VISUAL IMPACT ASSESSMENT REPORT FOR THE PROPOSED CONSTRUCTION OF THE 132kV CHICKADEE LOOP IN LOOP OUT POWER LINE BETWEEN THE EXISTING SPECULATE / GROOTLAAGTE 132KV LINE AND THE REABETSWE TRACTION SUBSTATION WITHIN THE STEVE TSHWETE LOCAL MUNICIPALITY, MPUMALANGA PROVINCE.

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Date of submission:
2018-10-18

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 two 132kV Chickadee loop in loop out powerline between the existing Speculate / Grootlaagte 132kV power line and the proposed Reabetswe 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.

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.

RECEIVING ENVIRONMENT

The regional topography consists predominantly of undulating plains that slopes evenly towards streams and pans. A general slope gradient falls towards the west. The project site is located on an evenly sloped plain that allows for open panoramic views in all directions.

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.

The site is located near a coal depot situated next to a railway line, approximately 3 km north of the Arnot Power Station. Cultivated fields surround the site with a coal silo and conveyor belt system noticeable to the west of the site. A dense stand of Wattle trees is present south of the site which screens most of the views from the south.

No community or residents are located within a 1 km radius from the site and the only observers that may be affected are farmers attending to their fields. The site is secluded and far from public roads and towns.

The Speculate / Grootlaagte 132kV power line runs parallel to the railway line past the proposed Reabetswe Traction Substation. A series of other transmission lines are visible on the north-eastern periphery of the project area and south of the railway line. The extensive electrical network contributes to a baseline environment where electrical infrastructure is common and in some cases dominant. It contrasts with the prevailing agricultural land use and causes corridors of parallel running power lines which converge at the power stations.

PROJECT DESCRIPTION

The proposed project is the development of two 132kV Chickadee loop in loop out powerline between the existing Speculate / Grootlaagte 132kV power line and the proposed Reabetswe Traction Substation. 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.

Two alternatives have been proposed:

- The client's preferred route is a short 2x loop in loop out power line that exits the Reabetswe Substation on the eastern side and immediately turns north to join the existing Speculate / Grootlaagte 132kV power line. The entire line will not be longer than 50m and is considered a small addition to the existing electrical network and receiving environment.
- The proposed alternative is a 2x loop in loop out power line also exiting the Reabetswe Substation on the eastern side but immediately turning south over the railway line. From here it turns west for approximately 300m before turning north and joining the Speculate / Grootlaagte 132kV power line via another 150m section. The entire line is approximately 500m in length. (The Reabetswe Substation is not yet constructed but is already approved by another application)

The client's preferred route may only require 2 sets of towers with the conductors connecting to the Speculate / Grootlaagte 132kV. Very little disturbance is expected for the construction of the loop in loop out lines, but damage to the vegetation can be expected due to the activities of the workforce. The alternative is a longer route and makes 3 directional changes. More towers can be expected with an increased disturbance footprint.

The client has proposed steel monopoles imbedded in a concrete footing. The height of the poles 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's why the distinction is made.

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 Reabetswe Traction Substation and the existing Speculate/Grootlaagte 132kV power line due to the movement of the technical team and the operation of construction equipment. These activities will negatively impact on the attributes of the landscape as it will remove or damage elements that partially contribute to the prevailing character of the landscape. 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 very small addition to the visual environment which is already impacted by existing power line infrastructure. The loop-in, loop-out power line will be 50m and 500m for the client's preferred and alternative route, respectively, and will cause a small visual change. No sensitive observers are located within the ZMVE and viewer incidence is expected to be insignificant. The impact on the landscape character is considered minimal with no significant disruption or intrusion caused by the proposed project.

VISUAL IMPACTS SIGNIFICANCE SUMMARY

	Receptor	Sensitivity of receptors	Severity of Impact without mitigation	Severity of Impact with mitigation	Significance of Impact without mitigation	Significance of Impact with mitigation
CONSTRUCTION PHASE						
Client's preferred route	OB	Low	Low 4	Low 2	Minor / Negligible	Minor / Negligible
Client's preferred route	LC	Low	Low 6	Low 4	Minor / Negligible	Minor / Negligible
Alternative route	OB	Low	Low 6	Low 4	Minor / Negligible	Minor / Negligible
Alternative route	LC	Low	Low 10	Low 8	Minor / Negligible	Minor / Negligible
OPERATIONAL PHASE						
Client's preferred route	OB	Low	Low 5	Low 3	Minor / Negligible	Minor / Negligible
Client's preferred route	LC	Low	Low 5	Low 3	Minor / Negligible	Minor / Negligible
Alternative route	OB	Low	Low 7	Low 5	Minor / Negligible	Minor / Negligible
Alternative route	LC	Low	Low 7	Low 5	Minor / Negligible	Minor / Negligible

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 with the client's preferred-, and alternative route, varying between 50m and 500m, respectively. This translates into low impact severities due to relatively small disturbance footprints and a small change to the status quo scenario. The receptors have low sensitivities and minor to negligible significant impacts are expected.

The client's preferred route is the most preferred option with the lowest impact significance. This is due to its very short distance of 50m. The alternative route is the least preferred option as it is a much longer route (500m) and will have a larger disturbance footprint and cause a larger intrusion on the landscape character. No sensitive observers are located within the ZMVE of 1 km in both cases.

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. Although the construction phase may cause a more severe impact, the impact is considered short term.

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

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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 two 132kV Chickadee loop in loop out powerline between the existing Speculate / Grootlaagte 132kV power line and the proposed Reabetswe Traction Substation within the Steve Tshwete Local Municipality in the Mpumalanga Province.

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2 OBJECTIVES AND METHODOLOGY

Part of developing an appropriate study methodology is to understand a suitable scale of assessment. Generally, 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 possibly 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.

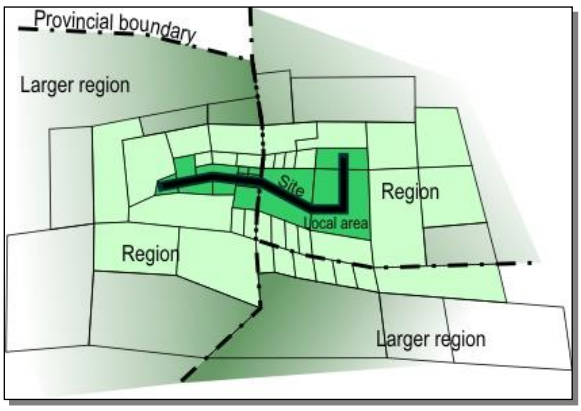


Figure 1: Scale of assessment

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 small physical dimensions 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.

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.

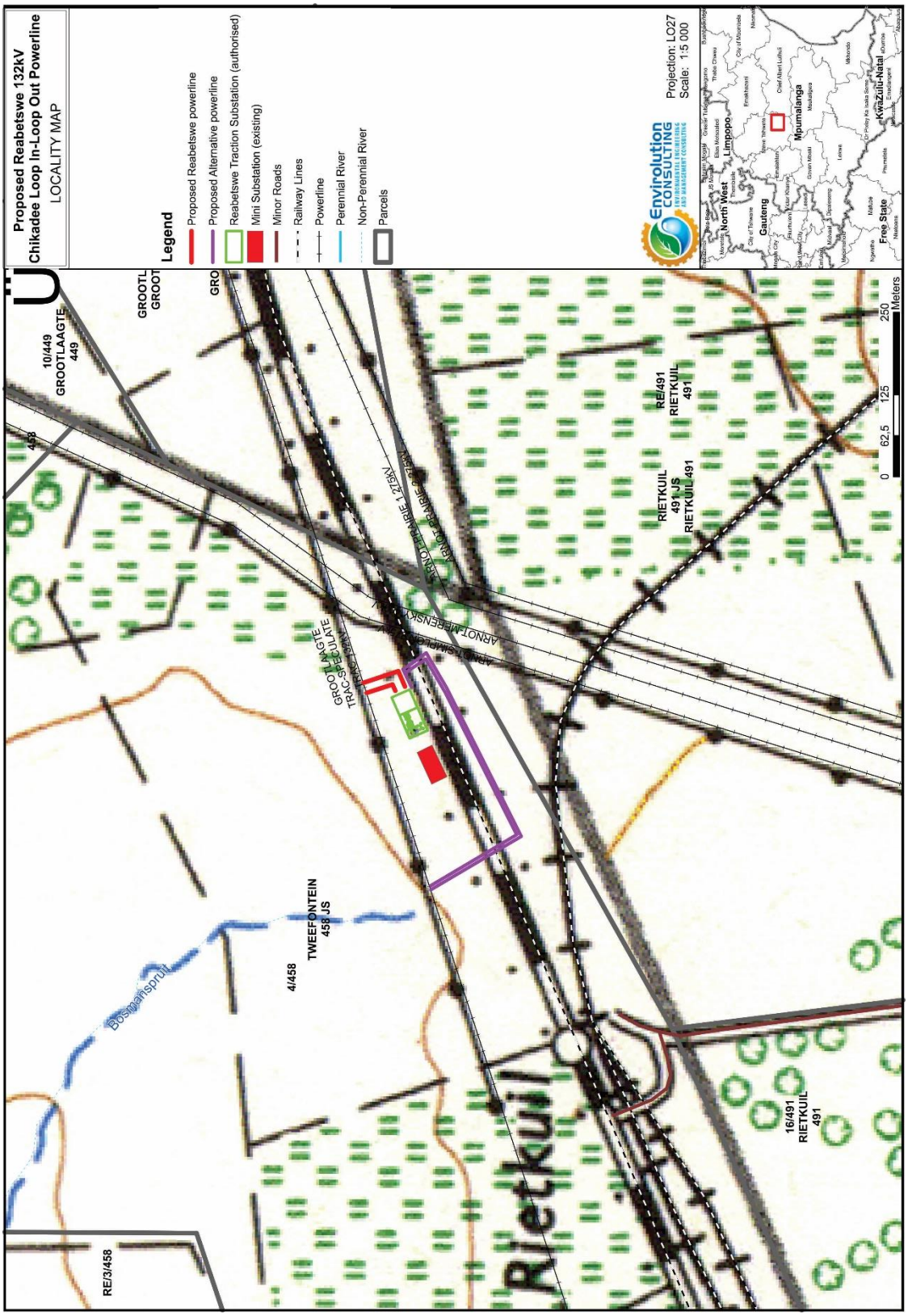


Figure 2: Locality Map

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. A general slope gradient falls towards the west. The project site is located on an evenly sloped plain that allows for open panoramic views in all directions. The coal depot towards the south east of the Reabetswe Substation site, consists of large coal stockpiles, waiting to be transported.

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 dense clusters between the open fields.

Mining has also transformed the natural landscape in the region. Large open cast coal mines are present in several locations and is easily identified by the large overburden- and black coal stockpiles next to it. These feeds the several power stations on the Highveld.

The site is located near a coal depot situated next to a railway line, approximately 3 km north of the Arnot Power Station. Cultivated fields surround the site with a coal silo and conveyor belt system noticeable to the west of the site. A dense stand of Wattle trees is present south of the site which screens most of the views from the south.

No community or residents are located within a 1 km radius from the site and the only observers that may be affected are farmers attending to their fields. The site is secluded and far from public roads and towns.

4.3 EXISTING ELECTRICITY NETWORK

The Speculate / Grootlaagte 132kV power line runs parallel to the railway line past the proposed Reabetswe Traction Substation. A series of other transmission lines are visible on the north-eastern periphery of the project area and south of the railway line. The extensive electrical network contributes to a baseline environment where electrical infrastructure is common and in some cases dominant. It contrasts with the prevailing agricultural land use and causes corridors of parallel running power lines which converge at the power stations.

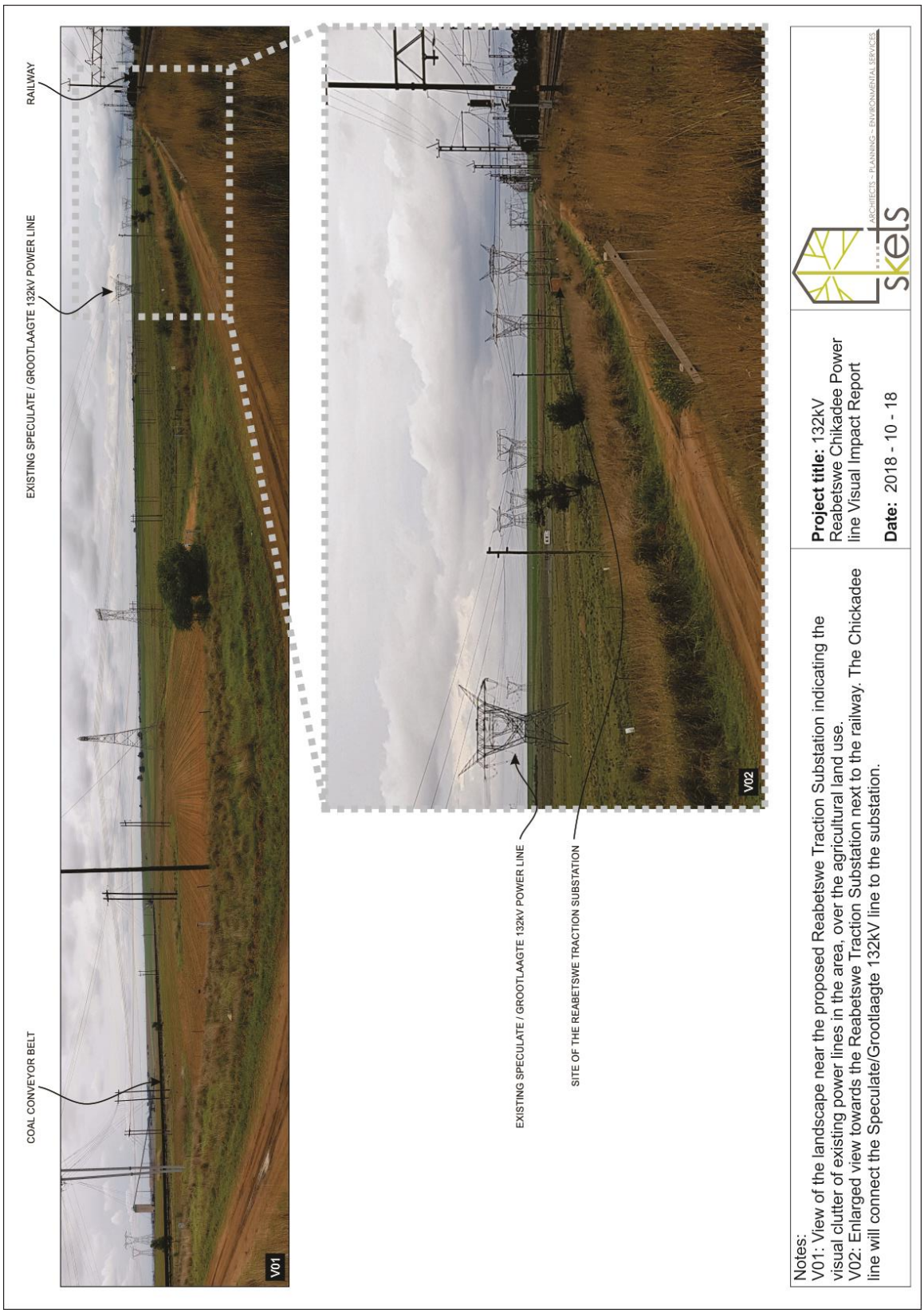


Figure 3: Site context

5 PROJECT DESCRIPTION

The proposed project is the development of two 132kV Chickadee loop in loop out powerline between the existing Speculate / Grootlaagte 132kV power line and the proposed Reabetswe Traction Substation. 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.

Two alternatives have been proposed:

- The client's preferred route is a short 2x loop in loop out power line that exits the Reabetswe Substation on the eastern side and immediately turns north to join the existing Speculate / Grootlaagte 132kV power line. The entire line will not be longer than 50m and is considered a small addition to the existing electrical network and receiving environment.
- The proposed alternative is a 2x loop in loop out power line also exiting the Reabetswe Substation on the eastern side but immediately turning south over the railway line. From here it turns west for approximately 300m before turning north and joining the Speculate / Grootlaagte 132kV power line via another 150m section. The entire line is approximately 500m in length. (The Reabetswe Substation is not yet constructed but is already approved by another application)

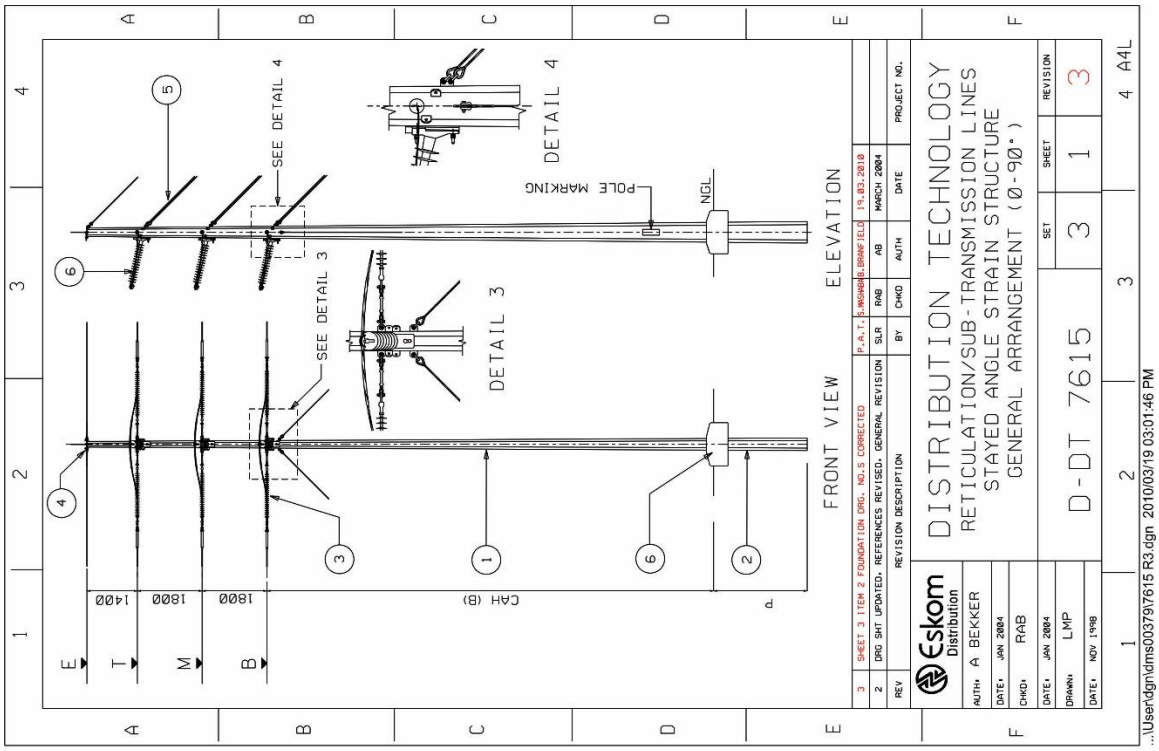
The client's preferred route may only require 2 sets of towers with the conductors connecting to the Speculate / Grootlaagte 132kV. Very little disturbance is expected for the construction of the loop in loop out lines, but damage to the vegetation can be expected due to the activities of the workforce. The alternative is a longer route and makes 3 directional changes. More towers can be expected with an increased disturbance footprint.

The exact locations of construction camps and material stockyards have not been determined yet, but it can be assumed to be next to, or inside the boundaries of the substation. A construction camp is usually a cleared and fenced area where temporary site offices and construction materials are stockpiled are located. 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.

The most visible elements of a power line are the towers/pylons. The towers/pylons carry the conductors and are fixed to the towers via the insulators which are also 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 poles 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.



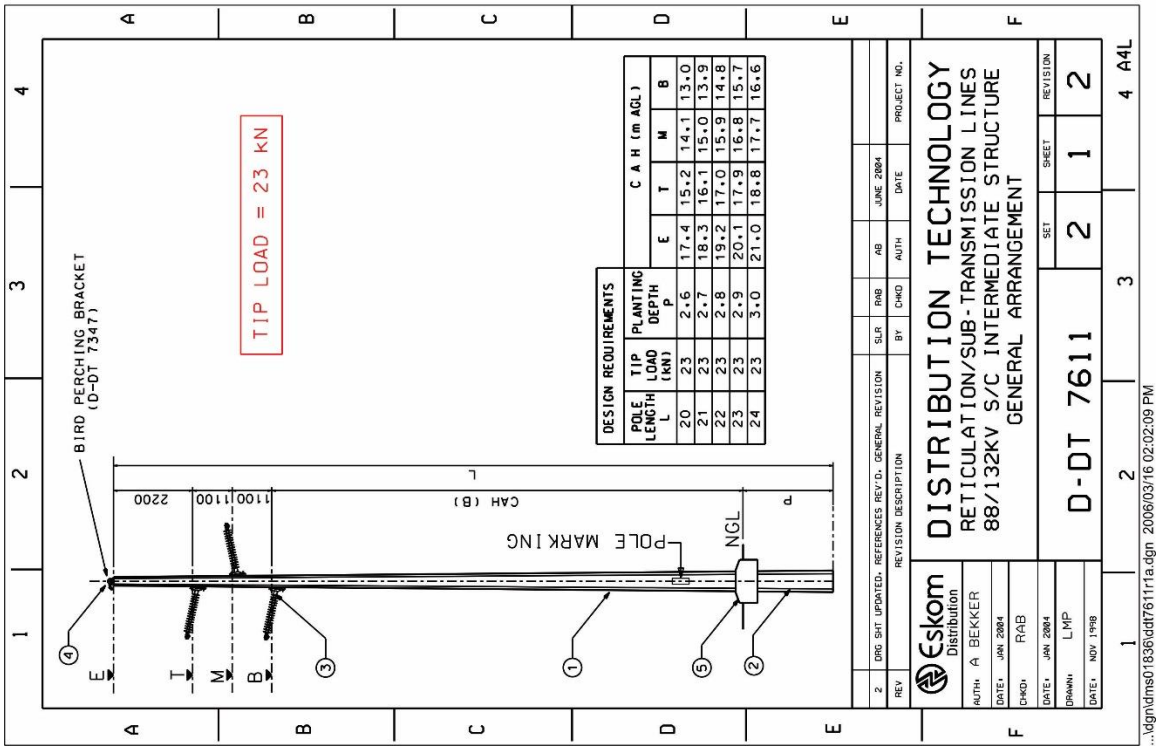


Figure 4: Proposed pylon

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.

Typical visual impacts that may be expected as a result of the construction and operation of the proposed project are:

- 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

Very few observers will be impacted by the proposed project due to its secluded location. It is far from any public roads or residents and no sensitive observers are located within the ZMVE. The only potential observers are the farmer or farm workers that attend to their fields near the proposed site. They are expected to have a brief exposure to the impacts and are considered to have a low sensitivity. The viewer incidence is expected to be very low

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 is expected to have a low sensitivity due to the existing electrical infrastructure. The baseline condition already features numerous power lines and railways near the coal depot which cause localised change in land use and landscape character in an otherwise prevailing rural landscape character. The introduction of the proposed project is not expected to dramatically change the landscape character is it will be absorbed into the network of electrical infrastructure due to its relatively small scale.

6.2 VISUAL IMPACT SEVERITY ASSESSMENT

Table 1: Visual Impact Severity – Client's preferred route

Client's preferred route - 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 Reabetswe Traction Substation and the existing Speculate/Grootlaagte 132kV power line due to the movement of the technical team and the operation of construction equipment. These activities will negatively impact on the attributes of the landscape as it will remove or damage elements that partially contribute to the prevailing character of the landscape. 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	*Improbable*	2	Improbable	2
Duration	OB	Short term	2	Very short duration	1
	LC	*Short term*	2	*Very short duration*	1
Extent	OB	Local area	2	Contained on site	1
	LC	*Contained on site*	1	*Contained on site*	1
Magnitude	OB	Small	0	Small	0
	LC	*Small*	0	*Small*	0
Severity	OB	**Low**	**4**	**Low**	**2**
	LC	***Low***	**6**	***Low***	**4**
Status	OB	Negative		Negative	
	LC	*Negative*		*Negative*	
Operational phase					
Nature of impact: A new loop-in, loop-out power line is considered a very small addition to the visual environment which is already impacted by existing power line infrastructure. The loop-in, loop-out power line will not be longer than 50m and will cause a very small visual change. No sensitive observers are located within the ZMVE and viewer incidence is expected to be insignificant. The impact on the landscape character is considered minimal with no significant disruption or intrusion caused by the proposed project.					
Probability	OB	Very Improbable	1	Very Improbable	1
	LC	*Very Improbable*	1	*Very Improbable*	1
Duration	OB	Long term	4	Short term	2
	LC	*Long term*	4	*Short term*	2
Extent	OB	Contained on site	1	Contained on site	1

	LC	*Contained on site*	1	*Contained on site*	1
Magnitude	OB	Small	0	Small	0
	LC	*Small*	0	*Small*	0
Severity	OB	**Low**	**5**	**Low**	**3**
	LC	***Low***	**5**	***Low***	**3**
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: Yes, refer to Section 7					
Cumulative impacts: A medium risk of cumulative impacts can be expected due to the presence of existing power lines and the soon-to-be constructed Reabetswe Traction Substation in the study area. The Chickadee line is however considered a relatively small addition and will add minimally to the existing visual "weight" of the electrical infrastructure.					
Residual Risks: Residual risks will occur as the visibility of the new power lines cannot be effectively reduced unless underground cables are considered.					

Table 2: Visual Impact Severity – Alternative route

Alternative route - 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 Reabetswe Traction Substation and the existing Speculate/Grootlaagte 132kV power line due to the movement of the technical team and the operation of construction equipment. These activities will negatively impact on the attributes of the landscape as it will remove or damage elements that partially contribute to the prevailing character of the landscape. 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	*Improbable*	2	Improbable	2

Duration	OB	Short term	2	Very short duration	1
	LC	*Short term*	2	*Very short duration*	1
Extent	OB	Local area	2	Contained on site	1
	LC	*Contained on site*	1	*Contained on site*	1
Magnitude	OB	Minor	2	Minor	2
	LC	*Minor*	2	*Minor*	2
Severity	OB	**Low**	**6**	**Low**	**4**
	LC	***Low***	**10**	***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 small addition to the visual environment which is already impacted by existing power line infrastructure. The loop-in, loop-out power line will be approximately 500m and will cause a small but noticeably visual change. No sensitive observers are located within the ZMVE and viewer incidence is expected to be insignificant. The impact on the landscape character is considered minimal as the proposed line remains within an area that is dominated by other power lines and railway infrastructure.					
Probability	OB	Very Improbable	1	Very Improbable	1
	LC	*Very Improbable*	1	*Very Improbable*	1
Duration	OB	Long term	4	Short term	2
	LC	*Long term*	4	*Short term*	2
Extent	OB	Contained on site	1	Contained on site	1
	LC	*Contained on site*	1	*Contained on site*	1
Magnitude	OB	Minor	2	Minor	2
	LC	*Minor*	2	*Minor*	2
Severity	OB	**Low**	**7**	**Low**	**5**
	LC	***Low***	**7**	***Low***	**5**
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: Yes, refer to Section 7					

Cumulative impacts: A medium risk of cumulative impacts can be expected due to the presence of existing power lines and the soon-to-be constructed Reabetswe Traction Substation in the study area. The Chickadee line is however considered a relatively small addition and will add minimally to the existing visual "weight" of the electrical infrastructure.
Residual Risks: Residual risks will occur as the visibility of the new power lines cannot be effectively reduced unless underground cables are considered.

6.3 VISUAL IMPACT SIGNIFICANCE SUMMARY

	Receptor	Sensitivity of receptors	Severity of Impact without mitigation	Severity of Impact with mitigation	Significance of Impact without mitigation	Significance of Impact with mitigation
CONSTRUCTION PHASE						
Client's preferred route	OB	Low	Low 4	Low 2	Minor / Negligible	Minor / Negligible
Client's preferred route	LC	Low	Low 6	Low 4	Minor / Negligible	Minor / Negligible
Alternative route	OB	Low	Low 6	Low 4	Minor / Negligible	Minor / Negligible
Alternative route	LC	Low	Low 10	Low 8	Minor / Negligible	Minor / Negligible
OPERATIONAL PHASE						
Client's preferred route	OB	Low	Low 5	Low 3	Minor / Negligible	Minor / Negligible
Client's preferred route	LC	Low	Low 5	Low 3	Minor / Negligible	Minor / Negligible
Alternative route	OB	Low	Low 7	Low 5	Minor / Negligible	Minor / Negligible
Alternative route	LC	Low	Low 7	Low 5	Minor / Negligible	Minor / Negligible

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. A thorough assessment of alternatives can yield the greatest results in limiting visual impact. The proposed alignment is already the shortest route and the only other alternative that can be considered is an underground cable. Although excavation 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;

7.2 CONSTRUCTION PHASE

As a 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 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 with the client's preferred-, and alternative route, varying between 50m and 500m, respectively. This translates into low impact severities due to relatively small disturbance footprints and a small change to the status quo scenario. The receptors have low sensitivities and minor to negligible significant impacts are expected.

The client's preferred route is the most preferred option with the lowest impact significance. This is due to its very short distance of 50m. The alternative route is the least preferred option as it is a much longer route (500m) and will have a larger disturbance footprint and cause a larger intrusion on the landscape character. No sensitive observers are located within the ZMVE of 1 km in both cases.

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. Although the construction phase may cause a more severe impact, the impact is considered short term.

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.

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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