Appendix O: Visual

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

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File Reference Number:	12/12/20/
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Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

ENVIRONMENTAL IMPACT ASSESSMENT FOR THE PROPOSED CONTINUOUS ASH DISPOSAL FACILITY FOR THE MATIMBAPOWER STATION IN LEPHALALE, LIMPOPO PROVINCE

Specialist:	Surface Water : Visual		
Contact person:	Paul la Cruz		
Postal address:	PO Box 867, Gallo Manor		
Postal code:	2052	Cell:	084 224 0088
Telephone:	(011) 7986000	Fax:	011 798 6005
E-mail:	paul.lacruz@rhdhv.com		
Professional affiliation(s) (if any)			

Project Consultant:	Royal HaskoningDHV		
Contact person:	Prashika Reddy		
Postal address:	PO Box 25302, Monument Park, Gauteng, South Africa		
Postal code:	0105	Cell:	083 2848687
Telephone:	012 367 5973	Fax:	012 367 5878
E-mail:	prashika.reddy@rhdhv.com		

4.2 The specialist appointed in terms of the Regulations_

I, Paul da Cruz , declare that --

General declaration:

I act as the 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
I declare that 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 knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, 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
I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.

Signature of the specialist:

Royal Haskoning DHV

Name of company (if applicable):

14.04.16

Date:

Proposed Continuous Ash Disposal Facility for the Matimba Power Station, Limpopo Province
EIAR Phase Visual Impact Assessment Study

Eskom Holdings SOC Ltd

June 2015

Eskom

Royal HaskoningDHV
Enhancing Society Together

Visual Impact Assessment Study

Client:

Eskom Holdings SOC Ltd

Project Name:

Proposed Continuous Ash Disposal Facility for the Matimba Power Station, Limpopo Province - EIAR Phase Visual Impact Assessment Study

Royal HaskoningDHV Reference Number:

E02.JNB.001222

Compiled by:

Paul da Cruz

Date:

June 2015

Location:

Woodmead

Approval: Malcolm Roods

_____

Signature

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Appendix A – Maps

Glossary of Terms

Anthropogenic	Human related, as opposed to natural
Band (banding)	In a visual assessment context a band is a contrasting linear form with two roughly parallel edges dividing an area in two.
Butt Edge	In a visual context this is the simple sharp edge between two contrasting areas.
Dimensional Mass	The volume of a landform, natural object, or manmade structure in the landscape.
Ephemeral	A stream that flows at the surface only periodically
Greenfield Site	Undeveloped land in a city or rural area that has not been subject to development or transformation.
Microphyllous	Referring to plants and trees with small leaves, as opposed to broad-leafed plants. A microphyll is termed as a leaf 25-75mm long
(Soil) Seed bank	The ungerminated but viable seeds that are found within the soil
Viewshed	A viewshed is an area of land, water, or other environmental element that is visible to the human eye from a fixed vantage point
Visual Envelope	= a viewshed

Acronyms

BLM – (US) Bureau of Land Management

CBD – Central Business District

VAC – Visual Absorption Capacity

1 INTRODUCTION

Eskom Holdings SoC Ltd. appointed Royal HaskoningDHV DHV to undertake an EIA study for the proposed continuous ash disposal facility for the Matimba Power Station in Lephalale, Limpopo Province. As part of the environmental studies the need for a visual impact study to assess the visual impact of the continued ashing has been identified. A scoping-level visual study was conducted that identified that the establishment expansion of the ash disposal facility could be associated with visual issues and impacts, hence the need for an EIA-phase visual study was identified. Accordingly this report assesses the visual impact aspects of the proposed ash disposal associated with the Matimba Power Station in greater detail.

1.1 Aims of the Study (Project Terms of Reference)

The primary aims of the study are to:

- Characterise the visual environment surrounding the two (alternative) development sites and linear infrastructure routes and to identify the degree of likely visual impact that would be exerted at receptor locations by the proposed development.
- Assess the nature and intensity of the visual impacts associated with the proposed expansion of the ash disposal facilities.
- Comparatively assess the two location alternatives and recommend a preferred alternative from a visual perspective

1.2 Assumptions and Limitations

It should be noted that the 'experiencing' of visual impacts is subjective and largely based on the perception of the viewer or receptor. The presence of a receptor in an area potentially affected by the proposed continuous ash disposal facility does not thus necessarily mean that a visual impact would be experienced.

2 PROJECT DESCRIPTION

2.1 Site Location and Description

The general study area is located to the north-west of Lephalale town which is found in the north-western part of the Limpopo Province. The Matimba Power Station is located to the north-west of the Lephalale CBD, with the closest part of the town to the power station being the Onverwacht suburb.

In addition to the Matimba Power Station and its associated ash disposal facility which have a large physical footprint, the Medupi Power Station is currently being constructed to the west of the Matimba Power Station. The Grootegeluk Coal Mine is located immediately to the north of the Matimba Power Station. Thus large parts of the area surrounding the existing ash disposal facility are highly industrialised.

Apart from the rapidly-expanding housing areas in Onverwacht and the settlement of Marapong to the east of the Matimba Power Station, there are some undeveloped properties to the south and west of the existing ash disposal facility that are used for either cattle farming or game farming. The area to the north of Marapong and the Grootegeluk Mine is more rural and consists of cattle and game farms as well as the Manketti Nature Reserve (owned by Exxaro Coal) .The study area thus has a mix of urban, industrial and rural land uses.

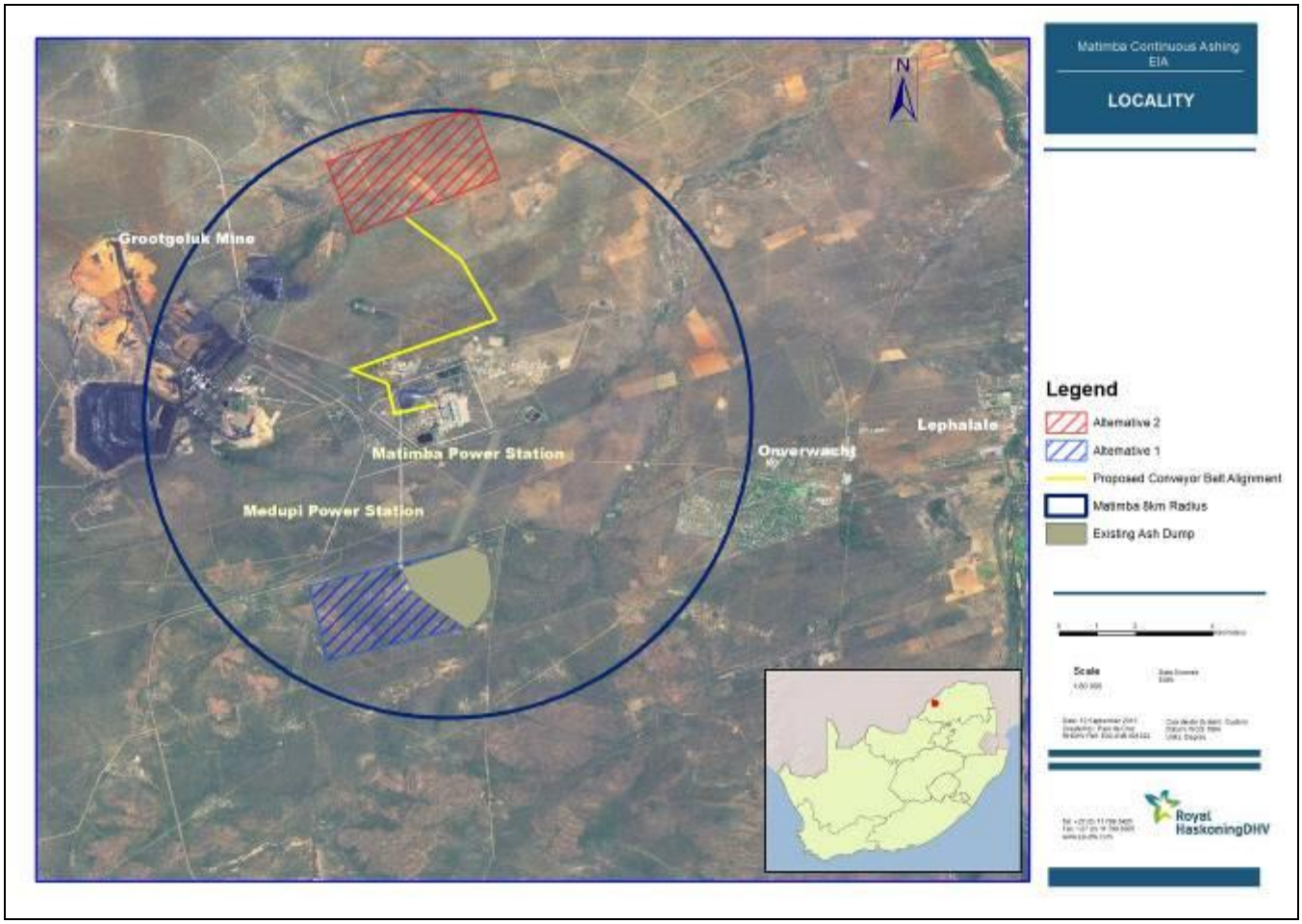


Figure 1 – Study Area Map showing the two alternative sites for the Ash Disposal Facility and location of linear infrastructure

2.2 Project Technical Description

2.2.1 Need and Background

The Matimba Power Station, located close to Lephalale (Ellisras) in the Limpopo Province), is a 3990MW installed capacity base load coal fired power station, consisting of 6 units. Matimba is a direct dry cooling power station, an innovation necessitated by the severe shortage of water in the area where it is situated. The station obtains its coal from the Exxaro Grootegeluk Colliery for the generation of electricity.

Ash is generated as a by-product from combustion of coal from the power station and Matimba produces approximately 6 million tons of ash annually. This ash is currently being disposed by means of 'dry ashing' approximately three kilometres south of the existing power station on the Eskom owned Farm Zwartwater 507 LQ.

Matimba Power Station envisages the continuation of ash disposal (dry ashing) and therefore, Eskom requires the licensing of its proposed continuous ash disposal facility in terms of the National Environmental Management Waste Act (NEMWA), Act 59 of 2008 and the EIA Regulations (2010) promulgated under the National Environmental Management Act (NEMA) Act 107 of 1998, (as amended).

This ash disposal facility will be able to accommodate the ashing requirements of the power station for its remaining life (approximately 44 years).

2.2.2 Site Alternative 1 Technical Details

The Ash disposal Facility has been designed with the intention to maximise the available footprint of the site to meet the airspace requirements for future waste disposal. The available site boundary is taken as the remaining portion of land currently owned by Eskom utilised for the existing SDF. The entire site spans approximately 4400m by 2600m. Of the site area available, approximately 510 ha is available for the development of a greenfields site with the remaining 190 ha being available through construction of the new ADF over the existing ADF by way of piggy-backing.

In order to accommodate the full airspace requirements, the conceptual design of Site Alternative 1 proposes that the new ADF be constructed over the existing ADF by way of a piggy-backing concept. It is proposed that approximately one third of the new ADF (by footprint area) be constructed over the existing facility. The final finished height of the proposed waste cell is approximately 90m above the average ground level of the site. The new waste cell will be approximately 45m higher than the existing facility from a piggy-backing perspective.

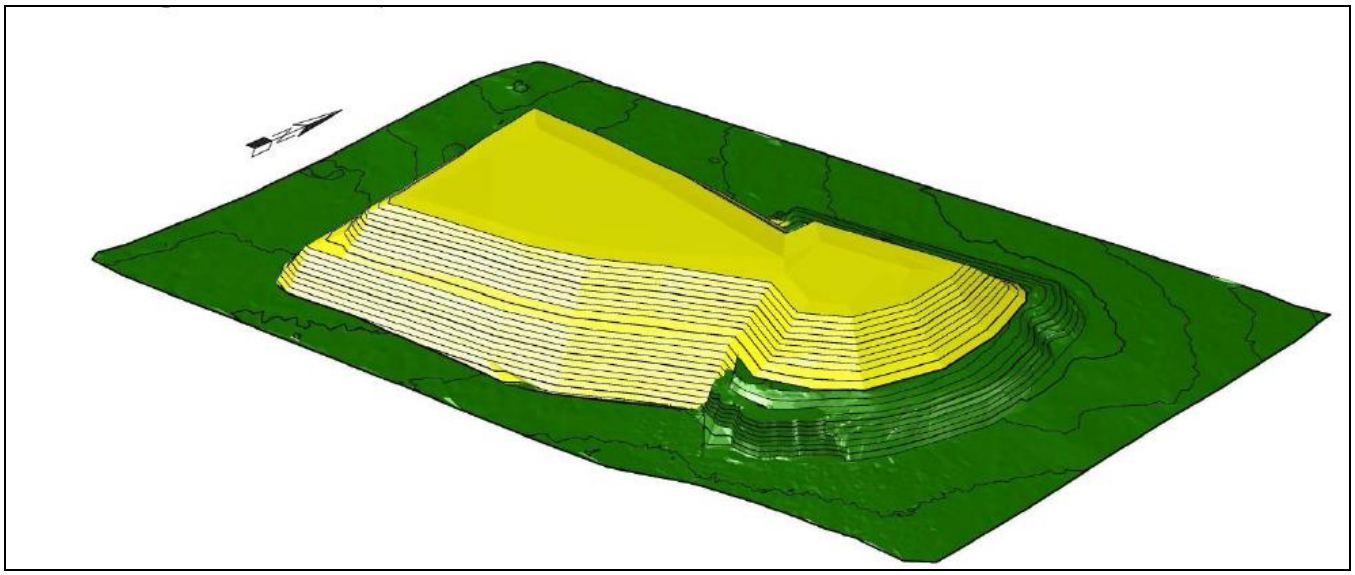


Figure 2 – 3-dimensional model of Site Alternative 1

The development of the proposed 700ha waste disposal facility has been broken up into 2 types of waste cells namely greenfields and piggy-backed waste cells. Detailed cell development is to be defined at detail design phase and is to be informed by the requirements from the client. The greenfields cells will be developed to reach a final finished height of approximately 90m above ground level while the piggy-backed cells shall be developed to reach a final finished height of approximately 45m above the existing facility height.

Figure 3 – The proposed footprint of the expanded ash disposal facility at Site Alternative 1

2.2.3 Site Alternative 2 Technical Details

The ash disposal facility at Site Alternative 2 was designed with the intention to maximise the available footprint of the site to meet the airspace requirements for future waste disposal. A 10m wide servitude area between the site boundary and the foot of the cell has been incorporated into the design. This servitude area makes allowances for a haul road, storm water channel and any services such as electrical cables, leachate collection pipes and manholes. A haul road along the perimeter of the site will allow for easy access to all areas of the cell for loading and maintenance.

Site Alternative 2 is an undeveloped site and thus an additional area of has been allocated to allow for infrastructure which may be required. The possible infrastructure includes:
Access control

- Guardhouse (Typically 94m x 4m)
- Weighbridge system (Typically 24m x 3.2m)
- Offices & Ablutions (Typically 30m x 15m)
- Parking (Typically 20m x 15m)
- Plant yard (Typically 100m x 95m)
- Vehicle wash (Typical 50m x 7.4m)

The footprint of the facility would cover an area of 3800m by 2030m (600ha) and would be 85m in height.

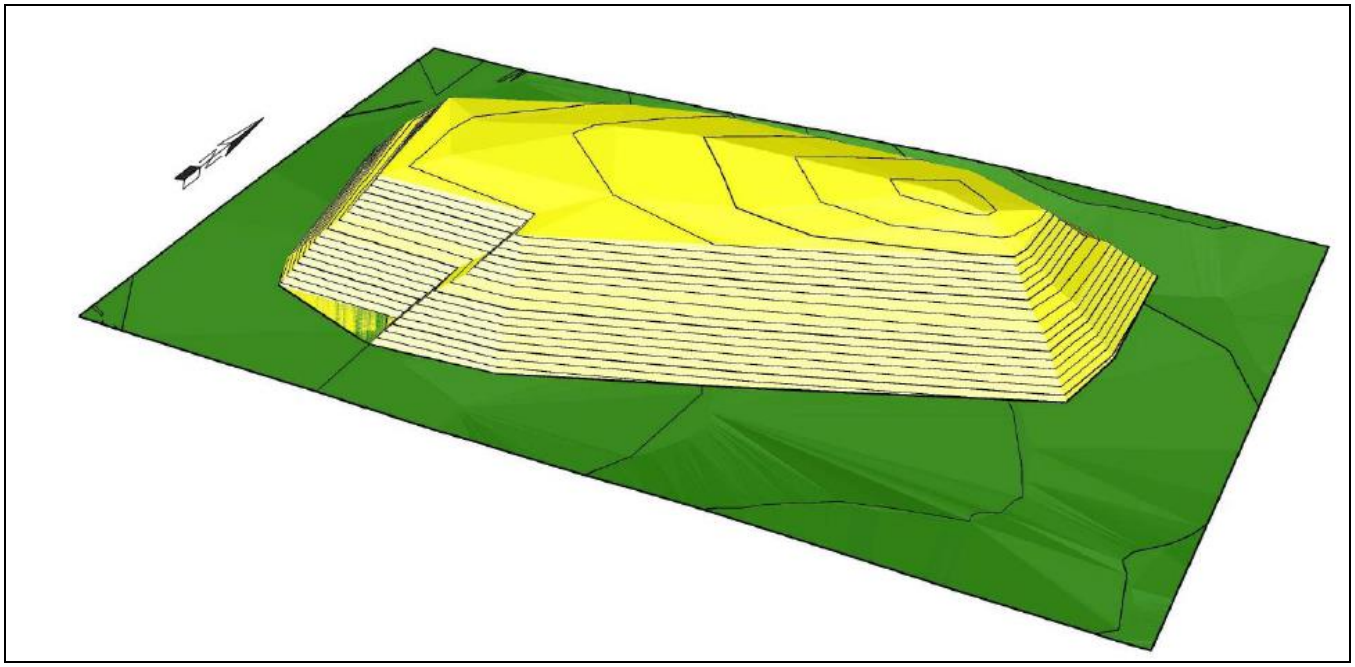


Figure 4 – 3-dimensional model of Site Alternative 2

The EIA process requires the investigation of alternatives and as such an 8km radius was delineated from the Matimba Power Station (source of the ash) to identify any potential alternative sites. It is within this radius that two alternative sites were identified to be assessed in the EIR phase.

The development of the proposed 600ha waste disposal facility has been broken up into 6 distinct cells each approximately 100ha in size. Each cell will initially be developed at half the height of the final cell height and each cell should accommodate 5 years of ash disposal.

Figure 5 - The proposed footprint of the expanded ash disposal facility at Site Alternative 2

3 STUDY AREA VISUAL ENVIRONMENT

The study area visual environment was assessed in the scoping phase visual study. The key points relating to the study area visual environment are included below in order to provide an understanding of the visual environment in which the ash disposal facility is proposed.

3.1 Landscape Structural Components, Topography, Visual Character, and VAC

Topographically the study area is relatively flat around the Onverwacht / Matimba power station area, and extending into the area to the north and west. These landscape characteristics mark a change from the area to the south of the town of Lephalale where much more hilly and incised topography, forming part of the Waterberg foothills, exists. The study area (i.e. area in which the two alternative sites are located) can thus be described as being very flat. Slopes on and around the two location alternatives are very gentle and in some places almost imperceptible. The ground typically slopes very gently down to localised low points drained by ephemeral drainage lines.

The nature of the topography has implications for views: due to the relatively flat terrain the topography typically does not restrict views to the surroundings, in particular when the viewer is located on a localised elevated position. However the flat nature of the terrain entails that micro-topographical features, in particular vegetation is highly effective in screening views from the viewer's location.

Vegetation cover is intrinsically related to land use; the natural vegetation of the area is woodland. The warm nature of the climate due to the latitudinal position of the site and generally sandy soils allows the climax vegetation type to develop as tall, relatively enclosed woodland, with a mix of deciduous and evergreen trees. The average height of the vegetation in its mature, undisturbed state is approximately 2-4m, and as described below this can have an important effect on restricting views.

Figure 6 – Typical woodland vegetation in the study area

The land use around the study area is a mix of a number of components, including urban (commercial and residential), industrial, and livestock / game farming. The urban commercial and residential component is provided by the town of Lephalale and its 'satellite' Onverwacht. The wider area around the proposed development site displays a significant industrial component in the form of the Matimba Power Station complex, the Medupi Power Station (currently under construction), and the Grootegeluk Mine Complex which is currently expanding to the north and the west. In contrast to this developed component, the surrounds of the town (especially areas to the south-west, west and north) still contain areas in which livestock rearing and game farming occur. In these areas, the natural woodland has largely been retained. One does not have to move too far beyond the boundaries of the town to find areas that are non-industrial in character, rather being characterised by a rural or even natural visual environment. The presence of woodland vegetation that is highly effective in screening views from the viewer's location within these areas of natural vegetation also tends to contribute to this perception of a more natural setting.

The visual character of the study area is thus partly industrial and urban, and partly rural or natural. The nature of the visual character affects the visual absorption capacity (VAC). The visual absorption capacity of an area / landscape refers to ability of that area / landscape to absorb development without noticeable intrusion or change to the visual character of the area. Visual absorption capacity can be measured on a scale from high (an area which has a high capacity to absorb new development) to low (an area in which a new development would be highly visible and would alter the visual character of the area). Visual absorption capacity is a function of a number of factors including topography (including slope and aspect) and the nature of land use and land cover (such as vegetation cover and height), and importantly the degree of human-induced transformation of the area. Urbanised or industrial areas typically have a high visual absorption capacity in the context of the type of development that is proposed, especially where industrial-type structures already occur. Conversely highly natural

or rural areas with a low human footprint would have a very low VAC for the development of an industrial component.

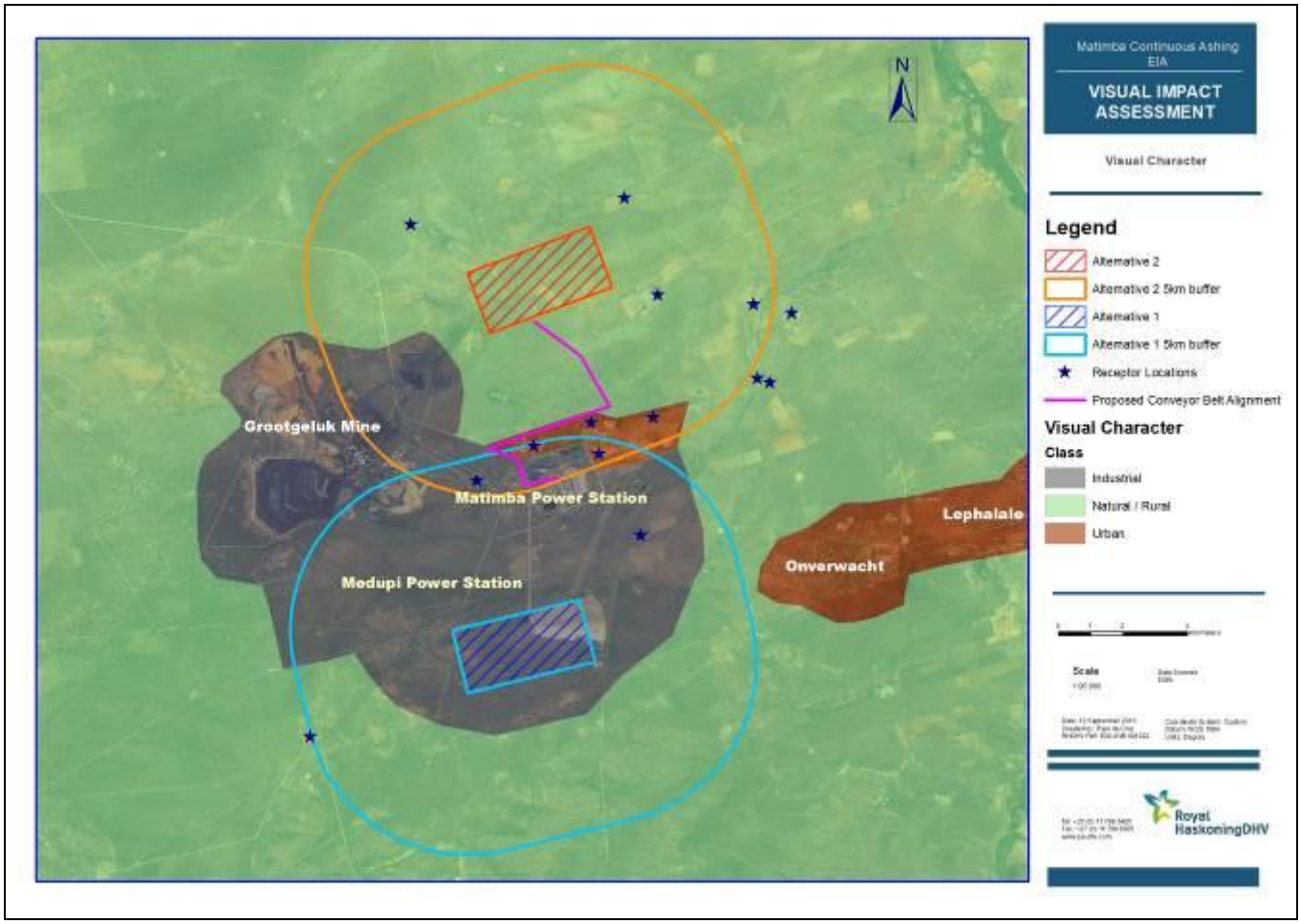


Figure 7 – Areas of differing visual character in the study area

As described above, the surrounds of the existing ash disposal facility contain the visually prominent Matimba and Medupi power stations, thus the landscape has a significant industrial element to it. Although immediately adjacent to areas of natural woodland to the west, east, and south, the existing ash disposal facility forms part of this industrial hub. As such the surrounds of the ash disposal facility would have a high to very high visual absorption capacity for an area of extension, or for a new dump. However the VAC of the areas further away from the existing industrial infrastructure would be much lower, and thus the surrounds of Site Alternative 2 have a low VAC.

Figure 8 – View of the Matimba (right of picture) and Medupi Power Stations as viewed from the outskirts of Lephalale

3.2 Location of Visual Receptors

Visual Impact is related to the presence of human receptors / viewers, thus visual impact is typically experienced from locations inhabited by humans. Accordingly an understanding of the areas inhabited / occupied by humans (even transiently) is important in the classification of potential visual impacts. One of the main aims of the study is to identify receptor locations in order to gain an understanding of how areas of human habitation will possibly be affected by the proposed ash disposal facility. Sites of human habitation (e.g. residential areas, farmsteads and homesteads) typically make up the bulk of the receptor locations within an area. However lodges and other accommodation facilities, as well as recreational sites are other static locations that are typically considered receptor locations. However not only 'static' locations can be termed as receptor areas; areas or routes of human movement such as roads can also be considered to be receptor locations, as well as wider areas in which certain activities that would be considered visually sensitive are practiced. This could include areas where tourism activities such as hiking trails or 4X4 routes, or hunting are practiced.

In order to identify receptor locations potentially affected by the proposed development, areas of human habitation within 5km of each of the two development sites were identified. 5km was selected as a reasonable radius, as beyond this distance the degree of visual exposure associated with the proposed development is likely to be too small to generate a visual impact (refer to section 4.1.1 below). In the identification of receptor locations, all residential areas were included, with properties on the margins of such settlements being most likely to be

exposed to views towards the proposed development (due especially to the flat nature of the terrain). Within the parts of the radial areas around the site alternatives which are not urban or industrial areas, homesteads and farmsteads, as well as commercial and non-commercial accommodation facilities where present were identified as receptor locations. Areas of potential future development were also considered. Properties on which visually sensitive activities such as hunting are being undertaken were also identified. The table below lists the static receptor locations within the two radial areas that have been identified.

Table 1 – Static Receptor Locations within the study area

Receptor Name	Receptor Type	Within 5km Radius of:
Manketti Reserve Manager's House	Homestead	Alternative Site 2
Droogeheuwel Farmstead	Farmstead	Alternative Site 2
Ganzepan Homestead	Homestead	Alternative Site 2
Manketti Lodge	Lodge	Alternative Site 1 & 2
Marapong Contractors Village	Contractor Accommodation	Alternative Site 1 & 2
Zongesien Homestead 1	Homestead	Alternative Site 2
Zongesien Homestead 2	Homestead	Alternative Site 2
Kalkfontein Farmstead	Farmstead	Alternative Site 2
Nel Family Homestead	Homestead	Alternative Site 2
Eendracht Farmstead	Farmstead	Alternative Site 1
Kuipersbult Farmstead	Farmstead	Alternative Site 1
Marapong	Residential Area	Alternative Site 1 & 2

The maps below identify the location of receptors within the 5km radii of the sites.

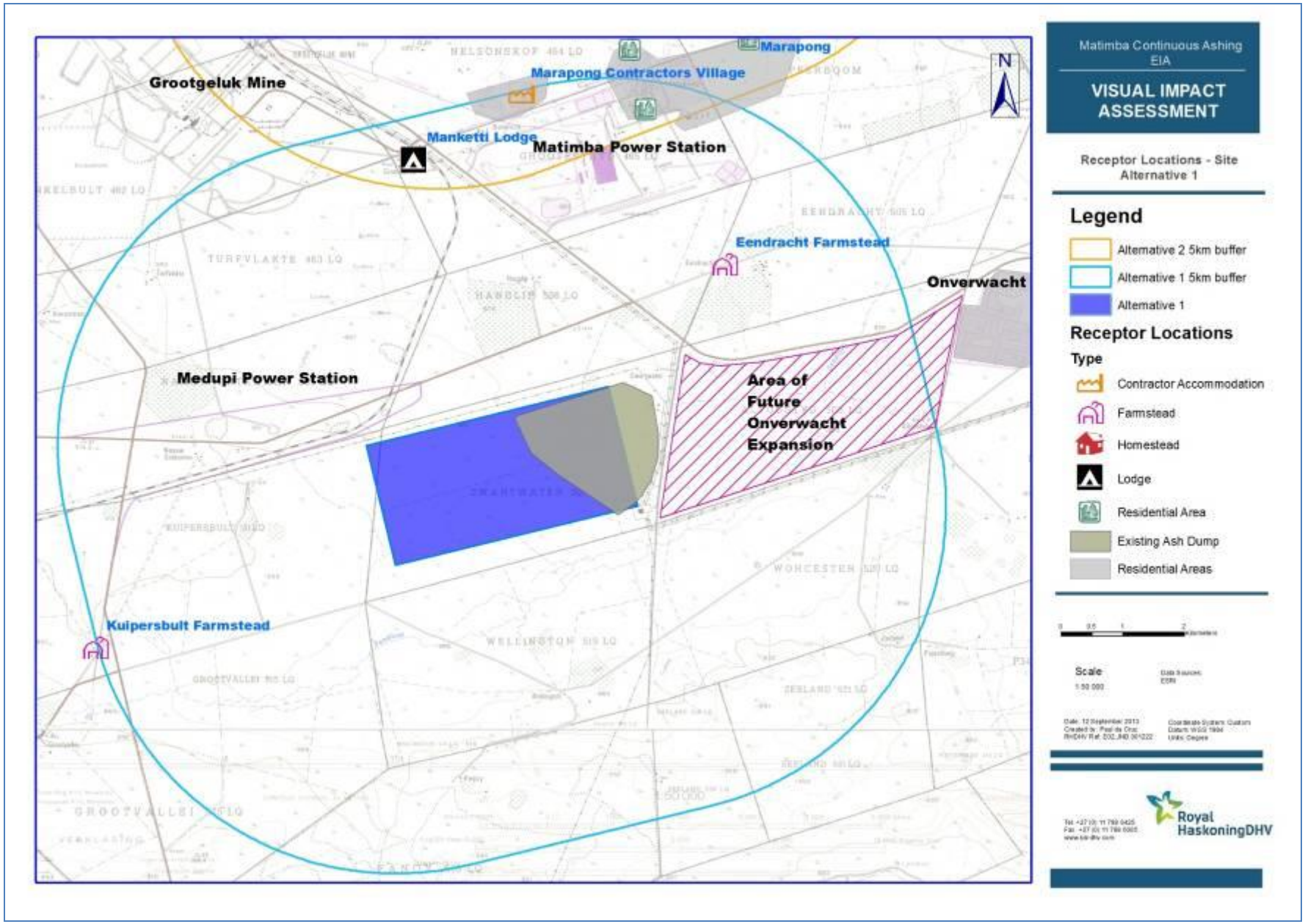


Figure 9 – Receptor locations surrounding Site Alternative 1

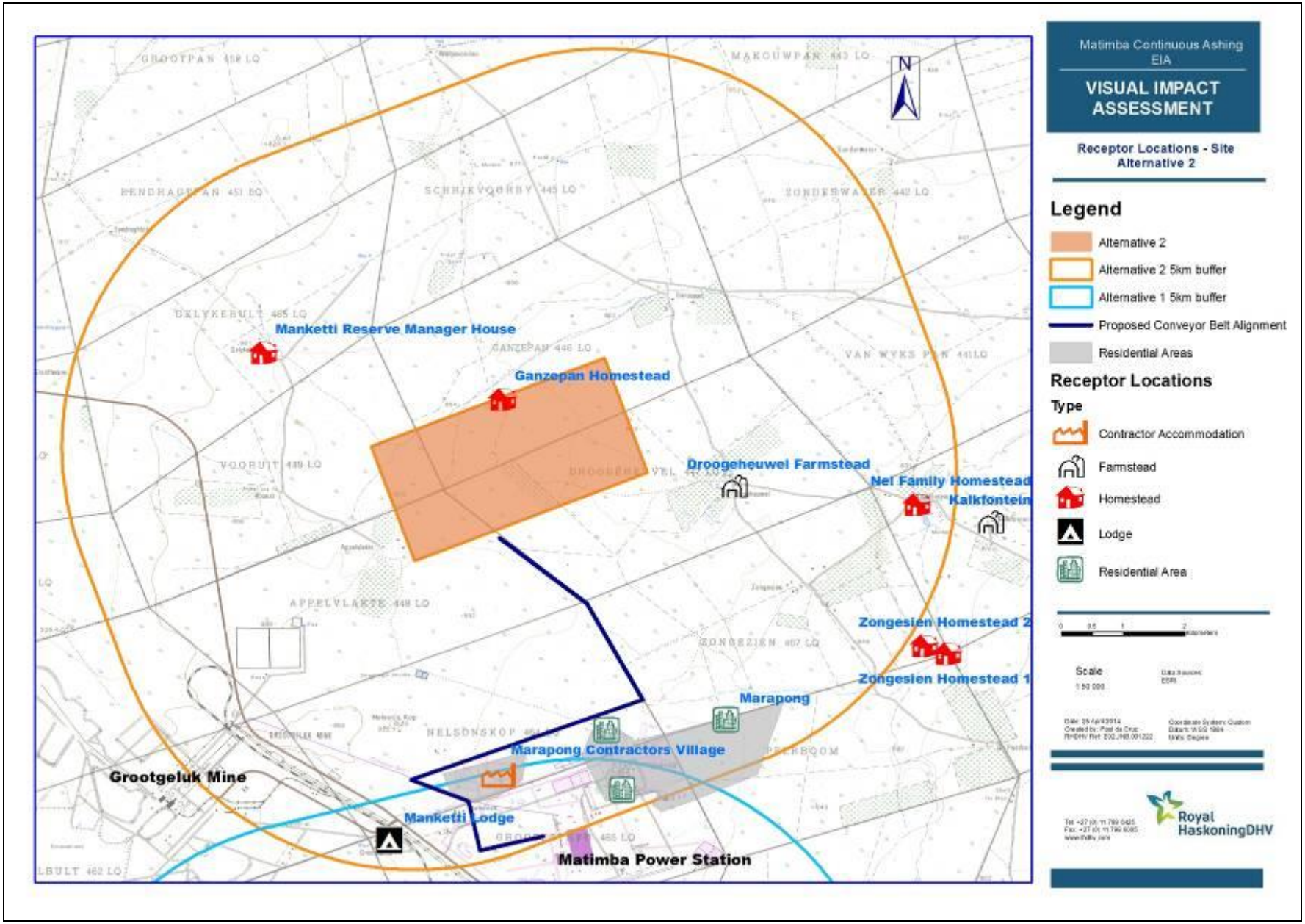


Figure 10 – Receptor locations surrounding Site Alternative 2

A distinction can be made between receptor locations and sensitive receptor locations. Sensitive Receptors would be receptors which would potentially be adversely impacted by a proposed development, i.e. from which people viewing a development would perceive it negatively. This takes into account a subjective factor on behalf of the viewer – i.e. whether the viewer would consider the visual intrusion associated with the development as a negative impact. In the context of visual impact, the adverse impact is often associated with the alteration of the visual character of the area in terms of the intrusion of a development into a 'view', which may affect the 'sense of place' of the area.

A question needs to be posed in terms of the visual sensitivity of the study area and whether any receptors in the study area could be termed sensitive receptors. For the purposes of this study, all farmsteads and homesteads as well as accommodation / tourism facilities in non-urban and non-industrial areas have been considered to be sensitive receptors. Larger conglomerations of housing – i.e. residential areas and contractors' accommodation facilities would potentially be less sensitive, in particular the latter category as this type of accommodation is often temporarily occupied and is intrinsically linked to industrial activity in the area. The largest residential area is the Marapong Township that consists of a mix of housing from low income formal housing to informal housing. Residential areas of this type are not typically sensitive to visual impacts due to their socio-economic profile, however in the interests of risk aversion, formal properties on the peripheries of these residential areas with views of the surrounding area have been considered to be potentially sensitive to visual impacts.

4 ASSESSMENT OF VISUAL IMPACTS

4.1 Generic aspects of visual impacts associated with large structures

Before exploring the site-specific impacts associated with the ash disposal facility, it is necessary to explore some generic aspects of visual impact as associated with large structures such as the proposed ash disposal facility.

- Size and footprint of an object

The existing ash dump / pile is a large structural feature and thus by its size (height - maximum height = 50m) and spatial footprint is a highly visible structure.

- Viewing distance

The distance of the viewer / receptor location away from an object is the most important factor in the context of the experiencing of visual impacts. Beyond a certain distance, even large structural features tend to be much less visible, and are difficult to differentiate from the surrounding landscape. The visibility of an object is likely to decrease exponentially with increasing distance away from the object, with maximum impact being exerted on receptors at a distance of 500m or less. The impact decreases exponentially as one moves away from the source of impact, with the impact at 1000m being a quarter of the impact at 500m away (see the figure below). At 5000m away or more, the impact would be negligible.

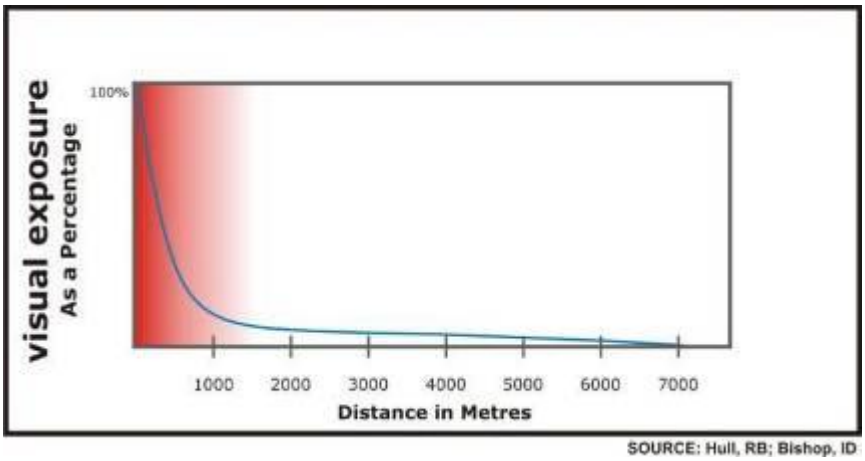


Figure 11 - Diagram Illustrating Diminishing Visual Exposure over Distance

- Presence of receptors

It is important to note that visual impacts are only experienced when there are receptors present to experience this impact; thus in a context where there are no human receptors or viewers present there are not likely to be any visual impacts experienced.

- Viewer perception

As described above, structural features such as ash / mine dumps are not a feature of the natural environment, but are rather representative of human (anthropogenic) intrusion into the natural environment. Thus when placed in a largely natural landscape, a large structural feature can be perceived to be highly incongruous in the context of the setting.

New developments / structural features are often perceived to be a source of visual impact if they affect or change the visual quality of a landscape. It is in this context of incongruity with a natural setting that new developments are often perceived to be a source of visual impact.

The perception of the viewer / receptor of impact is also very important, as certain receptors may not consider the development of such a feature to be visually intrusive. The perception of visual impacts is thus highly subjective and thus involves 'value judgements' on behalf of the receptor. The context of the landscape character, the scenic / aesthetic value of an area, and the types of land use practiced tend to affect the perception of whether new developments are considered to be an unwelcome intrusion. Sensitivity to visual impacts is typically most pronounced in areas set aside for the conservation of the natural environment (such as protected natural areas or conservancies), or in areas in which the natural character or scenic beauty of the area acts as a draw card for visitors (tourists) to visit an area. Residents and visitors to these areas may perceive a new large structural feature to be an unwelcome intrusion that would degrade the natural character and scenic beauty of the area, and which would potentially even compromise the practising of tourism activities in the area.

- Landform and Landscape context

The landform context of the environment in which the object is placed is an important factor. The location of the feature within the landform setting – i.e. in a valley bottom or on a ridge top is important in determining the relative visibility of the feature. In the latter example, the feature would be much more visible and would 'break' the horizon. Similarly the landform context in which the viewer is located is important in that topography can inherently block views towards an object if the viewer is located in a setting such as a steep-sided valley or on an aspect facing away from the object.

The landscape in which the viewer and object are located is also important; the presence of macro- or micro-topographical features such as buildings or vegetation that would screen views from a receptor position to an object can remove any visual impact factor associated with it.

Figure 12 – Pictures indicating the effective screening function performed by vegetation**.** The series of pictures taken along a road east of the Matimba Power Station shows: a view not blocked by vegetation (top), a view where vegetation partially screens the Power Station (middle), and where vegetation totally blocks the view (bottom)

- Landscape development context

Conversely, the presence / existence of other anthropogenic objects associated with the built environment may influence the perception of whether a new development is associated with a visual impact. Where buildings and other infrastructure exists, the visual environment could be considered to be already altered from a natural context and thus the introduction of a feature into this setting may be considered to be less of a visual impact than if there was no existing built infrastructure visible.

- Receptor type and nature of the view

Visual impacts can be experienced by different types of receptors, such as people driving along roads, or people living / working in the area in which the structural feature is visible. The receptor type in turn affects the nature of the typical 'view' of a potential source of visual impact, with views being permanent in the case of a residence or other place of human habitation, or transient in the case of vehicles moving along a road. The nature of the view experienced affects the intensity of the visual impact experienced.

- Weather and visibility

Meteorological factors, such as weather conditions (presence of haze, or heavy mist) which would affect visibility can impact the nature and intensity of a potential visual impact associated with a structural feature.

4.2 Visual Impacts associated with the existing Matimba Ash Disposal Facility and likely visual impacts associated with expansion

It is important to understand how the ash disposal facility will appear if either expanded at its current location (Alternative site 1) or if a new one is constructed. In this context the current visual profile of the existing ash disposal facility is examined (as explored in the scoping phase visual study), and thus the likely visual impacts associated with the ash disposal facility at a new location (Alternative Site 2) are able to be explored.

4.2.1 Profile of the existing ash disposal facility

Like any ash disposal facility, or mine dump, the Matimba Ash disposal facility on the Zwartwater Property is a large man-made feature. The ash dumps / piles have extended or grown over the years of operation, extending in a westward direction. Importantly in a visual context certain parts of the ash dump have been rehabilitated, i.e. those parts of the ash dump where the first ashing activities occurred. The northern and eastern sides of the ash dump have been vegetated, but the western face is not rehabilitated as ashing continues to extend the ash dump to the west. The differentiation of the ash dump in terms of a rehabilitated aspect as well as an active face is important in a visual context as these are associated with different degrees of visual intrusion and thus visual impact.

Figure 13 – The active western face of the ash dump, as viewed from the area into which the ash dump is proposed to expand

The rehabilitation of the dump has entailed grassing of the sides and top of the dump, as well as the planting of trees and shrubs. This practice has differentiated this ash dump from many other mine dumps that are not vegetated and is an important factor in allowing the ash dump to blend in with its surroundings that are naturally wooded. The 'final' profile of the ash dump is angular in nature with sloping sides and a flat top, i.e. no landform profiling of the dump has been attempted in order to give it a more natural appearance. It should be noted that the rehabilitated eastern and northern sides of the ash dump have slopes with relatively gently sloping sides; this factor assists in giving the ash dump a more natural and less artificial appearance as viewed from the east and the north.

In addition, the rehabilitation (re-vegetation) of the ash dump has given it a relatively natural appearance when viewed from the east. When viewed from the Matimba and Medupi access road heading westwards out of Onverwacht, one gets the impression of natural rising ground, such as a hill. Viewed in this way, the ash dump may not even be discerned as an unnatural feature by people who are not aware of its existence. Viewed from the north, the ash dump is more discernible as an unnatural feature due to its tabular shape and flat top, however the presence of trees and other vegetation cover on its sides provide it with some form of natural character. The presence of vegetation on the dump assists greatly in lowering the visual intrusion factor associated with it, in particular in a context of the presence of patches of residual natural woodland in the immediately adjacent area, allowing it to be less intrusive than if it was not vegetated in this way.

Figure 14 - The Ash Dump as viewed from the north. Note the successful re-vegetation of the dump with trees and grass

Viewed from the south and west the active face of the dump and the conveyor belt are visible and are prominent, providing a visual focal point in the landscape, contrasting with the surrounding natural vegetation. The prominence of the ash dump was noted to be enhanced by ash being blown off the active face of the dump during windy weather, creating a 'trail' of dust off the face. The pale grey colour of the ash on the active face contrasts with the surrounding vegetation and is more visible than the rehabilitated parts of the dump. The visual intrusiveness of the ash dump as viewed from the south is heightened by the presence of an 'active' non-rehabilitated face across much of the southern side of the ash dump.

Figure 15 – The southern face of the ash dump as viewed from a high point to the south

4.2.2 Likely Visual Impacts associated with the different development scenarios (expansion of the existing facility versus creation of a new facility)

4.2.2.1 Expansion of the existing facility

Expansion of the existing activity would be likely to constitute an extension of the existing visual status quo, although due to the recently proposed height expansion (piggy backing) of the existing ash dump the visual profile of the ash disposal facility would change. The disposal of ash is proposed to continue on the active western face into the currently undeveloped areas on the remainder of the site, with the ash dump growing laterally in a westward direction. However in order to accommodate the required airspace required at the ash disposal facility, the height of the current ash disposal facility would be increased with ash being disposed on top the current crest of the ash dump. This would steadily raise the total height of the facility and would make it increasingly visible as a large object in the landscape.

In order to compare the area of visual intrusion of the proposed facility as compared to the existing facility, a viewshed (i.e. area in which an object is visible) has been generated for the existing ash dump, and a viewshed has been generated for the proposed facility at its maximum height when fully developed – i.e. 90m. The viewshed are indicated in Figures 16 and 17 below. It is important to note that these viewsheds represent the area from which at least a portion of the ash dump / ash disposal facility is (would be) visible and does not represent the area from which the entire extent of the facility would be visible.

Analysis of Figures 16 and 17 below indicate that the existing ash dump is visible from a wide area within its radius. Most of the receptors to the north of the existing facility are located within the viewshed of the facility. The proposed extended facility at Alternative 1 would be visible from a wider area in the radius of the facility. Effectively as the existing facility is already visible from a wide area in the surrounds of the existing facility, the degree of change of *area (extent) of visibility* is not very marked. However the major difference will be in terms of the likely extent of the facility that will be visible from the surrounding area, with a greater degree of the full 'body'

of the extended facility being visible from the surrounds. As discussed elsewhere, however, screening features within the landscape such as existing structures and vegetation in particular will screen the expended (heightened) facility or parts of it from view at the receptor locations.

As importantly as the increased visual profile of the facility, the relative degree of visual intrusion of the expanded facility needs to be considered based on the altered appearance of the feature. It should be noted that as cells within the ash disposal facility are completed the sides and crest of the completed cells, as well as those parts of the ash disposal facility that are extending into the undeveloped part of the site (falling behind the active face) would be rehabilitated, providing an increasing portion of the dump with a more 'natural' appearance. Over the operational lifespan of the dump, it would be elongated (westwards) as viewed from the south and the north, but a portion of it would also be raised.

As viewed from the east and north-east the profile of the dump would be raised, with an active "ashing face" being visible. This is relatively important as the town of Lephalale is expected to expand westwards (closer to the existing ash dump) with the development of residential erven on the Altoostyd 506 property (Lephalale Local Municipality Integrated Development Plan), and as the main access road to the Matimba and Medupi Power Stations from Lephalale and to areas further afield to the west and north runs in this area.

The active face would extend closer to any receptors to the west, but the combination of a very low density of receptors in this area and the screening function of natural vegetation would be likely to entail that this is not a factor. The part of the surrounding area that would arguably be subject to the greatest degree of impact would be from the property to the south, the Wellington 519 LQ property. At the end of its operational lifespan the ash dump would extend the full east-west extent on the Wellington property, and would be prominent if viewed from cleared areas or areas of greater relief on the property. It is important to note that the gradual rehabilitation of the ash dump (especially if the dump was designed and landscaped to have a more natural appearance) would reduce the visual intrusion factor of the ash disposal facility, and the greatest visual intrusion factor would be during the operational period of the dump.

It is important to note that the conveyor belt that transports ash from the Matimba Power Station to the ash dump would not be likely to be moved, rather extended into the new ash disposal area and thus there will be no new visual impact associated with this feature.

In summary it is important to note that the further expansion of the ash dump on the current site would constitute a consolidation of existing visual impacts associated with the current dump, and importantly would not constitute a new visual impact.

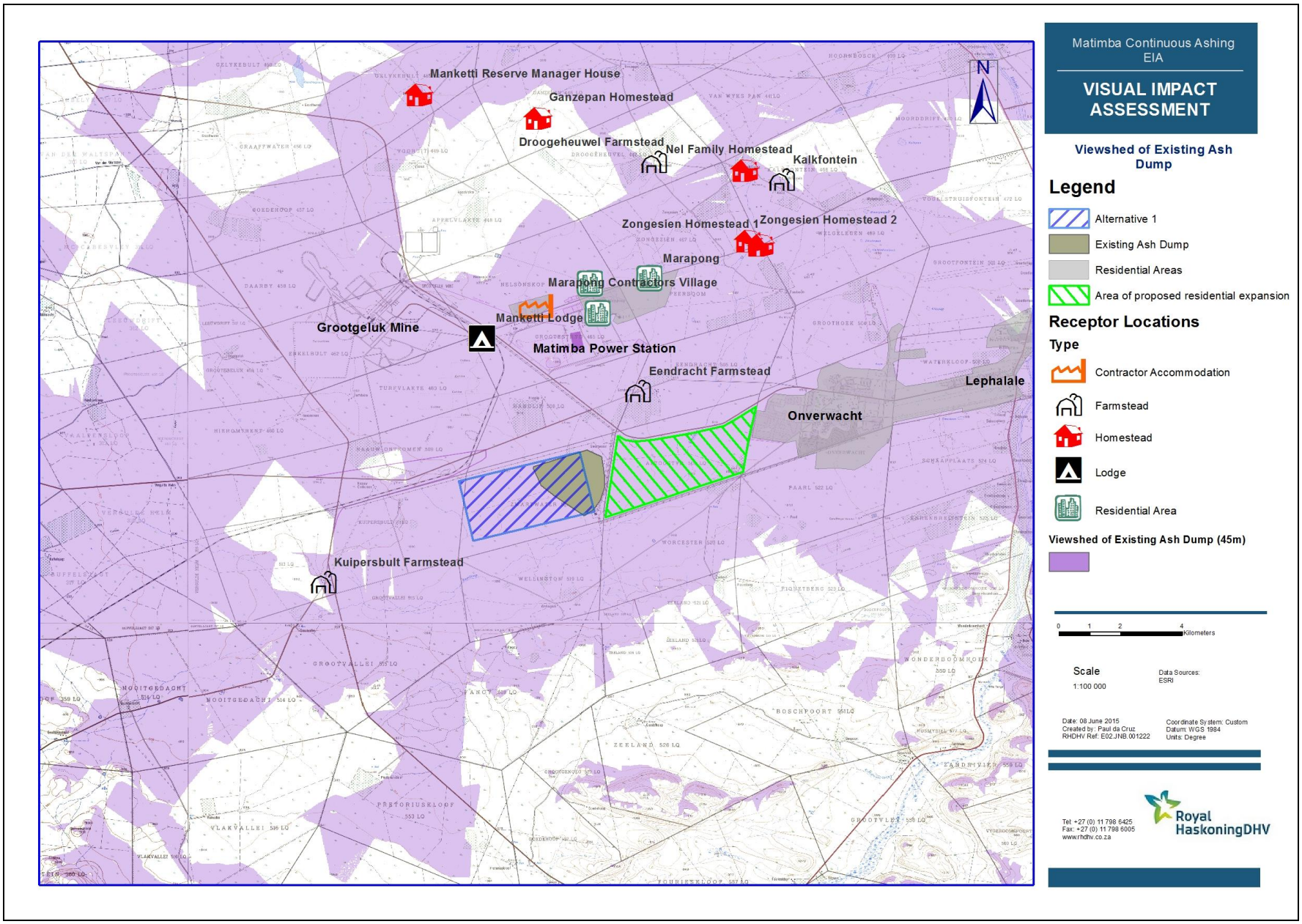


Figure 16 Viewshed of the existing Ash Dump

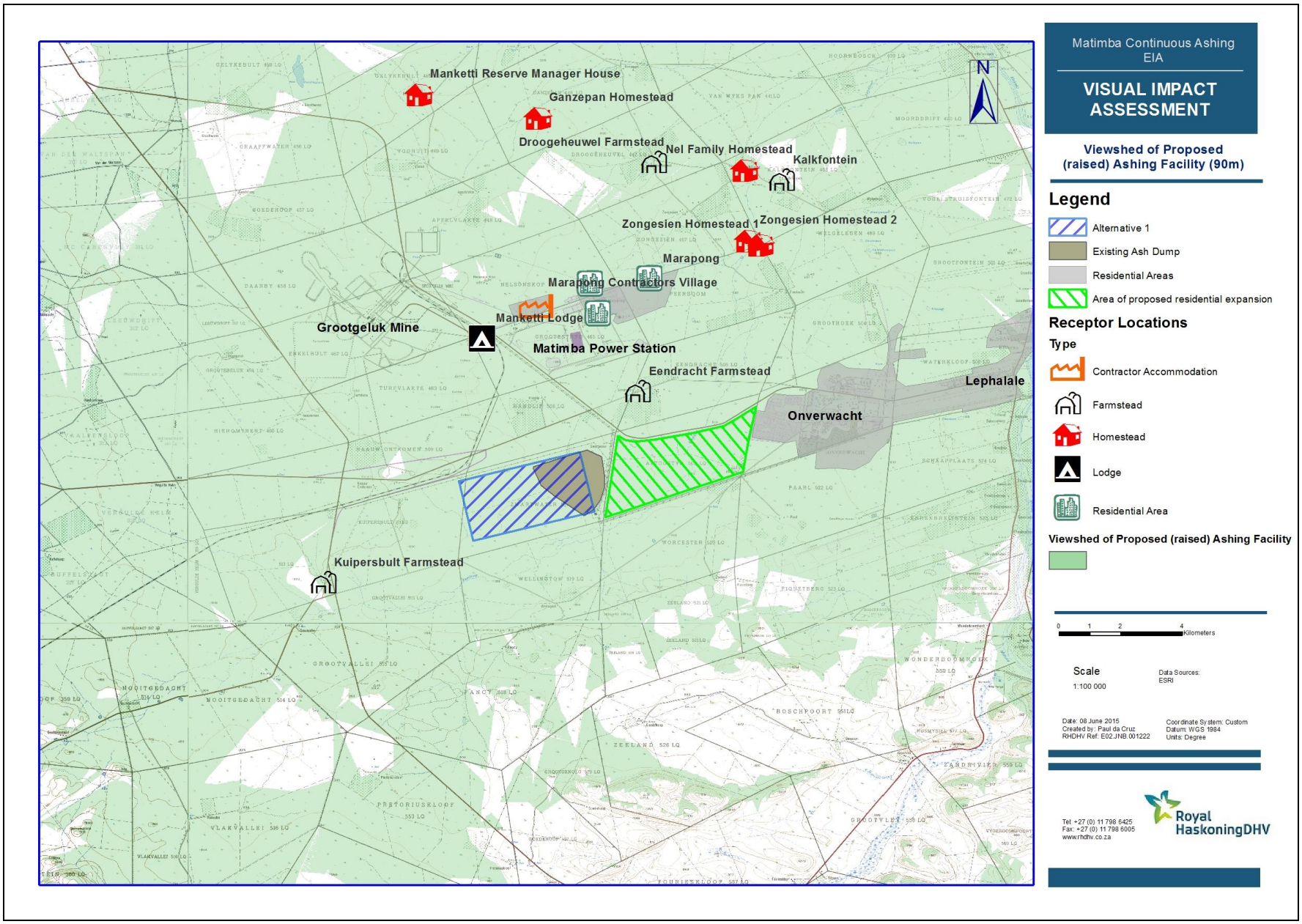


Figure 17 – Viewshed of the proposed expanded Ash Disposal Facility at full development height (90m above average ground level)

4.2.2.2 Creation of a new facility

If the continuous ashing was developed on Alternative Site 2, a completely new ash disposal facility would need to be developed. This would be in the context of the Alternative 2 site, on which there is no existing infrastructure except for an existing power line and farming infrastructure such as fencing. The site and its surrounds are highly natural in character, although it is located not too distant (approx. 2km) from the Grootegeluk Mine.

The creation of a new facility would involve the clearing of vegetation to form a base onto which the ash would be deposited. It should be noted that all vegetation in portions of the footprint of the ash dump will be cleared prior to the ash disposal operations commencing in order to install the lining under the ash disposal facility. A portion of the area will be cleared to cater for 3 – 4 conveyor shifts. Once the ash disposal facility becomes operational, an ash pile of a height of a maximum of 85m in height from ground level would form on the site. The height of this dump and the grey colour of the ash would make it highly visible in the context of the existing natural surroundings. This ash dump would create a visual contrast as explored further below, thus potentially being associated with visual impacts.

In addition to the ash dump, equipment associated with the ash disposal would be brought to the site, which would be visible at the height of the top of the ash dump. A conveyor belt transporting ash from the Matimba Power Station to the ash dump site would also be constructed, as explored below. This conveyor belt would be raised above the ground.

The infrastructure associated with the new ash disposal facility (if developed on the new site) would be similar to that associated with the existing facility and would include:

- Conveyors,
- Stacker and Spreader machines,
- Mobile equipment,
- Pollution control dams,
- Stormwater channels and berms,
- Gravel road access roads

Due to screening effect of the bushveld vegetation surrounding the new facility, certain of this infrastructure located at ground level, such as pollution control dams and local access roads will be unlikely to be visually prominent or even visible from surrounding receptor locations. The infrastructure used for ash disposal that would be located on top of the developing ash disposal facility would be more visually prominent as part of the ash dump itself.

Rehabilitation of the new facility would occur in a similar way to the existing facility, and thus parts of the ash dump on which ashing has been completed would be rehabilitated while ash disposal was proceeding in other parts of the footprint. As no information has been provided as to the part of the site or the part of the ash disposal facility footprint on which ashing would commence, it is not possible to determine the direction in which ash disposal would proceed and which aspect of the ash disposal facility would be rehabilitated first.

4.2.2.3 Visual Impact associated with the development of a new linear infrastructure route to Site Alternative 2

An existing conveyor belt that currently transports ash from the Matimba Power Station to the existing ash disposal facility would continue to be used for such a purpose if Alternative 1 was chosen as the site for the further ash disposal. However as Alternative 2 is a greenfields site, a new road and conveyor belt would have to be developed in order to transport ash from the Matimba Power Station to the new ash disposal facility. The applicant has provided the alignment of the conveyor belt and road for assessment.

The conveyor belt will be raised above the ground, and as such would be a visually prominent structure, due to its height and linear nature. The proposed alignment of the conveyor belt to Site Alternative 2 in relation to differing areas of visual character and in relation to the receptor locations in the vicinity of the site is indicated in Figure 4 and Figure 7, respectively. The southern-most part of the alignment of the conveyor belt to the north of the power station would traverse areas of industrial and urban visual character respectively. The conveyor belt would run in close proximity to the receptor locations of the Marapong Contractors Village and the north-western parts of Marapong. In spite of the close proximity of the conveyor belt to these locations, their location very close to the Matimba Power Station and the associated alteration of the visual character from a natural base to an urban area in a wider industrial setting entails that these locations are highly unlikely to be sensitive to the development of further infrastructure on their northern boundary, and the development of the conveyor belt in these areas is unlikely to be perceived to be a visual intrusion in this visual context.

To the north of Marapong, the conveyor belt would run along a cadastral boundary between the Nelsonskop and Zongezien properties and between the Appelvlakte and Droogeheuwel properties to the north, and in so doing would traverse an area of more natural visual character. It is important to note, however, that there are no stationary receptor locations located in close proximity to the proposed alignment of the conveyor belt in this area. The closest stationary receptor in this area, the Droogeheuwel Farmstead, would be located over 3km distant from the alignment, and as such would be unlikely to be visually affected. The ash dump would be developed between the Ganzepan Homestead and the conveyor belt and as such the conveyor belt would not be visible from that receptor location. The conveyor belt would run in proximity to areas of the above-mentioned properties on which hunting is practiced (or on which hunting could be practiced in the future – see below), and may constitute a visual intrusion in this context. However the conveyor belt would be aligned along the boundary of the properties, not bisecting any of them. Additionally it would be constructed along with the new ash disposal facility, and although the ash disposal facility would initially be limited in extent, it would over time become more visually prominent than the conveyor belt, resulting in the transformation of the visual environment in the surrounds of the ash disposal facility. The conveyor belt would represent a smaller component of the visual change in the surrounds of the ash disposal facility as resultant from the development of the ash disposal facility on the Alternative 2 site that would in practice extend the industrial hub northwards to the surrounds of the site. The conveyor belt would thus not be associated with a stand-alone visual impact, but would be a component of the larger scale visual change in the wider area associated with the potential development of the ash disposal facility on the Alternative 2 site.

4.3 Visual Contrast Rating

In order to better understand the visual impacts associated with the proposed ash disposal facility on receptor locations in the surrounding areas, a visual contrast assessment has been undertaken. This is done in order to quantify the degree of visual contrast or change that would be caused by the proposed ash disposal facility at certain key observation locations. Assessing the degree of visual change at key observation points will allow a judgement of the degree of 'acceptability' of the visual change to be made, and to suggest further mitigation measures.

In order to allow the effect of the visual contrast at the key observation locations within the study area to be assessed, the visual baseline of the landscape at these locations needs to be established. As prescribed by the US Department of Interior's Bureau of Land Management's Visual Resource Management Methodology, it is important to describe the visual baseline of the landscape at each key receptor location in order to allow the objective assessment of the degree of change in visual contrast that would result from the proposed facility. This study has used a methodology to establish the degree of visual contrast that is largely based upon the Bureau of Land Management (BLM) visual contrast rating methodology. This methodology prescribes that a number of basic structural elements of different physical components of the landscape at a key observation location be assessed. These basic elements include:

- Form
- Line
- Colour
- Texture

According to the methodology the landscape is divided into three components of which landscapes are typically comprised:

- Land form (Topographic units)
- Vegetation (including natural vegetation and planted vegetative features such as fields)
- Human Structures (e.g. buildings, power lines, etc.).

A table indicating the structural elements of different physical components of the landscape that can be individually described to allow an accurate understanding of the visual baseline at each key observation location is presented to give an indication of the visual landscape baseline. This is followed by a table which assesses these components of the landscape under a scenario where the ash dump has been developed. This table assesses a pre-rehabilitation scenario in which no rehabilitation (vegetating) measures have been implemented, and a post rehabilitation scenario in which the ash dump has been vegetated. The degree of visual change / visual contrast that will be created is thus able to be examined for each of these scenarios. The visual contrast rating methodology requires that a landscape be assigned a tolerance level relating to the degree of acceptable visual change of that landscape (named visual resource management classes in the BLM methodology). This assessment follows the comparative tables. The tolerance levels applicable to the study area are examined below

4.3.1 Key Observation Locations

Due to access limitations, not all sensitive receptor locations have been able to be assessed using the visual contract methodology. As a result a number of key observation locations have been selected to represent the typical views towards the ash disposal facility from a representative set of locations.

The list below indicates the following key observation locations for which the visual contrast rating has been undertaken:

- Manketti Reserve Manager's House
- Droogeheuwel Farmstead
- Marapong (Northern edge of Marapong)

It is important to note that the Ganzepan Homestead has not been assessed as the household and its immediate environs (farm compound) fall within the footprint of the ash disposal facility (ash dump) if it was developed on Site Alternative 2, therefore in practical terms it is likely that the farmstead would cease to be used as a homestead, thus ceasing to be a sensitive receptor location.

A number of other receptor locations were considered for assessment using the visual contrast rating methodology however, at these locations the proposed facility would not be visible due to factors such as the presence of vegetation that would prevent the ash disposal facility from being able to be viewed from that location. The table below lists these locations and the reason for the ash dump not being able to be viewed.

It should be noted that no visual impact would be created by the proposed ash disposal facility at these particular locations.

Table 2 – Receptor locations within the 5km radius of the development sites which would not be able to view the ash disposal facility

Receptor Location	Reasons for proposed ash dump not able to be viewed
Manketti Lodge	-The lodge is located very close to the Matimba Power Station and the massive structures of the power station are prominent and were able to be viewed through the flanking trees. The presence of the power station in the immediate vicinity engenders the immediate vicinity with a strong industrial component to its visual character. -Tall trees flank the lodge immediately adjacent on the northern and north-eastern side, thus blocking any potential views to the facility to the Alternative 2 site. Intervening vegetation between the lodge location and the proposed ash disposal facility site (to the north-east of the lodge) would also be likely to screen the facility from view.
Nel Family Homestead	-The house is surrounded on its western, southern and northern side by dense vegetation that precludes any views towards the proposed ash disposal facility. -In addition the homestead is located close to the valley bottom of the Sandloop Spruit, and its topographical location close to a valley bottom would hinder any potential views to the proposed facility.
Eendracht Farmstead	-The existing ash disposal facility cannot be viewed from the farmstead due to intervening trees in the area between the farmstead and the Matimba / Medupi access road. Thus any extension to the existing facility will not be able to be viewed. -The farmstead is also located very close to the Matimba Power Station, thus there is a strong industrial component to its visual character.

It should be noted that no receptor locations that fall within the 5km radius of Site Alternative 1 have been rated using the visual contrast rating methodology. This is due to the absence of *sensitive* receptors located close to the ash disposal facility site and the screening effect of vegetation between the ash dump and more distant receptor locations. However the potential visual impact of the Site 1 Alternative ash disposal facility on the extension of the Onverwacht housing area has been discussed.

4.3.2 Tolerance Levels relating to degree of acceptable change

As described above, the study area has a mixed visual character, with the hub of the town and the power stations having an urban / industrial visual character with some natural aspects and the outlying areas having a more natural visual character. In this context of differing visual and aesthetic qualities and differing degrees of change to a natural visual baseline there are likely to be differing tolerance levels to change within the landscape. In the parts of the study area that have retained their natural characteristics, the nature of certain types of land use practiced and the likely value placed in the natural characteristics of such a landscape entail that emphasis would thus likely to be on preserving the natural character of the landscape, in which human objects have spatially limited and non-intensive visual characteristics and prominence.

Accordingly, the associated objective would be to create as little visual change and contrast to the landscape as possible, by limiting the degree of visual intrusion caused by a development such as the proposed ash disposal facility. Put in another way, the objective would be to only allow development that did not degrade the visual context. In areas with a much more visually altered baseline (i.e. the dominant presence of industrial infrastructure of massive scale and extent), the tolerance level for further development and visual change of the landscape is likely to be much higher. The degree of visual intrusion created by the proposed ash disposal facility is thus important in these differing visual contexts. Accordingly the following visual objectives, and thus tolerance levels have been identified for the differing areas of visual character:

Table 3 - Visual Change Objective and Tolerance level for the study area

Landscape Context	Visual Change Objective	Tolerance Level
Rural environment – largely natural landscapes	Maintain the natural character as far as possible and limit intrusion of large-scale human structural features	Low degree of change in visual contrast permitted
Urban / Industrial environment	Allow developments similar in visual character to existing infrastructure, clustering infrastructure where possible	Medium degree or no change in visual contrast (from urban-industrial baseline) permitted.

The above visual change objectives are a very important component of the visual contrast assessment, as undertaken below, and the tolerance levels allow a judgment to be made of whether the degree of visual contrast created by the proposed development (and thus the likely degree intrusion of the development) is acceptable in terms of its visual setting.

4.3.3 Visual Contrast Rating at Key Observation Locations

4.3.3.1 Manketti Reserve Manager's House

Visual / Landscape Context: Natural Visual character (no human industrial infrastructure visible except for the top of 2 power line towers to the east**)**

Within 5km radius of: Site Alternative 2

☐ Pre-Construction (Current Visual Baseline)

	Landform	**Vegetation**	**Structures**
Form	Very flat terrain and dense fringing woodland (bushveld) vegetation entails that form is very poorly defined with little to no expression of form in the views from this household.	The dense fringing vegetation creates a visual barrier that hides all elements of form in the wider landscape, and thus vegetation is amorphous in a landscape context and thus is not an important factor in form.	No structural effect on form
Line	Very flat terrain and dense surrounding woodland (bushveld) vegetation entails	Some elements of vertical lines present within the surrounding bushveld vegetation in the form of tree trunks.	Telephone line poles, fence poles and weather mast provide a vertical line element contrasting with the

	that overall landscape is very poorly visible with little to no expression of form in the views from this household. However flat landscape provides a dominant horizontal line element to the landscape	However more dominant line element associated with vegetation is horizontal as the trees form a somewhat uniform horizontal line against the skyline.	horizontal skyline.
Colour	Colour based on vegetation (refer to column to right).	Colour of grasses in foreground will vary seasonally – green in summer and yellow for much of the year. Yellow colours provide contrast with darker green hues of predominant microphyllous (thorny) fringing vegetation.	No structural landscape effect on colour
Texture	Texture is based on vegetation (refer to column to right).	Natural fringing vegetation is dense and coarse grained, providing the near ground with a coarse texture.	Evenly-spaced fence poles provide an ordered textured component

☐ Post Construction (Landscape Context if Ash Disposal Facility is developed)

Note: at its maximum developed height (85m) most of the sides of the ash dump would be likely to be visible, with the bushveld vegetation being too distant to effectively shield the proposed ash dump

	(Phase)	**Landform**	**Vegetation**	**Structures**
Form	Pre-rehab	The flat tabular crest of the ash dump would be fully visible above the tree line. Although only being partially visible the presence of the ash dump beyond the near ground trees would introduce a weak element of dimensional shape and mass to the landscape, providing a slight visual contrast.	The flat tabular crest of the ash dump would be visible above the tree line. The visual contrast would be accentuated by the absence of vegetation on the top of the ash dump.	Ash disposal machinery may be visible but is unlikely to have any structural effect on form
	Post rehab	The flat tabular crest of the ash dump would be fully visible above the tree line. Although only being partially visible the presence of the ash dump beyond the near ground trees would introduce a weak element of dimensional shape and mass to the landscape, providing a slight visual contrast.	Trees planted on top of the dump will be distant and will have no impact on form	No significant structural element
Line	Pre-rehab	The flat tabular crest of the ash dump would be fully visible above the tree line. Although only being partially visible this would introduce a relatively prominent horizontal line element on the horizon that would accentuate the existing horizontal lines in the landscape engendered by the fringing vegetation.	The straight line of the crest of the dump would contrast slightly with the natural lines of the bushveld vegetation in the near ground of the view, although together the vegetation forms a similar horizontal line.	Structures placed on top of the ash dump will be too distant to have an impact on line, thus near ground structural elements will be the only important structural elements.

	(Phase)	Landform	Vegetation	Structures
	Post rehab	The vegetating of the top and sides of the ash dump would lessen the prominence of the straight lines of the ash dump, making these lines less prominent, but still visible.	Vegetation planted on the top of the ash dump as part of rehabilitation will be too distant to affect line, thus the lines of the fringing vegetation will remain dominant.	No structural component effect on line is likely.
Colour	Pre-rehab	The crest of the ash dump as visible above the surrounding vegetation would be a different colour to the fringing vegetation in the foreground – being light grey in colour. This would provide a partial visual contrast with the near ground vegetation which would be enhanced if significant plumes of dust were blown off the top of the ash dump during windy days, providing a visual focal point.	The crest of the ash dump as visible above the surrounding vegetation would be a different colour to the fringing vegetation in the foreground of the view and would thus create a contrast with the fringing vegetation.	No structural component effect on colour is likely.
	Post rehab	The grassed crest of the ash dump (yellow in colour) would provide a colour contrast on the horizon with the near ground (dark green) vegetation. However if trees and shrubs were planted on the top of the ash dump, there would be very little contrast created as these would be similar in colouration to the near ground fringing vegetation	The grassed crest of the ash dump (yellow in colour) would provide a colour contrast on the horizon with the near ground (dark green) vegetation. However if trees and shrubs were planted on the top of the ash dump, there would be very little contrast created as these would be similar in colouration to the near ground fringing vegetation	No structural component effect on colour is likely.
Texture	Pre-rehab	Refer to vegetation description to the right	The un-vegetated crest of the ash dump above the near ground tree line will provide a contrast with the near ground trees, displaying a smooth texture as opposed to the coarse grained texture of the trees	No structural component effect on texture is likely
	Post rehab	Refer to vegetation description to the right	No textural contrast will be created as the vegetated top of the ash dump as visible will be similar to the texture of the near ground tree line	No structural component effect on texture is likely

☐ Degree of Visual Contrast Caused

	Pre-rehabilitation				Post rehabilitation			
	Strong	**Moderate**	**Weak**	**None**	**Strong**	**Moderate**	**Weak**	**None**
Form			X				X	
Line		X					X	
Colour		X						X
Texture			X					X
Degree of Visual Contrast:	**MODERATE**				**WEAK to NEGLIGIBLE**			

The most important factor in terms of the degree of visual contrast created in the landscape view by the proposed ash disposal facility is that it would only be partially visible, with only the crest and upper portion of the ash dump likely to be visible above the top of the trees in the near ground. This factor greatly reduces the potential for visual contrast and visual intrusion created by the ash dump, as the degree to which a new dimensional form and mass is introduced into the view would not be significant. Prior to rehabilitation of the upper parts of the ash dump, it will create a moderate degree of visual contrast. The rehabilitation of the ash dump with trees and grasses is likely to achieve its aesthetic aim of helping the ash dump to blend into the environment, if trees are planted on top of the ash dump, the degree of visual contrast created will be weak to negligible.

Degree of acceptability of visual contrast created and visual intrusion factor:

As stated above the Manketti Manager's Household is located in a very natural context (context of a nature reserve), and is sufficiently far removed from the industrial hub around Grootegeluk mine and Matimba Power Station to not fall within the area visually affected by industrial development. The key observation point thus has a low visual tolerance level and the moderate degree of visual contrast created by the ash dump prior to rehabilitation would not fall within this tolerance level. Conversely, the weak to negligible degree of visual contrast that would be created if the top of the ash dump was rehabilitated with grasses and (especially) trees would be more beneficial and would allow the development to fall within the visual tolerance level.

The degree of visual contrast of the ash disposal facility if developed at Site Alternative 2 would thus be in keeping with the tolerance level for this location once rehabilitation has been completed.

4.3.3.2 Droogeheuwel Farmstead

Visual / Landscape Context: Natural Visual character (distant human industrial infrastructure visible in view to the west)

Within 5km radius of: Site Alternative 2

☐ Pre-Construction (Current Visual Baseline)

	Landform	**Vegetation**	**Structures**
Form	Very flat terrain within the view from the farmstead, with very little definition of dimensional shape and mass of landform features within the landscape.	The patchy vegetation in the near ground and the distant bushveld (woodland) vegetation are amorphous and have little bearing on form within the landscape.	The Grootegeluk Mine (coal) dump is visible on the distant horizon and has a limited effect on form by breaking the otherwise completely flat horizon.
Line	Very flat terrain entails that lines are not visible within the landscape and thus the predominant line is the horizontal line of the horizon. Access tracks in the foreground provide an element of banding within the	With the exception of a few large trees in the foreground which introduce an element of vertical and angular lines (associated with their trunks and branches), the distant bushveld vegetation is amorphous within the landscape and the dominant line is that of the horizon.	A water tank in the foreground of the view provides some vertical lines. The Grootegeluk Mine dump on the distant horizon rises above the horizon, however its tabular shape and distant position means that it enhances the horizontal line of the skyline.

	immediate landscape.		
Colour	Dominant colours within the near ground are the light orange colour of the soil, interspersed with the light green (seasonal) colour of flowering annuals. The middle ground of the view is green to yellow (depending on season), merging into the grey-green colours of the woodland in the far ground.	Vegetation is the predominant source of colour in the landscape, with the green of annuals and grasses contrasting with the duller grey-green hues of the distant woodland. The near and middle ground will take on yellower hues in the winter months out of the growing season	No structural landscape effect on colour
Texture	Texture within the landscape is largely based on vegetation (refer to column to right).	The foreground grass and annual herb vegetation is randomly ordered to amorphous, with the surrounding woodland being coarser, but limited in visual prominence by its distance.	No structural landscape effect on texture

☐ Post Construction (Landscape Context if Ash Disposal Facility is developed)

Note: at its maximum developed height (85m) most of the sides of the ash dump would be likely to be visible, with the bushveld vegetation being too distant to effectively shield the proposed ash dump

	(Phase)	**Landform**	**Vegetation**	**Structures**
Form	Pre-rehab	Refer to structural effect to the right.	The absence of any vegetation on the top and sides of the ash dump would provide a strong contrast with the vegetation in the near and middle ground, emphasising the ash dump as a new, foreign object.	The dump as a new structure in the landscape would be highly prominent, having strong dimensional shape and mass over much of the middle ground of the view that would contrast strongly with the absence of dimension in the pre-impacted view.
	Post rehab	Assuming the ash dump was not designed and constructed to have more natural lines (as opposed to a tabular shape), the planting of trees on the sides and top of the ash dump would nonetheless give it the appearance of a low hill / rising ground in the middle ground of the view. This raised 'landform' would however be visually prominent – breaking the flat terrain and rising above the distant horizon.	Trees planted on top of the dump will be distant and will have no impact on form	The vegetating of the dump with trees and a grassy substrate could allow the ash dump to appear less like a new foreign structural element and more like a natural feature of the local topography. Nonetheless the rehabilitated ash dump would still be visually prominent in the middle ground, being a visual focal point
Line	Pre-rehab	The dominant position of the ash dump in the middle ground entails that the horizontal lines of the flat tabular top and angular lines of the sides (depending on design) would be highly prominent within the landscape. Although the flat top of the ash dump would accentuate the flat horizon, the angular lines of the	The absence of any vegetation on the ash dump would accentuate the contrast of the ash dump in terms of creating stark straight lines, and accentuating the colour contrast (as discussed below).	The ash disposal equipment will be prominent on the top of the dump, and will introduce angular lines.

	(Phase)	Landform	Vegetation	Structures
		sides would provide a contrast with the horizontal lines in the landscape.		
	Post rehab	The vegetating of the top and sides of the ash dump would lessen the prominence of the straight lines of the ash dump, making these lines less prominent, but still visible.	The vegetating of the top and sides of the ash dump would lessen the prominence of the straight lines of the ash dump, making these lines less prominent, but still visible.	Apart from the contrast created by the ash dump as a structure itself, there will be no new structural elements in the landscape.
Colour	Pre-rehab	The sides of the ash dump as strongly visible in the middle ground of the view would be a different colour to the fringing vegetation in the foreground – being light grey in colour. This would provide a strong visual contrast with the near ground soil and vegetation and flanking bushveld vegetation which would be enhanced if significant plumes of dust were blown off the top of the ash dump during windy days, providing a visual focal point.	The absence of any vegetation on the top and sides of the ash dump will enhance the contrast of the dump with the surrounding bushveld vegetation and will make it highly prominent and visible	No structural component effect on colour is likely
	Post rehab	The grassed top and sides of the ash dump (yellow in colour) along with the presence of planted trees would likely be the same colour and would not provide a significant colour contrast with surrounding environment which consists of similar vegetation.	The grassed top and sides of the ash dump (yellow in colour) along with the presence of planted trees would likely be the same colour and would not provide a significant colour contrast with surrounding environment which consists of similar vegetation.	
Texture	Pre-rehab	The un-vegetated body of the ash dump in the middle ground of the view will provide a strong contrast with the near woodland vegetation in the middle and far ground of the view, displaying a smooth texture as opposed to the coarse grained texture of the trees	The un-vegetated body of the ash dump in the middle ground of the view will provide a strong contrast with the near woodland vegetation in the middle and far ground of the view, displaying a smooth texture as opposed to the coarse grained texture of the trees	No structural component effect on texture is likely
	Post rehab	A low degree of textural contrast will be created as the vegetated top and sides of the ash dump as visible will be similar to the texture of the surrounding woodland vegetation, providing that a sufficient density and species diversity of trees is planted as part of the rehabilitation.	No textural contrast will be created as the vegetated top of the ash dump as visible will be similar to the texture of the middle and far ground woodland.	

☐ Degree of Visual Contrast Caused

	Pre-rehabilitation				**Post rehabilitation**			
	Strong	**Moderate**	**Weak**	**None**	**Strong**	**Moderate**	**Weak**	**None**
Form	X				X			
Line		X				X		
Colour	X						X	
Texture		X					X	
Degree of Visual Contrast:	**STRONG-MODERATE**				**MODERATE**			

The position of the proposed ash dump, providing strong dimensional shape and mass, and taking up most of the middle ground of the view from this location entails that it would be highly visible, providing a strong contrast with the surrounding landscape, particular in the context of its light grey colouration and stark lines prior to rehabilitation. After rehabilitation, the presence of trees and grassy substrate will make it similar in colour and texture to the surrounding woodland; however the ash dump will remain as a prominent feature within the otherwise flat and featureless landscape.

Degree of acceptability of visual contrast created and visual intrusion factor:

In spite of the industrial infrastructure of Lephalale being visible on the distant horizon, the visual context is nonetheless natural, especially in the context of the north-west orientation of the view. The key observation point thus has a low visual tolerance level. The strong to moderate degree of visual contrast created by the ash dump does not fall within this tolerance level, and it is likely that the visual environment of the surrounds of the farmstead would be altered. While the rehabilitation of the ash dump through vegetating with trees and grasses would lessen this change slightly, the degree of visual change and visual intrusion created is not within the acceptable level for such a visual context.

The degree of visual contrast of the ash dump if developed at Site Alternative 2 would thus not be consistent with the tolerance level for this location.

4.3.3.3 Northern edge of Marapong

Visual / Landscape Context: Urban Visual character with a partly natural character

Within 5km radius of: Site Alternative 2[1]

☐ Pre-Construction (Current Visual Baseline)

	Landform	Vegetation	Structures
Form	Very flat terrain and surrounding shrubby bushveld vegetation entails that form is very poorly defined with little to no expression of form in the views from this area.	The fringing vegetation in the vacant area to the north of the settlement creates a visual barrier that hides all elements of form in the wider landscape.	No structural effect on form.
Line	Very flat terrain and surrounding bushveld vegetation entails that overall landscape is very poorly visible with little to no expression of line in the views	Some elements of vertical lines are present within the surrounding bushveld vegetation in the form of tree trunks. However more dominant line element associated is the horizon, thus	No structural effect on line.

[1] It should be noted that Marapong is also within 5km of the existing Ash disposal facility (Site Alternative 1). However, households on the northern edge of Marapong would not be able to view it due to the intervening parts of the township located to the south.

	from this area. However flat landscape provides a dominant horizontal line element to the landscape that is partly obscured by near ground vegetation.	vegetation has little effect on line.	
Colour	Brown colours of exposed soil contrasts with dark to lighter green hues of vegetation, but overall providing a very natural feel.	The predominant vegetation colour is darker green of thorny shrubveld. In early summer a green flush of grass in the understorey will change to yellows of the grassy substrate in drier months	No structural landscape effect on colour.
Texture	Texture is based on vegetation (refer to column to right).	The fringing shrubveld vegetation is randomly spaced and dense and coarse grained, providing the near ground that is visible with a coarse texture.	Evenly-spaced fence poles provide an ordered component to form.

☐ Post Construction (Landscape Context if Ash dump developed)

Note: at its maximum developed height (85m) only the top of the ash dump is likely to be visible as the intervening shrub veld vegetation would be likely to mostly shield the ash dump from view

	(Phase)	**Landform**	**Vegetation**	**Structures**
Form	Pre-rehab	The flat tabular crest of the ash dump would be partially visible above the tree line. Although only being partially visible, the presence of the ash dump beyond the near ground trees would introduce an element of dimensional shape and mass to the landscape, providing a slight visual contrast.	The flat tabular top of the ash dump would be partially visible above the tree line. The visual contrast would be accentuated by the absence of vegetation on the top of the ash dump, although the distance factor would nullify the contrast.	Ash disposal machinery may be visible but would be unlikely to have any structural effect on form.
	Post rehab		Trees planted on top of the dump will be distant and will have no impact on form.	No significant structural component effect on form is likely.
Line	Pre-rehab	The flat tabular crest of the ash dump would be partially visible above the tree line. Although only being partially visible this would introduce a relatively prominent horizontal line element on the horizon that would accentuate the existing horizontal lines in the landscape engendered by the flat terrain.	Vegetation planted on the top of the ash dump as part of rehabilitation will be too distant to affect line, thus the line of the horizon will remain dominant.	No significant structural component effect on line is likely.
	Post rehab			
Colour	Pre-rehab	The crest of the ash dump as partly visible above the surrounding vegetation would be a different colour to the intervening vegetation in the foreground of the view – being light grey in colour. This would provide a partial visual contrast with the near ground vegetation which would be enhanced if significant plumes of dust were blown off the top of the ash dump during windy days,	The crest of the ash dump as partly visible above the surrounding vegetation would be a different colour to the intervening vegetation in the foreground of the view and would thus create a contrast with the surrounding vegetation, although the distance factor would nullify the contrast.	No structural component effect on colour is likely.

	(Phase)	Landform	Vegetation	Structures
		providing a visual focal point.		
	Post rehab	The grassed crest of the ash dump (yellow in colour) would provide a colour contrast on the horizon with the near ground (dark green) vegetation. However if trees and shrubs were planted on the top of the ash dump, there would be very little contrast created as these would make the visible part of the ash dump a similar colouration to the near ground vegetation.	The grassed crest of the ash dump (yellow in colour) would provide a colour contrast on the horizon with the near ground (dark green) vegetation. However if trees and shrubs were planted on the top of the ash dump, there would be very little contrast created as these would be similar in colouration to the near ground vegetation.	
Texture	Pre-rehab	Refer to vegetation description to the right.	The un-vegetated top of the ash dump as partly visible above the near ground tree line will provide a contrast with the near ground trees, displaying a smooth texture as opposed to the coarser grained texture of the trees.	No structural component effect on texture is likely
	Post rehab	Refer to vegetation description to the right.	No textural contrast will be created as the vegetated top of the ash dump as visible would be similar to the texture of the near ground tree line.	

☐ Degree of Visual Contrast Caused

	Pre-rehabilitation				**Post rehabilitation**			
	Strong	**Moderate**	**Weak**	**None**	**Strong**	**Moderate**	**Weak**	**None**
Form			X				X	
Line			X					X
Colour		X						X
Texture			X					X
Degree of Visual Contrast:	**WEAK**				**NONE**			

The most important factor in terms of the degree of visual contrast created in the landscape view by the proposed ash disposal facility is that it would only be partially visible, with only the top of the ash dump likely to be visible above the top of the trees in the near ground. This factor greatly reduces the potential for visual contrast and visual intrusion created by the ash dump, as the degree to which a new dimensional form and mass would be introduced into the view would not be significant. Prior to rehabilitation of the upper parts of the ash dump, it will only create a weak degree of visual contrast. The rehabilitation of the ash dump with trees and grasses is likely to achieve its aesthetic aim of helping the ash disposal facility to blend into the environment, as trees are planted on top of the ash dump, the degree of visual contrast created will be negligible.

Degree of acceptability of visual contrast created and visual intrusion factor:

Marapong is a low income residential area that is located very close to the industrial hub around the Matimba Power Station and Grootegeluk Mine. The area thus has a visual character that is altered from a natural context, although it lies adjacent to a vacant area of natural vegetation. This area thus has a much higher tolerance level for visual contrast than areas further from the Lephalale industrial hub. The weak degree of visual contrast created by the ash dump prior to rehabilitation falls within this tolerance level. Conversely, the negligible degree of visual contrast that would be created if the top of the ash dump was rehabilitated with grasses and (especially) trees would be even more beneficial. It is unlikely that the ash dump would be associated with any measurable degree of visual intrusion or impact at this location.

The degree of visual contrast of the ash disposal facility if developed at Site Alternative 2 would thus be in keeping with the tolerance level for this location.

The table below provides a summary of the results of the visual contrast assessment at the key observation locations in the study area:

Table 4 - Comparative Assessment of Degree of Visual Contrast and Consistency with Tolerance Level for each alternative

Key Observation Location	Degree of visual contrast in key view (landscape) Pre-rehabilitation	Degree of visual contrast in key view (landscape) Post rehabilitation	Consistency with visual change tolerance level
Manketti Reserve Manager's House	Moderate	Weak	**Inconsistent** with tolerance level (pre-rehabilitation), but Consistent with tolerance level (post-rehabilitation)
Droogeheuwel Farmstead	Strong-moderate	Moderate	**Inconsistent** with tolerance level
Northern edge of Marapong	Weak	None	Consistent with tolerance level
Manketti Lodge	Ash disposal facility would not be visible		
Nel Family Homestead	Ash disposal facility would not be visible		
Eendracht Farmstead	Ash disposal facility would not be visible		

Figure 18 – View of the ash dump from the north, a view which would be similar to the view from Droogeheuwel if the ash dump is developed

4.3.4 Discussion and Implications for Visual Impact

4.3.4.1 Alternative Site 2

From the above analysis, it can be concluded that one receptor location - the Droogeheuwel Farmstead would be subject to a potential high degree of visual impact due to the visual contrast created by the proposed ash disposal facility and due to its high degree of visibility within the view from this location. In the case of the Ganzepan Homestead a high degree of contrast would have been likely to have been created due to the immediate proximity of the ash dump to the receptor location, but in practical terms it is expected that this receptor location would cease to be an inhabited homestead. In the case of the Droogeheuwel farmstead, the presence of a large area that has been cleared of the natural woodland vegetation immediately adjacent to the farmstead would allow the ash dump to be highly visible in the north-western arc of view from the farmstead.

It is likely that unless the Droogeheuwel properties in its entirety is purchased as part of the development of the ash disposal facility on the Alternative 2 site (in which case these would cease to exist as privately owned receptor locations, instead being owned by Eskom), the development of the ash disposal facility on the Alternative 2 site would cause significant and irreversible visual impacts at this location. Capital expenditure in the development of this homestead is evident, and although it does occur in a wider context of a significant presence of industrial infrastructure, the location is currently largely natural in visual context, although some large industrial infrastructure is visible in the distance. The development of the ash disposal facility (ash dump) in close proximity to this location is likely to represent an anachronism, altering the visual environment and sense of place, and

arguably in so doing diminishing the attractiveness of this location as a place of residence or as hunting accommodation. As such it is important to note that the visual impacts at this location would be very difficult, if not impossible to mitigate or reduce to acceptable levels.

For the other receptors locations within the 5km radius of the Alternative 2 Site, a number of factors entail that these locations would not be subject to significant visual impacts. A combination of the distance of the receptor locations away from the ash disposal facility site and vegetation or other structures that would shield the receptor location from views of the facility entail that the degree of visual contrast likely to be created by the facility would be minimal and thus there would be negligible visual intrusion associated with the ash dump at these static locations.

Away from the static locations, the land uses on the properties surrounding the Site Alternative 2 need to be examined to determine sensitivity to visual intrusion associated with the ash disposal facility. The Gelykebult, Vooruit and Appelvlakte properties are all owned by Exxaro Coal and are run as the Manketti Nature Reserve. Although hunting (bow hunting) has previously been undertaken on the property, hunting no longer occurs, but there is a possibility that it would be conducted in the future (Marius Fuls, pers. comm.). The presence of certain mega-herbivore species and a wide variety of general game on the property lends the reserve to be developed to offer certain eco-tourism activities such as game viewing or guided walks. Hunting has previously been undertaken on the Droogeheuwel property (Louis Grobler, pers. comm.), with accommodation for hunters having been established. Although currently not taking place on the farm, hunting could be a viable land use activity on the property in the future. The status of hunting on the Ganzepan property is not known, however the presence of electrified game fences on its boundary suggests that the property is stocked with game and that commercial hunting is likely to occur.

It can be debated whether hunting is an activity that is visually sensitive. Hunting does not depend on aesthetics as such, however in a context of commercial hunting activities, value is placed on the aesthetic appeal and 'the sense of place' of the area in which hunting takes place, especially as hunting is marketed to overseas clients as an 'African bush experience'. The presence of visibly intrusive and noisy industrial infrastructure would thus likely be perceived as detracting from, or degrading the 'bush hunting experience', especially in a context where hunting guests are accommodated on the property. The proximity of the proposed Site Alternative 2 to the above mentioned properties on which hunting is / may be practiced in the future is a significant factor. Much of the area of these properties is located closer to this site than the static receptor locations, and thus the ash disposal facility would be more visually prominent and thus visually intrusive (although the tall woodland vegetation will continue to perform an effective screening location). The potential for hunting (and potential future eco-tourism-related activities on the Manketti Reserve) to be subjected to visual impacts associated with the ash disposal facility on Site Alternative 2 exists.

4.3.4.2 Alternative 1 Site

A much lesser number of static receptor locations exist within the 5km radius of the Alternative 1 site as it is located within the current Matimba / Medupi Power Stations industrial cluster. The Eendracht farmstead is shielded from viewing the existing ash disposal facility by intervening woodland vegetation. The Kuipersbult Farmstead is similarly likely to be shielded from viewing the facility by intervening bushveld vegetation on the property to the east. Similarly woodland vegetation between the Manketti Lodge and the ash disposal facility entails that there is no view of the existing facility from this location. In the case of the southern parts of Marapong the enormous bulk of the Matimba Power Station shields the ash dump from view. In spite of the proposed extension in height of the ash dump if the ash disposal facility was to be developed at Site Alternative 1, the above mentioned distance and screening factors of structures and vegetation would still be likely to screen large parts of the raised ash dump from view, with only the upper parts of the ash dump being likely to be visible above the surrounding woodland vegetation.

To the east of the existing ash disposal facility, the Onverwacht Township is likely to expand to the west of its current boundary onto the Altoostyd property that lies immediately to the east. It is not certain whether a buffer of natural vegetation (that currently covers the Altoostyd site) will be maintained on its western edge. However, as this would be a new development, the existing ash dump would form part of the baseline visual environment. Although the eastern face of the ash dump (the face that would be viewed by the new settlement) is already rehabilitated with vegetation this would be likely to revert back to an active ashing face with the proposed piggy-backing of the facility and the concomitant raising of the total structure. The height of the facility when it reaches its maximum developed size and the proximity of the housing to the ash dump structure would make the facility highly prominent, dominating the surrounds of the development especially for the western parts of the development, unless a buffer of natural woodland vegetation was retained on the western edge of the development. The active ashing face would nonetheless form part of the baseline visual environment into which the housing was developed, representing part of the wider Matimba / Medupi industrial complex adjacent to which the housing development would be located.

Most importantly in the context of the Alternative 1 site, is that:

- The ash disposal facility already exists and thus is already a visually prominent feature of the environment that would be laterally enlarged but also increased in height, making it a very large and prominent structure as viewed from its surrounds (without the presence of any screening factors).
- The ash disposal facility occurs within the core of the industrial hub around Lephalale and it is flanked by two massive power stations and associated infrastructure (e.g. conveyor belts and numerous power lines). The visual character is thus highly industrial with very little value likely to be placed on aesthetic quality of the area.

This means that in spite of the height increase (of 45m) of the ash dump there is unlikely to be any significant visual intrusion factor associated with the expansion of the existing ash disposal facility. Most of the public accesses (roads) are located to the north and east of the facility, and thus the expansion of the ash dump in a westward direction is likely to be completely screened, or at least partly screened by the existing facility However mobile receptors be exposed to the renewed ashing face as the ash dump is increased in height.

The Wellington property located immediately to the south of the existing ash disposal facility is undeveloped and may be utilised for hunting, but this has not been confirmed. Thus, the visual sensitivity of hunting activities may apply here too however, an important factor is that the existing ash disposal facility forms part of the current visual baseline and views to the north from the property (where not screened by vegetation) are currently dominated by the active face of the ash dump and the southern side which has not yet been fully rehabilitated. The screening of the ash dump by vegetation on this property is an important factor, as not many parts of the property are likely to be exposed to views of the ash disposal facility, although the effective viewshed of the structure is likely to be increased in size. However it is likely that the expansion of the ash dump to the west would be unlikely to be perceived as a significant visual impact.

4.4 Comparative Assessment of Alternative Sites

From the above discussion, it is evident that the expansion of the existing ash dump is associated with a different degree of potential visual impact than if a new ash disposal facility was developed at the Alternative 2 site, as there is an existing ash dump / ash disposal facility at Site 1 which would be enlarged. The following factors are relevant in a comparative assessment of the two sites:

- The Alternative 2 site would be developed on a greenfields site, while the development of the Alternative 1 site entails the expansion of an existing feature. The Alternative 2 site would thus be associated with a new visual intrusion in an area that is currently subject to a much lesser degree of visual impact.

- The development of the Alternative 2 site would result in an effective expansion of the footprint of the industrial hub in the wider Lephalale area. This would not only relate to the establishment of a large ash dump, but would also relate to the development of ancillary infrastructure, in particular the conveyor belt carrying ash from the Matimba Power Station to the new ash disposal facility. This must be contrasted with the Alternative 1 site where the ash disposal facility exists within the industrial hub of Lephalale, and where ancillary infrastructure already exists.

- The Alternative 2 site is located in an area with a natural visual character, whereas the Alternative 1 Site is located within an industrial hub. Thus visual impacts associated with the Alternative 2 site would be much more significant in the context of the setting, and would be much more likely to be perceived as a significant visual impact due to this natural setting.

- Most of the properties surrounding the Alternative 2 site conduct hunting or have the potential to conduct commercial hunting and possibly even ecotourism in the future. These activities are more likely to be adversely affected by visual exposure to the ash disposal facility (if developed on Site Alternative 2) than the landuses surrounding the Alternative 1 site, where the existing ash disposal facility is part of the visual baseline.

- There are more static receptor locations located within a 5km radius of the Alternative 2 site than the Alternative 1 site.

- The only static receptor locations that has been assessed to be subject to significant visual contrast, and thus exposed to significant visual intrusion is located within the 5km radius of Site Alternative 2, whereas there are no such receptor locations affected by Site Alternative 1, as these are either effectively screened by structures and vegetation, or are already exposed to views of industrial infrastructure.

For these reasons above, the expansion of the existing ash disposal facility is preferred, and thus it is recommended that Site Alternative 1 be developed. The development of Site Alternative 2 is not supported from a visual perspective.

4.5 Impact Rating Matrices

The visual impacts related to each alternative have been assessed through the standard EA rating matrix that must be completed by each specialist. Impacts relating to the different project phases are detailed.

Alternative Site 1

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Construction	• No construction activities will occur as operation at the dump will continue – i.e. further vegetation clearing in the footprint of the extension and continued ash disposal as an operational activity.	Refer to operation below	• Refer to operation, below	Refer to operation below
Operation	• Operational activities will continue at the existing ash disposal facility as the facility increases its footprint – i.e. clearing of natural vegetation as the active face is extended westwards. • However in addition to the westward expansion of the ash dump, piggy backing would entail the development of new ashing cells on top of the existing ash dump and the heightening of the structure, making it more visible. • This would represent a continuation (consolidation) of the existing visual baseline associated with the ash disposal facility.	**Extent:** Local (-2) **Duration:** Permanent (-4) **Intensity:** Moderate (-2) **Probability:** Probable (-3) **Significance: Medium (-11)**	• Rehabilitation of parts of the ash disposal facility on which ash disposal is completed, especially relating to planting of vegetation to provide the ash disposal facility with a more natural appearance. • The retention of a strip (buffer) of natural woodland vegetation on the western edge of any new expansion to the Onverwacht housing area in order to assist in the screening of the active eastern face of the ash disposal facility from view.	**Extent:** Local (-2) **Duration:** Permanent (-4) **Intensity:** Moderate (-2) **Probability:** Possible (-2) **Significance: Medium (-10)**
Decom-missioning	• If the ash disposal facility is not fully rehabilitated, the decommissioned facility will retain the appearance of an active dump / disposal facility, as opposed to a rehabilitated facility that is more easily perceived as a natural part of the landscape.	**Extent:** Local (-2) **Duration:** Permanent (-4) **Intensity:** Moderate (-2) **Probability:** Possible (-2) **Significance: Medium (-10)**	• Once all ashing has been completed, the facility needs to be fully re-vegetated so that no bare 'face' exists. • Rehabilitation follow ups need to be conducted, with re-planting if necessary in order to ensure the success of rehabilitation • All operational equipment such as cranes, etc. must be fully removed from the ash disposal facility.	**Extent:** Local (-2) **Duration:** Permanent (-4) **Intensity:** Low (-1) **Probability:** Improbable (-1) **Significance: Medium (-8)**
Cumulative	• The continued ash disposal at the current facility represents a continuation of the existing visual baseline, especially when viewed from certain areas around the site. The development of Alternative 1 would thus be unlikely to be		• Refer to activity / phase specific mitigation measures above	

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
	associated with a cumulative impact.			

Alternative Site 2

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
Construction	• Due to the distance between the site and the nearest visual receptors, the setting up of site infrastructure as part of construction is unlikely to be associated with visual impacts, due in particular to the screening effect of natural vegetation. • The construction of the conveyor belt could be associated with a visual impact if cranes are utilised for construction.	**Extent:** Site (-1) **Duration:** Medium term (-2) **Intensity:** Moderate (-2) **Probability:** Possible (-2) **Significance: Medium (-7)**	• Limited clearing of vegetation on the development site unless required for construction facilities. This will retain the screening function of natural vegetation.	**Extent:** Site (-1) **Duration:** Medium term (-2) **Intensity:** Low (-1) **Probability:** Improbable (-1) **Significance: Low (-5)**
Operation	• The establishment of the ash disposal facility over time (as the facility grows vertically) will make the facility increasingly visible from a wider area. • The bare face of the ash disposal facility could be perceived to be an unwelcome / incongruous feature associated with industrial expansion into areas of currently natural visual character.	**Extent:** Local (-2) **Duration:** Permanent (-4) **Intensity:** High (-3) **Probability:** Definite (-4) **Significance: High (-13)**	• Rehabilitation of parts of the ash disposal facility on which ash disposal is completed must be initiated as soon as practically possible to limit the visual exposure factor of the facility's active face. Plating and establishment of vegetation is very important in this context.	**Extent:** Local (-2) **Duration:** Permanent (-4) **Intensity:** Moderate (-2) **Probability:** Highly probable (-3) **Significance: Medium (-11)**
Decom-missioning	• If the ash disposal facility is not fully rehabilitated, the decommissioned facility will retain the appearance of an active dump / disposal facility, as opposed to a rehabilitated facility that is more easily perceived as a natural part of the landscape.	**Extent:** Local (-2) **Duration:** Permanent (-4) **Intensity:** Moderate (-2) **Probability:** Possible (-2) **Significance:**	• Once all ashing has been completed, the facility needs to be fully re-vegetated so that no bare 'face' exists. • Rehabilitation follow ups need to be conducted, with re-planting if necessary in order to ensure the success of rehabilitation • All operational equipment such as cranes, etc. must be fully removed from the ash	**Extent:** Local (-2) **Duration:** Permanent (-4) **Intensity:** Low (-1) **Probability:** Improbable (-1) **Significance: Medium (-8)**

Phase	Potential Aspect and or Impact	Significance rating of impacts before mitigation	Mitigation	Significance rating of impacts after mitigation
		Medium (-10)	disposal facility.	
Cumulative	The creation of a new ash disposal facility at Site Alternative 2 would represent an extension of the industrialised part of the Lephalale area into an area of currently natural visual character. This would represent a cumulative impact in terms of the alteration of the visual character and extension of the industrialised part of the area, potentially detracting from the 'sense of place' in surrounding areas.		• Refer to activity / phase specific mitigation measures above	

4.6 Mitigation Measures

A number of mitigation measures are specified below in order to reduce the visual impacts associated with the ash disposal facility. The most important mitigation measure in a visual context would be the development of the site for future ashing at the existing (Alternative 1) site, rather than the Alternative 2 site, for the reasons discussed above. Should the Alternative 2 site be developed, it would be very difficult to practically mitigate the visual impacts associated with the ash disposal facility at the Ganzepan Homestead and Droogeheuwel Farmstead receptor locations, unless these properties were to be purchased in their entirety by the applicant (Eskom), but this would be dependent on the willing buyer-willing seller principle applying.

Further mitigation measures are discussed below.

4.6.1 Rehabilitation methods for the ash dump

Rehabilitation of the ash dump is a critical factor in reducing the degree of visual intrusion associated with the ash disposal facility. As discussed in section 4.2.1 above, the establishing of vegetation on the existing ash dump is a significant factor in allowing the ash dump to be less intrusive in the landscape context in which it is located, and to reduce the visual intrusion factor associated with it. The existing ash dump is vegetated with a grassy substrate, and trees and shrubs are planted on the dump as well. This process is assisted by the use of topsoil cleared from the expanding footprint of the dump and re-deposited on the top and sides, as this topsoil will contain a seed bank which will facilitate the regrowth of naturally-occurring grass, herb and shrub species on the dump. The rehabilitation efforts on the northern and eastern side of the dump have been successful to the degree that viewers approaching the dump from the east may not necessarily be aware of the presence of an ash dump. Rehabilitation assists with the masking of the dump, and as illustrated by the visual contrast rating (section 4.3.3), the rehabilitation of the ash dump would greatly reduce the potential for visual intrusion by mimicking the appearance of natural vegetation surrounding it and masking the highly visible pale grey colour of exposed ash.

For this reason it is strongly recommended that the rehabilitation of future expanded / created parts of the ash dump continue in this manner. Rehabilitation of the ash dump sides with vegetation **should aim to mimic the appearance of the naturally-occurring woodland as far as possible.** In this context rehabilitation efforts should:

- Utilise a similar tree and shrub species composition to that found in the surrounding woodland, using both microphyllous (e.g. Acacia, Dichrostachys) and broad-leafed (e.g. Terminalia, Combretum) species
- Aim to create as dense a cover of trees and shrubs as possible to provide the sides of the ash dump with a similar appearance to the surrounding bushveld / woodland. This may entail establishing a grassy substrate first, before densifying the cover of trees and shrubs.

It is important that rehabilitation efforts be ongoing to ensure that any parts of the ash dump potentially exposed by erosion of the topsoil substrate that would expose the underlying ash be remediated.

4.6.2 Structural Landscaping and design of the ash dump

The existing ash dump has been designed with a classical mine dump shape, i.e. a tabular shape with flat top and relatively steeply sloping sides which have been terraced to stabilise the sides. While appearing like a natural hilly feature from certain angles, and especially when partly masked by vegetation, the stark angles of the ash dump are visible from certain angles, especially when viewed from the north.

If the ash dump were to be designed to be more 'natural' in appearance, this would assist in helping the feature to be even less intrusive. This could involve designing the ash dump to have gentler, less steep slopes and a less acute angular transition between the sides and the crest. Shaping the feature to be a rounded, convex shape (i.e. the shape of an inverted bowl) would assist in giving the ash dump a more natural, organic look akin to a small koppie or hill. Such design measures would vary depending on which site is selected for further development; if a new ash disposal facility was created then the manner of ashing could possibly be adapted to create such a natural looking feature. In the case of the existing facility the remaining portion of the ash dump could be designed to have less steep sides and a convex, rounded margin between the crest and the sides. It is recommended that the principles of landform design (design to achieve a more natural appearance of artificial features that entails the collaboration of a multidisciplinary team that incorporates aspects of aspects of geotechnical science, surface water, groundwater, soils, vegetation and wildlife) (McKenna, 2009; Schor and Gray, 2007) be applied in the design of the future ash dump. On a practical level the use of landform grading on the surface of the ash dump – i.e. shaping slopes to have natural geomorphic shapes (an alternating pattern of swales and crests / valleys and spurs), utilising vegetation that is adapted to slope hydrology (McKenna, 2009; Schor and Gray, 2007) is strongly recommended. Re-sloping of benches could also be considered.

Such measures would depend on a number of technical factors such as technical feasibility and stability of the feature, as well as cost, but it would be highly beneficial in a visual context if an organic appearance was incorporated into design of the future ash dump.

4.6.3 The height of the ash dump and mitigation measures related to design

In a previous draft of this report 'piggy-backing' at the existing ash disposal facility was not recommended. In subsequent design reports piggy-backing has emerged as the preferred method of accommodating the volume of ash in the available space and it appears as if the avoiding of piggy-backing at the existing facility is now technically not an option.

In the context of Site Alternative 2, it is strongly recommended that if this alternative is developed, the ash dump should be designed to extend laterally (with the biggest possible spatial footprint) and thus be constructed to as low a height as possible. The lower the ash dump, the more likely it would be that vegetation surrounding the ash dump and located between the ash dump and receptor locations would be able to effectively screen the ash dump.

If Site Alternative 1 is selected for development and piggy-backing occurs on top of the existing ash dump, it is strongly recommended that the development of the cell(s) commence on the eastern and southern side of the ash dump, extending westwards and northwards, and thus that the rehabilitation of the new cell begin on its eastern and southern sides as soon as possible after its construction begins. The closest receptor locations and areas of greatest potential visual sensitivity (and natural character) are located on the eastern and southern sides of the ash disposal facility, and thus if rehabilitation of the sides of the ash dump is commenced as soon as possible, this will mitigate the visual exposure potential of the raised structure.

4.6.4 Retaining a natural buffer around the ash dump

On both site alternatives, the ash dump site with respect to site alternative 2 and area of future expansion for site alternative 1) is occupied by natural woodland vegetation. In order to assist in the screening of the ash dump for receptors in the surrounding area, it is recommended that a buffer of natural vegetation be maintained around the ash dump site. This buffer is recommended to be at least 150m wide to allow the natural woodland vegetation to partly screen (the lower parts of) the ash dump from the surrounding area.

It would also be advantageous in a mitigating perspective to ensure that if the housing area of Onverwacht is expanded to the west towards the existing ash disposal facility that the housing development layout be planned to include a buffer of the existing woodland vegetation on the western edge of the housing development that is at least 50m in width, as this will be a strong mitigating factor in reducing the visual exposure potential of the heightened ashing face by acting as a visual screen.

5 CONCLUSIONS AND RECOMMENDATIONS

This report has assessed the potential visual impacts associated with the proposed establishment of ash disposal facilities for the Matimba Power Station in the Lephalale area. The general study area displays a mix of industrial and urban land uses concentrated around the Lephalale-Matimba-Medupi hub, with areas of more natural character in the outlying areas. There are a number of static receptors, a number of which are located within a 5km radius of the two site alternatives for the further development of the ash disposal facility.

Two alternative sites have been presented for assessment, each of which is associated with a differing degree of visual impact and exposure. Site Alternative 1 is the existing ash disposal facility, and its continued use would include the western expansion of the ash disposal area as well as the raising of the structure as part of 'piggy-backing'. The raising of the structure would increase its visibility, but this must be considered in the context of it being an existing large structure that is already associated with a degree of visual change from a natural context, in the visual setting of a cluster of heavy industrial infrastructure. Site Alternative 2 is located further away from the industrial hub in an area of mostly natural woodland vegetation, and thus the development of an ash disposal facility in this context would represent a new high intensity visual impact in a context of no or little visual landscape change.

The visual contrast rating methodology has been utilised to assess the impact of the degree of visual contrast and level of visual intrusion of the proposed ash disposal facility at selected key observation locations. The assessment identified that natural screening of the ash dump by vegetation and other structures is the most important factor in preventing the ash dump from being visible and thus visually intrusive at a number of receptor locations. The rehabilitation of the existing ash dump using natural vegetation also assists the existing ash dump in being less visually intrusive.

The visual contrast rating methodology has indicated that one static receptor location would be subject to a significant level of visual contrast and thus visual impacts (if Site Alternative 2 is developed – note another sensitive receptor location falls within the footprint of the proposed ash dump at Site Alternative 2 and would thus effectively be destroyed). The degree of visual change at this location would be sufficiently pronounced to make it very difficult to effectively mitigate the impacts, and the development of the ash disposal facility would result in a permanent alteration of the visual environment at this location. The other receptors in the 5km radius of this alternative have been assessed to be likely to be exposed to a weak degree of contrast or no measurable visual impact. The practicing of hunting activities on the properties adjacent to the Alternative 2 site would arguably suffer from the development of an ash disposal facility at this site.

The assessment has revealed that no receptor locations would be likely to experience significant visual impacts as a result of the development of Site Alternative 1 (the expansion of the existing facility), in spite of the raising of the height of the structure through piggy-backing. This is primarily as a result of the existing ash disposal facility being located within the industrial hub of Lephalale, and the existing facility is already part of the existing visual environment. However it should be noted that a proposal to expand the Onverwacht housing area into the current vacant property to the west of the current edge of the housing would result in the creation of human settlement (static receptor locations) very close to the eastern side of the ash disposal facility. For these new receptor locations the raised ash dump (and active ashing face) would present a highly prominent large structure that would dominate the immediate visual environs, although the ash disposal facility would form part of the existing visual baseline in which the housing would be developed.

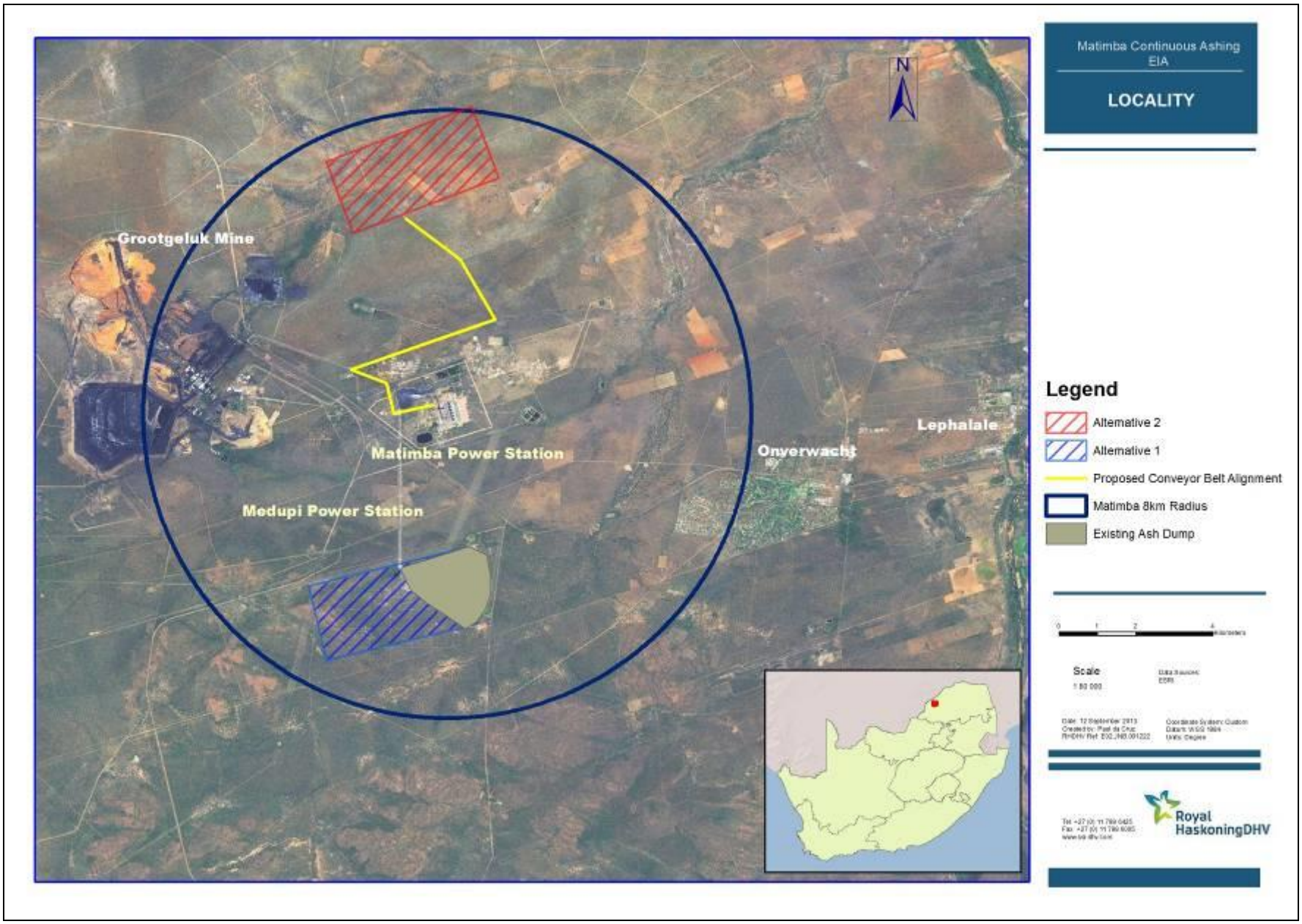
Due to the existing visual impacts associated with Site Alternative 1 and its location within an industrial hub, the development of the continued ash disposal facility at Site Alternative 1 is preferred to the new development of an ash disposal facility at the Alternative 2 site which is located in a much more natural setting.

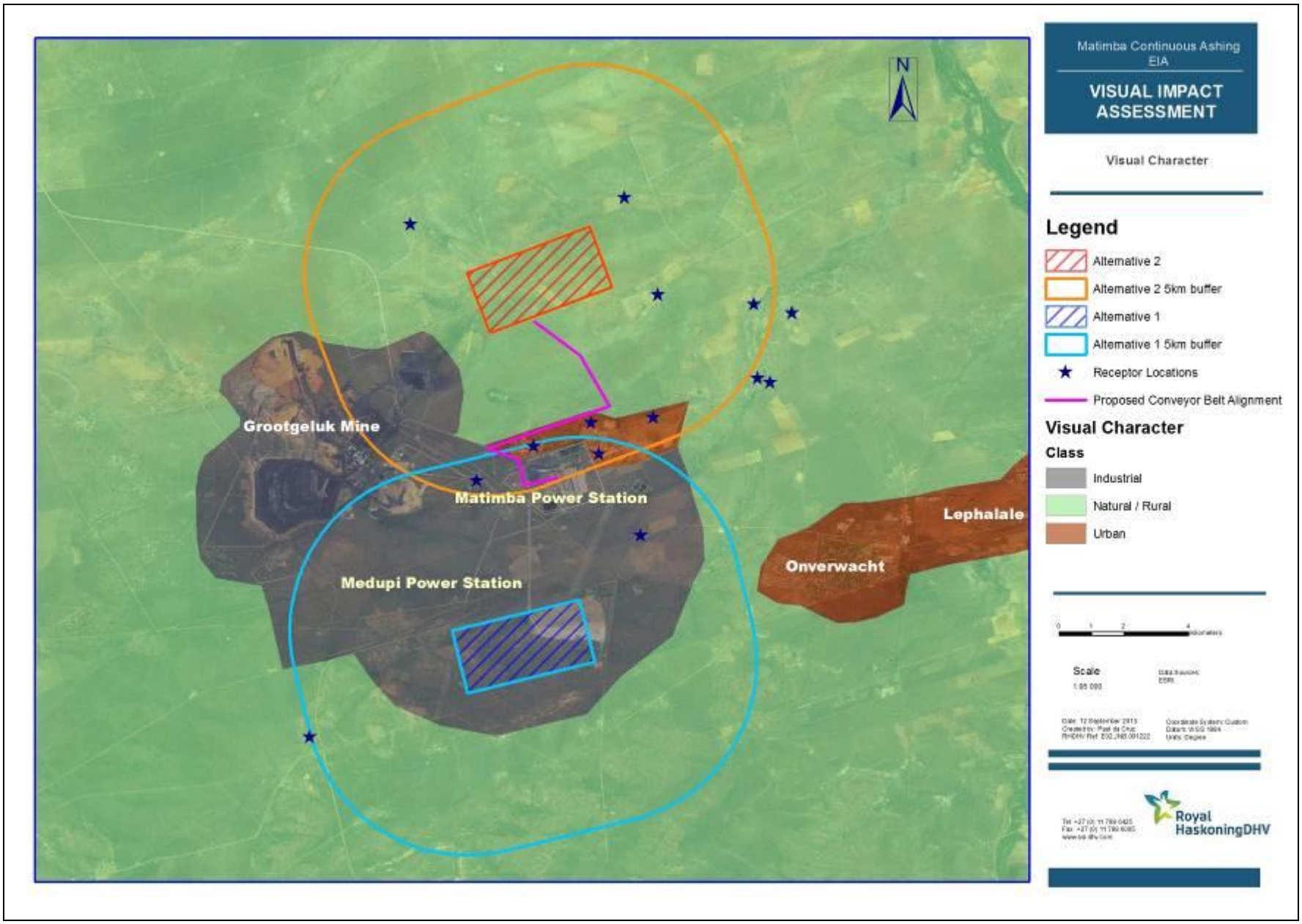
A number of mitigation recommendations have been made, the most important of which is the continued rehabilitation of newly deposited parts of the ash dump with vegetation cover, and a recommendation to consider the more natural / organic landform design of the ash dump to give it a more natural appearance.

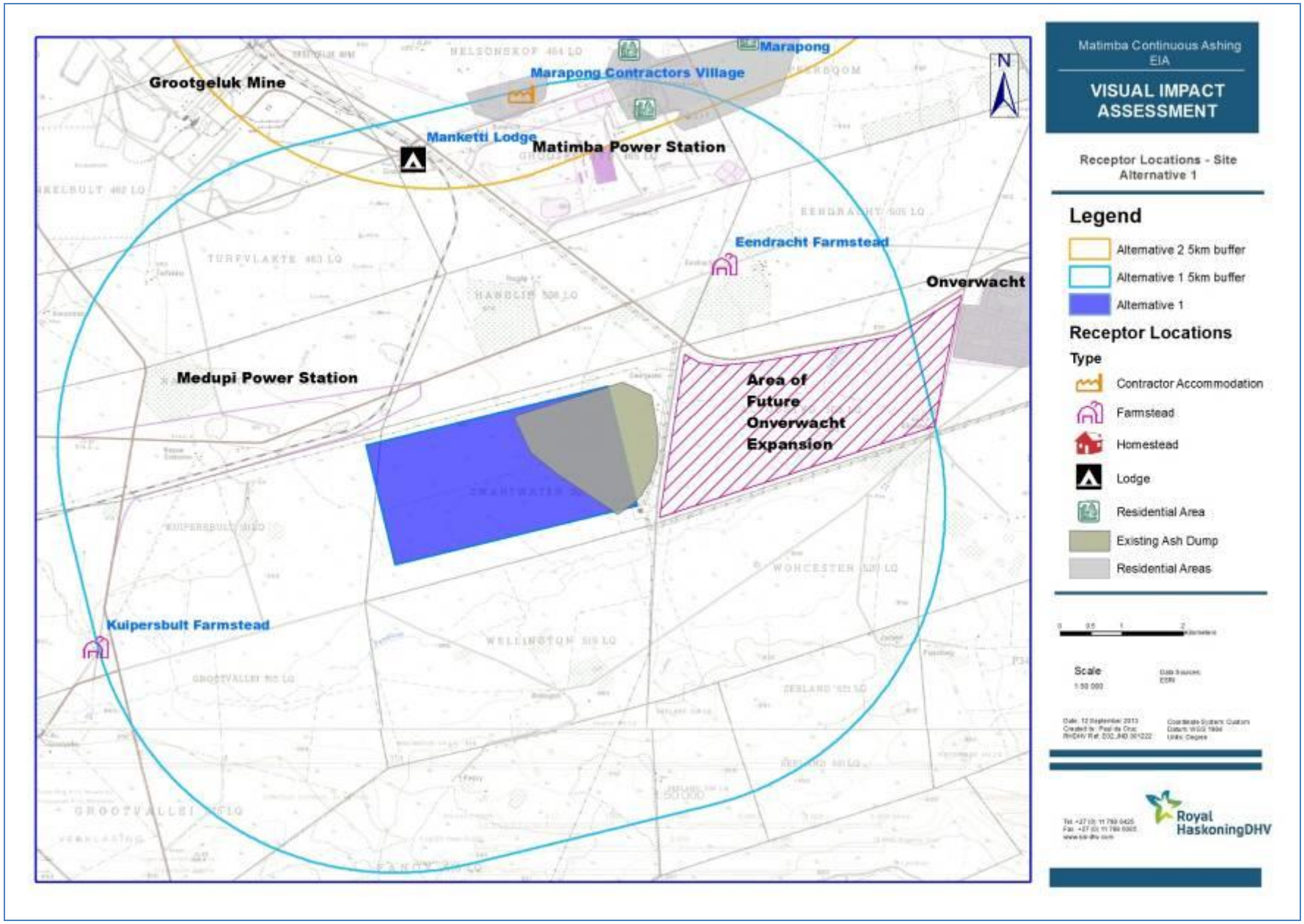
6 REFERENCES

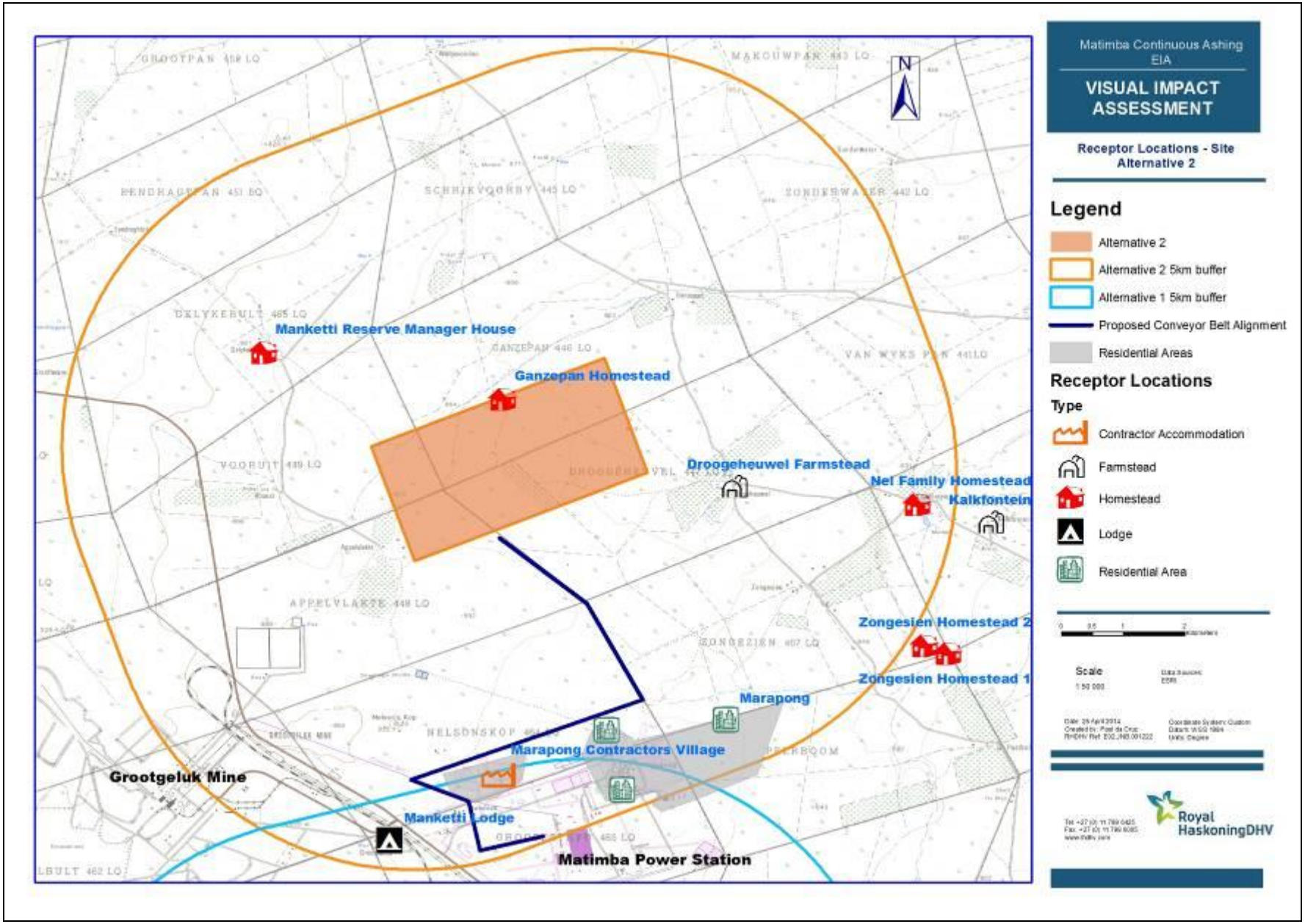
- Lephalale Municipality Integrated Development Plan 2012/2013, Civic Centre, C/O Joe Slovo and Douwater Road, Onverwacht
- McKenna,G., 2009. Techniques for creating Mining Landforms with Natural appearance. Techniques for creating mining landforms with natural appearance, Proceedings of Tailings and Mine Waste • f09 Conference. Banff, Alberta. November 1•]4, 2009. The University of Alberta Geotechnical Centre, Edmonton.
- Schor, H.J. and Gray, D.H., 2007. Landforming: an environmental approach to hillside development, mine reclamation and watershed restoration. John Wiley & Sons, Hoboken, NJ. 354p
- USA Department of the Interior: Bureau of Land Management, Manual 8431 - Visual Resource Contrast Rating.

APPENDIX A:
Maps


Matimba Continuous Ashing
EIA
LOCALITY
N
Grootgeluk Mine
Matimba Power Station
Medupi Power Station
Onverwacht
Lephalale
Legend
Alternative 2
Alternative 1
Proposed Conveyor Belt Alignment
Matimba 8km Radius
Existing Ash Dump
Scale
Royal HaskoningDHV


N
Grootgeluk Mine
Matimba Power Station
Medupi Power Station
Lephalale
Onverwacht
Matimba Continuous Ashing EIA
VISUAL IMPACT ASSESSMENT
Visual Character
Legend
Alternative 2
Alternative 2 5km buffer
Alternative 1
Alternative 1 5km buffer
Receptor Locations
Proposed Conveyor Belt Alignment
Visual Character
Class
Industrial
Natural / Rural
Urban
Scale
Royal HaskoningDHV


Grootgeluk Mine
Marapong
Marapong Contractors Village
Manketti Lodge
Matimba Power Station
Eendracht Farmstead
Onverwacht
Medupi Power Station
Area of Future Onverwacht Expansion
Kuipersbult Farmstead
N
Matimba Continuous Ashing EIA
VISUAL IMPACT ASSESSMENT
Receptor Locations - Site Alternative 1
Legend
Alternative 2 5km buffer
Alternative 1 5km buffer
Alternative 1
Receptor Locations
Type
Contractor Accommodation
Farmstead
Homestead
Lodge
Residential Area
Existing Ash Dump
Residential Areas
Scale
Royal HaskoningDHV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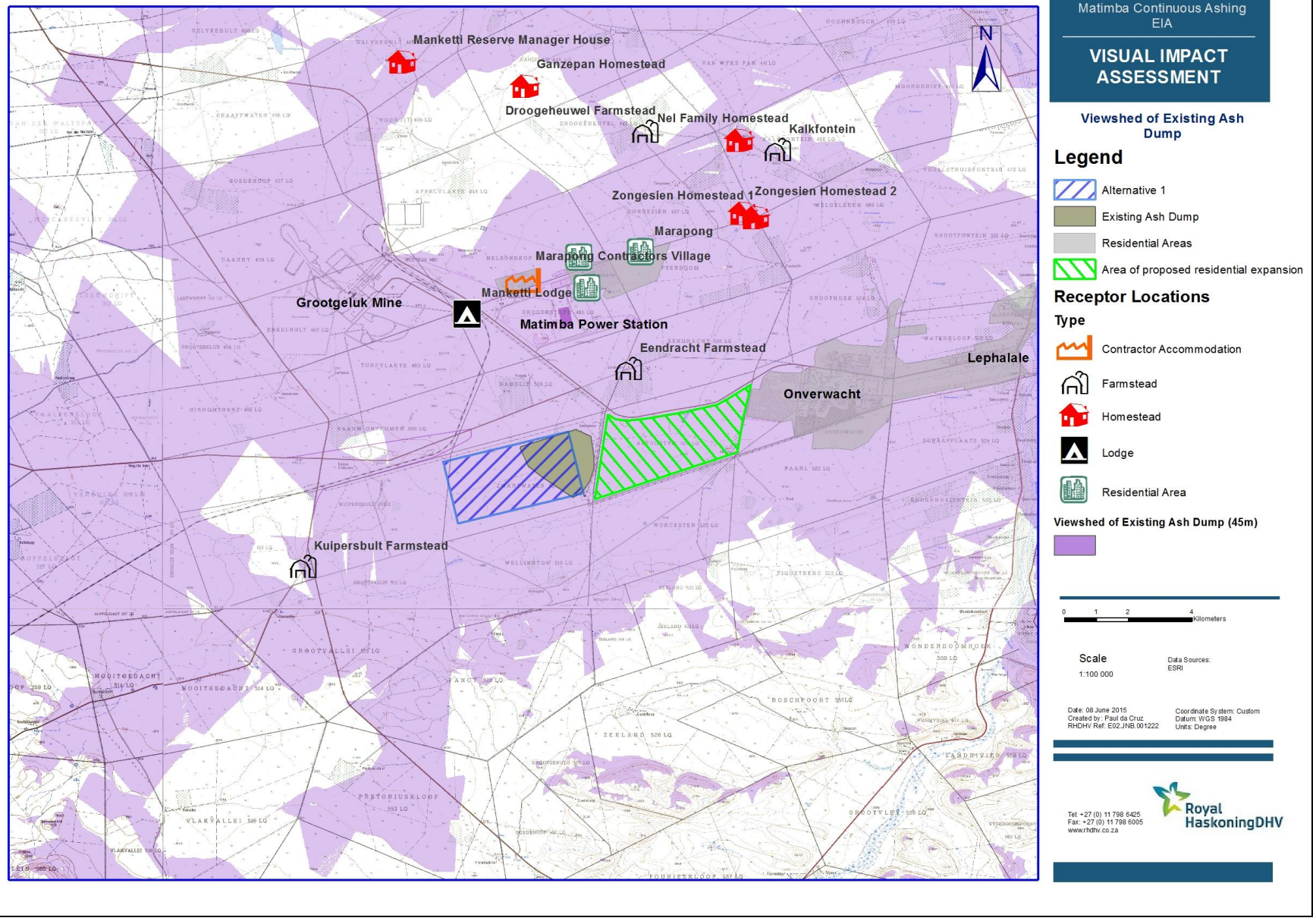
VISUAL IMPACT ASSESSMENT
Receptor Locations - Site Alternative 2
Legend
Alternative 2
Alternative 2 5km buffer
Alternative 1 5km buffer
Proposed Conveyor Belt Alignment
Residential Areas
Receptor Locations
Type
Contractor Accommodation
Farmstead
Homestead
Lodge
Residential Area
Scale
Royal HaskoningDHV
N
Manketti Reserve Manager House
Ganzepan Homestead
Droogeheuwel Farmstead
Nel Family Homestead
Kalkfontein
Zongesien Homestead 2
Zongesien Homestead 1
Marapong
Marapong Contractors Village
Grootgeluk Mine
Manketti Lodge
Matimba Power Station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Kalkfontein
Zongesien Homestead 1
Zongesien Homestead 2
Marapong
Marapong Contractors Village
Manketti Lodge
Grootgeluk Mine
Matimba Power Station
Eendracht Farmstead
Lephalale
Onverwacht
Kuipersbult Farmstead
N
Matimba Continuous Ashing EIA
VISUAL IMPACT ASSESSMENT
Viewshed of Existing Ash Dump
Legend
Alternative 1
Existing Ash Dump
Residential Areas
Area of proposed residential expansion
Receptor Locations
Type
Contractor Accommodation
Farmstead
Homestead
Lodge
Residential Area
Viewshed of Existing Ash Dump (45m)
0 1 2 4 Kilometers
Scale
1:100 000
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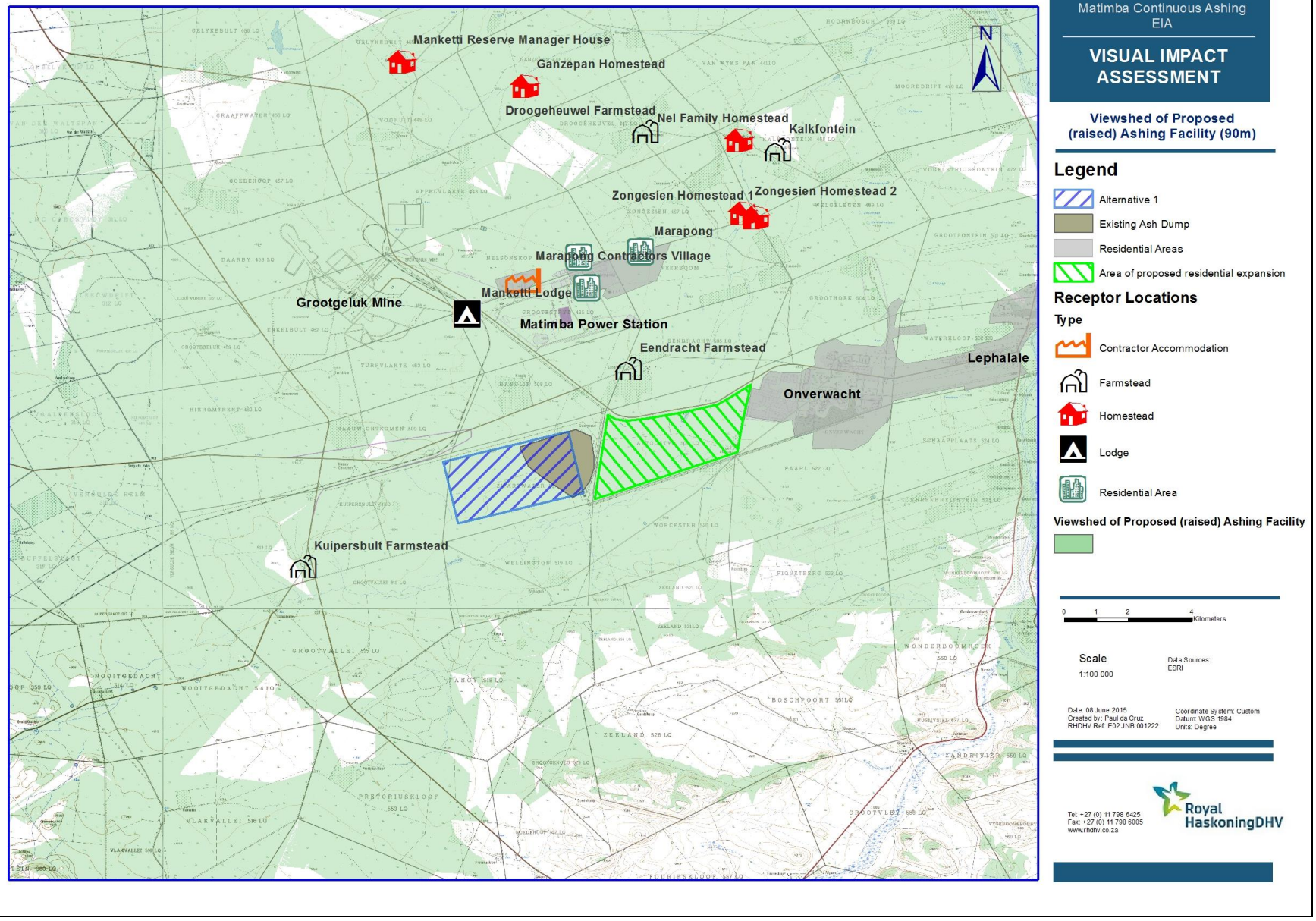
ESRI
Date: 08 June 2015
Created by: Paul da Cruz
RHDHV Ref: E02.JNB.001222
Coordinate System: Custom
Datum: WGS 1984
Units: Degree
Tel: +27 (0) 11 798 6425
Fax: +27 (0) 11 798 6005
www.rhdhv.co.za
Royal HaskoningDHV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Ganzepan Homestead
Droogeheuwel Farmstead
Nel Family Homestead
Kalkfontein
Zongesien Homestead 1
Zongesien Homestead 2
Marapong
Marapong Contractors Village
Manketti Lodge
Grootgeluk Mine
Matimba Power Station
Eendracht Farmstead
Lephalale
Onverwacht
Kuipersbult Farmstead
N
Matimba Continuous Ashing EIA
VISUAL IMPACT ASSESSMENT
Viewshed of Proposed (raised) Ashing Facility (90m)
Legend
Alternative 1
Existing Ash Dump
Residential Areas
Area of proposed residential expansion
Receptor Locations
Type
Contractor Accommodation
Farmstead
Homestead
Lodge
Residential Area
Viewshed of Proposed (raised) Ashing Facility
0 1 2 4 Kilometers
Scale
1:100 000
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Units: Degree
Tel: +27 (0) 11 798 6425
Fax: +27 (0) 11 798 6005
www.rhdhv.co.za
Royal HaskoningDHV

Peer Review

George
Suite 201
2nd Floor Bloemhof Bldg
65 York Street
George 6529

PO Box 509
George 6530
Docex: DX42

T +27 44 874 2165
F +27 44 873 5843
E george@aurecongroup.com
W aurecongroup.com

17 July 2014

Royal HaskoningDHV (Pty) Ltd
PO Box 25302
78 Kalkoen Street
Monument Park
0105

Attention: Prashika Reddy

Dear Prashika

Review of a visual impact assessment for the proposed continuous ash disposal facility for the Matimba Power Station, Limpopo Province

According to Oberholzer[1] (2005) the following principles should be considered when reviewing a visual impact assessment:

1. A clear and understandable method must be used by the visual specialist
2. A comprehensive range of values, considerations, and criteria should be included in the impact assessment
3. The criteria and ratings used in the assessment are explicit and defensible
4. The methodology that was used can be repeated

Based on the above principles we have reviewed the visual impact assessment for the abovementioned project. We found it acceptable and agree with the visual impact assessment results.

Yours faithfully,

Paul Buchholz

Senior GIS Consultant and Visaul Specialist I Aurecon
T +27 21 526 9509 **C** +27 79 881 4447
E Paul.Buchholz@aurecongroup.com

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