

**ENVIRONMENTAL IMPACT ASSESSMENT FOR THE EXXARO BELFAST COAL MINE  
EXPANSION PROJECT LOCATED WITHIN THE JURISDICTION OF EMAKHAZENI  
LOCAL MUNICIPALITY (WARDS 1 AND 8) IN THE MPUMALANGA PROVINCE**

***VISUAL IMPACT ASSESSMENT***

***PREPARED FOR:***



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## EXECUTIVE SUMMARY

Nsovo Environmental Consulting was appointed by Exxaro, as the independent environmental consultant to undertake the Environmental Authorization (EA) for the proposed Belfast Coal Mine Expansion Project located within the jurisdiction of Emakhazeni Local Municipality (Wards 1 & 8) in Mpumalanga Province.

Outline Landscape Architects was requested to compile a Visual Impact Assessment (VIA) for the project.

## DESCRIPTION OF THE AFFECTED ENVIRONMENT

The study area consists of large areas of agricultural land used for commercial purposes. There are human settlements, including small towns and agricultural communities and the landscape is degraded around these settlements. Mining is one of the key land-uses and contributes significantly to the visual degradation of parts of the study area.

ACTIVITY	DESCRIPTION
Open Cast Mining	The open pit areas at Belfast Expansion Project (BEP) will be a continuation of existing mining activities and will be mined with a similar method as with the Belfast Implementation Project (BIP). The Belfast Implementation Project (BIP) is currently using Strip Mining with a mixed hybrid of benching and doze-over. This method is successful for the shallow coal seams in the Witbank coal region. Two options were proposed for the Open Cast Shaft. The option 1 is within the BEP but over the Mining Area. Option 2 is the preferred option. Both options are within a landscape that is associated with mining activities.
Underground Mining	The identified underground mining areas will be done using traditional board and pillar mining method. The underground entrance will be at a depth of -54m from the surface. The link between the surface and entrance to the underground mine will be by means of an incline conveyor that will feed the Run of Mine (ROM) stockpile on the surface from the main underground conveyor and will be approximately 3km long.
Mine Residue and Infrastructure Facility	A location trade-off study was done. The area selected for the infrastructure facility is steep due to the topography. The site is close to the district road, away from mining activities, protected from prevailing winds and outside of blasting lines. Buildings will be of prefabricated material and temporary for the life of mine.
Transport Infrastructure	The main access route is the district road which will also be used as the link between the BIP and BEP for road going traffic. Internal infrastructure components will be connected with a network of gravel roads. Haul road route starts at the Run of Mine (ROM) stockpile and crosses over previously mined areas to the BIP areas. Dust suppression with water will be required on gravel roads.
Overland Conveyor Belt	A new overland curved conveyor crossing the Klein Komati onto the overland belt before the secondary crusher without a transfer station is proposed. There were 4 proposed options, and the preferred option is Alternative D. All 4 options run along parallel routes and will therefore have a similar visual impact. The conveyor belt will be approximately 4m in height and the preferred route crosses through existing mining infrastructure.
High Mast Lighting	There are 12 proposed high mast lights, approximately 25m in height at the infrastructure facility. The lights will be LED.

## **FINDINGS AND RECOMMENDATIONS**

### **VIEWER SENSITIVITY**

Within the receiving environment, specific viewers (visual receptors) experience different views of the visual resource and value it differently. They will be affected because of alterations to their views due to the proposed project. The visual receptors included in this study are:

- Residents
- Tourists
- Motorists

### **SIGNIFICANCE OF VISUAL IMPACTS**

#### **VISUAL IMPACT ON RESIDENTS**

The study area is moderately populated, with lower population in the rural settlements and farming communities, to higher populations in the towns. The closest town is Belfast and is 9km to the north. A possible visual impact to residents could be the traffic loading on surrounding roads, with large volumes of 30-ton interlink trucks transporting coal to the railway siding. Associated dust and noise could exacerbate the impact.

The residents close to the mine may experience a *moderate* degree of visual intrusion by the proposed expansion of the mine.

#### **VISUAL IMPACT ON TOURISTS**

The entire study area is considered to have a low tourism potential, mostly because of mining developments and human settlement activities. There is also no major thoroughfare to prominent tourist destinations.

The temporary exposure to possible unsightly views of the construction camps and the associated activity will be minimal and localised.

The proposed new developments will only have an impact on tourists along main transportation routes. The severity of the visual impact of the mining activities on tourists will be low, causing a *low* visual impact.

#### **VISUAL IMPACT ON MOTORISTS**

The major routes in the study area are the N4 and the R33, connecting the towns, mines and farms. The secondary road network in the study area carries a much lower volume of motorists. Many of the roads are gravel roads which are utilized by the local residents. Motorists on surrounding roads may be affected by the trucks used to transport coal to the railway sidings. Even though it is assumed most motorists using these routes are associated with the mines.

Motorists' visual exposure to the new activities will be brief and the severity of visual impact will be *low*.

### **RECOMMENDED MITIGATION MEASURES**

In most cases, the landscape and visual impacts occurring during the construction phase can be mitigated effectively. Rehabilitation of the disturbed areas may cause a reduction in the negative visual impact of the study area.

Upon closure of the mine, and once rehabilitation has taken place, the visual aesthetics will significantly improve. Therefore, there is an anticipated *low* significance of visual impact for the proposed development.

## CONCLUSION

The proposed main activities associated with the Belfast Expansion Project (BEP) have been evaluated against internationally accepted criteria to determine the impact they will have on the landscape character and the viewers that have been identified in the study area.

The activities have been rated in the table below, including the visual impact before mitigation measures and after mitigation measures have been applied.

### Evaluation of activities for mining extension during the Construction Phase

Visual Impact of Alternatives	Corrective Measures	Impact Rating Criteria					
		Nature	Extent	Duration	Magnitude	Probability	Significance
Open Cast Mining	No	Negative	2	3	4	3	27 low
	Yes	Negative	2	3	4	3	27 low
Underground Mining	No	Negative	2	2	3	3	21 low
	Yes	Negative	2	2	3	3	21 low
Mine Residue and Infrastructure Facility	No	Negative	2	3	4	2	18 low
	Yes	Negative	2	3	3	2	16 low
Transport Infrastructure	No	Negative	2	2	3	3	21 low
	Yes	Negative	2	2	2	2	14 low
Overland Conveyor Belt	No	Negative	2	2	3	3	21 low
	Yes	Negative	2	2	2	2	14 low
High Mast Lighting	No	Negative	2	2	3	3	21 low
	Yes	Negative	2	2	2	2	14 low

### Evaluation of activities for mining extension during the Operation Phase

Visual Impact of Alternatives	Corrective Measures	Impact Rating Criteria					
		Nature	Extent	Duration	Magnitude	Probability	Significance
Open Cast Mining	No	Negative	2	4	6	3	36 medium
	Yes	Negative	2	4	4	3	30 medium - low
Underground Mining	No	Negative	2	4	6	3	36 medium
	Yes	Negative	2	4	4	3	30 medium - low
Mine Residue and Infrastructure Facility	No	Negative	2	4	6	3	36 medium
	Yes	Negative	2	4	4	3	30 medium - low
Transport Infrastructure	No	Negative	2	4	4	3	30 medium - low
	Yes	Negative	2	4	2	3	24 low
Overland Conveyor Belt	No	Negative	2	4	4	3	30 medium - low
	Yes	Negative	2	4	2	3	24 low
High Mast Lighting	No	Negative	2	4	4	4	40 medium
	Yes	Negative	2	4	3	3	27 low

The following Visual Impact Assessment Criteria (as utilised in table above) applies:

**Status of Impact:**

The visual impact is assessed as either having a:  
Negative effect (i.e., at a cost to the environment),  
Positive effect (i.e., a benefit to the environment), or  
Neutral effect on the environment.

**Extent of the Impact:**

- (1) Site (site only),
- (2) Local (site boundary and immediate surrounds),
- (3) Regional,
- (4) National, or
- (5) International.

**Duration of the Impact:**

The length that the impact will last for is described as either:  
(1) Immediate (<1 year)  
(2) Short term (1-5 years),  
(3) Medium term (5-15 years),  
(4) Long term (ceases after the operational life span of the project),  
(5) Permanent.

**Magnitude of the Impact:**

The intensity or severity of the impacts is indicated as either:  
(0) none,  
(2) Minor,  
(4) Low,  
(6) Moderate (environmental functions altered but continue),  
(8) High (environmental functions temporarily cease), or  
(10) Very high / unsure (environmental functions permanently cease).

**Probability of Occurrence:**

The likelihood of the impact actually occurring is indicated as either:  
(0) None (the impact will not occur),  
(1) Improbable (probability very low due to design or experience)  
(2) Low probability (unlikely to occur),  
(3) Medium probability (distinct probability that the impact will occur),  
(4) High probability (most likely to occur), or  
(5) Definite.

**Significance of the Impact:**

Based on the information contained in the points above, the potential impacts are assigned a significance rating (S). This rating is formulated by adding the sum of the numbers assigned to extent (E), duration (D) and magnitude (M) and multiplying this sum by the probability (P) of the impact.

$$S = (E+D+M) P$$

The significance ratings are given below

(<30) low (i.e., where this impact would not have a direct influence on the decision to develop in the area),

(30-60) medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated), (>60) high (i.e. where the impact must have an influence on the decision process to develop in the area).

## DECLARATION BY SPECIALIST

I, **Kathrin Hammel-Louw**, declare that:

- I act as an independent specialist in this application.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant.
- There are no circumstances that may compromise my objectivity in performing such work.
- I have expertise in conducting the specialist report relevant to this application, including legislation, regulations and any guidelines that have relevance to the proposed activity.
- I will comply with the regulations and all other applicable legislation.
- I have no, and will not engage in, conflicting interests in the undertaking of the activity.
- I undertake to disclose to the applicant and the Competent Authority all material information in my possession that reasonably has or may have the potential of influencing
  - any decision to be taken with respect to the application by the competent authority; and
  - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority.
- All the particulars furnished by me in this form are true and correct; and



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Signature of the specialist:

**For and on behalf of Outline Landscape Architects CC**

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## LIST OF ABBREVIATIONS

<b>EIA</b>	Environmental Impact Assessment.
<b>FHWA</b>	Federal Highway Administration of the United States Department of Transportation. The publishers of the guide “ <i>Visual Impact Assessment for High Projects</i> ” 1981.
<b>LCA</b>	Landscape Character Assessment.
<b>LT</b>	Landscape Type
<b>VAC</b>	Visual Absorption Capacity
<b>VIA</b>	Visual Impact Assessment.
<b>ULI</b>	Urban Land Institute
<b>ZVI</b>	Zone of Visual Influence.

## 1. INTRODUCTION

Nsovo Environmental Consulting was appointed by Exxaro, as the independent environmental consultant to undertake the Environmental Impact Assessment (EIA) for Exxaro Coal Mpumalanga, (Pty) Ltd.'s proposed Belfast Coal Mine Expansion Project within the jurisdiction of Emakhazeni Local Municipality (Wards 1 & 8) in Mpumalanga Province.

Outline Landscape Architects was requested to compile a Visual Impact Assessment (VIA) for the project that addresses the visual effects of the proposed development.

Outline Landscape Architects is an independent sub-consultant and neither the author, nor Outline Landscape Architects will benefit from the outcome of the project decision-making.

Kathrin Hammel, the principal Landscape Architect and Visual Specialist from Outline Landscape Architects undertook this Visual Impact Assessment. She is a registered Professional Landscape Architect at the South African Council of Landscape Architects, SACLAP no 20162. Kathrin has been involved as a Visual Impact Specialist since 2009.

### 1.1. BACKGROUND AND BRIEF

This VIA will conform to the requirements of a Level Three assessment which requires the realisation of the following objectives (Adapted from Oberholzer (2005)):

- Determination of the extent of the study area.
- Description of the proposed project and the receiving environment.
- Identification and description of the landscape character of the study area.
- Identification of the elements of particular visual value and -quality that could be affected by the proposed project.
- Identification of landscape receptors and visual receptors in the study area that will be affected by the proposed project and assess their sensitivity.
- Indication of potential landscape- and visual impacts.
- Assessment of the significance of the landscape- and visual impacts.
- Recommendations of mitigation measures to reduce and/or alleviate the potential adverse landscape- and visual impacts.

### 1.2. STUDY AREA

The study area of the Belfast Expansion Project (BEP) is within the Mpumalanga Province and is situated south of Belfast along the N4. The site is in the Emakhazeni Local Municipality (Ward 1 and 8), Mpumalanga Province (Figure 1).

Figure 1: Locality Map

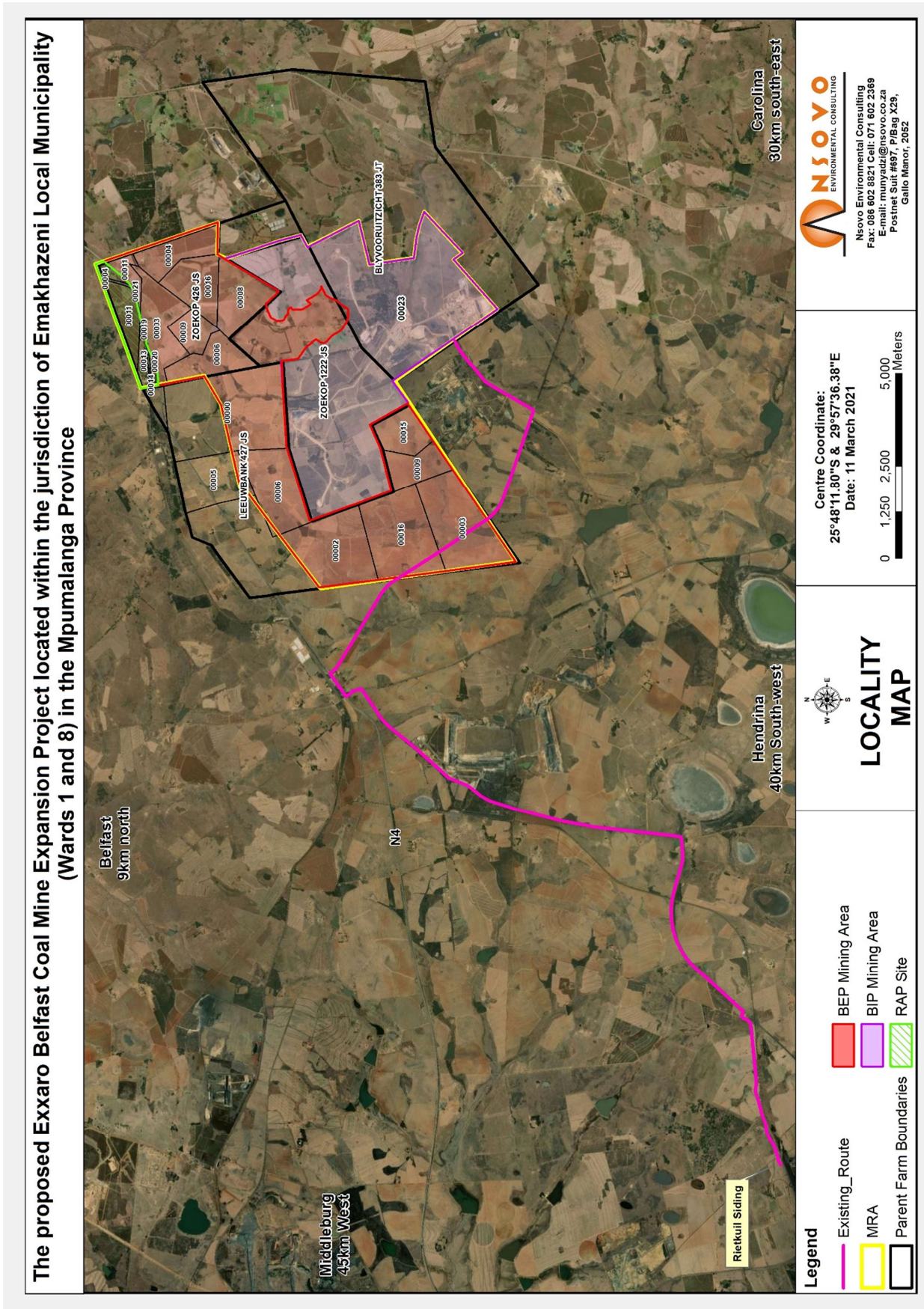


Figure 2: Potential Mining Areas and Infrastructure

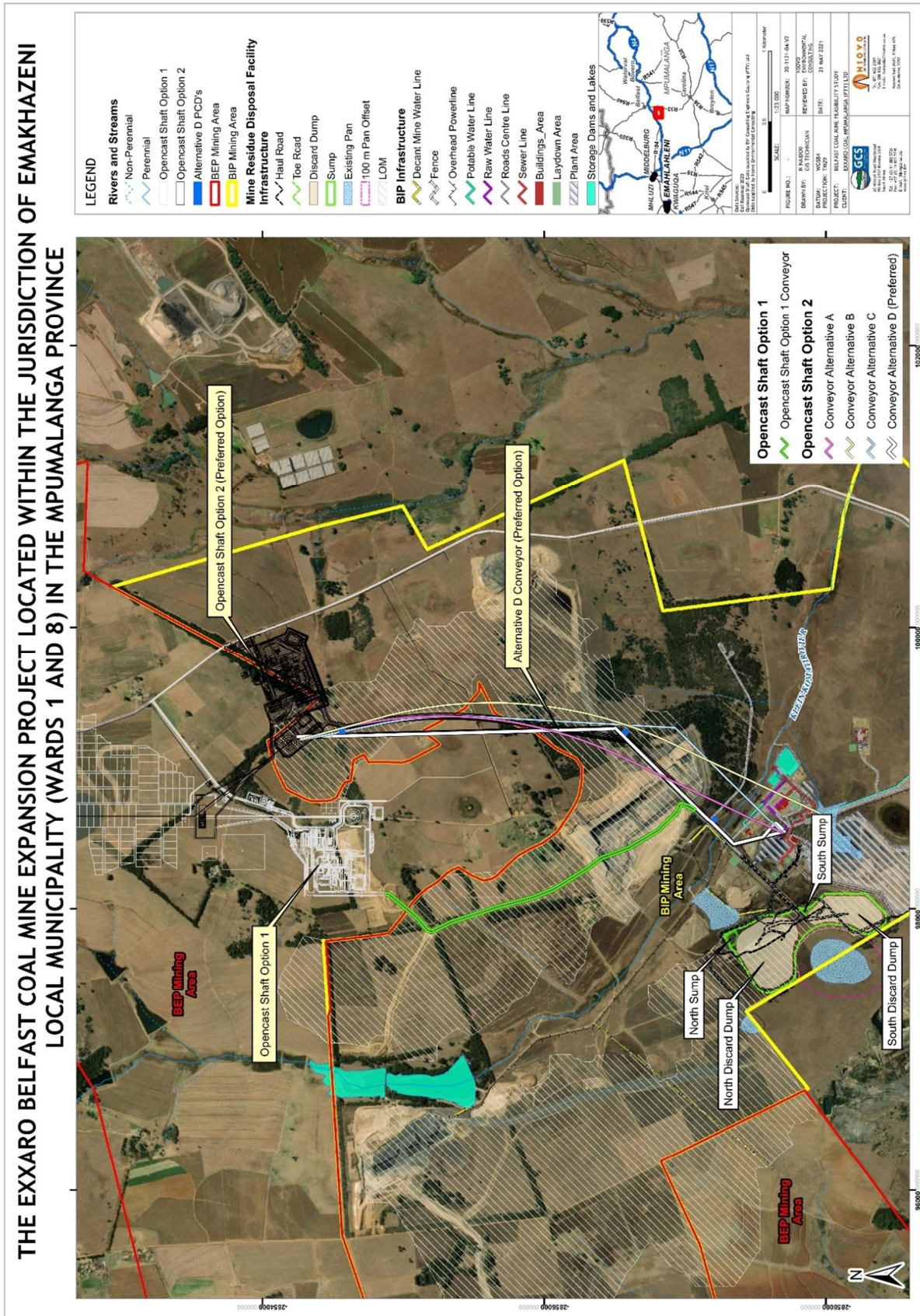
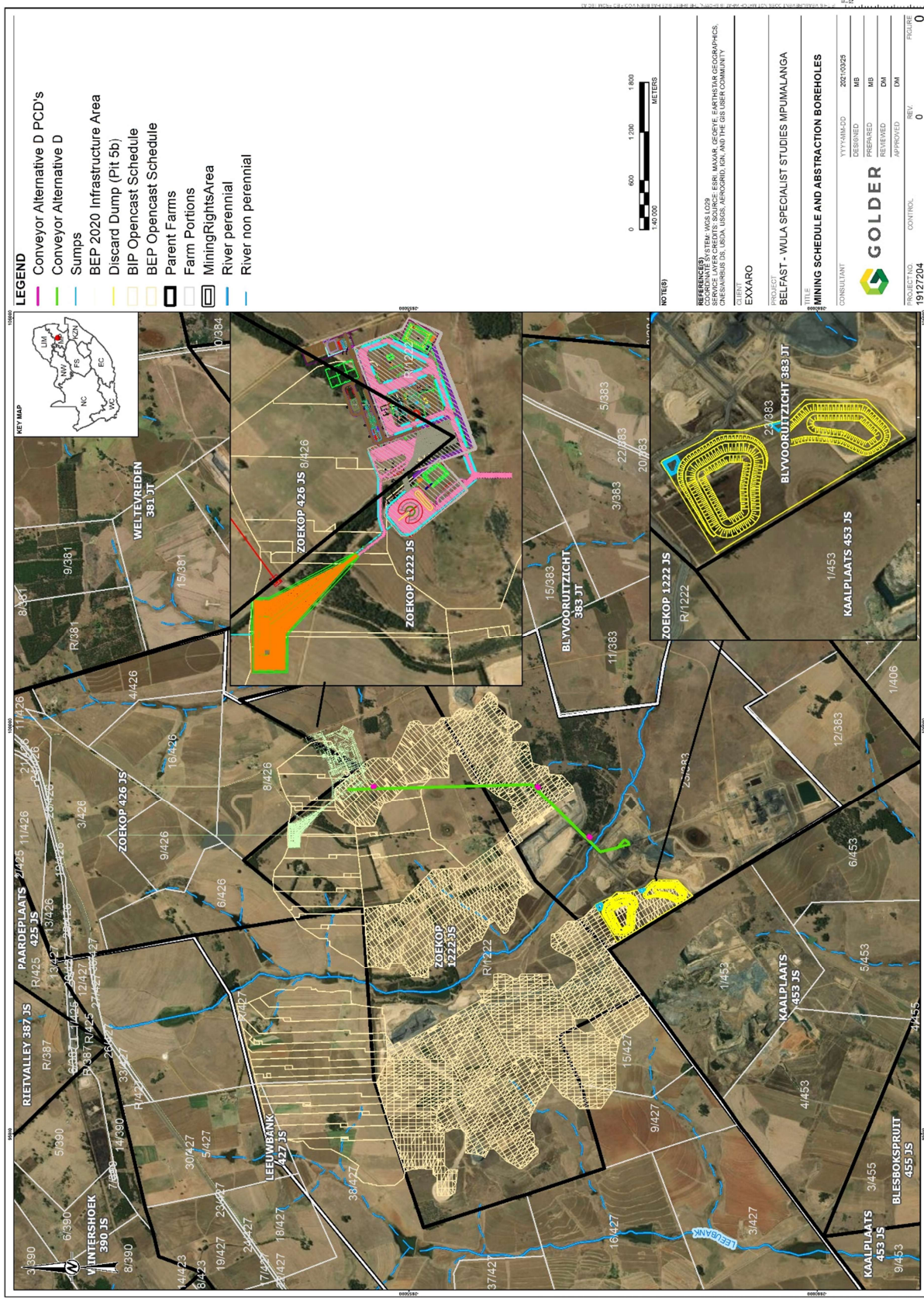


Figure 3: Mining Schedule



## **2. STUDY APPROACH**

### **2.1. INFORMATION BASE**

This assessment was based on information from the following sources:

- Topographical maps and GIS generated data were sourced from Google Earth imagery, and EcoGIS (2020) respectively.
- Site visit conducted in June 2020.
- Professional judgement based on experience gained from similar projects; and
- Literature research on similar projects.

### **2.2. ASSUMPTIONS AND LIMITATIONS**

This assessment was undertaken during the conceptual stage of the project and is based on information available at the time.

- This level of assessment excludes surveys to establish viewer preference and thereby their sensitivity. Viewer sensitivity is determined by means of a commonly used rating system (Table 3).

### **2.3. LEVEL OF CONFIDENCE**

The level of confidence assigned to the findings of this assessment is based on:

- The level of information available and/or understanding of the study area (rated 2); and
- The information available and/or knowledge and experience of the project (rated 3).

This visual impact assessment is rated with a general confidence level of 6. This rating indicates that the author's general confidence in the accuracy of the findings is *high* (Table 2). Where the confidence level of specific findings is not regarded as high, it is noted in the last column of each impact assessment table.

### **2.4. METHOD**

A broad overview of the approach and methodology used in this assessment is provided below:

- The extent of the study area is determined and indicated in Figure 1.
- The project components and activities are described and assessed as potential elements of visual and landscape impacts.
- The receiving environment is described in terms of its prevailing landscape- and visual character.
- Landscape- and visual receptors that may be affected by the proposed project are identified and described.
- Mitigation measures are proposed to reduce adverse impacts.
- The findings of the study are documented in this Visual Impact Assessment.

### 3. PROJECT DESCRIPTION

#### 3.1. PROJECT BACKGROUND

The Exxaro Belfast Mining Right (Ref No. MP 30/5/1/2/2/431 MR) is situated in the Mpumalanga Province and is located south of Belfast along the N4. The Belfast Implementation Project (BIP) commenced in 2018 with mining activities and the construction of the associated plant and infrastructure to process 3 Mtpa of Run of Mine (ROM) with a life of mine (LOM) of 17 years. The first coal was produced at the processing plant during September 2019.

The Belfast Expansion Project (BEP) area falls within the Belfast mining right area and subsequently forms part of the resource pertaining to Belfast. The project area falls outside the current mining area. The objective of such an operation would be to access high quality coal for export.

The table below indicates the description of the proposed activities.

**Table 1: Description of Activities**

ACTIVITY	DESCRIPTION (Figure 2)
Open Cast Mining	The open pit areas at Belfast Expansion Project (BEP) will be a continuation of existing mining activities and will be mined with a similar method as with the Belfast Implementation Project (BIP). The Belfast Implementation Project (BIP) is currently using Strip Mining with a mixed hybrid of benching and doze-over. This method is successful for the shallow coal seams in the Witbank coal region. Two options were proposed for the Open Cast Shaft. The option 1 is within the BEP but over the Mining Area. Option 2 is the preferred option. Both options are within a landscape that is associated with mining activities.
Underground Mining	The identified underground mining areas will be done using traditional board and pillar mining method. The underground entrance will be at a depth of -54m from the surface. The link between the surface and entrance to the underground mine will be by means of an incline conveyor that will feed the Run of Mine (ROM) stockpile on the surface from the main underground conveyor and will be approximately 3km long.
Mine Residue and Infrastructure Facility	A location trade-off study was done. The area selected for the infrastructure facility is steep due to the topography. The site is close to the district road, away from mining activities, protected from prevailing winds and outside of blasting lines. Buildings will be of prefabricated material and temporary for the life of mine.
Transport Infrastructure	The main access route is the district road which will also be used as the link between the BIP and BEP for road going traffic. Internal infrastructure components will be connected with a network of gravel roads. Haul road route starts at the Run of Mine (ROM) stockpile and crosses over previously mined areas to the BIP areas. Dust suppression with water will be required on gravel roads.
Overland Conveyor Belt	A new overland curved conveyor crossing the Klein Komati onto the overland belt before the secondary crusher without a transfer station is proposed. There were 4 proposed options, and the preferred option is Alternative D. All 4 options run along parallel routes and will therefore have a similar visual impact. The conveyor belt will be approximately 4m in height and the preferred route crosses through existing mining infrastructure.
High Mast Lighting	There are 12 proposed high mast lights, approximately 25m in height at the infrastructure facility. The lights will be LED.

#### 3.2. PROJECT COMPONENTS AND ACTIVITIES

Each project component and activity will affect the receiving environment differently and is therefore discussed separately. The following project components will occur during the construction and operational phases of the project and are identified as elements that may cause a potential landscape and/or visual impact:

### **3.2.1. CONSTRUCTION CAMPS AND LAY-DOWN YARDS**

Temporary construction camps will be present for the duration of the construction period. The material lay-down yards are expected to be located adjacent to the construction camp and will serve as storage areas for the construction material and equipment. The extension of the mining area will increase in area over time.

### **3.2.2. ACCESS ROADS**

An access road will be made during construction but will remain for the lifetime of the mining activities as a maintenance route. The service road will be seen as a unit with the mine structure, and as long as the road runs within the mining area and does not widen significantly, the visual impact is minimal.

## **3.3. VISUAL CHARACTERISTICS OF PROJECT COMPONENTS**

The majority of the proposed mining activities are on ground level or underground and will create a visual impact by surface disturbance and will affect viewers from nearby. The mine infrastructure area will have built structures with height that may create a visual impact from further away.

## **4. DESCRIPTION OF THE AFFECTED ENVIRONMENT**

Landscape and visual impacts may result from changes to the landscape. A distinction should be made between impacts on the visual resource (landscape) and on the viewers. The former are impacts on the physical landscape that may result in changes to landscape character while the latter are impacts on the viewers themselves and the views they experience.

### **4.1. VISUAL RESOURCE**

Visual resource is an encompassing term relating to the visible landscape and its recognisable elements, which through their co-existence, result in a particular landscape character.

#### **4.1.1. LANDSCAPE CHARACTER**

The study area consists primarily of agricultural land. The natural landscape is degraded, with minimal pristine landscape remaining. There is some vacant undeveloped land that was previously cultivated, as well as land used for subsistence farming. Mining, especially coal, is one of the key land-uses and contributes significantly to the visual degradation of the study area. Small pockets of grassland remain (Figure 3).

The landscape character does not change considerably through the study area, but the topography varies with undulating landscapes. Landscape types are distinguished by differences in topographical features, vegetation communities and patterns, land use and human settlement patterns (Swanwick, 2002).

The broad scale vegetation type that has been identified in the study area is the Eastern Highveld Grassland (Figure 4).

#### **4.1.2. VISUAL CHARACTER**

Visual character is based on human perception and the observer's response to the relationships between and composition of the landscape, the land uses and identifiable elements in the landscape. The description of the visual character includes an assessment of the scenic attractiveness regarding those landscape attributes that have aesthetic value and contribute significantly to the visual quality of the views, vistas and/or viewpoints of the study area.



The overall landscape varies between agricultural landscape, which is undulating to flat, to degraded, polluted landscapes around homesteads and towns. Large mines present a negative effect on the visual character of the landscape.

#### 4.1.2.1 Visual Value

Visual value relates to those attributes of the landscape or elements in the landscape to which people attach values that though not visually perceivable, still contribute to the value of the visual resource. These visual values are derived from ecological, historical, social and/or cultural importance and are described in terms of their uniqueness, scarcity, and naturalness and/or conservation status. The importance of visual value of a landscape or element in the landscape is measured against its value on an international, national and local level.

Very few parts of the study area have been left undisturbed and there is very little to no unspoilt pristine landscape remaining. These areas however remain under pressure and are vulnerable due to human settlement expansion, agricultural activities and mining activities.

#### 4.1.2.2 Visual Quality

Visual quality is a qualitative evaluation of the composition of landscape components and their excellence in scenic attractiveness. Many factors contribute to the visual quality of the landscape and are grouped under the following main categories (Table 2) that are internationally accepted indicators of visual quality (FHWA, 1981):

**Table 2: Criteria of Visual Quality (FHWA, 1981)**

INDICATOR	CRITERIA
Vividness	The memorability of the visual impression received from contrasting landscape elements as they combine to form a striking and distinctive visual pattern.
Intactness	The integrity of visual order in the natural and man-built landscape, and the extent to which the landscape is free from visual encroachment.
Unity	The degree to which the visual resources of the landscape join together to form a coherent, harmonious visual pattern. Unity refers to the compositional harmony of inter-compatibility between landscape elements.

The landscape is allocated a rating from an evaluation scale of 1 to 7 and divided by 3 to get an average. The evaluation scale is as follows: Very Low =1; Low =2; Moderately Low =3; Moderate =4; Moderately High =5; High =6; Very High =7;

The regional landscape is assessed against each indicator separately. All three indicators should be *high* to obtain a *high* visual quality. The evaluation is summarised in Table 3.

**Table 3: Visual Quality of the regional landscape**

VIVIDNESS	INTACTNESS	UNITY	VISUAL QUALITY
3	2	3	Moderately Low

The visual quality of the landscape is moderately low and can be attributed to the many mining developments and degraded towns and settlements.

#### 4.1.2.3 Visual absorption capacity

Visual Absorption Capacity (VAC) signifies the ability of the landscape to accept additional human intervention without serious loss of character and visual quality or value. VAC is founded on the characteristics of the physical environment such as:

- **Degree of visual screening:**  
A degree of visual screening is provided by landforms, vegetation cover and/or structures such as buildings. For example, a high degree of visual screening is present in an area that is mountainous and is covered with a forest compared to an undulating and mundane landscape covered in grass.
- **Terrain variability:**  
Terrain variability reflects the magnitude of topographic elevation and diversity in slope variation. A highly variable terrain will be recognised as one with great elevation differences and a diversity of slope variation creating talus slopes, cliffs and valleys. An undulating landscape with a monotonous and repetitive landform will be an example of a low terrain variability.
- **Land cover:**  
Land cover refers to the perceivable surface of the landscape and the diversity of patterns, colours and textures that are presented by the particular land cover (i.e. urbanised, cultivated, forested, etc.).

A basic rating system is used to evaluate the three VAC parameters. The values are relative and relate to the type of project that is proposed and how it may be absorbed in the landscape (Table 4). A three-value range is used; three (3) being the highest potential to absorb an element in the landscape and one (1) being the lowest potential. The values are counted together and categorised in a *high*, *medium* or *low* VAC rating.

**Table 4: Regional Visual Absorption Capacity evaluation**

ACTIVITY	VISUAL SCREENING	TERRAIN VARIABILITY	LAND COVER	VAC
Open Cast Mining	2	3	2	moderate
Underground Mining	2	3	2	moderate
Mine Residue and Infrastructure Facility	2	3	2	moderate
Transport Infrastructure	2	3	2	moderate
Overland Conveyor Belt	2	3	2	moderate
High Mast Lighting	2	3	2	moderate

The VAC of the study area is considered moderate, for the extension of the mining activities and provides a moderate overall screening capacity for this project. The moderate VAC relates to the slightly undulating topography and agricultural landscape with mostly monotonous vegetation.

Figure 4: Land Cover Map

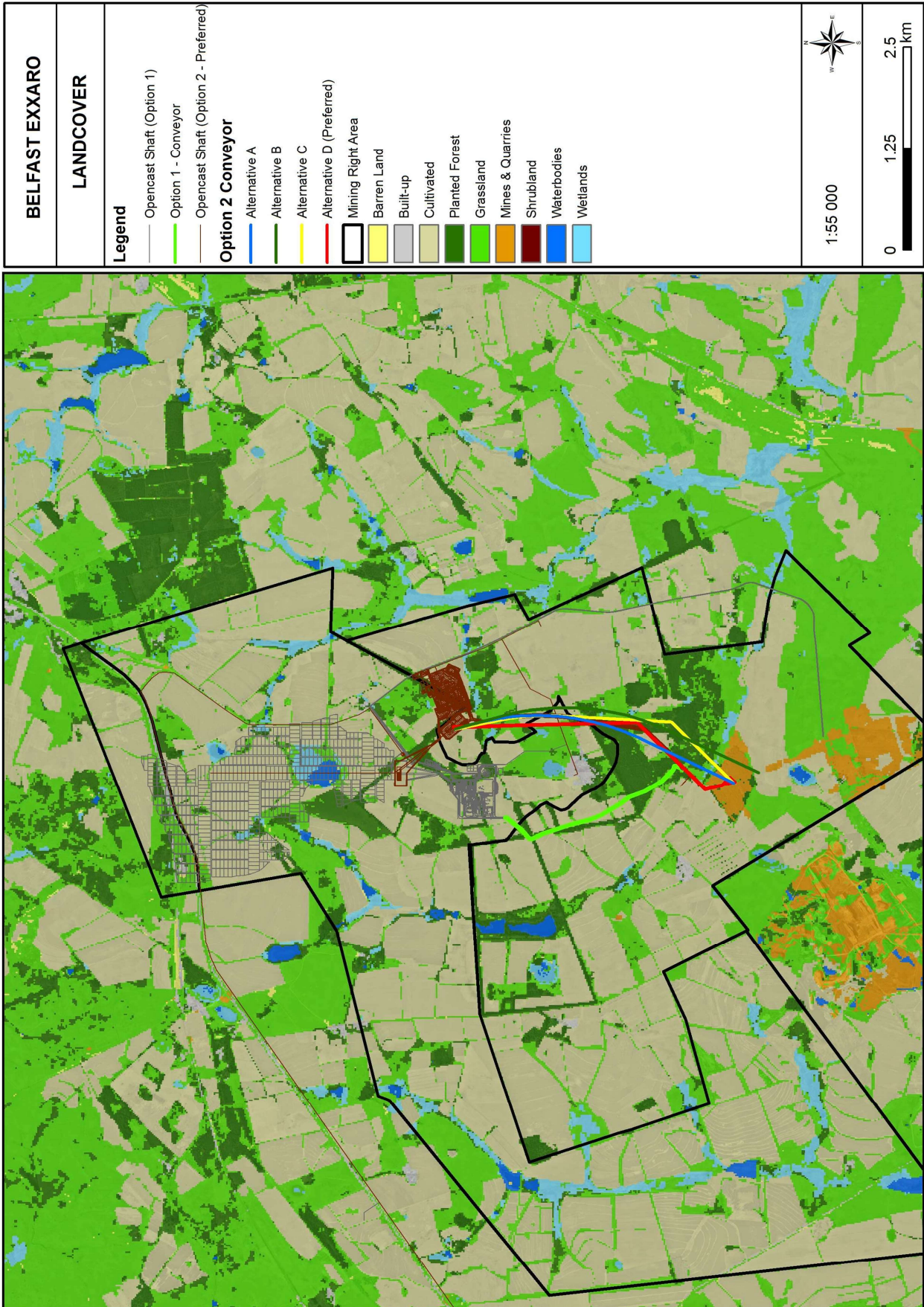
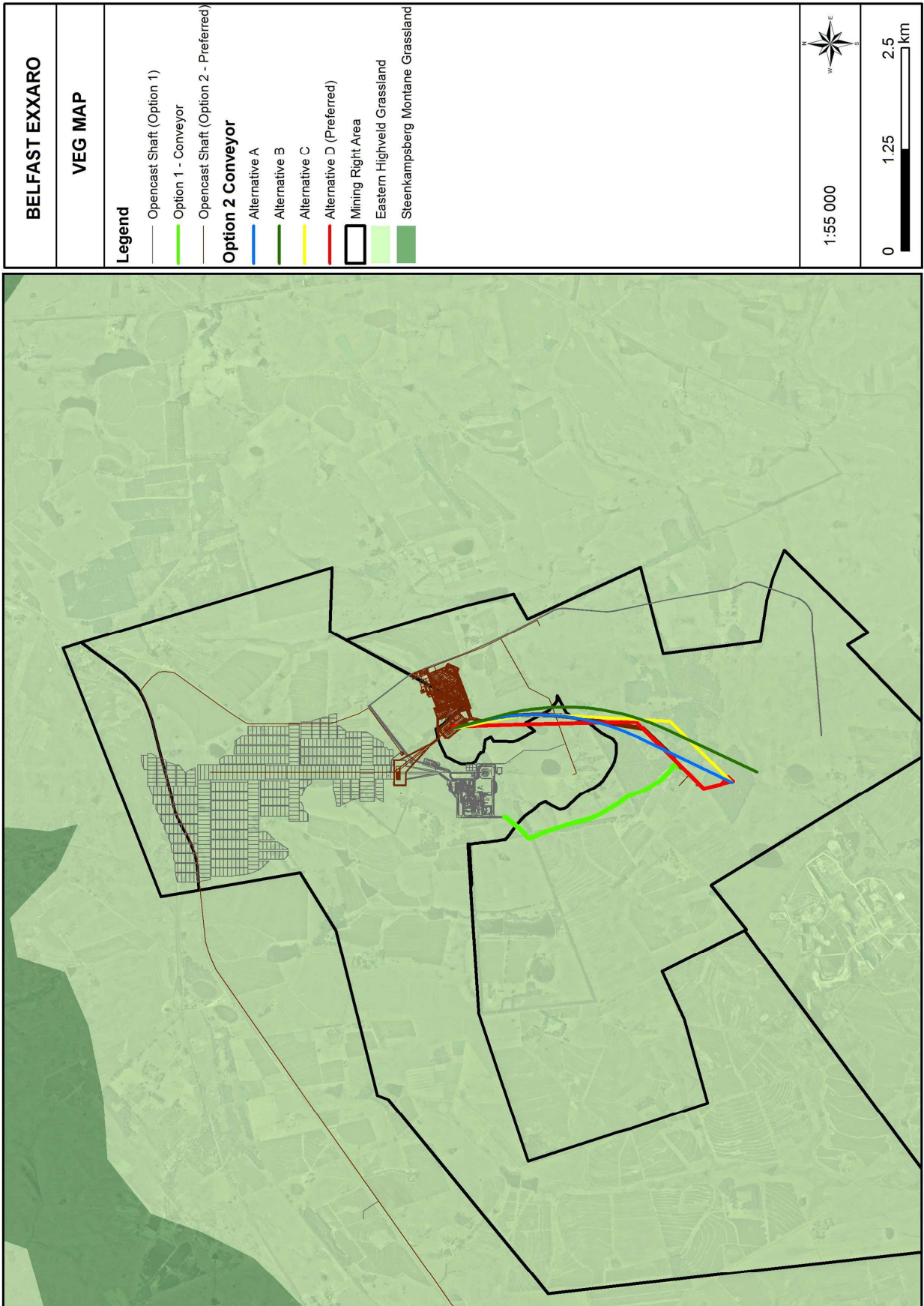


Figure 5: Vegetation Map



**Figure 6: Landscape Character of Study Area**



*Typical character of the landscape.*



*View towards the mine expansion area.*



*View towards existing mine.*

## 5. IMPACT ASSESSMENT

The significance of impacts is a comparative function relating to the severity of the identified impacts on the respective receptors. The significance of an impact is considered *high* should a *highly* sensitive receptor be exposed to a *highly* severe impact as indicated on Table 5 below.

**Table 5: Significance of impacts**

RECEPTOR SENSITIVITY	IMPACT SEVERITY		
	LOW	MEDIUM	HIGH
LOW	No significance	Low	Low
MEDIUM	Low	Medium	Medium
HIGH	Low	Medium	High

### 5.1. SIGNIFICANCE OF LANDSCAPE IMPACT

#### 5.1.1. LANDSCAPE CHARACTER SENSITIVITY

The sensitivity of the landscape character is an indication of the degree to which a particular landscape can accommodate change from a particular development, without detrimental effects on its character (GLVIA, 2002). A landscape with a *high* sensitivity would be one that is greatly valued for its aesthetic attractiveness and/or have ecological, cultural or social importance through which it contributes to the inherent character of the visual resource.

The majority of the study area is considered to have moderate to low landscape character sensitivity due to the mostly developed landscape, environmental degradation and the minimal pristine condition of the landscape, the moderate visual quality and minimal tourism value. The undulating agricultural landscape provides moderate visual screening towards mid and late summer when the vegetation is at maximum height. During the winter months, low visual screening is afforded by the landscape, except where the topography is varied. The site falls within the summer rainfall zone, and during the winter months plants are dormant and low growing.

Previous human induced activities and interventions have impacted significantly on the original landscape character. In this case, mining and existing infrastructure, including power lines, roads, mine dumps, etc., can be classified as landscape disturbances and elements that cause a reduction in the condition of the affected landscape type and negatively affect the quality of the visual resource.

The assessment of the landscape is substantiated through professional judgement and informed reasoning which is based on the landscape character assessment in Section 4 above. A landscape sensitivity rating was adapted from GOSW (2006) (Table 6) and applied in the classification of the study area into different sensitivity zones.

**Table 6: Landscape character sensitivity rating (Adapted from GOSW, 2006)**

	DESCRIPTION
<b>Low sensitivity</b>	<p>These landscapes are likely to:</p> <ul style="list-style-type: none"> <li>◦ Have distinct and well-defined landforms;</li> <li>◦ Have a strong sense of enclosure;</li> <li>◦ Provide a high degree of screening;</li> <li>◦ Have been affected by extensive development or man-made features;</li> <li>◦ Have reduced tranquillity;</li> <li>◦ Are likely to have little inter-visibility with adjacent landscapes; and</li> <li>◦ Exhibit no or a low density of sensitive landscape features that bare visual value.</li> </ul>
<b>Moderate sensitivity</b>	<p>These landscapes are likely to:</p> <ul style="list-style-type: none"> <li>◦ Have a moderately elevated topography with reasonably distinct landforms that provides some sense of enclosure;</li> <li>◦ Have been affected by several man-made features;</li> <li>◦ Have limited inter-visibility with adjacent landscapes; and</li> <li>◦ Exhibit a moderate density of sensitive landscape features that bare visual value.</li> </ul>
<b>High sensitivity</b>	<p>These landscapes are likely to:</p> <ul style="list-style-type: none"> <li>◦ Consist mainly of undulating plains and poorly defined landforms;</li> <li>◦ Be open or exposed with a remote character and an absence of man-made features;</li> <li>◦ Are often highly visible from adjacent landscapes; and</li> <li>◦ Exhibit a high density of sensitive landscape features that bare visual value.</li> </ul>

### 5.1.2. SEVERITY OF POTENTIAL LANDSCAPE IMPACTS

Landscape impacts are alterations to the fabric, character, visual quality and/or visual value which will either positively or negatively affect the landscape character. During the construction and operational phases, the project components are expected to impact on the landscape character of the landscape types it traverses. The magnitude/severity of this intrusion is measured against the scale of the project, the permanence of the intrusion and the loss in visual quality, -value and/or VAC.

Table 7: Landscape impact – Altering the landscape character.

LANDSCAPE IMPACT								
Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
<b>Construction phase</b>								
Open Cast Mining	Negative Impacting on the visual quality of the landscape due to the presence of foreign elements and a loss of vegetation cover	Localised impacts over an extensive area	Permanent if not mitigated	Low	Definite	Low	Low	High
Underground Mining				Low	Definite	Low	Low	High
Mine Residue and Infrastructure Facility				Low	Definite	Moderate	Low	High
Transport Infrastructure				Low	Definite	Low	Low	High
Overland Conveyor Belt				Low	Definite	Low	Low	High
High Mast Lighting				Low	Definite	Low	Low	High
<b>Operational phase</b>								
Open Cast Mining	Negative Impacting on the visual quality of the landscape.	Localised impact	Permanent if not mitigated	Low	Definite	Moderate	Low	High
Underground Mining				Low	Definite	Low	Low	High
Mine Residue and Infrastructure Facility				Moderate	Definite	Moderate	Low	High
Transport Infrastructure				Low	Definite	Moderate	Low	High
Overland Conveyor Belt				Low	Definite	Moderate	Low	High
High Mast Lighting				Moderate	Definite	Moderate	Moderate	High

### Construction phase

The activities that are expected to cause landscape impacts and that are associated with the construction phase, are the establishment of construction camps and the new roads. These activities will create surface disturbances which will result in the removal of vegetation, mostly through agricultural land and the exposure of the underlying soil. The exposed soil and change in texture will contrast severely with the intact vegetation around the disturbance footprint.

The size and location of the construction camps will play a major role in the severity of the landscape impact. Accurate technical information is not available for the construction camps but due to the disturbed, industrial character of the area the construction camp will be easily associated with the mine and therefore mitigates the impact considerably.



Considering the moderate to low VAC throughout most of the study area, the developed condition of great parts of the landscape and the relatively high recovery rate of the endemic vegetation, the *severity of landscape impact* during the construction stage is expected to be *low*.

The *severity of the landscape impact* can however be mitigated to a low severity for all the activities. Sensitive placement of the construction camps, limited surface disturbance and prompt rehabilitation are prerequisite conditions if the severity of the impact is to be reduced.

#### Operational phase

All operational activities (dust, transportation trucks, coal waste stockpiles) will be visible from a certain distance from the mine. It will pose a visual impact to rural residents that look onto the site and road users that regularly use the main road.

Surface disturbances that occur during construction may remain for an extended period during the operational phase. These are seen as residual effects carried forward from the construction phase and can be completely or substantially mitigated if treated appropriately during the construction phase.

Dust pollution and movement of machinery will also cause a visual intrusion. The existing mining activities and visual association of the workings of a mine will help to reduce the impact. Dust suppression measures should take place to mitigate the visual impact caused by dust pollution.

Lighting on the mine at night will have a high visual impact to viewers within close proximity to the mine.

#### Closure phase

Upon closure of the mining activities, rehabilitation of affected areas will take place and visual aesthetics will be improved. Minimal negative residual impact is expected on visual aspects.

## **5.2. SIGNIFICANCE OF VISUAL IMPACTS**

### **5.2.1. VIEWER SENSITIVITY**

Within the receiving environment, specific viewers (visual receptors) experience different views of the visual resource and value it differently. They will be affected because of alterations to their views due to the proposed project. The visual receptors are grouped according to their similarities. The visual receptors included in this study are:

- Residents
- Motorists
- Tourists

To determine visual receptor sensitivity, a commonly used rating system is utilised. This is a generic classification of visual receptors and enables the visual impact specialist to establish a logical and consistent visual receptor sensitivity rating for viewers who are involved in different activities without engaging in extensive public surveys.

#### **5.2.1.1 Residents**

Residents of the affected environment are classified as visual receptors of *high* sensitivity owing to their sustained visual exposure to the proposed development as well as their attentive interest towards their living environment.

### 5.2.1.2 Tourists

These are regarded as visual receptors of exceptional *high* sensitivity. Their attention is focused on the landscape which they essentially utilise for enjoyment purposes and appreciation of the quality of the landscape.

### 5.2.1.3 Motorists

Motorists are generally classified as visual receptors of *low* sensitivity due to their momentary view and experience of the proposed development. As a motorist's speed increases, the sharpness of lateral vision declines, and the motorist tends to focus on the line of travel (USDOT, 1981). This adds weight to the assumption that under normal conditions, motorists will show *low* levels of sensitivity as their attention is focused on the road and their exposure to roadside objects is brief.

## 5.2.2. SEVERITY OF POTENTIAL VISUAL IMPACTS

Severity of visual impact refers to the magnitude of change to specific visual receptor's views and/or experience of the landscape. Severity of visual impact is influenced by the following factors:

- The **viewer's exposure** to the project:
  - Distance of observers from the proposed project
  - The visibility of the proposed project (ZVI)
  - Number of affected viewers and
  - Duration of views to development experienced by affected viewers.
- Degree of **visual intrusion** created by the project.

Empirical research indicates that the visibility of the proposed new logistics route and hence the severity of visual impact, decreases as the distance between the observer and the road increases. The landscape type, through which the road crosses, can mitigate the severity of visual impact through topographical or vegetative screening. A complex landscape setting with a diverse land cover and topographical variation has the ability to decrease the severity of visual impact more than a mundane landscape (Bishop *et al*, 1985).

The Zone of Visual Influence (ZVI) is determined through a Geographical Information System (GIS). The result reflects a shaded pattern which identifies the areas that are expected to experience views of the proposed alignments. The ZVI is limited to 5 km from the proposed alignments.

A visibility analysis and viewer sensitivity has been completed for the Belfast Expansion Project (Appendix 1). According to Bishop *et al* (1988), visual receptors within 1 km from the alignments are most likely to experience the highest degree of visual intrusion, hence contributing to the severity of the visual impact. This is considered as the zone of highest visibility after which the degree of visual intrusion decreases rapidly at distances further away.

In order to assess the extent and degree of visibility in the visual envelope, a Geographical Information System (GIS) was utilized. A visibility analysis was performed which provides the following information on Figure 6 below:

- The areas within the visual envelope that may experience views of the proposed project; and
- The degree of visibility in terms of the percentage of the proposed project that will be visible from a specific location.

The GIS performs an analysis for a series of elevated observer points which represents the height of the logistics routes in a digital elevation model (DEM). This results in a visibility map with the degree of visibility illustrated by a colour. The visibility analysis considers worst-case scenarios, using line-of-sight, based on topography alone. The screening capability of vegetation is not captured in the base model of the DEM and is therefore not considered in these results.

A visibility analysis was also completed for the potential visual impact from the proposed high mast lighting and is Figure 7 in the Appendix.

### 5.2.2.1 Potential visual impacts on Residents

**Table 8: Potential visual impacts on residents**

VISUAL IMPACT ON RESIDENTS								
Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
<b>Construction phase</b>								
Open Cast Mining	Negative – Construction camp and lay-down yard may cause unsightly views	Local	Lifetime of Mine	Moderate	Probable	Moderate	Low	High
Underground Mining				Low	Probable	Low	Low	High
Mine Residue and Infrastructure Facility				Low	Probable	Low	Low	High
Transport Infrastructure				Low	Probable	Low	Low	High
Overland Conveyor Belt				Low	Probable	Low	Low	High
High Mast Lighting				Low	Probable	Low	Low	High
<b>Operational phase</b>								
Open Cast Mining	Negative – The presence of open cast mining, new infrastructure and transport and conveyor routes intrudes on existing views and spoils the views of the landscape.	Local	Lifetime of Mine	High	Definite	High	Moderate	High
Underground Mining				Low	Definite	Low	Low	High
Mine Residue and Infrastructure Facility				Moderate	Definite	Moderate	Low	High
Transport Infrastructure				Low	Definite	Low	Low	High
Overland Conveyor Belt				Moderate	Probable	Moderate	Low	High
High Mast Lighting				High	Definite	High	Moderate	High
<b>Closure phase</b>								
All Activities	Upon closure of mine and after rehabilitation	Local	Lifetime of Mine	Low	Low	Low	Low	High

The study area is moderately populated, with mostly agricultural and mining activities adjacent to the site. Farming communities surround the site. The towns and surrounding areas are generally degraded and not very scenic. Belfast is the closest town to the mine and is situated 9km to the north.

It can be concluded that the study area has a moderate density of residents that will be affected viewers.

#### Construction phase

During the construction phase, unsightly views may be created by the presence of the construction camp and the associated activities. The duration of the potential visual impact will be temporary which will result in an anticipated *low* significance of visual impact for all the activities. The visual exposure to the construction activity will be limited.

The cleared site, construction camp and material lay-down yards will appear unsightly and out of character. Large construction vehicles will be visible and increase awareness of the construction activity over a considerable area. The visual intrusion caused during the construction stage will be moderate but will be temporary in nature.

#### Operational phase

The residents of the settlements and farming communities surrounding the mine may experience a low degree of visual intrusion.

The current presence of the mines in the visual field of the residents will reduce the impact experienced.

The Visibility Analysis indicates that the highest infrastructure component will have the most intrusive visual impact on residents.

A possible visual impact to residents could be the traffic loading on surrounding roads, with large volumes of 30-ton interlink trucks transporting coal to the railway siding. Associated dust and noise could exacerbate the impact.

The Visual Absorption Capacity (VAC) of the landscape plays a role in the visibility of the proposed logistics routes. The landscape is gently undulating and in summer when vegetation is taller, the VAC is higher than dry winter months when vegetation will be scarce.

The region is associated with large-scale existing mining activities which reduces the significance of the overall visual impact and can be regarded as moderately low.

The anticipated visual impact related to lighting will be high for residents in close proximity to the proposed mine. The impact can be lowered to a moderate significance with correct mitigation measures.

#### Closure phase

The duration of the impact will only be as long as the mine is operational. Upon closure of mining activities, rehabilitation of all areas is anticipated, and the visual aesthetics will be improved. No negative residual impacts are expected on visual aspects.

## 5.2.2.2 Potential visual impacts on tourists

Table 9: Potential visual impacts on tourists

VISUAL IMPACT ON TOURISTS								
Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
<b>Construction phase</b>								
Open Cast Mining	Negative – Construction camp and lay-down yard may cause unsightly views	Local	Lifetime of Mine	Low	Probable	Low	Low	High
Underground Mining				Low	Low Probability	Low	Low	High
Mine Residue and Infrastructure Facility				Low	Probable	Low	Low	High
Transport Infrastructure				Low	Low Probability	Low	Low	High
Overland Conveyor Belt				Low	Probable	Low	Low	High
High Mast Lighting				Low	Probable	Low	Low	High
<b>Operational phase</b>								
Open Cast Mining	Negative – The presence of open cast mining, new infrastructure and transport and conveyor routes intrudes on existing views and spoils the views of the landscape.	Local	Lifetime of Mine	Moderate	Probable	Moderate	Low	High
Underground Mining				Low	Low Probability	Low	Low	High
Mine Residue and Infrastructure Facility				Moderate	Probable	Moderate	Low	High
Transport Infrastructure				Low	Low Probability	Low	Low	High
Overland Conveyor Belt				Moderate	Probable	Moderate	Low	High
High Mast Lighting				High	Probable	High	Moderate	High
<b>Closure phase</b>								
All Activities	Upon closure of mine and after rehabilitation	Local	Lifetime of Mine	Low	Low Probability	Low	Low	High

The study area has very little tourist activity. The entire regional area is considered to have low tourism potential, mostly because of the agricultural areas, large scale mining developments and overall environmental degradation. The district route is also not a main thoroughfare road used to reach prominent tourist destinations. The N4 which borders on the site is however a main tourist route to the Kruger National Park, but the visual impact is considered low due to many other mines along the route.

#### Construction phase

The temporary duration of the construction phase is not expected to cause major visual impacts. The location, number and size of the construction camps and lay-down yards will be crucial in regulating the impact. Detail information is not available, and it is anticipated that the visual impact will occur localised and that a very small number of tourists will be adversely affected by these project components during construction.

The potential visual impact on tourists during the construction phase of the proposed project can be mitigated with relative ease. The greatest factor to consider is the location of the construction camp.

#### Operational phase

Considering the ground level of the logistics routes, very few tourists might be affected during their visit to or passing through the study area. Although it is difficult to pinpoint particular locations in the study area that are of specific value, the areas next to the roads will be most important.

The severity of the visual impact of the expansion of the mine on tourists will be low, causing a low visual impact.

At night the lights of the mine may be seen along sections of the N4 where the landscape does not absorb the impact. The visual impact of the lights can be reduced by mitigating the impact.

#### Closure phase

The duration of the impact will only be as long as the mine is operational. Upon closure of mining activities, rehabilitation of all areas is anticipated, and the visual aesthetics will be improved. No negative residual impacts are expected on visual aspects.

## 5.2.2.3 Potential visual impacts on motorists

Table 10: Potential visual impacts on motorists

VISUAL IMPACT ON MOTORISTS								
Activity	Nature of Impact	Extent of Impact	Duration of Impact	Severity of Impact	Probability of Impact	Significance without Mitigation	Significance with Mitigation	Level of Confidence
<b>Construction phase</b>								
Open Cast Mining	Negative – Construction camp and lay-down yard may cause unsightly views	Local	Lifetime of Mine	Moderate	Probable	Moderate	Low	High
Underground Mining				Low	Low Probability	Low	Low	High
Mine Residue and Infrastructure Facility				Moderate	Probable	Moderate	Low	High
Transport Infrastructure				Low	Low Probability	Low	Low	High
Overland Conveyor Belt				Low	Low Probability	Low	Low	High
High Mast Lighting				Low	Low Probability	Low	Low	High
<b>Operational phase</b>								
Open Cast Mining	Negative – The presence of open cast mining, new infrastructure and transport and conveyor routes intrudes on existing views and spoils the views of the landscape.	Local	Lifetime of Mine	Moderate	Probable	Moderate	Low	High
Underground Mining				Low	Low Probability	Low	Low	High
Mine Residue and Infrastructure Facility				Moderate	Probable	Moderate	Low	High
Transport Infrastructure				Low	Low Probability	Low	Low	High
Overland Conveyor Belt				Moderate	Probable	Moderate	Low	High
High Mast Lighting				Moderate	Probable	Moderate	Low	High
<b>Operational phase</b>								
All Activities	Upon closure of mine and after rehabilitation	Local	Lifetime of Mine	Low	Low Probability	Low	Low	High

The major routes within the study area are the N4 and R33, connecting the towns, mines and farms. The secondary road network in the study area carries a much lower volume of motorists. Many of the roads are gravel roads which are utilized by the local residents. Their duration of views will be temporary, and it is expected that the visual intrusion that they will experience will be low. The visibility analysis for all activities show that motorists on the N4 will not be significantly affected.

#### Construction phase

The potential visual impact that may be experienced by motorists during the construction phase is considered to be minimal. Limited information is available, and the number, location and size of the construction camps and lay-down yard are essential for accurately assessing the visual impact.

The presence of the construction camp and lay-down yard may create unsightly views. Motorists' visual exposure to the impact will be brief and the severity of visual impact will be *low*. The significance of potential visual impact is expected to be *low*.

#### Operational phase

The severity and significance of visual impact for the proposed activities by the expansion of the mine on motorists will be low. The speed at which motorists travel and the association of the regional area with coal mines, also has a moderating effect on the severity of the visual impact and further reduces visual exposure.

Motorists on surrounding roads may be affected by the trucks used to transport coal to the railway sidings. Even though it is assumed most motorists using these routes are associated with the mines.

The lighting at night may be visible at intervals to motorists on the R33 and N4. Mitigation measures can be implemented to reduce the visual impact on motorists.

#### Closure phase

The duration of the impact will only be as long as the mine is operational. Upon closure of mining activities, rehabilitation of all areas is anticipated, and the visual aesthetics will be improved. No negative residual impacts are expected on visual aspects.

## **6. RECOMMENDED MITIGATION MEASURES**

The aim of mitigation is to reduce or alleviate the intrusive contrast between the proposed project components and activities, and the receiving landscape to a point where it is acceptable to visual and landscape receptors.

### **6.1. GENERAL**

- Where areas are going to be disturbed through the destruction of vegetation, for example the establishment of the construction camp, the vegetation occurring in the area to be disturbed must be replanted with endemic, indigenous species, especially veld-grass and trees. A hydroseeding application is recommended in the disturbed areas as a measure of rehabilitation.

### **6.2. ACCESS ROUTES**

- Make use of existing access roads where possible.
- Where new access roads are required, the disturbance area should be kept to a minimum. A two-track dirt road will be the most preferred option.



- Locate access routes so as to limit modification to the topography and to avoid the removal of established vegetation.
- Avoid crossing over or through ridges, rivers, pans or any natural features that have visual value. This also includes centres of floral endemism and areas where vegetation is not resilient and takes extended periods to recover.
- Road verges that need to be cleared should be kept to a minimum.
- Access routes should be located on the perimeter of disturbed areas such as cultivated/fallow lands as not to fragment intact vegetated areas.
- If it is necessary to clear vegetation for a road, avoid doing so in a continuous straight line. Alternatively, curve the road in order to reduce the visible extent of the cleared corridor.

### **6.3. CLEARED SERVITUDES**

- Locate the alignment and the associated cleared servitude so as to avoid the removal of established vegetation; and
- Avoid a continuous linear path of cleared vegetation that would strongly contrast with the surrounding landscape character. Feather the edges of the cleared corridor to avoid a clearly defined line through the landscape.

### **6.4. CONSTRUCTION CAMPS AND LAY DOWN YARDS**

- If practically possible, locate construction camps in areas that are already disturbed or where it isn't necessary to remove established vegetation in naturally bare areas.
- Utilise existing screening features such as dense vegetation stands or topographical features to place the construction camps and lay-down yards out of the view of sensitivity visual receptors.
- Keep the construction sites and camps neat, clean and organised in order to portray a tidy appearance.
- Screen the construction camp and lay-down yards by enclosing the entire area with a dark green or black shade cloth of no less than 2m height.

### **6.5. HIGH MAST LIGHTING**

- Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself).
- Directing light sources away from residential units and roads.
- Limiting mounting heights of lighting fixtures.
- Making use of minimum lumen or wattage in fixtures.
- Making use of down-lighters or shielded fixtures.
- Making use of low impact lighting.
- Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.

## 7. CONCLUSION

The six proposed main activities associated with the Belfast Expansion Project have been evaluated against internationally accepted criteria to determine the impact they will have on the landscape character and the viewers that have been identified in the study area.

The activities have been rated in the table below, including the visual impact before mitigation measures and after mitigation measures have been applied.

**Table 11: Evaluation of activities for mining extension during the Construction Phase**

Visual Impact of Alternatives	Corrective Measures	Impact Rating Criteria					
		Nature	Extent	Duration	Magnitude	Probability	Significance
Open Cast Mining	No	Negative	2	3	4	3	27 low
	Yes	Negative	2	3	4	3	27 low
Underground Mining	No	Negative	2	2	3	3	21 low
	Yes	Negative	2	2	3	3	21 low
Mine Residue and Infrastructure Facility	No	Negative	2	3	4	2	18 low
	Yes	Negative	2	3	3	2	16 low
Transport Infrastructure	No	Negative	2	2	3	3	21 low
	Yes	Negative	2	2	2	2	14 low
Overland Conveyor Belt	No	Negative	2	2	3	3	21 low
	Yes	Negative	2	2	2	2	14 low
High Mast Lighting	No	Negative	2	2	3	3	21 low
	Yes	Negative	2	2	2	2	14 low

**Table 12: Evaluation of activities for mining extension during the Operation Phase**

Visual Impact of Alternatives	Corrective Measures	Impact Rating Criteria					
		Nature	Extent	Duration	Magnitude	Probability	Significance
Open Cast Mining	No	Negative	2	4	6	3	36 medium
	Yes	Negative	2	4	4	3	30 medium - low
Underground Mining	No	Negative	2	4	6	3	36 medium
	Yes	Negative	2	4	4	3	30 medium - low
Mine Residue and Infrastructure Facility	No	Negative	2	4	6	3	36 medium
	Yes	Negative	2	4	4	3	30 medium - low
Transport Infrastructure	No	Negative	2	4	4	3	30 medium - low
	Yes	Negative	2	4	2	3	24 low
Overland Conveyor Belt	No	Negative	2	4	4	3	30 medium - low
	Yes	Negative	2	4	2	3	24 low
High Mast Lighting	No	Negative	2	4	4	4	40 medium
	Yes	Negative	2	4	3	3	27 low

The following Visual Impact Assessment Criteria (as utilised in table above) applies:

**Status of Impact:**

The visual impact is assessed as either having a:  
 Negative effect (i.e. at a cost to the environment),  
 Positive effect (i.e. a benefit to the environment), or  
 Neutral effect on the environment.

**Extent of the Impact:**

- (1) Site (site only),
- (2) Local (site boundary and immediate surrounds),
- (3) Regional,
- (4) National, or
- (5) International.

**Duration of the Impact:**

- The length that the impact will last for is described as either:
- (1) Immediate (<1 year)
  - (2) Short term (1-5 years),
  - (3) Medium term (5-15 years),
  - (4) Long term (ceases after the operational life span of the project),
  - (5) Permanent.

**Magnitude of the Impact:**

- The intensity or severity of the impacts is indicated as either:
- (0) none,
  - (2) Minor,
  - (4) Low,

- (6) Moderate (environmental functions altered but continue),
- (8) High (environmental functions temporarily cease), or
- (10) Very high / unsure (environmental functions permanently cease).

**Probability of Occurrence:**

The likelihood of the impact actually occurring is indicated as either:

- (0) None (the impact will not occur),
- (1) Improbable (probability very low due to design or experience)
- (2) Low probability (unlikely to occur),
- (3) Medium probability (distinct probability that the impact will occur),
- (4) High probability (most likely to occur), or
- (5) Definite.

**Significance of the Impact:**

Based on the information contained in the points above, the potential impacts are assigned a significance rating (S). This rating is formulated by adding the sum of the numbers assigned to extent (E), duration (D) and magnitude (M) and multiplying this sum by the probability (P) of the impact.

$$S = (E+D+M) P$$

The significance ratings are given below

- (<30) low (i.e. where this impact would not have a direct influence on the decision to develop in the area),
- (30-60) medium (i.e. where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- (>60) high (i.e. where the impact must have an influence on the decision process to develop in the area).

## **APPENDIX 1**

Figure 7 reflects the results of a viewer sensitivity visibility assessment, carried out using GIS software. The results provide a clear interpretation of the extent of the visual influence and also provide an indication of the land use that can be expected in the affected areas.

Figure 8 shows the results of the visual impact of the high light masts proposed on site within a radius of 5km from site.

Figure 7: Visibility Analysis

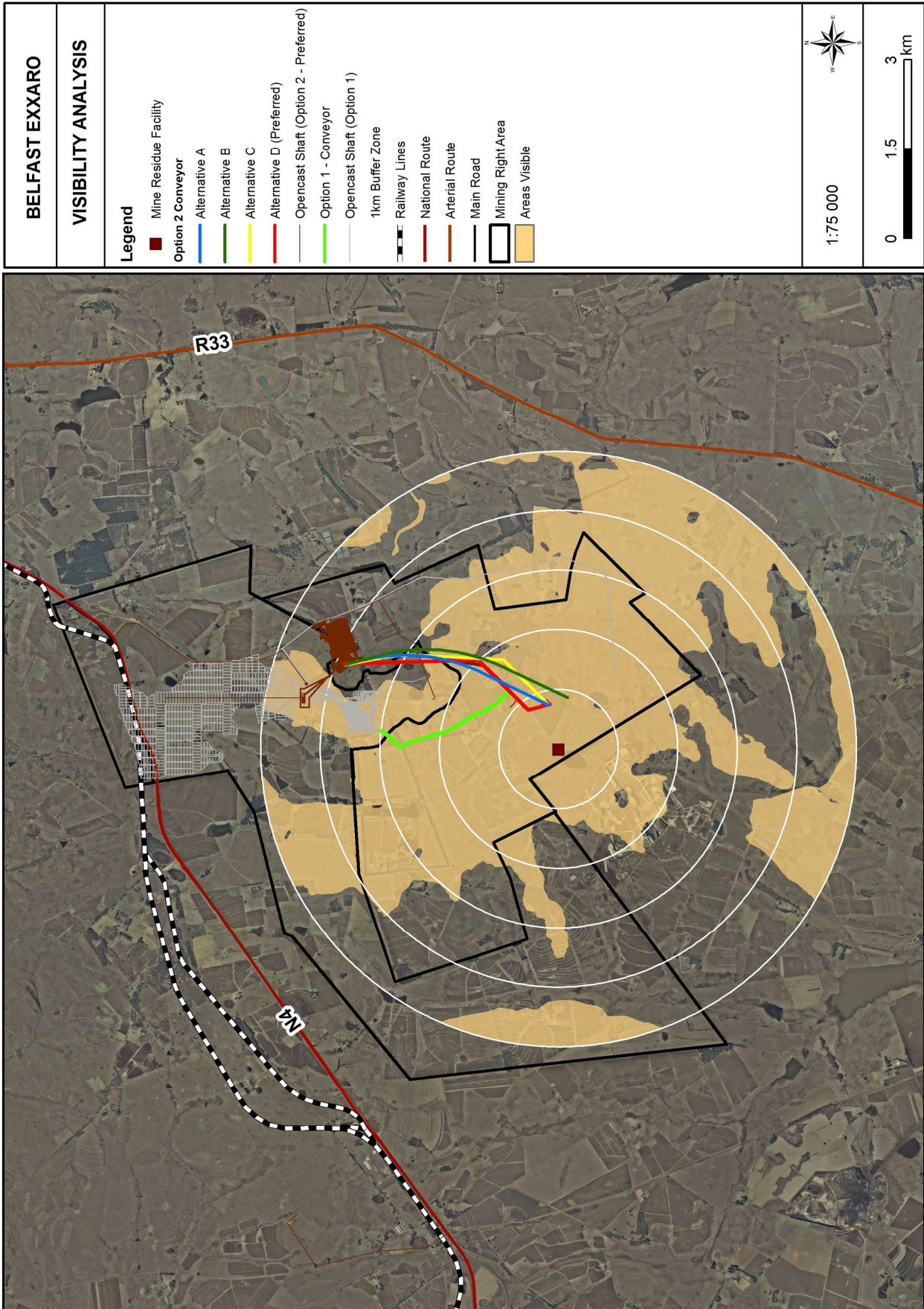
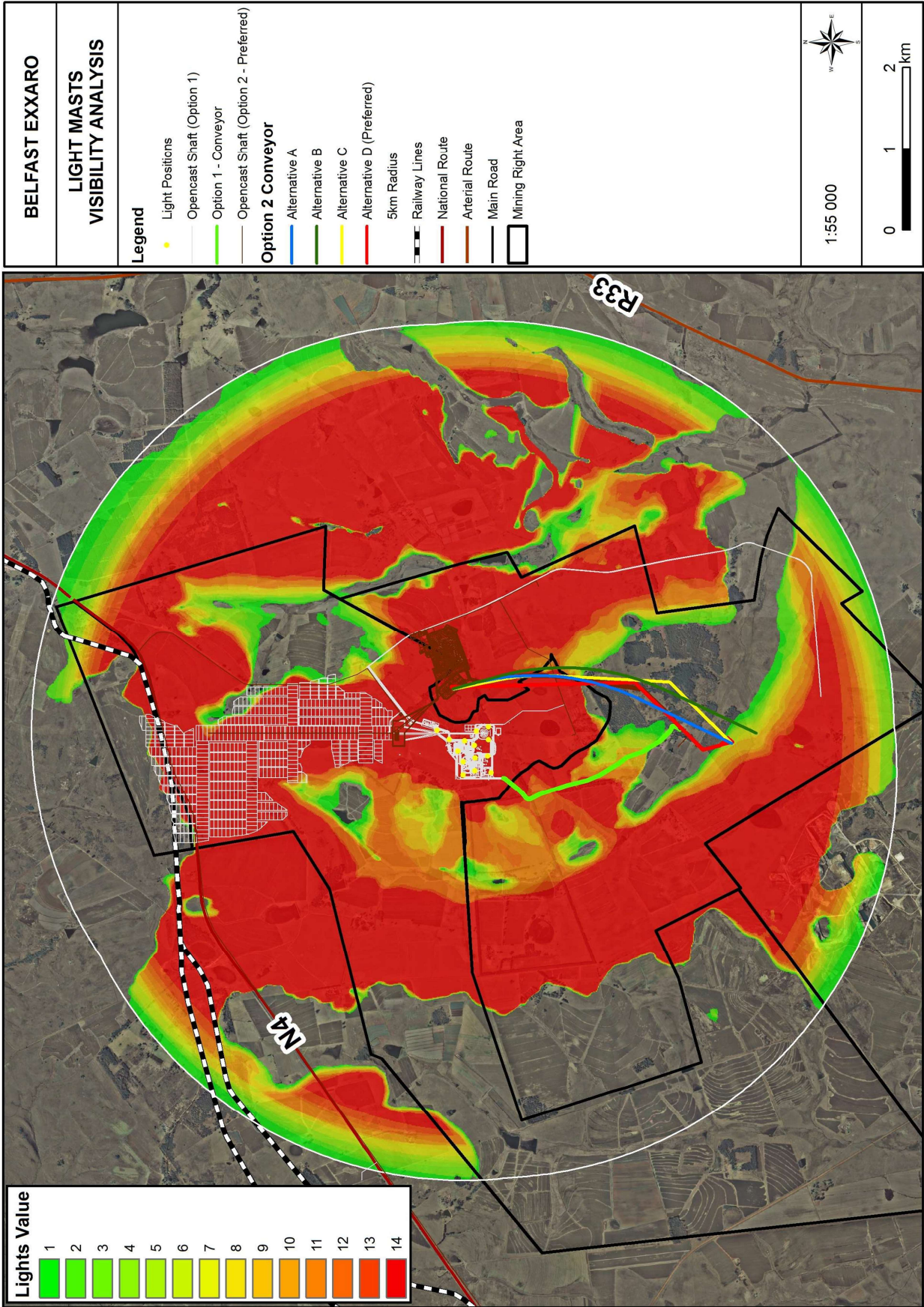


Figure 8: Lighting Visibility Analysis



## GLOSSARY OF TERMS

<b>Aesthetics</b>	The science or philosophy concerned with the quality of sensory experience. (ULI, 1980)
<b>Horizon contour</b>	A line that encircles a development site and that follows ridgelines where the sky forms the backdrop, and no landform is visible as a background. This is essentially the skyline that when followed through the full 360-degree arc as viewed from a representative point on the site defines the visual envelope of the development. This defines the boundary outside which the development would not be visible.
<b>Landscape characterisation/ character</b>	This covers the gathering of information during the desktop study and field survey work relating to the existing elements, features, and extent of the landscape (character). It includes the analysis and evaluation of the above and the supporting illustration and documentary evidence.
<b>Landscape condition</b>	Refers to the state of the landscape of the area making up the site and that of the study area in general. Factors affecting the condition of the landscape can include the level maintenance and management of individual landscape elements such as buildings, woodlands etc and the degree of disturbance of landscape elements by non-characteristics elements such as invasive tree species in grassland or car wrecks in a field.
<b>Landscape impact</b>	Changes to the physical landscape resulting from the development that include; the removal of existing landscape elements and features, the addition of new elements associated with the development and altering of existing landscape elements or features in such as way as to have a detrimental effect on the value of the landscape.
<b>Landscape unit</b>	A landscape unit can be interpreted as an “outdoor room” which are enclosed by clearly defined landforms or vegetation. Views within a landscape unit are contained and face inward.
<b>Sense of place</b>	That distinctive quality that makes a particular place memorable to the visitor, which can be interpreted in terms of the visual character of the landscape. A more emotive sense of place is that of local identity and attachment for a place “ <i>which begins as undifferentiated space [and] becomes place as we get to know it better and endow it with value</i> ” (Tuan 1977) <sup>1</sup> .
<b>Viewer exposure</b>	The extent to which viewers are exposed to views of the landscape in which the proposed development will be located. Viewer exposure considers the visibility of the site, the viewing conditions, the viewing distance, the number of viewers affected the activity of the viewers (tourists or workers) and the duration of the views.
<b>Viewer sensitivity</b>	The assessment of the receptivity of viewer groups to the visible landscape elements and visual character and their perception of visual quality and value. The sensitivity of viewer groups depends on their activity and awareness within the affected landscape, their preferences, preconceptions and their opinions.
<b>Visual absorption capacity (VAC)</b>	The inherent ability of a landscape to accept change or modification to the landscape character and/or visual character without diminishment of the visual quality or value, or the loss of visual amenity. A high VAC rating implies a high ability to absorb visual impacts while a low VAC implies a low ability to absorb or conceal visual impacts.

<sup>1</sup> Cited in Climate Change and Our 'Sense of Place', <http://www.ucsus.org/greatlakes/glimpactplace.html>

<b>Visual amenity</b>	The notable features such as hills or mountains or distinctive vegetation cover such as forests and fields of colour that can be identified in the landscape and described. Also included are recognised views and viewpoints, vistas, areas of scenic beauty and areas that are protected in part for their visual value.
<b>Visual character</b>	This addresses the viewer response to the landscape elements and the relationship between these elements that can be interpreted in terms of aesthetic characteristics such as pattern, scale, diversity, continuity and dominance.
<b>Visual contour</b>	The outer perimeter of the visual envelope determined from the site of the development. The two-dimensional representation on plan of the horizon contour.
<b>Visual contrast</b>	The degree to which the physical characteristics of the proposed development differ from that of the landscape elements and the visual character. The characteristics affected typically include: <ul style="list-style-type: none"> <li>• Volumetric aspects such as size, form, outline and perceived density;</li> <li>• Characteristics associated with balance and proportion such scale, diversity, dominance, continuity;</li> <li>• Surface characteristics such as colour, texture, reflectivity; and</li> <li>• Luminescence or lighting.</li> </ul>
<b>Visual envelope</b>	The approximate extent within which the development can be seen. The extent is often limited to a distance from the development within which views of the development are expected to be of concern.
<b>Visual impact</b>	Changes to the visual character of available views resulting from the development that include: obstruction of existing views; removal of screening elements thereby exposing viewers to unsightly views; the introduction of new elements into the view shed experienced by visual receptors and intrusion of foreign elements into the view shed of landscape features thereby detracting from the visual amenity of the area.
<b>Visual impact assessment</b>	A specialist study to determine the visual effects of a proposed development on the surrounding environment. The primary goal of this specialist study is to identify potential risk sources resulting from the project that may impact on the visual environment of the study area, and to assess their significance. These impacts include landscape impacts and visual impacts.
<b>Visual quality</b>	An assessment of the aesthetic excellence of the visual resources of an area. This should not be confused with the value of these resources where an area of low visual quality may still be accorded a high value. Typical indicators used to assess visual quality are vividness, intactness and unity. For more descriptive assessments of visual quality attributes such as variety, coherence, uniqueness, harmony, and pattern can be referred to.
<b>Visual receptors</b>	Includes viewer groups such as the local community, residents, workers, the broader public and visitors to the area, as well as public or community areas from which the development is visible. The existing visual amenity enjoyed by the viewers can be considered a visual receptor such that changes to the visual amenity would affect the viewers.
<b>Zone of visual influence</b>	The extent of the area from which the most elevated structures of the proposed development could be seen and may be considered to be of interest (see visual envelope).



## LEVEL OF CONFIDENCE

Table 13: Confidence level chart and description

CONFIDENCE LEVEL CHART				
		Information, knowledge and experience of the <b>project</b>		
		3b	2b	1b
Information, and knowledge of the <b>study area</b>	3a	9	6	3
	2a	6	4	2
	1a	3	2	1

3a – A *high* level of information is available of the **study area** in the form of recent aerial photographs, GIS data, documented background information and a thorough knowledge base could be established during site visits, surveys etc. The study area was readily accessible.

2a – A *moderate* level of information is available of the **study area** in the form of aerial photographs GIS data and documented background information and a moderate knowledge base could be established during site visits, surveys etc. Accessibility to the study area was acceptable for the level of assessment.

1a – *Limited* information is available of the **study area** and a poor knowledge base could be established during site visits and/or surveys, or no site visit and/or surveys were carried out.

3b – A *high* level of information and knowledge is available of the **project** in the form of up-to-date and detailed engineering/architectural drawings, site layout plans etc. and the visual impact assessor is well experienced in this type of project and level of assessment.

2b – A *moderate* level of information and knowledge is available of the **project** in the form of conceptual engineering/architectural drawings, site layout plans etc. and/or the visual impact assessor is moderately experienced in this type of project and level of assessment.

1b – *Limited* information and knowledge is available of the **project** in the form of conceptual engineering/architectural drawings, site layout plans etc. and/or the visual impact assessor has a low experience level in this type of project and level of assessment. (Adapted from Oberholzer. B, 2005)

## VISUAL RECEPTOR SENSITIVITY

Table 14: Visual receptor sensitivity

<b>VISUAL RECEPTOR SENSITIVITY</b>	<b>DEFINITION (BASED ON THE GLVIA 2<sup>ND</sup> ED PP90-91)</b>
<b>Exceptional</b>	Views from major tourist or recreational attractions or viewpoints promoted for or related to appreciation of the landscape, or from important landscape features.
<b>High</b>	Users of all outdoor recreational facilities including public and local roads or tourist routes whose attention or interest may be focussed on the landscape; Communities where the development results in changes in the landscape setting or valued views enjoyed by the community; Residents with views affected by the development.
<b>Moderate</b>	People engaged in outdoor sport or recreation (other than appreciation of the landscape);
<b>Low</b>	People at their place of work or focussed on other work or activity; Views from urbanised areas, commercial buildings or industrial zones; People travelling through or passing the affected landscape on transport routes.
<b>Negligible (Uncommon)</b>	Views from heavily industrialised or blighted areas

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