# VISUAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED CONSTRUCTION OF THE 132kV CHICKADEE POWER LINE BETWEEN THE HENDRINA / ABERDEEN 132KV LINE AND THE PROPOSED BOSCHMANSKOP TRACTION STATION WITHIN THE STEVE TSHWETE LOCAL MUNICIPALITY, MPUMALANGA PROVINCE.


**PREPARED BY:**
Skets Architects, Planning & Environmental Consulting cc.
Reg. no: 2010/034929/23

P.O. Box 14956
Zuurfontein
1912
Fax: 086 520 4677
Tel: 076 169 1435
Email: mader@skets.co.za

**LEAD CONSULTANT:**
Envirolution Consulting (Pty) Ltd

Vista Place Suite 1a & 2
No 52 Cnr Vorster Avenue & Glen Avenue
Glenanda 2019

Fax: 0861 626 222
Tel: 0861 444 499
Web: www.envirolution.co.za


# EXECUTIVE SUMMARY

Skets Architects, Planning & Environmental Consulting, an independent consultant, has been appointed by Envirolution Consulting (Pty) Ltd to compile a Visual Impact Assessment (VIA) report as part of a Basic Assessment (BA). The client, Eskom Holdings SOC Ltd (hereafter referred to as Eskom), proposes the development of a 132kV Chickadee loop in loop out powerline between the existing Hendrina / Aberdeen 132kV power line and the proposed Boschmanskop Traction Substation within the Steve Tshwete Local Municipality in the Mpumalanga Province.

The objective of the proposed development is to assist Transnet in increasing its export coal capacity to 81MTPA by upgrading the DC sections on the Transnet site as well as on the corresponding Eskom sides.

The site is located south of the Hendrina Power Station, next to a railway line. It is within a rural area characterised by cultivated fields, with the Hendrina Power Station towering above the plains.

A VIA is a specialist study which assesses the potential visual changes to an existing baseline setting resulting from the implementation of the proposed project. The associated visual changes could potentially impact on the character and value of the landscape and affect the views and perceptions of observers in the study area. The purpose is to determine the significance of the changes and to recommend mitigation measures where the impacts are considered unacceptably negative.

The objectives will be to:

- Address the concerns that are raised during public participation events which relates to aesthetic or any visual aspects;
- Determine the impact on the observers, landscape character and/or landscape features in the study area due to the change in the visual characteristics of the environment;
- Discuss the project alternatives and provide a recommendation with regards to the preferred choice if applicable; and
- Recommend mitigation measures to alleviate or reduce the anticipated impacts.

## *STUDY AREA*

The regional topography consists predominantly of undulating plains that slopes evenly towards streams and pans. The project site is located on an evenly sloped plain that allows open panoramic views in all directions. The ash dump to the east of the site, hinders panoramic views towards the east, and is considered a large topographic alteration to the even landscape.

The predominant land uses in the study area are agriculture and mining. The study area falls within the Eastern Highveld Grassland Vegetation type (Mucina & Rutherford, 2006). The natural vegetation can broadly be described as mostly grassland with scattered small and medium trees in the valleys or ridges. The natural vegetation cover is greatly transformed by agriculture and large cultivated field parcels dominate the even landscape. Invader tree species such as Wattles and Blue Gums, form dense clusters between the open fields.

Mining and the operations of the Hendrina Power Station, have also transformed the natural landscape in the region. The Hendrina Power Station and a large ash dump is present to the north and the east of the project site. Large scale coal mining occurs behind the power station but is out

of sight from the study area. A small town, called Pullens Hope, is situated north west of the power station and 3 km north of the project site.

The site is located near the existing Boschmanskop Substation which is in the process of being upgraded. A railway line also passes the existing substation. Cultivated fields surround the site with a sparse dirt road network connecting farmsteads.

A sparse farming community is present with only a few farmsteads located inside a 2 km radius from the project sites. One farmstead is located in the northern part of the study area and will be directly affected by the proposed project. The small town of Pullens Hope is situated 3 km north of the study area and are considered outside the ZMVE.

A number of power lines converge at the Hendrina Power Station, but only one crosses the project site. This is the Hendrina / Aberdeen 132kV power line that traverses across the farmlands. The existing Boschmanskop Substation is a fenced, brick building which is currently being upgraded. It is situated next to the railway line that comes from Hendrina Power Station, going towards the south west. More power lines are visible to the north of the site, near the power station.

## *PROJECT DESCRIPTION*

The proposed project is the development of a 132kV Chickadee loop in loop out powerline between the existing Hendrina / Aberdeen 132kV power line and the Boschmanskop Traction Substation. The authorised upgrade of the Boschmanskop Substation is currently underway. The objective of the proposed development is to assist Transnet in increasing its export coal capacity to 81MTPA by upgrading the DC sections on the Transnet site as well as on the corresponding Eskom sides.

Three alternative alignments have been proposed by Eskom:

- Alternative 1 is a 2 km line exiting the Boschmanskop Substation in a north westerly direction, over the railway line and traversing the farmland, before connecting to the Hendrina / Aberdeen power line to the north west of the substation;
- Alternative 2 is a 3.4 km line existing the Boschmanskop Substation in a westerly direction over the railway line. At approximately 1.4 km it turns north west and at 2.9 km it turns north, before connecting to the Hendrina / Aberdeen power line. It traverses farmland along its route; and
- Alternative 3 is a 2.8 km line exiting the Boschmanskop Substation in a north westerly direction over the railway line. It turns north over the farmland before turning west again and crossing over the farmstead at Portion 7 of the farm Boschmanskop 154. It connects to the Hendrina / Aberdeen power line to the west of the farmstead.

The most visible elements of a power line are the towers/pylons that are rhythmically spaced along the length of the alignment. The towers/pylons carry the conductors and are fixed to the towers via the insulators which are also fairly visible elements.

The client has proposed steel monopoles imbedded in a concrete footing. Strain pylons are installed at corners and are further supported with stay cables. The height of the pylons is expected to be between 20-25 m and a servitude width of 18 m on either side of the centreline is usually required for a single 132 kV power line.

# *VISUAL IMPACT ASSESSMENT*

Within the study area observers experience and interact differently with their environment and therefore value it differently. They may be affected by the proposed project due to additions or alterations in the visual environment which may influence their experience and views of the visual resource. In this assessment a distinction is made between impacts on the **observers** and impacts on the **landscape character**. The observers represent all people that may be affected visually while the impacts on the landscape character strictly assess the changes to the landscape's character and the impact on its visual value. A highly significant impact on the observers will not necessarily be a highly significant impact on the landscape character and vice versa and that is why the distinction is made.

The following typical visual impacts may be expected as a result of the construction and operation of the proposed project:

- The project activities and components noticeably change the existing features and qualities of the landscape;
- The project introduces new features which are uncharacteristic or in contrast with the existing character of the landscape; and/or
- The project removes or blocks aesthetic features in the landscape which subsequently affects the visual value and aesthetic appeal of the visual resource.

A VIA is a specialist study that assesses the potential visual changes/impacts to an existing baseline setting resulting from the implementation of a proposed project. This implies that, firstly, a baseline must be established and secondly, the visual change, resulting from the project, must be compared to the baseline. The quantification of the visual change is referred to as the severity of the impact and is a function of:

- The nature of the impact;
- The probability of the impact occurring;
- The duration of the impact;
- The extent of the impact; and
- The magnitude of the impact.

## VISUAL IMPACTS DURING CONSTRUCTION PHASE

The construction activity will cause damage to the existing vegetation cover between the Boschmanskop Traction Substation and the existing Hendrina / Aberdeen 132kV power line due to the movement of the technical team and the operation of construction equipment. These activities will negatively impact on the agricultural land use and may prevent active cultivation around the footprint of the poles. The construction equipment, construction camps and workforce will be elements that are uncharacteristic to the visual environment. Construction sites are considered unsightly and may intrude on the views of the identified observers inside the ZMVE. It will negatively impact on the visual value and quality of the landscape character on a localised scale.

## VISUAL IMPACTS DURING OPERATIONAL PHASE

A new loop-in, loop-out power line is considered a new addition to the visual environment which is relatively free of power lines, besides the existing Hendrina / Aberdeen Power line. The three alternative power lines vary in length from 2 – 3.4 km and will cause an easily detectable visual

change to the status quo. The farming community is dispersed with only one farmstead within the ZMVE. The impact on the landscape character is considered moderate as interference with the agricultural land use is expected and continuity of the fields will be interrupted at the pylon locations.

The only observers in the study area are residents from the dispersed farming community. Only one farmstead was identified in the ZMVE which is located at Portion 7 of the farm Boschmanskop 154. Residents living here will be directly affected by Alternative 1 and 3 as it passes in close proximity to the farm stead. They are classified as visual receptors of **high** sensitivity owing to their sustained visual exposure to the proposed development as well as their attentive interest towards their living environment.

The landscape character sensitivity in the study area is considered to be medium. It is predominantly a rural landscape with extensive farming activity occurring in large blocks. During the summer season it is visually pleasing and the small farm dams and pans raise the visual quality of the landscape. This is however very common in the region and not regarded as unique. The even terrain causes a high degree of inter-visibility between parts of the study area with panoramic views of the surroundings. Despite the presence of the Hendrina Power Station in the north, the study area is surprisingly free of electrical infrastructure with only one power line traversing the study area.

VISUAL IMPACTS SIGNIFICANCE SUMMARY

| Project Alternatives | Receptor | Sensitivity of receptors | Severity of Impact without mitigation | Severity of Impact with mitigation | Significance of Impact without mitigation | Significance of Impact with mitigation |
|---|---|---|---|---|---|---|
| Alternative 1 | OB | High | Low 24 | Low 12 | Moderate/Minor | Moderate/Minor |
| | LC | Medium | Medium 40 | Low 24 | Moderate/Minor | Minor |
| Alternative 2 | OB | High | Low 6 | Low 6 | Moderate/Minor | Moderate/Minor |
| | LC | Medium | Medium 40 | Low 24 | Moderate/Minor | Minor |
| Alternative 3 | OB | High | Medium 40 | Low 24 | Moderate | Moderate/Minor |
| | LC | Medium | Medium 40 | Low 24 | Moderate/Minor | Minor |

## *COMPARATIVE ANALYSIS*

| Rating | Power line routes | Notes (Reasoning behind rating) |
|---|---|---|
| 1 | Alternative 2 | Alternative 2 is the most preferred option. This alignment is the furthest away from any sensitive observers and will therefore have the least impact on them. It is the longest route and will cause a slightly higher magnitude of disturbance on the landscape due to more pylons, but the low severity of the impact on the observers carries more weight in this regard. |
| 2 | Alternative 1 | Alternative 1 is marginally less preferred than Alternative 2. It is closer to the farmstead on Portion 7 of the farm Boschmanskop 154 which places it within the ZMVE. Its impact on the landscape character is similar to Alternative 2, but will be marginally less due to the shorter distance. If realignment is considered as proposed in Figure 5, Alternative 1 will be the most preferred option |
| 3 | Alternative 3 | Alterative 3 is the least preferred option as it affects directly on the residents on Portion 7 of the farm Boschmanskop 154. It will pass directly overhead of the farmstead. The impact on the residents is the highest of the 3 options. |

## *CONCLUSION*

The significance of the visual impact is determined through a separate assessment of impacts on the landscape character and impacts on observers in the study area. This has been done for the construction and operational phases as each phase presents different impacts. The landscape character and the observers are receptors in the study area and have different sensitivities towards the proposed project. It is expected that each receptor will respond differently to the visual impacts and would therefore react uniquely.

The sources of impact originate from the activities during the construction phase and the final project components that will alter the baseline condition of the study area. The relative scale of the proposed project is considered small which translates into low to medium impact severities. The observers in the study area have a high sensitivity, but viewer incidence is very low, and the impact is considered localised with a small but noticeable visual change. The impact on the landscape character is considered medium due to the low occurrence of existing electrical infrastructure in the study area. The baseline condition is surprisingly free of major power lines and the new project will increase the visual dominance of electrical infrastructure. The impact is considered localised.

The only mitigation measure that will yield a significant result is the construction of an underground cable instead of an overhead line. This option will conceal any visible parts of the power line and will have the least long-term impacts. Slight realignment of the proposed routes and conscious placement of the towers/pylons are also recommended to maintain the least interference with the agricultural activity.

No fatally flawed issues are identified, and visual impacts are considered within acceptable limits.

# TABLE OF CONTENTS

# LIST OF FIGURES



# LIST OF TABLES



# LIST OF ABBREVIATIONS

| | |
|---|---|
| BA | Basic Assessment |
| DEM | Digital Elevation Model |
| EIA | Environmental Impact Assessment |
| EIR | Environmental Impact Report |
| GIS | Geographical Information System |
| VAC | Visual Absorption Capacity |
| VIA | Visual Impact Assessment |
| ZMVE | Zone of Maximum Visual Exposure |
| ZVI | Zone of Visual Influence |

# 1 INTRODUCTION

Skets Architects, Planning & Environmental Consulting, an independent consultant, has been appointed by Envirolution Consulting (Pty) Ltd to compile a Visual Impact Assessment (VIA) report as part of a Basic Assessment (BA). The client, Eskom Holdings SOC Ltd (hereafter referred to as Eskom), proposes the development of a 132kV Chickadee loop in loop out powerline between the existing Hendrina / Aberdeen 132kV power line and the proposed Boschmanskop Traction Substation within the Steve Tshwete Local Municipality in the Mpumalanga Province.

The objective of the proposed development is to assist Transnet in increasing its export coal capacity to 81MTPA by upgrading the DC sections on the Transnet site as well as on the corresponding Eskom sides.

The site is located south of the Hendrina Power Station, next to a railway line. It is within a rural area characterised by cultivated fields, with the Hendrina Power Station towering above the plains.

A VIA is a specialist study which assesses the potential visual changes to an existing baseline setting resulting from the implementation of the proposed project. The associated visual changes could potentially impact on the character and value of the landscape and affect the views and perceptions of observers in the study area. The purpose is to determine the significance of the changes and to recommend mitigation measures where the impacts are considered unacceptably negative.

# 2 OBJECTIVES AND METHODOLOGY

Part of developing an appropriate study methodology is to understand a suitable scale of assessment. The scale of assessment occurs on four levels namely; site, local area, region or larger region (Figure 1).

- **Site** is the smallest level of assessment and stipulates the extent of the activities related to the project. This is limited to the footprint of the project or the area of disturbance;
- The **local area** is limited to the immediate surroundings and will often be defined by the properties on which the project is located and could include the surrounding properties;
- A **region** is described by area classifications such as cities/towns and municipalities/districts; and
- A **larger region** is measured by provincial, national or international borders being crossed or affected.

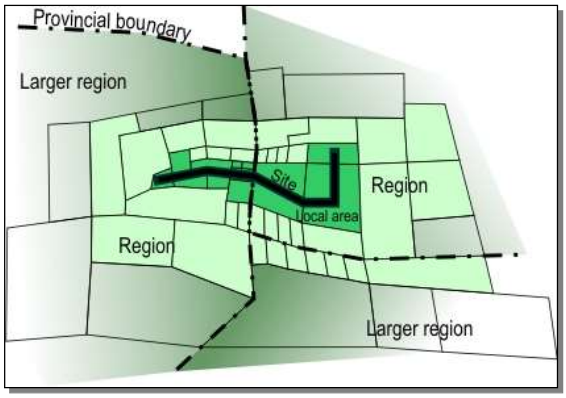



**Figure 1: Scale of assessment**

The scale of assessment is determined by the extent of the impact and the size of the study area. The study area can be described as the area affected by visual impact and usually extends beyond the boundaries of the site, especially when tall structures are erected. A study by Hull&Bishop (1988) concluded that a power line has its maximum impact on the visual resource when viewed from distances =< than 1 km. Beyond this distance, the impact decreases considerably to a point where it is virtually insignificant. This should not be confused with the visibility of a power line. It is possible to visually detect a power line over much greater distances, but Hull&Bishop specifically assessed the impact of a power line on the visual resource. A Zone of Maximum Visual Exposure (ZMVE) can therefore be delineated around the project at 1 km as a preliminary buffer. Viewers beyond that distance are still considered impacted, but to a lesser degree according to Hull&Bishop's findings.

Due to the relatively small dimensional proportions of the project, the scale of the assessment will be limited to the local area and will include a zone of up to 1 km from the proposed power line.

## *2.1 VIA OBJECTIVES*

The objectives will be to:

- Address the concerns that are raised during public participation events which relates to aesthetic or any visual aspects;
- Determine the impact on the observers, landscape character and/or landscape features in the study area due to the change in the visual characteristics of the environment;
- Discuss the project alternatives and provide a recommendation with regards to the preferred choice if applicable; and
- Recommend mitigation measures to alleviate or reduce the anticipated impacts.

The information basis that are used include the studying of aerial photographs, such as those available to the public in the form of web-based maps etc., land use maps and information gathered during a site investigation. Information on the project is provided by the client and/or lead consultant and is presumed accurate.

## *2.2 VIA METHODOLOGY*

The above objectives will be met by applying the following methodology:

1) **Delineation and description of study area:** Determine the extent of the study area and describe its comprising features that establish the landscape character;
2) **Project Description:** Describe the type, scale and extent of the proposed project, with a focus on the visible elements as per client's information;
3) **Visual Impact Assessment:** Determine the sensitivity of the receptors and assess the significance of the potential visual impacts;
4) **Comparative Analysis:** Comparing the different alternatives and arriving at a preferred option that has the least visual impact; and
5) **Mitigation Measures:** Mitigation measures are proposed to alleviate or eliminate the potential impacts that are identified.

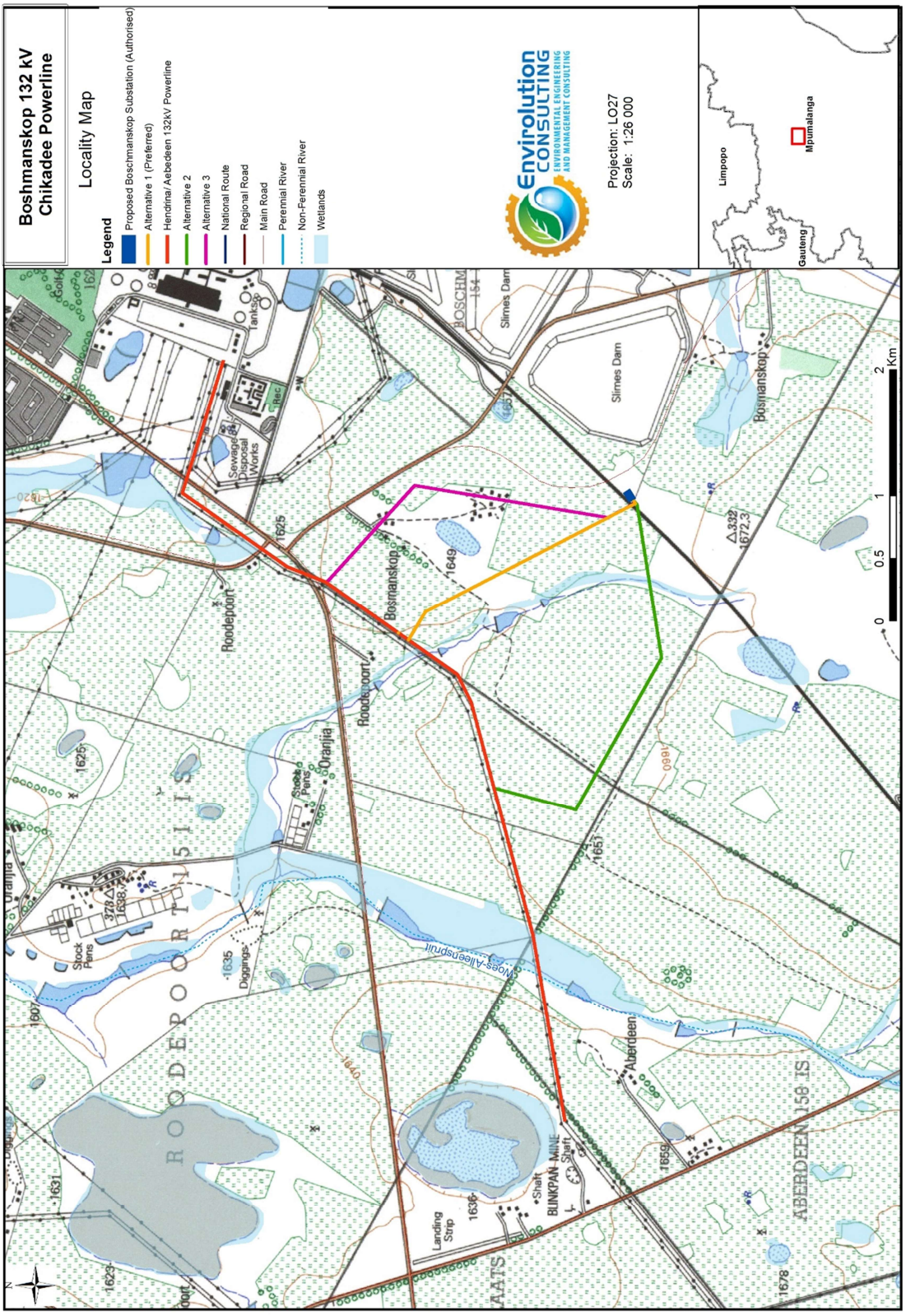



**Figure 2: Locality Map**

# 3 LIMITATIONS AND ASSUMPTIONS

This section provides a clear understanding of the limitations and assumptions that negatively affects the accuracy of the assessment and influences the confidence of the visual specialist in his professional judgement. Normally the specialist's confidence is influenced by the inherent knowledge of the specific project and study area as well as by the level of detail provided pertaining to the project.

- A Visual Impact Assessment is not a purely objective science and often integrates qualitative evaluations based on human perceptions. It is the visual specialist's aim to utilise as much quantitative data and scientific research as possible, to substantiate professional judgement and to motivate subjective opinions; and
- No comments or complaints have been received from the public prior to the writing of this report and could therefore not be incorporated.

# 4 DESCRIPTION OF THE RECEIVING ENVIRONMENT

A description of the current receiving environment establishes a baseline condition that serves as a measure to which the potential visual changes can be compared to. The receiving environment consists of various land uses and functions that translate into a landscape character. This can be broadly described by discussing land uses, topography and land cover patterns. (Figure 3)

## *4.1 TOPOGRAPHY*

The regional topography consists predominantly of undulating plains that slopes evenly towards streams and pans. Numerous small pans and farm dams are noticeable on aerial imagery. The project site is located on an evenly sloped plain that allows open panoramic views in all directions. The ash dump to the east of the site, hinders panoramic views towards the east, and is considered a large topographic alteration to the even landscape.

## *4.2 LAND USE/COVER*

The predominant land uses in the study area are agriculture and mining. The study area falls within the Eastern Highveld Grassland Vegetation type (Mucina & Rutherford, 2006). The natural vegetation can broadly be described as mostly grassland with scattered small and medium trees in the valleys or ridges. The natural vegetation cover is greatly transformed by agriculture and large cultivated field parcels dominate the even landscape. Invader tree species such as Wattles and Blue Gums, form isolated clusters between the open fields or around farmsteads.

Mining and the operations of the Hendrina Power Station, have also transformed the natural landscape in the region. The Hendrina Power Station and a large ash dump is present to the north and the east of the project site. Large scale coal mining occurs behind the power station but is out of sight from the study area. A small town, called Pullens Hope, is situated north west of the power station and 3 km north of the project site.

The site is located near the existing Boschmanskop Substation which is in the process of being upgraded. A railway line also passes the existing substation. Cultivated fields surround the site with a sparse dirt road network connecting farmsteads.

A sparse farming community is present with only a few farmsteads located inside a 2 km radius from the project sites. One farmstead is located in the northern part of the study area and will be directly affected by the proposed project. The small town of Pullens Hope is situated 3 km north of the study area and are considered outside the ZMVE.

## *4.3 EXISTING ELECTRICITY NETWORK*

A number of power lines converge at the Hendrina Power Station, but only one crosses the project site. This is the Hendrina / Aberdeen 132kV power line that traverses across the farmlands. The existing Boschmanskop Substation is a fenced, brick building which is currently being upgraded. It is situated next to the railway line that comes from Hendrina Power Station, going towards the south west. More power lines are visible to the north of the site, near the power station.

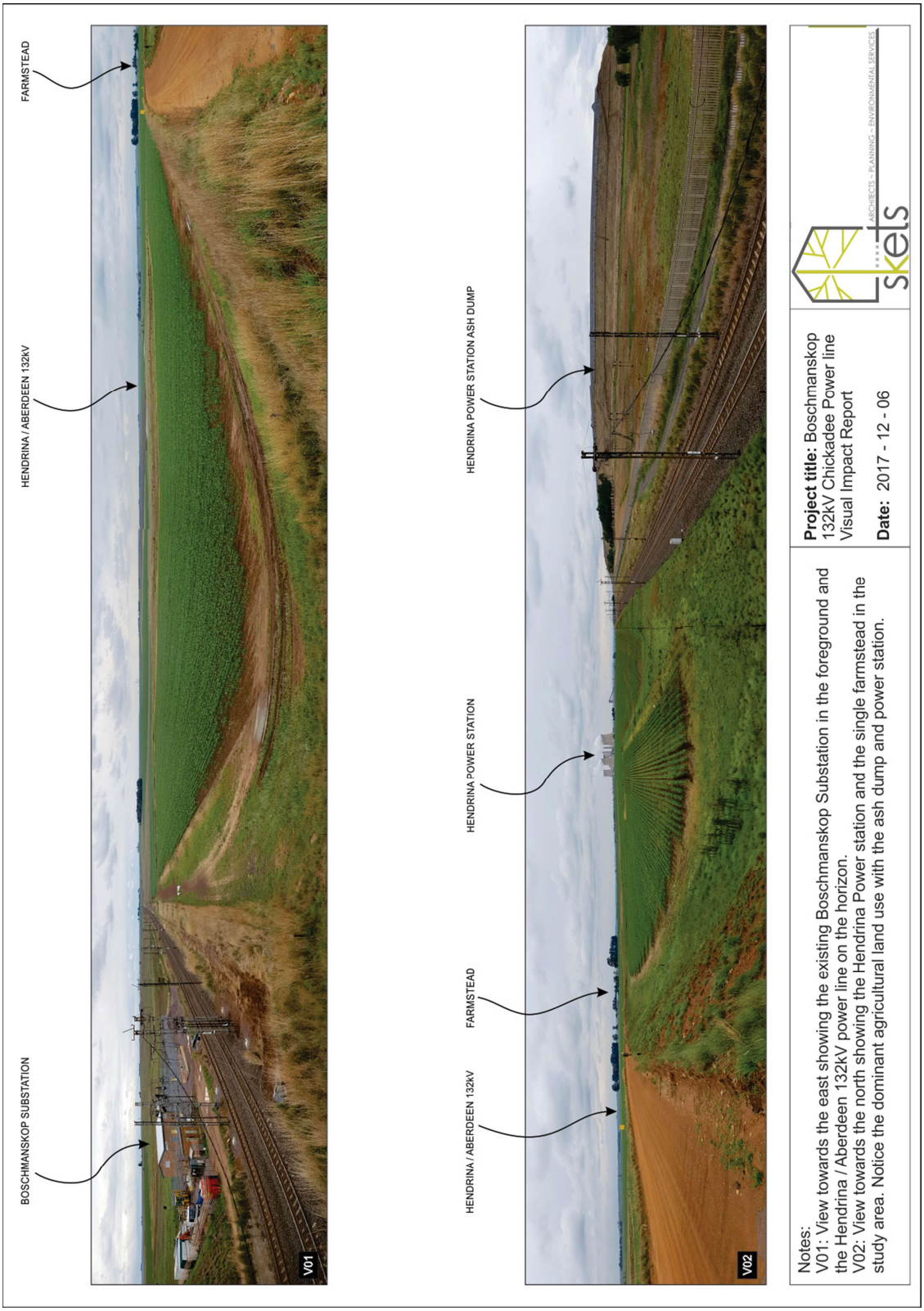



**Figure 3: Landscape context (1)**

# 5 PROJECT DESCRIPTION

The proposed project is the development of a 132kV Chickadee loop in loop out powerline between the existing Hendrina / Aberdeen 132kV power line and the Boschmanskop Traction Substation. The authorised upgrade of the Boschmanskop Substation is currently underway. The objective of the proposed development is to assist Transnet in increasing its export coal capacity to 81MTPA by upgrading the DC sections on the Transnet site as well as on the corresponding Eskom sides.

Three alternative alignments have been proposed by Eskom:

- Alternative 1 is a 2 km line exiting the Boschmanskop Substation in a north westerly direction, over the railway line and traversing the farmland, before connecting to the Hendrina / Aberdeen power line to the north west of the substation;
- Alternative 2 is a 3.4 km line existing the Boschmanskop Substation in a westerly direction over the railway line. At approximately 1.4 km it turns north west and at 2.9 km it turns north, before connecting to the Hendrina / Aberdeen power line. It traverses farmland along its route; and
- Alternative 3 is a 2.8 km line exiting the Boschmanskop Substation in a north westerly direction over the railway line. It turns north over the farmland before turning west again and crossing over the farmstead at Portion 7 of the farm Boschmanskop 154. It connects to the Hendrina / Aberdeen power line to the west of the farmstead.

## *5.1 CONSTRUCTION PHASE*

The construction period of a 132kV power line of this scale is expected to be approximately 3-6 months. Physical construction can only commence once environmental authorisation is granted and negotiations with the relevant landowners have come to a closing. It is only from this point that visual impacts, relating to the construction phase, will become potential issues.

The construction of the power line will consist of the following basic phases which will occur in no particular order:

- Survey and pegging of tower positions through aerial and/or ground survey teams;
- Construction of additional access roads and gates if required. Existing roads will be used as far as possible, but it can be expected that new roads will typically be established by means of driving over the vegetation continuously and creating a two-tread passage as oppose to a graded gravel road;
- Clearing or trimming of vegetation along the corridor that may interfere with the line;
- Establishment of construction camp/s for the construction and stockyards. Size and location is unknown;
- Construction of foundations usually by means of earthmoving equipment such as tlb's and back actors.
- Tower/pylon assembly and erection;
- Conductor stringing and tensioning;
- Servitude rehabilitation;
- Testing and commissioning; and
- Continued maintenance.

The exact locations of construction camps and material stockyards are not certain yet, but is will presumably be near in the substation's fenced area. A construction camp is usually a cleared and

fenced area where temporary site offices are located, and construction materials are stockpiled. Due to its temporary nature and practical function, aesthetic consideration is often less of a concern which could result in an unsightly terrain that may cause a visual impact.

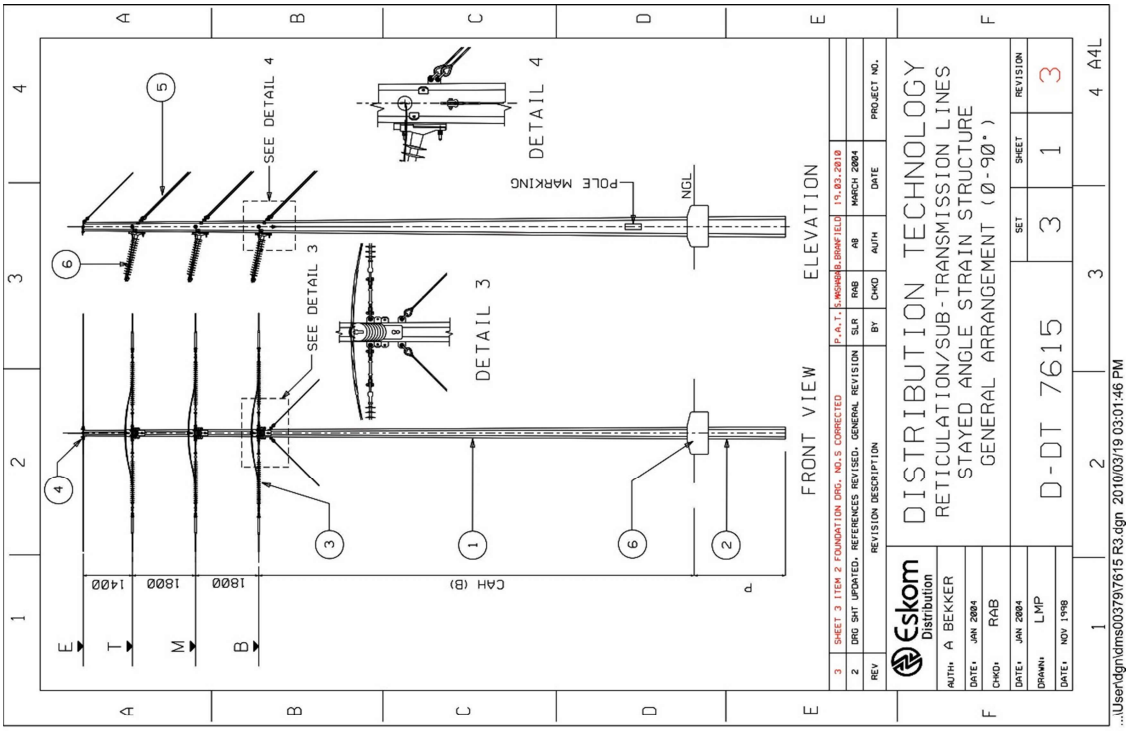
During construction, the workforce will be present in the corridor, facilitating and managing the foundation casting and tower assembly. Transport vehicles will deliver construction material during the construction phase at the tower locations where it will be assembled. A mobile crane is utilised to lift the tower structures before the pieces are bolted together and anchored. The last step is the conductor stringing and tensioning at which point the cables/conductors are attached to the towers. Vehicles and machinery will be operated by the workforce inside the corridor.

One of the activities that can cause a major visual change to the status quo scenario, is the clearing of trees and shrubs in the power line servitude. It is uncertain how much will have to be cleared but judging by the position of the proposed alignments, individual trees may be removed or trimmed. Usually trees are removed, and smaller ones are trimmed to maintain a safety clearance distance between the conductors and top of trees. This may be required along a section of Alternative 2 where the alignment passes through a Wattle tree stand near the railway bridge.

## *5.2 OPERATIONAL PHASE*

The most visible elements of a power line are the towers/pylons that are rhythmically spaced along the length of the alignment. The towers/pylons carry the conductors and are fixed to the towers via the insulators which are also fairly visible elements.

The client has proposed steel monopoles imbedded in a concrete footing. Strain pylons are installed at corners and are further supported with stay cables (Figure 4). The height of the pylons is expected to be between 20-25 m and a servitude width of 18 m on either side of the centreline is usually required for a single 132 kV power line.



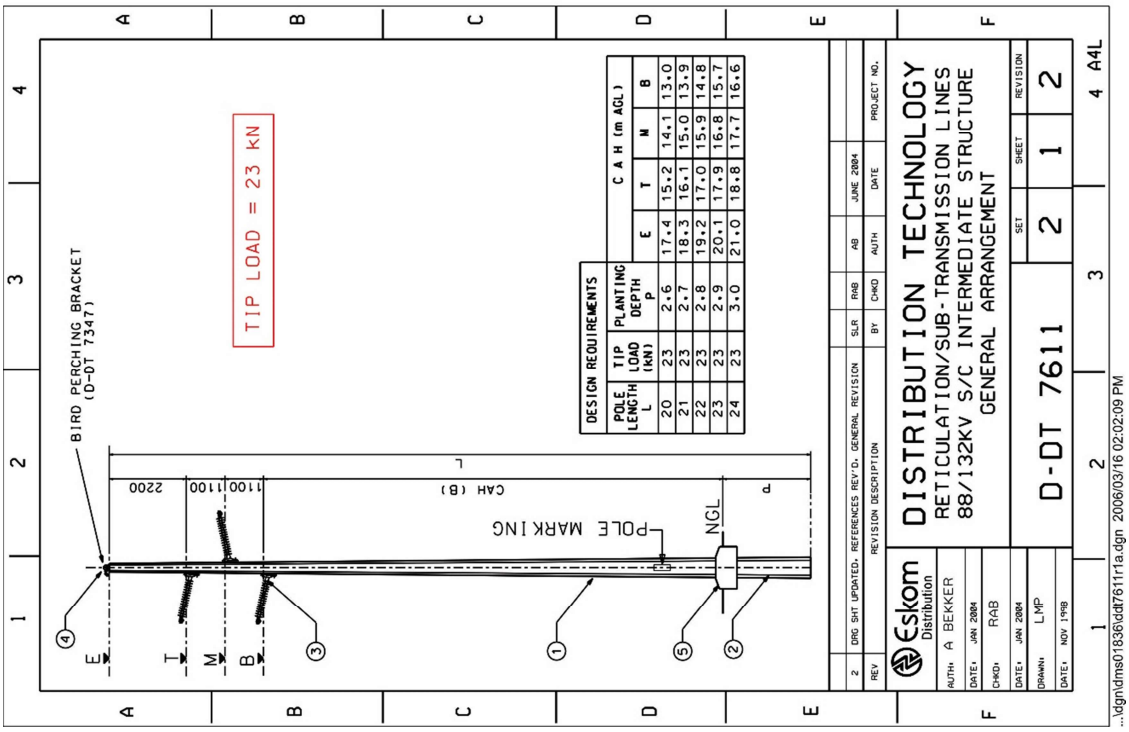




**Figure 4: Proposed pylon**

# 6 VISUAL IMPACT ASSESSMENT

## *6.1 METHODOLOGY*

Within the study area observers experience and interact differently with their environment and therefore value it differently. They may be affected by the proposed project due to additions or alterations in the visual environment which may influence their experience and views of the visual resource. In this assessment a distinction is made between impacts on the **observers** and impacts on the **landscape character**. The observers represent all people that may be affected visually, while the impacts on the landscape character strictly assess the changes to the landscape's character and the impact on its visual value. A highly significant impact on the observers will not necessarily be a highly significant impact on the landscape character and vice versa and that is why the distinction is made.

The following typical visual impacts may be expected as a result of the construction and operation of the proposed project:

- The project activities and components noticeably change the existing features and qualities of the landscape;
- The project introduces new features which are uncharacteristic or in contrast with the existing character of the landscape; and/or
- The project removes or blocks aesthetic features in the landscape which subsequently affects the visual value and aesthetic quality of the visual resource.

A VIA is a specialist study that assesses the potential visual changes/impacts to an existing baseline setting resulting from the implementation of a proposed project. This implies that, firstly, a baseline must be established and secondly, the visual change, resulting from the project, must be compared to the baseline. The quantification of the visual change is referred to as the severity of the impact and is a function of:

- The nature of the impact;
- The probability of the impact occurring;
- The duration of the impact;
- The extent of the impact; and
- The magnitude of the impact. (refer to APPENDIX 2)

The essence of determining the significance of a visual impact, centres on the severity of the potential impacts, and the sensitivity of the affected receptors. In simple terms, a low severity impact affecting receptors of low sensitivity, will result in a low significance. On the other end of the scale, a highly severe impact, affecting highly sensitive receptors, will result in a high significance.

### Sensitivity of observers

The sensitivity of an observer is related to the value an observer has for the particular visual resource being impacted on. To determine viewer sensitivity a commonly used rating system is utilised (Table 1). This is a generic classification of observers and enables the visual impact specialist to establish a logical and consistent viewer sensitivity rating for viewers who are involved in different activities without engaging in extensive public surveys.

**Table 1: Viewer Sensitivity**

| VIEWER SENSITIVITY | DEFINITION (BASED ON THE LANDSCAPE INSTITUTE, 2002 ED PP90-91) |
|---|---|
| **High** | Views from major tourist or recreational attractions or viewpoints promoted for or related to appreciation of the landscape, or from important landscape features.<br>Users of all outdoor recreational facilities including public and local roads or tourist routes whose attention or interest may be focussed on the landscape;<br>Communities where the development results in changes in the landscape setting or valued views enjoyed by the community;<br>Residents with views affected by the development;<br>People generating an income from the visual resource or pristine quality of the environment. |
| **Moderate** | People engaged in outdoor sport or recreation (other than appreciation of the landscape);<br>People commuting between work place and home or other destinations. |
| **Low** | People at their place of work or focussed on other work or activity;<br>Views from urbanised areas, commercial buildings or industrial zones.<br>Views from heavily industrialised or blighted areas |

The only observers in the study area are residents from the dispersed farming community. Only one farmstead was identified in the ZMVE which is located at Portion 7 of the farm Boschmanskop 154. Residents living here will be directly affected by Alternative 1 and 3 as it passes in close proximity to the farm stead. They are classified as visual receptors of **high** sensitivity owing to their sustained visual exposure to the proposed development as well as their attentive interest towards their living environment.

## Sensitivity of the Landscape Character

The sensitivity of a landscape's character is a measure of the robustness of its character and the ability of the landscape to accommodate certain changes without detrimental impacts on its character. The magnitude of an impact is often mitigated by the inherent Visual Absorption Capacity (VAC) of the landscape to absorb changes or to screen the impacts. A landscape with a high VAC may have one or more of the following attributes:

- A high screening capacity which screens views from sensitive vantage points;
- Is often visually isolated and has a low degree of inter-visibility with adjacent landscapes; and/or
- Features land uses that are compatible with the proposed project;

On the other end of the scale, a landscape with a low VAC may:

- Be an open or exposed landscape with few topographic or surface features that can act as visual screens from sensitive vantage points;
- Has a high degree of inter-visibility with adjacent landscapes; and/or
- Comprises of land uses that are incompatible with the proposed project.

A landscape character with a high sensitivity will typically have one or a combination of the following attributes:

- Has a low VAC;
- Has a very high concentration of valued attributes or its attributes are of a high value.

- Has a well-established and distinct identity and sense of place; and/or
- Is often in a pristine natural condition with high ecological value that contributes to a valued aesthetic condition.

A landscape character with a low sensitivity will typically have one, or a combination of the following attributes:

- Has a high VAC;
- Has a poorly established identity and sense of place;
- Is often intensely developed or transformed by exploitive human activities and therefore has a low value and scenic quality as a baseline condition to start with; and/or
- Has a low concentration of valued attributes or its attributes are of a low value.

The landscape character sensitivity in the study area is considered to be medium. It is predominantly a rural landscape with extensive farming activity occurring in large blocks. During the summer season it is visually pleasing and the small farm dams and pans raise the visual quality of the landscape. This is however very common in the region and not regarded as unique. The even terrain causes a high degree of inter-visibility between parts of the study area with panoramic views of the surroundings. Despite the presence of the Hendrina Power Station in the north, the study area is surprisingly free of electrical infrastructure with only one power line traversing the study area.

## *6.2 VISUAL IMPACT SEVERITY ASSESSMENT*

**Table 2: Visual Impact Severity – Alternative 1**

| **Alternative 1 – Severity of impacts on observers (OB*) and landscape character(LC)*** | | | | | |
|---|---|---|---|---|---|
| | | **Without mitigation** | | **With mitigation** | |
| **Construction phase** | | | | | |
| **Nature of impact:** The construction activity will cause damage to the existing vegetation cover between the Boschmanskop Traction Substation and the existing Hendrina / Aberdeen 132kV power line due to the movement of the technical team and the operation of construction equipment. These activities will negatively impact on the agricultural land use and may prevent active cultivation around the footprint of the poles. The construction equipment, construction camps and workforce will be elements that are uncharacteristic to the visual environment. Construction sites are considered unsightly and may intrude on the views of the identified observers inside the ZMVE. It will negatively impact on the visual value and quality of the landscape character on a localised scale. | | | | | |
| **Probability** | OB | Probable | 3 | Improbable | 2 |
| | *LC* | *Probable* | 3 | *Improbable* | 2 |
| **Duration** | OB | Very short duration | 1 | Very short duration | 1 |
| | *LC* | *Very short duration* | 1 | *Very short duration* | 1 |
| **Extent** | OB | Local area | 2 | Contained on site | 1 |
| | *LC* | *Local area* | 2 | *Contained on site* | 1 |
| **Magnitude** | OB | Minor | 2 | Minor | 2 |

| | | | | | |
|---|---|---|---|---|---|
| | *LC* | *Low* | 4 | *Minor* | 2 |
| **Severity** | OB | **Low** | **15** | **Low** | **8** |
| | *LC* | ***Low*** | **21** | ***Low*** | **8** |
| **Status** | OB | Negative | | Negative | |
| | *LC* | *Negative* | | *Negative* | |

**Operational phase**

**Nature of impact:** A new loop-in, loop-out power line is considered a new addition to the visual environment which is relatively free of power lines, besides the existing Hendrina / Aberdeen Power line. The loop-in, loop-out power line will be 2km long and will cause an easily detectable visual change to the status quo. The farming community is dispersed with only one farmstead within the ZMVE. The impact on the landscape character is considered moderate as interference with the agricultural land use is expected and continuity of the fields will be interrupted at the pylon locations.

| | | | | | |
|---|---|---|---|---|---|
| **Probability** | OB | Probable | 3 | Improbable | 2 |
| | *LC* | *Highly probable* | 4 | *Probable* | 3 |
| **Duration** | OB | Long term | 4 | Long term | 4 |
| | *LC* | *Long term* | 4 | *Long term* | 4 |
| **Extent** | OB | Local area | 2 | Local area | 2 |
| | *LC* | *Local area* | 2 | *Local area* | 2 |
| **Magnitude** | OB | Minor | 2 | Small | 0 |
| | *LC* | *Low* | 4 | *Minor* | 2 |
| **Severity** | OB | **Low** | **24** | **Low** | **12** |
| | *LC* | ***Medium*** | **40** | ***Low*** | **24** |
| **Status** | OB | Negative | | Negative | |
| | *LC* | *Negative* | | *Negative* | |
| **Reversibility** | OB | Medium | | Medium | |
| | *LC* | *Medium* | | *Medium* | |
| **Irreplaceable loss of resources?** | | | | | |
| | OB | Low | | Low | |
| | *LC* | *Low* | | *Low* | |

**Can impacts be mitigated:** Can impacts be mitigated: Yes. Probably the most effective long-term mitigation measure, is to place the cable underground. Impacts during construction may have a higher magnitude due to the required groundworks, but upon completion the baseline condition will return, and no impacts are expected during the operational phase. This is however dependant on the economic viability and technical possibility which are not explored in this report. For the purpose of this study an underground cable is not considered under the mitigation section. Refer to Section 7.

| |
|---|
| **Cumulative impacts:** A medium risk of cumulative impacts can be expected due to the presence of the existing power line, railway line and power station in the study area. The proposed route is considered a noticeable addition to the baseline environment and will increasing the visual dominance of electrical infrastructure in the study **area**. |
| **Residual Risks:** Residual risks will occur as the visibility of the power line cannot be effectively reduced and therefore visual intrusion will remain an impact for the lifetime of the project, unless underground cabling is considered. |

**Table 3: Visual Impact Severity – Alternative 2**

| **Alternative 2 – Severity of impacts on observers (OB) and *landscape character(LC)*** | | | | | |
|---|---|---|---|---|---|
| | | **Without mitigation** | | **With mitigation** | |
| **Construction phase** | | | | | |
| **Nature of impact:** The construction activity will cause damage to the existing vegetation cover between the Boschmanskop Traction Substation and the existing Hendrina / Aberdeen 132kV power line due to the movement of the technical team and the operation of construction equipment. These activities will negatively impact on the agricultural land use and may prevent active cultivation around the footprint of the poles. The construction equipment, construction camps and workforce will be elements that are uncharacteristic to the visual environment. Construction sites are considered unsightly and may intrude on the views of the identified observers inside the ZMVE. It will negatively impact on the visual value and quality of the landscape character on a localised scale. | | | | | |
| **Probability** | OB | Very improbable | 1 | Very improbable | 1 |
| | *LC* | *Probable* | 3 | *Probable* | 3 |
| **Duration** | OB | Very short duration | 1 | Very short duration | 1 |
| | *LC* | *Very short duration* | 1 | *Very short duration* | 1 |
| **Extent** | OB | Local area | 2 | Contained on site | 1 |
| | *LC* | *Local area* | 2 | *Contained on site* | 1 |
| **Magnitude** | OB | Small | 0 | Small | 0 |
| | *LC* | *Low* | 4 | *Minor* | 2 |
| **Severity** | OB | **Low** | **3** | **Low** | **2** |
| | *LC* | ***Low*** | **21** | ***Low*** | **12** |
| **Status** | OB | Negative | | Negative | |
| | *LC* | *Negative* | | *Negative* | |

**Operational phase**

**Nature of impact:** A new loop-in, loop-out power line is considered a new addition to the visual environment which is relatively free of power lines, besides the existing Hendrina / Aberdeen Power line. The loop-in, loop-out power line will be 3,4km long and will cause an easily detectable visual change to the status quo. The farming community is dispersed, and no farmsteads are within the ZMVE. The impact on the landscape character is considered moderate as interference with the agricultural land use is expected and continuity of the fields will be interrupted at the pylon locations.

| | | | | | |
|---|---|---|---|---|---|
| **Probability** | OB | Very improbable | 1 | Very improbable | 1 |
| | *LC* | *Highly probable* | 4 | *Probable* | 3 |
| **Duration** | OB | Long term | 4 | Long term | 4 |
| | *LC* | *Long term* | 4 | *Long term* | 4 |
| **Extent** | OB | Local area | 2 | Local area | 2 |
| | *LC* | *Local area* | 2 | *Local area* | 2 |
| **Magnitude** | OB | Small | 0 | Small | 0 |
| | *LC* | *Low* | 4 | *Minor* | 2 |
| **Severity** | OB | **Low** | **6** | **Low** | **6** |
| | *LC* | ***Medium*** | **40** | ***Low*** | **24** |
| **Status** | OB | Negative | | Negative | |
| | *LC* | *Negative* | | *Negative* | |
| **Reversibility** | OB | Medium | | Medium | |
| | *LC* | *Medium* | | *Medium* | |
| **Irreplaceable loss of resources?** | | | | | |
| | OB | Low | | Low | |
| | *LC* | *Low* | | *Low* | |

**Can impacts be mitigated:** Can impacts be mitigated: Yes. Probably the most effective long-term mitigation measure, is to place the cable underground. Impacts during construction may have a higher magnitude due to the required groundworks, but upon completion the baseline condition will return, and no impacts are expected during the operational phase. This is however dependant on the economic viability and technical possibility which are not explored in this report. For the purpose of this study an underground cable is not considered under the mitigation section. Refer to Section 7.

**Cumulative impacts:** A medium risk of cumulative impacts can be expected due to the presence of the existing power line, railway line and power station in the study area. The proposed route is considered a noticeable addition to the baseline environment and will increasing the visual dominance of electrical infrastructure in the study area.

**Residual Risks:** Residual risks will occur as the visibility of the power line cannot be effectively reduced and therefore visual intrusion will remain an impact for the lifetime of the project, unless underground cabling is considered.

**Table 4: Visual Impact Severity – Alternative 3**

| **Alternative 3 – Severity of impacts on observers (OB) and *landscape character(LC)*** | | | | | |
|---|---|---|---|---|---|
| | | **Without mitigation** | | **With mitigation** | |
| **Construction phase** | | | | | |
| **Nature of impact:** The construction activity will cause damage to the existing vegetation cover between the Boschmanskop Traction Substation and the existing Hendrina / Aberdeen 132kV power line due to the movement of the technical team and the operation of construction equipment. These activities will negatively impact on the agricultural land use and may prevent active cultivation around the footprint of the poles. The construction equipment, construction camps and workforce will be elements that are uncharacteristic to the visual environment. Construction sites are considered unsightly and may intrude on the views of the identified observers inside the ZMVE. It will negatively impact on the visual value and quality of the landscape character on a localised scale. | | | | | |
| **Probability** | OB | Highly probable | 4 | Probable | 3 |
| | *LC* | *Probable* | 3 | *Improbable* | 2 |
| **Duration** | OB | Very short duration | 1 | Very short duration | 1 |
| | *LC* | *Very short duration* | 1 | *Very short duration* | 1 |
| **Extent** | OB | Local area | 2 | Contained on site | 1 |
| | *LC* | *Local area* | 2 | *Contained on site* | 1 |
| **Magnitude** | OB | Low | 4 | Minor | 2 |
| | *LC* | *Low* | 4 | *Minor* | 2 |
| **Severity** | OB | **Low** | **28** | **Low** | **12** |
| | *LC* | ***Low*** | **21** | ***Low*** | **8** |
| **Status** | OB | Negative | | Negative | |
| | *LC* | *Negative* | | *Negative* | |
| **Operational phase** | | | | | |
| **Nature of impact:** A new loop-in, loop-out power line is considered a new addition to the visual environment which is relatively free of power lines, besides the existing Hendrina / Aberdeen Power line. The loop-in, loop-out power line will be 2,8km long and will cause an easily detectable visual change to the status quo. The farming community is dispersed with only one farmstead within the ZMVE. The proposed route traverses directly over the farmstead and will cause high levels of visual intrusion. The impact on the landscape character is considered moderate as interference with the agricultural land use is expected and continuity of the fields will be interrupted at the pylon locations. | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| **Probability** | OB | Highly probable | 4 | Probable | 3 |
| | *LC* | *Highly probable* | 4 | *Probable* | 3 |
| **Duration** | OB | Long term | 4 | Long term | 4 |
| | *LC* | *Long term* | 4 | *Long term* | 4 |
| **Extent** | OB | Local area | 2 | Local area | 2 |
| | *LC* | *Local area* | 2 | *Local area* | 2 |
| **Magnitude** | OB | Low | 4 | Minor | 2 |
| | *LC* | *Low* | 4 | *Minor* | 2 |
| **Severity** | OB | **Medium** | **40** | **Low** | **24** |
| | *LC* | ***Medium*** | **40** | ***Low*** | **24** |
| **Status** | OB | Negative | | Negative | |
| | *LC* | *Negative* | | *Negative* | |
| **Reversibility** | OB | Medium | | Medium | |
| | *LC* | *Medium* | | *Medium* | |
| **Irreplaceable loss of resources?** | | | | | |
| | OB | Low | | Low | |
| | *LC* | *Low* | | *Low* | |

**Can impacts be mitigated:** Can impacts be mitigated: Yes. Probably the most effective long-term mitigation measure, is to place the cable underground. Impacts during construction may have a higher magnitude due to the required groundworks, but upon completion the baseline condition will return, and no impacts are expected during the operational phase. This is however dependant on the economic viability and technical possibility which are not explored in this report. For the purpose of this study an underground cable is not considered under the mitigation section. Refer to Section 7.

**Cumulative impacts:** A medium risk of cumulative impacts can be expected due to the presence of the existing power line, railway line and power station in the study area. The proposed route is considered a noticeable addition to the baseline environment and will increasing the visual dominance of electrical infrastructure in the study area.

**Residual Risks:** Residual risks will occur as the visibility of the power line cannot be effectively reduced and therefore visual intrusion will remain an impact for the lifetime of the project, unless underground cabling is considered.

## *6.3 VISUAL IMPACT SIGNIFICANCE SUMMARY*

| Project Alternatives | Receptor | Sensitivity of receptors | Severity of Impact without mitigation | Severity of Impact with mitigation | Significance of Impact without mitigation | Significance of Impact with mitigation |
|---|---|---|---|---|---|---|
| Alternative 1 | OB | High | Low 24 | Low 12 | Moderate/Minor | Moderate/Minor |
| | LC | Medium | Medium 40 | Low 24 | Moderate/Minor | Minor |
| Alternative 2 | OB | High | Low 6 | Low 6 | Moderate/Minor | Moderate/Minor |
| | LC | Medium | Medium 40 | Low 24 | Moderate/Minor | Minor |
| Alternative 3 | OB | High | Medium 40 | Low 24 | Moderate | Moderate/Minor |
| | LC | Medium | Medium 40 | Low 24 | Moderate/Minor | Minor |

# 7 MITIGATION

The aim of mitigation is to reduce or alleviate the anticipated impacts that are a consequence of the proposed project's components and activities.

Mitigation measures are provided for three phases of the project namely, the design, construction and operational phases. "Mitigation is a design skill that should start at the very inception of a project with the analysis of environmental opportunities and constraints." (Institute of Environmental Assessment and Landscape Institute, 1995) This approach generates preventative measures that will influence design decisions instead of relying on cosmetic landscape remediation of a completed project.

## *7.1 DESIGN PHASE*

The single most important mitigation measure that should be addressed in the design phase is a feasible, low-impact alignment for the proposed power line. A thorough assessment of alternative routes can yield the greatest results in limiting visual impact.

The alternative that will cause the least visual impacts, will be the installation of an underground cable. Although excavations during the construction phase will cause the magnitude of the impact to increase, it is considered temporary and the final product will be completely unnoticeable. This option is subject to engineering approval and is not considered under the "with mitigation" section in Table 2, Table 3 and Table 4.

Alternatively, the realignment of the routes should also be considered. This has been explored in Figure 5 where Alternative 1 and 3 are positioned along the edges of the existing fields. The placement of towers/pylons is important in this scenario as it should take into consideration the least interference with agricultural activity. Tower placement in the middle of a cultivated field will disrupt the continuity of the fields. Align the power line along the edges of the fields to cause the least disruption and maintain the visual continuity of the parallel lines created through cultivation.

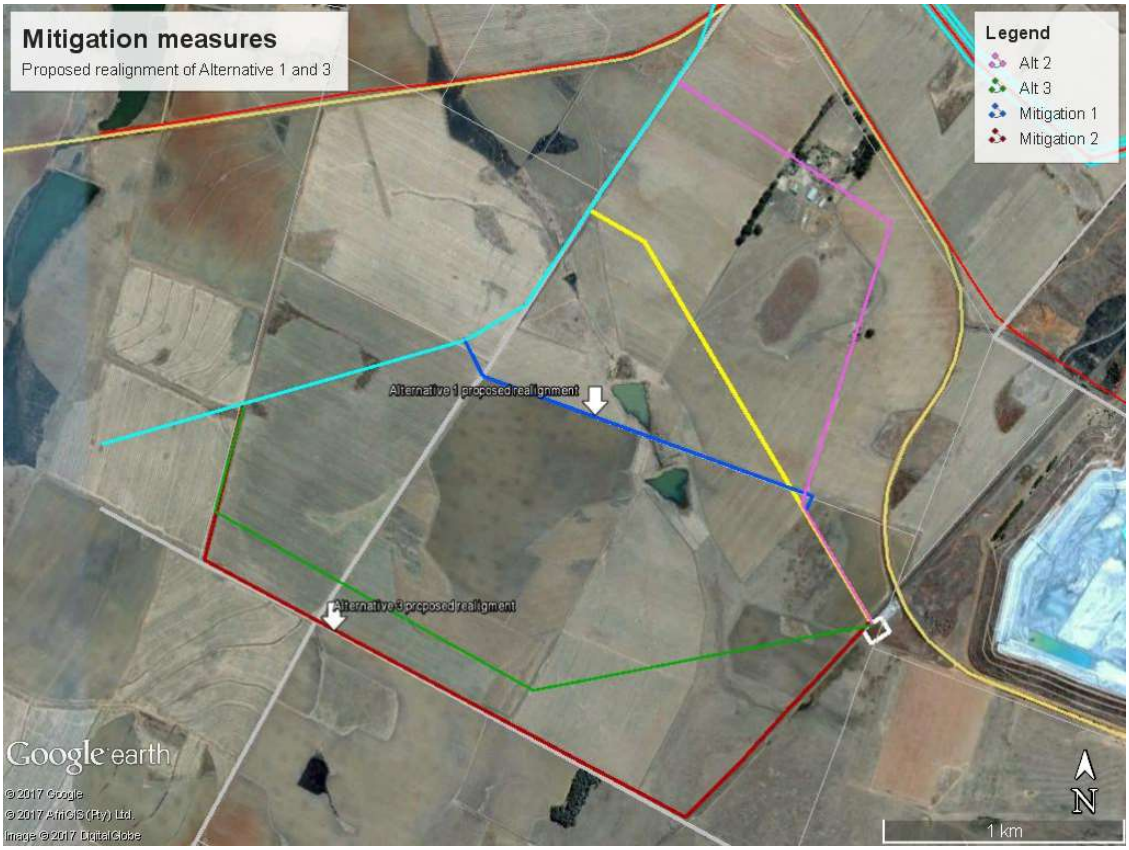



**Figure 5: Proposed realignment of routes**

## *7.2 CONSTRUCTION PHASE*

As a general rule of thumb, one can significantly reduce the extent and intensity of visual impact by limiting the area of surface disturbance during construction. Exposed soil or damaged vegetation is expected to cause visual intrusion and impact on the scenic quality of the environment. The following techniques can be implemented to reduce surface disturbances:

- Locate construction camps and stock yards in the least visible areas or locate it on areas that are already disturbed such as agricultural fields for example;
- The screening capacity of the site can be temporarily enhanced through the erection of a 3 m high shade cloth fence around the construction camp during construction. The colour of the shade cloth should be similar to that of the adjacent vegetation, i.e. a light brown or khaki green;
- Keep the construction camp and construction area neat and tidy at all times. Remove any waste products from the site or contain it in an enclosed area out of sight from viewers;
- Establish limits of disturbances during construction through the demarcating of the construction areas to prevent unnecessary damage to vegetation;
- Keep to existing road infrastructure as far as possible to minimise the physical damage to vegetation in the power line servitude;
- Implement rehabilitation of disturbed areas as soon as possible to limit the duration of exposed surfaces;
- Keep as much of the natural shrubs and trees in and around the servitude. This will maintain a degree of screening from sensitive viewpoints.

## *7.3 OPERATIONAL PHASE*

- Previously rehabilitated areas must be monitored to prevent the infestation of weeds that may become an unsightly feature;
- Maintenance of the servitude in terms of clearing up littering and dumped refuse is highly recommended. This must be done on a routine basis in order to keep the servitude neat and maintain a visually unobtrusive condition;

# 8 ALTERNATIVE SELECTION AND CONCLUSION

**Table 5: Comparative analysis of alternatives**

| Rating | Power line routes | Notes (Reasoning behind rating) |
|---|---|---|
| 1 | Alternative 2 | Alternative 2 is the most preferred option. This alignment is the furthest away from any sensitive observers and will therefore have the least impact on them. It is the longest route and will cause a slightly higher magnitude of disturbance on the landscape due to more pylons, but the low severity of the impact on the observers carries more weight in this regard. |
| 2 | Alternative 1 | Alternative 1 is marginally less preferred than Alternative 2. It is closer to the farmstead on Portion 7 of the farm Boschmanskop 154 which places it within the ZMVE. Its impact on the landscape character is similar to Alternative 2, but will be marginally less due to the shorter distance. If realignment is considered as proposed in Figure 5, Alternative 1 will be the most preferred option |
| 3 | Alternative 3 | Alterative 3 is the least preferred option as it affects directly on the residents on Portion 7 of the farm Boschmanskop 154. It will pass directly overhead of the farmstead. The impact on the residents is the highest of the 3 options. |

The significance of the visual impact is determined through a separate assessment of impacts on the landscape character and impacts on observers in the study area. This has been done for the construction and operational phases as each phase presents different impacts. The landscape character and the observers are receptors in the study area and have different sensitivities towards the proposed project. It is expected that each receptor will respond differently to the visual impacts and would therefore react uniquely.

The sources of impact originate from the activities during the construction phase and the final project components that will alter the baseline condition of the study area. The relative scale of the proposed project is considered small which translates into low to medium impact severities. The observers in the study area have a high sensitivity, but viewer incidence is very low, and the impact is considered localised with a small but noticeable visual change. The impact on the landscape character is considered medium due to the low occurrence of existing electrical infrastructure in the study area. The baseline condition is surprisingly free of major power lines and the new project will increase the visual dominance of electrical infrastructure. The impact is considered localised.

The only mitigation measure that will yield a significant result is the construction of an underground cable instead of an overhead line. This option will conceal any visible parts of the power line and will have the least long-term impacts. Slight realignment of the proposed routes and conscious placement of the towers/pylons are also recommended to maintain the least interference with the agricultural activity.

No fatally flawed issues are identified, and visual impacts are considered within acceptable limits.

# 9 REFERENCES

As a matter of best practice, this assessment is based on internationally accepted guidelines and standards with regards to VIA.


- Barnard, D, Friend, F, Barnard, C and Visser, H. 2006. *Road Map to Environmental Legislation: Edition 3.* Impact Books CC, Pretoria.
- Forest Stewardship, 2008. *Forest Investment Account: integrated Visual Design Procedures and Standards.* British Columbia. (http://www.for.gov.bc.ca/hfp/publications/00040/FIA-Standards-Final.pdf). Accessed May 2012.
- Hull, R.B. and I.D. Bishop. 1988. *Scenic Impacts of Electricity Transmission Towers: The influence of Landscape Type and Observer Distance.* Journal of Environmental Management. 1988. Vol. 27: pp. 99-108.
- Landscape Institute. 2002. *Guidelines for Landscape and Visual Impact Assessment*. The Landscape Institute with the Institute of Environmental Management and Assessment. Spon Press, London, United Kingdom.
- Lita Furby, Paul Slovic, Baruch Fischhoff, Robin Gregory. 1988. *Public perceptions of electric power transmission lines.* Journal of Environmental Psychology, Volume 8, Issue 1, March 1988, Pages 19-43, ISSN 0272-4944, 10.1016/S0272-4944(88)80021-5. (http://www.sciencedirect.com/science/article/pii/S0272494488800215). Accessed May 2012.
- MetroGIS (Pty) Ltd. 2011. *Proposed Aberdeen 200MW wind energy facility in the Eastern Cape Province. Visual Assessment – Input for Scoping Report.* (Report can be downloaded from www.savannahSA.com). Accessed August 2012.
- Oberholzer, B. 2005. Guideline for Involving Visual and Aesthetic Specialists in EIA Processes. Edition 1. CSIR Report No. ENV-S-C 2005 053 F. Provincial Government of the Western Cape, Department of Environmental Affairs and Development Planning, Cape Town.
- The Countryside Agency and Scottish Natural Heritage (2002). *Landscape Character Assessment – Topic paper 6.*
- Thomas Priestley, Gary W. Evans. 1996. *Resident Perceptions of a Nearby Electric Transmission Line*. Journal of Environmental Psychology, Volume 16, Issue 1, March 1996, Pages 65-74, ISSN 0272-4944, 10.1006/jevp.1996.0006. (http://www.sciencedirect.com/science/article/pii/S0272494496900067). Accessed May 2012.
- Swanwick, C. Department of Landscape, University of Sheffield and Land Use Consultants. 2002. *Landscape Character Assessment: Guidance for England and Scotland.* The Countryside Agency / Scottish Natural Heritage.
- Soini, K., Pouta, E., Salmiovirta, M., Uusitalo, M., Kivinen, T. 2009. *Perceptions of power transmission lines among local residents: A case study from Finland.* Paper presented at the International Conference of Landscape Economics @ University of Natural Resources and Applied Life Science (BOKU), Vienna, Austria. (http://www.ceep-europe.org/workshop.php?id_workshop=48&view=programme). Accessed May 2012.
- U.S. Department of the Interior, Bureau of Land Management - Visual Resource Management. Web Site (www.blm.gov/VRM/index.html). Accessed April 2005.

- U.S.D.O.T., Federal Highway Administration, Office of Environmental Policy. (1981). *Visual Impact Assessment for Highway Projects*. U. S. Department of Transportation Washington D. C.

# APPENDIX 1

## *GLOSSARY OF TERMS*

(Derived from the IEMA & LI Guidelines with additional descriptions)

**Baseline assessment:** Record and analysis of existing landscape and visual conditions. A description of the status quo.
**Cumulative effects/impacts:** The summation of effects that result from changes caused by a development in the conjunction with other past, present and reasonably foreseeable actions.
**Landscape:** The European Landscape Convention (2000) defines landscape as "an area, as perceived by people, whose character is the result of the action and interaction of natural and/or human factors." It can also include rural landscapes, townscapes and seascapes.
**No-Go or Do-Nothing alternative:** Continued change/evolution of the landscape or of the environment in the absence of the proposed development.
**Impact severity:** A combination of the probability, duration, extent and magnitude of an impact. It is calculated with an equation of S=(E+D+M)P where E,D,M and P are given values in the impact report and impact severity is determined to be low, medium or high.
**Impact significance:** A combination of the impact severity and the receptor sensitivity based on values of high to insignificant.
**Indirect impacts:** Impacts on the environment, which are not a direct result of the development, but are often produced away from it, or as a result of, a complex pathway. Sometimes referred to as secondary impacts.
**Land use:** The primary use of the landscape or dominant functions.
**Land cover:** Refers to the elements that are on the surface of the landscape. Relates to the land use.
**Landform:** Combinations of slope and elevation that produce the shape and form of the land surface.
**Landscape Character Assessment:** A Landscape Character Assessment (LCA) identifies and describes the comprising attributes and their qualities/values in the study area. It recognises that a landscape consists of interconnected systems, patterns and individual components that is defined by the natural, cultural and historical aspects of the region.
**Landscape exposure:** Landscape exposure is a description of the inter-visibility between parts of a study area and the potential screening of project components. It refers to the openness of a landscape and the ability or inability to experience panoramic views across vast distances. It relates to the VAC of a landscape.
**Landscape type:** A landscape type (LT) will have broadly similar patterns of geology, landform, vegetation, land uses, settlement patterns, etc. that gives it a common character.
**Landscape feature:** A prominent eye-catching element that is unique to a specific landscape.
**Landscape sensitivity:** The extent to which a landscape can accept change of a particular type and scale without unacceptable adverse effects.
**Mitigation:** Measures, including any process, activity or design implementation to avoid, reduce, remedy or compensate for the adverse effect of an impact or visual effect due to a development.
**Receptor (Landscape or viewer):** A physical landscape feature, resource, character component or viewer group that will experience an effect from a development.
**Residual risks:** The risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014)

**Study area:** An area determined by the specialist to be the area of impact. This area may vary from project to project and is usually the extent of visibility.
**Viewshed:** A viewshed analysis or visibility mapping is a GIS generated area that calculates the direct line of sight of an object in a study area based on the topography in the study area. This provides a first order impression of the visibility of an object without the screening effect of vegetation or other structures.
**Visual Absorption Capacity (VAC):** VAC is the degree of ability of a study area/landscape to conceal or absorb the proposed project.
**Visual Exposure:** Visual exposure has reference to a specific observer or observer group, and relates to how close a viewer is to an impact, or what percentage of the impact is visible, and how it affects the viewers' visual field.
**Visual Resource:** Any scene of a landscape can be referred to as a visual resource. The term, visual resource, is commonly used when the value of the scene is described.
**Visual tolerance/intolerance threshold:** A visual tolerance/intolerance threshold is a point where a specific cumulative impact oversteps the boundary between being accepted or not accepted. It is a very subjective matter and it is up to the visual specialist to motivate why the threshold is reached or exceeded.
**Zone of Visual Influence (ZVI):** Area from which a proposed development is likely to be visible, based on GIS viewsheds and field observations.

# APPENDIX 2

## *IMPACT SEVERITY ASSESSMENT CRITERIA*

The assessment of the significance of a visual or landscape impact is a combination of how severe an impact is considered to be, and how sensitive are the receptors that are being impacted on. According to Section 13 of the 2014 EIA Regulations 982, the following assessment criteria is followed to describe the severity of the impact along the topics of nature of impact, extent, duration, magnitude and probability.

**Nature of impact:**
A description of what causes the effect, what will be affected and how it will be affected. A distinction is made between direct, indirect, cumulative and residual impacts.

**Extent:**

1. Contained on site.
2. Local area, limited to the project site and adjacent properties.
3. Regional, often affecting a large community such as a town or municipal area.
4. Larger region, affecting an area that is on a provincial or national scale.
5. Crossing international borders.

**Duration:**

1. Very short duration, <1 years.
2. Short duration, 2-5 years.
3. Medium term, 5-15 years.
4. Long term, >15 years.
5. Permanent.

**Magnitude:**

0. Small and will have no effect on the environment.
2. Minor, although detectable, it will not result in an impact on processes.
4. Low and will cause a slight impact on processes.
6. Moderate and will result in processes continuing but in a modified way.
8. High, processes are altered to the extent that they temporarily cease.
10. Very high and result in complete destruction of patterns and permanent cessation of processes.

**Probability:**

1. Very improbable, will probably not happen.
2. Improbable, some possibility but low likelihood.
3. Probable, distinct possibility.
4. Highly probable, most likely.
5. Definite, impact will occur regardless of any prevention measure.

Additional to the aforementioned criteria, there is also mention of the **Reversibility** of an impact and the risk of **Irreplaceable loss of resources**:

**Reversibility**:

1. Low – Irreversible.
2. Medium – Reversible but with human intervention.
3. High – Completely reversible.

**Irreplaceable loss of resources**:

1. High – No potential for replacing a particularly vulnerable resource that will be impacted.
2. Medium – Resource can be replaced with human intervention.
3. Low – No irreplaceable resource will be impacted.

The significance of the impact is determined by plotting the severity of the impact and the sensitivity of the receptors on a matrix.

| | | Impact severity | | | | |
|---|---|---|---|---|---|---|
| Receptor sensitivity | | Very high | High | Medium | Low | Very low |
| | Very high | Substantial | Major | Major/Moderate | Moderate | Moderate/Minor |
| | High | Major | Major | Moderate | Moderate/Minor | Minor |
| | Medium | Major/Moderate | Moderate | Moderate/Minor | Minor | Minor/Negligible |
| | Low | Moderate | Moderate/Minor | Minor | Minor/Negligible | Negligible |
| | Very low | Moderate/Minor | Minor | Minor/Negligible | Negligible | Negligible/None |