10. VISUAL IMPACT ASSESSMENT

The visual impact assessment was undertaken and compiled by Lourens du Plessis from MetroGIS (Pty) Ltd in his capacity as a visual assessment and Geographic Information Systems specialist.

10.1. Introduction

The farms Naauwontkomen and Eenzaamheid were identified as the preferred alternatives for the construction and operation of the proposed coal-fired power station in the Lephalale area. The former farm will host the core power station, coal stockpile and immediately related facilities, whilst the latter farm will be utilised for the ash dump and its related infrastructure. This farm could potentially also be used for the construction of a temporary (2-3 years) construction camp that will house approximately 2000 workers. Other associated infrastructure or issues related to the power station includes the construction of conveyor belts from the Grootegeluk coal mine to the power station, conveyor belts from the power station to the ash dump, the re-alignment of the Steenbokpan road and the erection of transmission lines from the power station to the existing Matimba transmission lines.

The proposed power station would be similar to the existing Matimba power station in terms of operations, design and dimensions. The structure's dimensions, in this case, are quite considerable: two smoke stacks (a maximum of 250 m high but more likely 220m high. For the purposes of this assessment 250 m was used) and a core power station building that is 130 m high and approximately 500 m wide. The ash dump will, for the purpose of this study, be approximately 45m - 50m high, about 2000m long and 600m wide. It is clear from the dimensions mentioned above that the proposed power station could have a certain degree of visual impact on the region in general and potentially have a more localised effect on residents surrounding the facility (See Figure 10.1).

This report sets out to identify, quantify and offer potential mitigation of these visual impact related issues.

Figure 10.1: Matimba power station as seen from Nelson's Kop.

10.2. Scope and Limitations

The scope of work and the determination of the study area for the proposed power station, were to a large degree determined by the visual experience of the existing Matimba power station. The dimensions of the core facility dictated that a relatively large geographical area could potentially be influenced by the construction and operation of another power station in the region. The study area includes a minimum 12 km radius from the core power station in order to cover the potential long distance visual impacts within the region.

The issues related to the visual impact assessment as identified during the scoping phase of the project further dictated the scope of work. These are:

- **A**: The potential visual exposure of the proposed power station within the region.
- **B**: The visual exposure and proximity of the proposed power station to major roads and tourist routes (i.e. the R510 and the R33).
- **C**: The visual exposure and proximity of the proposed power station to secondary roads (i.e. the Steenbokpan and Stockpoort roads).
- **D**: The visual exposure and proximity of the facility from areas with high viewer incidence (i.e. residential areas: Lephalale, Onverwacht and Marapong).

- **E**: The visual exposure and proximity of the proposed facility to game farms and lodges in the vicinity, especially farms from which complaints have been received about the existing power station and mining activities.
- **F**: The compound visual impact of the proposed facility, the existing power station and the mining activities on the bushveld character and sense of place of the region. This issue relates to the proximity of the proposed facility to the existing power station and the Grootegeluk Mine. In other words: would the selection of a specific farm facilitate the containment of the visual impact or would it spread the visual impact.
- **G**: The effect of lighting of the facility in terms of light glare, light trespass and sky glow.

The issues identified for the placement of the power station's ancillary infrastructure are:

- **A**: The visual exposure and proximity of the ancillary infrastructure to secondary roads.
- **B**: The visual exposure and proximity of the ancillary infrastructure to residential areas (areas with high viewer incidence).
- **C**: The visual exposure of the ancillary infrastructure from game farms and lodges in the vicinity, especially farms from which complaints have been received about the existing power station and mining activities.
- **D**: The effect of lighting in terms of light glare, light trespass and sky glow.
- **E**: The strategic placement of ancillary infrastructure in terms of future mine expansion. This issue relates to the containment of the ancillary infrastructure to areas where there are already similar activities, as opposed to spreading it to relatively remote areas with potential conflicting land-uses.

Two more issues arose since the completion of the scoping phase. These are the re-alignment of the Steenbokpan Road and the selection of the preferred alignment for the coal supply conveyor belt. In both instances Eskom Holdings Limited identified two alternatives and this report will address the merits of each alternative in order to mitigate additional visual impacts.

The constraints, or limitations, placed on the assessment of the visual impact of the proposed power station, is largely restricted to the modelling of the visual absorption capacity (VAC) of the natural vegetation in the area. The topography, as will be mentioned under the description of the affected environment, does not lend itself to the effective shielding of a facility of these dimensions, but the vegetation proved to be quite effective. The only absolute accurate way of incorporating the VAC of natural vegetation into the viewshed analysis would be to map each and every tree,

shrub or bush and enter their heights into the terrain model. This approach would theoretically not be possible due to time and budgetary constraints. A relative generalisation had to be made and this will be addressed under the description of the methodology for the assessment of the visual impact.

10.3. Methodology for the Assessment of the Visual Impact

10.3.1. General

The study was undertaken using Geographic Information Systems (GIS) software as a tool to generate viewshed analyses and to apply relevant spatial criteria to the proposed facility. A detailed Digital Terrain Model (DTM) for the study area was created from a combination of the 20 m and 5 m interval contours, supplied by the Surveyor General, Eskom Holdings Limited and Kumba Resources.

Site visits were undertaken to source information regarding land use, vegetation cover, topography and general visual quality of the affected environment. It further served the purpose of verifying the results of the spatial analyses and to identify other possible mitigating/aggravating circumstances related to the potential visual impact.

The results of the spatial analysis and other relevant orientation data are displayed on a number of supplementary maps, which will be referred to in the text.

10.3.2. Potential Visual Exposure

The visibility or visual exposure of any structure or activity is the point of departure for the visual impact assessment. It stands to reason that if the proposed power station and associated infrastructure weren't visible, no impact would occur.

Viewshed analyses of the proposed power station and the related infrastructure, based on a combined 20 m and 5 m contour interval digital terrain model of the study area, indicate the potential visibility.

The visual exposure of the proposed power station is indicated on Map 3 included in Appendix V. The result of the viewshed analysis, based on the dimensions of the facility, indicates the extensive potential visual exposure of the proposed power station within the study area. The greatest topographical influence on the exposure of the power station is the current man-made features (the Grootegeluk mine dumps, the Matimba power station, the Matimba ash dump, and ironically its own proposed ash dump) in the close proximity of the facility. It must be borne in mind

that the effect of vegetation cover as a potential to absorb the visual exposure has not yet been calculated into the model.

Map 4 in Appendix V shows the potential visual exposure of the proposed new ash dump situated on the farm Eenzaamheid. The viewshed analysis was calculated at an average offset of 5 m above the ash dump's maximum elevation above ground level (45 m) for the purpose of this study. This was done in order to allow for the appearance of infrastructure such as the ash-depositing device on top of the dump.

It is clear that the topography alone would once again fail to shield the ash dump from large areas of visual exposure.

10.3.3. Visual Distance/Observer Proximity to the facility

The principle of reduced impact over distance is applied in order to determine the core area of visual influence for this type of structure. It is envisaged that the nature of the structure and the relatively natural state of the environment would create a significant contrast that would make the facility visible and recognisable from a great distance. This would be especially true where the observer has an elevated vantage point.

The proximity radii for the proposed power station are indicated on Map 5 in Appendix V in order to indicate the scale and viewing distance of the facility and to determine the prominence of the structure in relation to its environment.

The proximity radii chosen for the power station, based on the dimensions of the existing facility, are:

- 0 - 3 km. Short distance view where the power station would dominate the frame of vision and constitute a very high visual prominence.
- 3 - 6 km. Medium distance view where the power station would be easily and comfortably visible and constitute a high visual prominence.
- 6 - 12 km. Medium to longer distance view where the power station would become part of the visual environment, but would still be visible and recognisable. This zone constitutes a high to medium visual prominence.
- Greater than 12 km. Long distance view of the facility where the power station would still be visible thought not as easily recognisable. This zone constitutes a medium visual prominence for the power station.

The proximity radii (see Map 6 included in Appendix V) chosen for the ancillary infrastructure (mainly the ash dump) are:

- 0 - 2 km (short distance). This buffer zone includes the ash dump and its immediate surroundings. The ash dump fills and dominates the frame of vision and constitutes a high visual prominence.
- 2 - 4 km (short to medium distance). At a distance of twice its combined width and height, the ash dump is easily and comfortably visible and constitutes a high to medium visual prominence.
- 4 - 6 km (medium to long distance). At a distance of three times the combined width and height, the ash dump is seen as being framed by its surroundings and becomes part of the visual environment. This zone constitutes a medium to low visual prominence.
- Greater than 6 km (long distance). At a distance of more than three times its combined width and height, the ash dump begins to blend into the surroundings and ceases to be seen as an individual element. This zone constitutes a low visual prominence.

The visual distance theory and the observer's proximity to the facility are closely related, and especially relevant, when considered from areas with a high viewer incidence and a predominantly negative visual perception of the proposed facility.

10.3.4. Viewer Incidence/Viewer Perception

The number of observers and their perception of a structure determine the concept of visual impact. If there are no observers or if the visual perception of the structure is favourable to all the observers, there would be no visual impact.

It is necessary to identify areas of high viewer incidence and to classify certain areas according to the observer's visual sensitivity towards the proposed power station and it's related infrastructure. It would be impossible not to generalise the viewer incidence and sensitivity to some degree, as there are many variables when trying to determine the perception of the observer; regularity of sighting, cultural background, state of mind, purpose of sighting, etc. which would create a myriad of options.

For the purpose of this study five areas were classified as having differing observer incidences and/or perceptions. These are indicated on Map 7 in Appendix V.

The first is a 500 m buffer zone from the R510 main road that extends along the eastern boundary of the study area. This road has a high incidence of potential observers, especially since it functions as a main tourist route between Gauteng and Grobler's Bridge (the South Africa/Botswana border post). The envisaged perception of these observers would be predominantly negative, as the purpose of their journey is generally nature and wildlife orientated.

The second zone of observer incidence and perception is a 500 m buffer zone along the secondary roads in the area, more specifically Nelson Mandela Drive (connecting Lephalale, Onverwacht, the Matimba power station and the Grootegeluk mine), the Stockpoort road and the Steenbokpan road. The secondary roads in the study area are predominantly frequented by employees of the mine and the power station and by landowners whose farms are situated west and north-west of the mine. These roads are also utilised, to a lesser degree (in terms of traffic volume), by hunters and tourists visiting these farms. It is envisaged that the perception of the observers in this zone will range between negative and neutral.

A third zone of high viewer incidence and predominantly negative viewer perception is the residential areas of Onverwacht, Marapong and, to a lesser degree (due to its relatively long distance from the proposed facility), Lephalale town. The observers in these areas would generally not welcome the sight of either the construction or the operation of a coal fired power station near their places of residence.

The fourth zone addresses the specific farms from which complaints had been received regarding the existing Matimba power station and the Grootegeluk mining activities. This area has, due to the complaints, a negative viewer perception, but a low viewer incidence.

The fifth zone comprises the rest of the study area. This zone is characterised by relatively large and sparsely populated farms that predominantly function as cattle and game farming areas. This zone has, due to the relative absence of random observers, a neutral envisaged viewer perception of the proposed power station.

10.3.5. Visual Absorption Capacity of the natural vegetation

It is has become apparent from site inspections that the visual absorption capacity of the natural veld (thicket, bushland and woodland) is considerable in mitigating the impact of the existing power station. This is true for large tracts of land where the natural vegetation is still intact. The observer is effectively shielded from the facility by dense vegetation adjacent to the road. The opposite is also very noticeable where the natural vegetation had been cleared for agricultural fields or for transmission line servitudes, or where the observer is elevated above the vegetation; the power station becomes highly visible. These cleared areas are, due to the low success rate with dry-land agriculture in this region (as indicated by Gary Patterson - Agricultural Potential Specialist), restricted to scattered patched across the study area.

A broad vegetation cover map was created, identifying areas where large tracts of natural vegetation had been removed, in order to model the effects of either the absence or the presence of vegetation cover on the visual exposure of the facility.

10.3.6. Visual Impact Index

The results of the above analyses were merged in order to determine where the areas of likely visual impact would occur. These areas were further analysed in terms of the previously mentioned issues (related to the visual impact) and in order to judge the severity of each impact.

10.4. Regional Overview

10.4.1. Description of the affected environment

Cattle and game farming practices dominate the general land-use character of the immediate area surrounding the proposed power station. The existing Matimba Power Station and the Grootegeluk Coal Mine are within a 10 km radius of the two identified farms and have, to a large degree, set the trend for industrial and mining related practises. A formal industrial area has been earmarked for the remainder of the Grootestryd farm south of the Stockpoort road. Large areas surrounding the Grootegeluk Coal Mine, land owned by Kumba Resources, are being utilised as a game reserve and commercial hunting area. *See Map 1 in Appendix V: Broad Land Use Description.*

The dominant topographical unit or terrain type of the study area is plains, with low mountains and foothills of the Waterberg plateau to the extreme south-east of the study area. Map 2 (Topography and Shaded Relief) in Appendix V indicates the relatively flat topography of the area and the extent of the existing mining and power station operations (mine dumps, the open cast pit, slimes dams and the Matimba ash dump).

The natural vegetation type is woodland to the south and thicket and bushland to the north (generally referred to as bushveld). The natural vegetation cover (for the greater portion of the study area) is relatively undisturbed due to the low success rate with dry-land agriculture in this region.

Source: Department of Environmental Affairs and Tourism (2001), Kumba Resources and site observations.

10.4.2. Site description

The two farms, Naauwontkomen (power station) and Eenzaamheid (ash dump), border the Grootegeluk Coal Mine to the south, along the Steenbokpan Road. The road crosses over both of the properties and will subsequently have to be re-aligned in order to construct the power station and the ash dump. The farms are flanked, to the south and the east, by the railway line transporting coal from the mine. Both of the sites have extensively been utilised as cattle and game farming areas and are characterised by overgrazing and bush clearing patterns. The natural vegetation is, in spite of the former land uses, still relatively intact and will play a large role in the mitigation of the visual impact of the proposed power station and related activities.

Figure 10.2: The farm Eenzaamheid south of the Steenbokpan Road

10.5. Site Specific Results

10.5.1. Visual impact index - power station

Please refer to Map 8 in Appendix V for the visual impact index of the power station.

The visual impact index is a combined weighted index of the visual exposure, the observer proximity, the viewer incidence/perception and the visual absorption capacity (presence/absence of vegetation cover) of the proposed power station. The result of the combination of the above criteria gives an indication of the likely area of

visual impact. This helps in focussing the attention to the critical areas of potential impact when evaluating the issues related to the visual impact.

It becomes clear from the visual impact index that, even though the proposed facility could potentially be visible from a great distance, the envisaged visual impacts would more than likely occur within a 0 - 6 km radius from the power station. This visual impact would predominantly occur along road corridors (high viewer incidence) where the natural vegetation had been removed, or where the road surface is elevated above the vegetation cover. This is evident at the road crossing with the existing Matimba ash conveyer belt and will probably also be the case at the crossing with the proposed coal supply conveyor belt. This is based on the assumption that the sighting of the power station would evoke a primarily negative perception from the observer.

Areas further afield, with similar viewing characteristics, could have the same experience of the proposed facility. The principle of reduced impact over distance would however lessen the likely impact considerably.

Figure 10.3: View (3.2 km) of the existing Matimba power station from the Steenbokpan road crossing with the ash conveyer belt.

10.5.2. Visual impact index - ash dump

Please refer to Map 9 in Appendix V for the visual impact index of the ash dump.

The visual impact index of the proposed ash dump displays a similar pattern to the impact index of the proposed power station, with the primary difference being the reduced sphere of visual influence associated with the type of structure. The same criteria apply to the ash dump's visual impact index, as was the case with the proposed power station, with the exception of the observer proximity to the feature.

The likely area of visual impact is reduced from 0 - 6 km to 0 - 2 km for the proposed ash dump. The potential area of visual exposure is also greatly reduced due to the ash dump's relatively lower elevation above average ground level (45 m as apposed to the 250 m high smoke stacks of the power station). The shape and colour of the ash dump is also less stark in comparison to the power station's sharp outline. Once again the visual impact would occur where natural vegetation had been cleared along the road corridors, or where the observer is elevated above the vegetation cover.

10.5.3. Issues related to the visual impact of the power station

The issues related to the visual impact of the power station address the particular potential visual impacts identified during the scoping phase of the project. Some of these issues will be addressed jointly where the envisaged visual impacts have similar characteristics or share common denominators. Please see the previous section "Scope and Limitations" for the issues related to the visual impact.

- **Issues A, B and F -** Long distance and regional visual impact
  These visual impact issues refer predominantly to the longer distance appearance and visual influence of the proposed power station and associated infrastructure within the region.

  Site inspections and inspections along the R510 and R33 indicated that the facility would either not be visible from these tourist roads or that the visual exposure would occur as glimpses of the facility from a relatively long distance (15 - 20 km). The visual absorption capacity of the natural vegetation cover further indicates that the likelihood of viewing the Matimba power station, the proposed Matimba B power station and the Grootegeluk mining activities together is slim. This would also occur from a great distance and would be restricted to a few elevated viewpoints where the R33 descends from the Waterberg plateau foothills.

Figure 10.4: Simulated view of Matimba (right) and proposed power stations (left) from a lookout point along the R33, south-east of the study area.

The placement of the proposed power station and its associated infrastructure sufficiently contains the compound visual impact of the proposed facility, the existing power station and the mining activities to a relatively small geographical area without unnecessarily stacking the visual impact. In other words the three major industrial activities in this area do not spread the visual impact over a large area and it does not create a highly noticeable dense cluster of activities. The visual impact is therefore relatively contained and more manageable from a mitigation perspective.

Table 10.1: Long distance and regional visual impacts.

Area of Visual Impact	Nature	Extent	Duration	Intensity	Probability	Significance	Mitigation potential
Regional impact	Negative	Regional	Long term	Low	Improbable	Low	Low
Impact from R510/R33	Negative	Regional	Long term	Low	Improbable	Low	Low
Compound visual impact	Negative	Regional	Long term	Low	Probable	Low	Low

- **Issues C and E** - Medium and short distance visual impacts.
  The visual impact index of the proposed power station has indicated, mainly through the principle of reduced visual impact over distance that the highest potential visual impacts would occur within a 6 km radius of the facility. This principle is further supplemented with the observer incidence rating in order to calculate the likelihood or severity of the impact.

  The Steenbokpan and Stockpoort roads are the two major secondary roads (higher viewer incidence) in the closest visual proximity of the proposed power station and associated infrastructure and will therefore account for the majority of short distance (0 - 3 km) visual impacts. Even here the visual absorption capacity of the natural vegetation has proven to be considerable in reducing and even negating the visual impact. Once again the areas with vegetation cover shielded the observer from the facility and oppositely, where the vegetation was removed or the observer was elevated above the trees and bushes, the facility became highly visible.

Figure 10.5: The presence of vegetation cover along the Stockpoort road near the Matimba power station, as apposed to the absence of vegetation at the Stockpoort/Steenbokpan road junction.

The above photos illustrate the importance of retaining the natural vegetation along these roads and highlight the potential areas of impact for the proposed power station: namely where the road crosses over the conveyor belt, underneath transmission lines, or other cleared agricultural areas.

Table 10.2: Short distance visual impacts - power station.

Area of Visual Impact	Nature	Extent	Duration	Intensity	Probability	Significance	Mitigation potential
Cleared areas	Negative	Local	Long term	High	Highly probable	High	Low-medium
Vegetated areas	Negative-neutral	Local	Long term	Low-medium	Probable	Medium	High

The potential medium distance (3 - 6 km) and medium to longer distance (6 - 12 km) visual impact of the proposed power station would predominantly occur, in terms of area, on farms south, west and north-west of the proposed facility. These farms are mainly utilised as cattle and game farms and sometimes function as commercial hunting areas and game lodges.

The exact locations of all the private and commercial game farms and lodges in the study area are not known. There were however specific complaints from landowners (the farms of which are indicated on the visual exposure maps) about the existing power station and the Grootegeluk mine. These farms (as indicated on Maps 3 and 4 in Appendix V) are located to the north-west of the proposed power station location at a minimum distance of about 12 km. The Grootegeluk mine is situated between the proposed power station and these farms and would influence the visual experience to a certain degree. The existing visual clutter and activities (and relative distance from the farm Naauwontkomen) could reduce the potential visual impact or at the very least divert attention from the power station.

Other lodges and weekend retreats located closer to the proposed power station (some were indicated on the farms Kromdraai, Nooitgedacht and Kuipersbult) would be influenced by their exact locations on the farm and the general vegetation cover present. The impact on these farms, within a 3 - 6 km distance of the proposed power station, is difficult to determine due to these variables.

Table 10.3: Medium and medium to long distance visual impacts - power station.

Area of Visual Impact	Nature	Extent	Duration	Intensity	Probability	Significance	Mitigation potential
Complaint farms	Negative	Local	Long term	Medium	Probable	Medium	Low-medium
Other farms/ lodges	Negative	Local	Long term	Medium	Probable	Medium	Low-medium

- **Issue D** - Visual impacts from residential areas - power station.
  The construction and operation of a coal-fired power station on the farm Naauw ontkomen won't have a significant visual impact on the residents of Lephalale (town), Onverwacht or Marapong. The proposed power station won't be visible from the former two residential areas, mainly due to their distance from the facility and also due to the structures and visual clutter already present in these areas. The Marapong residential area, closest of the three built-up areas, is situated north-east of the existing Matimba power station, and is ironically shielded from the proposed power station by the existing power station (1 - 1.5 km away) and also by its own structures.

Figure 10.6: View of the Matimba smoke stacks from Marapong. The proposed power station is located 6 km behind the existing power station.

Table 10.4: Visual impacts from residential areas - power station

Area of Visual Impact	Nature	Extent	Duration	Intensity	Probability	Significance	Mitigation potential
Formal Residential areas	Neutral	Local-regional	Long term	Low	Improbable	Low	N.A.

- **Issue G** - Lighting impacts - power station.
  The construction and 24 hour operation of the proposed power station has the potential to impact on adjacent landowners if the design and placement of lighting is not executed with utmost care and sensitivity. There are three major types of lighting impacts: glare, sky glow and spill light.

  Glare is the effect of looking directly into a light fixture or light source and poses the greatest potential visual impact associated with security and nighttime operational lighting. The proposed power station property, as is the case at the existing facility, will operate 24 hours a day and has a considerable amount of floodlights mounted on 10 - 15 m high poles. Another source of glare light, albeit not as intense as flood lighting, is the aircraft warning lights mounted on top of the two 250 m high smoke stacks. These lights are less aggravating due to the toned-down red colour, but have the potential to be visible from a great distance.

  Light trespass, or spill light, is the unintentional illumination of surfaces beyond the property boundary. It is less intense than glare but has the potential to aggravate the visual impact considerable if it is not addressed properly.

  Sky glow is the condition where the night sky is illuminated when light reflects off particles in the atmosphere such as moisture, dust or smog. The sky glow intensifies with the increase in the amount of light sources. Each new light source, especially upwardly directed lighting, contribute to the increase in sky glow.

  Poor planning, ignorance and failure to perform timely maintenance on lighting structures and fixtures are often the cause of visual impacts associated with lighting. A qualified lighting engineer should be consulted during both the construction and operational phases of the proposed power station. The primary goal should be to contain light to the areas that needs illumination and to prevent glare. The strategic placement of lighting covers and shields can mitigate the impacts of glare and spill light effectively. This would be true for both the

security and operational lighting of the facility, but would not apply to the aircraft warning lights that are required and prescribed by the Civil Aviation Authority.

The effects of sky glow is difficult to quantify and even more difficult to mitigate as it can't be addressed in isolation. The existing power station, the mining activities and even the expansion of the residential areas contribute to this phenomenon. These activities are often beyond the control of one responsible body and can therefore only be addressed as a concerted effort.

Table 10.5: Lighting impacts - power station.

Visual Impact	Nature	Extent	Duration	Intensity	Probability	Significance	Mitigation potential
Glare: Floodlights	Negative	Local	Long term	Medium	Probable	Medium	High
Glare: Aircraft warning lights	Negative	Local	Long term	Medium	Probable	Medium	Low
Spill light	Negative	Local	Long term	Low	Improbable	Low	High
Sky glow	Negative	Local-regional	Long term	Low-medium	Probable	Low	Low

10.5.4. Issues related to the visual impact of the ancillary infrastructure.

The operation of the Matimba B power station will necessitate the construction of ancillary infrastructure for the supply of coal, the disposal of ash and ultimately the distribution of electricity. The farm Eenzaamheid was chosen as the preferred alternative for the ash dump. This section will focus primarily on the ash dump, as this entity has, next to the power station and due to its relatively large dimensions, the greatest potential for visual impact. The impacts associated with the conveyor belts will be addressed in greater detail under the heading "Conveyor belt alignment options" and the transmission lines under the heading "Steenbokpan road re-alignment".

Please see the previous section "Scope and Limitations" for the issues related to the visual impact of the ancillary infrastructure.

- **Issue A and C** - Short distance visual impact - ash dump.
  The ancillary infrastructure is not expected to have a regional or long distance visual impact due to the fact that it is either not visible or not recognisable from

great distances. It does however have the potential to create short distance visual impacts due to its close proximity to secondary roads in the area.

The issues related to the medium and short distance visual impact of the power station are also applicable to the ash dump, but at a greatly reduced scale. The sphere of visual influence, as indicated in the visual impact index, is restricted to a 4 km radius from the dump. The maintenance of the integrity of the natural vegetation cover will once again play a large role in mitigating the visual impact. The successful concealment of the existing Matimba ash dump is a case in point. The creation of a green buffer zone along the Steenbokpan road, is similarly crucial for the successful mitigation of the visual impact and should be implemented from the establishment of the ash dump and maintained up to the decommissioning and rehabilitation phases of the dump.

Table 10.6: Short distance visual impacts - ash dump.

Area of Visual Impact	Nature	Extent	Duration	Intensity	Probability	Significance	Mitigation potential
Cleared areas	Negative	Local	Long term	Medium-high	Highly probable	Medium	Low-medium
Vegetated areas	Negative-neutral	Local	Long term	Low-medium	Probable	Medium	High

- **Issue B** - Visual impacts from residential areas - ancillary infrastructure.
  The ancillary infrastructure will not a have visual influence on the residential areas within the region due to the fact that it won't be visible from any of the aforementioned formal residential areas.

- **Issue D** - Lighting impacts - ancillary infrastructure.
  The only envisaged lighting impact associated with the ancillary infrastructure is the potential glare from the lights of the ash-depositing device. This device is, due to the functional design of the ash dump, situated on the southern slope of the dump and will more than likely not be visible from areas with a high viewer incidence. It could however have a visual impact on landowners south of the dump. The mitigation of this visual impact might be problematic due to the fact that the ash-depositing device is not stationary. This may require periodic adjustment of lighting shields or covers to compensate for the movement of the device.

Table 10.7: Lighting impacts - ash depositor.

Visual Impact	Nature	Extent	Duration	Intensity	Probability	Significance	Mitigation potential
Glare: Floodlights	Negative	Local	Long term	Medium	Probable	Medium	Medium

- **Issue E** - Strategic placement of the ancillary infrastructure.
  The principle of containing the potential compound visual impact has already been mentioned in this report. The placement of the ancillary infrastructure in close proximity to similar activities, such as the existing ash dump and mining activities would prevent the spread of the area of visual influence. This strategic placement should also be cognisant of the future expansion of the Grootegeluk mine. The farms Eenzaamheid and Naauwontkomen both conform to this principle in terms of their locality in relation to the existing and future mining areas, the mining pit (in case of back-ashing into the pit) and the existing Matimba ash dump (as a short term ashing solution).

- **General Issues**
  The potential erection of a construction camp on the farm Eenzaamheid (selected for the ash dump) is being considered in order to provide accommodation for either a portion or all of the 2000 labourers that would be involved during the construction phase of the project. The construction phase is approximated to last for about 2 - 3 years. The establishment of infrastructure for a township of this size in an area that is relatively ill populated has the potential to create secondary visual impacts.

  The construction of dwellings, access roads, security lighting, etc. could all attract unwanted attention and impact negatively on adjacent landowners and random observers. The same care should be taken when considering the placement and layout of the construction camp, as with the power station. The camp must ideally be located away from public roads and adjacent farms in order to avoid random observation. The same level of mitigation measures should be implemented, especially for lighting impacts at night, as would be done for any of the other associated infrastructure of this project. The camp should be maintained in a good working and neat condition for the duration of the construction phase and should not be allowed to become neglected and rundown due to its temporary status.

  A late addition to the list of issues related to the visual impact is the use of various emission control technologies at Eskom's disposal to limit SO^2 emissions from the power station such as Flue Gas Desulphourisation (FGD). The exact

technology has not been decided yet, but some of the technologies being considered would result in a visible plume of harmless vapour being emitted from the smoke stacks. The approximate size of the plume is indicated in Figure 10.7 and it stands to reason that it would more than likely attract attention to the already considerably tall smoke stacks. The severity of the visual impact would depend on the wind direction in relation to the observer. The refraction of light from the minute droplets of water at certain times of the day could worsen the appearance of the plumes. A similar effect, the reflection of the lights of the power station, could create the appearance of an illuminated plume at night. This together with the possible misconception of health threatening emissions being released from the stacks could lead to another potential visual impact.

Figure 10.7: An example of a wet plume produced from a wet FGD scrubber

10.5.5. Conveyor belt alignment options.

The construction of a conveyor belt to supply coal from the Grootegeluk coal mine to the proposed coal-fired power station has the potential to further increase the visual impacts associated with the creation of visual clutter and the clearing of natural vegetation. The two proposed alignments are indicated as *Proposed Conveyor* and *Proposed Conveyor Alternative* on the map below. The first alignment runs adjacent to the railway line until it crosses the proposed new Steenbokpan road alignment, where it veers off to the west until it reaches the power station coal stockpile. The second alignment cuts across the Grootegeluk mining property, where it also crosses the new road alignment north of the proposed power station.

The crossings with the proposed Steenbokpan road have specific relevance in that the road is elevated at these crossing in order to bridge the conveyor belt. It was indicated earlier in the report that it is at exactly these elevated areas where the greatest short distance visual impacts occur. The conveyor crossing at the existing railway line crossing is therefore preferred, as apposed to the crossing north of the power station, due to its relative distance from the power station. This alignment further serves the purpose of consolidating the linear infrastructure in the area by utilising the same servitude as the railway line. It does therefore not require the clearing of natural vegetation for a new servitude, as is the case with the alternative option.

The preferred alignment is the *Proposed Conveyor* alternative, adjacent to the railway line.

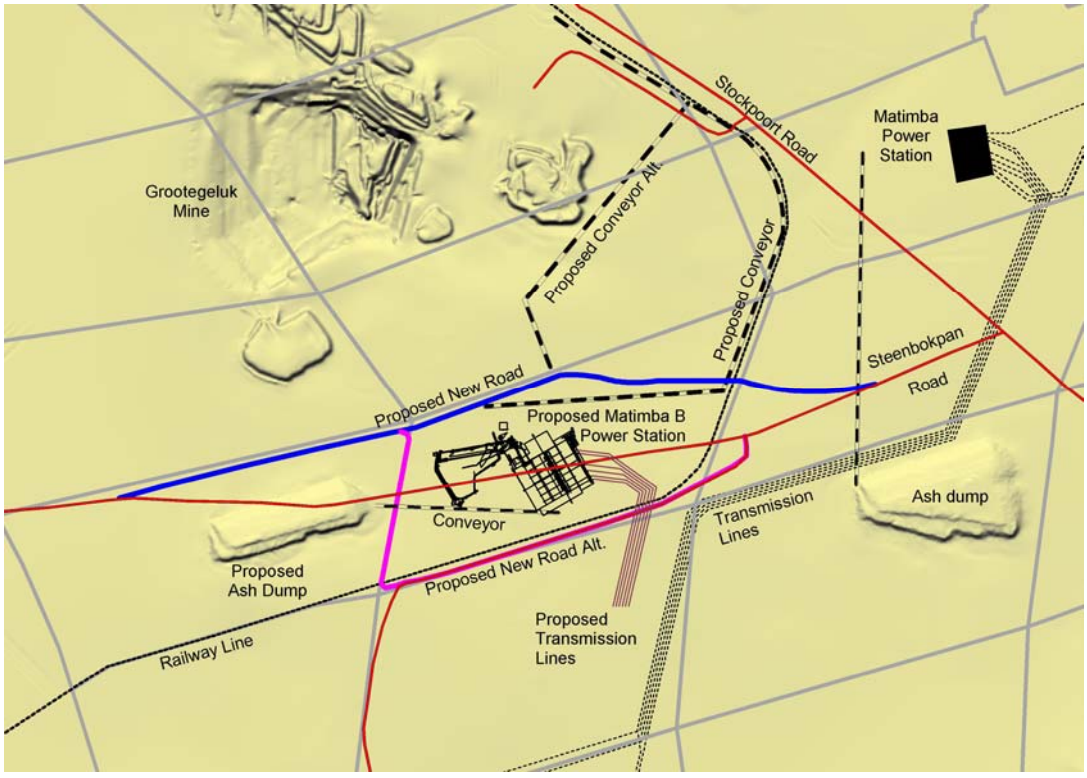

Figure 10.7: Proposed conveyor belt and new Steenbokpan road alignment options.

10.5.6. Steenbokpan road re-alignment options.

The re-alignment and construction of the Steenbokpan road should ideally be done with the minimum amount of disruption to road users. A lengthy construction period can inconvenience motorist and unnecessarily sensitise these observers to the construction of the power station.

The two alignment options are indicated on the map above. The northern alignment (Proposed New Road - blue line) diverts from the existing road alignment at the railway line crossing and extends westwards along the northern boundary of the farms Naauwontkomen and Eenzaamheid. The southern alignment (Proposed New Road Alternative - pink line) follows an existing dirt road along the southern boundary of the farm Naauwontkomen, after which it makes a sharp turn into a north-easterly direction. It passes between the proposed power station and ash dump until it meets up with the northern alignment and sharply turns into a south-westerly direction until it joins the current Steenbokpan road again.

The selection of the preferred road alignment is primarily aimed at minimising any further visual impacts from the power station and the ancillary infrastructure.

Both of the alignments will cross a proposed new conveyor belt, once again elevating the road above the natural vegetation and exposing the power station and/or the ash dump. The northern alignment's crossing is relatively far from the power station whilst the southern alignments crossing would be located between the power station and the ash dump. This is due to this alignment's awkward zigzag pattern and it being wedged between station and the dump. The southern alignment will also pass underneath the proposed transmission lines from the power station exposing both the lines and potentially the power station to the observer. A further visual impact associated with the southern alignment is the line of sight visibility (forced observation) of the Grootegeluk mining activities where the road travels north.

The northern alignment option facilitates a relatively smooth transition without any major noticeable diversions from the existing road. It further has a higher potential to shield the observer from both the power station and the mining activities.

The preferred re-alignment option for the Steenbokpan road is the northern alignment.

Figure 10.8: Transmission lines spanning the Stockpoort/Steenbokpan intersection.

It is noteworthy that if the northern alignment is selected the proposed transmission lines from Matimba B would more than likely not be visible from any of the roads.

10.6. Conclusions and Recommendations

The vegetation cover of this region is possibly the single most important element in the construction and operation of the proposed coal-fired power station, and should be revered as a critical component in the mitigation and potential negation of the visual impact. The services of a professional landscape architect should be acquired in order to create a master plan for the detailed design and placement of, firstly the power station, and secondly the ancillary infrastructure. Green buffer zones should be reserved or created and maintained at critical areas surrounding the facilities.

The removal of natural vegetation should be limited to the bare minimum and should not be undertaken without proper planning and delineation. Individual vegetation communities should be identified and earmarked as visual absorption buffer zones. The activities and movement of construction vehicles and personnel during the construction phase should be restricted to help prevent the wanton destruction of natural vegetation that could play an important role in the long term mitigation of visual impacts.

The clearing of vegetation for servitudes should be restricted to the bare minimum required for the servicing and maintenance of infrastructure.

Figure 10.9: Existing Matimba conveyor belt servitude.

The above photograph of the existing Matimba conveyor belt indicates how the excessively wide (100 m) cleared area unnecessarily expose, not only the conveyor belt, but also the transmission and distribution lines in the background.

Other potential mitigation measures for the proposed power station include the maintenance and general appearance of the facility. These measures focus on the fact that if/when the facility is seen by outsiders; the general impression should be favourable. Timely maintenance of the station, ancillary infrastructure and the general surrounds of the property (gardens, access roads, etc.) can prevent the visual impact of degradation and perceived poor management. The most notable aspect of maintenance on this type of structure is the painting of the cladding of the power station. In this regard and as a further mitigation to the visual impact, overtly contrasting and bright colours should be avoided. Natural hues that compliment the natural environment (i.e. light sky blue where the facility is seen against the skyline or pale green where it is seen against vegetation cover) can soften the general appearance of the power plant. The removal of the cladding of the power station has been mentioned as a possible cost reduction measure, but this will worsen the appearance of the facility considerably and ultimately create an even greater visual impact as soon as the novelty of seeing the station's "insides" wears off.

Every care should be taken to not attract further unwanted attention to the power station through the construction of unnecessarily large support structures (i.e. office buildings, perimeter fences, parking garages, etc.). These structures should not impose any further on the observer, or in the case of perimeter fencing, create an air

of secrecy that might be construed as wrong doing or hiding something from the public. The perimeter fence should fulfil the function of a security barrier only and should not be used to try and hide the facility. Less prominent alternatives to very tall concrete fences should be investigated. These might include palisade fencing, electrified fencing, or a combination of both. The same principles regarding the painting of the core power station apply to the support infrastructure, buildings and security fences.