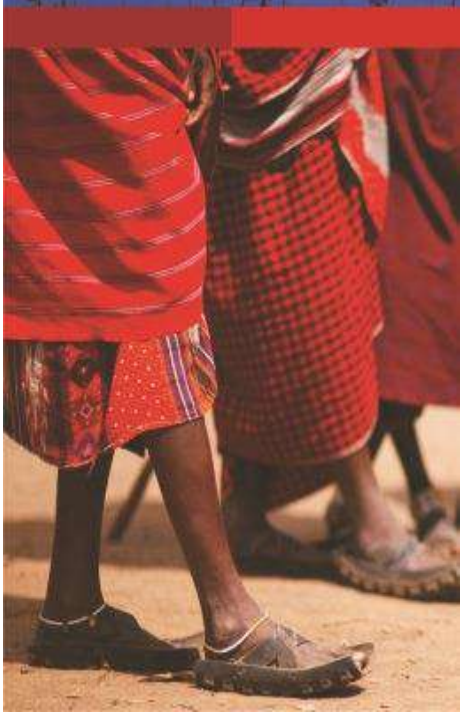


DIGBY WELLS
ENVIRONMENTAL

DMR Reference Number:

MP30/5/1/2/2/10129MR

Proposed Development of an Underground Coal Mine and Associated Infrastructure near Hendrina, Mpumalanga Province

Visual Impact Assessment Report

Project Number:

XST3791

Prepared for:

Umcebo Mining (Pty) Ltd

October 2016

Digby Wells and Associates (South Africa) (Pty) Ltd
Co. Reg. No. 2010/008577/07. Turnberry Office Park, 48 Grosvenor Road, Bryanston, 2191. Private Bag X10046, Randburg, 2125, South Africa
Tel: +27 11 789 9495, Fax: +27 11 069 6801, info@digbywells.com, www.digbywells.com

This document has been prepared by Digby Wells Environmental.

Report Type:	**Visual Impact Assessment Report**
Project Name:	**Proposed Development of an Underground Coal Mine and Associated Infrastructure near Hendrina, Mpumalanga Province**
Project Code:	**XST3791**

Name	Responsibility	Signature	Date
Stephanie Mulder	Report Writer		August 2016
Renée van Aardt	Report Reviewer		October 2016

DECLARATION OF INDEPENDENCE

Digby Wells and Associates (South Africa) (Pty) Ltd

Contact person: Stephanie Mulder

Digby Wells House
Turnberry Office Park
48 Grosvenor Road
Bryanston
2191

Tel: 011 789 9495
Fax: 011 069 6801
E-mail: stephanie.mulder@digbywells.com

I, Stephanie Mulder as duly authorised representative of Digby Wells and Associates (South Africa) (Pty) Ltd., hereby confirm my independence (as well as that of Digby Wells and Associates (South Africa) (Pty) Ltd.) and declare that neither I nor Digby Wells and Associates (South Africa) (Pty) Ltd. have any interest, be it business, financial, personal or other, in any proposed activity, application or appeal in respect of Umcebo Mining (Pty) Ltd, other than fair remuneration for work performed, specifically in connection with the proposed development of an underground coal mine and associated infrastructure, located near Hendrina, Mpumalanga Province.

Full Name:	Stephanie Claire Mulder
Title/ Position:	Unit Manager: GIS
Qualification(s):	BSc Honours in Geography
Experience (Years):	9.5 years
Registration(s):	GISSA

EXECUTIVE SUMMARY

Digby Wells Environmental (Digby Wells) has been appointed by Umcebo as the independent Environmental Assessment practitioner (EAP) to conduct the Environmental Impact Assessment (EIA) for the Project. This includes the associated specialist studies and the required Public Participation Process (PPP). The environmental considerations for the impact assessment phase of the EIA included a Visual Impact Assessment (VIA) for the Project.

Umcebo Mining (Pty) Ltd (Umcebo), a subsidiary of Glencore Operations South Africa (Pty) Ltd (Glencore) is proposing the development and operation of a new underground coal mine and associated infrastructure at a site situated approximately 10-22 kilometres (km) south-east of Hendrina in the Mpumalanga Province of South Africa (the Project).

Umcebo currently holds two Prospecting Rights (PRs), namely, MP 1265 PR and MP 1266 PR, located within the Ermelo Coal Field. The total extent of MP 1265 PR (referred to as Mooivley East and Mooivley West) is 3 926.5 hectares (ha) and comprises the following farms and portions:

- Mooivley 219 IS – Portions 2, 4, 5 and Remaining Extent (RE) of the farm;
- Oranje Vallei 201 IS – RE of Portion 1, Portion 3 and RE of the farm;
- Tweefontein 203 IS – Portions 2, 14, 15, 16, 17, 28 and 29; and
- Uitkyk 220 IS – Portions 2 and 3.

The total extent of MP 1266 PR (referred to as Hendrina South) is 2 788 ha and comprises the following farm and portions:

- Bosmanskrans 217 IS – Portions 1, 3, 4, 6, 8, 9 and RE of the farm
- Elim 247 IS - RE of the farm;
- Geluksdraai 240 IS – Portions 1 and 2; and
- Orpenskraal 238 IS – RE of the farm.

The Project area has a combined footprint of 6 714.5 ha.

The Project area comprises three underground reserve blocks namely Mooivley East, Mooivley West and Hendrina South. The two Mooivley reserves comprise two incline shafts each which will be developed to gain access to the two underground areas whilst the Hendrina South reserve comprises two incline shafts to gain access to one underground area. According to the Life of Mine (LOM) plan Mooivley West will be mined from Year 1 to Year 36 (36 years), Hendrina South will be mined from Year 1 to Year 23 (23 years) whilst Mooivley East will be mined from Year 23 to Year 31 (9 years) of the Project.

The Project is situated in the Ermelo Coalfield Area. This region is characterised by agriculture with coal mines and power stations. The Project area falls within both the Steve Tshwete Local Municipality in the Nkangala District Municipality and the Msukaligwa Local Municipality in the Gert Sibande District Municipality of the Mpumalanga Province, South Africa. The nearest towns are Hendrina and Kwazamokuhle situated approximately 3.3 km north-west and 4.6 km north of the Project area respectively. The nearest major town is Ermelo situated 26.7 km south-east of the Project area. The residential areas in the Project area and surrounds are potential visual receptors of the Project.

Road users in the Project areas and surrounds are potential visual receptors of the Project. The N11 national road runs through the Project area. The R38 regional road is situated 2.5 km north of the Project area. The R542 regional route intersects the R38 regional road 4.6 km north-west of the Project area and follows the R38 and N11 for a while before splitting from the N11 approximately 1.1 km east of the Project area.

The Project area and surrounds have a largely agricultural sense of place. With the exception of the Hendrina and Kwazamokuhle towns the surrounding land use is agriculture (maize) and cattle grazing. There are numerous farm residences and farm workers houses scattered throughout the Project area and surrounds. The people living and working in these agricultural areas are potential visual receptors of the Project.

Several mines occur in the vicinity of the Project and the majority of these are underground mines. The nearest operational mines are Weltevreden Coal located 5.4 km west of the Project area and Spitzkop Colliery located 6.7 km south-east of the Project area. The nearest power station is the Hendrina power station located 21.4 km north-north-west of the Project area.

The Project area and surrounds have numerous heritage sites including archaeological sites, palaeontological sites, burial grounds and graves, and historical buildings. Visitors to these heritage sites are potential visual receptors of the Project.

People visiting the area for birdwatching and fishing are potential visual receptors of the Project. Protected areas such as nature reserves, and recreational and tourism areas are considered sensitive visual receptors. The Project falls within the Amersfoort-Bethal-Carolina Important Bird Area (IBA). Other nearby IBAs include the Chrissie Pans IBA located 17.4 km east of the Project area, the Steenkampsberg IBA located 28.8 km north of the Project area and the Grasslands IBA located 46.3 km south-east of the Project area. The nearest nature reserve is the Rietvlei Private Nature Reserve located 21.7 km south of the Project area.

The Project area and surrounds are undulating with numerous hills and valleys. The topographical model indicates that the elevation of the Project area increases from 1633 metres above mean sea level (m.a.m.s.l.) in the Klein Olifants River valley in the north to 1784 m.a.m.s.l. on the hill in the south. The undulating topography is expected to provide moderate screening of the proposed development.

According to Mucina and Rutherford (2012) the dominant vegetation types of the Project area and surrounds are Eastern Highveld Grassland and Soweto Highveld Grassland. Much of the area has been transformed by agriculture and little natural vegetation remains. The agricultural and natural Grassland vegetation will only provide minimal screening of the proposed development. There are existing rows of trees planted near some farm residences as windbreaks/ vegetation screens. It is anticipated that these trees will have a screening effect and will reduce the visual impact of the Project on these farm residences.

A viewshed is a geographical area, defined by the topography, within which a particular feature will be visible (Oberholzer, 2005). Theoretical and practical viewshed models were created for both the Mooivley West and Hendrina South, and the Mooivley East mining activities. These viewshed models are based on the topography only and do not take the screening effect of vegetation into account. The viewshed models show the areas from which the Project may potentially be visible.

The theoretical viewshed models were refined to practical viewshed models with a buffer of 5 km around the proposed infrastructure and divided into areas that are likely to experience different categories of visual exposure. Visual exposure and the visual impact of a development diminish exponentially with distance (Oberholzer, 2005). Due to the nature of the receiving environment it is unlikely that the proposed infrastructure will be noticeable beyond this 5 km buffer. The practical viewshed models depict the area from which the Project may potentially be visible.

The practical viewshed model for Mooivley West and Hendrina South covers an area of 79.37 km² while the practical viewshed model for Mooivley East covers an area of 64.48 km².

The potential visual receptors identified within the practical viewshed of Mooivley West and Hendrina South include 62 farm residences (including farm workers houses), 21 heritage sites (including archaeological sites, burial grounds and graves, and historical buildings) and road users on the N11 national route, the R542 regional road, secondary roads and farm roads within the practical viewshed area. There are no urban areas within the practical viewshed of Mooivley West and Hendrina South. The entire practical viewshed of Mooivley West and Hendrina South is within the Amersfoort-Bethal-Carolina IBA. No other protected areas are within this practical viewshed.

The potential visual receptors identified within the practical viewshed of Mooivley East include residents of the Hendrina and Kwazamokuhle towns, 62 farm residences (including farm workers houses), seven heritage sites (including burial grounds and graves, and historical buildings) and roads users on the N11 national route, the R38 regional road, secondary roads and farm roads within the practical viewshed area. Approximately 90% of the practical viewshed of Mooivley West and Hendrina South is within the Amersfoort-Bethal-Carolina IBA. No other protected areas are within the practical viewshed.

The receiving environment of the Project has a moderate visual sensitivity. The Project has a high visibility and a moderate visual exposure as it will be visible from a large area and recognisable to the viewer but will not dominate the landscape. The Project has a high visual intrusion as it results in a noticeable change and is discordant with the surroundings. There are no mines within the 5 km buffer around the proposed infrastructure and the Project will be the first mine in this area.

The identified receptors (residents of the Hendrina and Kwazamokuhle towns, residents of the surrounding farms, heritage sites and roads users) of the Project have a moderate sensitivity as there is a combination of residential, agricultural and natural areas. The receiving environment of the Project has a moderate Visual Absorption Capacity (VAC) because there is partial screening provided by the undulating topography and existing vegetation screens.

The “guideline for involving visual and aesthetic specialists in EIA processes” document by Oberholzer (2005) identifies quarrying and mining activities as a Category 5 development. The receiving environment of the project is classified as an area of medium scenic, cultural or historical significance and a Category 5 development in this area is expected to have a high visual impact. The findings of this VIA concur with this categorisation.

Based on the findings of this VIA only (not taking into account the findings of any other studies), it is recommended that the Project can proceed together with the implementation of all mitigation measures stipulated.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF PLANS

LIST OF ACRONYMS AND ABBREVIATIONS

CD: NGI	Chief Directorate: National Geospatial Information
CV	Curriculum Vitae
Digby Wells	Digby Wells Environmental
EIA	Environmental Impact Assessment
ELC	European Landscape Convention
EMP	Environmental Management Plan
GIS	Geographic Information System
Glencore	Glencore Operations South Africa (Pty) Ltd
ha	hectares
km	kilometres
ℓ	litres
LoM	Life of Mine
m	metres
m.a.m.s.l.	metres above mean sea level
mm	millimetres
MPRDA	Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002)
MRA	Mining Right Application
PCD	Pollution Control Dam
PR	Prospecting Right
RE	Remaining Extent
ROM	Run of Mine
Umcebo	Umcebo Mining (Pty) Ltd
VAC	Visual Absorption Capacity
VIA	Visual Impact Assessment

1 Introduction

"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, society and the economy of the region. In addition, this resource may have a scarcity value, be easily degraded, and is usually not replaceable" (Oberholzer, 2005).

The significance of the long term visual impacts of a proposed development will determine the acceptability of the development to receptors. An understanding of the visual / aesthetic character of a landscape allows the sensitivity of the landscape to be determined. This in turn indicates the ability of the landscape to accommodate visual change. A VIA is performed to identify the potential visual impacts of a proposed project on the receiving environment.

This report describes the visual/ aesthetic character of the receiving environment and the expected visual impacts of the proposed Hendrina Project (the Project). The impacts of the Project are described and rated, and mitigation measures proposed to reduce the negative impacts and enhance the positive impacts, where applicable.

2 Project Description

Umcebo Mining (Pty) Ltd (Umcebo), a subsidiary of Glencore Operations South Africa (Pty) Ltd (Glencore) is proposing the development and operation of a new underground coal mine and associated infrastructure at a site situated approximately 3.3 kilometres (km) south-east of the town of Hendrina in the Mpumalanga Province of South Africa (the Project).

Umcebo currently holds two Prospecting Rights (PRs), namely, MP 1265 PR and MP 1266 PR, located within the Ermelo Coal Field. The total extent of MP 1265 PR (referred to as Mooivley East and Mooivley West) is 3 926.5 hectares (ha) and comprise the following farms and portions:

- Mooivley 219 IS – Portions 2, 4, 5 and Remaining Extent (RE) of the farm;
- Oranje Vallei 201 IS – RE of Portion 1, Portion 3 and RE of the farm;
- Tweefontein 203 IS – Portions 2, 14, 15, 16, 17, 28 and 29; and
- Uitkyk 220 IS – Portions 2 and 3.

The total extent of MP 1266 PR (referred to as Hendrina South) is 2 788 ha and comprises the following farm and portions:

- Bosmanskrans 217 IS – Portions 1, 3, 4, 6, 8, 9 and RE of the farm
- Elim 247 IS - RE of the farm;
- Geluksdraai 240 IS – Portions 1 and 2; and
- Orpenskraal 238 IS – RE of the farm.

The Project area has a combined footprint of 6 714.5 ha.

2.1 Project Overview

The Project area comprises three underground reserve blocks namely Mooivley East, Mooivley West and Hendrina South. The two Mooivley reserves comprise two incline shafts each which will be developed to gain access to the two underground areas whilst the Hendrina South reserve comprises two incline shafts to gain access to one underground area. According to the Life of Mine (LOM) plan Mooivley West and Hendrina South will be mined from Year 1 to Year 36 (36 years) while Mooivley East will be mined from Year 23 to Year 31 (9 years) of the Project.

The estimated LoM will be 30 years[1] for all mining areas with a production rate of 2.4 million tonnes per annum at full capacity, with an approximate 78 million tonnes Run of Mine (ROM). The mine will reach full production within the first four years.

The quality of coal makes it suitable for use in the domestic thermal market (Eskom). The coal product will be transported to a nearby Eskom power station (i.e. Kusile, Kendal, Kriel, and Grootvlei); via the existing road network.

Limited surface infrastructure will be established to support the mining activities. The primary structures proposed include: a package sewage treatment plant, water treatment plant, diesel generator set, fuel storage tanks, access and service roads, a conveyor belt and office and workshop buildings.

The Project is proposed to commence with construction and development when all required licences and authorisations have been granted.

2.2 Associated Mine Infrastructure

The proposed mine infrastructure includes the following:

- Crushing and screening plant;
- Overburden and product stockpiles;
- Access and service roads (with weighbridges);
- Overland conveyors;
- Three access points to the underground reserve (two incline shafts per access point);
- Three ventilation shafts (one per access point);
- Office complex (change house, workshop, offices);

[1] The Mining Right Application (MRA) will be made for an initial period of 30 years, the maximum allowed in terms of the provisions of Section 23 of the Mineral and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002) (MPRDA). At the end of this period an application for renewal of the mining right will be made for any remaining reserves.

- Three Pollution Control Dams (PCDs) and water pipelines;
- Five aboveground storage tanks for the storage of diesel (8 000 litres (ℓ) to 16 000 ℓ) will be utilised onsite with three tanks located at the shafts and two tanks located near the crushing and screening plant;
- Three waste bins per shaft;
- Site fencing located around the conveyer belt and each mining complex;
- Diesel generator and sub-station;
- Water treatment plant; and
- Package sewage treatment plant.

2.3 Terms of Reference

Digby Wells Environmental (Digby Wells) has been appointed by Umcebo as the independent Environmental Assessment Practitioner (EAP) to conduct the Environmental Impact Assessment (EIA) for the Project. This includes the associated specialist studies and the required Public Participation Process (PPP). The environmental considerations for the impact assessment phase of the EIA included a VIA for the Project.

3 Details of the Specialist

A Curriculum Vitae (CV) is attached in Appendix A.

Stephanie Mulder is Unit Manager of the Geographical Information System (GIS) Unit at Digby Wells. She obtained a BSc Geography and Informatics with Financial Orientation degree and a BSc (Hons) degree in Geography from the University of Johannesburg. Stephanie joined Digby Wells as a GIS Specialist in September 2009 and became Unit Manager of the GIS Unit in July 2012. She is responsible for managing the GIS staff and overseeing all GIS work. Stephanie has experience writing VIA specialist reports. She has experience managing GIS specific projects and has also managed several social survey projects. Stephanie has a strong technical GIS background and has experience using GIS as a digital cartographic and spatial analytical tool. She also has experience with interactive mapping, sensitivity analysis, site selection and remote sensing projects.

4 Relevant Legislation

The following international, national and regional documents form part of the legislative and policy framework of the visual assessment.

4.1 International Conventions

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).

There is no regional or local scale legislation pertaining to mining activities and visual assessments exclusively but visual assessments are relevant to the International Finance Corporation’s (IFC) Performance Standards and this will be treated as a best practice guideline.

IFC Performance Standard 3: Resource Efficiency and Pollution Prevention is applicable to the visual assessment. 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, Greenhouse Gas (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.”

4.2 National Legislation and Policy

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

- 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.

5 Aim and Objectives

The aim of this VIA is to determine the nature of the Project area and the impact of the Project on the visual/ aesthetic character of the surrounding landscape. The following objectives have been identified to achieve this aim:

- Examine aerial photography available for the Project area from the Chief Directorate: National Geo-Spatial Information (CD: NGI), 2012;
- Create and analyse topographical, slope intensity, slope aspect and viewshed models in ArcGIS 3D Analyst Extension;
- Visit the project area to verify these models;

- Describe the topography and visual/ aesthetic character of the receiving environment;
- Describe the current and post development visual aspects of the Project area;
- Identify sensitive visual receptors and key public viewpoints that will be impacted on by the proposed project, taking into account visibility aspects;
- Create photomontages to illustrate the current and potential future views of the project area;
- Identify the impacts, pre- and post-mitigation that the proposed infrastructure will have on the visual landscape, by rating the scale, duration, severity and probability of the impacts occurring; and
- Provide mitigation measures and recommendations in an attempt to reduce the potential negative visual impacts.

6 Assumptions and Limitations

A VIA is open to subjectivity. This subjectivity is due to the different opinions receptors may have of a proposed project. Oberholzer (2005) defines receptors as “individuals, groups or communities who are subject to the visual influence of a particular project”. A receptor may be partial to the fact that a 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 a proposed project. Vegetation near a receptor’s viewpoint can greatly reduce that receptor’s view of a proposed project. Other factors such as weather / climatic conditions and seasonal change can also affect a receptor’s view of a proposed project.

It is, therefore, difficult to determine the visual impact of the Project from the viewpoint, as well as the perspective of each individual receptor. Consequently, this report focuses on the size of the viewshed area and the number of receptors within the viewshed area as an indication of the significance of the visual impacts of the Project. Five key viewpoints were selected for the photomontages to provide an example of the expected views of the Project (refer to Section 10.4 below).

Some infrastructure heights were not available for this study and assumptions were made. These assumptions were based on the heights of infrastructure from similar projects and confirmed by Umcebo.

The site visit took place on 5th July 2016. The weather conditions were mainly sunny, clear skies (no clouds) with some haze at times. Hazy conditions are not optimal conditions to take photographs for use in a VIA but sufficient visual observations and photographs were obtained for this study.

A night time site visit to assess the impacts of night time lighting did not form part of the scope of work for this VIA. It was therefore not possible to create a practical viewshed model indicating the extent of the night time lighting impacts.

7 Sensitivity Analysis and No-go Areas

Two alternative routes were considered for the access road and overland conveyor. Both alternatives for the access road and conveyor are within the same area of disturbance. For the VIA only the preferred access road and conveyor route was assessed but it is not anticipated that the alternative routes will increase the expected visual disturbance.

8 Project Area

The Project is situated in the Ermelo Coalfield Area. This region is characterised by agriculture with coal mines and power stations. Plan 1 (Appendix B) illustrates the regional setting of the Project.

The Project covers an area of 6 714.5 hectares. The coordinates for the centre of the Project are 26° 14’ 54.514” S and 29° 47’ 26.977” E. The Project area is situated on portions of the farms Oranje Vallei 201 IS, Tweefontein 203 IS, Bosmanskrans 217 IS, Mooivley 219 IS, Uitkyk 220 IS, Orpenskraal 238 IS, Geluksdraai 240 IS and Elim 247 IS.

The Project area falls within both the Steve Tshwete Local Municipality in the Nkangala District Municipality and the Msukaligwa Local Municipality in the Gert Sibande District Municipality of the Mpumalanga Province, South Africa. The nearest towns are Hendrina and Kwazamokuhle situated approximately 3.3 km north-west and 4.6 km north of the Project area respectively. The nearest major town is Ermelo situated 26.7 km south-east of the Project area.

The residential areas in the Project area and surrounds are potential visual receptors of the Project. The closest towns and settlements, as well as their direct distance and direction from the Project area summarised in Table 1. All distances are straight line distances measured from the edge of the Project area to the centre of the towns/ settlements.

Table 1: Closest Towns and Settlements

Name	Type	Direct Distance	Direction
Hendrina	Other Town	3.3 km	NW
Kwazamokuhle	Settlement	4.6 km	N
Breyten	Secondary Town	12.6 km	E
Gloria	Settlement	17.1 km	NW
Davel	Other Town	20.5 km	SW
Ermelo	Major Town	26.7 km	SE
Voorslag	Settlement	29.5 km	S

Name	Type	Direct Distance	Direction
Carolina	Secondary Town	34.5 km	NE
Bethal	Major Town	35.0 km	SW
Chrissiesmeer	Settlement	35.2 km	E

Road users in the Project areas and surrounds are potential visual receptors of the Project. The N11 national road runs through the Project area. The R38 regional road is situated 2.5 km north of the Project area. The R542 regional route intersects the R38 regional road 4.6 km north-west of the Project area and follows the R38 and N11 for a while before splitting from the N11 approximately 1.1 km east of the Project area.

The Project area and surrounds have a largely agricultural sense of place. With the exception of the Hendrina and Kwazamokuhle towns the surrounding land use is agriculture (maize) and cattle grazing. There are numerous farm residences and farm workers houses scattered throughout the Project area and surrounds. The people living and working in these agricultural areas are potential visual receptors of the Project.

Several mines occur in the vicinity of the Project and the majority of these are underground mines. The nearest operational mines are Weltevreden Coal located 5.4 km west of the Project area and Spitzkop Colliery located 6.7 km south-east of the Project area. The nearest power station is the Hendrina power station located 21.4 km north-north-west of the Project area. Plan 2 (Appendix B) illustrates the local setting of the Project.

The Project area and surrounds have numerous heritage sites including archaeological sites, palaeontological sites, burial grounds and graves, and historical buildings. Visitors to these heritage sites are potential visual receptors of the Project.

People visiting the area for birdwatching and fishing are potential visual receptors of the Project. The Project area falls within the Olifants River Catchment and is bordered by the Inkomati River Catchment on the east. This should be noted for the surface water studies. The Klein Olifants River has its source 2.3 km south of the Project area and then the river and its tributaries flow in a northerly direction through the Project area. Wetlands occur along these streams and there are numerous small dams and pans within the Project area. The Vaalwaterspruit River and the Olifants River flow in a northerly direction on the east and west of the Project area respectively. The surrounding area is interspersed with streams and wetlands.

Protected areas such as nature reserves, and recreational and tourism areas are considered sensitive visual receptors. The Project falls within the Amersfoort-Bethal-Carolina IBA. Other nearby IBAs include the Chrissie Pans IBA located 17.4 km east of the Project area, the Steenkampsberg IBA located 28.8 km north of the Project area and the Grasslands IBA located 46.3 km south-east of the Project area.

The closest protected areas identified from the South African Protected Areas Database (Department of Environmental Affairs, 2015), as well as their direct distance and direction from the Project area are summarised in Table 2. All distances are straight line distances measured from the edge of the Project area to the edge of the protected area.

Table 2: Protected Areas

Name	Type	Direct Distance	Direction
Rietvlei Private Nature Reserve	Nature Reserve	21.7 km	S
Chrissiesmeer Protected Environment	Protected Environment	24.2 km	E
Ahlers Private Nature Reserve	Nature Reserve	25 km	SE
Nooitgedacht Dam Nature Reserve	Nature Reserve	30.3 km	NE
Rentia Kritzinger Private Nature Reserve	Nature Reserve	33.7 km	ENE
St Louis Private Nature Reserve	Nature Reserve	35. 2km	ENE
Heyns Private Nature Reserve	Nature Reserve	38.8 km	NW
Cecilia Private Nature Reserve	Nature Reserve	39.2 km	NNE
Langcarel Private Nature Reserve	Nature Reserve	42.0 km	SSE
Burnside Private Nature Reserve	Nature Reserve	42.8 km	NW
Vaalbank Private Nature Reserve	Nature Reserve	45.1 km	NNW
Bewerwyk Private Nature Reserve	Nature Reserve	48.0 km	ENE
Maffia Private Nature Reserve	Nature Reserve	48.4 km	ENE
Paulina van Niekerk Private Nature Reserve	Nature Reserve	49.1 km	NE
Krugerdam Private Nature Reserve	Nature Reserve	49.2km	NNW

9 Methodology

The VIA was performed using surveyed geographically referenced information and aerial photography, together with the professional opinion of an experienced visual impact assessor.

A study was conducted to identify and evaluate the surface features using ArcGIS 3D Analyst Extension to create a topographical model, and the resultant slope intensity, slope aspect and viewshed models.

9.1 Characterisation of Visual Impacts

The expected visual impact of the Project was categorised based on the type of receiving environment and the type of development as detailed in Table 3 (Oberholzer, 2005). This table provides an indication of the visual impacts that can be expected for different types of developments in relation to the nature of the receiving environment. Following the

classification system of Oberholzer (2005), the Project is classed as a **Category 5 development** because it is a mining activity with an associated processing plant (Table 4). The receiving environment can be described as having **medium scenic, cultural or historical significance** as it consists mainly of agricultural land interspersed with farm residences, farm workers houses and the Hendrina and Kwazamokuhle towns. There are numerous heritage sites (including archaeological sites, burial grounds and graves, and historical buildings) in the Project area and surrounds. The nearest mining activity is located approximately 5.4 km from the Project area. The Project area and surrounds have a largely agricultural sense of place. It is therefore expected that the Project will have a **high visual impact** on the receiving environment. This will be verified in the investigation to follow.

Table 3: 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
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 4: 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 CD: NGI aerial photography (flown in 2012) of the area was examined to determine the surface features. Available vector GIS data was used to determine the relative location of the features surrounding the Project area.

A topographical model (Plan 3, Appendix B) was created using ArcGIS 3D Analyst Extension. The model was created using the 5 metre contour relief data available from CD: NGI.

The resultant topographical model was then used to create slope intensity (Plan 4, Appendix B) and slope aspect (Plan 5, Appendix B) models using the Slope and Aspect tools of ArcGIS 3D Analyst Extension. The slope model indicates the slope degree and was classified using the Natural Breaks (Jenks)[2] classification method.

The information gathered from the above desktop study was verified with a site visit. The combined information from the desktop study and the site visit forms the basis of this report.

[2] The Natural Breaks (Jenks) classification method splits data into classes based on natural groupings within the data. Natural breaks occur at low points on the histogram and are used to identify classes that group similar values together while maximising the differences between classes. This method accurately depicts trends in the data (Cartographica, 2010 and ESRI, 2016).

9.3 Viewshed Analysis

The resultant topographical model was used to create viewshed models using the Viewshed Tool of the ArcGIS 3D Analyst Extension. The viewshed models illustrate the areas from which the Project will potentially be visible, taking into account the estimated height of the proposed infrastructure (Table 5). Some infrastructure heights were not available for this study and assumptions were made. These assumptions were based on the heights of infrastructure from similar mining projects and confirmed by Umcebo. The infrastructure heights are indicated in Table 5 and the infrastructure is illustrated on Plan 6 (Appendix B).

Table 5: Infrastructure Heights for Viewshed Modelling

Infrastructure	Height	Source
Overburden stockpile	18 m	Provided
Workshop	14 m	Provided
Crushing and screening plant	10 m	Provided
Product stockpile	10 m	Assumed (based on height of crushing and screening plant)
Tip	10 m	Provided
Stores / offices (spares)	9 m	Provided
Powerlines	8 m	Assumed (based on the height of infrastructure from similar mining projects)
Change house	6 m	Provided
Main offices	6 m	Provided
Conveyor	5 m	Assumed (based on the height of infrastructure from similar mining projects)
Shift change office	5 m	Provided
Wash bay	5 m	Assumed (based on the height of infrastructure from similar mining projects)
Security office	4 m	Provided
Generator and mini substation	3 m	Assumed (based on the height of infrastructure from similar mining projects)
Fuel station	3 m	Assumed (based on the height of infrastructure from similar mining projects)
Topsoil stockpile	3 m	Provided
Ventilation shaft	3 m	Assumed (based on the height of infrastructure from similar mining projects)

Infrastructure	Height	Source
Car ports	2.5 m	Assumed (based on the height of infrastructure from similar mining projects)
Sewer treatment plant	2 m	Assumed (based on the height of infrastructure from similar mining projects)
Water treatment plant	2 m	Assumed (based on the height of infrastructure from similar mining projects)
Berm	1.5 m	Provided
Pollution control dam (PCD)	1 m	Assumed (based on the height of infrastructure from similar mining projects)
Access road	0 m	Ground level
Haul road	0 m	Ground level
Parking area	0 m	Ground level
Weigh bridge	0 m	Ground level
Incline shaft	0 m	Ground level and below ground level
Pipeline	0 m	Below ground level
Storm water drain	0 m	Below ground level

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 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.

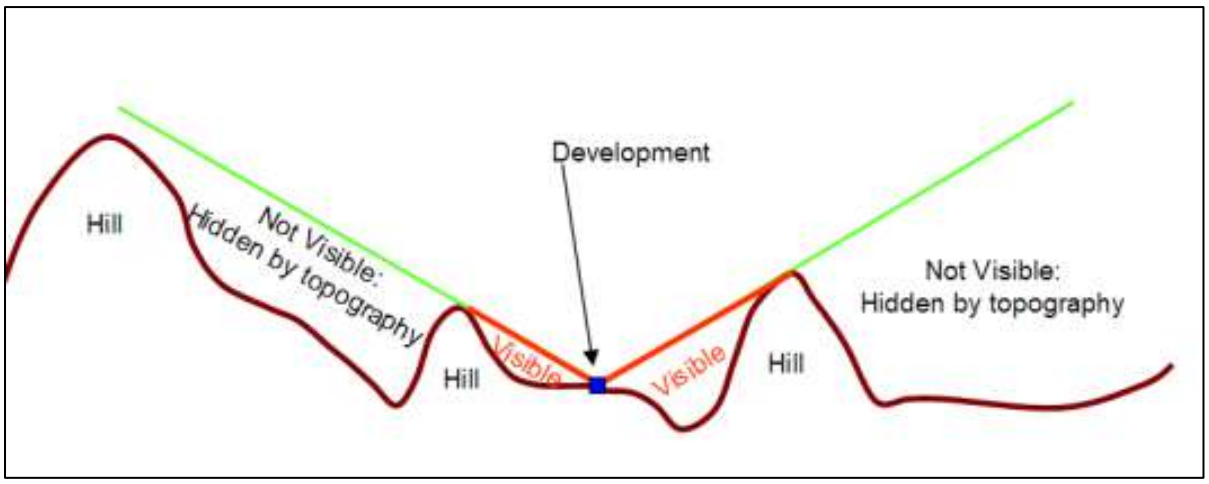


Figure 1: Theoretical Background of Viewshed Modelling

Theoretical and practical viewshed models were created for both the Mooivley West and Hendrina South, and the Mooivley East mining activities. These viewshed models are based on the topography only and do not take the screening effect of vegetation into account. The viewshed models show the areas from which the Project may potentially be visible. The natural Grassland vegetation has been transformed by agricultural activities and little natural vegetation remains. The vegetation of the Project area and surrounds is expected to provide minimal screening of the Project.

The theoretical viewshed models were refined to practical viewshed models by dividing the viewshed area into areas that are likely to experience different categories of visual exposure. Visual exposure and the visual impact of a development diminish exponentially with distance (Oberholzer, 2005).

The findings of the site visit on 5th July 2016 were used to determine these categories. The site visit took place during the daytime in winter and the weather conditions were mainly sunny, clear skies (no clouds) with some haze at times.

The visibility of the nearby Sudor Coal Mine was used to determine the expected visibility of the Project. The Sudor Coal Mine is an operational underground coal mine in a similar receiving environment to the Project.

Due to the hazy conditions the infrastructure was more visible to the naked eye than in the photographs. The photographs were taken with a focal length of 5 mm and the zoom photographs with a focal length of 25 mm.

Figure 2 and Figure 3 (zoom) illustrate that the Sudor Coal Mine infrastructure is just noticeable on the horizon from a distance of approximately 3.9 km. Based on the findings of the site visit it is likely that the mine infrastructure will be visible from a distance of up to 5 km. It is noted that after 5 km the visual exposure is expected to be negligible.

Figure 4 and Figure 5 (zoom) illustrate that the Sudor Coal Mine infrastructure is more clearly visible from a distance of approximately 1.9 km. As one moves closer to the mine infrastructure it will become more visible and starts to dominate the view.

In the photographs of Sudor Coal Mine, the mine infrastructure is visible above the horizon making it more noticeable than if it were on the side of a hill. Most of the proposed infrastructure for the Project will be situated on higher-lying areas with the exception of the Hendrina South infrastructure which is located on the side of a slope. This will increase the visibility of the Project.

Based on the findings of the site visit the following categories were used for the practical viewshed model:

- 0 – 0.5 km: Potentially very high visual exposure;
- 0.5 – 1.5 km: Potentially high visual exposure;
- 1.5 – 2.5 km: Potentially moderate visual exposure;
- 2.5 – 4 km: Potentially low visual exposure; and

- 4 – 5 km: Potentially very low visual exposure.

Figure 2: View of the Sudor Coal Mine in a NNE Direction from 3.9 km

Figure 3: Zoomed View of the Sudor Coal Mine in a NNE Direction from 3.9 km

Figure 4: View of the Sudor Coal Mine in a SSW Direction from 1.9 km

Figure 5: Zoomed View of the Sudor Coal Mine in a SSW Direction from 1.9 km

10 Findings

10.1 Visual/ Aesthetic Character and Topography

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

The Project area and surrounds are undulating with numerous hills and valleys. Hills are known to create a multitude of unique habitats for both faunal and floral species increasing the expected biodiversity of the area. Hills also have significant cultural value as historical settlements were located on higher-lying areas for safety and strategic advantage.

The topographical model indicates that the elevation of the Project area increases from 1633 m.a.m.s.l. in the Klein Olifants River valley in the north to 1784 m.a.m.s.l. on the hill in the south. Plan 3 (Appendix B) illustrates the topographical model and features of the Project area.

The majority of the Project area has gentle slopes of between 0° and 5.4°. Isolated steeper slopes of between 5.5° and 24.1° occur along the sides of the hills and river valleys. Plan 4 (Appendix B) illustrates the slope model of the Project area.

Due to the undulating topography, the slope aspect / direction of the Project area is not in any specific direction. The sides of the hills and valleys slope in various different directions as illustrated by the aspect model of the Project area (Plan 5, Appendix B).

The undulating topography is expected to provide moderate screening of the proposed development; however, if the mining activities are located on a hill they will be more visible than if they are located on a lower-lying area.

Figure 6, Figure 7 and Figure 8 illustrate the topography and vegetation of the Project area.

Figure 6: Topography and Vegetation of the Project Area

Figure 7: Topography and Vegetation of the Project Area

Figure 8: Topography and Vegetation of the Project Area

According to Mucina and Rutherford (2012) the dominant vegetation types of the Project area and surrounds are Eastern Highveld Grassland and Soweto Highveld Grassland. Much of the area has been transformed by agriculture and little natural vegetation remains. The agricultural and natural Grassland vegetation will only provide minimal screening of the proposed development. There are existing rows of trees planted some near farm residences as windbreaks/ vegetation screens (Figure 9 and Figure 10). It is anticipated that these trees will have a screening effect and will reduce the visual impact of the Project on these farm residences.

Figure 9: Example of a Vegetation Screen

10.2 Viewshed Model

The theoretical viewshed models were refined to practical viewshed models with a buffer of 5 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 noticeable beyond this 5 km buffer. The practical viewshed models depict the area from which the Project may potentially be visible.

10.2.1 Mooivley West and Hendrina South

The theoretical viewshed model for Mooivley West and Hendrina South is illustrated in Plan 7 (Appendix B). The practical viewshed model for Mooivley West and Hendrina South is illustrated in Plan 8 (Appendix B) and covers an area of 79.37 km². The viewshed areas for the categories are listed in Table 6 below.

Table 6: Viewshed Area per Category – Mooivley West and Hendrina South

Category	Impact	Viewshed Area
0 – 0.5 km	Potentially Very High Visual Exposure	6.25 km²
0.5 – 1.5 km	Potentially High Visual Exposure	14.80 km²
1.5 – 2.5 km	Potentially Moderate Visual Exposure	17.21 km²
2.5 – 4 km	Potentially Low Visual Exposure	24.34 km²

Category	Impact	Viewshed Area
4 – 5 km	Potentially Very Low Visual Exposure	16.76 km²

10.2.2 Mooivley East

The theoretical viewshed model for Mooivley East is illustrated in Plan 9 (Appendix B). The practical viewshed model for Mooivley East is illustrated in Plan 10 (Appendix B) and covers an area of 64.48 km². The viewshed areas for the categories are listed in Table 7 below.

Table 7: Viewshed Area per Category – Mooivley East

Category	Impact	Viewshed Area
0 – 0.5 km	Potentially Very High Visual Exposure	2.69 km²
0.5 – 1.5 km	Potentially High Visual Exposure	7.02 km²
1.5 – 2.5 km	Potentially Moderate Visual Exposure	11.85 km²
2.5 – 4 km	Potentially Low Visual Exposure	24.95 km²
4 – 5 km	Potentially Very Low Visual Exposure	17.96 km²

10.3 Sensitive Receptors

10.3.1 Mooivley West and Hendrina South

The potential visual receptors identified within the practical viewshed of Mooivley West and Hendrina South include residents of the surrounding farms, heritage sites and roads users. These visual receptors are indicated on Plan 8 (Appendix B).

A total of 62 farm residences (including farm workers houses) were identified within the practical viewshed area. The number of farm residences within each category is shown in Table 8 below.

Table 8: Number of Farm Residences per Category – Mooivley West and Hendrina South

Category	Impact	Number of Farm Residences
0 – 0.5 km	Potentially Very High Visual Exposure	3
0.5 – 1.5 km	Potentially High Visual Exposure	7
1.5 – 2.5 km	Potentially Moderate Visual Exposure	23
2.5 – 4 km	Potentially Low Visual Exposure	18
4 – 5 km	Potentially Very Low Visual Exposure	11

A total of 21 heritage sites (including archaeological sites, burial grounds and graves, and historical buildings) were identified within the practical viewshed area. The number of heritage sites within each category is shown in Table 9 below.

Table 9: Number of Heritage Sites per Category – Mooivley West and Hendrina South

Category	Impact	Number of Heritage Sites
0 – 0.5 km	Potentially Very High Visual Exposure	Historical Buildings (2)
0.5 – 1.5 km	Potentially High Visual Exposure	Burial Grounds and Graves (1) Historical Buildings (2)
1.5 – 2.5 km	Potentially Moderate Visual Exposure	Archaeological Sites (3) Burial Grounds and Graves (1) Historical Buildings (1)
2.5 – 4 km	Potentially Low Visual Exposure	Archaeological Sites (2) Burial Grounds and Graves (3) Historical Buildings (2)
4 – 5 km	Potentially Very Low Visual Exposure	Archaeological Sites (2) Historical Buildings (2)

Road users on the N11 national route, the R542 regional road, secondary roads and farm roads within the practical viewshed area are also potential visual receptors of the Project. The main roads within each category are shown in Table 10.

Table 10: Main Roads per Category – Mooivley West and Hendrina South

Category	Impact	Main Roads
0 – 0.5 km	Potentially Very High Visual Exposure	None
0.5 – 1.5 km	Potentially High Visual Exposure	None
1.5 – 2.5 km	Potentially Moderate Visual Exposure	None
2.5 – 4 km	Potentially Low Visual Exposure	N11
4 – 5 km	Potentially Very Low Visual Exposure	N11 R542

There are no urban areas within the practical viewshed of Mooivley West and Hendrina South. The entire practical viewshed of Mooivley West and Hendrina South is within the Amersfoort-Bethal-Carolina IBA. No other protected areas are within the practical viewshed.

10.3.2 Mooivley East

The potential visual receptors identified within the practical viewshed of Mooivley East include residents of the Hendrina and Kwazamokuhle towns, residents of the surrounding farms, heritage sites and roads users. These visual receptors are indicated on Plan 10 (Appendix B).

A total of 62 farm residences (including farm workers houses) were identified within the practical viewshed area. The number of farm residences within each category is shown in Table 11 below.

Table 11: Number of Farm Residences per Category – Mooivley East

Category	Impact	Number of Receptor Points
0 – 0.5 km	Potentially Very High Visual Exposure	1
0.5 – 1.5 km	Potentially High Visual Exposure	4
1.5 – 2.5 km	Potentially Moderate Visual Exposure	10
2.5 – 4 km	Potentially Low Visual Exposure	26
4 – 5 km	Potentially Very Low Visual Exposure	21

A total of 7 heritage sites (including burial grounds and graves, and historical buildings) were identified within the practical viewshed area. The number of heritage sites within each category is shown in Table 12 below.

Table 12: Number of Heritage Sites per Category – Mooivley East

Category	Impact	Number of Receptor Points
0 – 0.5 km	Potentially Very High Visual Exposure	0
0.5 – 1.5 km	Potentially High Visual Exposure	Burial Grounds and Graves (1)
1.5 – 2.5 km	Potentially Moderate Visual Exposure	Burial Grounds and Graves (1) Historical Buildings (1)
2.5 – 4 km	Potentially Low Visual Exposure	Historical Buildings (3)
4 – 5 km	Potentially Very Low Visual Exposure	Burial Grounds and Graves (1)

Some areas of the Hendrina and Kwazamokuhle towns are within the practical viewshed of Mooivley East and are likely to be visually impacted by the Mooivley East mining activities. These urban areas are indicated on Plan 10 (Appendix B). The affected area of the Hendrina town is mostly in the 2.5 – 4 km category and is expected to experience a potentially low visual exposure. The affected area of the Kwazamokuhle town is mostly in the 4 – 5 km category and is expected to experience a potentially very low visual exposure.

Road users on the N11 national route, the R38 regional road, secondary roads and farm roads within the practical viewshed area are also potential visual receptors of the Project. The main roads within each category are shown in Table 13.

Table 13: Main Roads per Category – Mooivley East

Category	Impact	Main Roads
0 – 0.5 km	Potentially Very High Visual Exposure	N11
0.5 – 1.5 km	Potentially High Visual Exposure	N11
1.5 – 2.5 km	Potentially Moderate Visual Exposure	N11
2.5 – 4 km	Potentially Low Visual Exposure	N11 R38
4 – 5 km	Potentially Very Low Visual Exposure	N11 R38

Approximately 90% of the practical viewshed of Mooivley West and Hendrina South is within the Amersfoort-Bethal-Carolina IBA. No other protected areas are within the practical viewshed.

10.4 Photomontages

This section presents the photomontages created from photographs taken during the site visit on 5th July 2016. Plan 11 (Appendix B) indicates the viewpoint (position) and view direction in which the photographs were taken. The photomontages were created using GIMP version 2 software.

The photomontages were created by adding the proposed infrastructure to photographs of the current views. The scale of the images was measured by comparing the length of an object in the photo to the length of the object in reality. This scale was then used to calculate the size of the proposed infrastructure based on the estimated heights of the proposed infrastructure (Table 5).

The infrastructure is then overlaid onto the original photograph in their respective locations (based on the line of sight from the point the photograph was taken) to give an approximation of what the view will look like before and during the operation of the Project. The foreground of the photograph was extracted from the original photograph and replaced on top of the infrastructure to give a realistic representation of the view from the viewpoint.

Artistic impressions of the proposed infrastructure were not available at the time of this assessment. The infrastructure overlaid on the photographs is an example and does not reflect accurate depictions of the proposed infrastructure, i.e. the plant depicted is not the actual proposed plant but an example of a similar plant and the proposed plant will be of

equivalent height and footprint area. The photomontages provide an indication of what the landscape might potentially look like in the future.

10.4.1 Viewpoint 1

Viewpoint 1 is located on the N11 national route within the Project area. The photograph was taken looking in a north-north-easterly direction towards the Mooivley East mining activities. Figure 10 illustrates the current view from Viewpoint 1. Figure 11 illustrates the potential future view from Viewpoint 1. The product stockpile and the crushing and screening plant are approximately 625 m from Viewpoint 1. The office area, topsoil stockpile and overburden stockpile are approximately 630 m, 665 m and 880 m from Viewpoint 1 respectively. The Mooivley East mining activities will be clearly visible from Viewpoint 1 and the Project is expected to have a negative visual impact on the road users of the N11 national route.

Figure 10: Current View from Viewpoint 1 in a NNE Direction towards Mooivley East

Figure 11: Potential Future View from Viewpoint 1 in a NNE Direction towards Mooivley East

10.4.2 Viewpoint 2

Viewpoint 2 is located on the southern edge of the town of Hendrina on the corner of Sluiter and Joubert Streets. This is the nearest urban residential receptor to the Mooivley East mining activities. The photograph was taken looking in a south-easterly direction towards the Mooivley East mining activities. Figure 12 illustrates the current view from Viewpoint 2. Figure 13 illustrates the potential future view from Viewpoint 2. The office area and the topsoil stockpile are approximately 2.5 km from Viewpoint 2. The overburden stockpile is approximately 2.6 km from Viewpoint 2. The product stockpile and the crushing and screening plant are approximately 2.7 km from Viewpoint 2. The Mooivley East mining activities will be just visible on the horizon from Viewpoint 2 and the Project is expected to have a minimal negative visual impact on the residents of the town of Hendrina.

Figure 12: Current View from Viewpoint 2 in a SE Direction towards Mooivley East

Figure 13: Potential Future View from Viewpoint 2 in a SE Direction towards Mooivley East

10.4.3 Viewpoint 3

Viewpoint 3 is located at the farm residence on the Remaining Extent of the farm Groblershoek 191 IS. The photograph was taken looking in an east-south-easterly direction towards the Hendrina South mining activities. The overburden stockpile and the topsoil stockpile are approximately 665 m and 675 m from Viewpoint 3 respectively. The Hendrina South mining activities will be noticeable from Viewpoint 3 but will be partly hidden by the topography. The Project is expected to have a negative visual impact on this farm residence.

Figure 14: Current View from Viewpoint 3 in an ESE Direction towards Hendrina South

Figure 15: Potential Future View from Viewpoint 3 in an ESE Direction towards Hendrina South

10.4.4 Viewpoint 4

Viewpoint 4 is located at the farm residence on the Remaining Extent of the farm Groblershoek 191 IS. The photograph was taken looking in a north-westerly direction towards the overland conveyor running between the Mooivley West and Hendrina South mining activities. The conveyor is located approximately 600 m from Viewpoint 4. It is anticipated that the conveyor will dominate the view from Viewpoint 4. The Project is expected to have a negative visual impact on this farm residence.

Figure 16: Current View from Viewpoint 4 in a NW Direction towards Overland Conveyor

Figure 17: Potential Future View from Viewpoint 4 in a NW Direction towards Overland Conveyor

10.4.5 Viewpoint 5

Viewpoint 5 is located at the farm workers houses on the Remaining Extent of the farm Mooivley 219 IS. The photograph was taken looking in a south-south-easterly direction towards the Mooivley West mining activities. The product stockpile and the crushing and screening plant are approximately 2.4 km from Viewpoint 5. The office area, overburden stockpile and topsoil stockpile are approximately 2.6 km from Viewpoint 5. The Mooivley West mining activities will be noticeable from Viewpoint 5 and the Project is expected to have a negative visual impact on the residents of these houses.

Figure 18: Current View from Viewpoint 5 in a SSE Direction towards Mooivley West

Figure 19: Potential Future View from Viewpoint 5 in a SSE Direction towards Mooivley West

11 Discussion

The Project will have a negative visual impact on the aesthetic quality of the receiving environment. The most significant visual impact will be from the product stockpiles, crushing and screening plants, overburden stockpiles, topsoil stockpiles and the overland conveyor between the Mooivley West and Hendrina South mining activities. This is due to the height and / or large footprint area of these components of the infrastructure. The construction of other smaller surface infrastructure will have a lesser visual impact.

11.1 Visibility of the Project

The visibility of the project refers to the viewshed area and is also related to the number of receptors affected (Oberholzer, 2005). The Project has a **high visibility** as it is visible from a large area (defined by Oberholzer (2005) as several square kilometres) with numerous visual receptors.

The practical viewshed of Mooivley West and Hendrina South covers an area of approximately 79.37 km². The potential visual receptors include 62 farm residences (including farm workers houses), 21 heritage sites (including archaeological sites, burial grounds and graves, and historical buildings), and road users of the N11 national route, the R542 regional road, secondary roads and farm roads.

The practical viewshed of Mooivley East covers an area of 64.48 km². The potential visual receptors include residents of the Hendrina and Kwazamokuhle towns, 62 farm residences (including farm workers houses), seven heritage sites (including burial grounds and graves, and historical buildings), and road users of the N11 national route, the R38 regional road, secondary roads and farm roads.

11.2 Visual Exposure

Visual exposure is "based on the distance from the project to selected viewpoints" and "tends to diminish exponentially with distance" (Oberholzer, 2005). The Project has a **moderate exposure** as it will be recognisable to the viewer but will not dominate the landscape. This is illustrated by the photomontages in Section 10.4 above.

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 Project has a **moderate sensitivity**.

11.4 Visual Sensitivity of the Receptors

The visual sensitivity of receptors is dependent on the nature of the receptors (Oberholzer, 2005). 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 (residents of the Hendrina and Kwazamokuhle towns, residents of the surrounding farms, heritage sites and roads users) of the Project have a **moderate sensitivity** as there is a combination of residential, agricultural and natural areas.

11.5 Visual Absorption Capacity

The Visual Absorption Capacity (VAC) refers to "the potential of the landscape to conceal the proposed project" (Oberholzer, 2005). The receiving environment of the Project has a **moderate VAC** because there is partial screening provided by the undulating topography and existing vegetation screens.

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 Project has a **high visual intrusion** as it results in a noticeable change and is discordant with the surroundings. There are no mines within the 5 km buffer around the proposed infrastructure and the Project will be the first mine in this area.

12 Impact Assessment

12.1 Methodology used in Determining and Ranking the Nature, Significance, Consequence, Extent, Duration and Probability of Potential Environmental Impacts and Risks

Details of the impact assessment methodology used to determine the significance of physical, bio-physical and socio-economic impacts are provided below.

The significance rating process follows the established impact / risk assessment formula:

Significance = Consequence x Probability x Nature

Where

Consequence = Intensity + Extent + Duration

And

Probability = Likelihood of an impact occurring

And

Nature = Positive (+1) or negative (-1) impact

Note: In the formula for calculating consequence, the type of impact is multiplied by +1 for positive impacts and -1 for negative impacts.

The matrix calculates the rating out of 147, whereby Intensity, Extent, Duration and Probability are each rated out of seven as indicated in Table 14. The weight assigned to the various parameters is then multiplied by +1 for positive and -1 for negative impacts.

Impacts are rated prior to mitigation and again after consideration of the mitigation measure proposed in this specialist report. The significance of an impact is then determined and categorised into one of eight categories (Table 15). The description of the significance ratings is discussed in Table 16.

It is important to note that the pre-mitigation rating takes into consideration the activity as proposed, i.e. there may already be certain types of mitigation measures included in the design (for example due to legal requirements). If the potential impact is still considered too high, additional mitigation measures are proposed.

Table 14: Impact Assessment Parameter Ratings

Rating	Intensity / Replacability		Extent	Duration / Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
7	Irreplaceable loss or damage to biological or physical resources or highly sensitive environments. Irreplaceable damage to highly sensitive cultural / social resources.	Noticeable, on-going natural and / or social benefits which have improved the overall conditions of the baseline.	International The effect will occur across international borders.	Permanent The impact is irreversible, even with management, and will remain after the life of the project.	Definite There are sound scientific reasons to expect that the impact will definitely occur. > 80% probability
6	Irreplaceable loss or damage to biological or physical resources or moderate to highly sensitive environments. Irreplaceable damage to cultural / social resources of moderate to high sensitivity.	Great improvement to the overall conditions of a large percentage of the baseline.	National Will affect the entire country.	Beyond Project Life The impact will remain for some time after the life of the project and is potentially irreversible even with management.	Almost Certain / Highly Probable It is most likely that the impact will occur. < 80% probability

Rating	Intensity / Replacability		Extent	Duration / Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
5	Serious loss and / or damage to biological or physical resources or highly sensitive environments, limiting ecosystem function. Very serious widespread social impacts. Irreparable damage to highly valued items.	On-going and widespread benefits to local communities and natural features of the landscape.	Province / Region Will affect the entire province of region.	Project Life (> 15 years) The impact will cease after the operational life span of the project and can be reversed with sufficient management.	Likely The impact may occur. < 65% probability
4	Serious loss and / or damage to biological or physical resources or moderately sensitive environments, limiting ecosystem function. On-going serious social issues. Significant damage to structures / items of cultural significance.	Average to intense natural and / or social benefits to some elements of the baseline.	Municipal Area Will affect the whole municipal area.	Long Term 6-15 years and the impact can be reversed with management.	Probable Has occurred here or elsewhere and could therefore occur. < 50% probability

Rating	Intensity / Replacability		Extent	Duration / Reversibility	Probability
	Negative Impacts (Nature = -1)	**Positive Impacts (Nature = +1)**			
3	Moderate loss and / or damage to biological or physical resources or low to moderately sensitive environments, limiting ecosystem function. On-going social issues. Damage to items of cultural significance.	Average, on-going positive benefits, not widespread but felt by some elements of the baseline.	Local Local extending only as far as the development site area.	Medium Term 1-5 years and the impact can be reversed with minimal management.	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. < 25% probability
2	Minor loss and / or effects to biological or physical resources or low sensitive environments, not affecting ecosystem functioning. Minor medium term social impacts on local population. Mostly repairable. Cultural functions and processes not affected.	Low positive impacts experienced by a small percentage of the baseline.	Limited Limited to the site and its immediate surroundings.	Short Term Less than 1 year and is reversible.	Rare / Improbable Conceivable, but only in extreme circumstances. The possibility of the impact materialising is very low as a result of design, historic experience or implementation of adequate mitigation measures. < 10% probability

Rating	Intensity / Replacability		Extent	Duration / Reversibility	Probability
	Negative Impacts (Nature = -1)	Positive Impacts (Nature = +1)			
1	Minimal to no loss and / or effect to biological or physical resources, not affecting ecosystem functioning. Minimal social impacts, low-level repairable damage to common place structures.	Some low-level natural and / or social benefits felt by a very small percentage of the baseline.	Very Limited / Isolated Limited to specific isolated parts of the site.	Immediate Less than 1 month and is completely reversible without management.	Highly Unlikely / None Expected never to happen. < 1% probability

Table 15: Probability / Consequence Matrix

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 16: Significance Rating Description

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.	Major (positive) (+)
36 to 72	A positive impact. These impacts will usually result in positive medium to long term effects on the natural and / or social environment.	Minor (positive) (+)
3 to 35	A small positive impact. The impact will result in medium to short term effects on the natural and / or social environment.	Negligible (positive) (+)
-3 to -35	An acceptable negative impact for which mitigation is desirable. 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 natural and / or social environment.	Negligible (negative) (-)
-36 to -72	A minor 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 effects on the natural and / or social environment.	Minor (negative) (-)
-73 to -108	A moderate negative impact which may prevent the implementation of the project. These impacts would be considered as constituting a major and usually a long term change to the (natural and / or social) environment and result in severe changes.	Moderate (negative) (-)
-109 to -147	A major 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. The impacts are likely to be irreversible and / or irreplaceable.	Major (negative) (-)

12.2 Project Activities

The activities associated with the Project are listed in Table 17 below. The activities highlighted in red are applicable to this VIA.

Table 17: Project Activities

Project Phase	No.	Project Activity	Project Structures
Construction	1	Site clearance	Topsoil stockpiles
	2	Blasting and excavation	Two incline shafts and one ventilation shaft per mining area
	3	Construction of surface infrastructure	Crushing and screening plant Mine offices Change house Workshop Overburden and product stockpiles Site fencing Access and service roads (with weighbridges) Overland conveyor Sewage treatment plant Three pollution control dams Water treatment plant Diesel storage tanks Ventilation shaft per mining area
	4	Water abstraction and use	Water tanks and pipes
	5	Waste generation and disposal	Waste skips
	6	Power generation	Diesel generator
Operational	7	Underground blasting and mining	Heavy machinery and equipment
	8	Stockpiling	Waste rock berms Product stockpiles
	9	Hauling / conveying of coal	Overland conveyor belt Haul and access roads
	10	Plant and equipment operations	Crushing and screening plant Workshop and diesel storage tanks
	11	Water use and storage	Pollution control dams and Jo Jo tanks

Project Phase	No.	Project Activity	Project Structures
	12	Waste generation and storage	Sewage treatment plant Waste skips
	13	Power generation	Diesel generator
Decommissioning and Closure	14	Removal of infrastructure and surface rehabilitation	Crushing and screening plant Mine offices Change house Workshop Overburden and product stockpiles Site fencing Access and service roads (with weighbridges) Overland conveyor Sewage treatment plant Three pollution control dams Water treatment plant Diesel storage tanks Ventilation shaft per mining area
	15	Waste generation and disposal	Waste skips

12.3 Visual Impact Assessment

The Project activities listed in Table 17 will be rated according to the visual 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. 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 are removed. Positive visual impacts rarely occur.

Where the impact ratings are the same for the two mining areas (Mooivley West and Hendrina South, and Mooivley East) only one impact rating table is provided. Two impact rating tables are provided where the impact ratings differ for the two mining areas.

12.3.1 Construction Phase

The construction phase is characterised by site development and infrastructure construction. This includes site clearance and vegetation removal, topsoil removal and stockpiling, surface infrastructure development and blasting and excavation for the incline and ventilation shafts. The establishment of infrastructure and related construction activities will draw attention to

the Project area making receptors aware of the Project. The construction phase will have negative visual impacts on the receiving environment.

12.3.1.1 Activity 1: Site Clearance

Site clearance including vegetation removal and topsoil removal and stockpiling is expected to have a negative visual impact on the receiving environment. The interactions and resultant impacts of site clearance are indicated in Table 18.

Table 18: Interactions and Impacts of Site Clearance on the Visual Aspects

Interaction	Impact
Site clearance and vegetation removal	Site clearance and vegetation removal will have a negative visual impact on the receiving environment. The Project area will become noticeable to nearby receptors as it will contrast the surrounding areas.
Topsoil removal and stockpiling	Topsoil removal and stockpiling will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact.

12.3.1.1.1 Impact Description

Site clearance will have a minor negative visual impact on the receiving environment.

12.3.1.1.2 Management Objective

The management objective is to minimise the negative visual impact caused by site clearance and topsoil removal and stockpiling.

12.3.1.1.3 Management Actions

The following management actions are required for site clearance:

- Vegetation should only be removed when and where necessary;
- Topsoil should only be removed when and where necessary;
- Topsoil stockpiles should be vegetated with grasses (*Cynodon dactylon, Digitaria erianth, Chloris gayan, Eragrostis chloromelas and Panicum maximum*) where possible so as to blend into the surrounding landscape and reduce dust generation;
- Limit footprint area of topsoil stockpiles where possible;
- Limit the height of topsoil stockpiles to 3 m (Table 5); and
- Apply dust suppression techniques to limit the dust generated from stockpiles.

12.3.1.1.4 Impact Ratings

The impact ratings and mitigation / management for site clearance are summarised in Table 19 and Table 20.

Table 19: Potential Impacts of Site Clearance on the Visual Aspects – Mooivley West and Hendrina South

Dimension	Rating	Motivation	Significance
Activity and Interaction (Site Clearance)			
Impact Description: Site clearance and vegetation removal will have a negative visual impact on the receiving environment. The Project area will become noticeable to nearby receptors as it will contrast the surrounding areas. Topsoil removal and stockpiling will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact.			
Prior to Mitigation / Management			
Duration	Project Life (5)	The impact will occur during the construction phase which is expected to last for three years and remain for the duration of the proposed project.	Moderate negative (-77)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 21 heritage sites within the practical viewshed area. Road users on the N11 national route, the R542 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors.	
Intensity	Moderate (3)	The activity is expected to cause a moderate visual disturbance. The project area will become noticeable to nearby receptors as it will contrast the surrounding areas. Dust from the stockpiles will have a negative visual impact on the receiving environment.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Vegetation should only be removed when and where necessary; ▪ Topsoil should only be removed when and where necessary; ▪ Topsoil stockpiles should be vegetated with grasses (*Cynodon dactylon, Digitaria erianth, Chloris gayan, Eragrostis chloromelas* and *Panicum maximum*) where possible so as to blend into the surrounding landscape and reduce dust generation; ▪ Limit footprint area of topsoil stockpiles where possible; ▪ Limit the height of topsoil stockpiles to 3 m (Table 5); and ▪ Apply dust suppression techniques to limit the dust generated from stockpiles.			
Post-Mitigation			

Dimension	Rating	Motivation	Significance
Duration	Project Life (5)	The impact will occur during the construction phase which is expected to last for three years and remain for the duration of the proposed project.	Minor negative (-63)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Minor (2)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		

Table 20: Potential Impacts of Site Clearance on the Visual Aspects – Mooivley East

Dimension	Rating	Motivation	Significance
Activity and Interaction (Site Clearance)			
Impact Description: Site clearance and vegetation removal will have a negative visual impact on the receiving environment. The Project area will become noticeable to nearby receptors as it will contrast the surrounding areas. Topsoil removal and stockpiling will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact.			
Prior to Mitigation / Management			
Duration	Project Life (5)	The impact will occur during the construction phase which is expected to last for three years and remain for the duration of the proposed project.	Moderate negative (-84)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 7 heritage sites within the practical viewshed area. Road users on the N11 national route, the R38 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors. Some areas of the Hendrina (mostly a low visual exposure) and Kwazamokuhle (mostly a very low visual exposure) towns are within the practical viewshed of Mooivley East and are likely to be visually impacted by the Mooivley East mining activities.	

Dimension	Rating	Motivation	Significance
Intensity	Serious (4)	The activity is expected to cause a serious visual disturbance. The project area will become noticeable to nearby receptors as it will contrast the surrounding areas. Dust from the stockpiles will have a negative visual impact on the receiving environment.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Vegetation should only be removed when and where necessary; ▪ Topsoil should only be removed when and where necessary; ▪ Topsoil stockpiles should be vegetated with grasses (*Cynodon dactylon, Digitaria erianth, Chloris gayan, Eragrostis chloromelas* and *Panicum maximum*) where possible so as to blend into the surrounding landscape and reduce dust generation; ▪ Limit footprint area of topsoil stockpiles where possible; ▪ Limit the height of topsoil stockpiles to 3 m (Table 5); and ▪ Apply dust suppression techniques to limit the dust generated from stockpiles.			
Post-Mitigation			
Duration	Project Life (5)	The impact will occur during the construction phase which is expected to last for three years and remain for the duration of the proposed project.	Minor negative (-70)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Moderate (3)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		

12.3.1.2 Activity 2: Blasting and Excavation

Blasting and excavation for shaft development is expected to have a negative visual impact on the receiving environment. The interactions and resultant impacts of blasting and excavation are indicated in Table 21.

Table 21: Interactions and Impacts of Blasting and Excavation on the Visual Aspects

Interaction	Impact
Blasting and excavation	Dust from blasting and excavation for shaft development will have a negative visual impact on the receiving environment.

12.3.1.2.1 Impact Description

Dust from blasting and excavation will have a minor negative visual impact on the receiving environment.

12.3.1.2.2 Management Objective

The management objective is to minimise the negative visual impact caused by blasting and excavation.

12.3.1.2.3 Management Actions

The following management actions are required for blasting and excavation.

- Apply dust suppression techniques to limit the dust generated from blasting.

12.3.1.2.4 Impact Ratings

The impact ratings and mitigation / management for blasting and excavation are summarised in Table 22 and Table 23.

Table 22: Potential Impacts of Blasting and Excavation on the Visual Aspects – Mooivley West and Hendrina South

Dimension	Rating	Motivation	Significance
Activity and Interaction (Blasting and Excavation)			
Impact Description: Dust from blasting and excavation for shaft development will have a negative visual impact on the receiving environment.			
Prior to Mitigation / Management			
Duration	Medium Term (3)	The impact will occur during the construction phase which is expected to last for 2-5 years.	Minor negative (-48)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 21 heritage sites within the practical viewshed area. Road users on the N11 national route, the R542 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors.	
Intensity	Minor (2)	Dust from blasting and excavation for shaft	

		development is expected to cause a minor visual disturbance.	
Probability	Almost Certain / Highly Probable (6)	The impact will almost certainly occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Apply dust suppression techniques to limit the dust generated from blasting.			
Post-Mitigation			
Duration	Medium Term (3)	The impact will occur during the construction phase which is expected to last for 2-5 years.	Negligible negative (-24)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Minimal (1)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Probable (4)	The probability of the impact occurring will be reduced by implementing the mitigation measures listed above.	
Nature	Negative		

Table 23: Potential Impacts of Blasting and Excavation on the Visual Aspects – Mooivley East

Dimension	Rating	Motivation	Significance
Activity and Interaction (Blasting and Excavation)			
Impact Description: Dust from blasting and excavation for shaft development will have a negative visual impact on the receiving environment.			
Prior to Mitigation / Management			
Duration	Medium Term (3)	The impact will occur during the construction phase which is expected to last for three years.	Minor negative (-54)

Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 7 heritage sites within the practical viewshed area. Road users on the N11 national route, the R38 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors. Some areas of the Hendrina (mostly a low visual exposure) and Kwazamokuhle (mostly a very low visual exposure) towns are within the practical viewshed of Mooivley East and are likely to be visually impacted by the Mooivley East mining activities.	
Intensity	Moderate (3)	Dust from blasting and excavation for shaft development is expected to cause a moderate visual disturbance.	
Probability	Almost Certain / Highly Probable (6)	The impact will almost certainly occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Apply dust suppression techniques to limit the dust generated from blasting.			
Post-Mitigation			
Duration	Medium Term (3)	The impact will occur during the construction phase which is expected to last for three years.	Negligible negative (-28)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Minor (2)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Probable (4)	The probability of the impact occurring will be reduced by implementing the mitigation measures listed above.	
Nature	Negative		

12.3.1.3 Activity 3: Construction of Surface Infrastructure

Construction of surface infrastructure is expected to have a negative visual impact on the receiving environment. The interactions and resultant impacts of construction of surface infrastructure are indicated in Table 24.

Table 24: Interactions and Impacts of Construction of Surface Infrastructure on the Visual Aspects

Interaction	Impact
Change of land use from agriculture to mining	Change of land use from agriculture to mining will have a negative visual impact on the receiving environment. This change of land use will change the sense of place of the Project area and surrounds from an agricultural sense of place to an industrial / mining sense of place resulting in a loss of scenic character and increased visual disturbance.
Construction of surface infrastructure	The construction of surface infrastructure will have a negative visual impact on the receiving environment. The surface infrastructure will change the sense of place of the Project area from a rural sense of place to an industrial / mining sense of place. Construction area lighting at night will have a negative visual impact on the receiving environment. The construction area lighting will be visible from afar and will draw attention to the Project area. This will also have a negative impact on the sense of place.

12.3.1.3.1 Impact Description

Change of land use from agriculture to mining will have a major negative visual impact on the receiving environment. Construction of surface infrastructure will have a moderate negative visual impact on the receiving environment.

12.3.1.3.2 Management Objectives

The management objectives are to minimise the negative visual impact caused by the change of land use from agriculture to mining and to minimise the negative visual impact caused by construction of surface infrastructure.

12.3.1.3.3 Management Actions

The following actions are required for construction of surface infrastructure:

- Ensure screening vegetation is left intact around the Project area and near receptors;
- Ensure the surface infrastructure does not exceed the proposed heights in Table 5 above;
- 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;
- Down lighting must be implemented for construction activities taking place at night to minimise light pollution;
- Apply dust suppression techniques to limit the dust from the demolition area;
- Use shade cloth / netting to screen the demolition area;
- Ensure all infrastructure is demolished;
- Limit the quantity and time of rubble stored on site;
- Ensure that the shafts are backfilled with material from the overburden stockpiles and waste rock berms;
- Rehabilitate all disturbed areas;
- Ensure that the rehabilitated area is re-contoured and profiled to create a free-draining topography;
- Spread topsoil over the rehabilitated area;
- Ensure that surface water and drainage lines are rehabilitated;
- Re-vegetate the rehabilitated areas with grasses (*Cynodon dactylon, Digitaria erianth, Chloris gayan, Eragrostis chloromelas* and *Panicum maximum*); and
- Ensure all the mitigation measures outlined in the Closure and Rehabilitation reports are conducted.

12.3.1.3.4 Impact Ratings

The impact ratings and mitigation / management for construction of surface infrastructure are summarised in Table 25,

Table 26 and

Table 27.

Table 25: Potential Impacts of Construction of Surface Infrastructure on the Visual Aspects

Dimension	Rating	Motivation	Significance
Activity and Interaction (Change of Land Use)			
Impact Description: Change of land use from agriculture to mining will have a negative visual impact on the receiving environment. This change of land use will change the sense of place of the Project area and surrounds from an agricultural sense of place to an industrial / mining sense of place resulting in a loss of scenic character and increased visual disturbance.			
Prior to Mitigation / Management			

Dimension	Rating	Motivation	Significance
Duration	Beyond Project Life (6)	The impact will remain until after the Project area has been rehabilitated.	Major negative (-112)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 21 heritage sites within the practical viewshed area of Mooivley West and Hendrina South. There are 62 farm residences and 7 heritage sites within the practical viewshed area of Mooivley East. Road users on the N11 national route, the R38 and R542 regional routes, secondary roads and farm roads within the practical viewshed area are also potential visual receptors. Some areas of the Hendrina (mostly a low visual exposure) and Kwazamokuhle (mostly a very low visual exposure) towns are within the practical viewshed of Mooivley East and are likely to be visually impacted by the Mooivley East mining activities.	
Intensity	Highly Irreplaceable (7)	Change of land use will result in a permanent change in the sense of place of the project area and surrounds.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			

Dimension	Rating	Motivation	Significance
▪ Apply dust suppression techniques to limit the dust from the demolition area; ▪ Use shade cloth / netting to screen the demolition area; ▪ Ensure all infrastructure is demolished; ▪ Limit the quantity and time of rubble stored on site; ▪ Ensure that the shafts are backfilled with material from the overburden stockpiles and waste rock berms; ▪ Rehabilitate all disturbed areas; ▪ Ensure that the rehabilitated area is re-contoured and profiled to create a free-draining topography; ▪ Spread topsoil over the rehabilitated area; ▪ Ensure that surface water and drainage lines are rehabilitated; ▪ Re-vegetate the rehabilitated areas with grasses (*Cynodon dactylon, Digitaria erianth, Chloris gayan, Eragrostis chloromelas* and *Panicum maximum*); and ▪ Ensure all the mitigation measures outlined in the Closure and Rehabilitation reports are conducted.			
Post-Mitigation			
Duration	Beyond Project Life (6)	The impact will remain until after the Project area has been rehabilitated.	Moderate negative (-91)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Very Serious (5)	The impact will be reduced by implementing the mitigation measures listed above.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		

Table 26: Potential Impacts of Construction of Surface Infrastructure on the Visual Aspects – Mooivley West and Hendrina South

Dimension	Rating	Motivation	Significance
Activity and Interaction (Construction of Surface Infrastructure)			
Impact Description: The construction of surface infrastructure will have a negative visual impact on the receiving environment. The surface infrastructure will change the sense of place of the Project area from a rural sense of place to an industrial / mining sense of place. Construction area lighting at night will have a negative visual impact on the receiving environment. The construction area lighting will be visible from afar and will draw attention to the Project area. This will also have a negative impact on the sense of place.			
Prior to Mitigation / Management			

Dimension	Rating	Motivation	Significance
Duration	Project Life (5)	The impact will occur for the duration of the project. Mooivley West and Hendrina South will be mined from Year 1 to Year 36 (36 years).	Moderate negative (-84)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 21 heritage sites within the practical viewshed area. Road users on the N11 national route, the R542 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors.	
Intensity	Serious (4)	Construction of surface infrastructure is expected to cause a serious visual disturbance.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Ensure screening vegetation is left intact around the Project area and near receptors; ▪ Ensure the surface infrastructure does not exceed the proposed heights in Table 5 above; ▪ 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; and ▪ Down lighting must be implemented for construction activities taking place at night to minimise light pollution.			
Post-Mitigation			
Duration	Project Life (5)	The impact will occur for the duration of the project. Mooivley West and Hendrina South will be mined from Year 1 to Year 36 (36 years).	Moderate negative (-77)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Moderate (3)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		

Table 27: Potential Impacts of Construction of Surface Infrastructure on the Visual Aspects – Mooivley East

Dimension	Rating	Motivation	Significance
Activity and Interaction (Construction of Surface Infrastructure)			
Impact Description: The construction of surface infrastructure will have a negative visual impact on the receiving environment. The surface infrastructure will change the sense of place of the Project area from a rural sense of place to an industrial / mining sense of place. Construction area lighting at night will have a negative visual impact on the receiving environment. The construction area lighting will be visible from afar and will draw attention to the Project area. This will also have a negative impact on the sense of place.			
Prior to Mitigation / Management			
Duration	Long Term (4)	The impact will occur for the duration of the project. Mooivley East will be mined from Year 23 to Year 31 (9 years). Construction activities for Mooivley East will commence during the mine life of Mooivley West and Hendrina South.	Moderate negative (-84)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 7 heritage sites within the practical viewshed area. Road users on the N11 national route, the R38 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors. Some areas of the Hendrina (mostly a low visual exposure) and Kwazamokuhle (mostly a very low visual exposure) towns are within the practical viewshed of Mooivley East and are likely to be visually impacted by the Mooivley East mining activities.	
Intensity	Very Serious (5)	Construction of surface infrastructure is expected to cause a very serious visual disturbance.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Ensure screening vegetation is left intact around the Project area and near receptors; ▪ Ensure the surface infrastructure does not exceed the proposed heights in Table 5 above; ▪ 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; and			

Dimension	Rating	Motivation	Significance
▪ Down lighting must be implemented for construction activities taking place at night to minimise light pollution.			
Post-Mitigation			
Duration	Long Term (4)	The impact will occur for the duration of the project. Mooivley East will be mined from Year 23 to Year 31 (9 years). Construction activities for Mooivley East will commence during the mine life of Mooivley West and Hendrina South.	Moderate negative (-77)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Serious (4)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		

12.3.1.4 Activity 4: Water Abstraction and Use

Water abstraction and use (including water tanks and pipes) will take place within the surface infrastructure area. The negative visual impact from the construction of surface infrastructure was assessed in Activity 3 above (Section 12.3.1.3) and water abstraction and use is not expected to result in any additional visual impacts.

12.3.1.5 Activity 5: Waste Generation and Disposal

Waste generation and disposal (including waste skips) will take place within the surface infrastructure area. The negative visual impact from the construction of surface infrastructure was assessed in Activity 3 above (Section 12.3.1.3) and waste generation and disposal is not expected to result in any additional visual impacts.

12.3.1.6 Activity 6: Power Generation

Power generation (using diesel generators) will take place within the surface infrastructure area. The negative visual impact from the construction of surface infrastructure was assessed in Activity 3 above (Section 12.3.1.3) and power generation is not expected to result in any additional visual impacts.

12.3.2 Operational Phase

The operational phase is characterised by mining, stockpiling, hauling and crushing processes. The operational phase is expected to have negative visual impacts on the receiving environment.

12.3.2.1 Activity 7: Underground Blasting and Mining

Underground blasting and mining activities will not be visible on the surface and therefore no visual impact is expected.

12.3.2.2 Activity 8: Stockpiling

Stockpiling of material on the overburden stockpiles, waste rock berms and product stockpiles is expected to have a negative visual impact on the receiving environment. The interactions and resultant impacts of stockpiling are indicated in Table 28.

Table 28: Interactions and Impacts of Stockpiling on the Visual Aspects

Interaction	Impact
Stockpiling	Stockpiling of material on the overburden stockpiles, waste rock berms and product stockpiles will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact. The impact of the overburden stockpiles and waste rock berms will occur for the life of the Project. This impact will be reversed when the material is used to backfill the shafts during the closure phase.

12.3.2.2.1 Impact Description

Stockpiling of material on the overburden stockpiles, waste rock berms and product stockpiles will have a moderate negative visual impact on the receiving environment. These stockpiles will become noticeable from a greater distance as they increase in height and will begin to dominate the landscape for nearby receptors.

12.3.2.2.2 Management Objective

The management objective is to minimise the negative visual impact caused by stockpiling of material on the overburden stockpiles, waste rock berms and product stockpile.

12.3.2.2.3 Management Actions

The following management actions are required for stockpiling:

- Ensure the overburden stockpiles do not exceed the proposed height of 18 m (Table 5);
- Ensure the product stockpiles do not exceed the proposed height of 10 m (Table 5);
- Ensure the waste rock berms do not exceed the proposed height of 1.5 m (Table 5);
- Limit the quantity and time of ROM stored on site; and
- Apply dust suppression techniques to limit the dust generated from stockpiles.

12.3.2.2.4 Impact Ratings

The impact ratings and mitigation / management for stockpiling are summarised in Table 29 and

Table 30.

Table 29: Potential Impacts of Stockpiling on the Visual Aspects – Mooivley West and Hendrina South

Dimension	Rating	Motivation	Significance
Activity and Interaction (Stockpiling)			
Impact Description: Stockpiling of material on the overburden stockpiles, waste rock berms and product stockpiles will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact. The impact of the overburden stockpiles and waste rock berms will occur for the life of the Project. This impact will be reversed when the material is used to backfill the shafts during the closure phase.			
Prior to Mitigation / Management			
Duration	Project Life (5)	The impact will occur for the duration of the operational phase. Mooivley West and Hendrina South will be mined from Year 1 to Year 36 (36 years).	Moderate negative (-84)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 21 heritage sites within the practical viewshed area. Road users on the N11 national route, the R542 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors.	
Intensity	Serious (4)	Stockpiling of material and the associated dust is expected to cause a serious visual disturbance.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Ensure the overburden stockpiles do not exceed the proposed height of 18 m (Table 5); ▪ Ensure the product stockpiles do not exceed the proposed height of 10 m (Table 5); ▪ Ensure the waste rock berms do not exceed the proposed height of 1.5 m (Table 5); ▪ Limit the quantity and time of ROM stored on site; and ▪ Apply dust suppression techniques to limit the dust generated from stockpiles.			
Post-Mitigation			
Duration	Project Life (5)	The impact will occur for the duration of the operational phase. Mooivley West and Hendrina South will be mined from Year 1 to Year 36 (36 years).	Minor negative (-70)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	

Dimension	Rating	Motivation	Significance
Intensity	Moderate (3)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		

Table 30: Potential Impacts of Stockpiling on the Visual Aspects – Mooivley East

Dimension	Rating	Motivation	Significance
Activity and Interaction (Stockpiling)			
Impact Description: Stockpiling of material on the overburden stockpiles, waste rock berms and product stockpiles will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact. The impact of the overburden stockpiles and waste rock berms will occur for the life of the Project. This impact will be reversed when the material is used to backfill the shafts during the closure phase.			
Prior to Mitigation / Management			
Duration	Long Term (4)	The impact will occur for the duration of the operational phase. Mooivley East will be mined from Year 23 to Year 31 (9 years).	Moderate negative (-84)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 7 heritage sites within the practical viewshed area. Road users on the N11 national route, the R38 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors. Some areas of the Hendrina (mostly a low visual exposure) and Kwazamokuhle (mostly a very low visual exposure) towns are within the practical viewshed of Mooivley East and are likely to be visually impacted by the Mooivley East mining activities.	
Intensity	Very Serious (5)	Stockpiling of material and the associated dust is expected to cause a very serious visual disturbance.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			

Dimension	Rating	Motivation	Significance
▪ Ensure the overburden stockpiles do not exceed the proposed height of 18 m (Table 5); ▪ Ensure the product stockpiles do not exceed the proposed height of 10 m (Table 5); ▪ Ensure the waste rock berms do not exceed the proposed height of 1.5 m (Table 5); ▪ Limit the quantity and time of ROM stored on site; and ▪ Apply dust suppression techniques to limit the dust generated from stockpiles.			
Post-Mitigation			
Duration	Long Term (4)	The impact will occur for the duration of the operational phase. Mooivley East will be mined from Year 23 to Year 31 (9 years).	Minor negative (-70)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Serious (4)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		

12.3.2.3 Activity 9: Hauling / Conveying of Coal

Vehicular activity to haul coal is expected to have a negative visual impact on the receiving environment. Operation of the overland conveyor is not expected to have a visual impact. The interactions and resultant impacts of hauling of coal are indicated in Table 31.

Table 31: Interactions and Impacts of Hauling of Coal on the Visual Aspects

Interaction	Impact
Hauling of coal	Vehicular activity to haul coal will have a negative visual impact on the receiving environment. Dust from vehicular activity will also have a negative visual impact.

12.3.2.3.1 Impact Description

Vehicular activity to haul coal will have a minor negative visual impact on the receiving environment.

12.3.2.3.2 Management Objective

The management objective is to minimise the negative visual impacts caused by hauling of coal.

12.3.2.3.3 Management Actions

The following management actions are required for hauling of coal:

- Limit the speed of vehicles on the haul roads to reduce dust; and
- Haul roads should be wetted frequently by means of a water bowser to suppress dust.

12.3.2.3.4 Impact Ratings

The impact ratings and mitigation/ management measures for hauling of coal are summarised in Table 32 and Table 33.

Table 32: Potential Impacts of Hauling of Coal on the Visual Aspects – Mooivley West and Hendrina South

Dimension	Rating	Motivation	Significance
Activity and Interaction (Hauling of Coal)			
Impact Description: Vehicular activity to haul coal will have a negative visual impact on the receiving environment. Dust from vehicular activity will also have a negative visual impact.			
Prior to Mitigation / Management			
Duration	Project Life (5)	The impact will occur for the duration of the operational phase. Mooivley West and Hendrina South will be mined from Year 1 to Year 36 (36 years).	Minor negative (-60)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 21 heritage sites within the practical viewshed area. Road users on the N11 national route, the R542 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors.	
Intensity	Minor (2)	Hauling of coal and the associated dust is expected to cause a minor visual disturbance.	
Probability	Almost Certain / Highly Probable (6)	The impact will almost certainly occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Limit the speed of vehicles on the haul roads to reduce dust; and ▪ Haul roads should be wetted frequently by means of a water bowser to suppress dust.			
Post-Mitigation			

Dimension	Rating	Motivation	Significance
Duration	Project Life (5)	The impact will occur for the duration of the operational phase. Mooivley West and Hendrina South will be mined from Year 1 to Year 36 (36 years).	Negligible negative (-32)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Minimal (1)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Probable (4)	The probability of the impact occurring will be reduced by implementing the mitigation measures listed above.	
Nature	Negative		

Table 33: Potential Impacts of Hauling of Coal on the Visual Aspects – Mooivley East

Dimension	Rating	Motivation	Significance
Activity and Interaction (Hauling of Coal)			
Impact Description: Vehicular activity to haul coal will have a negative visual impact on the receiving environment. Dust from vehicular activity will also have a negative visual impact.			
Prior to Mitigation / Management			
Duration	Long Term (4)	The impact will occur for the duration of the operational phase. Mooivley East will be mined from Year 23 to Year 31 (9 years).	Minor negative (-60)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 7 heritage sites within the practical viewshed area. Road users on the N11 national route, the R38 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors. Some areas of the Hendrina (mostly a low visual exposure) and Kwazamokuhle (mostly a very low visual exposure) towns are within the practical viewshed of Mooivley East and are likely to be visually impacted by the Mooivley East mining activities.	
Intensity	Moderate (3)	Hauling of coal and the associated dust is expected to cause a moderate visual disturbance.	
Probability	Almost Certain / Highly Probable (6)	The impact will almost certainly occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Limit the speed of vehicles on the haul roads to reduce dust; and ▪ Haul roads should be wetted frequently by means of a water bowser to suppress dust.			
Post-Mitigation			
Duration	Long Term (4)	The impact will occur for the duration of the operational phase. Mooivley East will be mined from Year 23 to Year 31 (9 years).	Negligible negative (-32)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	

Dimension	Rating	Motivation	Significance
Intensity	Minor (2)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Probable (4)	The probability of the impact occurring will be reduced by implementing the mitigation measures listed above.	
Nature	Negative		

12.3.2.4 Activity 10: Plant and Equipment Operations

Plant and equipment operations (including crushing and screening plants, workshops, diesel storage tanks and other surface infrastructure) are expected to have a negative visual impact on the receiving environment. The interactions and resultant impacts of plant and equipment operations are indicated in Table 34.

Table 34: Interactions and Impacts of Plant and Equipment Operations on the Visual Aspects

Interaction	Impact
Plant and equipment operations	Dust from the crushing and screening plants will have a negative visual impact on the receiving environment. Operational area lighting at night will have a negative visual impact on the receiving environment. The operational area lighting will be visible at night and will draw attention to the Project area. This will also have a negative impact on the sense of place.

12.3.2.4.1 Impact Description

Dust from the crushing and screening plants will have a minor negative visual impact on the receiving environment.

12.3.2.4.2 Management Objective

The management objective is to minimise the negative visual impact caused by plant and equipment operations.

12.3.2.4.3 Management Actions

The following management actions are required for plant and equipment operations:

- Apply dust suppression techniques to limit the dust generated from the crushing and screening plant; and
- Down lighting must be implemented for operational activities taking place at night to minimise light pollution.

12.3.2.4.4 Impact Ratings

The impact ratings and mitigation/ management measures for plant and equipment operations are summarised in Table 35 and

Table 36.

Table 35: Potential Impacts of Plant and Equipment Operations on the Visual Aspects – Mooivley West and Hendrina South

Dimension	Rating	Motivation	Significance
Activity and Interaction (Plant and Equipment Operations)			
Impact Description: Dust from the crushing and screening plants will have a negative visual impact on the receiving environment. Operational area lighting at night will have a negative visual impact on the receiving environment. The operational area lighting will be visible at night and will draw attention to the Project area. This will also have a negative impact on the sense of place.			
Prior to Mitigation / Management			
Duration	Project Life (5)	The impact will occur for the duration of the operational phase. Mooivley West and Hendrina South will be mined from Year 1 to Year 36 (36 years).	Moderate negative (-84)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 21 heritage sites within the practical viewshed area. Road users on the N11 national route, the R542 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors.	
Intensity	Serious (4)	Dust from the crushing and screening plant and operational area lighting are expected to cause a serious visual disturbance.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Apply dust suppression techniques to limit the dust generated from the crushing and screening plant; and ▪ Down lighting must be implemented for operational activities taking place at night to minimise light pollution.			
Post-Mitigation			

Dimension	Rating	Motivation	Significance
Duration	Project Life (5)	The impact will occur for the duration of the operational phase. Mooivley West and Hendrina South will be mined from Year 1 to Year 36 (36 years).	Minor negative (-70)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Moderate (3)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		

Table 36: Potential Impacts of Plant and Equipment Operations on the Visual Aspects – Mooivley East

Dimension	Rating	Motivation	Significance
Activity and Interaction (Plant and Equipment Operations)			
Impact Description: Dust from the crushing and screening plants will have a negative visual impact on the receiving environment. Operational area lighting at night will have a negative visual impact on the receiving environment. The operational area lighting will be visible at night and will draw attention to the Project area. This will also have a negative impact on the sense of place.			
Prior to Mitigation / Management			
Duration	Long Term (4)	The impact will occur for the duration of the operational phase. Mooivley East will be mined from Year 23 to Year 31 (9 years).	Moderate negative (-84)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 7 heritage sites within the practical viewshed area. Road users on the N11 national route, the R38 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors. Some areas of the Hendrina (mostly a low visual exposure) and Kwazamokuhle (mostly a very low visual exposure) towns are within the practical viewshed of Mooivley East and are likely to be visually impacted by the Mooivley East mining activities.	
Intensity	Very	Dust from the crushing and screening plant and	

Dimension	Rating	Motivation	Significance
	Serious (5)	operational area lighting are expected to cause a very serious visual disturbance.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Apply dust suppression techniques to limit the dust generated from the crushing and screening plant; and ▪ Down lighting must be implemented for operational activities taking place at night to minimise light pollution.			
Post-Mitigation			
Duration	Long Term (4)	The impact will occur for the duration of the operational phase. Mooivley East will be mined from Year 23 to Year 31 (9 years).	Minor negative (-70)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Serious (4)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		

12.3.2.5 Activity 11: Water Use and Storage

Water use and storage (including pollution control dams and Jo Jo tanks) will take place within the surface infrastructure area. The negative visual impact from the operation of surface infrastructure was assessed in Activity 10 above (Section 12.3.2.4) and water use and storage is not expected to result in any additional visual impacts.

12.3.2.6 Activity 12: Waste Generation and Storage

Waste generation and disposal (including sewage treatment plant and waste skips) will take place within the surface infrastructure area. The negative visual impact from the operation of surface infrastructure was assessed in Activity 10 above (Section 12.3.2.4) and waste generation and disposal is not expected to result in any additional visual impacts.

12.3.2.7 Activity 13: Power Generation

Power generation (using diesel generators) will take place within the surface infrastructure area. The negative visual impact from the operation of surface infrastructure was assessed

in Activity 10 above (Section 12.3.2.4) and power generation is not expected to result in any additional visual impacts.

12.3.3 Decommissioning and Closure Phase

The decommissioning and closure phase is characterised by removal of infrastructure and surface rehabilitation. This phase will have a negative visual impact on the receiving environment; however, once the rehabilitation is complete there will be an overall neutral visual impact on the receiving environment.

12.3.3.1 Activity 14: Removal of Infrastructure and Surface Rehabilitation

Removal of infrastructure and surface rehabilitation will have a negative visual impact on the receiving environment. The interactions and resultant impacts of removal of infrastructure and surface rehabilitation are indicated in Table 37.

Table 37: Interactions and Impacts of Removal of Infrastructure and Surface Rehabilitation on the Visual Aspects

Interaction	Impact
Removal of Infrastructure and Surface Rehabilitation	Removal of infrastructure will have a negative visual impact on the receiving environment. Dust from the demolition process will also have a negative visual impact. Once the infrastructure is removed and rehabilitation is complete, there will be an overall neutral visual impact on the receiving environment. Surface rehabilitation will have a negative visual impact on the receiving environment. Once the rehabilitation is complete, there will be an overall neutral visual impact on the receiving environment.

12.3.3.1.1 Impact Description

Removal of infrastructure and surface rehabilitation will have a minor negative visual impact on the receiving environment. Once the infrastructure is removed and rehabilitation is complete, there will be an overall neutral visual impact on the receiving environment and it will be returned to a state similar to the pre-development state.

12.3.3.1.2 Management Objective

The management objective is to increase the neutral visual impact caused by removal of infrastructure and surface rehabilitation.

12.3.3.1.3 Management Actions

The following management actions are required for removal of infrastructure and surface rehabilitation:

- Apply dust suppression techniques to limit the dust from the demolition area;
- Use shade cloth / netting to screen the demolition area;

- Ensure all infrastructure is demolished;
- Limit the quantity and time of rubble stored on site;
- Ensure that the shafts are backfilled with material from the overburden stockpiles and waste rock berms;
- Rehabilitate all disturbed areas;
- Ensure that the rehabilitated area is re-contoured and profiled to create a free-draining topography;
- Spread topsoil over the rehabilitated area;
- Ensure that surface water and drainage lines are rehabilitated;
- Re-vegetate the rehabilitated areas with grasses (*Cynodon dactylon, Digitaria erianth, Chloris gayan, Eragrostis chloromelas and Panicum maximum*); and
- Ensure all mitigation measures in the Closure and Rehabilitation reports are conducted.

12.3.3.1.4 Impact Ratings

The impact ratings and mitigation/ management measures for removal of infrastructure and surface rehabilitation are summarised in Table 38 and Table 39.

Table 38: Potential Impacts of Removal of Infrastructure and Surface Rehabilitation on the Visual Aspects – Mooivley West and Hendrina South

Dimension	Rating	Motivation	Significance
Activity and Interaction (Removal of Infrastructure and Surface Rehabilitation)			
Impact Description: Removal of infrastructure will have a negative visual impact on the receiving environment. Dust from the demolition process will also have a negative visual impact. Surface rehabilitation will have a negative visual impact on the receiving environment. Once the infrastructure is removed and rehabilitation is complete, there will be an overall neutral visual impact on the receiving environment.			
Prior to Mitigation / Management			
Duration	Medium Term (3)	The impact will occur during the decommissioning and closure phase which is expected to last for 2-5 years.	Minor negative (-56)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 21 heritage sites within the practical viewshed area. Road users on the N11 national route, the R542 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors.	

Dimension	Rating	Motivation	Significance
Intensity	Minor (2)	Removal of infrastructure and surface rehabilitation is expected to cause a minor visual disturbance.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Apply dust suppression techniques to limit the dust from the demolition area; ▪ Use shade cloth / netting to screen the demolition area; ▪ Ensure all infrastructure is demolished; ▪ Limit the quantity and time of rubble stored on site; ▪ Ensure that the shafts are backfilled with material from the overburden stockpiles and waste rock berms; ▪ Rehabilitate all disturbed areas; ▪ Ensure that the rehabilitated area is re-contoured and profiled to create a free-draining topography; ▪ Spread topsoil over the rehabilitated area; ▪ Ensure that surface water and drainage lines are rehabilitated; ▪ Re-vegetate the rehabilitated areas with grasses (*Cynodon dactylon, Digitaria erianth, Chloris gayan, Eragrostis chloromelas* and *Panicum maximum*); and ▪ Ensure all mitigation measures in the Closure and Rehabilitation reports are conducted.			
Post-Mitigation			
Duration	Medium Term (3)	The impact will occur during the decommissioning and closure phase which is expected to last for 2-5 years.	Minor negative (-36)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Minimal (1)	The visual disturbance will be reduced by implementing mitigation measures listed above.	
Probability	Almost Certain/ Highly Probable (6)	The impact will almost certainly occur.	
Nature	Negative		

Table 39: Potential Impacts of Removal of Infrastructure and Surface Rehabilitation on the Visual Aspects – Mooivley East

Dimension	Rating	Motivation	Significance
Activity and Interaction (Removal of Infrastructure and Surface Rehabilitation)			
Impact Description: Removal of infrastructure will have a negative visual impact on the receiving environment. Dust from the demolition process will also have a negative visual impact. Surface rehabilitation will have a negative visual impact on the receiving environment. Once the infrastructure is removed and rehabilitation is complete, there will be an overall neutral visual impact on the receiving environment.			
Prior to Mitigation / Management			
Duration	Medium Term (3)	The impact will occur during the decommissioning and closure phase which is expected to last for 2-5 years.	Minor negative (-63)
Extent	Local (3)	The practical viewshed model indicates that the Project will be visible from a distance of up to 5 km. There are 62 farm residences and 7 heritage sites within the practical viewshed area. Road users on the N11 national route, the R38 regional route, secondary roads and farm roads within the practical viewshed area are also potential visual receptors. Some areas of the Hendrina (mostly a low visual exposure) and Kwazamokuhle (mostly a very low visual exposure) towns are within the practical viewshed of Mooivley East and are likely to be visually impacted by the Mooivley East mining activities.	
Intensity	Moderate (3)	Removal of infrastructure and surface rehabilitation is expected to cause a moderate visual disturbance.	
Probability	Definite (7)	The impact will definitely occur.	
Nature	Negative		
Mitigation / Management Actions			
▪ Apply dust suppression techniques to limit the dust from the demolition area; ▪ Use shade cloth / netting to screen the demolition area; ▪ Ensure all infrastructure is demolished; ▪ Limit the quantity and time of rubble stored on site; ▪ Ensure that the shafts are backfilled with material from the overburden stockpiles and waste rock berms; ▪ Rehabilitate all disturbed areas; ▪ Ensure that the rehabilitated area is re-contoured and profiled to create a free-draining topography; ▪ Spread topsoil over the rehabilitated area; ▪ Ensure that surface water and drainage lines are rehabilitated; ▪ Re-vegetate the rehabilitated areas with grasses (*Cynodon dactylon, Digitaria erianth, Chloris*			

Dimension	Rating	Motivation	Significance
gayan, Eragrostis chloromelas and *Panicum maximum*); and ▪ Ensure all mitigation measures in the Closure and Rehabilitation reports are conducted.			
Post-Mitigation			
Duration	Medium Term (3)	The impact will occur during the decommissioning and closure phase which is expected to last for 2-5 years.	Minor negative (-42)
Extent	Limited (2)	The extent of the impact will be reduced by implementing the mitigation measures listed above.	
Intensity	Minor (2)	The visual disturbance will be reduced by implementing the mitigation measures listed above.	
Probability	Almost Certain / Highly Probable (6)	The impact will almost certainly occur.	
Nature	Negative		

12.3.3.2 Activity 15: Waste Generation and Disposal

Waste generation and disposal (including waste skips) will take place within the surface infrastructure area. The negative visual impact of the removal of surface infrastructure was assessed in Activity 14 above (Section 12.3.3.1) and waste generation and disposal is not expected to result in any additional visual impacts.

12.3.4 Post-Closure Phase

During the decommissioning and closure phase all surface infrastructure will be removed from the site. The shafts will be backfilled with material from the overburden stockpiles and waste rock berms. The topsoil stockpiles will be spread over the disturbed areas and these areas will be vegetated to complete the rehabilitation process. Once rehabilitation is complete the Project area will be returned to a state similar to the pre-development state with little evidence of mining remaining.

13 Cumulative Impacts

The Ermelo Coalfield is characterised by agriculture interspersed with coal mines and power stations and little of the natural Grassland vegetation remains. The receiving environment consists mainly of agricultural land interspersed with farm residences, farm workers houses and the Hendrina and Kwazamokuhle towns. Several mines occur in the vicinity of the Project area and the majority of these are underground mines. The nearest operational mines are Weltevreden Coal located 5.4 km west of the Project area and Spitzkop Colliery located 6.7 km south-east of the Project area. The nearest power station is the Hendrina power station located 21.4 km north-north-west of the Project area.

13.1 Sense of Place

The Project area and surrounds have an agricultural sense of place. Land uses in the region include agriculture and tourism with isolated areas of mining and power generation. The Project is expected to have a visual impact on the less industrial activities, i.e. agriculture and tourism. As more mining and power generation projects are developed in the region the sense of place will change from agricultural to industrial/ mining. This will result in a loss of scenic character and increased visual disturbance. Over time the receiving environment will change from one dominated by agriculture to one dominated by mining and industry.

14 Unplanned Events and Low Risks

The unplanned events and low risks are listed in Table 40 below.

Table 40: Unplanned Events, Low Risks and Their Management Measures

Unplanned Event	Potential Impact	Mitigation/ Management/ Monitoring
Surface subsidence	Potential negative visual impact	Ensure that sufficient pillars are left in place for high extraction underground mining areas to prevent surface subsidence.

15 Environmental Management Plan

The objective of an Environmental Management Plan (EMP) is to present mitigation (a) to manage undue or reasonably avoidable adverse impacts associated with the development of a project and (b) to enhance potential positives.

Mitigation measures will sometimes be built into the base of a project and should be considered as part of the "pre-mitigation" scenario; additional mitigation must be recommended if the impact assessment indicates it is necessary.

The EMP must consider each activity and its potential (significant) impacts during the construction, operational, decommissioning and post-closure phases.

15.1 Project Activities with Potentially Significant Impacts

The Project activities with potentially significant visual impacts on the receiving environment are listed in Table 41.

Table 41: Potentially Significant Project Impacts

Phase	Activity	Interaction	Potentially Significant Impacts
Construction	Activity 1: Site Clearance	Site clearance and vegetation removal	Site clearance and vegetation removal will have a negative visual impact on the receiving environment. The Project area will become noticeable to nearby receptors as it will contrast the surrounding areas.

Phase	Activity	Interaction	Potentially Significant Impacts
		Topsoil removal and stockpiling	Topsoil removal and stockpiling will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact.
	Activity 2: Basting and Excavation	Blasting and excavation	Dust from blasting and excavation for shaft development will have a negative visual impact on the receiving environment.
	Activity 3: Construction of Surface Infrastructure	Change of land use from agriculture to mining	Change of land use from agriculture to mining will have a negative visual impact on the receiving environment. This change of land use will change the sense of place of the Project area and surrounds from an agricultural sense of place to an industrial/ mining sense of place resulting in a loss of scenic character and increased visual disturbance.
		Construction of surface infrastructure	The construction of surface infrastructure will have a negative visual impact on the receiving environment. The surface infrastructure will change the sense of place of the Project area from a rural sense of place to an industrial/ mining sense of place. Construction area lighting at night will have a negative visual impact on the receiving environment. The construction area lighting will be visible from afar and will draw attention to the Project area. This will also have a negative impact on the sense of place.
Operational	Activity 8: Stockpiling	Stockpiling	Stockpiling of material on the overburden stockpiles, waste rock berms and product stockpiles will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact. The impact of the overburden stockpiles and waste rock berms will occur for the life of the Project. This impact will be reversed when the material is used to backfill the shafts during the closure phase.

Phase	Activity	Interaction	Potentially Significant Impacts
	Activity 9: Hauling / Conveying of Coal	Hauling of coal	Vehicular activity to haul coal will have a negative visual impact on the receiving environment. Dust from vehicular activity will also have a negative visual impact.
	Activity 10: Plant and Equipment Operations	Plant and equipment operations	Dust from the crushing and screening plants will have a negative visual impact on the receiving environment. Operational area lighting at night will have a negative visual impact on the receiving environment. The operational area lighting will be visible at night and will draw attention to the Project area. This will also have a negative impact on the sense of place.
Decommissioning and Closure	Activity 14: Removal of Infrastructure and Surface Rehabilitation	Removal of Infrastructure and Surface Rehabilitation	Removal of infrastructure will have a negative visual impact on the receiving environment. Dust from the demolition process will also have a negative visual impact. Surface rehabilitation will have a negative visual impact on the receiving environment. Once the infrastructure is removed and rehabilitation is complete, there will be an overall neutral visual impact on the receiving environment.

15.2 Summary of Mitigation and Management

Table 42 provides a description of the mitigation and management options for the environmental impacts anticipated during the construction, operational and decommissioning and closure phases. The table provides a summary of the proposed Project activities, environmental aspects and visual impacts on the receiving environment. Information on the frequency of mitigation, relevant legal requirements, recommended management plans, timing of implementation, and roles/ responsibilities of persons implementing the EMP are also included.

Table 42: Mitigation and Management Plan

Phase	Activity	Potential Impacts	Size and Scale of Disturbance	Aspects Affected	Mitigation Measures	Standard to be Achieved	Time Period for implementation	Responsible Person
Construction	Activity 1: Site Clearance	Site clearance and vegetation removal will have a negative visual impact on the receiving environment. The Project area will become noticeable to nearby receptors as it will contrast the surrounding areas.	Local	Visual	▪ Vegetation should only be removed when and where necessary.	To minimise the negative visual impact caused by site clearance.	Construction Phase	Mining Contractor
		Topsoil removal and stockpiling will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact.	Local		▪ Topsoil should only be removed when and where necessary; ▪ Topsoil stockpiles should be vegetated with grasses (*Cynodon dactylon, Digitaria erianth, Chloris gayan, Eragrostis chloromelas* and *Panicum maximum*) where possible so as to blend into the surrounding landscape and reduce dust generation; ▪ Limit footprint area of topsoil stockpiles where possible; ▪ Limit the height of topsoil stockpiles to 3 m (Table 5); ▪ Apply dust suppression techniques to limit the dust generated from stockpiles.	To minimise the negative visual impact caused by topsoil removal and stockpiling.	Construction Phase	
	Activity 2: Blasting and Excavation	Dust from blasting and excavation for shaft development will have a negative visual impact on the receiving environment.	Local		▪ Apply dust suppression techniques to limit the dust generated from blasting.	To minimise the negative visual impact caused by blasting and excavation.	Construction Phase	Mining Contractor
	Activity 3: Construction of Surface Infrastructure	Change of land use from agriculture to mining will have a negative visual impact on the receiving environment. This change	Local		▪ Apply dust suppression techniques to limit the dust from the demolition area; ▪ Use shade cloth / netting to screen the demolition area;	To minimise the negative visual impact caused by the change of land use from agriculture to mining.	Decommissioning and Closure Phase	Environmental Officer

Phase	Activity	Potential Impacts	Size and Scale of Disturbance	Aspects Affected	Mitigation Measures	Standard to be Achieved	Time Period for implementation	Responsible Person
		of land use will change the sense of place of the Project area and surrounds from an agricultural sense of place to an industrial / mining sense of place resulting in a loss of scenic character and increased visual disturbance.			▪ Ensure all infrastructure is demolished; ▪ Limit the quantity and time of rubble stored on site; ▪ Ensure that the shafts are backfilled with material from the overburden stockpiles and waste rock berms; ▪ Rehabilitate all disturbed areas; ▪ Ensure that the rehabilitated area is re-contoured and profiled to create a free-draining topography; ▪ Spread topsoil over the rehabilitated area; ▪ Ensure that surface water and drainage lines are rehabilitated; ▪ Re-vegetate the rehabilitated areas with grasses (*Cynodon dactylon, Digitaria erianth, Chloris gayan, Eragrostis chloromelas* and *Panicum maximum*); and ▪ Ensure all the mitigation measures outlined in the Closure and Rehabilitation reports are conducted.			
		The construction of surface infrastructure will have a negative visual impact on the receiving environment. The surface infrastructure will change the sense of place of the Project area from a rural sense of place to an industrial / mining sense of place. Construction area lighting	Local		▪ Ensure screening vegetation is left intact around the Project area and near receptors; ▪ Ensure the surface infrastructure does not exceed the proposed heights in Table 5 above; ▪ Surface infrastructure should be painted natural hues so as to blend into the surrounding landscape	To minimise the negative visual impact caused by construction of surface infrastructure.	Construction Phase	Mining Contractor

Phase	Activity	Potential Impacts	Size and Scale of Disturbance	Aspects Affected	Mitigation Measures	Standard to be Achieved	Time Period for implementation	Responsible Person
		at night will have a negative visual impact on the receiving environment. The construction area lighting will be visible from afar and will draw attention to the Project area. This will also have a negative impact on the sense of place.			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; and ▪ Down lighting must be implemented for construction activities taking place at night to minimise light pollution.			
Operational	Activity 8: Stockpiling	Stockpiling of material on the overburden stockpiles, waste rock berms and product stockpiles will have a negative visual impact on the receiving environment. Dust from the stockpiles will also have a negative visual impact. The impact of the overburden stockpiles and waste rock berms will occur for the life of the Project. This impact will be reversed when the material is used to backfill the shafts during the closure phase.	Local		▪ Ensure the overburden stockpiles do not exceed the proposed height of 18 m (Table 5); ▪ Ensure the product stockpiles do not exceed the proposed height of 10 m (Table 5); ▪ Ensure the waste rock berms do not exceed the proposed height of 1.5 m (Table 5); ▪ Limit the quantity and time of ROM stored on site; and ▪ Apply dust suppression techniques to limit the dust generated from stockpiles.	To minimise the negative visual impact caused by stockpiling of material on the overburden stockpiles, waste rock berms and product stockpile.	Operational Phase	Mining Contractor
	Activity 9: Hauling / Conveying of Coal	Vehicular activity to haul coal will have a negative visual impact on the receiving environment. Dust from vehicular activity will also have a negative visual impact.	Limited		▪ Limit the speed of vehicles on the haul roads to reduce dust; and ▪ Haul roads should be wetted frequently by means of a water bowser to suppress dust.	To minimise the negative visual impacts caused by hauling of coal.	Operational Phase	Mining Contractor
	Activity 10: Plant and Equipment	Dust from the crushing and screening plants will	Local		▪ Apply dust suppression techniques to limit the dust	To minimise the negative visual impact	Operational Phase	Mining Contractor

Phase	Activity	Potential Impacts	Size and Scale of Disturbance	Aspects Affected	Mitigation Measures	Standard to be Achieved	Time Period for implementation	Responsible Person
	Operations	have a negative visual impact on the receiving environment. Operational area lighting at night will have a negative visual impact on the receiving environment. The operational area lighting will be visible at night and will draw attention to the Project area. This will also have a negative impact on the sense of place.			generated from the crushing and screening plant; and ▪ Down lighting must be implemented for operational activities taking place at night to minimise light pollution.	caused by plant and equipment operation.		
Decommissioning and Closure	Activity 14: Removal of Infrastructure and Surface Rehabilitation	Removal of infrastructure will have a negative visual impact on the receiving environment. Dust from the demolition process will also have a negative visual impact. Surface rehabilitation will have a negative visual impact on the receiving environment. Once the infrastructure is removed and rehabilitation is complete, there will be an overall neutral visual impact on the receiving environment.	Local		▪ Apply dust suppression techniques to limit the dust from the demolition area; ▪ Use shade cloth / netting to screen the demolition area; ▪ Ensure all infrastructure is demolished; ▪ Limit the quantity and time of rubble stored on site; ▪ Ensure that the shafts are backfilled with material from the overburden stockpiles and waste rock berms; ▪ Rehabilitate all disturbed areas; ▪ Ensure that the rehabilitated area is re-contoured and profiled to create a free-draining topography; ▪ Spread topsoil over the rehabilitated area; ▪ Ensure that surface water and drainage lines are rehabilitated; ▪ Re-vegetate the rehabilitated areas with grasses (*Cynodon dactylon, Digitaria erianth,*	To increase the neutral visual impact caused by removal of infrastructure and surface rehabilitation.	Decommissioning and Closure Phase	Environmental Officer

Phase	Activity	Potential Impacts	Size and Scale of Disturbance	Aspects Affected	Mitigation Measures	Standard to be Achieved	Time Period for implementation	Responsible Person
					Chloris gayan, Eragrostis chloromelas and *Panicum maximum*); and ▪ Ensure all mitigation measures in the Closure and Rehabilitation reports are conducted.			

15.3 Monitoring Plan

Umcebo will be responsible for the implementation of all monitoring actions. The recommended monitoring actions for the identified impacts are detailed below. Umcebo will also be responsible for keeping a record of all environmental monitoring undertaken for the Project.

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

- Dust monitoring and management as per the Air Quality Monitoring Plan (reducing the dust on site will reduce the visual impact of dust);
- The existing rows of trees planted near some farm residences as windbreaks/ vegetation screens need to be maintained and protected against fire and utilisation of the vegetation for fire wood, etc.; and
- Grievances from visual receptors must be monitored and addressed through a Grievance Mechanism.

15.4 General Mitigation

According to Brush et al (1979), vegetation screening is the best mitigation measure to conceal a development. Figure 20 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. This includes the existing rows of trees planted near some farm residences as windbreaks/ vegetation screens. Figure 21 illustrates the effect of cleared vegetation allowing direct views of the proposed infrastructure.

The natural vegetation of the Project area and surrounds is Grassland and does not contain tree species. The existing rows of trees planted near some farm residences as windbreaks / vegetation screens are alien invasive species. It is therefore not possible to recommend tree species for vegetation screens as there are no indigenous trees in the Grassland vegetation.

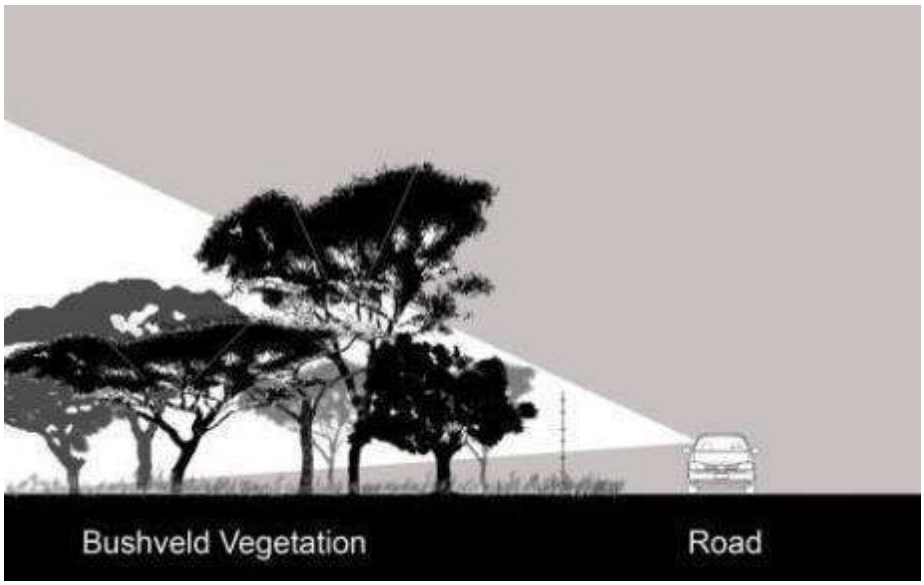


Figure 20: Screening Effect of Vegetation

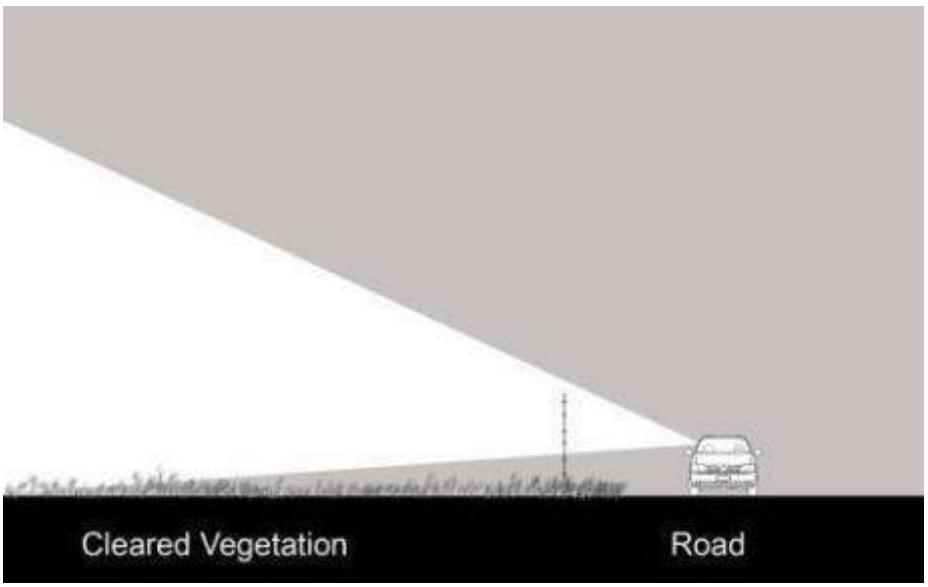


Figure 21: Effect of Cleared Vegetation

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;
- Infrastructure areas (access roads, haul roads, topsoil stockpiles, product stockpiles and coal handling area) 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;
- Down lighting must be implemented to minimise light pollution at night; and

- An appropriate grievance mechanism should be developed to respond to grievances from receptors.

16 Consultation Undertaken

Table 43 provides a list of the landowners consulted for the VIA and a summary of the fieldwork conducted during the site visit.

Table 43: Landowners Consulted

Farm	Portion	Landowner	Access	Fieldwork
Vaalbank 177 IS	Portion 8	Lloyd John James	Access granted	Photographs taken for the VIA
Groblershoek 191 IS	Remaining Extent	W. A. de Klerk	Access granted	Photographs taken for the VIA
Grasfontein 199 IS	Portion 3	Lloyd John James	Access granted	Photographs taken for the VIA
Mooivley 219 IS	Remaining Extent	Anvin Trust/ Vincent Schulze	Access granted	Photographs taken for the VIA
Mooivley 219 IS	Portion 6	Pieter Oosthuysen	Access granted	Photographs taken for the VIA

16.1 Comments and Responses

During the Scoping Phase no comments related to the visual aspects were received. This is a draft VIA report and once this report has been made available for public review during the EIA Phase, the comments and responses section will be populated with any comments received.

17 Recommendations

It is recommended that the mitigation measures in Section 15 above are implemented to reduce the impact that the Project will have on the visual character of the receiving environment.

The Project will have a high visual impact on the receiving environment and will be visible from a distance of up to 5 km. This visual impact will occur for the life of the Project but can be reversed when the Project is complete.

During the decommissioning and closure phase all surface infrastructure will be removed from the site. The shafts will be backfilled with material from the overburden stockpiles and waste rock berms. The topsoil stockpiles will be spread over the disturbed areas and these areas will be vegetated to complete the rehabilitation process. Once rehabilitation is complete the Project area will be returned to a state similar to the pre-development state with little evidence of mining remaining.

Based on the findings of this VIA only (not taking into account the findings of any other studies), it is recommended that the Project can proceed together with the implementation of all mitigation measures stipulated.

18 Conclusion

Umcebo Mining is proposing the development and operation of a new underground coal mine and associated infrastructure at a site situated approximately 3.3 km) south-east of Hendrina in the Mpumalanga Province of South Africa (the Project).

The Project area comprises three underground reserve blocks namely Mooivley East, Mooivley West and Hendrina South. The two Mooivley reserves comprise two incline shafts each which will be developed to gain access to the two underground areas whilst the Hendrina South reserve comprises two incline shafts to gain access to one underground area. According to the Life of Mine (LOM) plan Mooivley West and Hendrina South will be mined from Year 1 to Year 36 (36 years) while Mooivley East will be mined from Year 23 to Year 31 (9 years) of the Project.

Theoretical and practical viewshed models were created for both the Mooivley West and Hendrina South, and the Mooivley East mining activities. These viewshed models are based on the topography only and do not take the screening effect of vegetation into account. The viewshed models show the areas from which the Project may potentially be visible.

The theoretical viewshed models were refined to practical viewshed models with a buffer of 5 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 noticeable beyond this 5 km buffer. The practical viewshed model for Mooivley West and Hendrina South covers an area of 79.37 km² while the practical viewshed model for Mooivley East covers an area of 64.48 km².

The potential visual receptors identified within the practical viewshed of Mooivley West and Hendrina South include 62 farm residences (including farm workers houses), 21 heritage sites (including archaeological sites, burial grounds and graves, and historical buildings) and road users on the N11 national route, the R542 regional road, secondary roads and farm roads within the practical viewshed area. There are no urban areas within the practical viewshed of Mooivley West and Hendrina South. The entire practical viewshed of Mooivley West and Hendrina South is within the Amersfoort-Bethal-Carolina IBA. No other protected areas are within this practical viewshed.

The potential visual receptors identified within the practical viewshed of Mooivley East include residents of the Hendrina and Kwazamokuhle towns, 62 farm residences (including farm workers houses), seven heritage sites (including burial grounds and graves, and historical buildings) and roads users on the N11 national route, the R38 regional road, secondary roads and farm roads within the practical viewshed area. Approximately 90% of the practical viewshed of Mooivley West and Hendrina South is within the Amersfoort-Bethal-Carolina IBA. No other protected areas are within the practical viewshed.

The “guideline for involving visual and aesthetic specialists in EIA processes” document by Oberholzer (2005) identifies quarrying and mining activities as a Category 5 development. The receiving environment of the project is classified as an area of medium scenic, cultural or historical significance and a Category 5 development in this area is expected to have a high visual impact. The findings of this VIA concur with this categorisation.

19 References

Brush, R.O., Williamson, D. and Fabos, J., 1979: Visual Screening Potential of Forest Vegetation, USDA Forest Service, Mass. U.S.A.

Cartographica, 2010: GIS Data Classifications in Cartographica. Available online: http://blog.cartographica.com/blog/2010/8/16/gis-data-classifications-in-cartographica.html (Accessed: 2016/03/30).

Contesse, E., 2011: Landscape and Wind Turbines. Report presented at the 6th Council of Europe Conference of the European Landscape Convention. Available online: http://www.coe.int/t/dg4/cultureheritage/heritage/landscape/reunionconf/6econference/CEP-CDPATEP%282011%2911_en.pdf (Accessed: 2014/11/24).

Department of Environmental Affairs, 2015: South African Protected Areas Database (SAPAD) September 2015.

ESRI, 2016: Data Classification Methods. Available online: http://pro.arcgis.com/en/pro-app/help/mapping/symbols-and-styles/data-classification-methods.htm (Accessed: 2016/03/30).

European Landscape Convention, 2007: A Framework for Implementation. Available online: http://www.coe.int/t/dg4/cultureheritage/heritage/landscape/compendium/ELCFramework09.pdf (Accessed: 2014/11/24).

International Finance Corporation (IFC), 2012: IFC Performance Standards on Environmental and Social Sustainability. Available online: http://www.ifc.org/wps/wcm/connect/c8f524004a73daeca09afdf998895a12/IFC_Performance_Standards.pdf?MOD=AJPERES (Accessed: 2014/11/24).

Mucina, L. and Rutherford, M.C., 2012: *The Vegetation of South Africa, Lesotho and Swaziland*. Pretoria: Strelitzia 19, South African National Biodiversity Institute (SANBI).

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

Appendix A: Specialist CV

Mrs. Stephanie Mulder

Unit Manager: GIS

GIS, Remote Sensing & Noise

Digby Wells Environmental

1 Education

Year	Qualification
2006	BSc (Hons) Geography (cum laude) at University of Johannesburg Major subjects: Philosophy and Research Methodology; Strategic Environmental Planning; Geographic Information Systems (GIS); Urban Geography and Geomorphology
2003 to 2005	BSc Geography and Informatics with Financial Orientation at University of Johannesburg Major subjects: Geography and Informatics Ancillary subjects: Mathematics; Analytical Techniques; Financial Management; Accounting and Business Management

2 Training

Year	Course
2012	Diplôme D'Études en Langue Française – DELF A1 (La Commission Nationale du DELF et du DALF)
2011	ArcPad for ArcGIS (ESRI)
2011	Mining for Non-Miners (Snowden)
2009	Emerging Management Development Programme (EMDP) (University of Pretoria in association with the Public Administration Leadership and Management academy (PALAMA) and the School of Public Management and Administration)
2008	Building Geodatabases (ESRI)
2008	Geodatabase Design Concepts (ESRI)
2007	Introduction to ArcGIS I (ESRI)

3 Language Skills

Language	Level
English	Excellent
Afrikaans	Good
French	Intermediate

4 Employment

Date	Company	Position
1 July 2012 to Present	Digby Wells Environmental	Unit Manager: GIS
1 September 2009 to 30 June 2012	Digby Wells Environmental	Environmental GIS Specialist
1 January 2008 to 31 August 2009	Statistics South Africa, Geography Division	GIS Specialist – Geo-Database and Application Development
1 January 2007 to 31 December 2007	Statistics South Africa, Geography Division	Intern Professional
February 2006 to October 2006	Department of Geography, Environmental Management and Energy Studies, University of Johannesburg	Demonstrator for the First Year Geography Practical Lectures

5 Experience

I have experience in using Geographic Information Systems (GIS) as a digital cartographic and spatial analytical tool. As a GIS Specialist at Statistics South Africa I was responsible for maintaining the geodatabase and I gained experience working with vector data, aerial photography and satellite imagery. I was responsible for the data preparation and mapping for the Community Survey 2007 Digital Atlas CD. I assisted with map production for surveys and user requests for spatial data. I also worked on the Dwelling Frame Project, Placename and Enumerator Area Demarcation.

My responsibilities at Digby Wells currently include but are not limited to:

- Management of the GIS unit;

- Generation of maps for projects;
- Conducting Topography and Visual Impact Assessments (T&VIAs);
- Review of GIS maps and T&VIA Reports;
- Assisting with the maintenance of the GIS databases by storing all electronic files in a well organised structure;
- Expanding and improving the GIS databases by identifying gaps and sources of additional mapping data;
- The production of spatial information in map format;
- Application of GPS technology, aerial photo and satellite images.
- Assessing digital databases to ensure a high level of accuracy of data available at all times; and
- Spatial analyses relating to environmental projects.

6 Project Experience

My project experience at Digby Wells includes but is not limited to:

Year	Client	Project	Responsibility	Location
2016	Ergo	Grootvlei TSF Cluster EIA	Topography and Visual Baseline Report Supervise mapping	Gauteng, South Africa
2016	Glencore	Hendrina Reserve Mine EIA	Topography and Visual Baseline Report Supervise mapping	Mpumalanga, South Africa
2016	Ivanplats	Addendum to Platreef EIA	Visual Impact Assessment Mapping	Limpopo, South Africa
2016	Namane Generation	Namane Generation IPP and Transmission Line Project	Topography and Visual Impact Assessment Supervise mapping	Limpopo, South Africa
2016	Sasol Mining	Brandspruit Interactive Map and Document Management System	Project Manager	Mpumalanga, South Africa

Year	Client	Project	Responsibility	Location
2016	Sasol Mining	Middelbult Interactive Map and Document Management System	Project Manager	Mpumalanga, South Africa
2016	Sasol Mining	Mooikraal Interactive Map and Document Management System	Project Manager	Mpumalanga, South Africa
2015	Anker Coal	Elandsfontein and Golfview Baseline Studies	Mapping	Mpumalanga, South Africa
2015	Anker Coal	Elandsfontein and Golfview Closure Cost Assessments	3D modelling and closure calculations Mapping	Mpumalanga, South Africa
2015	Anker Coal	Elandsfontein and Golfview IWULAs	Mapping	Mpumalanga, South Africa
2015	Anker Coal	Golfview Rehabilitation Plan	3D modelling and volume calculations Mapping	Mpumalanga, South Africa
2015	BECSA (South 32)	KPSX: Weltevreden EIA	Topography and Visual Impact Assessment Supervise mapping	Mpumalanga, South Africa
2015	CDC Group	Fauna and Flora, and Social Studies	Data compilation Mapping	DRC
2015	Fountain Capital	Oakleaf Open Pit Coal Mine EIA	Assist with Topography and Visual Impact Assessment Supervise mapping	Gauteng, South Africa
2015	Gold One	Sibanye WRTRP EIA	Topography and Visual Impact Assessment Supervise mapping	Gauteng, South Africa

Year	Client	Project	Responsibility	Location
2015	Harmony Gold	Closure Cost Assessment 2015	3D modelling and closure calculations Supervise mapping	Free State, Gauteng and North West, South Africa
2015	Lanxess Mining	Lanxess Chrome Mine Section 102 EMP Amendment	Topography and Visual Impact Assessment Mapping	North West, South Africa
2015	Pamish Investments	Magnetite EIA	Topography and Visual Impact Assessment Mapping	Limpopo, South Africa
2015	Sasol Mining	Sigma Interactive Map and Document Management System	Project Manager	Mpumalanga, South Africa
2015	Sasol Mining	Twistdraai Interactive Map and Document Management System	Project Manager	Mpumalanga, South Africa
2014	AECOM	EIA for Management of AMD from the Eastern Basin	Assist with Topography and Visual Impact Assessment Supervise mapping	Gauteng, South Africa
2014	BECSA (South 32)	KPSX: South EIA	Topography and Visual Impact Assessment Supervise mapping	Mpumalanga, South Africa
2014	Ergo	Pipeline GIS Audit	Project Manager	Gauteng, South Africa
2014	Exxaro	Tshikondeni Closure Plan	Mapping	Limpopo, South Africa
2014	Genesis Analytics	Evaluation of Environmental Governance	Interviews, Research and Report Compilation	South Africa
2014	Glencore Xstrata	Tavistock EMP	Mapping	Mpumalanga, South Africa

Year	Client	Project	Responsibility	Location
2014	Harmony Gold	Closure Cost Assessment 2014	3D modelling and closure calculations Supervise mapping	Free State, Gauteng and North West, South Africa
2013	Amara Sega	Cluff Sega RAP	Data compilation Mapping	Burkina Faso
2013	Anglo American Thermal Coal	Dalyshope Coal Mine EIA	Topography and Visual Impact Assessment Mapping	Limpopo, South Africa
2013	Aureus Mining Inc	New Liberty Gold Mine RAP	Questionnaire design Data compilation and analysis Mapping	Liberia
2013	Glencore Xstrata	GIS Phase 2 Project	Project Manager	Mpumalanga, South Africa
2013	Glencore Xstrata	Closure Cost Assessment 2013	3D modelling and closure calculations Supervise mapping	Mpumalanga, South Africa
2013	Harmony Gold	Closure Cost Assessment 2013	3D modelling and closure calculations Supervise mapping	Free State, Gauteng and North West, South Africa
2013	Platreef Resources	Platreef EIA	Topography and Visual Impact Assessment Mapping	Limpopo, South Africa
2013	Rhodium Reefs	Rhodium Reefs EIA	Topography and Visual Impact Assessment	Limpopo, South Africa
2013	Vedanta	Vedanta IPP EIA	Topography and Visual Scoping Study Mapping	Limpopo, South Africa
2012	Bokoni Platinum Mine	Bokoni Water Balance	Mapping	Limpopo, South Africa

Year	Client	Project	Responsibility	Location
2012	Platreef Resources	Platreef Agricultural Survey	Project Manager Data compilation Mapping	Limpopo, South Africa
2012	Platreef Resources	Platreef Skills and Business Survey	Project Manager Digital survey methodology Data compilation and analysis	Limpopo, South Africa
2012	Xstrata Coal	Closure Cost Assessment 2012	3D modelling and closure calculations Supervise mapping	Mpumalanga, South Africa
2012	Xstrata Coal	Consolidated EIA EMP for Tavistock	Mapping	Mpumalanga, South Africa
2011	DRD Gold	Crown Knights Reclamation of Sand Dump 4/A/6 (Lycaste)	Topography and Visual Impact Assessment Mapping	Gauteng, South Africa
2011	DRD Gold	Crown Pipeline Audit	Mapping	Gauteng South Africa
2011	DRD Gold	Crown Consolidated EMP	Mapping	Gauteng, South Africa
2011	Koidu	Koidu RAP	Questionnaire design Data compilation and analysis	Sierra Leone
2011	Rand Gold	Gounkoto RAP	Fieldwork Mapping	Mali
2011	ResGen	Boikarabelo Railway EIA	Topography and Visual Impact Assessments	Limpopo, South Africa
2011	ResGen	Boikarabelo Power Station EIA	Topography Impact Assessment Mapping	Limpopo, South Africa

Year	Client	Project	Responsibility	Location
2011	Temo Coal	Temo Coal Mine EIA	Topography and Visual Impact Assessments	Limpopo, South Africa
2011	Universal Coal	Brakfontein Social and Environmental Screening Study	Mapping	Mpumalanga, South Africa
2011	Universal Coal	Roodekop EIA	Mapping	Mpumalanga, South Africa
2011	Xstrata Coal	Closure Cost Assessment 2011	3D modelling and closure calculations Mapping	Mpumalanga, South Africa
2011	Xstrata Alloys	Lesedi Power Station EIA	Topography Impact Assessment Mapping	Mpumalanga, South Africa
2010	DRD Gold	Crown Pipeline EIA	Mapping	Gauteng, South Africa
2010	DRD Gold	Crown City Deep Reclamation of Slimes Dam 4/L/2	Mapping	Gauteng, South Africa
2010	DRD Gold	Crown City Deep Reclamation of Slimes Dams 3/L/40 & 3/L/42	Mapping	Gauteng, South Africa
2010	Galaxy Gold	Galaxy Gold Mine EIA	Topography and Visual Impact Assessments Mapping	Mpumalanga, South Africa
2010	HCI Coal	Nokuhle Colliery EIA	Topography Impact Assessment Mapping	Mpumalanga, South Africa
2010	HCI Coal	Palesa Extension EIA	Topography and Visual Impact Assessments Mapping	Mpumalanga, South Africa

Year	Client	Project	Responsibility	Location
2010	Mmamabula	Mookane Domestic Power Project	Mapping	Botswana
2010	ResGen	Boikarabelo Coal Mine EIA	Mapping	Limpopo South Africa
2010	Xstrata Coal	Closure Cost Assessment 2010	3D modelling and closure calculations Mapping	Mpumalanga, South Africa
2010	Xstrata Coal	Zonnebloem Colliery EIA	Mapping	Mpumalanga, South Africa
2009	BHP Billiton	Naudesbank & Vaalbank Baseline Studies	Mapping	Mpumalanga, South Africa
2009	MSA	Nkwe Social Survey	Mapping	Limpopo, South Africa
2009	Sasol Mining	Syferfontein Colliery EIA	Mapping	Mpumalanga, South Africa
2009	Universal Coal	Kangala Coal Mine EIA	Mapping	Mpumalanga, South Africa
2009	Xstrata Coal	Community Baseline Survey	Data analysis Mapping	Mpumalanga, South Africa
2009	Xstrata Coal	Tavistock EMPR	Mapping	Mpumalanga, South Africa

7 Professional Affiliations

Geographic Information Society of South Africa (GISSA)

Appendix B: Plans

Plan 1: Regional Setting

Plan 2: Local Setting

Plan 3: Topographical Model

Plan 4: Slope Model

Plan 5: Aspect Model

Plan 6: Proposed Infrastructure

Plan 7: Theoretical Viewshed Model – Mooivley West and Hendrina South

Plan 8: Practical Viewshed Model – Mooivley West and Hendrina South

Plan 9: Theoretical Viewshed Model – Mooivley East

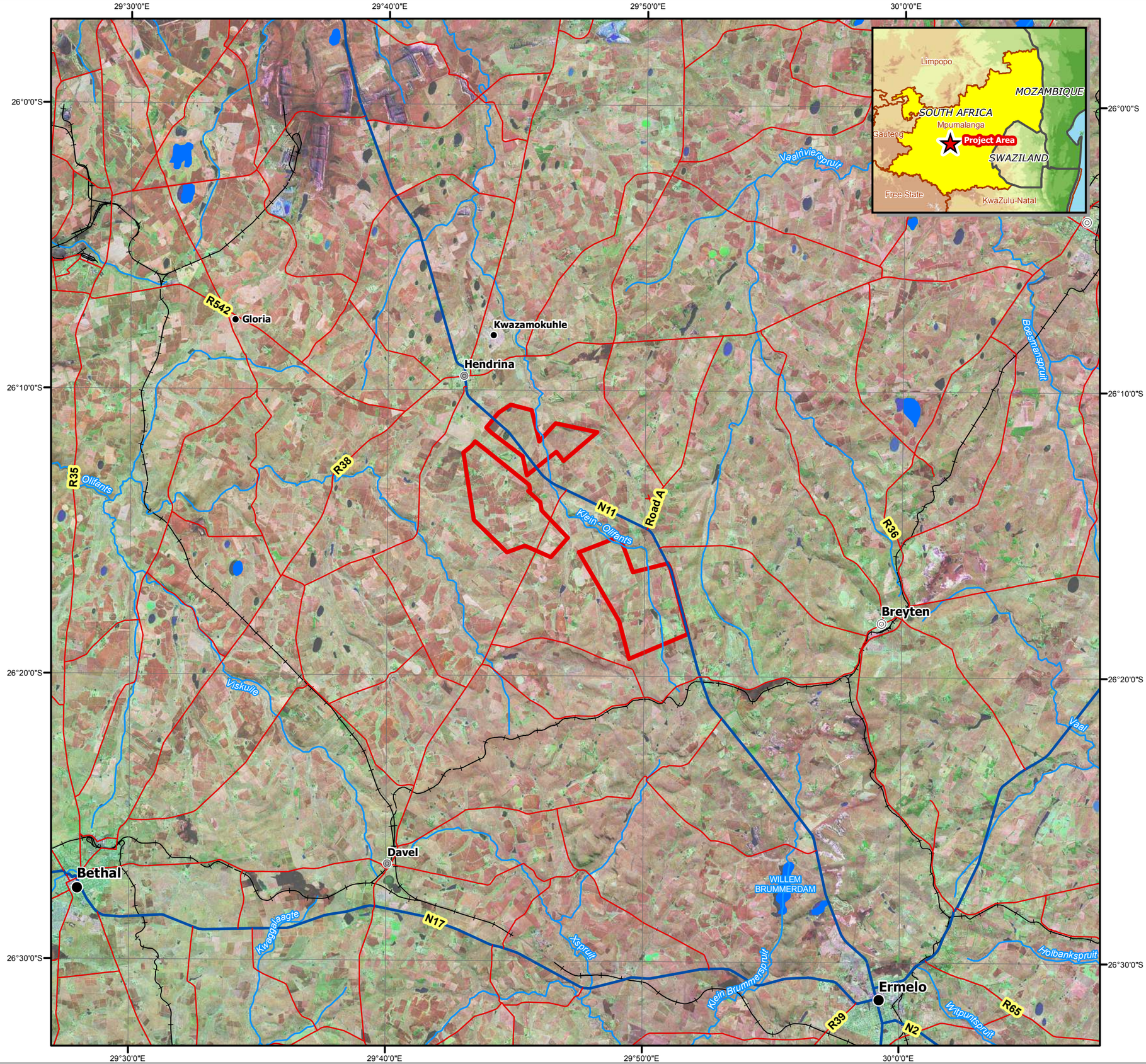
Plan 10: Practical Viewshed Model – Mooivley East

Plan 11: Viewpoints for Photomontages

Plan 1

Umcebo Mining Hendrina Underground Coal Mine EIA

Regional Setting



Legend

- Project Area
- Major Town
- Secondary Town
- Other Town
- Settlement
- National Road
- Main Road
- Railway Line
- River
- Dam

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator	Ref #: kam.XST3791.201607.063
Datum: WGS 1984	Revision Number: 1
Central Meridian: 29°E	Date: 14/07/2016

N

0 2 4 8 12

Kilometres

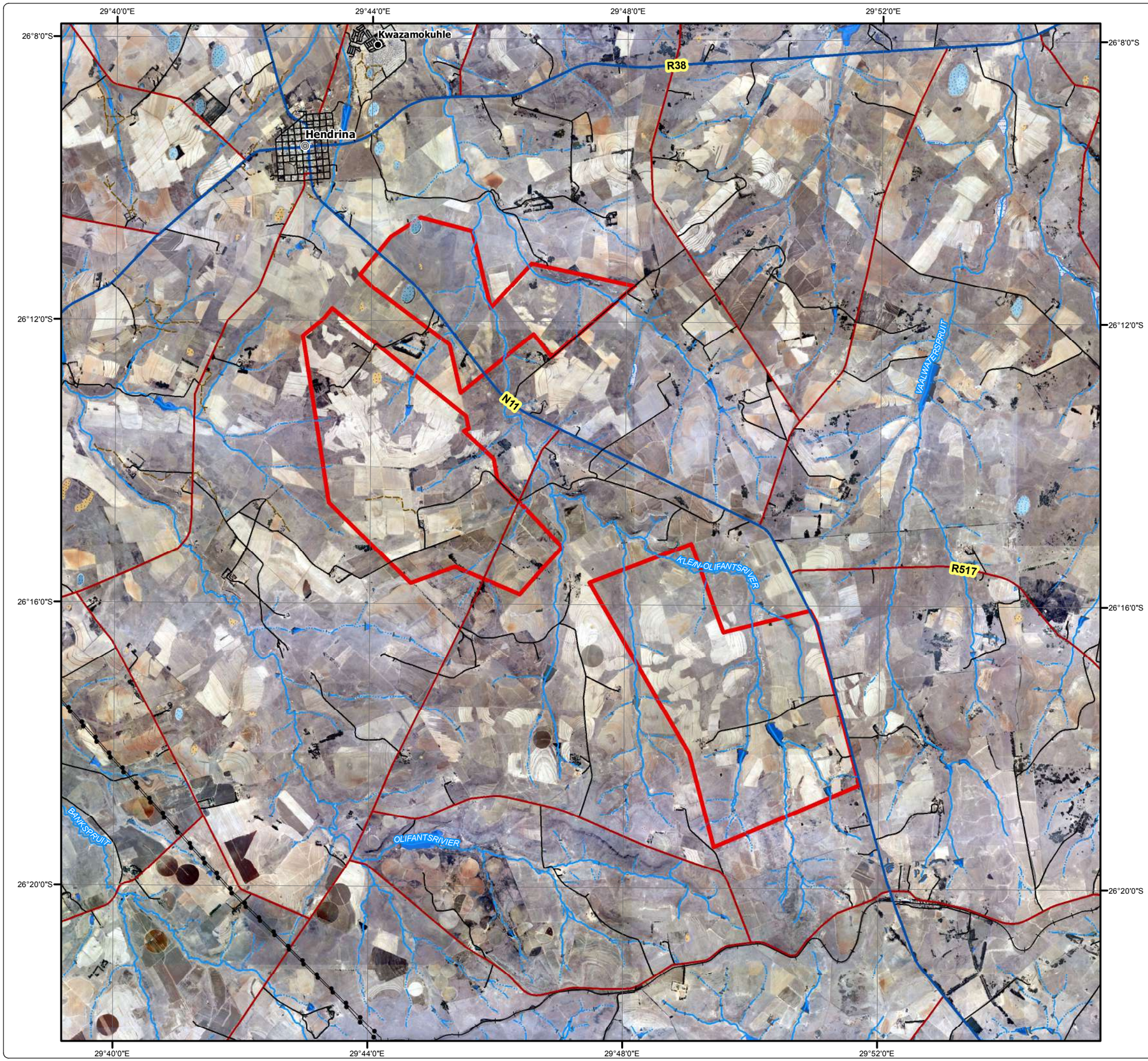
1:250,000

www.digbywells.com

Plan 2

Umcebo Mining Hendrina Underground Coal Mine EIA

Local Setting



Legend

- Project Area
- Other Town
- Settlement
- Power Line
- Arterial/National Route
- Main Road
- Minor Road
- Track
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam/Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator	Ref #: kam.XST3791.201607.064
Datum: WGS 1984	Revision Number: 1
Central Meridian: 29°E	Date: 14/07/2016

N

0 1 2 4

Kilometres

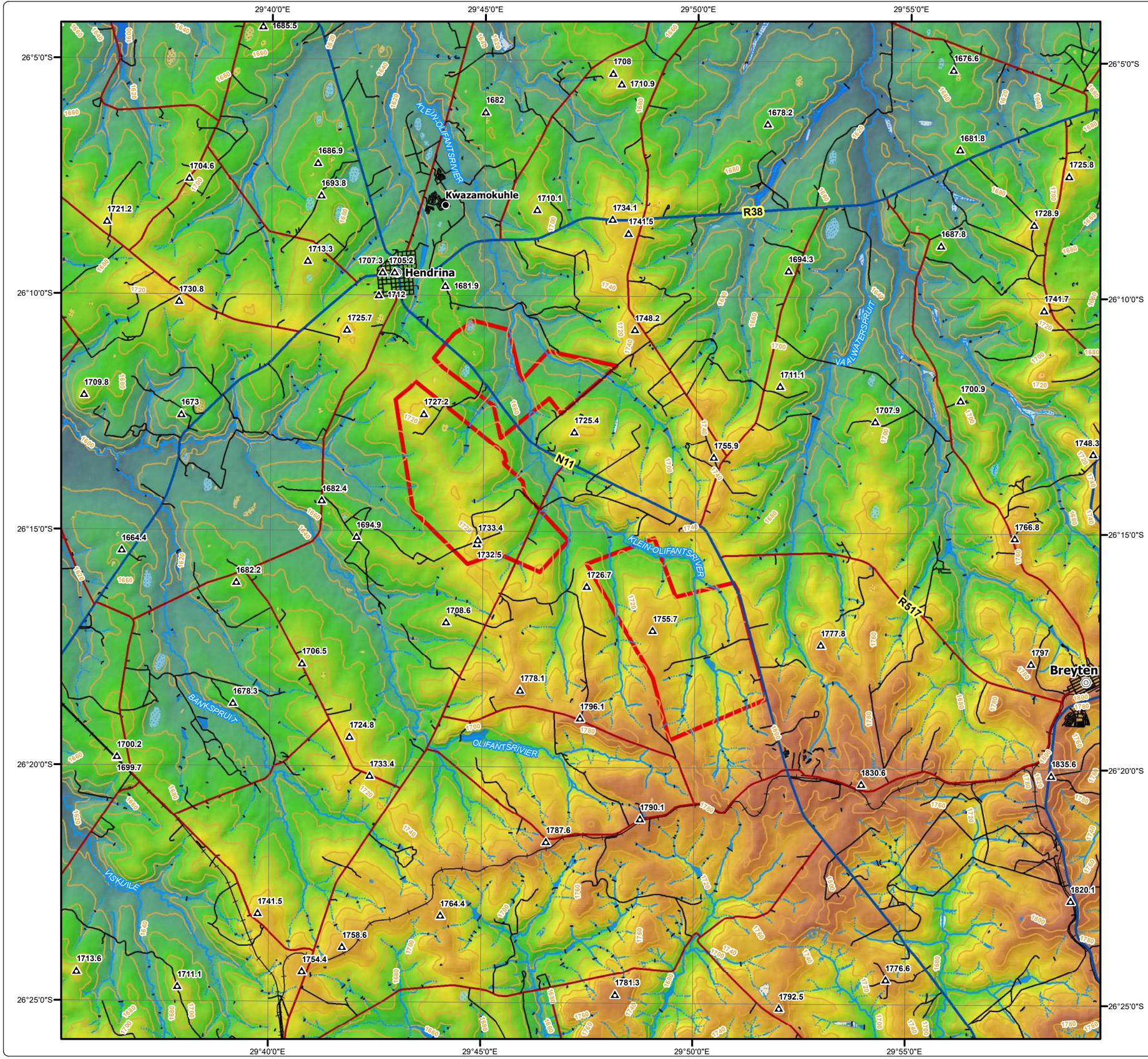
1:100,000

www.digbywells.com

Plan 3

Umcebo Mining Hendrina Underground Coal Mine EIA

Topographical Model



Legend

- Project Area
- Secondary Town
- Other Town
- Settlement
- Trig Beacon
- Arterial/National Route
- Main Road
- Minor Road
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Contour (20m)
- Dam Wall
- Dam/Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland

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

High : 1832

Low : 1596

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator	Ref #: kam.XST3791.201607.065
Datum: WGS 1984	Revision Number: 1
Central Meridian: 29°E	Date: 14/07/2016

N

0 2 4 8

Kilometres

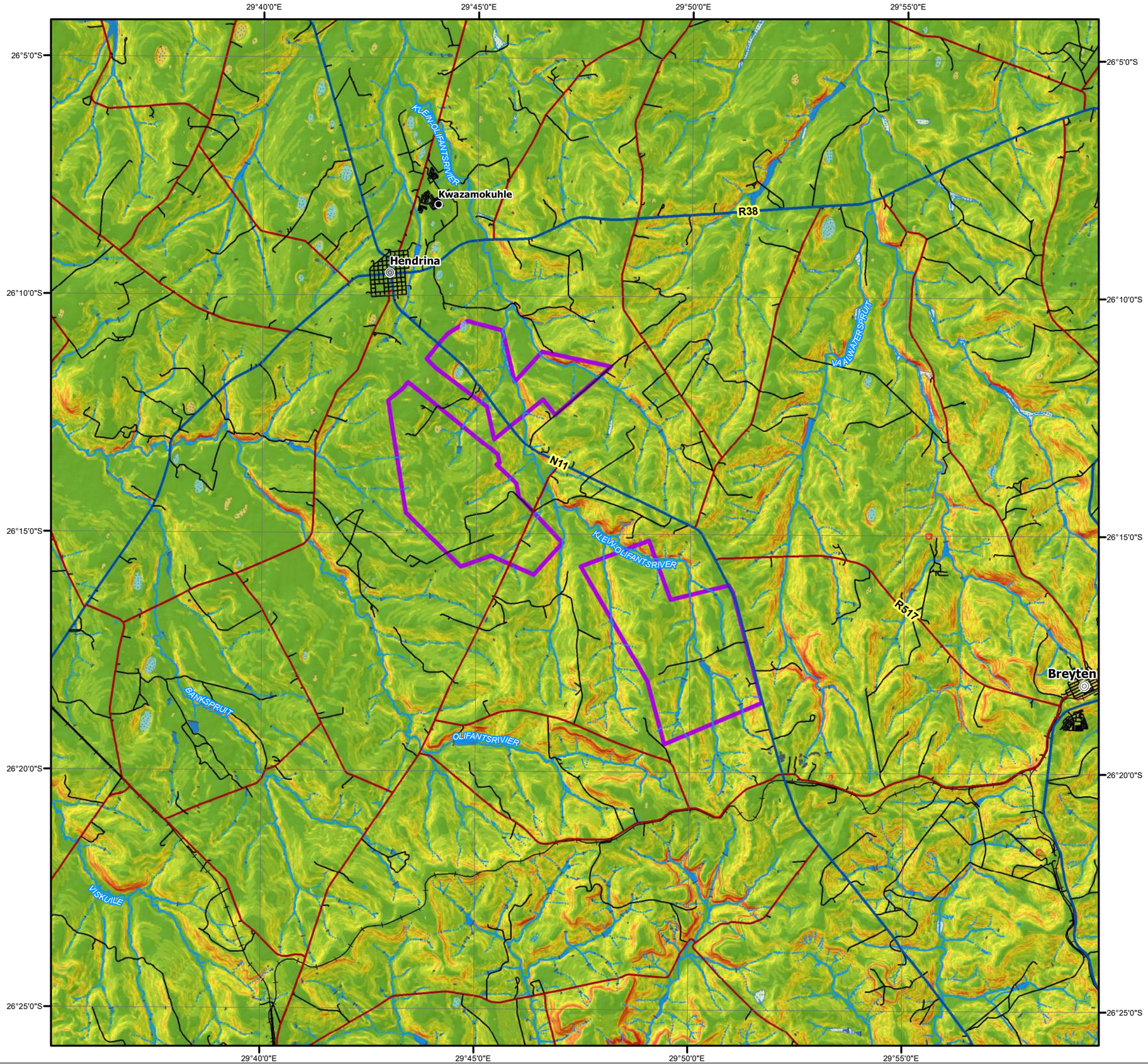
1:150,000

www.digbywells.com

Plan 4

Umcebo Mining Hendrina Underground Coal Mine EIA

Slope Model



Legend

- Project Area
- Secondary Town
- Other Town
- Settlement
- Arterial/National Route
- Main Road
- Minor Road
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam/Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland

Slope Model

Degrees (°)

- 0 - 1.41
- 1.42 - 2.71
- 2.72 - 4.12
- 4.13 - 5.88
- 5.89 - 8.47
- 8.48 - 13.42
- 13.43 - 29.89

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 29°E

Ref #: kam.XST3791.201607.066
Revision Number: 1
Date: 14/07/2016

N

0 2 4 8

Kilometres

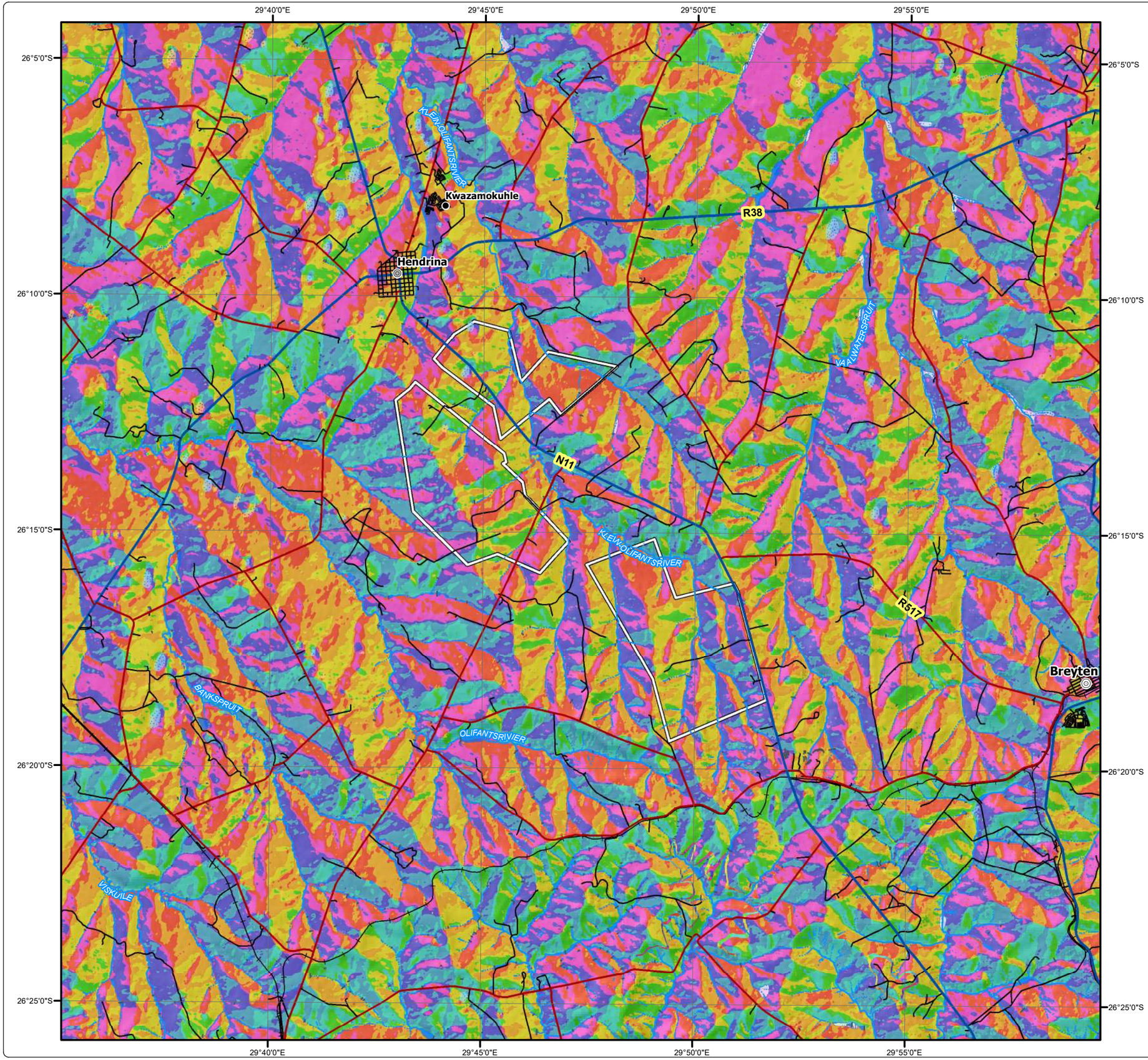
1:150,000

www.digbywells.com

Plan 5

Umcebo Mining Hendrina Underground Coal Mine EIA

Aspect Model



Legend

- Project Area
- Secondary Town
- Other Town
- Settlement
- Arterial/National Route
- Main Road
- Minor Road
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam/Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland

Aspect Model

- 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)

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 29°E

Ref #: kam.XST3791.201607.067
Revision Number: 1
Date: 14/07/2016

N

0 2 4 8

Kilometres

1:150,000

www.digbywells.com

Plan 6

Umcebo Mining Hendrina Underground Coal Mine EIA

Proposed Infrastructure

29°44'0"E 29°48'0"E 29°52'0"E 29°56'0"E

26°12'0"S 26°16'0"S 26°20'0"S

Hendrina
R38
N11
R517
KLEIN-OLIFANTSRIVIER
OLIFANTSRIVIER

Legend

- Project Area
- Other Town
- Arterial/National Route
- Main Road
- Minor Road
- Track
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam/Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland

Infrastructure

- Access Road
- Alternative Access Road
- Conveyor
- Fence
- Haul Road
- Pipeline
- Powerline
- Berms
- Buildings
- Crushing & Screening
- Generator & Mini-Subs
- Incline Shaft
- Office Area
- Overburden Stockpile
- PCD
- Parking
- Product Stockpile
- Sewer Treatment Plant
- Stormwater Drain
- Tip
- Topsoil Stockpile
- Ventilation Shaft
- Water Treatment Plant
- Weighbridge

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 29°E

Ref #: kam.XST3791.201607.068
Revision Number: 1
Date: 14/07/2016

N

0 1 2 4
Kilometres
1:100,000

www.digbywells.com

Plan 7

Umcebo Mining Hendrina Underground Coal Mine EIA

Theoretical Viewshed Model Mooivley West and Hendrina South

29°42'0"E 29°45'0"E 29°48'0"E 29°51'0"E

26°12'0"S 26°15'0"S 26°18'0"S

N11 R517 KLEIN-OLIFANTSRIVER OLIFANTSRIVIER

Legend

- Project Area
- 5km Buffer of Infrastructure
- Arterial/National Route
- Main Road
- Minor Road
- Track
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam/Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland
- Infrastructure

Theoretical Viewshed Model

- Not Visible
- Potentially Visible

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 29°E

Ref #: kam.XST3791.201607.074
Revision Number: 1
Date: 17/08/2016

N

0 0.5 1 2 3

Kilometres

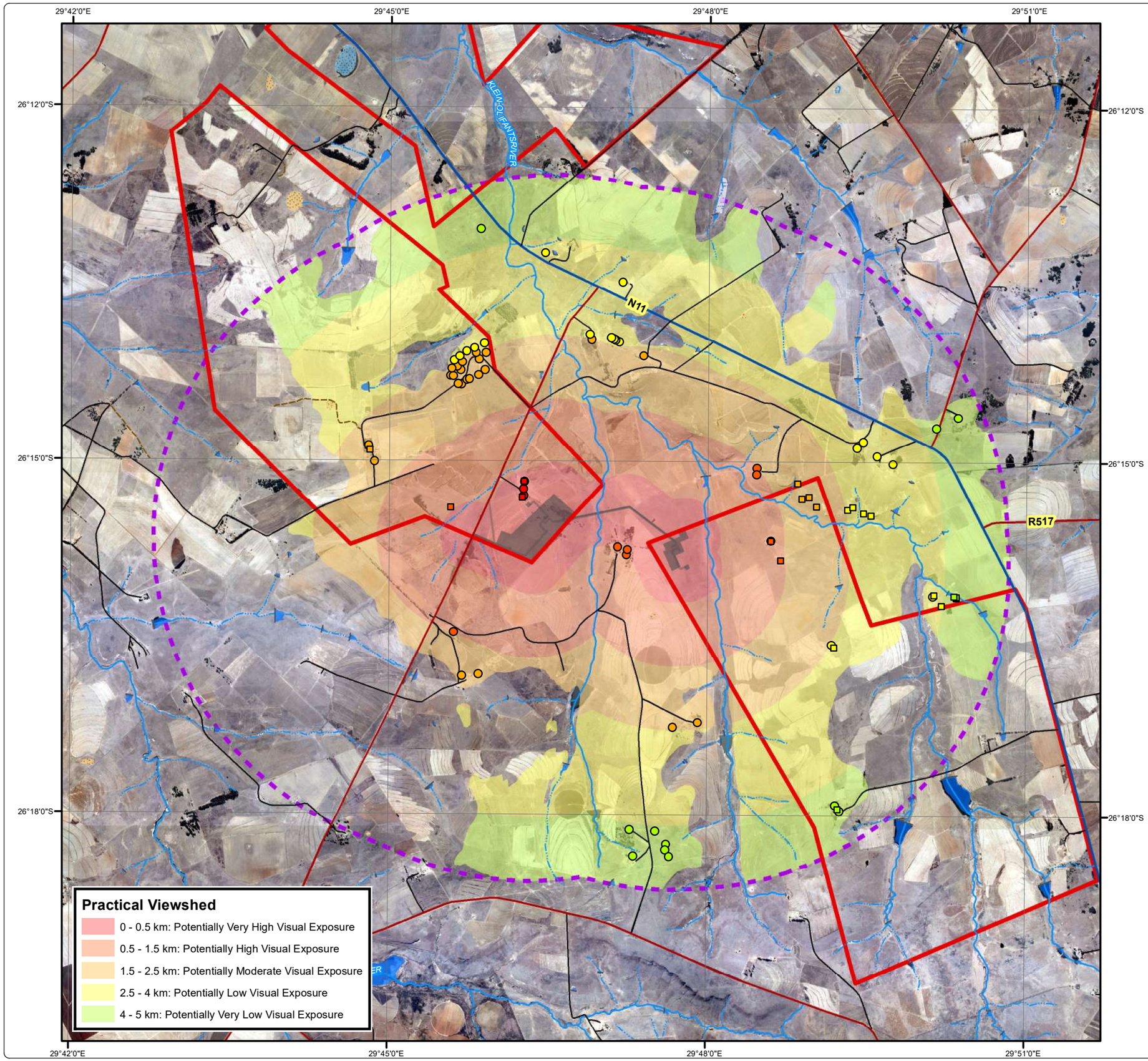
1:60,000

www.digbywells.com

Plan 8

Umcebo Mining Hendrina Underground Coal Mine EIA

Practical Viewshed Model
Mooivley West and Hendrina South



Legend

- Project Area
- 5km Buffer of Infrastructure

Heritage Sites

- Very High (2)
- High (3)
- Moderate (5)
- Low (7)
- Very Low (4)

Farm Residences

- Very High (3)
- High (7)
- Moderate (23)
- Low (18)
- Very Low (11)
- Arterial/National Route
- Main Road
- Minor Road
- Track
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam/Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland
- Infrastructure

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator
Datum: WGS 1984
Central Meridian: 29°E

Ref #: kam.XST3791.201607.075
Revision Number: 1
Date: 17/08/2016

N

0 0.5 1 2 3

Kilometres

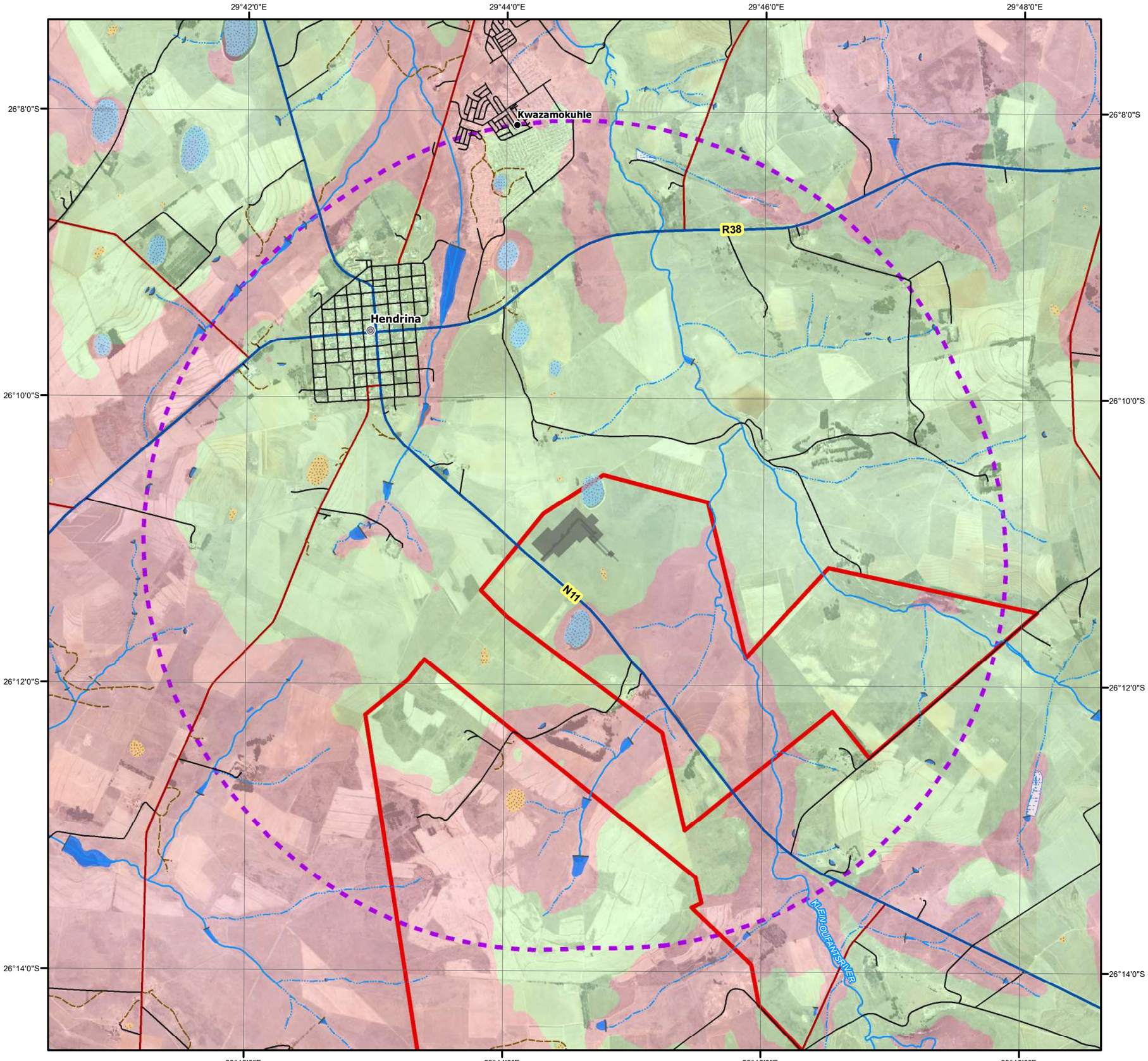
1:60,000

www.digbywells.com

Plan 9

Umcebo Mining Hendrina Underground Coal Mine EIA

Theoretical Viewshed Model Mooivley East



Legend

- Project Area
- 5km Buffer of Infrastructure
- Other Town
- Settlement
- Arterial/National Route
- Main Road
- Minor Road
- Track
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam/Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland
- Infrastructure

Theoretical Viewshed Model

- Not Visible
- Potentially Visible

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator	Ref #: kam.XST3791.201608.070
Datum: WGS 1984	Revision Number: 1
Central Meridian: 29°E	Date: 17/08/2016

N

0 0.5 1 2

Kilometres

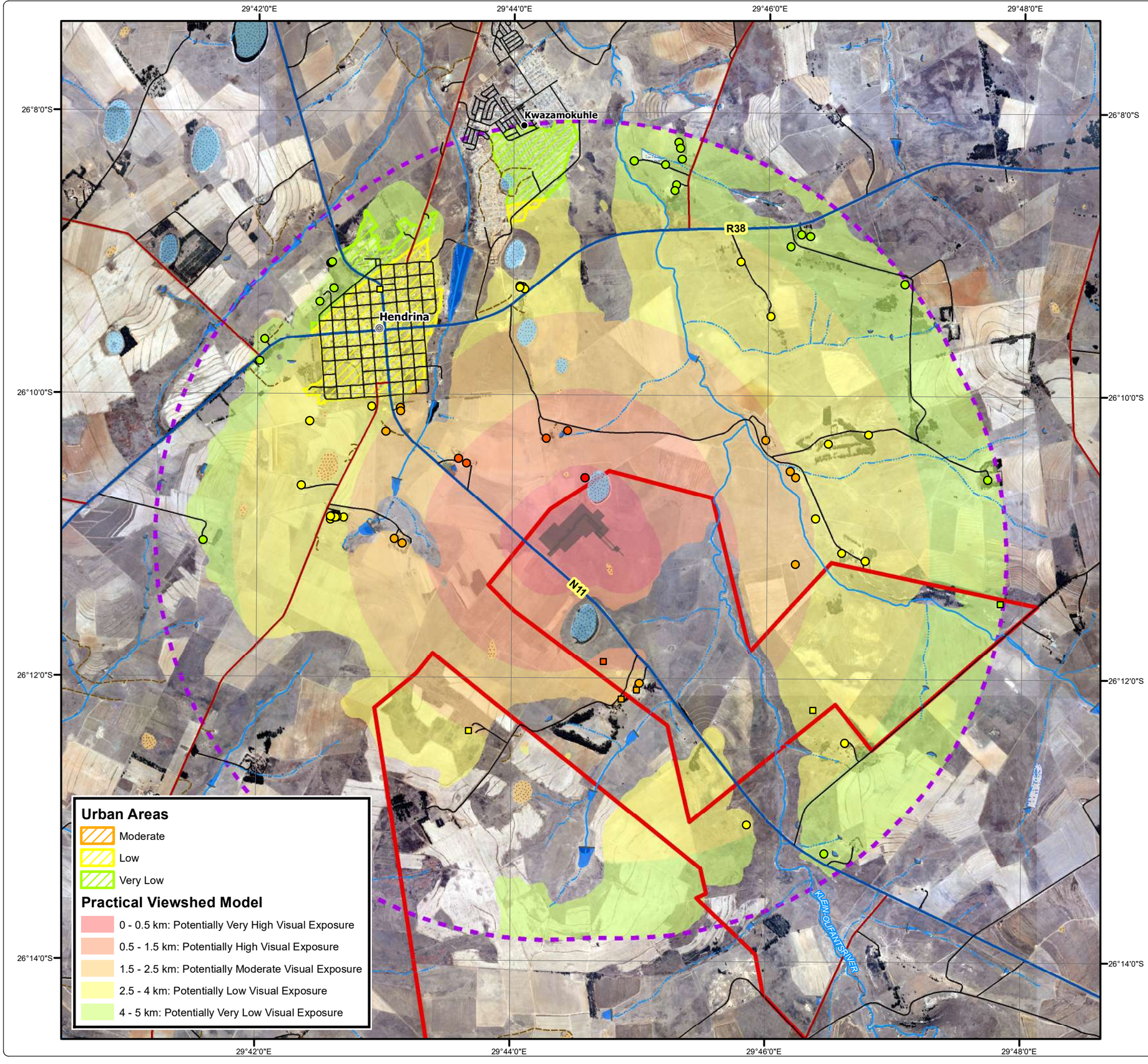
1:50,000

www.digbywells.com

Plan 10

Umcebo Mining Hendrina Underground Coal Mine EIA

Practical Viewshed Model
Mooivley East



Legend

- Project Area
- 5km Buffer of Infrastructure

Heritage Sites

- High (1)
- Moderate (2)
- Low (3)
- Very Low (1)

Farm Residences

- Very High (1)
- High (4)
- Moderate (10)
- Low (26)
- Very Low (21)
- Other Town
- Settlement
- Arterial/National Route
- Main Road
- Minor Road
- Track
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam/Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland
- Infrastructure

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator	Ref #: kam.XST3791.201608.071
Datum: WGS 1984	Revision Number: 1
Central Meridian: 29°E	Date: 17/08/2016

N

0 0.5 1 2

Kilometres

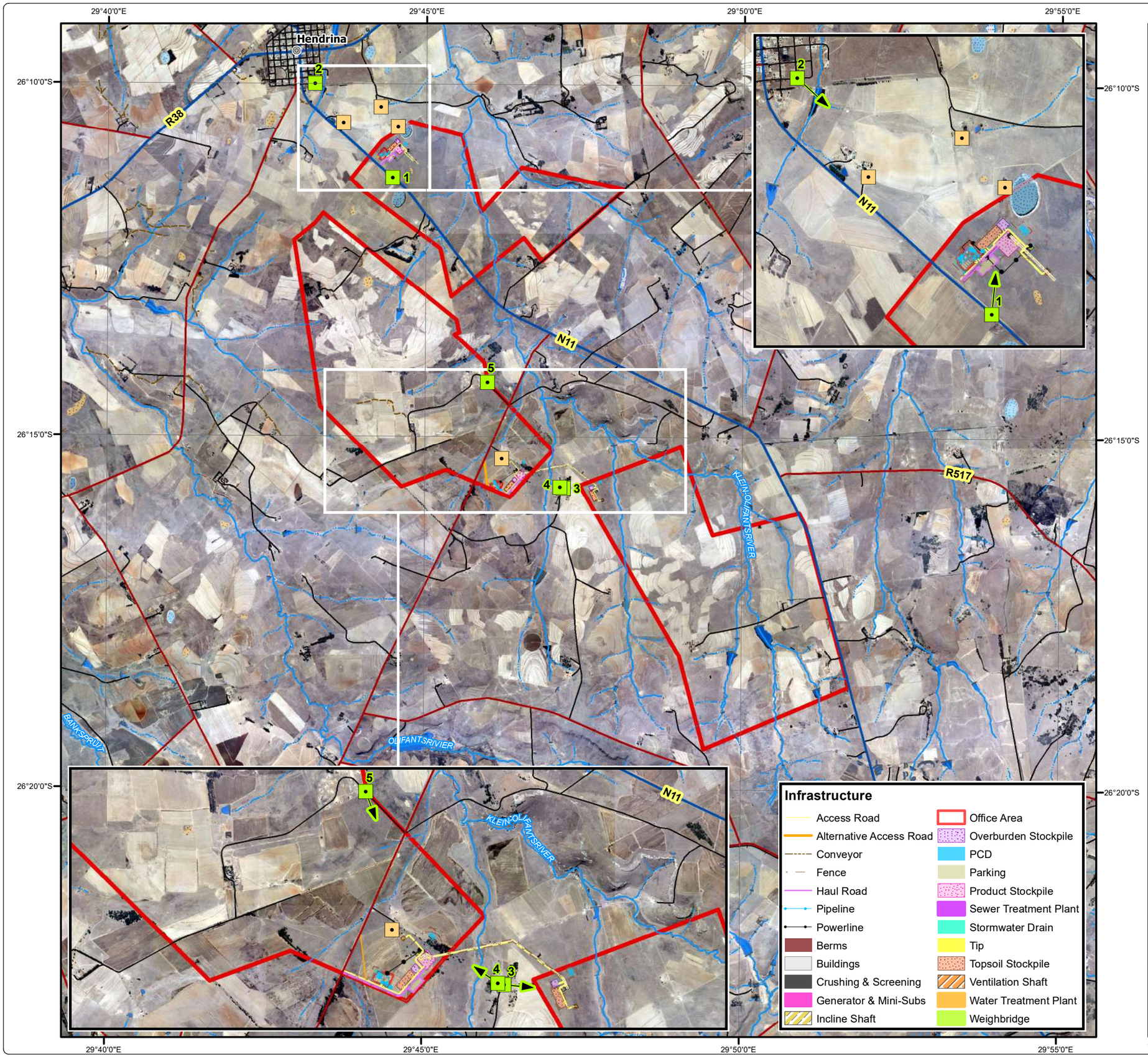
1:50,000

www.digbywells.com

Plan 11

Umcebo Mining Hendrina Underground Coal Mine EIA

Viewpoints for Photomontages



Legend

- Project
- Other Town
- Arterial/National Route
- Main Road
- Minor Road
- Track
- Railway Line
- Non-Perennial Stream
- Perennial Stream
- Dam Wall
- Dam/Lake
- Non-Perennial Pan
- Perennial Pan
- Wetland

Visual Viewpoints

- Site Visit Photo
- Viewpoint Direction
- Photomontage View Direction

Infrastructure

- Access Road
- Alternative Access Road
- Conveyor
- Fence
- Haul Road
- Pipeline
- Powerline
- Berms
- Buildings
- Crushing & Screening
- Generator & Mini-Subs
- Incline Shaft
- Office Area
- Overburden Stockpile
- PCD
- Parking
- Product Stockpile
- Sewer Treatment Plant
- Stormwater Drain
- Tip
- Topsoil Stockpile
- Ventilation Shaft
- Water Treatment Plant
- Weighbridge

DIGBY WELLS ENVIRONMENTAL

• Sustainability • Service • Positive Change • Professionalism • Future Focused • Integrity

Projection: Transverse Mercator	Ref #: kam.XST3791.201607.076
Datum: WGS 1984	Revision Number: 1
Central Meridian: 29°E	Date: 18/07/2016

N

0 1 2 4

Kilometres

1:100,000

www.digbywells.com