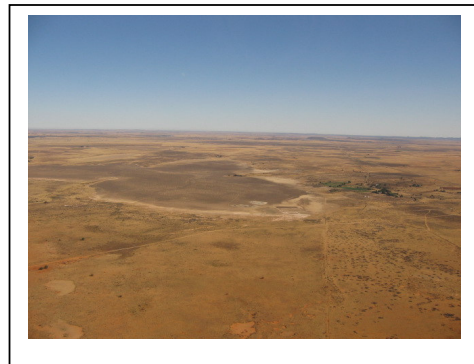


**ENVIRONMENTAL IMPACT ASSESSMENT FOR THE
PROPOSED PERSEUS-HYDRA 765kV
TRANSMISSION POWER LINE**

**VISUAL IMPACT ASSESSMENT OF FOUR
ALTERNATIVE ROUTES**

FINAL REPORT



Visual Impact Assessment Study

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July 2006

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Perseus-Hydra 765 kV Transmission Power Line
Visual Impact Assessment of Four Route
Alternatives

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EXECUTIVE SUMMARY

Eskom intends to construct a new 765 kV transmission line from the Perseus Substation near Dealesville (approximately 70 km north-west of Bloemfontein) to the Hydra Substation at De Aar. The towers are a new design of the kite form and are approximately 45 m high and are stabilised by four guy cables. This transmission line forms part of the Cape Strengthening Project.

This report evaluates four alternative routes selected during a 4-day site visit of the environmental project team.

Risk sources of the visual intrusion of the proposed transmission line in the landscape are identified. These relate primarily to the increase in visual intrusion, which may result from the practical and cost elements to keep the line / route as straight as possible.

Each alternative route is discussed and rated according to the visual criteria of visibility from roads and the general surrounding landscape, the possible visual intrusion on landscape character and sense of place, the visual association with existing transmission lines and the view obstruction of homesteads.

Each alternative is assessed according to an intensity and significance rating for each criterion. The alternative route, which has the lowest rating, is recommended as the one with the perceived lesser visual impact.

Mitigation measures are proposed and the conclusion drawn is that the Western Alternative Route will have the least visual impact.

The dilemma of placing a new route close to existing lines, or well away from these, in order to reduce the visual intrusion intensity, however remains.

The additional two link transmission lines between Perseus and Beta and Perseus and the existing 765 kV line were assessed. The former has a visual impact due to association with the existing parallel 400 kV line while the latter alignment has been recommended to skirt the existing pans to the west.

The new 765 kV route to continue southward (i.e. not to link to Hydra Substation near De Aar) has been assessed and the recommendation is to bypass De Aar on the east.

The expansion of Perseus Substation is recommended to be towards the west.

VISUAL IMPACT ASSESSMENT FOR THE PROPOSED PERSEUS- HYDRA 765kV TRANSMISSION POWER LINE

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1 INTRODUCTION

1.1 Background

Eskom Holdings Limited (Eskom) intends to construct a 765 kV overhead transmission line from Perseus Substation near Dealesville (Refer to **Figure 1: Locality Plan**) to Hydra Substation near De Aar. In addition two new short 12 km 765 kV transmission lines is planned to link the Perseus and Beta Substation and a 40 km 765 kV line from Perseus to connect to the existing 765 kV line.

This transmission line forms part of Eskom's upgrading of electricity supply to the Cape.

In accordance with the requirements of Section 22 of the Environmental Conservation Act 73 of 1989. The new power line falls into the category 1(a) of Schedule 1 of R1182 due to its scale, extent and expected general impact on the natural and social environments.

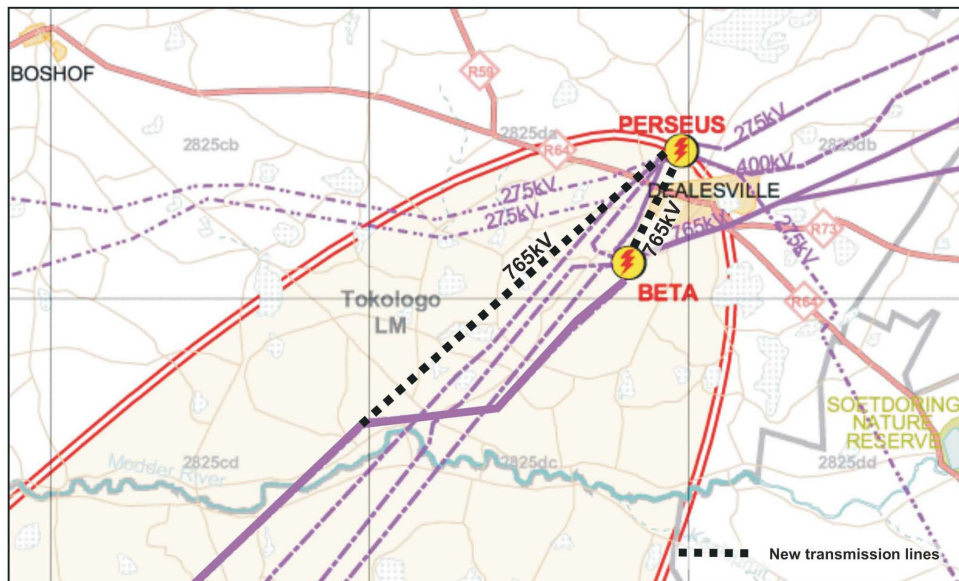
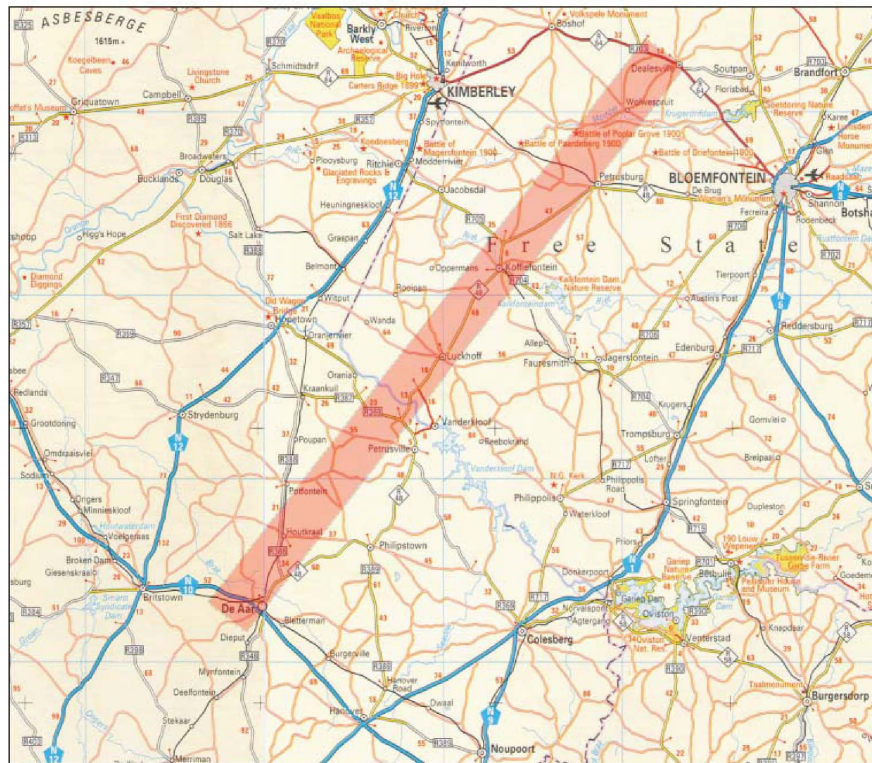
This visual impact study forms part of the Environmental Impact Assessment Report as required by the Act and which will be produced by ARGUS GIBB, the principal environmental consultants on the project.

1.1.1 Power line Route Alternatives

This report's function is to identify from a visual impact perspective a preferred power line route out of 4 alternative routes. The alternative routes, shown on **Figure 2: The Route Alternatives** are the result of an assessment of all the inputs received from the specialists and collated by Arcus Gibb.

The selected routes include the following visual constraints and requirements:

- Existing four major transmission line routes exists between the Perseus and Hydra Substations. The new line will have to be either west or east of these.
- The western area within the field of study was chosen from a visual perspective above the eastern area due to the extent of visually sensitive areas. These include conservation areas – some associated with major dams and the extensive cultivated and irrigated farmland. Refer to **Figure 3: Visual Sensitive Areas**.
- The slightly raised and varied landform created by the presence of dolerite sills, dykes which have eroded to form platforms, ridges and koppies to the west of the existing line routes provided greater visual diversity. These assist in reducing the visual impact of a linear structure in a predominantly flat landscape.
- The requirement that the transmission line route should have minimal changes in direction.



Locality Plan

Figure 1



The alternative route corridors are described as the Central Corridor (blue), the Western Corridor (red), the Eastern Corridor (yellow) and the 200 m Corridor distant but parallel to the existing 765 kV line (green) in reference to the 3 separate new corridors hence the east, central and western name.

1.1.2 The Visual Impact Assessment in Context

The size of the transmission line tower (51m high) and the length of the route (256 km) as well as the 12 km Perseus-Beta route and the 40 km 765 links will significantly alter the visual character and quality of the landscape over which it traverses. Refer to **Figure 4: Transmission Tower Form**.

The visual impact study is intended to assess the extent of the visual intrusion of the 4 routes on the existing landscape and to identify a preferred route alternative that will have the least visual impact. In addition, visual impact mitigation guidelines will be presented.

1.2 Study Approach

This report is the final assessment of the four routes selected following the Scoping Phase of the Environmental Assessment Process.

1.2.1 The Study Approach and Method

An overall impression of the terrain through which the proposed transmission routes will pass, was gained during the site visit of August 2005. The second site visit in May / June 2006 focused on the more precise alignments and their relationship to landform, land use and visibility from homesteads and provincial road crossing points.

Maps of land cover, topography and cadastral boundaries as well as homesteads were used to correlate visual and mapped features. Using the information gained from the aerial view and car traverses of the area four alternative routes were placed on the plan.

The view shed, the area within which the proposed transmission line can be visible, was determined using digital topographic maps analysed by the Geographic Information System (GIS), algorithms available in the Arcview Software Suite.

The locality of homesteads was identified from 1:50 000 digital maps and overlaid onto the view shed and base data.

The visual impact of each line's corridor (500 m wide) was assessed and rated according to accepted norms that relate to intensity, extent and significance of the visual impact.

1.2.2 Assumptions made regarding the Route's Corridors

The study area is approximately 70 km wide within which four major transmissions lines (3 x 400 kV and 1 x 765 kV) have already been constructed. Refer to **Figure 2: Route Corridors**.

The land use and natural features of the study area were assessed and the decision was made to investigate only the area west of the existing lines. The reasons for this decision are:

- There are significant physical obstacles present in the eastern area such as major dams, conservation areas, extensive irrigated areas and more diverse topography.
- The eastern area is more scenic than the western side due to a more varied topography.
- The eastern area landscape was likely to be viewed and appreciated by a greater number of landowners and tourists.
- The western area was less intensely utilised and occupied.

1.2.3 Limitations of this Study

The purpose of this visual impact assessment study is to identify a preferred alternative route after the visual impact of each alternative route has been assessed.

The position of important or key viewpoints such as farmsteads, tourist lodges and private conservancies have been plotted from 1:50 000 topocadastral maps but have not been checked on site. The 'ground truthing' of this information would have been prohibitively time consuming.

2 DESCRIPTION OF AFFECTED ENVIRONMENT

The extent of the visual impact of linear structures will depend on the following characteristics of the receiving environment:

- Topography: varied or uniform and open, i.e. plains or closed hilly view sheds
- Vegetation cover: grassland, savanna, forest
- Land use: pasture, irrigated land, agricultural holdings, suburban conservation areas
- Landscape diversity: a combination of the above
- Landscape character: sense of place, scenic quality

The study area is broadly divided into two sections. These are the plains containing irrigated and dryland farms together with salt pans north of the Orange River and the predominantly pasture grasslands amongst varied small plateaux and koppies of the dolerite intrusives south of the Orange River.

2.1 Topography

The northern area is characterised by flat open plains that contain a number of salt pans. The soils are commercially cultivated either as dryland or by irrigation. The pans align generally north-south along ancient drainage lines.

Implications for the Project

The open flat landscape with minor vertical relief will allow any high structure to be silhouetted above the horizon. Only distant views of the transmission line will mitigate its visibility in this flat landscape. Align transmission line upslope and away from pans to keep the view along the pan alignments open.

The southern area is characterised by open grassland plains with the vertical relief of plateaux and koppies formed by dolerite intrusions. The soils are predominantly shallow and are used as natural grassland pasture.

Implications for the Project

Align the route on the mid-slope between the plains and the plateaux and koppies. This will provide a backdrop at lengths along the line that will reduce the horizon being broken by the transmission towers. This is effective particularly at a distance of 2 km and more (observation on site).

2.2 Vegetation

The northern area is a patch work of cultivated land and natural grassland. Few trees are present and if so they are clustered on rocky outcrops or along drainage lines.

Implications for the Project

The grassland affords little variation in height over the plains to make any difference to the visibility of the tall rows of transmissions towers.

The southern area is predominantly grassland with natural fynbos on the slope of koppies and plateaux.

Implications for the Project

The grassland provides little variation to materially affect the visibility of the transmission lines.

2.3 Land Use

The northern area comprises predominantly of cultivated dryland and irrigated farmland.

The southern area is predominantly natural pasture grazing for sheep and cattle.

Implications for the Project

The visibility of the transmissions towers will be much more significant in the northern area due to the intense farming activities and the cultivated lands. These monocultures of vegetation are geometric in shape and line.

To the south of the Orange River the visibility will be less due to the large areas of natural grassland pasture and the associated reduced density of farming activities and farmsteads.

2.4 Landscape Diversity

The diversity of the northern area is influenced by the land use patterns of cultivation rather than any topographical features. This pattern is made up of the cultivated lands and natural veld areas, which are interspersed with the shallow salt pans. This pattern of diversity is significantly altered by the dense irrigated lands in the immediate surroundings of the Modder and Riet Rivers, which flow east to west across the area.

Implications for the Project

The landform patterns in a predominantly flat landscape are only appreciated when viewed from above. The visual mitigation of the transmission lines is not significantly affected by the landscape diversity where topographical relief is present in the form of plateaux and koppies.

The diversity of the southern area is dominated by the topography of the plateaux and koppies. The land use diversity is restricted to natural areas of pasture and patches of thicket bush, and high fynbos.

Implications for the Project

As for the northern area the pattern only becomes apparent when viewed from above. The generally low vegetation height offers little visual mitigation but the raised dolerite based landforms can provide transmission tower silhouette reducing backdrops when viewed from ground level.

2.5 Landscape Character

The northern half of the study area (between the Riet River and Modderspruit) has an agricultural character as a result of the dryland and irrigated lands. This character is significantly negatively modified by the four existing transmission lines which all fall within a 10 km wide corridor midway between the eastern and western boundary of the study area.

Implications for the Project

The option to add another transmission line to the concentration of existing lines or to move the new line well to the west of these to reduce the repeated visual intrusion experienced, as one travels east-west across the area, needs to be carefully considered.

The southern half of the western study area (Riet River to De Aar) has a more natural grassland character as a result of the predominant pastoral land use. The more varied landform of plateaux and koppies adds to the natural character of this section.

Implications for the Project

The visual change to a relatively natural scenic landscape by a new transmission requires consideration.

3 IDENTIFICATION OF RISK SOURCES

The following general risks are associated with the visual intrusion in the landscape and therefore apply to the four route corridors. These may result if the urge to keep the line as straight as possible persists.

- The obscuring of views from existing farm houses.
- The provision of views along the transmission line from existing roads. This will magnify the visual intrusion of the line in the landscape.
- The degradation of areas of particular visual character e.g. salt pans, if the line is placed too close by.
- The exposure of the entire silhouette of the transmission tower by crossing plateaux or ridges. Refer to Chapter 5: General Mitigation Measures.
- The compromising of views from lodges or the ambience of natural areas or game farms that are in the planning stage but unknown to the assessment team. The visual impact can only be evaluated on existing land use.

4 THE VISUAL ASSESSMENT

An assessment of the wider visual issues will be described for each route corridor. The description of the visual impacts of the phases of erection and decommissioning will not be presented since these are not considered as significant visual impacts since the period of activity is of short duration and of a primary impact (localised, of short duration and is easily mitigated at the end of the phase) and the fact that rehabilitation is undertaken of disturbed areas, e.g. camps / lay down areas.

It is the operational phase that presents the most significant long term visual impact. This is due primarily to the scale, form and number of the transmission towers. Refer to **Figure 4: Typical Transmission Line Towers** and to a lesser extent the transmission cables. Views of the towers and line recede at distances perpendicular to the line.

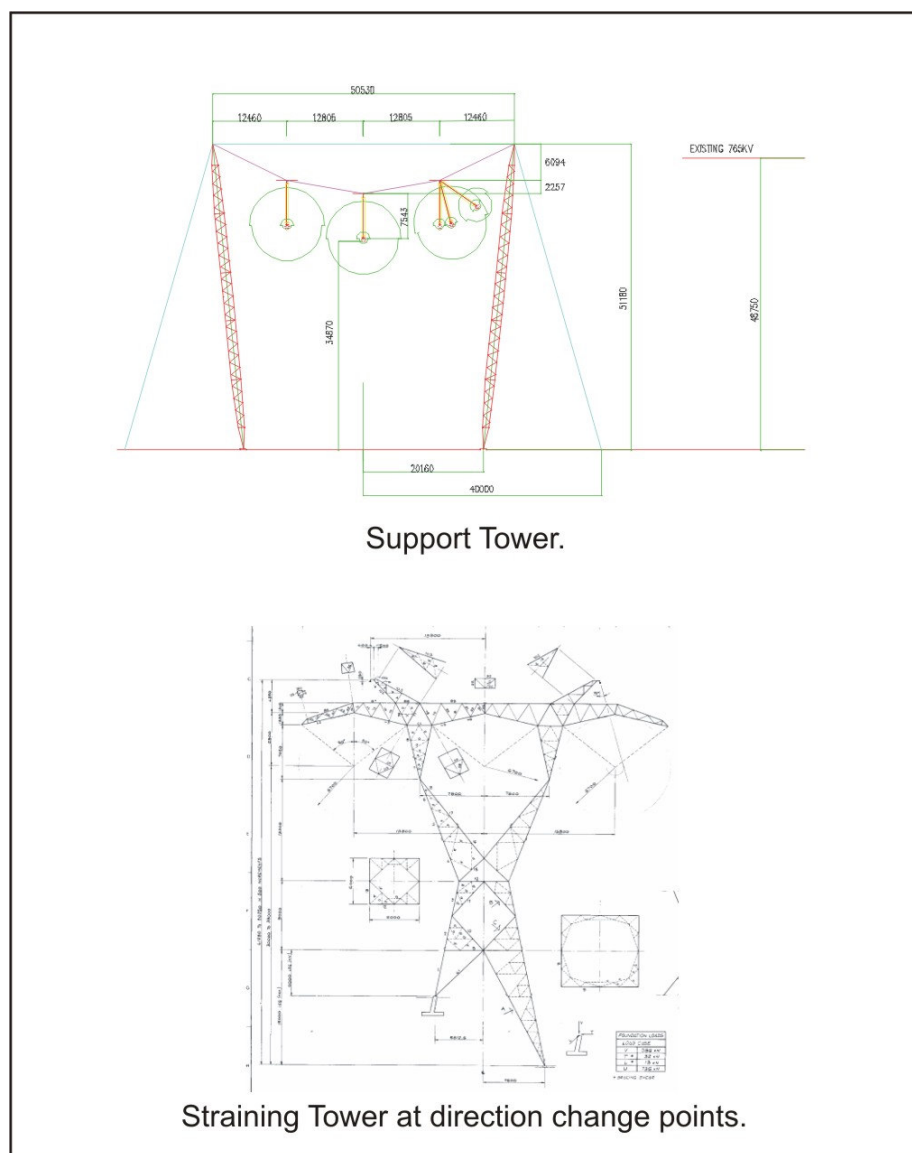


Figure 4: Typical Transmission Line Towers

Apart from the physical structure of the towers and the cables there are the ancillary requirements to ensure maintenance of uninterrupted electricity transmission. These include access roads, cleared servitudes and substations. These have greater visual intrusions in the landscape the more vegetated and hilly the terrain. This is due to the need to remove vegetation and cut roads.

This route will traverse a flat landform and therefore the extent of servitude clearance of tall vegetation is not a significant visual impact element and therefore is not addressed in detail. The substations Perseus, Beta and Hydra exist and therefore comment on their visual intrusion will not form part of this report.

The visual impact assessment will be evaluated against the following standard criteria:

Nature of the Impact

The nature of the impact is classified as positive (beneficial) or negative (detrimental). This appraisal categorises the overall perceived effect the activity will have on the affected environment. This description includes what is being affected and to what extent.

Extent

Extent indicates whether the effect of the activity would be limited to the site and/or its immediate surroundings:

- Local – extending into adjoining properties;
- Regional – impact within the local physical region;
- National – Provincial / National impact.

Duration

- Short term – 0 to 1½ year-construction phase;
- Medium term – 1½ to 3 years: stabilisation period for the operational phase;
- Long term – cessation of impact after the operational life of the activity;
- Permanent – where mitigation, either by natural process or by human intervention, would not occur in such a way or within such a time span that environmental impact could be considered transient.

Probability

The likelihood of the impact actually occurring indicated as:

- Improbable – very low likelihood for the impact to occur due to design or historic experience;
- Probable – distinct likelihood for the impact to occur;
- Highly probable – most likely for the impact to occur;
- Definite – impact will occur regardless of any prevention or mitigation measures.

Intensity

The degree or intensity to which the impact would affect the environment:

- Low – where the impact affects the natural, cultural or social environment in such a way these functions and processes are not affected;
- Medium – where the impact affects the natural, cultural or social environment in such a way that these functions and processes continue in a modified positive or negative way;
- High – where the impact affects the natural, cultural or social environment in such a way that these functions and processes temporarily or permanently cease (negative) or change / improve (positive).

Significance

Impact significance is determined through a synthesis of the aspects produced in terms of their nature, extent, duration, intensity and probability and are described as:

- Negligible – where the impact will not have an effect on the activity, people or environment;
- Low – where the impact will not have an influence on the decision of the activity;
- Medium – where the impact should have an influence on the decision unless it is mitigated;
- High – where the impact will influence the decision regardless of any possible mitigation;
- Uncertain – cannot be ascertained due to lack of information or knowledge or subjectivity.

As a result of the transmission tower's scale and the great distance that it will be routed over the landscape, the first four criteria will apply to each route alternative and therefore need not be repeated. One statement will be made regarding these criteria. The varying visual impact of each line route alternative will however vary when evaluated against the criteria of intensity of visual impact and the significance of the impact.

An example is the situation along the route where the route follows a fairly narrow undisturbed valley between two flat topped landforms. The visual impact's intensity is **low** since it cannot be seen from surrounding areas. The towers have the hillsides as a backdrop and therefore blend into the valley texture. The significance, however, is **high** within the context of the scenic value of the pristine valley because the sense of place and the character of the valley are severely compromised.

The converse is also true in that a high visual intensity impact can have a low significance. The visual impact assessment of the route alternatives will therefore be based on the criteria of intensity and significance relative to land use and the nearness to important viewpoints.

The general assessment of the common visual impact criteria for each line:

Nature of the visual impact:

Negative – the 51 m high towers are highly visible in the flat and generally featureless landscape of irrigated and dryland fields and grassland pasture.

It is important to note that the supporting transmission tower to be used has less of a visual impact in the landscape than the “kite” type although it is 6 m taller.

The reason for this is that the density of form is less as a result less steel is used and the three cable support is a cable and not a frame as with the “kite” type.

This design has a considerable effect of reducing the visual impact in a landscape as the viewing distance increases. This can be attributed to the “density of form” being less than the “kite” type of transmission tower.

Extent of the visual impact:

The visual impact is experienced locally and regionally as a result of the length of the transmission line and its scale.

Duration of the visual impact:

The visual impact will persist until the line is decommissioned and removed. The impact will be experienced over the long term, > 15 – 25 years.

Probability of the impact occurring: The visual impact will definitely be experienced.

Table 1a: Visual Assessment Criteria - Intensity

Visual Assessment Criteria	Intensity Rating		
	High	Medium	Low
Visibility from existing major roads (N8, R48, R705, R639, R369)	Highly visible due to alignment with road and within 1 km	Partially visible due to roads approximately 2 km from line	Low visibility due to line being > 3 km from road
Visibility from general surrounding landscape	Not obscured by natural landform	Partially obscured by landform	Mostly obscured by surrounding landform
Visual intrusion on landscape character and sense of place	Dominates sense of place	Partially influences sense of place	Has little effect on sense of place
Visual association with existing transmission lines to the east	Existing lines are easily visible from proposed corridor (within 2 km)	Existing lines are partially visible from proposed corridor (>2-<5 km)	Existing lines are barely noticeable (>6 km) from the proposed corridor.
Visibility from homesteads	Highly visible. Dominates view within 500 m	Visible but does not dominate view within range 500 m – 1 000 m	Visible but are not obviously noticeable in the view > 1 000 m

Table 1b: Visual Assessment Criteria - Significance

Visual Assessment Criteria	Significance Rating		
	High	Medium	Low
Visibility from existing major roads (N8, R48, R705, R639, R369)	Obstructs particularly scenic views by being close to road and at an oblique angle	Particularly interferes with scenic views from the road	Transmission line is too far from the road to obstruct scenic views
Visibility from general surrounding landscape	Compromises particularly scenic distant views of the landscapes	Particularly noticeable in scenic landscapes	Hardly noticeable in scenic landscapes
Visual intrusion on landscape character and sense of place	Traverses proclaimed conservation and wilderness areas or passes within 500 m of a natural feature e.g. pans	Passes particularly scenic landscape features e.g. pans, undisturbed valleys; homestead within 1 000 m	Passes built up areas which exhibit an industrial character; is less visible, homestead greater than 1 500 m away
Visual association with existing transmission lines to the east	Where the line, in particular the towers, are within 200 m from existing lines. The closeness adds the visual intrusion of the lines in the landscape	Where the line and towers are within 1 000 m from existing lines. At this distance the joint visual intrusion is diminished	Where the line and towers are further than 2 500 m from existing transmission lines. The visual intrusion is not associated with the other line
Visibility from homesteads	Where the homestead is used as a tourism enterprise and/or the line obstructs scenic distant views by being within 500 m of the homestead	Where the homestead is used as a tourism enterprise and/or the line obstructs scenic distant views by being within 1 000 m of the homestead	Where the homestead is used as a tourism enterprise and/or the line obstructs scenic distant views by being within 1 000 m to 2 000 m of the homestead

4.1 The Common Alignment – 40 km south-west from Perseus Substation

4.1.1 Visibility

The transmission line's alignment is direct to the connecting point on the existing transmission line. Refer to **Figure 1**.

The alignment has been influenced by the need to make the crossover of the two existing 275 kV lines as short as possible.

The landform over which the above route alignment will cross is almost flat and contains a number of large to medium sized pans. The surrounding vegetation is natural grassland.

- Visibility from Existing Main Roads

The transmission line will cross the R64 west of an existing 400 kV line and east of an existing 275 kV line. The visibility to motorists of the new line will be at its maximum at this point with reduced visibility as the transmission towers increase in distance southward from the road.

This crossing presents a **high** intensity of visual impact condition to the most number of persons. A number of farm access roads are also crossed.

The significance rating is **medium** since the view is partly obscured for a limited time as the road user passes through the view cone.

- Visibility from General Surrounding Landscape

The flat partially concave landform where the pans have formed in places, presents the lines and more dominantly the towers above the horizon. The visibility therefore is considered to be high. The 51 m high towers will dominate views of the landscape when they are within 500 m of the viewpoint.

The significance is **medium** as the line and towers are noticeable in the open grassland landscape.

4.1.2 Visual Intrusion on Landscape Character and Sense of Place

The open natural grassland and pans present different characters during the dry winter and the wet summer. The tranquil and visually interesting combination has an undisturbed natural grassland character.

The intensity of the visual impact of the line and towers in this landscape is considered **high** since they will dominate the grassland and pan setting.

As the proposed route passes close to existing pans the significance of the intensity is considered to be **medium**.

4.1.3 Visual Association with Existing Transmission Lines

There are three existing lines, an almost parallel 400 kV to the east of the proposed alignment and two 275 kV lines; one which is parallel for a short distance north of the R64 and one which crosses the proposed route south-west to north-east approximately 5 km south of Perseus Substation.

The visual impact intensity rating is **high** in this area as all the lines converge on the substation. Further southwards the route is approximately 5 km west of the 400 kV line. There is no visual association with the existing 400 kV line and therefore the intensity of the visual impact is not reinforced. The rating is therefore considered to be **low** due to the distance. As the line is within 1 km of the existing lines the existing significance rating is **medium**.

4.1.4 Intrusion of Homesteads' View Outward

There are three houses within 500 m, three within 500-1 000 m and four within 1 000-2 000 m of the proposed line.

The intensity is considered to be **high** as one third (3) of the houses along the section are within 500 m of the line.

The significance rating is **high**.

4.1.5 Visual Impact Mitigation

The preferred alignment of the 40 km 765 kV line is along the western edge of the existing pans. The route to the east of the pans will be close to the existing 400 kV line.

4.2 Perseus-Beta 765 kV line – 12 km

4.2.1 Visibility

The transmission line's alignment is 200 metres east of the existing 400 kV line route. Refer to Figure 1.

The landform slopes gently to the south and the land use / cover is natural grassland with indigenous tree groupings.

- Visibility from Existing Major Roads

The transmission line will cross the R64 and a farm road at approximately 90° and will be most visible at these points. The line will be more visible to the north of the road since the landform rises. To the south of the road the visibility fades relatively rapidly as the line follows the southward sloping land profile to Beta Substation approximately 7 kilometres to the south from that road crossing point. The line is highly visible as it crosses the road west of Dealesville and is therefore considered to have a **high** visual intensity at the crossing.

The significance is considered **low** since the route crosses the R64 near existing transmission lines between Perseus en Beta and partially interferes with views of the area.

- Visibility from the General Surrounding Landscape

The flat to gently south sloping landform between the two substations (Perseus being on the higher ground) does present the line and towers above the horizon and therefore its visibility is considered **high**. The 45 m towers will dominate views within 500 m of them in the landscape.

The surrounding landscape has existing transmission lines nearby and therefore the significance of the visibility is considered to be **low**.

4.2.2 Visual Intrusion on Landscape Character and Sense of Place

The landscape character is predominantly natural grassland with tree groups along the full distance of the line link. The intensity of the visual impact on the landscape character is **high** since the new line will dominate the grassland setting.

The visual intrusion intensity is considered **high** due to the scale of the towers (51 m) in the flat grassland dominated landscape. The line is not obscured by any landform or vegetation.

The significance of the visual intrusion on the character and sense of place is considered to be **low** as existing transmission lines are visible relatively nearby and present an industrial character to that section of the link route.

4.2.3 Visual Association with Existing Transmission Lines

The existing 400 kV line from Perseus to Beta will contribute to the overall visual impact when the 765 kV line is located 200 metres to the east of it. The visual intensity rating is **high** since the existing line is visible from the proposed new line (i.e. within 2 km).

The significance of the association with existing lines is considered **high** in that the nearness will increase the visual impact since the existing visibility will be increased by having the larger 765 kV line and the 400 kV line parallel and converging on the Perseus Substation.

4.2.4 Visual Impact Mitigation

There are no realistic mitigation options available to reduce the visual impact of this short section of line. It is best to keep the line straight from Perseus to Beta to avoid the use of the bulky self-supporting straining tower at direction change points. The presence of existing lines nearby have already established a visual intrusion on the local landscape.

4.3 Centre Route (Blue) – approximately 5 km westward of the existing 765 kV Transmission Line (Refer to Figure 5a)

4.3.1 Visibility

- Visibility from Existing Roads

Most of the major roads convey traffic in an east-west direction and the visual experience of the transmission line is reduced because the intersection of the line and the road is at approximately right angles. The visual intrusion of the line will be the highest at these points of intersection.

The greater distance (approximately 10 km) from the R48 between Koffiefontein and Van der Kloof reduces the possible visibility of the proposed line. The rated intensity of visibility from roads is judged as **low** for this section.

Similarly the section Van der Kloof to De Aar is also judged as having a **low** intensity of visibility from major north-south routes as a result of the viewing distance being greater than 10 km. However, the crossing of the R48 near the junction with the R388 near De Aar will result in a **high** intensity rating of visibility.

The significance of the visibility from existing main roads for the entire route is considered **low** due to the distance from them. Where the line crosses near the R48-R388 junction the significance is also considered **low** since the crossover presents the line for a short duration to the road users.

- **Visibility from the General Surrounding Landscape**

The visibility condition for this route in the section Perseus to Koffiefontein also traverses the flat, agricultural landscape of cultivated land and a relatively dense rural population. It is therefore not obscured by natural raised landforms. Its intensity of visibility in the landscape is judged as **high**.

The visibility in the section Koffiefontein to the Orange River is slightly reduced as the landform becomes interspersed with low plateaux and koppies. Still further south from the Orange River to De Aar the visibility is further reduced as a result of the increase in the number of plateaux and koppies. The intensity of visibility rating for these two sections is judged to be **medium** for the section Koffiefontein to De Aar.

The significance of the visibility over the route section Perseus to Koffiefontein is considered **medium** since the area has been modified by cultivated lands and is particularly noticeable by contrast in that scenic landscape.

The significance of the line's visibility over the route sections Koffiefontein to the Orange River and from the Orange River to De Aar is considered **low** since the landscape profile / topography assists in reducing the visibility.

4.3.2 Visual Intrusion on Landscape Character and Sense of Place

The route section Perseus to Koffiefontein is primarily an agricultural landscape with cultivated dryland and irrigated fields. The flatness of the landform combined with the vertical scale of the transmission tower (51 m) does dominate the sense of place within a distance of 500 m either side of the servitude. This detracts from the sense of place and is judged as having a **high** intensity of visual impact.

The route section from Koffiefontein to the Orange River traverses an area of large salt pans which have a particular visual value apart from other attributes. The route passes close-by two pans and over irrigated cultivated land near Luckhoff in the Oppermans area. This visual intrusion on a land type that has a particular quality is judged as having a **high** intensity.

The route section Orange River to De Aar is characterised by more frequently occurring plateaux and koppies in a natural veld plain. The scale of the landform assists in reducing the visual dominance of the towers by providing a backdrop from time to time along the route length. The visual intrusion for this section is judged to be **medium**.

The significance of the visual intrusion on landscape character and sense of place is considered to be **medium** for Perseus to Koffiefontein due to the cultivated lands which have other structures such as centre pivot irrigation systems.

For the section Koffiefontein to the Orange River the significance is considered **high** due to the presence of large pans between Koffiefontein and Luckhoff and the stream that crosses the R369 west of Van der Kloof.

From the Orange River to De Aar the significance is ranked as **low** due to the more varied topography and the line is less visible.

4.3.3 Visual Association with Existing Transmission Lines to the East

The approximate 10 km distance from the existing 765 kV line and the intervening landforms renders the nearest existing line not noticeable over the whole length. The intensity of visual association with the existing transmission lines is judged as **low**.

The significance is considered to be **low** due to the distance of the existing lines from this route.

4.3.4 Intrusion of Homesteads' View Outward (Refer to Figure 6a&b)

The section Perseus to Koffiefontein has the highest number of mapped homesteads.

Even although it is logical to presume the view from the homestead will be north-east to north-west, this has not been considered. The outdoor living areas will alter with season and vista, therefore only the closeness of the homestead has been used as the criteria for evaluation.

The visual impact is considered **high** for distances to the line from the homestead less than 500 m, **medium** for between 500 m and 1 000 m and **low** for 1 000 m to 2 000 m. Beyond 2 000 m the impact is **negligible**.

The number of homesteads within the 2 km range of the 765 kV transmission line has been counted for each of the 3 sections namely Perseus to Koffiefontein, Koffiefontein to Orange River and Orange River to De Aar.

The number of homesteads for each section is given as follows:

		<500 m H	>500 <1000 m M	>1000 <2000 m L
a.	Perseus to Koffiefontein	44	11	9
b.	Koffiefontein to Orange River	21	6	4
c.	Orange River to De Aar	14	3	6
		79	20	19
				40

The significance of the intrusion on homesteads' views is considered to be **high** for the section Perseus to Koffiefontein due to there being 11 (identified from 1:50 000 topocadastral maps) homesteads; for Koffiefontein to the Orange River and on to De Aar the significance rating is considered to be **medium** for both sections.

4.3.5 Visual Impact Mitigation

The suggested mitigation measures for each of the three route sectors are as follows:

Perseus to Koffiefontein:	Attempt to align the final route in such a way so as to minimise the view disruption of homesteads
Koffiefontein to Orange River:	Realign the line to the west of the pans and eastwards at the R369 to avoid the stream corridor. Refer to Figure 5a
Orange River to De Aar:	Realign the route to eliminate the “dog leg” near the hills north-west of De Aar

4.4 Western Route (Red) – Approximately 10 km West of the Existing 765 kV Transmission Line (Refer to Figure 5b)

4.4.1 Visibility

- Visibility from Existing Roads

The same description of visibility applies to this route as for the previous route assessment in that the greatest visibility on national and regional roads is at the crossing of the transmission line.

The visibility at road crossing of the R48 and R388 just north-west of De Aar increases this route's visibility. The R48 north of Van der Kloof and on to Koffiefontein is too far east to provide views of this route. The intensity of visibility of the proposed line route from roads is judged to be **medium** as a result of the R48 and R388 crossing.

The significance rating of the visibility from the major roads is considered to be **low** due to the distance from them.

- Visibility from the General Surrounding Landscape

The visibility condition is the same as that for the Central Route in the route section Perseus to Koffiefontein namely a flat landform of cultivated farmland and a denser population. This is judged as a **high** visual intensity. The visibility in the section Koffiefontein to the Orange River and on to De Aar is the same as that as described for the Central Route which has landform to backdrop views eastward to the line. The intensity of visibility is therefore judged as being **medium**.

The visibility from the surrounding landscape is considered to have a **medium** significance rating due to the already altered landscape caused by cultivation in the Perseus to Koffiefontein section and is particularly conspicuous by contrast.

The significance rating for Koffiefontein to Orange River and on to De Aar is given as **low** since the visibility is reduced by low landforms at intervals along the route.

4.4.2 Visual Intrusion on Landscape Character and Sense of Place

On the section Perseus to Koffiefontein the route traverses an area that is almost at the western limit of extensive agriculture zone and salt pans. The intrusion on the agricultural character of the area is less pronounced due to this. The intrusion on landscape character is judged to be **medium** for this section.

The section Koffiefontein to the Orange River conflicts less with the character of the four large salt pans midway in that the route skirts the western edge. For this reason the intensity of visual intrusion is judged as **medium** since the transmission line is judged to only partially influence the sense of place.

The route section Orange River to De Aar is similar to that as described for the Central Route (landform as view backdrop), and therefore the visual intrusion is judged also to be **medium**.

The significance of the visual intrusion is rated as **medium** for the Perseus to Koffiefontein section due to the scenic natural areas and away from visually sensitive areas eastwards; **medium** for the Koffiefontein to Orange River and on to De Aar as the line section covers wide extensive open grassland and the scale of intrusion is diminished.

4.4.3 Visual Association with Existing Transmission Lines to the East

This route is so far (10 km approximately) from the existing 765 kV line that the two cannot be seen from ground level due to distance and the intervening landforms.

Due to the distance of existing lines from the proposed route the significance is rated as **low** for all three sections.

4.4.4 Intrusion of Homesteads' View Outward (Refer to Figure 7a&b)

Views from farm homesteads provide one of the appealing aspects of the farming lifestyle. The house location is chosen with care. The alteration of these long and distant views that characterise the Free State's landscape cannot be treated as trivial in the route / corridor selection process.

The number of homesteads within 2 km of the line identified from the 1:50 000 topocadastral maps are fewer than for the Central Route. The numbers per section are as follows:

		<500 m H	>500 <1000 m M	>1000 <2000 m L
a.	Perseus to Koffiefontein	42	11	11
b.	Koffiefontein to Orange River	15	4	5
c.	Orange River to De Aar	17	5	7
		74	20	21
				33

The intrusion significance on homesteads' views outward within 2 km from the line is rated as being **medium** for all three route sections as the estimated number of

homesteads is around 15 for each section and that the distance is between 400 m and 1 000 m from the house.

4.4.5 Visual Impact Mitigation

Mitigation of the view obstruction from homesteads can be done at the detail layout stage when the line position can be negotiated with the landowner.

A reduction of visibility of the line can be achieved by considering a shift in alignment to the east to avoid high ground at the crossing of the R369.

Again just south the alignment could be adjusted slightly westward (refer to **Figure 5b**).

4.5 Eastern Route (Yellow) - 2 km west of the Existing 765 kV line. (Refer to Figure 5c)

4.5.1 Visibility

- Visibility from Existing Major Roads

The visibility of the transmission line is greatest at the road crossings and will be the same for all the route alternatives. The long term visibility is associated with near parallel alignments with roads. The greater the distance from the road reduces the visibility.

This alternative route is approximately between 10 km west of the critical section of the R48, i.e. between Van der Kloof and Koffiefontein. The intensity of the visibility is therefore **low**, i.e. greater than 5 km away.

The significance of the visibility from approximately parallel road is rated as **low** since the line will be generally further than 10 km from the R48, the north-south road.

- Visibility from the General Surrounding Landscape

The section of the line between Perseus and Koffiefontein passes through a flat landscape of cultivated land and a denser rural population relative to the sections between Koffiefontein and De Aar. The proposed Alternative Eastern route will therefore have a **high** intensity of visibility between Perseus and Koffiefontein.

The section from Koffiefontein to De Aar has a more varied landform, which is the result of the dolerite intrusives that form the low plateaux and koppies. These landforms will assist in partially obscuring the transmission line. This section is rated as having a **medium** intensity visibility rating.

The significance of the visual intensity is considered to be **medium** for the Perseus to Koffiefontein section due to the scenic cultivated land and the visibility to a higher density of rural population.

For the sections Koffiefontein to De Aar the significance is rated as **low** since the line will be hardly noticeable in the open extensive landscape.

4.5.2 Visual Intrusion on Landscape Character and Sense of Place

The route section Perseus to Koffiefontein is primarily an agricultural landscape with cultivated dryland and irrigated fields. The flatness of the landform combined with the vertical scale of the transmission tower (51 m) does dominate and detract from the sense of place within a distance of 500 m either side of the servitude.

The intensity of visual intrusion is therefore judged to be **high** because of the relatively intense cultivation of the central portion of the Perseus to Koffiefontein section.

The intensity of the route section Koffiefontein to Orange River is considered **high** since the line passes close to and through a number of large pans. The section Orange River to De Aar is predominantly natural grassland and some flat topped hills which reduce the visual intensity to **medium** since it partially influences the sense of place and character.

The significance rating is considered to be **medium** since it passes through intensely cultivated / irrigated land along the Perseus to Koffiefontein section, particularly in the northern part. The remainder of the route is also rated as **medium** as the landscape character changes to natural grassland with koppies.

4.5.3 Visual Association with Existing Transmission Lines

The nearest and largest of the existing transmission lines is the 765 kV. This line is approximately 2 km to the east of this route. Due to the flat landscape in the Perseus to Koffiefontein section this line is partially visible. This section is rated as having a **medium** intensity visual association with the existing lines.

This 2 km distance of this route and the existing line continues all the way along the section Koffiefontein to De Aar. The intensity of visual association of this alternative route with the existing lines is rated as **medium** since the distance is approximately 5 km from the nearest line.

The significance of the entire route is considered to be **low** since the joint visual intensity is diminished by the distance from each line.

4.5.4 Intrusion of Homesteads' View Outward (Refer to Figures 8a&b)

The section Perseus to Koffiefontein has the highest number of mapped homesteads.

The visual impact is considered **high** for distances to the line from the homestead less than 500 m, **medium** for between 500 m and 1 000 m and **low** for 1 000 m to 2 000 m. Beyond 2 000 m the impact is **negligible**.

The number of homesteads within the 2 km range of the 765 kV transmission line has been counted for each of the 3 sections namely Perseus to Koffiefontein, Koffiefontein to Orange River and Orange River to De Aar.

The number of homesteads for each section is given as follows:

		<500 m H	>500 <1000 m M	>1000 <2000 m L
a.	Perseus to Koffiefontein	34	14	8
b.	Koffiefontein to Orange River	15	2	7
c.	Orange River to De Aar	10	3	2
		59	19	17
				23

The general significance of the intrusion on homesteads' views is considered to be **medium** for the Perseus to Koffiefontein section and **low** for the remainder of the route. This is due to the low number of homesteads within the 2 km zone.

4.5.5 Visual Impact Mitigation

Apart from the detailed negotiations regarding the placement of towers with landowners, a single realignment is necessary to remove the high visual impact on an undisturbed valley.

The realignment is approximately midway between De Aar and the Orange River. The realignment is shown on **Figure 5c** where the line is moved out of the 5 km long valley and taken to the western side of the flat topped hill.

4.6 200 m West of Existing 765 kV line. (Refer to Figure 5c)

In terms of the scale between this alternative and the other three the alignment can, from a visual assessment viewpoint, be identical to the present alignment of the existing 765 kV transmission line only magnified in intensity.

4.6.1 Visibility

- Visibility from Existing Major Roads

The majority of the major roads convey traffic in an east-west direction and the visual experience of the transmission line is reduced because the intersection of the line and the road is at approximately right angles. The visual intrusion of the two lines being so close together will be the highest of the four alternatives at these points of intersection.

With respect to the R48 which has an approximate north-south alignment the "double" line will have a high visibility between Van der Kloof and Koffiefontein. The R48 between De Aar and Van der Kloof is not influenced by the new route except at the crossing point immediately due north of De Aar.

Due to the nearness of this alternative alignment to the existing 765 kV line thereby presenting a bulkier visual image in the view from the road the intensity rating is given as **high**.

The significance rating is considered to be **high** at the major road crossings, namely the R64, N8, R70, R369 and R48 where the closeness to the existing 765 kV line dominates the view on approaching them.

- Visibility from General Surrounding Landscape

The proximity of this alternative to the existing 765 kV line has the effect of making the two lines more visible in the landscape. Whether the combined visibility is obscured by natural landforms or not the visual bulking will increase the visibility and therefore the intensity rating is given as **high**.

The significance rating is considered to be **high** since the lines will compromise distant views of the landscape.

4.6.2 Visual Intrusion on Landscape Character and Sense of Place

The existing 765 kV line has already intruded visually on the landscape character of its corridor. The additional visual intrusion of Existing Route will not double the significance of the intrusion but may quadruple its intrusion. On this basis the visual intrusion intensity rating on landscape character and sense of place is given as **high**.

The significance is considered to be **medium** since it passes along the whole length through scenic landscapes and intensely cultivated land.

4.6.3 Visual Association with Existing Transmission Lines to the East

The existing transmission lines are visually associated by being close and relatively close to the proposed alignment. The intensity rating is therefore **high**.

The significance is considered to be **high** along the whole length of the line due to the expanded visual impact intensity of the lines being so close together.

4.6.4 Intrusion of Homesteads' View Outward (Refer to Figures 9a&b)

The section Perseus to Koffiefontein has the highest number of mapped homesteads.

The visual impact is considered **high** for distances to the line from the homestead less than 500 m, **medium** for between 500 m and 1 000 m and **low** for 1 000 m to 2 000 m. Beyond 2 000 m the impact is **negligible**.

The number of homesteads within the 2 km range of the 765 kV transmission line has been counted for each of the 3 sections namely Perseus to Koffiefontein, Koffiefontein to Orange River and Orange River to De Aar.

The number of homesteads for each section is given as follows:

		<500 m H	>500 <1000 m M	>1000 <2000 m L
a.	Perseus to Koffiefontein	32	9	5
b.	Koffiefontein to Orange River	19	5	6

c.	Orange River to De Aar	13	0	3	10
		64	14	14	36

The general significance of the intrusion on homesteads' views is considered to be **high** primarily as a result of the two 765 kV lines being so close together.

4.6.5 Visual Impact Mitigation

There are no effective visual mitigation measures that can be implemented, apart from minor positioning of transmission towers to minimise view impacts from homesteads.

Due to the closeness of the two lines (new and existing) visual impacts at some locations will be significant due to the sheer scale of the towers.

4.7 The Transmission Route to Bypass Hydra Substation

There are two options namely east or west of De Aar.

4.7.1 East of De Aar

This area has not yet been established as suburbs although it is clearly within the municipal boundary.

Existing line converges on Hydra Substation which is situated approximately 5 km due to east of the towns built area at present.

The landscape is flat and the area's character has already been significantly visually altered by the existing lines. However, due to the undeveloped nature of grasslands and the distant backdrop of the hills further eastward the visual impact of these lines as well as a new line is reduced.

4.7.2 West of De Aar

There is a narrow corridor between the western edge of the town and the hill which could accommodate a new route.

This option will have a greater visual impact because the line will be closer to the town and to the southern entry road off the N 10

In addition, the crossing of existing lines which are aligned east-west just south of the N 10 will require crossing. This will increase the visual impact of all lines at that point.

4.7.3 Visual Impact Mitigation

The visual impact of the Hydra Station bypass will be reduced if the transmission line is routed to the east of De Aar and just west of the existing 765 kV line.

4.8 The Expansion of Perseus Substation

The land use surrounding the substation is maize fields to the west and grasslands to the south and east.

The landform gently slopes to the south-west but this is hardly noticeable and no topographic features restrict expansion on the east, south and west.

However, expansion is only likely to be east or west due to the existing lines that enter and leave on the northern and southern side respectively. The configuration of the substation layout appears to leave only the west side available for expansion.

The visual impact of this expansion will on marginally increase the extent and the intensity of the visual impact. This visual impact is only really experienced from the road that gives access to the substation on the north side.

Table 2: Summary of Visual Criteria Rating for Four Alternative Transmission Route Alignments

	INTENSITY AND SIGNIFICANCE RATING OF THE ALTERNATIVE ROUTES							
	Central		Western		Eastern		200 m	
	I	S	I	S	I	S	I	S
1. Visibility								
• From existing roads N8, R48, R705, R639, R369								
Section a: Perseus Substation to Koffiefontein	L	L	M	L	L	L	H	H
Section b: Koffiefontein to Orange River	L	L	M	L	L	L	H	H
Section c: Orange River / Van der Kloof to De Aar	L	L	M	L	L	L	H	H
• From the general surrounding landscape								
Section a: Perseus Substation to Koffiefontein	H	M	H	M	H	M	H	H
Section b: Koffiefontein to Orange River	M	L	M	L	M	L	H	H
Section c: Orange River / Van der Kloof to De Aar	M	L	M	L	M	L	H	H
2. Visual Intrusion on landscape character and sense of place								
Section a: Perseus Substation to Koffiefontein	H	M	M	M	H	M	H	M
Section b: Koffiefontein to Orange River	H	H	M	M	H	M	H	M
Section c: Orange River / Van der Kloof to De Aar	M	L	M	M	M	M	H	M
3. Visual association with existing transmission lines to the east								
Section a: Perseus Substation to Koffiefontein	L	L	L	L	M	L	H	H
Section b: Koffiefontein to Orange River	L	L	L	L	M	L	H	H
Section c: Orange River / Van der Kloof to De Aar	L	L	L	L	M	L	H	H
4. Intrusion on homestead's views outward								
Section a: Perseus Substation to Koffiefontein	44	H	42	M	34	M	32	H
Section b: Koffiefontein to Orange River	21	M	15	M	15	L	19	H
Section c: Orange River / Van der Kloof to De Aar	14	M	17	M	10	L	13	H
	<u>79</u>		<u>74</u>		<u>59</u>		<u>64</u>	
RANKING ON INTENSITY AND SIGNIFICANCE	2	2	1	1	3	3	4	4

Table 3: Summary of Homestead View Intrusion by Transmission Line and Ranking Based on Intensity of View Intrusion.

CENTRAL ROUTE	Homesteads	No	Weight	Weighted value	Dealesville – Koffiefontein	Koffiefontein – Orange River	Van Der Kloof – De Aar
	Within 500m	20	3	60	11	6	3
	Within 1000m	19	2	38	9	4	6
	Within 2000m	40	1	40	24	11	5
	Total	79		138	44	21	14
	Visual obstruction	57% Ranking 3					
WESTERN ROUTE	Within 500m	20	3	60	11	4	5
	Within 1000m	21	2	42	11	5	5
	Within 2000m	33	1	33	20	6	7
	Total	74		135	42	15	17
	Visual obstruction	55% Ranking 2					
EASTERN ROUTE	Within 500m	19	3	57	14	2	3
	Within 1000m	17	2	34	8	7	2
	Within 2000m	23	1	23	12	6	5
	Total	59		114	34	15	10
	Visual obstruction	52% Ranking 1					
200m WEST OF EXISTING 765kV LINE	Within 500m	14	3	42	9	5	0
	Within 1000m	14	2	28	5	6	3
	Within 2000m	36	1	36	18	8	10
	Total	64		106	32	19	13
	Visual obstruction	60% Ranking 4					

4.8.1 Visual Impact Mitigation

There are not effective mitigation measures. This is due to the existing extent and scale of the station which has a significant visual impact. The station is not along a well travelled road and is some distance to the north of Dealesville.

4.9 View shed Analysis

A view shed analysis was run on the GIS programme Arcview with the parameters of the eye level at 1,5 m and the transmission tower at 51 m.

An area of 5 km on each side of the line was used as the view envelope since beyond this the transmission towers fade into the haze.

Given the flat terrain and the height of the tower the results show limited areas from where the towers cannot be seen.

In comparing the four corridors the Western Corridor (Red) has more areas from where it cannot be seen than the Central Corridor (Blue).

The Central Corridor has visually screened areas just north of the R704 between Koffiefontein and Ritchie and north-west of De Aar. They correspond to the presence of “koppies” and “platberge” in the area.

On the Western Corridor the areas from where the line is not visible are spread along most of the corridor with larger areas north of the Koffiefontein-Ritchie road and the area north of the Van der Kloof-Orania Road, the R639.

The Eastern Corridor shows the screened areas are between the Modder River and Koffiefontein and then again in the hilly section north-east of De Aar.

Visibility of the 200 m west of the 765 kV line Corridor is visible for almost its entire length except for an area around Koffiefontein and north-east of De Aar in the hilly section.

The number of homesteads within 2 km of the line is about the same as for the Eastern Route (59), Western Route (74), but substantially less than the Central Route (79) and the 200 m west of 765 kV Route (64).

The area north-west of De Aar is open and the line will be visible along most of its corridor here. The view shed map shows that in the area where the most homesteads are grouped, i.e. between Perseus-Koffiefontein and Koffiefontein-Orange River; there are limited areas from which the proposed transmission line cannot be seen.

The conclusion is drawn that the Western Corridor will generally be less visible than the Central, Eastern or the 200m West of the 765kV corridors.

5 RECOMMENDED MITIGATION MEASURES

5.1 General Mitigation Measures

The following general measures relate to the entire transmission route with relevance to the minimisation of the visual intrusion and impact on the existing receiving environment.

- Avoid selecting a route that will traverse the top of the plateau landforms.



- Avoid a route that will follow a narrow valley between plateaux or koppies



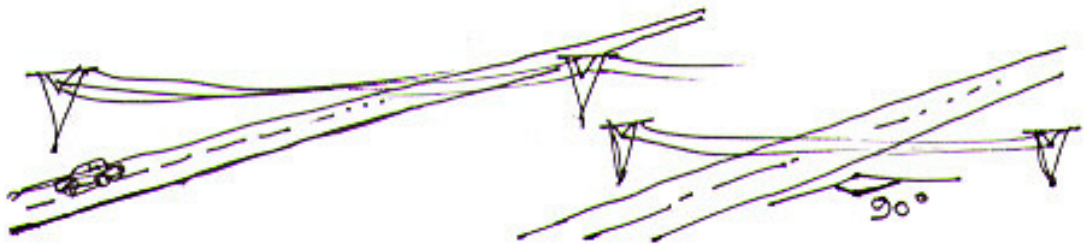
- Avoid a route that will dominate any farmsteads' view.



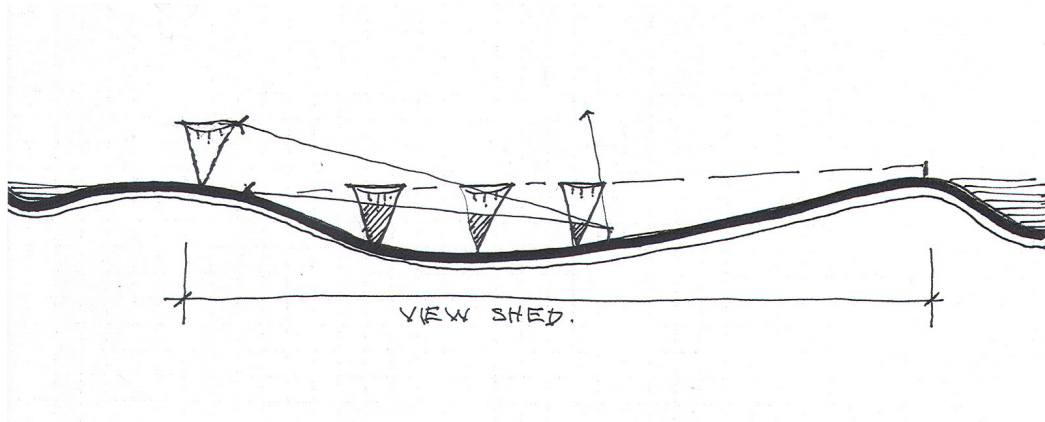
- Position the towers on a mid-slope of a landform that rises to a plateau and koppie so that the plateau or koppie will form a background to the line.



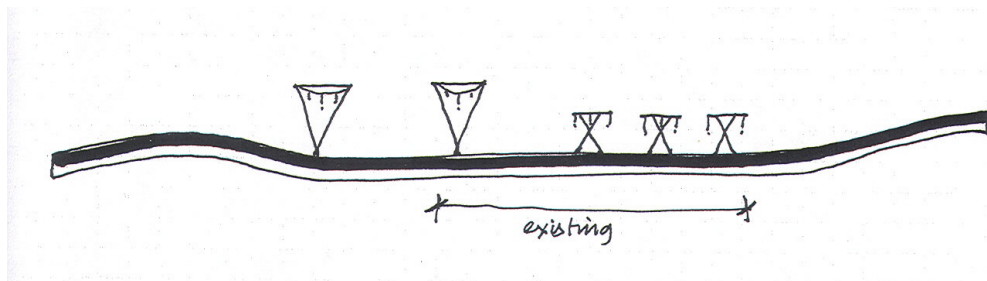
- Cross roads, rivers and streams at right angles to limit visual intrusion of the landscape by the line to road users.



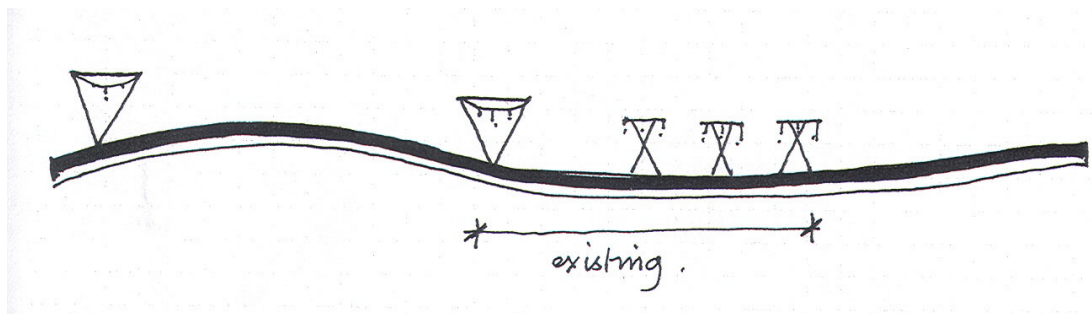
- When a new line runs parallel and close to an existing line place the transmission towers at the same spacing as the existing line where possible.



- Illustration of how view positions and topography affect intensity of visual impact.



- Adding a new transmission line to a number of existing lines significantly increases the visual impact of the whole.



- Moving the new transmission line away lessens the visual impact of the line relative to the existing ones.
- The grey colour of the galvanising on the transmission towers is suitably neutral and helps to blur the form against landscape and sky in that flat and generally featureless topography.

5.2 Specific Mitigation Measures

5.2.1 Central Corridor (Refer to Figure 5a)

The following suggested realignments of the corridor or line are made to reduce the visual impact:

- The corridor between Koffiefontein and Luckhoff

The shifting of the line westwards in order to avoid passing between two pans; and on the eastern edge of a third.
- The crossing of the R369 west of Van der Kloof

The current alignment is near or over a perennial river course. The movement of the “dog leg” to the east overcomes the visual interference with the stream and its valley and vegetation.
- Realignment midway between Van der Kloof and De Aar

The shifting of the corridor westwards and down slope will allow the line to be directed straight to the point on the “dog leg” and further away from the existing hills, a visual feature in that flat landscape.
- Align the final route to minimise view disruption from homesteads.

5.2.2 Western Corridor (Refer to Figure 5b)

- The crossing of the R369 west of Van der Kloof

The adjustment of the corridor eastwards to avoid taking the line over the low ridge.
- The crossover of the Central to Western Route

The crossover will avoid taking the transmission line over a low hill.
- Align the final route to minimise view disruption from homesteads.

5.2.3 Eastern Corridor (Refer to Figure 5c)

- Midway between Orange River and De Aar

Move the ‘dog leg’ to the west to avoid taking the line along the 5 km undisturbed valley between four flat topped hills.

5.2.4 200 m West of 765 kV line Corridor (Refer to Figure 5c)

- North of Modder River to Perseus

Align this short section (40 km) to the west side of the existing pans.

6 CONCLUSIONS AND RECOMMENDATIONS

The recommendation for the Perseus-Hydra routes is that the Western Route has less of a negative visual impact on the existing scenic quality, sense of place and views from homesteads than does the Central Route, Eastern or 200 m Corridor west of existing 765 kV line.

The conclusions and recommendations, where appropriate, are discussed for each sector of the report and the pertinent aspects at each are presented.

- Alternative Routes

- The corridor option for this new line should be west of the other existing transmission lines. This focuses the study zone to half of the original area proposed.
- The alternative routes, Central, Western, Eastern and 200 m west of the existing 765 kV line have been selected with a significant degree of attention to landform, land use and natural features, all of which contribute to the visual character and quality of the study area. The selection was the result of a scoping exercise which evaluated four selected routes.

- Study Method and Approach

The study method built upon the scoping report and used where relevant the assessment and findings of that study. These resulted in definite benefits for the visual impact assessment.

- Limitations of the Study

The information on the position of occupied homesteads was taken from 1:50 000 maps and may not present the current location. Tourist related lodges and environmental conservancies have not been identified although some may be planned.

The development of view shed models have contributed significantly to narrow the choice for the least visually intrusive transmission line route, however, at the scale of the mapping and given the low relief topography, their accuracy is broad.

- The Affected Environment

The landform and pattern of land use are the primary characteristics that influence the visual intrusion and impact of this transmission line route. The overall flatness of the landform in the northern section provides little opportunity to screen, mask or obscure the line. Views of transmission towers (new and existing) on the horizon will characterise the visual intrusion and impact on the landscape setting.

- Risks

In a feature impoverished landscape those features that do exist assume land mark proportions or areas. The characteristic low plateau or “tafel” and the cone “koppie” are characteristic at the south-western portion of the study area. In the flat areas to the north nestle ephemeral pans which come to life each rain season. The character and sense of place of these areas and features should not be compromised if at all possible by the scale and position of transmission towers.

- The Visual Assessment

The summary of the visual assessment of the four transmission route alternatives reveal the following:

- That the Eastern Route will by virtue of the closeness to the existing line present the significant visual intrusion in the landscape. This is due to the visual “mass” of the double row of transmission towers through the landscape.
- That the 200 m west of the existing 765 kV line will present the greatest visual intrusion in the landscape. This is primarily the result of the closeness of the existing 765 kV line which adds to the visual form and scale of both the viewed lines.
- That Alternative Routes Central and Western present the lowest intensity rating of the chosen assessment criteria. If the visual association with the existing transmission line is ignored since both routes have the same value, Central route has the lower visibility intensity rating, but a higher “visual intrusion on landscape character” rating than that of Western route.

The Eastern route has the same visibility and visual intrusion intensity as the Central Route but has a **medium** rated association with the existing transmission line, notably the 765 kV some 2 km to the west.

The ranking of the visual intrusion to existing homesteads based on the closeness of the line to those identified, presented the alternative corridor preference as being Eastern, Western, Central and Existing 765 kV line. The results cannot be taken as factual because not all the homesteads identified on the maps are occupied.

The result therefore presents the Western route as the preferred alignment with having the relative visual impact and intrusion on the scenic landscape, the land use and sense of place less than for the Central route. These ranking positions have been influenced mainly by their visibility (Western is less visible as shown by view shed analysis) and the number of people exposed to the Corridor. The natural character of the landscape, the pans and the landform guided the Corridor away from these impressive features.

The expansion of the Perseus Substation westward will present less of a visual impact than it expanded eastward. The eastward expansion will reduce the viewing distance of the substation between it and Dealesville.

The preferred route to bypass Hydra Substation is that which will be east of De Aar. The visual impact of this option will be less as the area has no housing development yet. The western route is closer to the towns build up area.

The perennial dilemma associated with new transmission line alignments choice in the vicinity of existing lines is whether to contain the visual intrusion but increase its intensity by placing the new route near to the existing route/s or to place the new route well away and intrude on a new area but at reduced visual intrusion intensity. In other words is the visual impact burden shared over a greater area or intensified over a lesser area?

- Mitigation Measures

The study presents the general mitigation measures which relate to the general placement of the transmission line in the landscape to reduce the visual intrusion on landscape character, sense of place and specific alignment shifts.

The recommendations for mitigation are principals to follow when plotting the chosen alternative route.

Specific mitigation of visual intrusion of the routes have been presented but will require further consideration once the final route is negotiated with the landowners by Eskom.

FIGURES 2, 3 & 5-9

PHOTO PAGES