

February 2010

**VISUAL SPECIALIST
REPORT**

SPECIALIST STUDY

*PROPOSED TUTUKA GENERAL
WASTE DISPOSAL SITE VISUAL
IMPACT SPECIALIST STUDY*

Proponent: Eskom Holdings Limited

Prepared by: Zitholele Consulting

**FINAL VISUAL IMPACT
REPORT**

Project 12333

EXECUTIVE SUMMARY

The Tutuka Power Station is looking to either extend their current waste disposal site or to establish a new general waste disposal site. In terms of the NEMA legislation an EIA is required to obtain an environmental authorisation for the proposed project. In addition the NEM: WA requires a waste license application to be submitted. As part of these reports, specialist studies were undertaken for the various environmental elements. In this report the findings from the visual impact assessment are detailed.

The proposed waste disposal site is located adjacent to a non-perennial stream to the west of the Tutuka Power Station. Elevations in the area range between 1 665 and 1 550 mamsl resulting in a rolling topography with intermittent streams and wetlands.

The current visual environment is impacted by the Tutuka Power Station, the New Denmark Colliery and the Thuthukani Township. There is also an existing waste disposal site on the study site which has reached a height of 5 m above ground level.

The proposed new waste site will reach a maximum height of 30 m above ground level, elevating it higher than the current site. The viewshed generated for the site indicates that the site will be visible from New Denmark and the Tutuka Power Station, while views from the Thuthukani Township are relatively restricted. These places along with several farmhouses in the area constitute the main static observers of the proposed development. This impact is rated as a **Moderate impact**.

The dynamic viewers of the site will be mostly travellers on the Thuthukani – Tutuka road and the New Denmark – Standerton road. There is some screening in the form of planted trees along the Thuthukani – Tutuka road but none along the other road. Views from these roads will be from a relatively close distance but only for a period of 22 seconds and 2 minutes respectively. This impact is rated as a **Low impact**.

The review of the visual resources at the proposed Tutuka general waste disposal site has found that the proposed development has the potential to impact on the visual environment. However these impacts can be mitigated by the successful implementation of the mitigation measures proposed in this report. It is therefore recommended that the development be approved conditional to the implementation of the abovementioned mitigation measures.

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1 INTRODUCTION

1.1 PROJECT BACKGROUND

Eskom is currently operating the Tutuka Power Station as part of its electricity generation fleet. Throughout the operational life of the station, general waste, inclusive of garden waste and building rubble, is being generated. This waste is being disposed of in an authorised general waste disposal site within the Tutuka Power Station premises.

The current waste disposal site provides domestic waste disposal services to New Denmark Colliery, Thuthukani Township, Tutuka Power Station, selected contractors and some neighbouring farmers. This particular disposal site has reached its capacity, and as of the end of October 2008, the waste has been transported to a waste disposal site at Kriel town, which is approximately 200 km away from the power station. The associated transportation costs are high and therefore an alternative means of waste disposal needs to be put in place.

Two alternatives are available for the Tutuka Power Station waste disposal site. The first would be to extend the current waste disposal site and to apply for a permit amendment into a new Waste License. The second alternative is to establish a new waste disposal site within close proximity to the power station property and the current site. A site selection exercise in line with the Minimum Requirements for the Disposal of Waste by Landfill, Draft 3rd edition (Department of Water Affairs¹, 2005) was undertaken to identify the suitable alternatives.

After the site selection process a study area was identified that should provide sufficient space for any of the potential waste disposal site alternatives. The study area is illustrated in Figure 1-1 below.

¹ DWA previously referred to as the Department of Water Affairs and Forestry (DWAf).

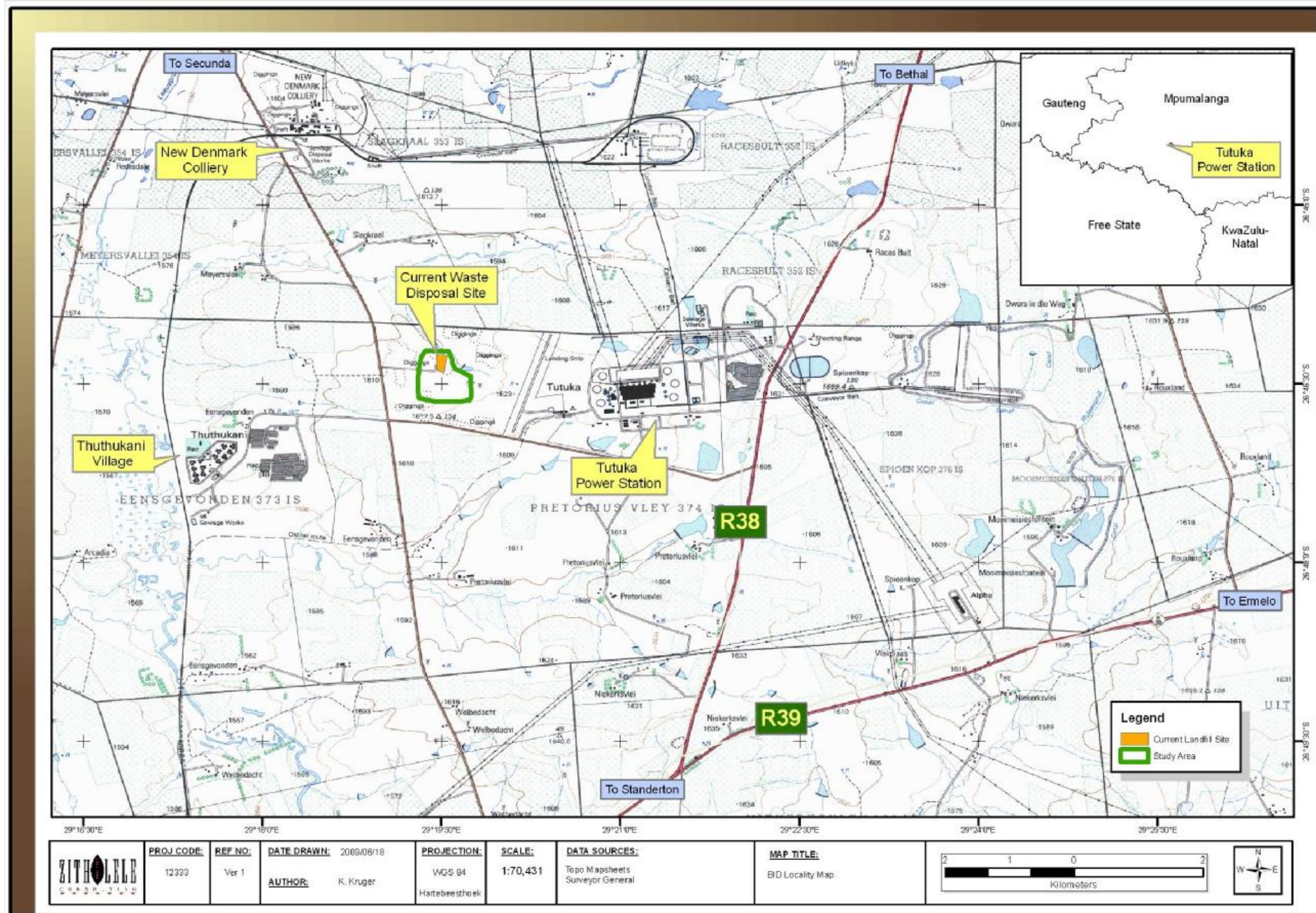


Figure 1-1: Proposed waste disposal site location.

1.2 STUDY SCOPE

Eskom's Generation Division has appointed Zitholele Consulting (Pty) Ltd, an independent company, to conduct an EIA and Waste Licence Application to evaluate the potential environmental and social impacts of the proposed project. As part of the environmental impact assessment for the aforementioned project it is required that certain biophysical specialist investigations are undertaken. Internal resources at Zitholele Consulting were appointed to undertake the Topography and Visual Impact Assessment which is detailed in this report.

1.3 STUDY APPROACH

Internal resources at Zitholele Consulting undertook the visual impact specialist study through a site visit, and by desktop investigations using GIS software and data from the Surveyor General's database.

1.4 PROJECT PERSONNEL

The following project personnel was involved in the compilation of this report.

Konrad Kruger, BSc Hons (Geog)

Mr. Konrad Kruger graduated from the University of Pretoria with a BSc Honours in Geography in 2003. He has been involved in a variety of environmental projects in the last six years and has become specialised in undertaking specialist studies, mapping and environmental consulting. He has undertaken GIS mapping for mining, residential as well as industrial developments. He is also an experienced land ecologist and will provide expertise for this project in terms of soil surveys, land capability assessments and mapping.

1.5 ASSUMPTIONS AND LIMITATIONS

The following assumptions were made during the assessment:

- The information regarding the location of the waste disposal site provided by Eskom is accurate; and
- The waste disposal site will reach a maximum height of 30 m above ground.

2 BIOPHYSICAL RECEIVING ENVIRONMENT

This section details the receiving environment at the project location. For the context of this report the regional environment refers to a 30 km radius around the study area.

2.1 TOPOGRAPHY

2.1.1 Data Collection

The topography data was obtained from the Surveyor General's 1:50 000 toposheet data for the region, namely 2629CB and CD. Contours were combined from the topographical mapsheets to form a combined contour layer. Using the Arcview GIS software the contour information was used to develop a digital elevation model of the region as shown in Figure 2-1 below.

2.1.2 Regional Description

The topography of the region is gently undulating to moderately undulating landscape of the Highveld plateau. Some small scattered wetlands and pans occur in the area, rocky outcrops and ridges also form part of significant landscape features in the area. Altitude ranges between 1 550 – 1 665 metres above mean sea level (mamsl). Figure 2-1 provides an illustration of the topography of the site. There are no ridges in the immediate study area.

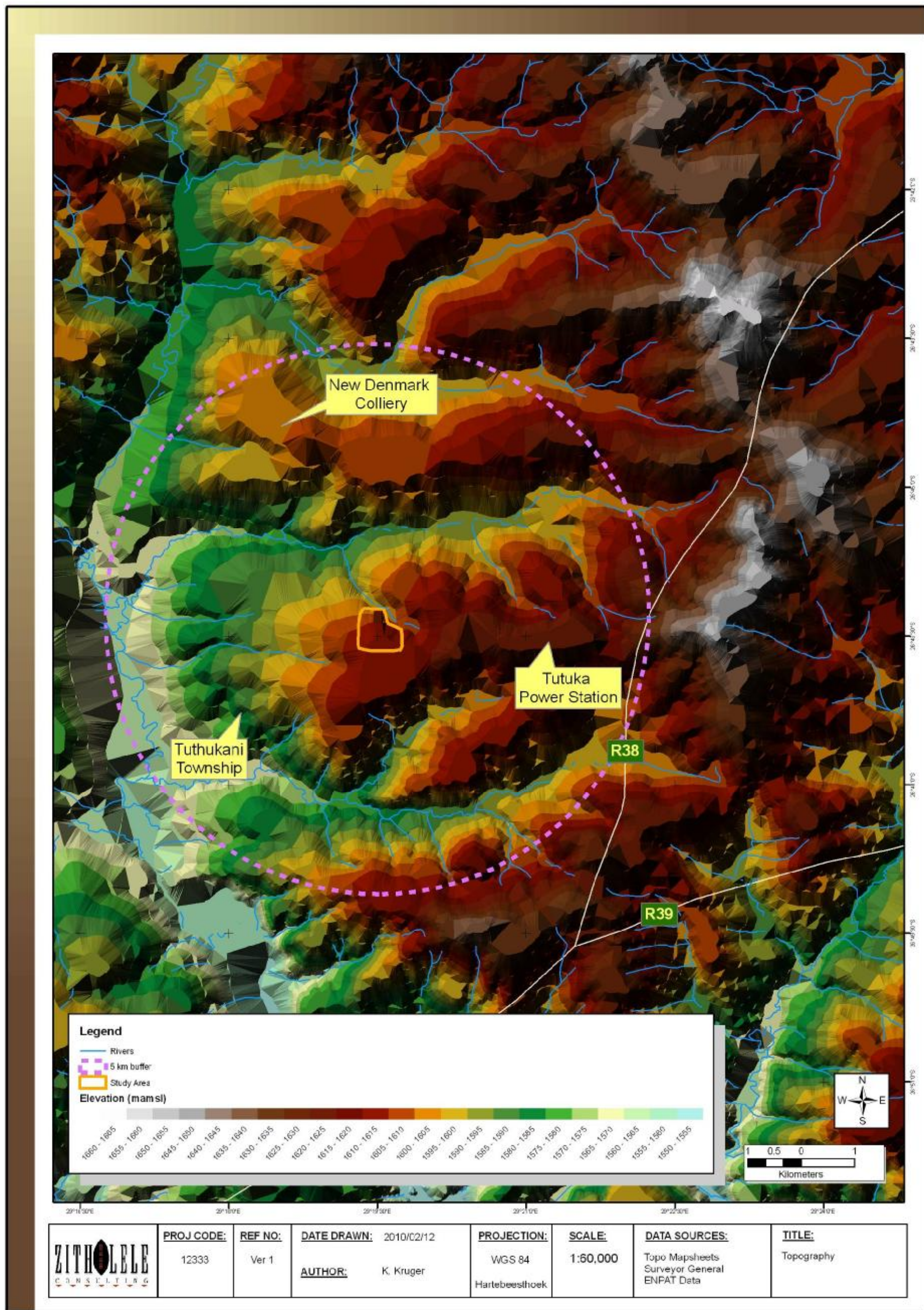


Figure 2-1: Topography of the site

2.2 VISUAL IMPACT ASSESSMENT

2.2.1 Introduction

The site and surrounding area may be characterised as agricultural land utilised mainly for the grazing of cattle. The topography of the region and study site is gently undulating to moderately undulating landscape of the Highveld plateau.

The proposed waste disposal site is located in the area immediately west of the Tutuka Power Station with the power station and other infrastructures like New Denmark Colliery, existing power lines, conveyor belts, water towers and roads featuring prominently in the landscape.

2.2.2 Methodology

The methodology adopted for the visual assessment includes the following tasks:

- Examine the baseline information (contours, building dimensions, vegetation, inter alia);
- Determine the area from which the proposed disposal site may be visible (viewshed);
- Identify the locations from which views of the proposed waste disposal site may be visible (observation sites), which include buildings and roads;
- Analyse the observation sites to determine the potential level of visual impact that may result from the proposed waste disposal site; and
- Identify measures available to mitigate the potential impacts.

Each component of the assessment process is explained in detail in the following sections of the report.

The Viewshed

The viewshed represents the area from which the proposed site would potentially be visible. The extent of the viewshed is influenced primarily by the combination of topography and vegetation, which determine the extent to which the site would be visible from surrounding areas.

The viewshed was determined by Zitholele through the following steps and presumptions:

- The likely viewshed was determined by desktop study (ArcGIS) using contour plans (5 m interval); and
- An offset of 2 m (maximum) for the observer and an offset of 30 m (maximum) for the proposed waste disposal site was utilized during the spatial analysis.

Visibility Assessment

Site visibility is an assessment of the extent to which the proposed waste disposal site would potentially be visible from surrounding areas. It takes account of the context of the view, the relative number of viewers, duration of view and view distance.

The underlying rationale for this assessment is that if the proposed waste disposal site (and associated infrastructure) is not visible from surrounding areas then the development will not produce a visual impact. On the other hand if the waste disposal site is highly visible to a large number of people in surrounding areas then the potential visual impact is likely to be high.

Based on a combination of all these factors an overall rating of visibility was applied to each observation point. For the purpose of this report, categories of visibility have been defined as high (H), moderate (M) or low (L).

Assessment Criteria

For the purpose of this report, the quantitative criteria listed in Table 2-1 have been determined and used in the Visibility Assessment. The criteria are defined in more detail in the subsection following.

Table 2-1: Visual Impact Assessment Criteria

CRITERIA	DEFINITIONS
Category of Viewer	
Static	Farms, homesteads or industries
Dynamic	Travelling along road
View Elevation	
Above	Higher elevation than proposed waste disposal site
Level	Level with waste disposal site.
Below	Lower elevation than waste disposal site viewed
View Distance	
Long	> 5 km
Medium	1 – 5 km
Short	200 m – 1 000 m
Very Short	< 200 m
Period of View	
Long Term	> 120 minutes
Medium Time	1 – 120 minutes
Short Term	< 1 minute

Category Viewer

The visibility of the proposed waste disposal site will vary between static and dynamic view types. In the case of static views, such as views from a farmhouse or homestead, the visual relationship between the proposed waste disposal site and the landscape will not change. The cone of vision is relatively wide and the viewer tends to scan back and forth across the landscape.

In contrast views from a moving vehicle are dynamic as the visual relationship between the proposed waste disposal site / associated infrastructure is constantly changing as well as the visual relationship between the proposed waste disposal site and the landscape in which it is seen. The view cone for motorists, particularly drivers, is generally narrower than for static views.

View Elevation

The elevation of the viewer relative to the object observed, which in this case is the proposed waste disposal site (and associated infrastructure), significantly influences the visibility of the object by changing the background and therefore the visual contrast. In situations where the viewer is at a higher elevation than the building/structure it will be seen against a background of landscape. The level of visual contrast between the proposed waste disposal site and the background will determine the level of visibility. A white/bright coloured structure seen against a background of dark/pale coloured tree-covered slopes will be highly visible compared to a background of light coloured slopes covered by yellow/brown dry vegetation.

In situations where the viewer is located at a lower elevation than the proposed waste disposal site it will mostly be viewed against the sky. The degree of visual contrast between a white coloured structure and the sky will depend on the colour of the sky. Dark grey clouds will create a significantly greater level of contrast than for a background of white clouds.

View Distance

The influence of distance on visibility results from two factors:

- With increasing distance the proportion of the view cone occupied by a visible structure will decline; and
- Atmospheric effects due to dust and moisture in the air reduce the visual contrast between the structure and the background against which they are viewed.

Period of View

The visibility of structures will increase with the period over which they are seen. The longer the period of view the higher the level of visibility. However, it is presumed that over an extended period the level of visibility declines as people become accustomed to the new element in the landscape.

Long term views of the proposed waste disposal site will generally be associated with residences and industries located within the viewshed. Short term and moderate term views will generally relate to travellers moving through the viewshed mostly by vehicle.

Site Visibility

The procedure followed to assess Site Visibility involved:

- Generate a viewshed analysis of the area utilizing ArcGIS 9.
- Determine the various categories of observation points (e.g. Static, Dynamic).

Impact Assessment Methodology

Visual impact is defined as the significance and/or severity of changes to visual quality of the area resulting from a development or change in land use that may occur in the landscape.

Significance or severity is a measure of the response of viewers to the changes that occur. It represents the interaction between humans and the landscape changes that they observe. The response to visible changes in the landscape may vary significantly between individuals.

Perception results from the combination of the extent to which the proposed waste disposal site is visible (level of visibility) and the response of individuals to what they see. A major influence on the perception of people in relation to the proposed waste disposal site will be the visual character and quality of the landscape in which it would be located. Natural landscape areas such as national parks, mountain areas or undeveloped sections of coast are valued for their high visual quality. The introduction of buildings and associated infrastructure may be seen as a negative impact on these areas of high visual quality.

The potential visual impact of the proposed waste disposal site will primarily result from changes to the visual character of the area within the viewshed. The nature of these changes will depend on the level of the visual contrast between buildings/structures and the existing landscape within which they would be viewed.

The degree of contrast between the proposed waste disposal site and the surrounding landscape will result from one or more of the following visual characteristics:

- Colour;
- Shape or form;
- Scale;
- Texture; and
- Reflectivity.

2.2.3 Visual Character

Landscape Character

The site and the surrounding area can be described as an agricultural landscape with intermittent mining, townships and power generation activities. The proposed waste disposal site will be located on a slight slope moving towards an unnamed non-perennial stream to the west of the Tutuka Power Station. Elevations along the slope range from 1 665 mamsl and 1 550 mamsl. Very little screening is available from the topography or natural grassland vegetation. Trees have however been established along the Thuthukani – Tutuka road in an effort to screen the current waste disposal site. Please refer to Figure 2-1 for the topography of the site.

There are no major rivers in the area, but the unnamed tributary to the Racesbult Spruit and non perennial Racesbult Spruit are found to the north of the proposed waste disposal site.

The landscape surrounding the proposed waste disposal site can be described as open grassland with some cultivated fields. In addition current developments include the Tutuka Power Station and the New Denmark Colliery and their associated structures. The natural vegetation does not provide any screening for the proposed waste disposal site. There are also several existing power lines close to the site to the north of the Power Station. Figure 2-2 below provides a view of the existing waste disposal site looking east from the New Denmark – Standerton road.

Viewshed

It should be noted that the viewshed, which is plotted on Figure 2-3 is an approximation that may vary in some locations. Potential views to the proposed waste disposal site are likely to be blocked in some localised situations by buildings, vegetation or local landform features at specific locations within the viewshed. Similarly, glimpses of the proposed waste disposal site may be available from some isolated high-elevation locations outside the plotted viewshed. The coloured areas indicate areas that are visible with the blue areas having very high visibility and the brown having lower visibility.



Figure 2-2: View of the existing waste disposal site from the west of the study area.

Notable features of the viewshed are summarised by the following points:

- The viewshed extends approximately 9 km to the north of the proposed waste disposal site;
- In a easterly direction the viewshed is generally limited by higher ground approximately 7 km from the site;
- To the west the viewshed extends approximately 14 km with isolated views on high outcrops; and
- Potential views from the south are blocked by the flowing hills located south from the proposed site, and the viewshed extends about 9 km.

It should be noted that the average person can only distinguish features up to 5 km. Thereafter atmospheric effects and the curvature of the earth start to reduce visual perception. Therefore a 5 km buffer has been added to the map below.

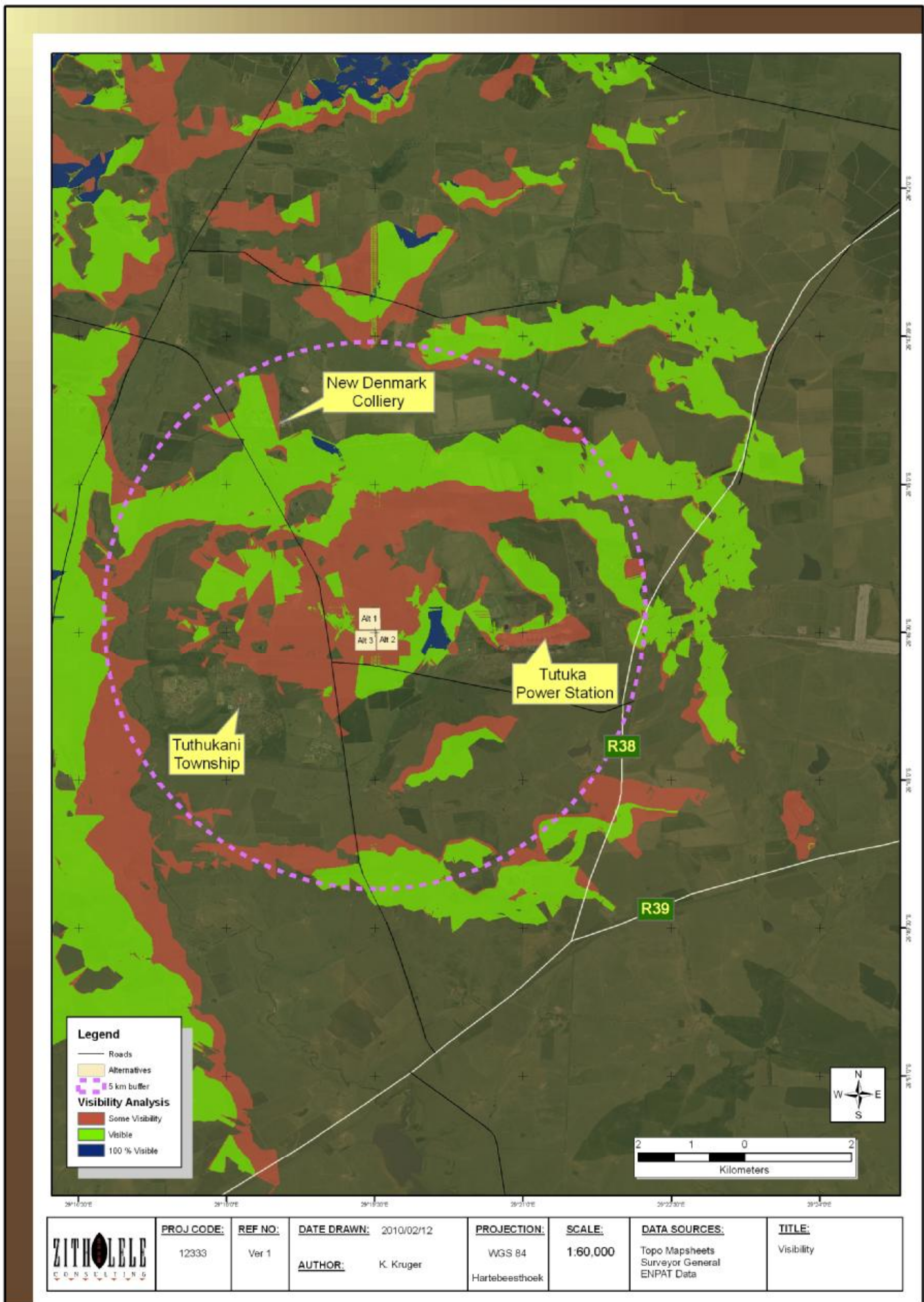


Figure 2-3: Visual Impact from the proposed waste disposal site.

3 VISUAL IMPACT ASSESSMENT

The Impact Assessment will highlight and describe the impact to the following components:

- Visual Assessment.

The impact assessment was undertaken for the construction, operational and decommissioning phases of the project. The waste disposal site will consist of a waste dump with a single access point and an access road (Figure 3-1). It should be noted that there is currently a waste disposal site on the terrain and it is anticipated that the activities would be identical to the current operations.



Figure 3-1: Operations at the current waste disposal site with rehabilitated area in the foreground

The visual simulations (Figure 2-3) illustrate the extent to which the waste disposal site will be visible from key observation points (static and dynamic views). The vertical form/dimensions of the structures would be hidden by their location among existing buildings and within a well vegetated area. The visual contrast is increased by the “shape” and scale of the structures, which generally will not be viewed along the skyline.

3.1 Current Conditions

In the case of the Tutuka general waste disposal site it is pertinent to mention the existing impacts found on site. In this case there is a power station, the Thuthukani township and the New

Denmark Colliery and its associated structures as can be seen in the background of Figure 2-2 and Figure 3-3.

3.2 Static Views

The proposed waste disposal site would potentially be visible from the surrounding farmland and the high-lying areas to the north and west. The potential number of viewers from this area should be low as the farmlands are quite sparsely populated but the views would vary greatly depending on site specific conditions like the orientation of the homes as well as the location of other buildings, fences, vegetation and localized landforms. All these elements have the potential to block views from the buildings to the proposed waste disposal site. In terms of the three main developments in the area i.e. Tutuka Power Station, New Denmark Colliery and Thuthukani Village, the site will be visible from Tutuka and New Denmark, but only slightly visible from Thuthukani.

3.3 Dynamic Views

The waste disposal site will be visible to a moderate number of viewers, mainly those travelling along the Thuthukani – Tutuka road and some travellers along the New Denmark – Standerton road. Views from the New Denmark – Standerton road extend approximately 6 km and represent a view period of approximately 22 seconds travelling at 100 km/h. The level of visibility should not be influenced by the view distance and the resulting atmospheric effects that reduce the contrast between the waste disposal site and the surrounding landscape, as the road is relatively close to the site. The effects are similar for the Thuthukani – Tutuka road. Please refer to Table 3-1 and Figure 3-2 for a summary of the dynamic impacts.

The proposed waste disposal site is also visible from the R 38 road from Bethal to Standerton, but with a viewing distance on the 5 km mark, it is unlikely that a traveller would be able to distinguish the waste disposal site from the surrounding landscape. Therefore the potential visual impact would be considered as low.

Table 3-1: Dynamic Impact Table

Road Name	Speed limit (km/h)	Length of Road (km)	Approximate Period of View (min)	View Distance
New Denmark – Standerton	100	6	22 seconds	0 – 4 km
Thuthukani – Tutuka	80	3	2.25 minutes	0 – 4 km



Figure 3-2: View from the New Denmark – Standerton Road illustrating the view of the completed disposal after 40 years.

3.4 Impact Assessment

Initial Impact

Table 3-2 lists the observation points together with the category of viewer, context of view, relative numbers of viewers and approximate distance of observation point to the proposed site. The location of these observation points are shown in Figure 2-3.

Table 3-2: Visual Impact Matrix

Potential Observation Point	Category of Potential Receptor	Context of View	Approximate View Distance	Period of View	Visibility Rating
Surrounding Farmland	Static	Level	0 – 8 km	Long Term	High
Tutuka Power Station	Static	Level and above	2.5 km	Long Term	High
New Denmark Colliery	Static	Level and above	4 km	Long Term	High
Thuthukani Township	Static	Level below	2.5 km	Long Term	High
Gravel Roads	Dynamic	Above & below	0 – 8 km	Medium	High
Tar Roads	Dynamic	Level - Above	0 – 4 km	Short	High

The visual impact of the waste disposal site in a landscape characterised by a power station, coal mines, roads and farmlands will have an impact, but not as high as in an unimpacted area. It is also very important to note that there is an existing waste disposal site on the terrain and therefore the visual impact is already occurring. This site is however only 5m high and the extension will be up to a height of 30 m, making it much more visible.

The additional impact from the proposed project during construction is rated as a LOW negative impact acting on the *local area* in the short term. This impact will occur and is therefore rated as a **Moderate** impact.

During the operational phase the waste disposal site will grow to its maximum height of 30 m. This impact is rated as a HIGH negative impact, acting on the *local area* in the long term. As this impact will occur the impact is rated as a **High** negative impact.

Cumulative Impact

The cumulative construction impact is rated the same as the initial impact and remains a **High** impact.

Due to the existing impact levels and the proposed new development adding to that impact the operational impact will be rated as a HIGH negative impact, acting on the *local area* in the long term. As this impact will occur the impact is rated as a **High** negative impact.

Mitigation Measures

There are several methods of screening the visual impact of a development like waste disposal site and any of these can be utilised by the power station to reduce the visual impact:

- Ensure that the waste is covered with soil on a daily basis;
- Design the site to match local topographical features and avoid sharp edges;
- Re-vegetate the waste body once capacity has been reached in order to match the local surroundings;
- Screening vegetation can be planted along the roads (in this case trees have already been planted along the Thuthukani – Tutuka road see Figure 3-3); and
- Do not exceed the maximum licensed height of the facility.



Figure 3-3: Picture from the Tutuka – Thuthukani road, showing existing screening by trees

Residual Impact

During construction the residual impact will remain as assessed during the cumulative impact assessment. This remains a **High** impact.

If the waste disposal site is screened from all sides by vegetation along the main roads the impact can be reduced as the development will only be visible intermittently and only to people very close to the site. This reduces the impact rating to a MODERATE negative impact only acting on the *study site* in the long term. This impact will occur and is therefore rated as a **Moderate** impact.

After closure and rehabilitation has been completed the site will be covered with vegetation and profiled to appear naturally. However the waste body will remain on site and the visual impact will persist. If the mitigation measures remain in place (screening vegetation) then the impact will remain as assessed for the operational phase, a **Moderate** impact.

Table 3-3: Impact Rating Matrix for the Visual Impact

Construction phase					
Impact Type	Significance	Spatial	Temporal	Probability	Rating
Initial	Moderate	Local Area	Long Term	Is occurring	3.3 – High
Additional	Low	Local Area	Short Term	Will Occur	2.3 – Moderate
Cumulative	Moderate	Local Area	Long Term	Will Occur	3.3 – High
Residual	Moderate	Local Area	Long Term	Will Occur	3.3 – High
Operational Phase					
Impact Type	Significance	Spatial	Temporal	Probability	Rating
Additional	High	Local Area	Long Term	Will Occur	3.67 - High
Cumulative	High	Local Area	Long Term	Will Occur	3.67 - High
Residual	Moderate	Study Site	Long Term	Will Occur	3.0 - Moderate
Closure and Rehabilitation Phase					
Impact Type	Significance	Spatial	Temporal	Probability	Rating
Residual	Moderate	Study Site	Long Term	Will Occur	3.0 - Moderate

4 CONCLUSION

In conclusion, the proposed waste disposal site is located adjacent to a non-perennial stream to the west of the Tutuka Power Station. Elevations in the area ranges between 1 665 and 1 550 mamsl resulting in a rolling topography with intermittent streams and wetlands.

The current visual environment is impacted by the Tutuka Power Station, the New Denmark Colliery and the Thuthukani Township. There is also an existing waste disposal site on the study site which has reached a height of 5 m above ground level.

The proposed new waste site will reach a maximum height of 30 m above ground level, elevating it quite a bit higher than the current site. The viewshed generated for the site indicates that the site will be visible from New Denmark and the Tutuka Power Station, while views from the Thuthukani Township are relatively restricted. These places along with several farmhouses in the area constitute the main static observers of the proposed development. This impact is rated as a **High impact**.

The dynamic viewers of the site will be mostly travellers on the Thuthukani – Tutuka road and the New Denmark – Standerton road. There is some screening in the form of planted trees along the Thuthukani – Tutuka road but none along the other road. Views from these roads will be from a relatively close distance but only for a period of 22 seconds and 2 minutes respectively. This impact is rated as a **High impact**.

The review of the visual resources at the proposed Tutuka general waste disposal site has found that the proposed development has the potential to impact on the visual environment. However these impacts can be mitigated by the successful implementation of the mitigation measures proposed in this report. It is therefore recommended that the development be approved conditional to the implementation of the abovementioned mitigation measures.

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