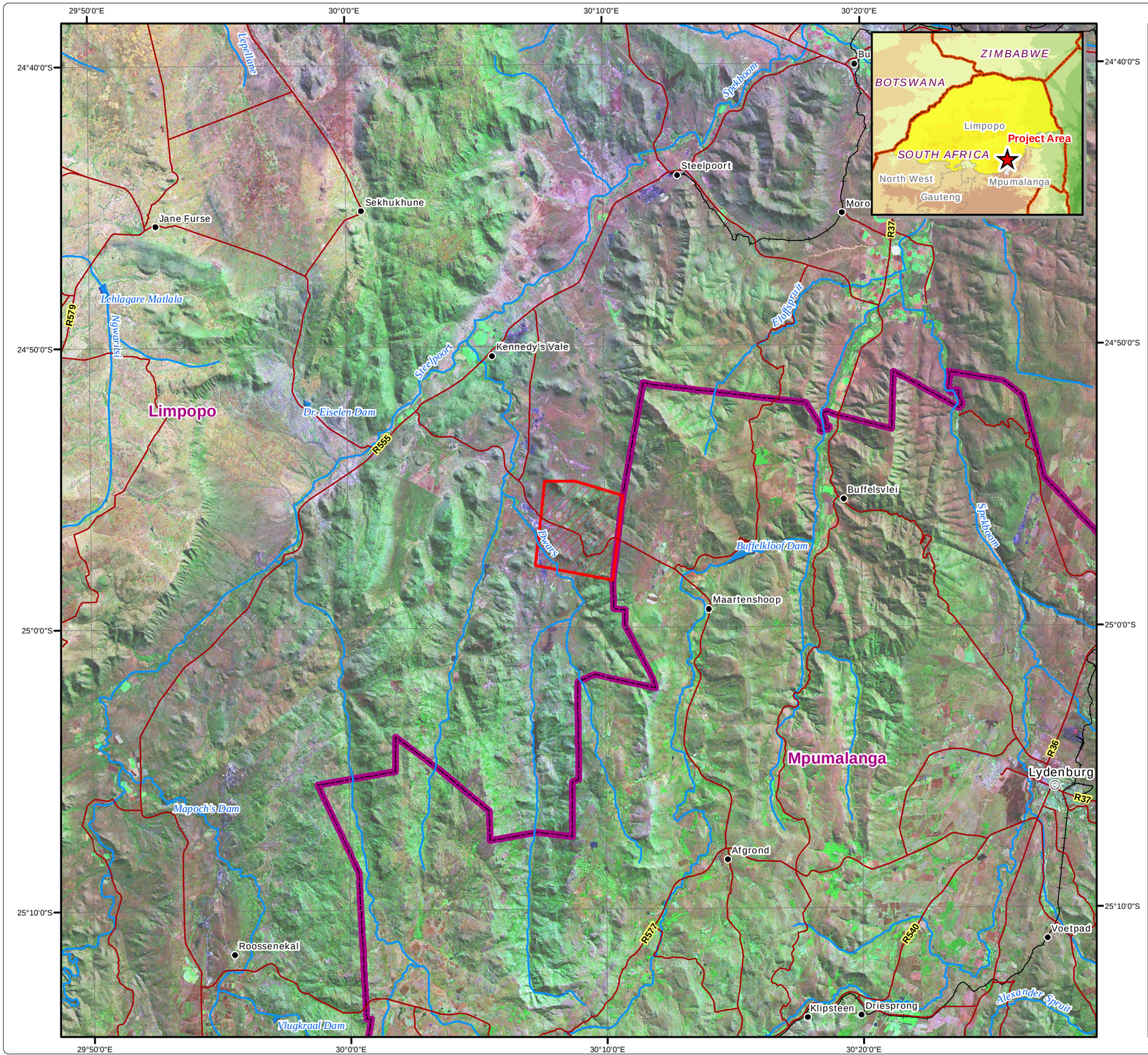
Appendix A: Plans

Plan 1

De Groote Boom Mining Permit

Regional Setting



Legend

- Prospecting Area
- Secondary Town
- Settlement
- Main Road
- Railway Line
- River
- Dam
- Provincial Boundary

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Projection: Transverse Mercator	Ref #: sdp.UAR2967.201504.134
Datum: WGS 1984	Revision Number: 1
Central Meridian: 31°E	Date: 22/04/2015

N

0 2 4 8 12

Kilometres

1:250 000

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Plan 2

De Groote Boom Mining Permit

Local Setting

Legend

- Prospecting Area
- Main / Secondary Road
- Minor Road
- Dam Wall
- Non-Perennial River
- Perennial River
- Dam
- Wetland
- Farm Boundary
- Provincial Boundary

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Projection: Transverse Mercator	Ref #: sdp.UAR2967.201504.135
Datum: WGS84	Revision Number: 1
Central Meridian: 31°E	Date: 22/04/2014

N

0 0.5 1 2

Kilometres

1:40 000

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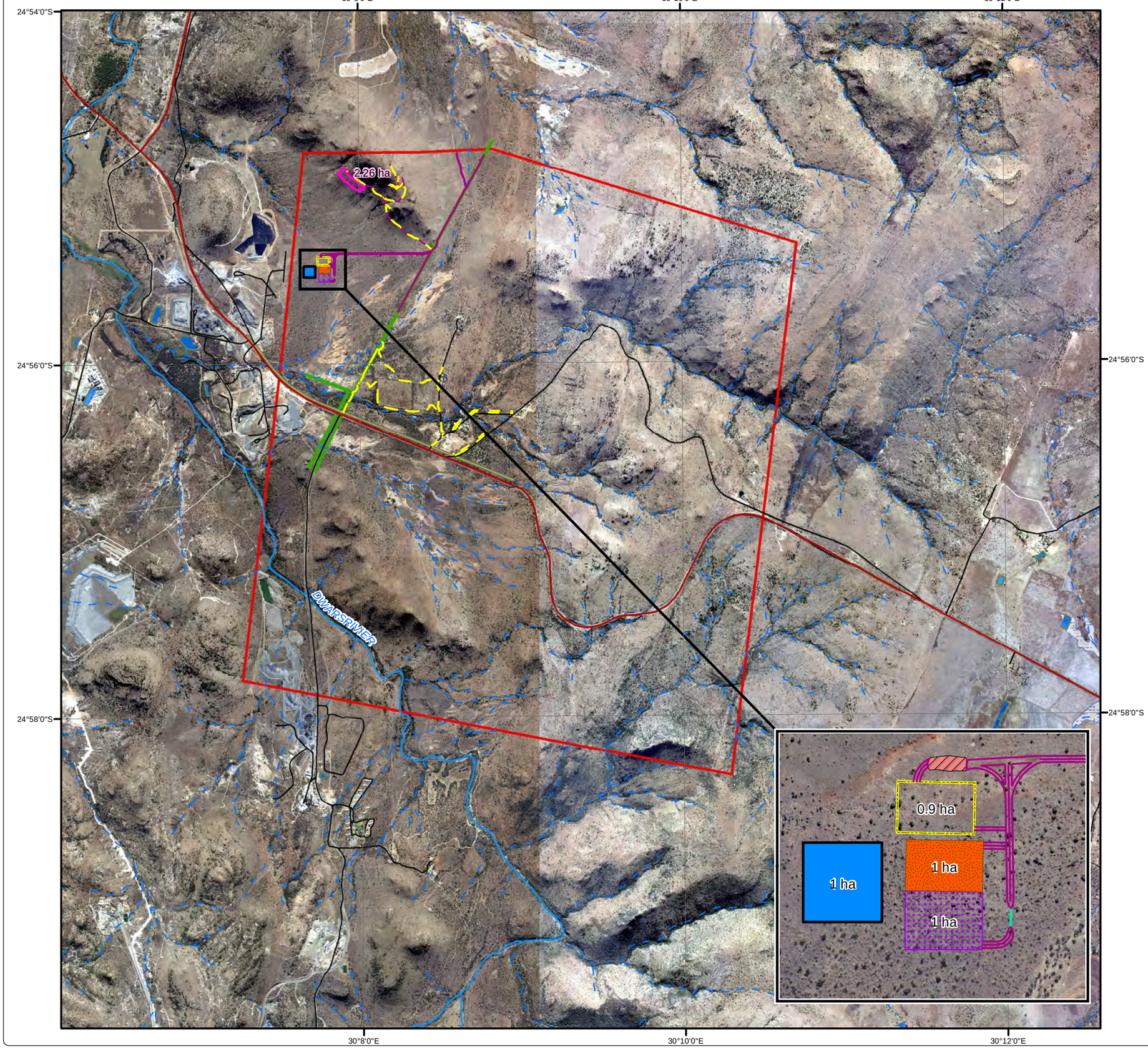
Plan 3

De Groote Boom Mining Permit

Mining Permit Activities



Legend

- Prospecting Area
- Main / Secondary Road
- Minor Road
- Non-Perennial River
- Perennial River
- Dam Wall
- Dam
- Wetland

Infrastructure

- Existing Road
- Proposed Haul Road (10m Wide)
- Break Test Ramp
- Mining Permit Area
- Crushing Area
- Existing Tar Road
- Pollution Control Dam
- Powerline with Servitude Boundary
- Stockpile Area
- Weigh Bridge
- Workshop

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Ref #: sdp.UAR2967.201504.136
Revision Number: 1
Date: 22/04/2015

N

0 0.5 1 2

Kilometres

1:40 000

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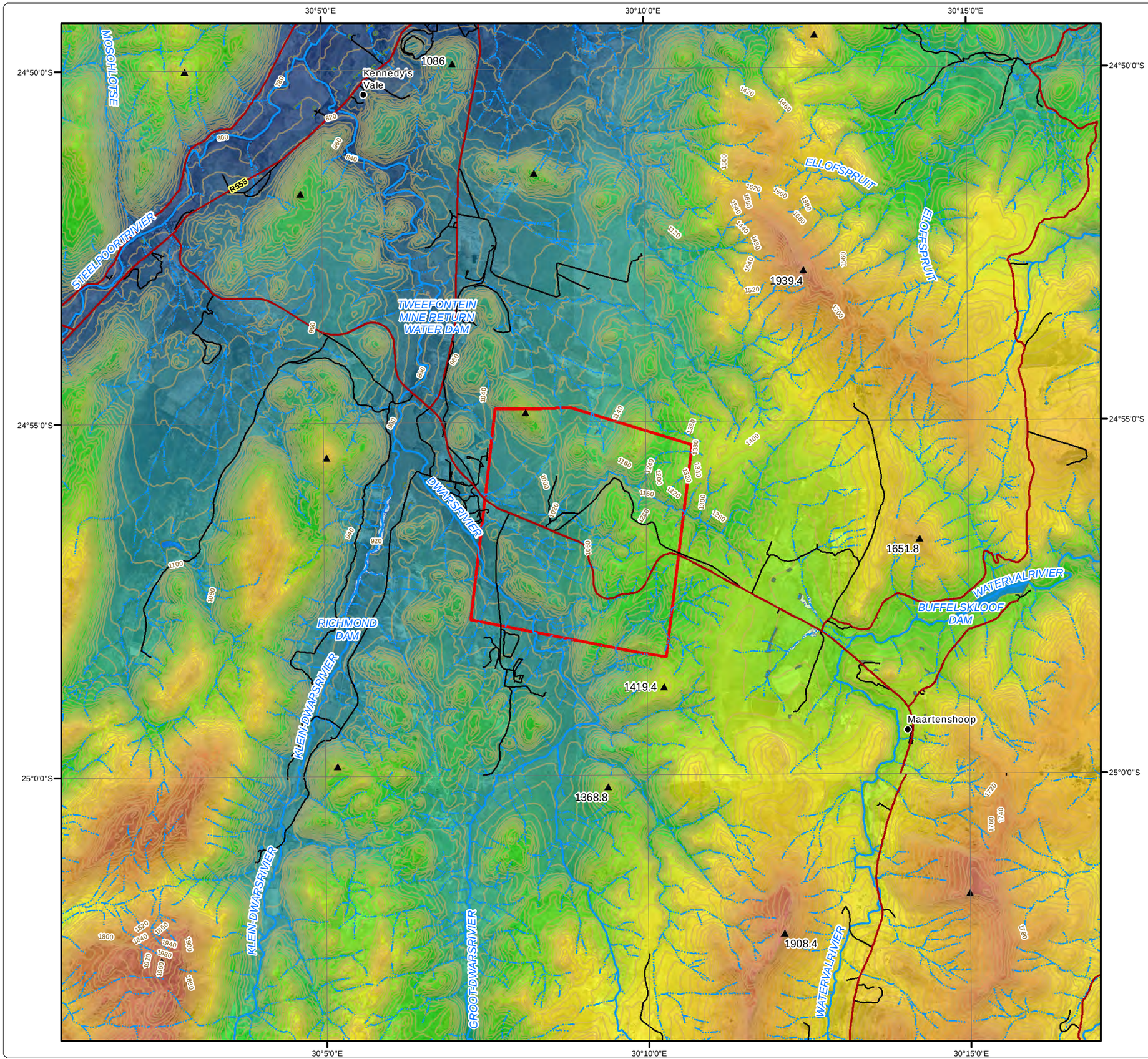
Plan 4

De Groote Boom Mining Permit

Topography



Legend

- Prospecting Area
- Settlement
- Trigonometric Beacons
- Main / Secondary Road
- Minor Road
- Non-Perennial River
- Perennial River
- Dam Wall
- Contour (20m)
- Dam
- Wetland

Digital Elevation Model

Elevation (m.a.m.s.l)

High : 1990

Low : 779

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Projection: Transverse Mercator	Ref #: sdp.UAR2967.201504.137
Datum: WGS 1984	Revision Number: 1
Central Meridian: 31°E	Date: 22/04/2015

N

0 1 2 4

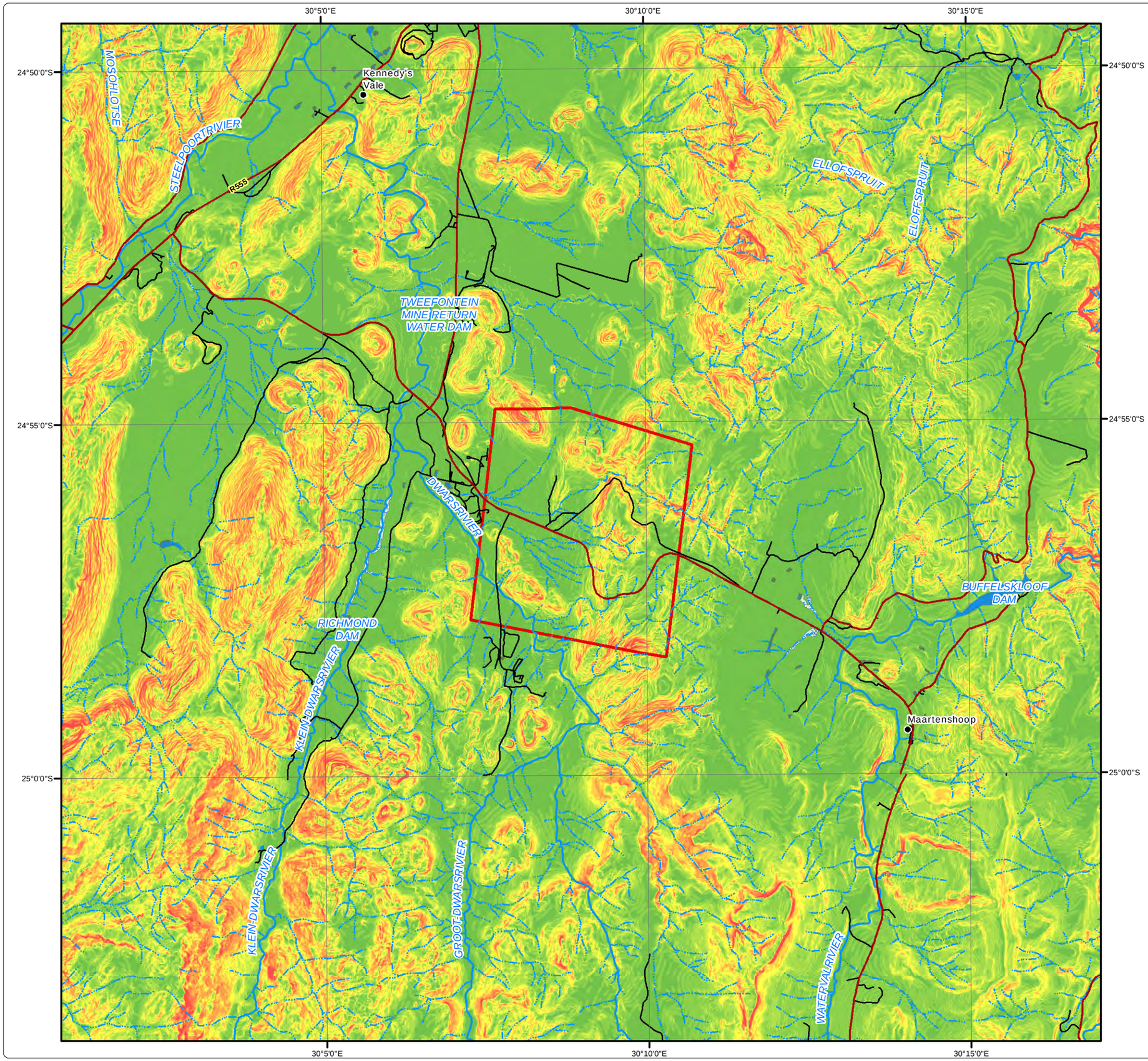
Kilometres

1:100 000

Plan 5

De Groote Boom Mining Permit

Slope



Legend

- Prospecting Area
- Settlement
- Main / Secondary Road
- Minor Road
- Non-Perennial River
- Perennial River
- Dam Wall
- Dam
- Wetland

Slope

Degree (°)

- 0 - 4
- 5 - 9
- 10 - 13
- 14 - 18
- 19 - 23
- 24 - 28
- 29 - 33
- 34 - 41
- 42 - 68

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Projection: Transverse Mercator	Ref #: sdp.UAR2967.201504.138
Datum: WGS 1984	Revision Number: 1
Central Meridian: 31°E	Date: 22/04/2015

N

0 1 2 4

Kilometres

1:100 000

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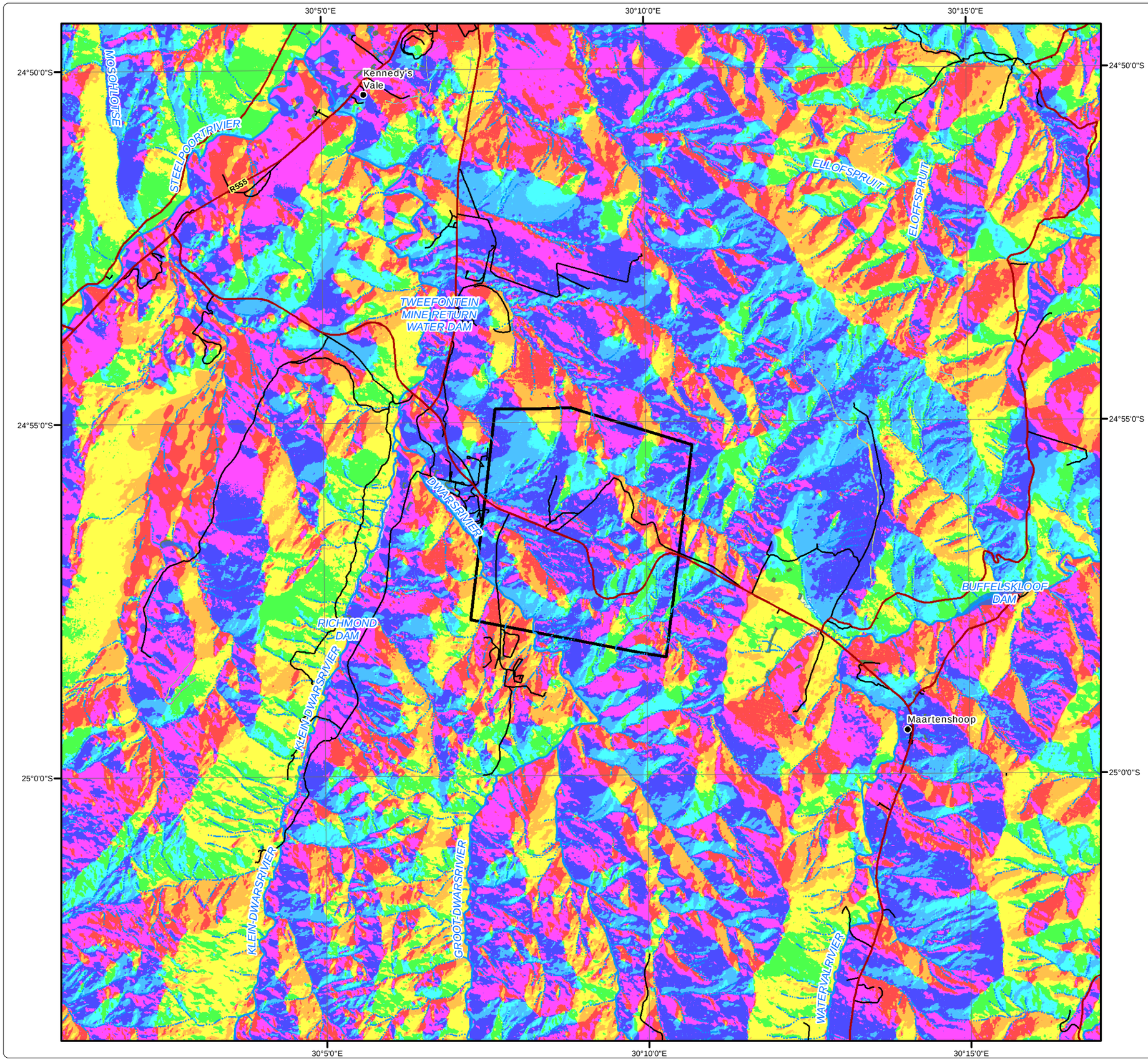
Plan 6

De Groote Boom Mining Permit

Aspect



Legend

- Prospecting Area
- Settlement
- Main / Secondary Road
- Minor Road
- Non-Perennial River
- Perennial River
- Dam Wall
- Dam
- Wetland

Aspect

- Flat (-1)
- North (0-22.5)
- Northeast (22.5-67.5)
- East (67.5-112.5)
- Southeast (112.5-157.5)
- South (157.5-202.5)
- Southwest (202.5-247.5)
- West (247.5-292.5)
- Northwest (292.5-337.5)
- North (337.5-360)

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Central Meridian: 31°E	Date: 22/04/2015

N

0 1 2 4

Kilometres

1:100 000

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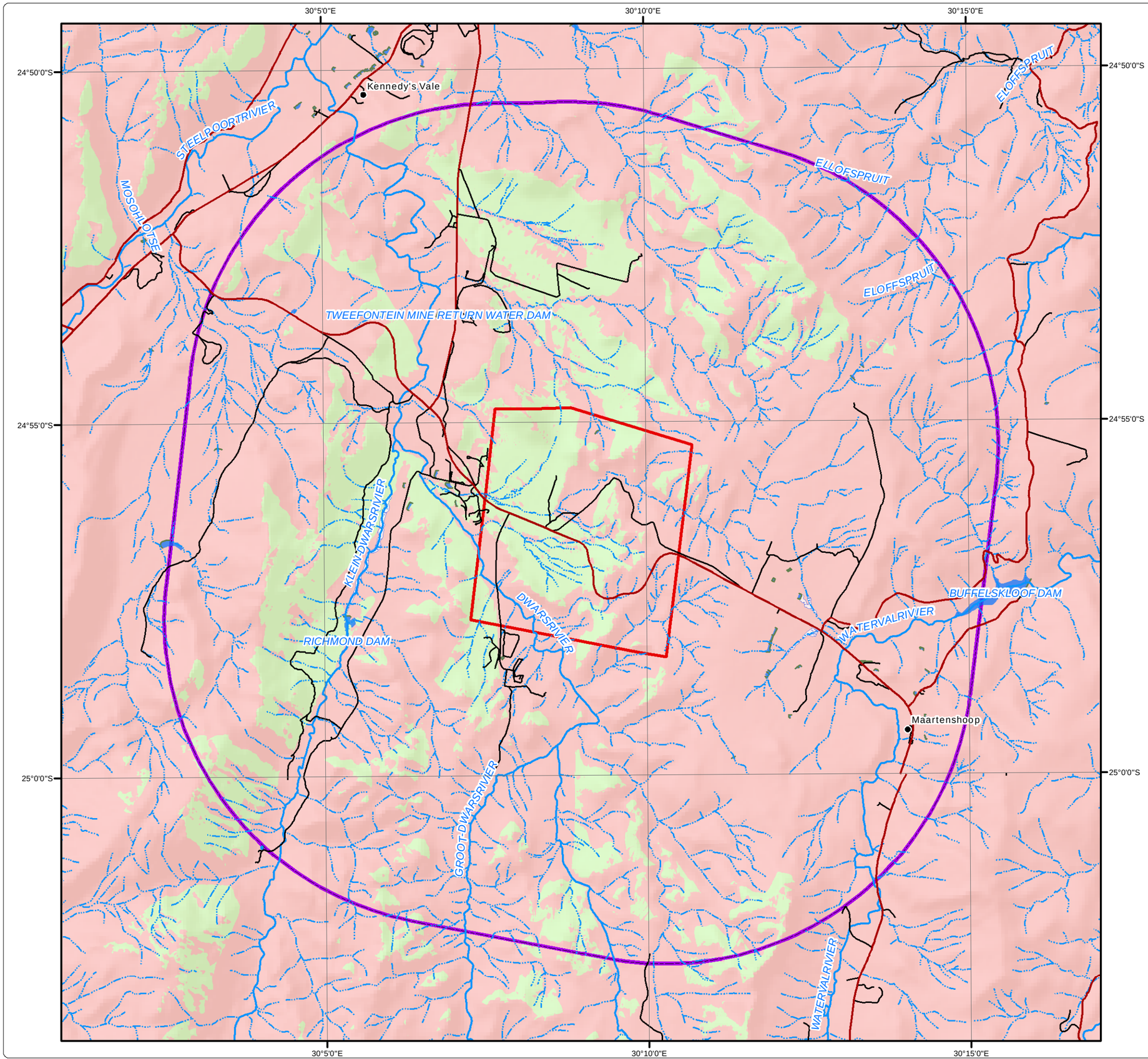
Plan 7

De Groote Boom Mining Permit:

Theoretical Viewshed



Legend

- Prospecting Area
- 8km Study Area
- Settlement
- Main / Secondary Road
- Minor Road
- Non-Perennial River
- Perennial River
- Dam Wall
- Dam
- Wetland

Theoretical Viewshed

- Not Visible
- Potentially Visible

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Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 31°E

Ref #: sdp.UAR2967.201504.140
Revision Number: 1
Date: 22/04/2015

N

0 1 2 4

Kilometres

1:100 000

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Plan 8

De Groote Boom Mining Permit:

Practical Viewshed

30°5'0"E 30°10'0"E 30°15'0"E

24°50'0"S 24°55'0"S 25°0'0"S

Kennedy's Vale
Maartenshoop
STEELPOORTRIVIER
MOSOMLOTSE
TWEEFONTEIN MINE RETURN WATER DAM
ELLOFSPRUIT
KLEIN-DWARSRIVIER
DWARSRIVIER
RICHMOND DAM
GROOT-DWARSRIVIER
BUFFELSKLOOF DAM
WATERVALRIVIER

Legend

- Prospecting Area
- 8km Study Area
- Settlement
- Main / Secondary Road
- Minor Road
- Non-Perennial River
- Perennial River
- Dam Wall
- Dam
- Wetland

Visual Receptors

- Visual Receptors

Practical Viewshed Model

- 0 - 2 km Potentially High Visual Exposure
- 2 - 5 km Potentially Moderate Visual Exposure
- 5 - 8 km Potentially Low Visual Exposure

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Projection: Transverse Mercator	Ref #: sdp.UAR2967.201504.141
Datum: WGS 1984	Revision Number: 1
Central Meridian: 31°E	Date: 22/04/2015

N

0 1 2 4

Kilometres

1:100 000

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Appendix B: CV and Declaration of Independence

RENEE VAN AARDT

Miss Renée van Aardt

Department Manager: Closure, GIS and Noise

Digby Wells Environmental

1 EDUCATION

2003 BSc (Hons) Ecology, Environment and Conservation

2002 BSc Ecology, Environment and Conservation, and Zoology

2 EMPLOYMENT

January 2014 to present:	Digby Wells Environmental
January 2010 to August 2013:	African Barrick Gold
August 2009 to December 2010:	Foskor
February 2008 to July 2009:	Fraser Alexander Tailings

3 EXPERIENCE

Renée is the Department Manager: Closure, GIS and Noise and has been appointed to assist with the management and co-ordination of all activities relevant to closure, GIS and noise projects. Renée's specialization is compilation of mine closure plans and developing closure liability assessments through the mine life cycle. Renée has extensive expertise in rehabilitation and several years' experience in the implementation of closure plans as well as negotiating closure criteria and financial provisions in both South Africa and Tanzania.

Prior to her appointment, she was a technical specialist at African Barrick Gold and provided support to exploration and operational sites in Tanzania. In addition to the closure support Renée provided, she was also involved in sustainability reporting, EIA/EMP compilation and biodiversity management.

4 PROJECT EXPERIENCE

Year	Client	Project	Responsibility	Location
2013	African Barrick Gold	Final mine closure plan for Tulawaka Gold Mine	Data collection, public participation, risk assessments, report compilation	Kagera Region, Tanzania
2011-2013	African Barrick Gold	Conceptual mine closure plans for Bulyanhulu, North Mara and Buzwagi Gold Mine	Data collection, risk assessments, public participation report compilation	Tanzania
2011-2012	African Barrick Gold	Closure liability calculations.	Data collection, modelling and report compilation	Tanzania
2011	African Barrick Gold	Draft biodiversity action plan	Data collection and report compilation	Tanzania
2011	African Barrick Gold	Golden Ridge feasibility closure plan and liability assessment	Data collection, risk assessments, modelling and report compilation	Tanzania
2010	Foskor	Tailings rehabilitation	Project management	Limpopo, South Africa
2009	Royal Bafokeng Holdings	Royal Bafokeng mined land strategic environmental assessment	Data collection and report compilation	North West, South Africa
2008	Lonmin Platinum	Rehabilitation for Western Platinum tailings dams	Managed operations team members	North West, South Africa
2008	Lonmin Platinum	Biodiversity action plan	Data collection and report compilation	North West, South Africa
2008	Lonmin Platinum	Biodiversity monitoring framework	Data collection and report compilation	North West, South Africa
2008	Lonmin Platinum	Rehabilitation guidelines	Data collection and report compilation	North West, South Africa
2006-2007	National Department of Minerals and Energy	Rehabilitation of derelict and ownerless asbestos mines	Data collection, risk assessments, public participation and report compilation	South Africa

5 PROFESSIONAL AFFILIATIONS

Institute of Business Management of Southern Africa, Member no: IBM2012/93510.