

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impact of labourers	2	Temporary	High	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impact on Birds	3	Permanent	Low	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Social Impact	4	Temporary	High	2

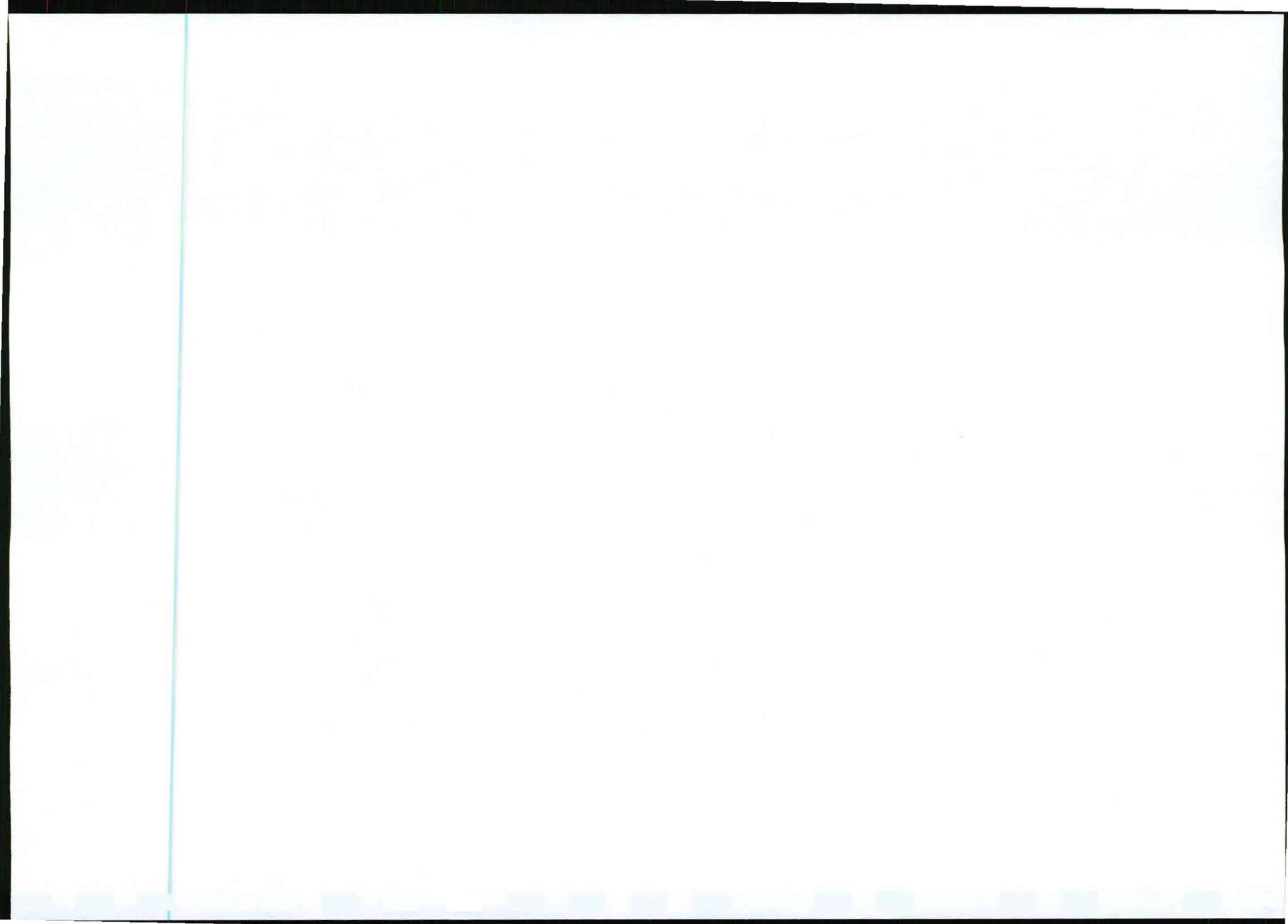
Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impact of Solid Waste	3	Temporary	Medium	0

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Loss of agricultural land	2	Temporary	Medium	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impact of alien vegetation	2	Permanent	High	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Access to properties	4	Permanent	High	2

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation



Impact Description	Impact	Impact	Impact	Mitigation
Impact on conservation areas/ game farms	4	Permanent	High	2

#### Route Alternative 4

##### Evaluation of Impact and Evaluation of Mitigation Measures

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Risk of surface and ground water pollution	2	Permanent	Medium	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impact on cultural heritage resources	0	none	none	0

0

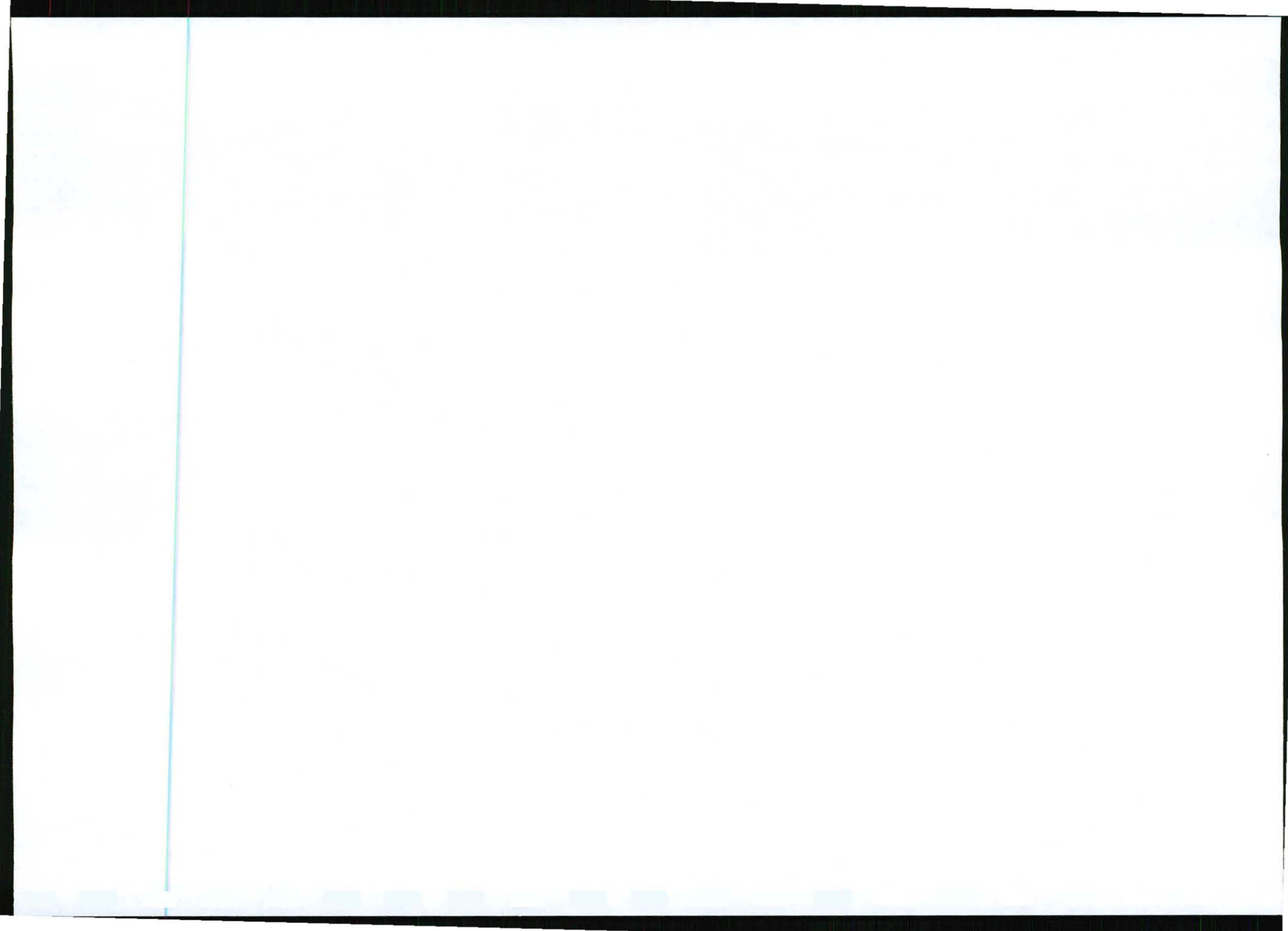
Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impact on natural habitat	2	Permanent	Medium	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Risk of Erosion	3	Permanent	High	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Visual impact (Change of character and atmosphere of the area)	2	Permanent	High	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impacts on safety and security	3	Temporary	High	1

Impact Description	Impact	Impact	Impact	Mitigation
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Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impact of labourers	2	Temporary	High	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impact on Birds	3	Permanent	Low	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Social Impact	3	Temporary	High	1

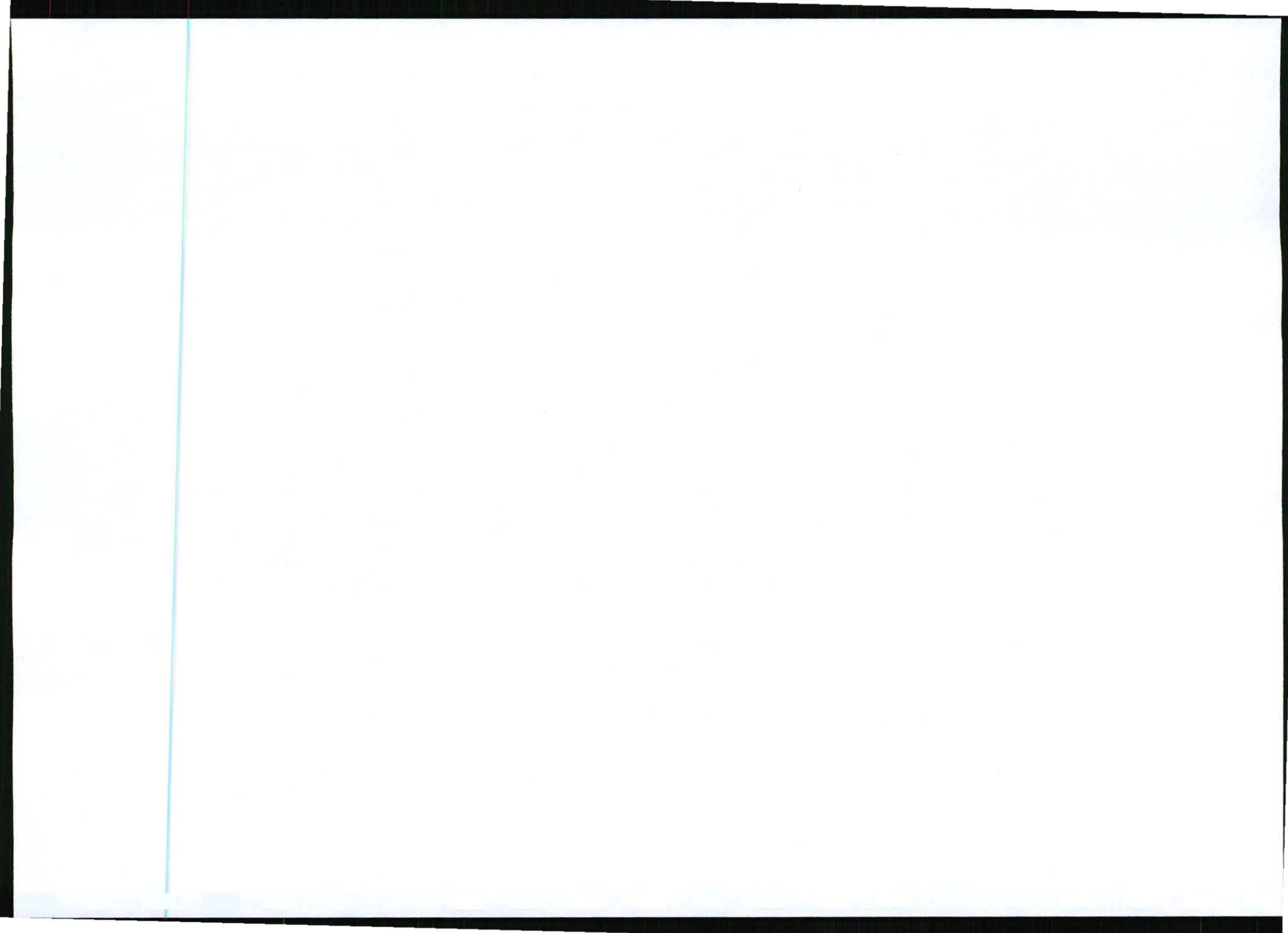
Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impact of Solid Waste	3	Temporary	Medium	0

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Loss of agricultural land	2	Temporary	Medium	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Impact of alien vegetation	2	Permanent	High	1

Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation
Access to properties	3	Permanent	High	2

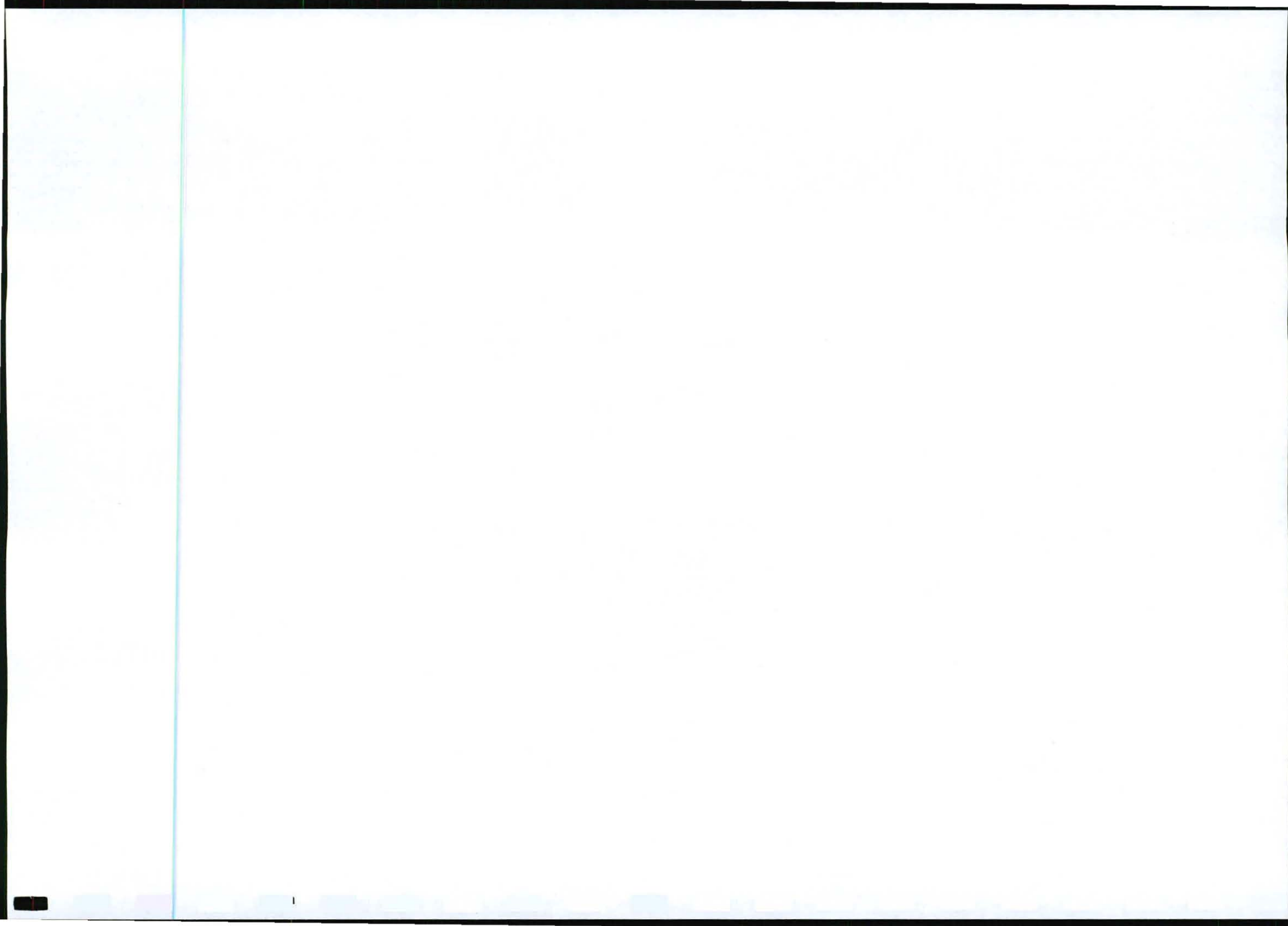
Impact Description	Impact	Impact	Impact	Mitigation
	Impact Severity Degree	Duration	Probability	Severity of Impact After Mitigation



---

Impact Description	Impact	Impact	Impact	Mitigation
Impact on conservation areas/ game farms	3	Permanent	High	2

No biophysical, social or cultural-historical environmental impact has been identified that is expected to result in significant costs to the environment should the proposed mitigation measures be implemented; therefore the environmental consultants (EAPs) recommend the construction of the project.





## SECTION E. RECOMMENDATION OF PRACTITIONER

Is the information contained in this report and the documentation attached hereto sufficient to make a decision in respect of the activity applied for (in the view of the environmental assessment practitioner)?

YES	NO
-----	----

If "NO", indicate the aspects that should be assessed further as part of a Scoping and EIA process before a decision can be made (list the aspects that require further assessment):

If "YES", please list any recommended conditions, including mitigation measures that should be considered for inclusion in any authorisation that may be granted by the competent authority in respect of the application:

### Ecological Sensitivity:

A number of mitigating actions were recommended and the proper implementation and management of these will ensure that impacts are reduced and are kept to acceptable levels. These measures include:

- staying out of No-Go zones/ highly sensitive areas such as the camel thorn grove on both sides of the D1882 sand road in the vicinity of the Mokolo River. The route should be planned to avoid the groves. GPS coordinates taken from the road: S24°06.822'; E27°48.301'. Should the camel thorns be impacted, then a permit is needed.
- not placing any pylons closer than 30m from the edge of river banks or 10m from the edge of drainage lines;
- an ongoing management programme to mechanically control alien plant species that invade the disturbed soils around the newly erected pylons; to not use chemicals in the control of weeds;
- to inspect the power line corridor every year (before and after the summer rain season) for soil erosion and if found to rehabilitate;
- to use wide spacing of pylons in the rocky areas to limit the physical footprint on the actual ground;
- and to remove all left over construction materials, rubble etc. upon completion of the project.
- Having taken all aspects of the investigation into account the following **line variant is recommended - Alternative Route 4** (A-B<sub>1</sub>-C<sub>2</sub>-C<sub>1</sub>-D-H-F). However, between map points (C<sub>1</sub> – D) both sections of Alternative Routes 4 & 3 are equally ecologically acceptable and either may be used across this section. (Refer to map in specialist report on the ecological environment in Appendix D1.)

### Heritage Resources:

- The Phase I Heritage Impact Assessment for the Eskom Project revealed none of the types and ranges of heritage resources as outlined in Section 3 of the National Heritage Resources Act (No 25 of 1999) for the Eskom Project Area.
- If any heritage resources of significance are exposed during the Eskom Project the South African Heritage Resources Authority (SAHRA) should be notified immediately, all development activities must be stopped and an archaeologist accredited with the Association for Southern African Professional Archaeologist (ASAPA) should be notified in order to determine appropriate mitigation measures for the discovered finds. This may include obtaining the necessary authorisation (permits) from SAHRA to conduct the mitigation measures.
- From a heritage point of view, **all 4 alignments (Route Alternatives 1,2,3 and 4) are suitable options**, should the proposed mitigation be implemented.

### Bird Impact:

The construction of the proposed 132kV Bulge-Dorset power line should pose a limited threat to the birds. The power line poses a medium-high collision risk, mostly to water associated species, and those species attracted to open habitats, particularly old lands. The line will pose a medium electrocution risk, in particular to vultures. The proposed construction of the new power line should have a low habitat transformation impact from an avifaunal perspective, especially if alternative 2 is used. If alternative 1 is used, the impact would be medium-low, as it would involve more extensive clearing of undisturbed woodland. With alternative 3 and 4, the impact will be medium, as it would require more extensive clearing of woodland than the other.

#### Recommendations

- Power line: The span that crosses drainage lines and old lands should be marked with Bird Flight Diverters on the earth wire of the line, five metres apart, alternating black and white (see Appendix B Sensitivity map in the specialist report on bird impact in Appendix D3 for the area to be marked with Bird Flight Diverters). Appendix C indicates the preferred Bird Flight Diverters to be used.





- 
- Poles: The poles should be fitted with bird perches on top of the poles to draw birds, particularly vultures, away from the potentially risky insulators.
  - From a bird impact perspective, **all four alignments** (Route Alternatives 1, 2, 3 and 4) are suitable options, should the proposed mitigation be implemented.

#### CONCLUSION

Alternative routes have been investigated for the project. From a heritage viewpoint there is no preferred alternative route. From a bird impact perspective, Route Alternative 2 will have the least impact, but **all four alignments** (Route Alternatives 1, 2, 3 and 4) are suitable options, should the proposed mitigation be implemented. From a purely ecological viewpoint, Route Alternative 4 is slightly preferred. The final decision between Route 3 or 4 should be made on the accumulative weight of other parameters such as feedback from public participation, land tenure issues, construction costs, etc.

**Currently, Alternative 4 is preferred** from the viewpoint of impact on the landowners and their activities.

Is an EMPr attached?

YES	NO
-----	----

The EMPr must be attached as Appendix F.



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## **SECTION F: APPENDIXES**

The following appendixes must be attached as appropriate:

Appendix A: Site plan(s)

Appendix B: Photographs

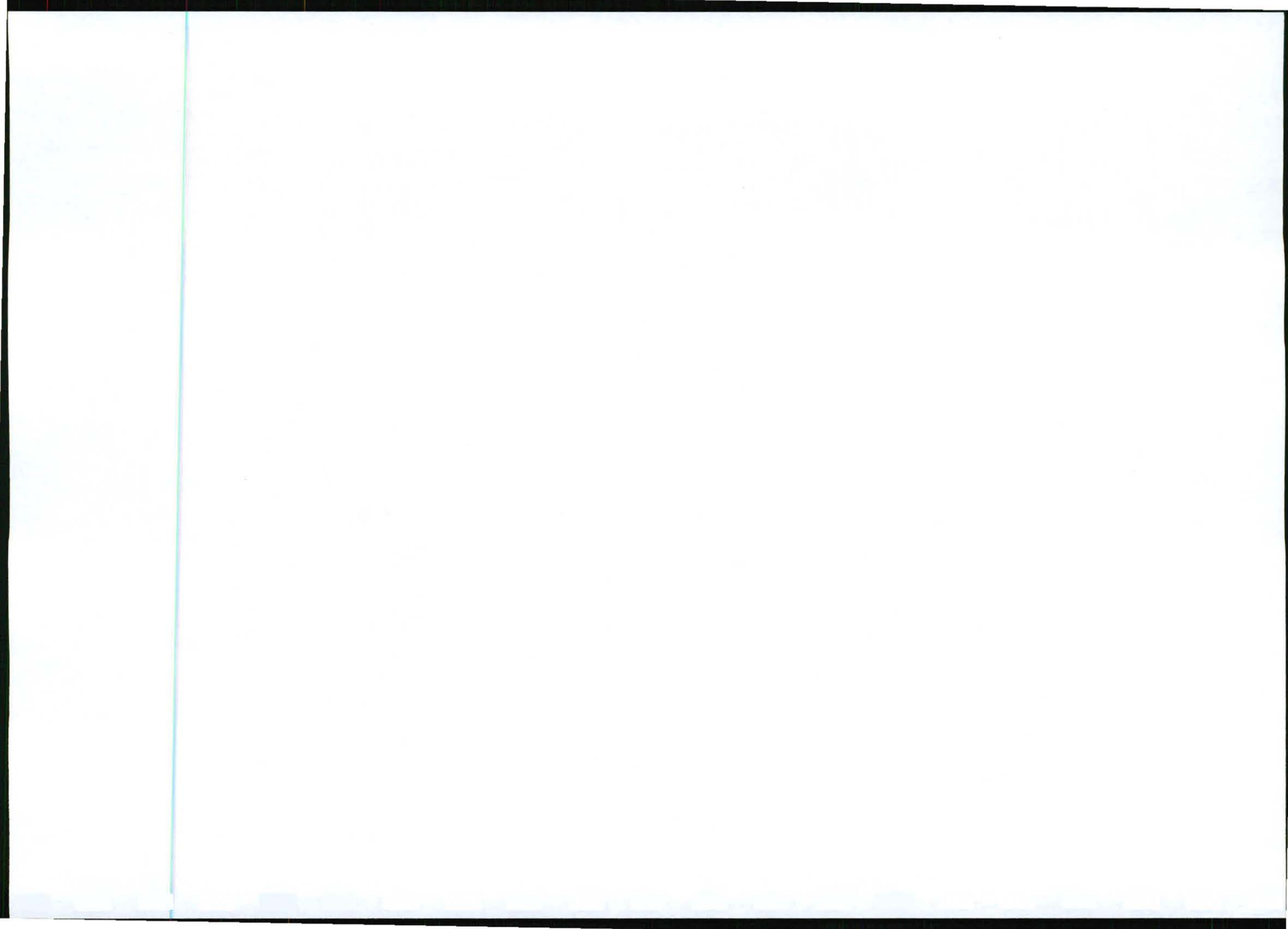
Appendix C: Facility illustration(s)

Appendix D: Specialist reports

Appendix E: Comments and responses report

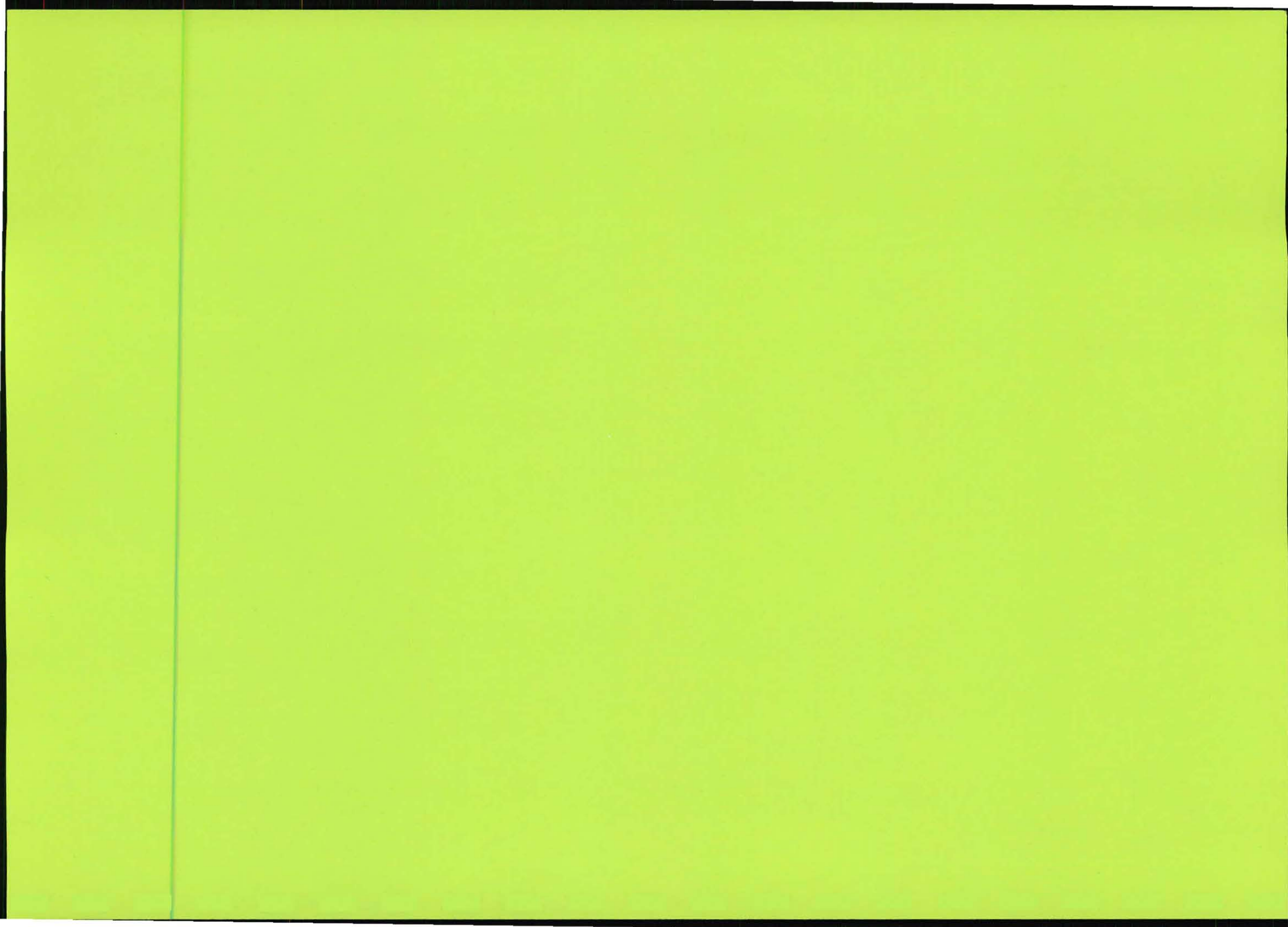
Appendix F: Environmental Management Programme (EMPr)

Appendix G: Other information

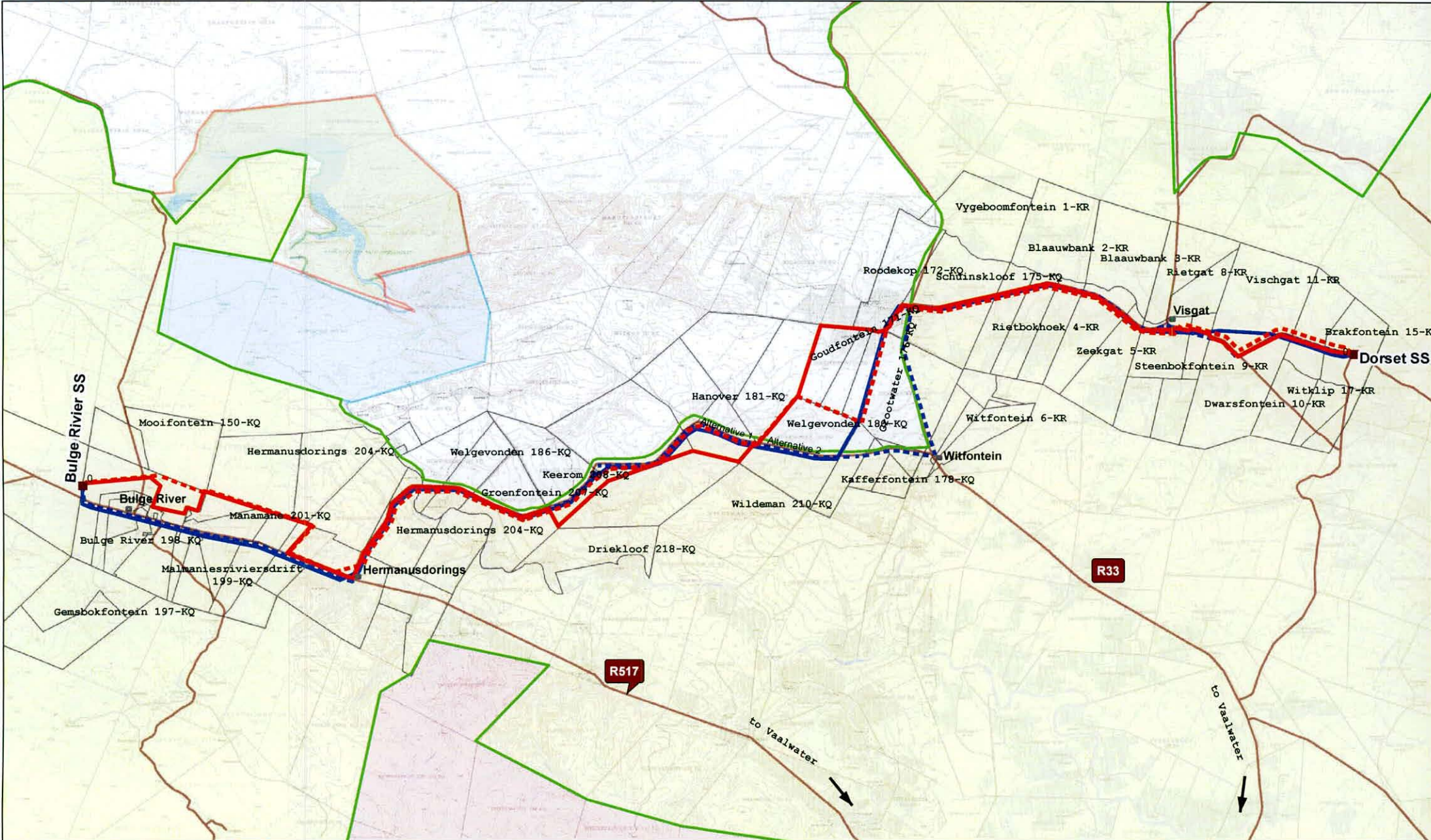




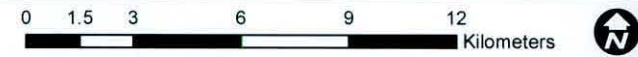
## Appendix A1: Locality map







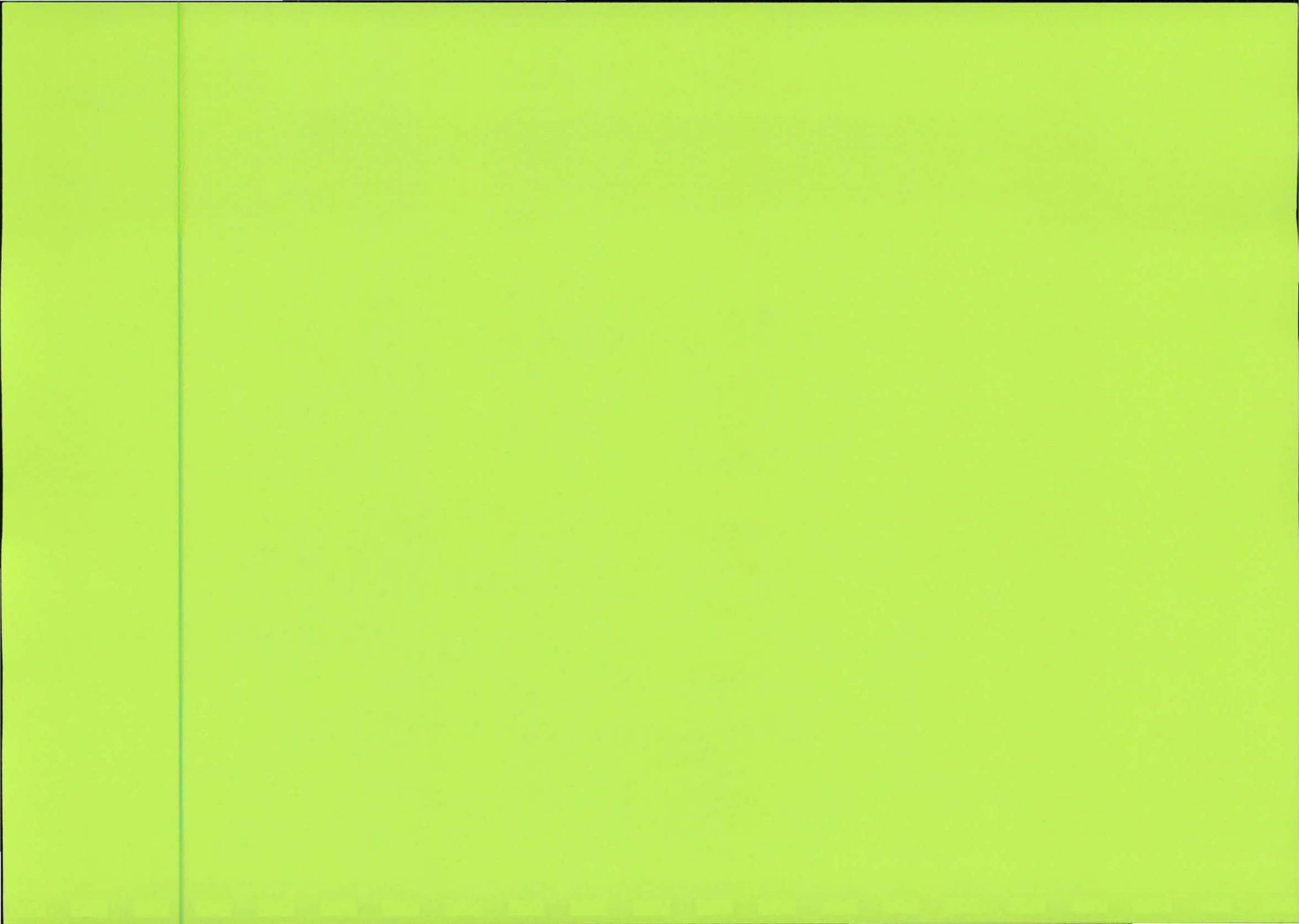
- |               |                           |                             |                             |             |
|---------------|---------------------------|-----------------------------|-----------------------------|-------------|
| Substations   | Secondary road            | Biosphere buffer zone       | Mokolo dam / Nature reserve | Major Towns |
| Alternative 4 | Farm Portions             | Biosphere moepel core       | Kwalata                     |             |
| Alternative 3 | Biosphere transition zone | Mokolo dam / Nature reserve | Welgevonden nature reserve  |             |
| Alternative 2 |                           |                             |                             |             |





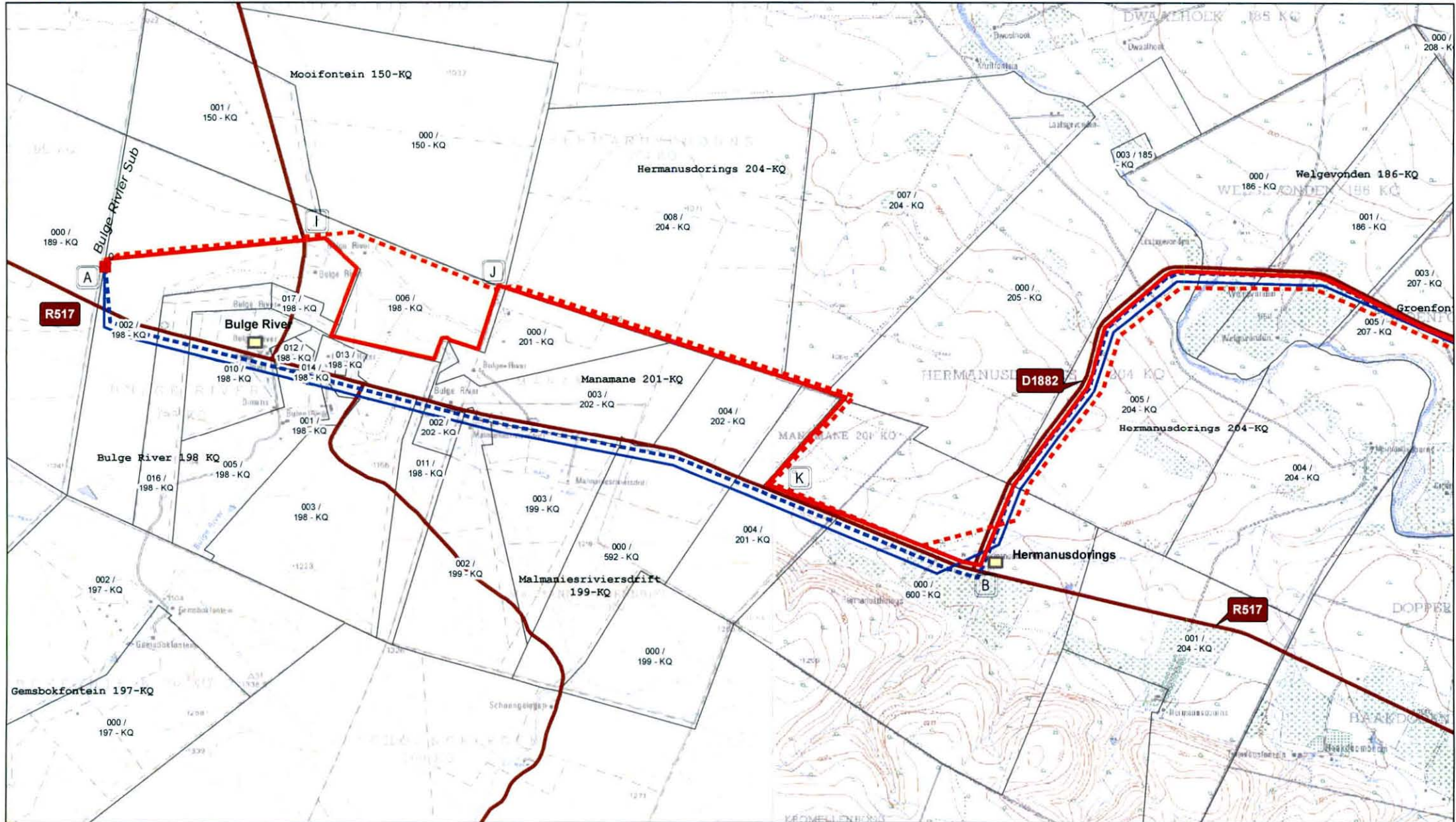
**Appendix A2: Site/Route map**  
***Route Alternatives: Portion 1***





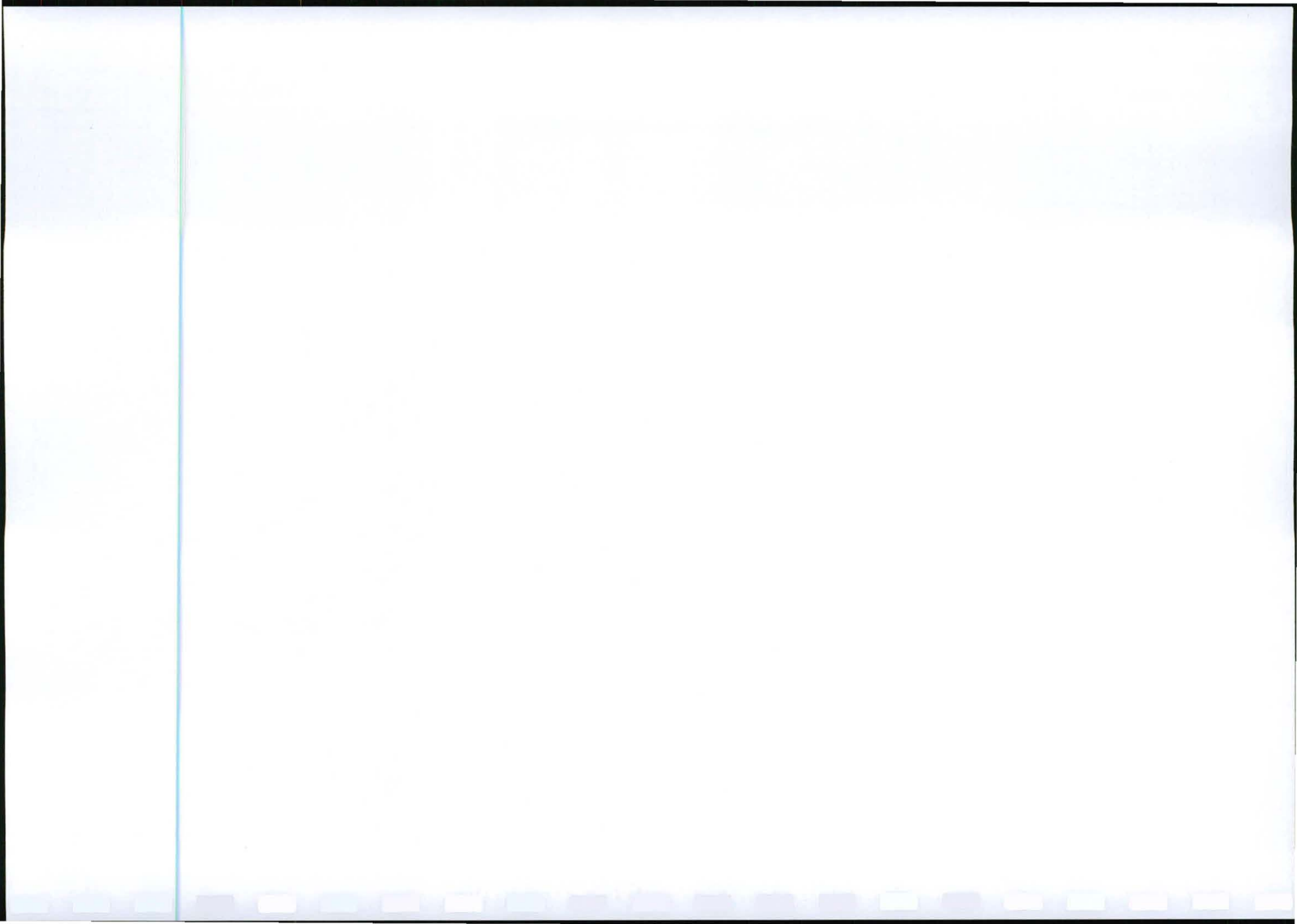
# Bulge-Dorset 132kV line

## Detail map - Route alternatives (Portion 1)



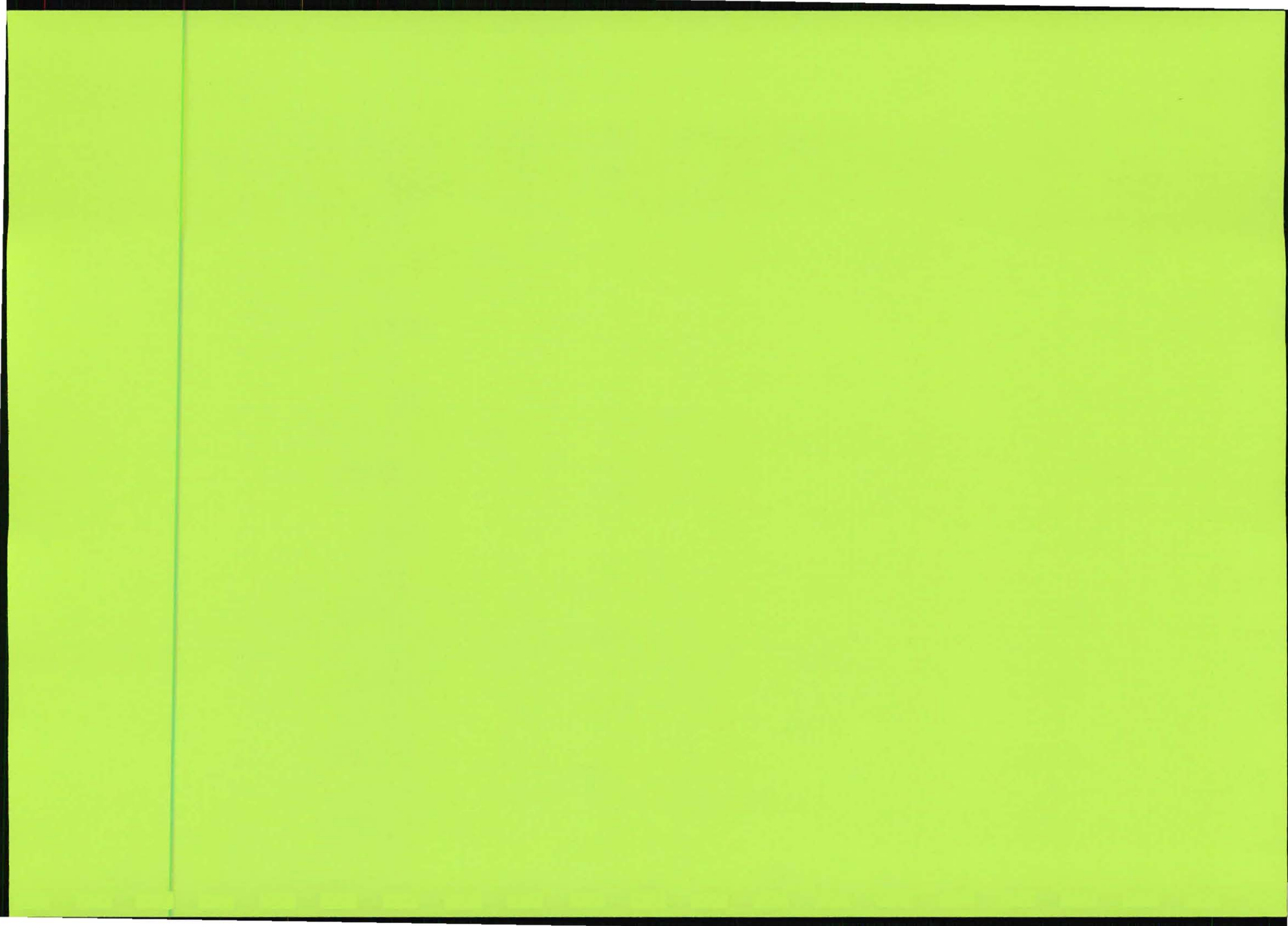
- Substations
- SECONDARY ROAD
- - - Alternative 3
- Farm Portions
- Alternative 4 (Preferred)
- Major Towns
- Alternative 1
- - - Alternative 2







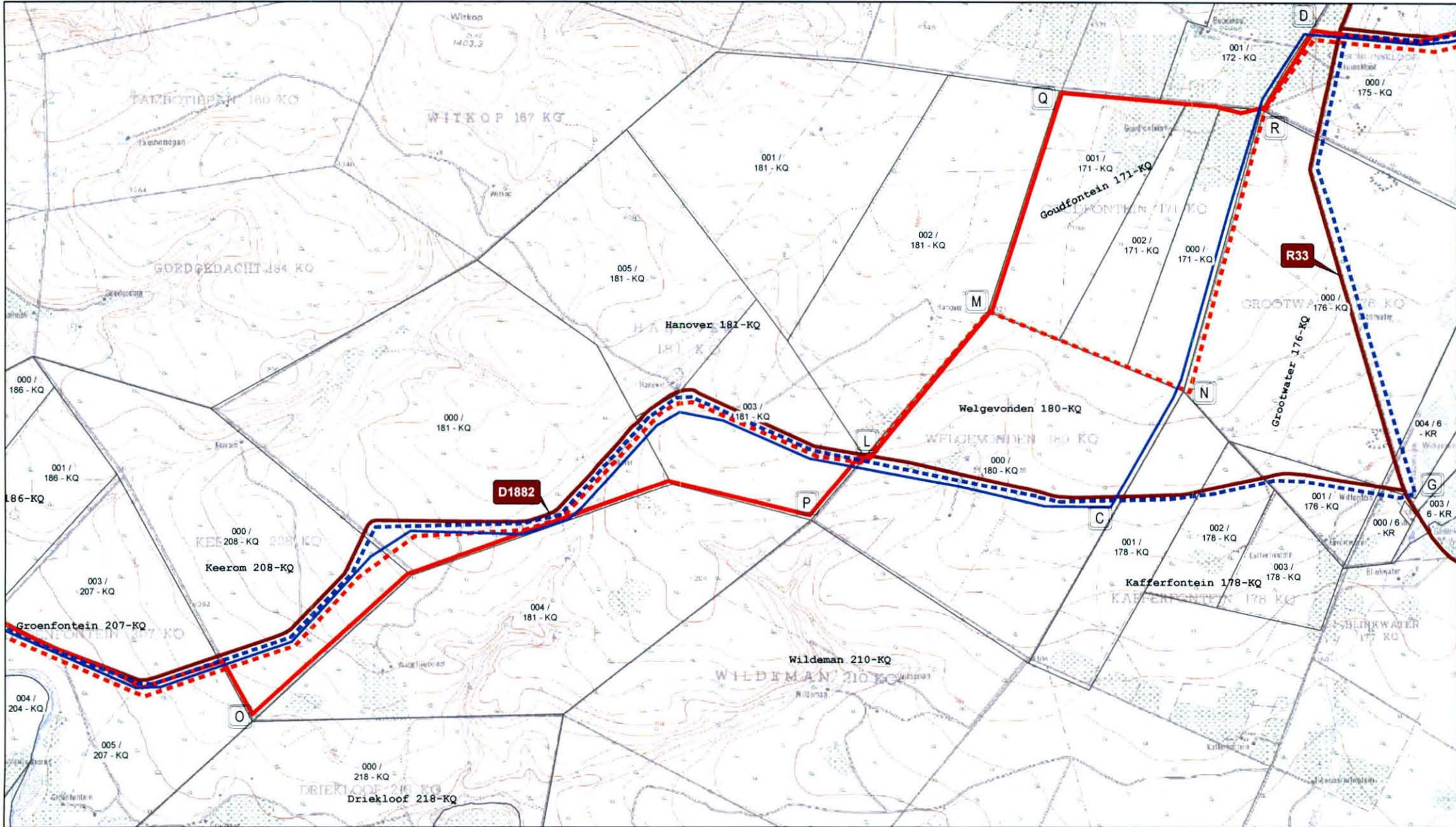
**Appendix A3: Site/Route map**  
***Route Alternatives: Portion 2***





# Bulge-Dorset 132kV line

## Detail map - Route alternatives (Portion 2)



- Substations
- Alternative 1
- - - Alternative 2
- . . . Alternative 3
- Alternative 4 (Preferred)
- SECONDARY ROAD
- Farm Portions
- Major Towns



1:50 000 Topographical base maps: 2327DC; 2327DD; 2427BB; 2427BA; 2328CC; 2428AA

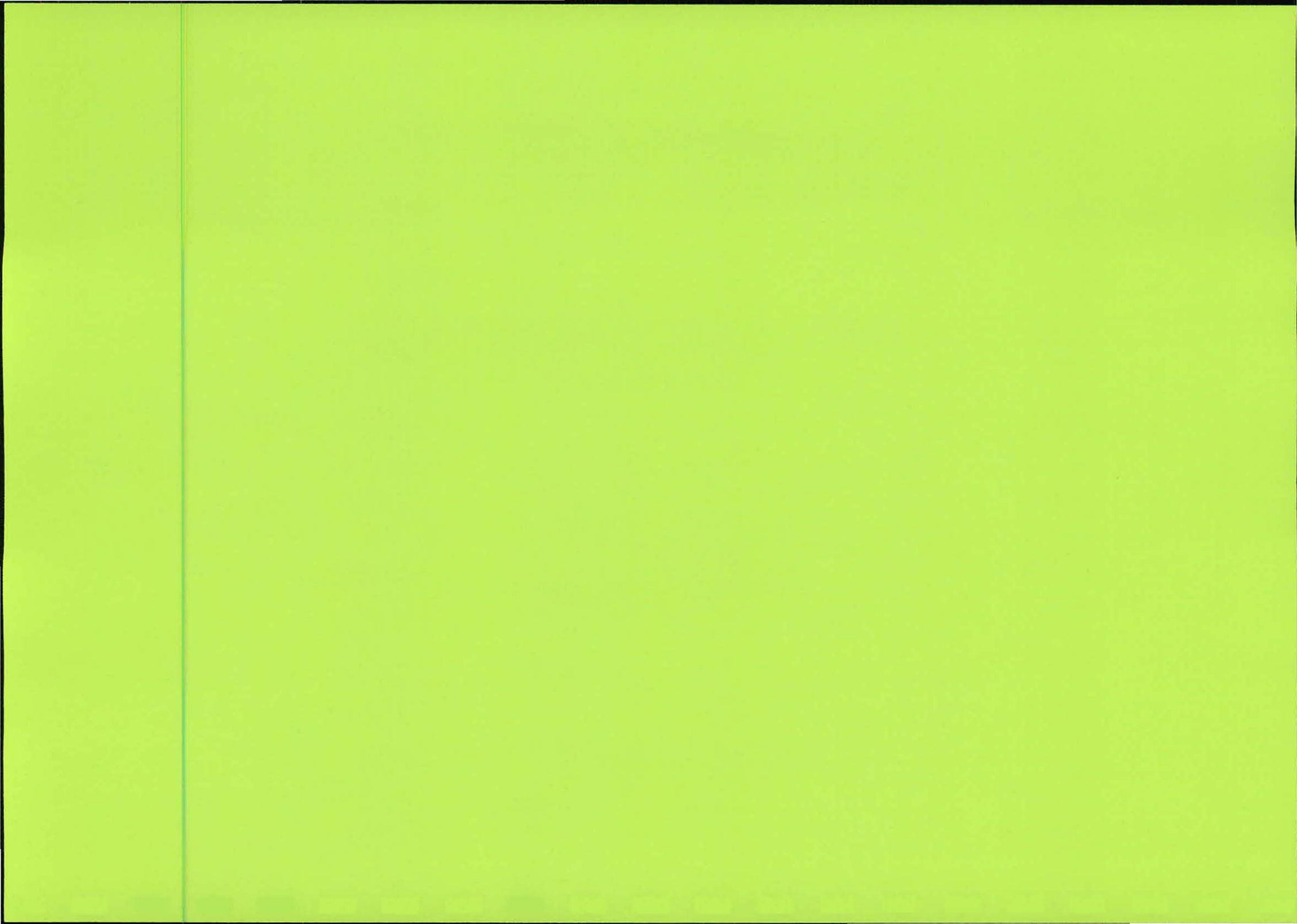
Bulge-Dorset 132kV line

© A. Froneman - 25 May 2012



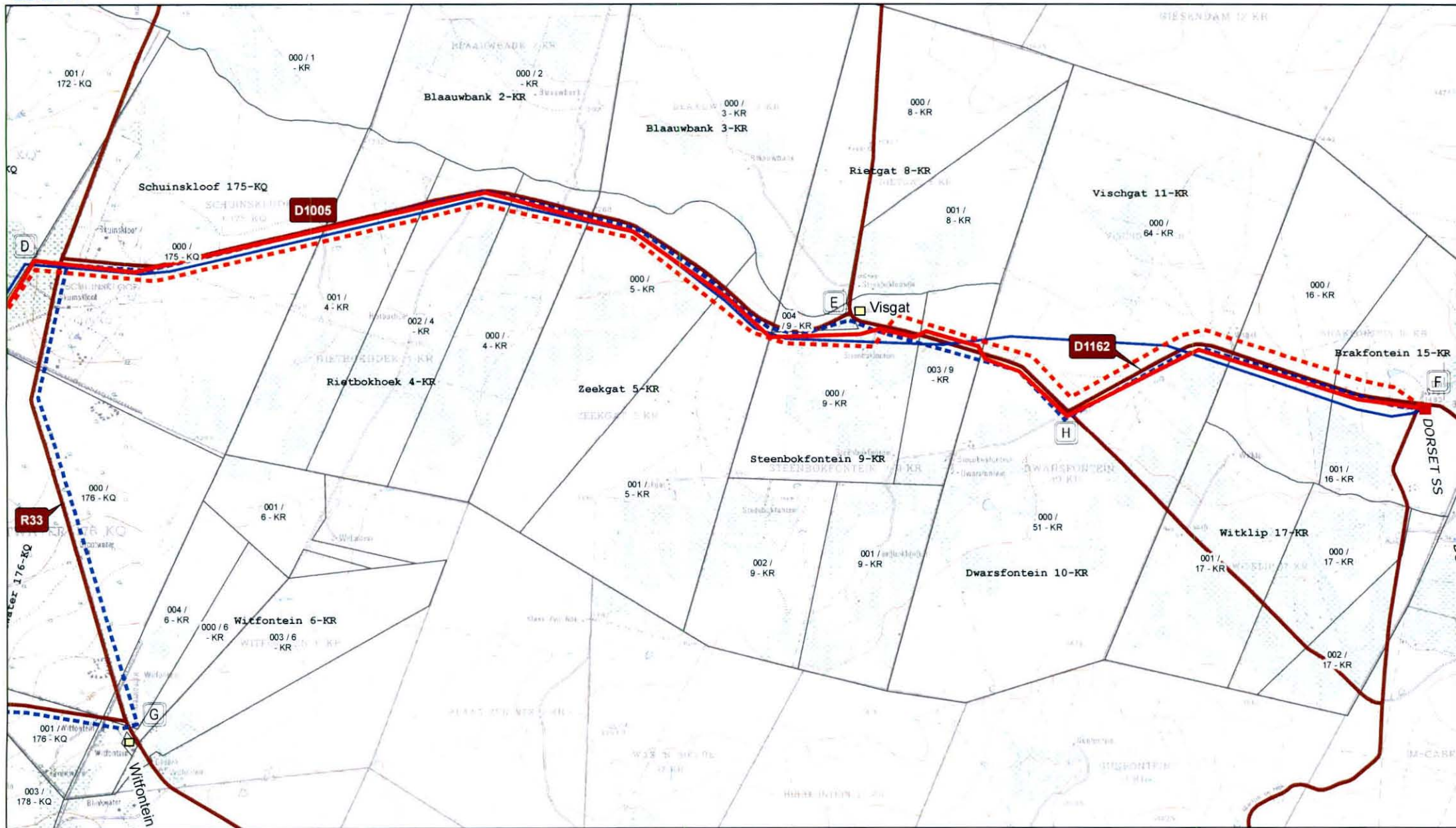
**Appendix A4: Site/Route map  
Route Alternatives: Portion 3**



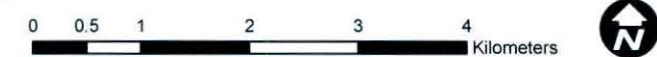


# Bulge-Dorset 132kV line

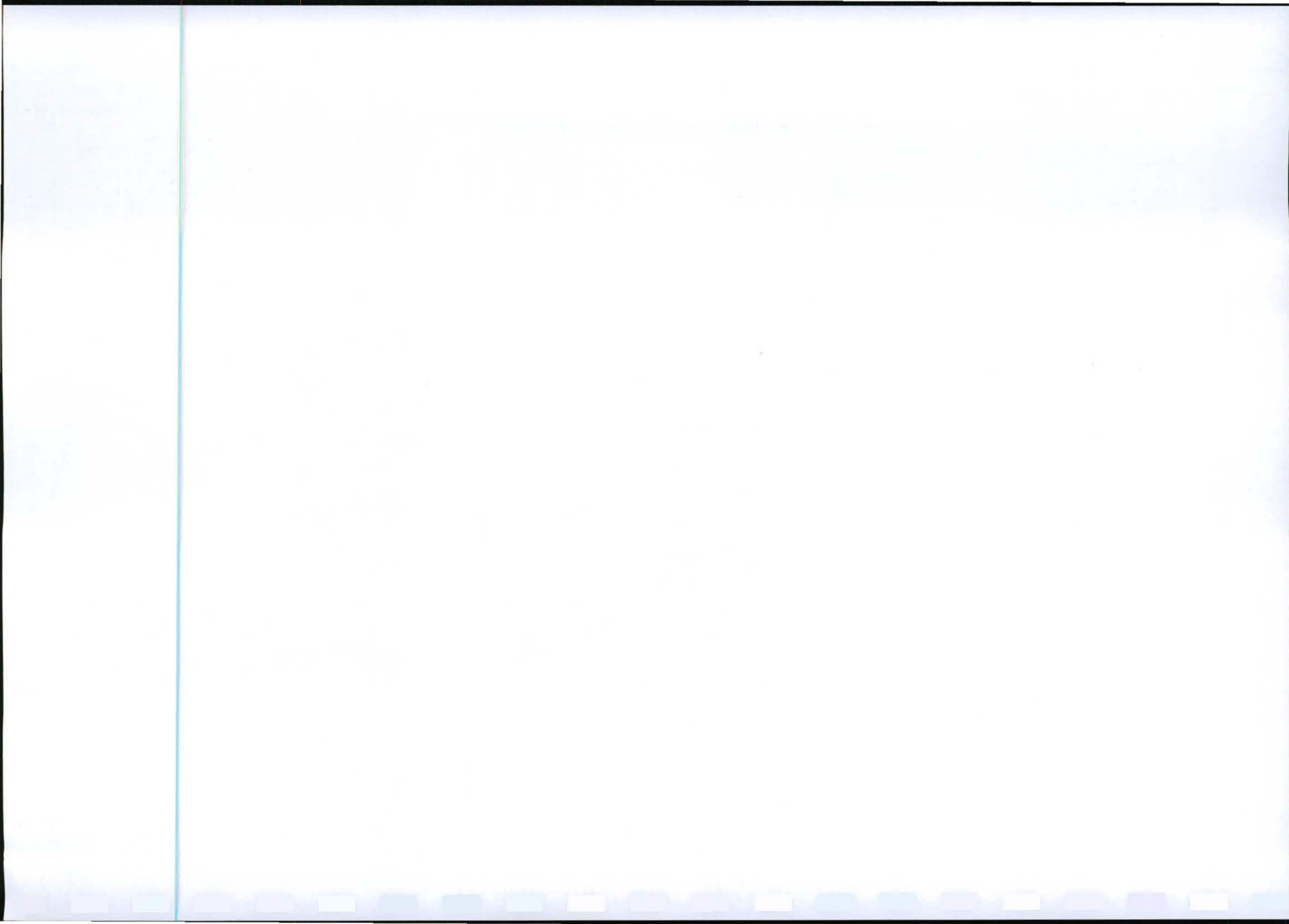
## Detail map - Route alternatives (Portion 3)



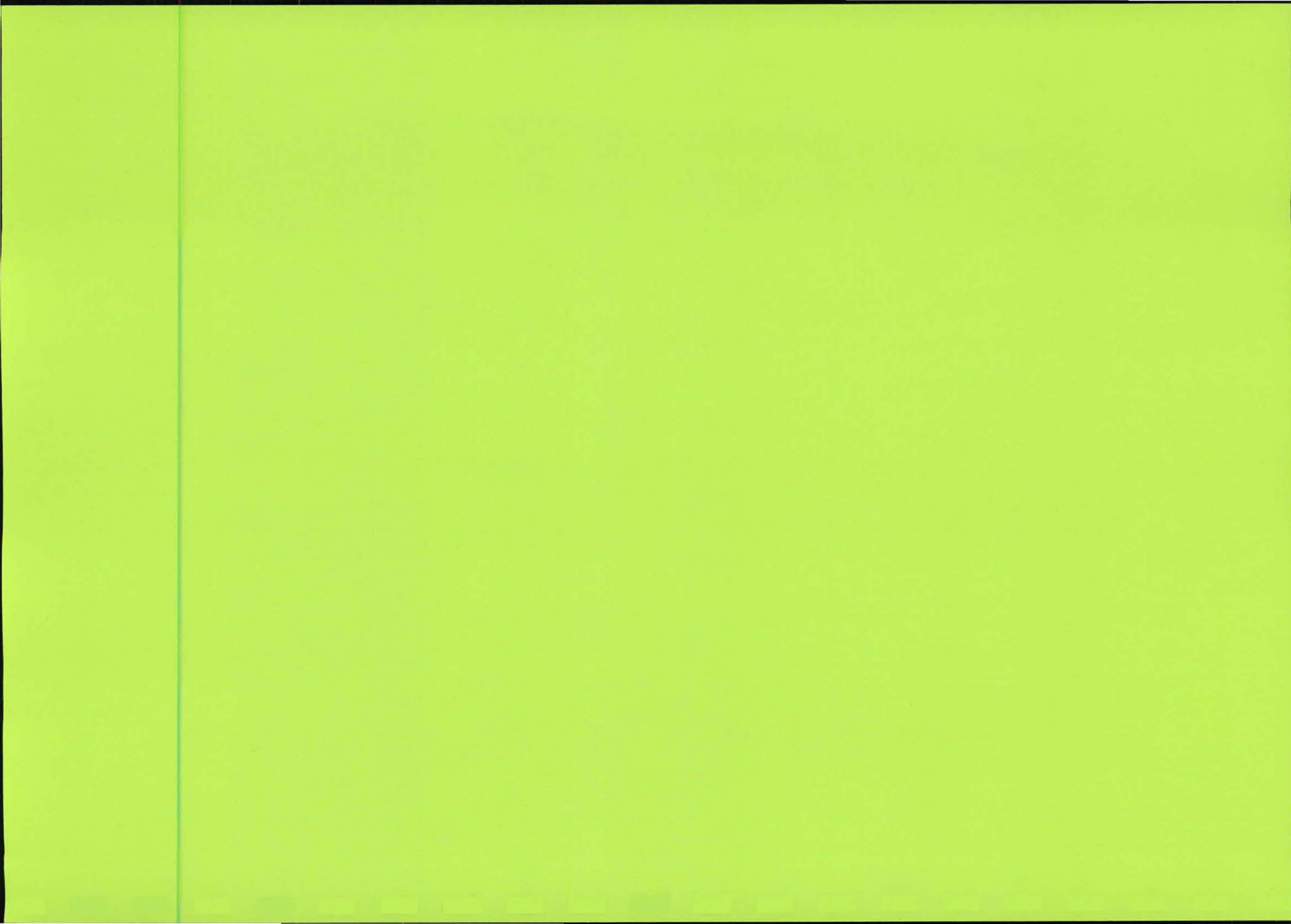
- Substations
- - - Alternative 3
- Alternative 4 (Preferred)
- Alternative 1
- - - Alternative 2
- SECONDARY ROAD
- Farm Portions
- Major Towns







**Appendix A5**  
**Topographical map & Aerial view**  
**Route Alternative 4: Portion 1**





# Bulge-Dorset 132kV line

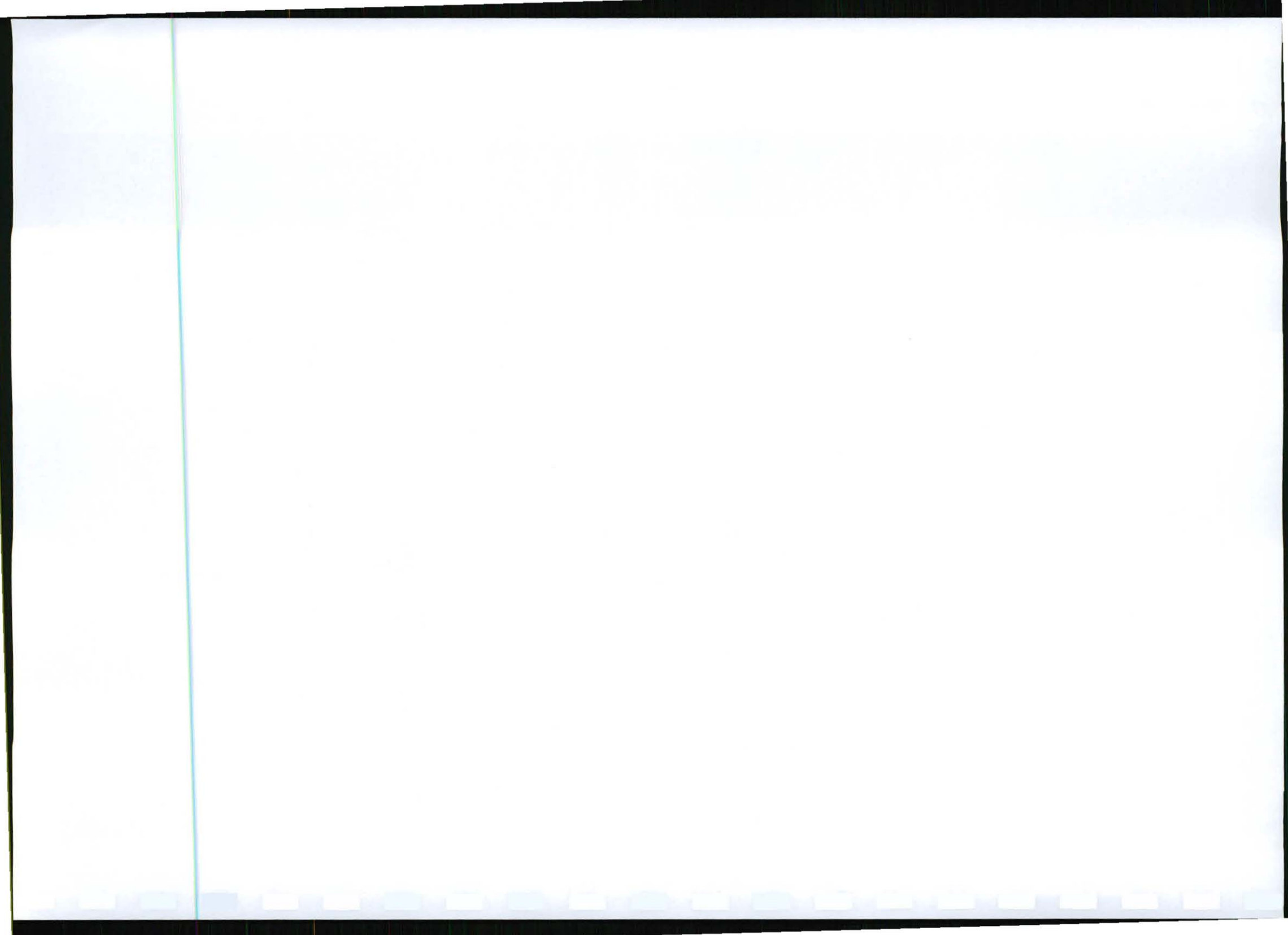
## Detail map - Route alternatives (Portion 1)



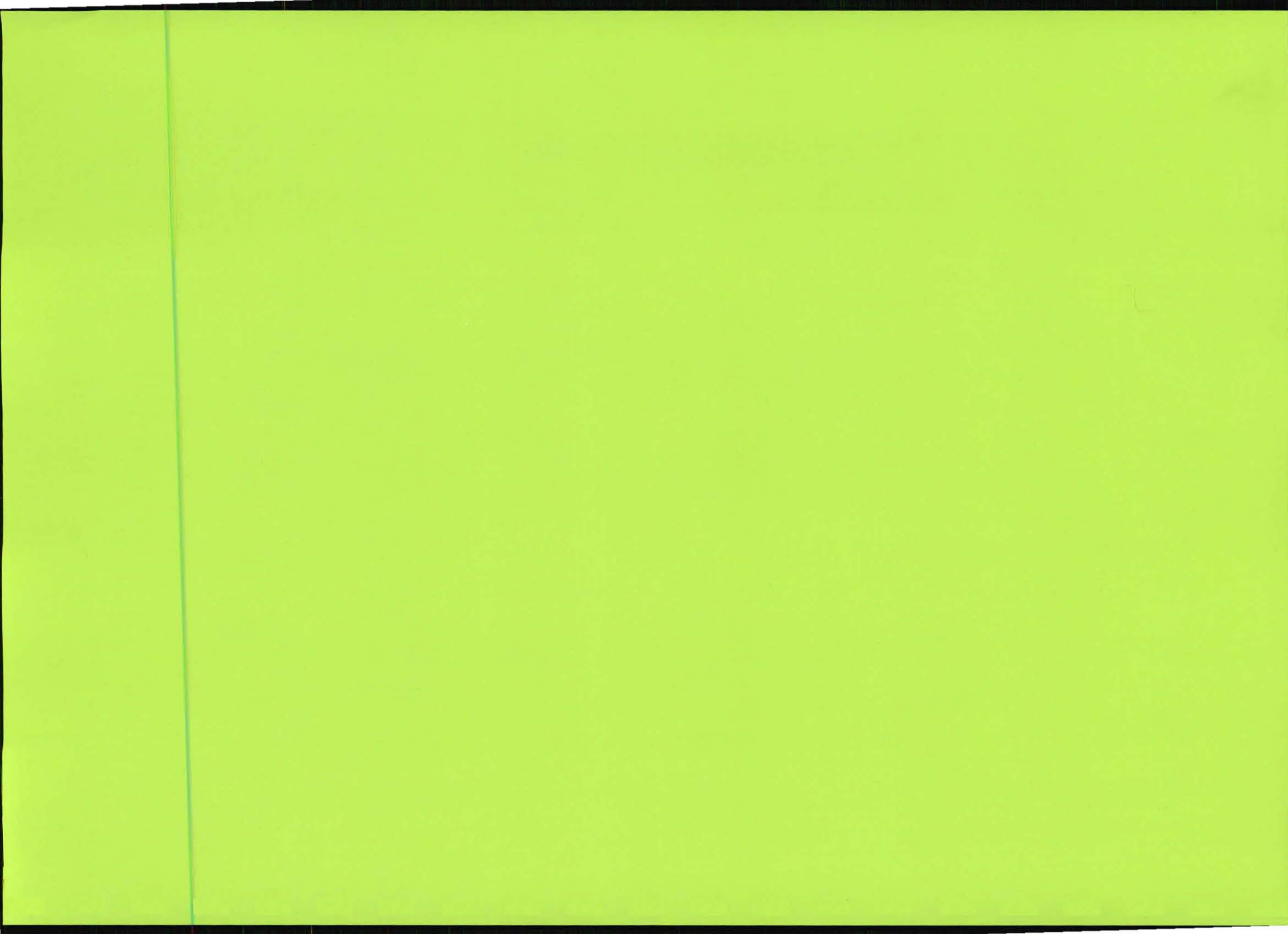
- Substations
- SECONDARY ROAD
- Farm Portions
- Major Towns







**Appendix A6**  
**Topographical map & Aerial view**  
**Route Alternative 4: Portion 2**



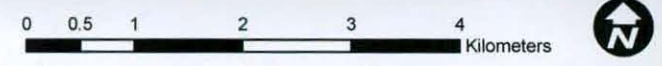


# Bulge-Dorset 132kV line

## Detail map - Route alternatives (Portion 2)



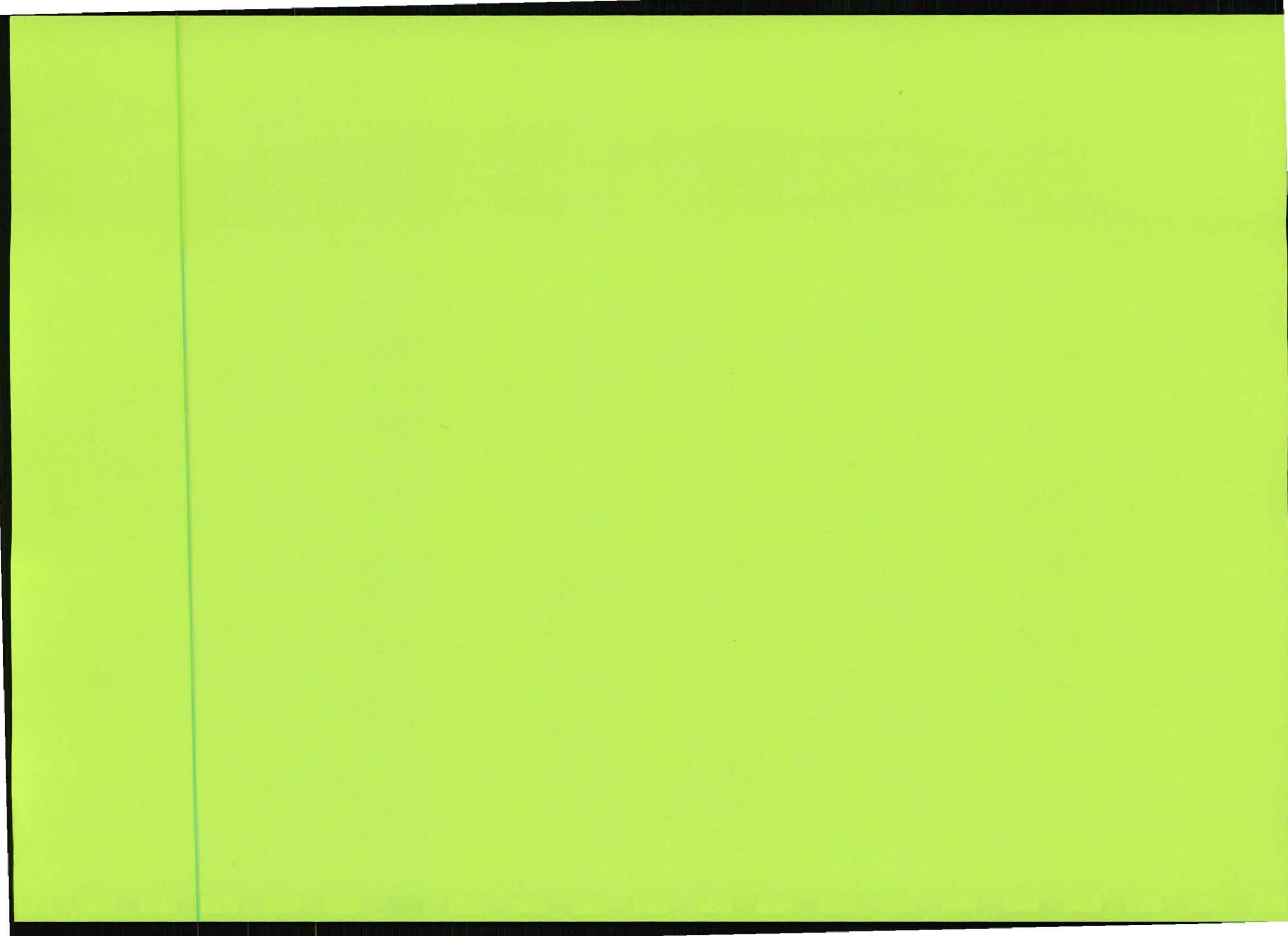
- Substations
- SECONDARY ROAD
- Alternative 4 (Preferred)
- Major Towns
- Farm Portions







**Appendix A7**  
**Topographical map & Aerial view**  
**Route Alternative 4: Portion 3**





# Bulge-Dorset 132kV line

## Detail map - Route alternatives (Portion 3)



- Substations
- SECONDARY ROAD
- Alternative 4 (Preferred)
- Major Towns
- Farm Portions



1:50 000 Topographical base maps: 2327DC; 2327DD; 2427BB; 2427BA; 2328CC; 2428AA

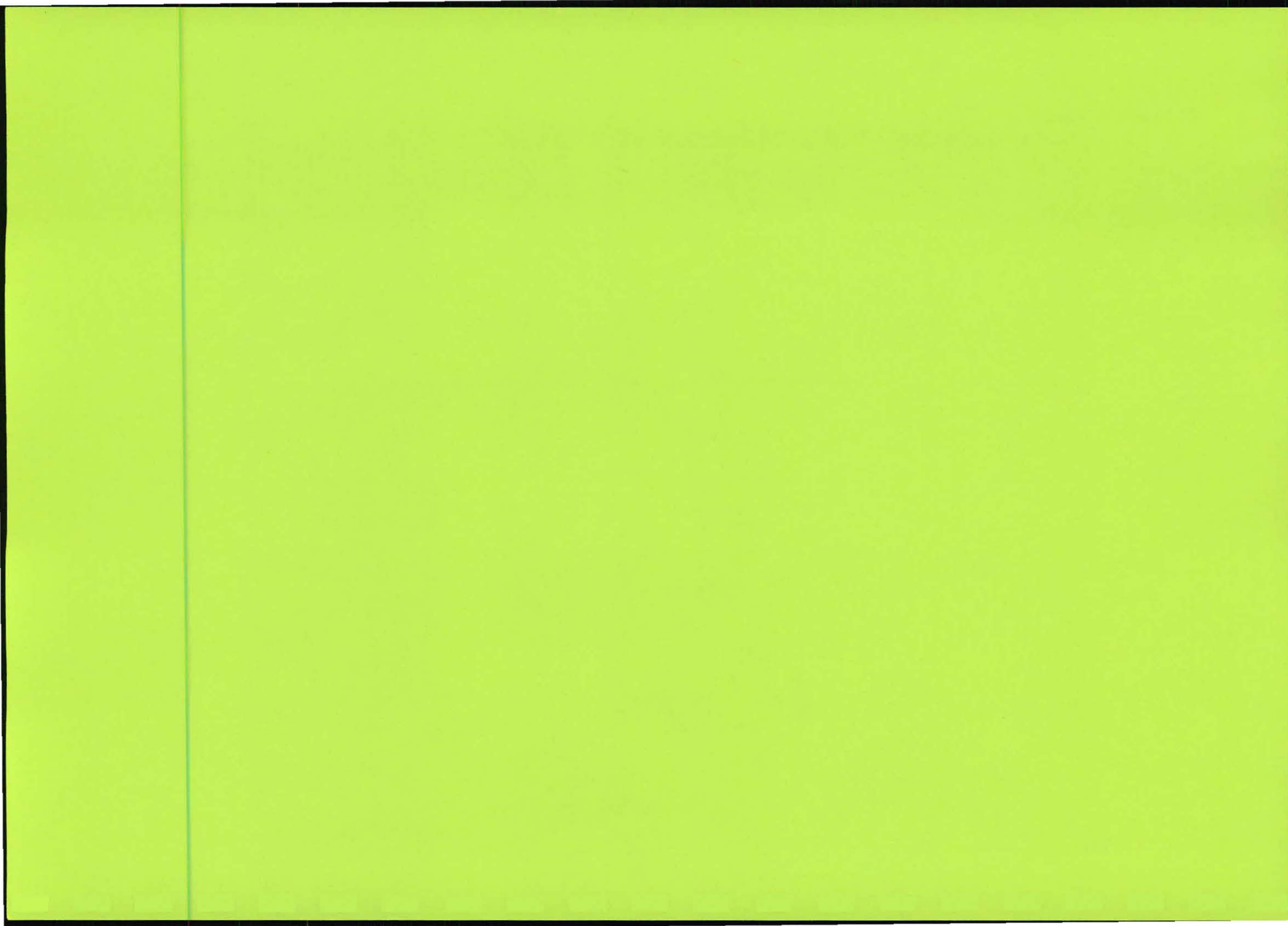
Bulge-Dorset 132kV line

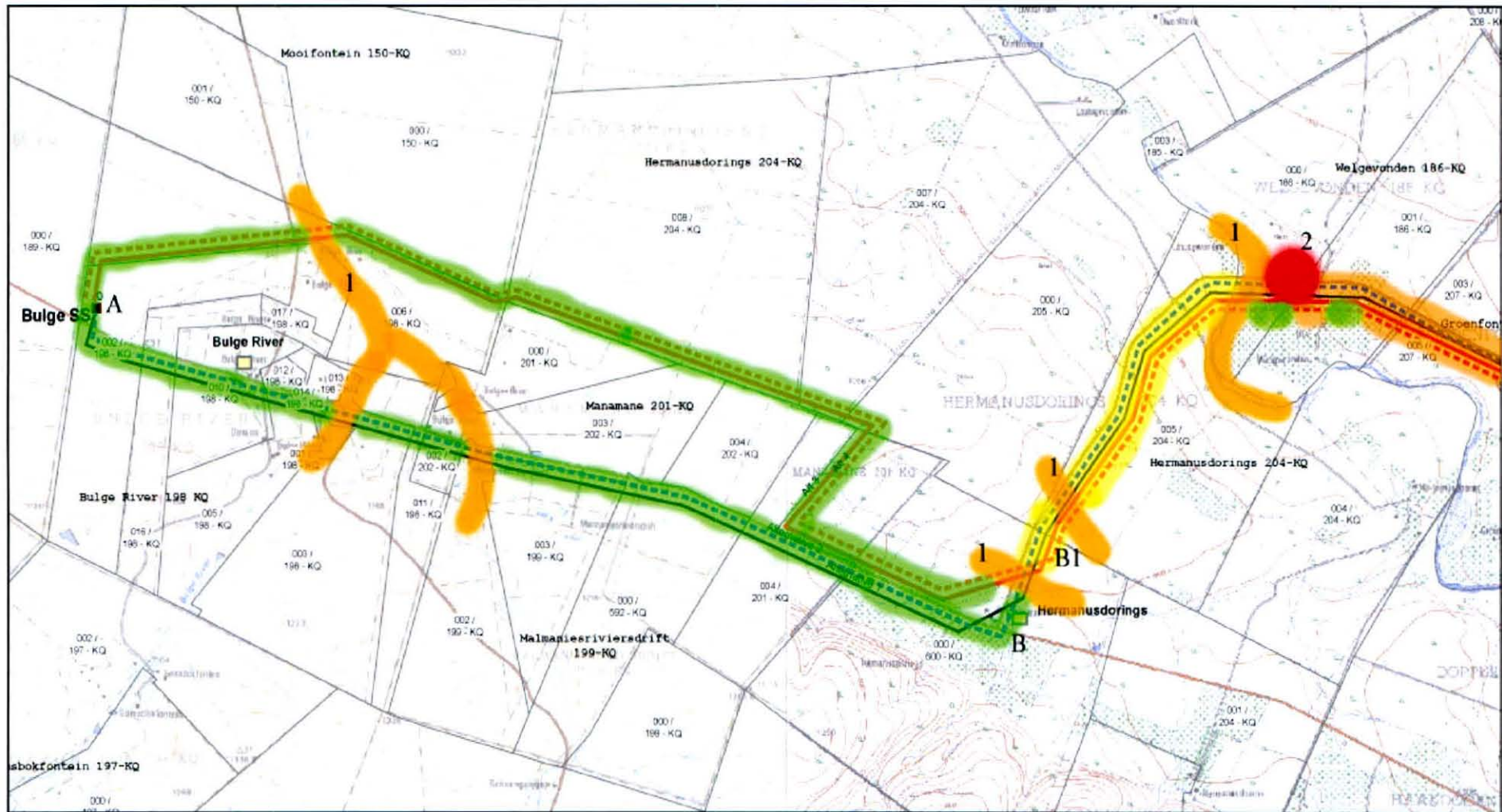
© A. Froneman - 25 May 2012





**Appendix A8:  
Sensitivity map: Portion 1**





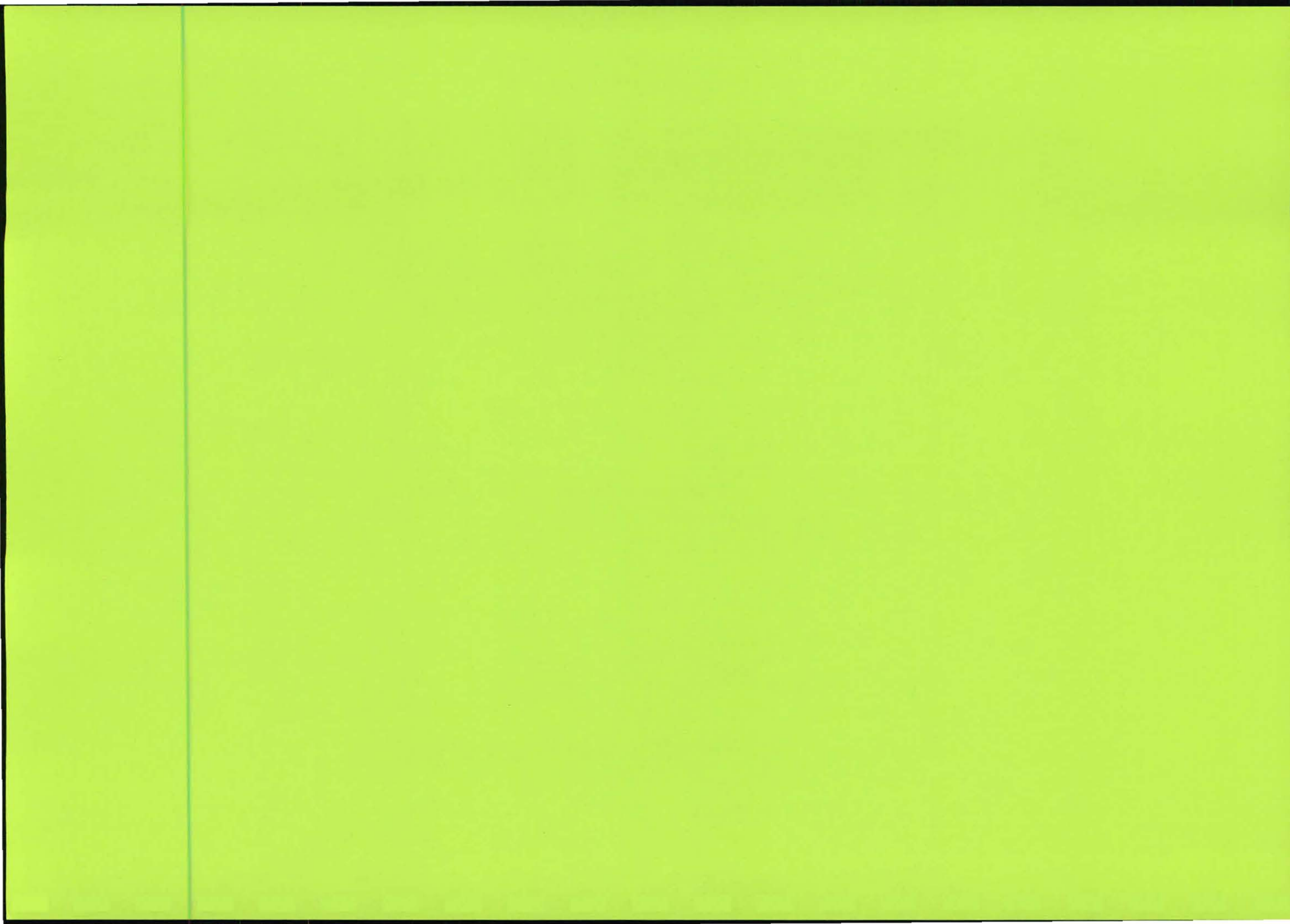
**Legend to Map Detail – Route Alternatives (Portion 1)**

- Areas of High ecological sensitivity. No-Go areas.
- Areas of Medium / High ecological sensitivity. Go-But areas.
- Areas of Medium ecological sensitivity. Go-Slow areas.
- Areas of Low to Medium / Low ecological sensitivity. Go areas.
- 1 Rivers, streams and major drainage lines.
- 2 “No-Go” zone of Camel thorn trees (*Acacia erioloba*)

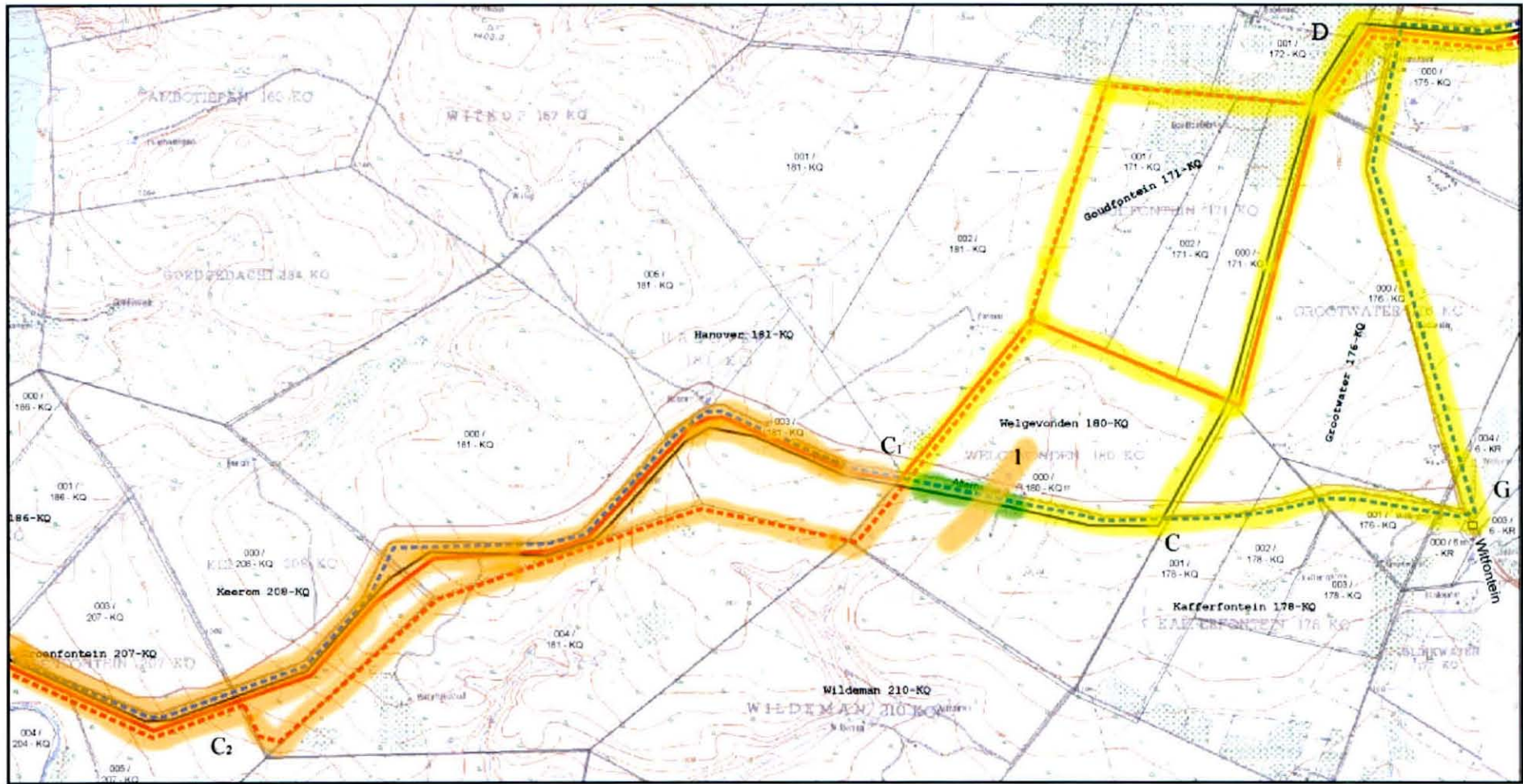




**Appendix A9:  
Sensitivity map: Portion 2**

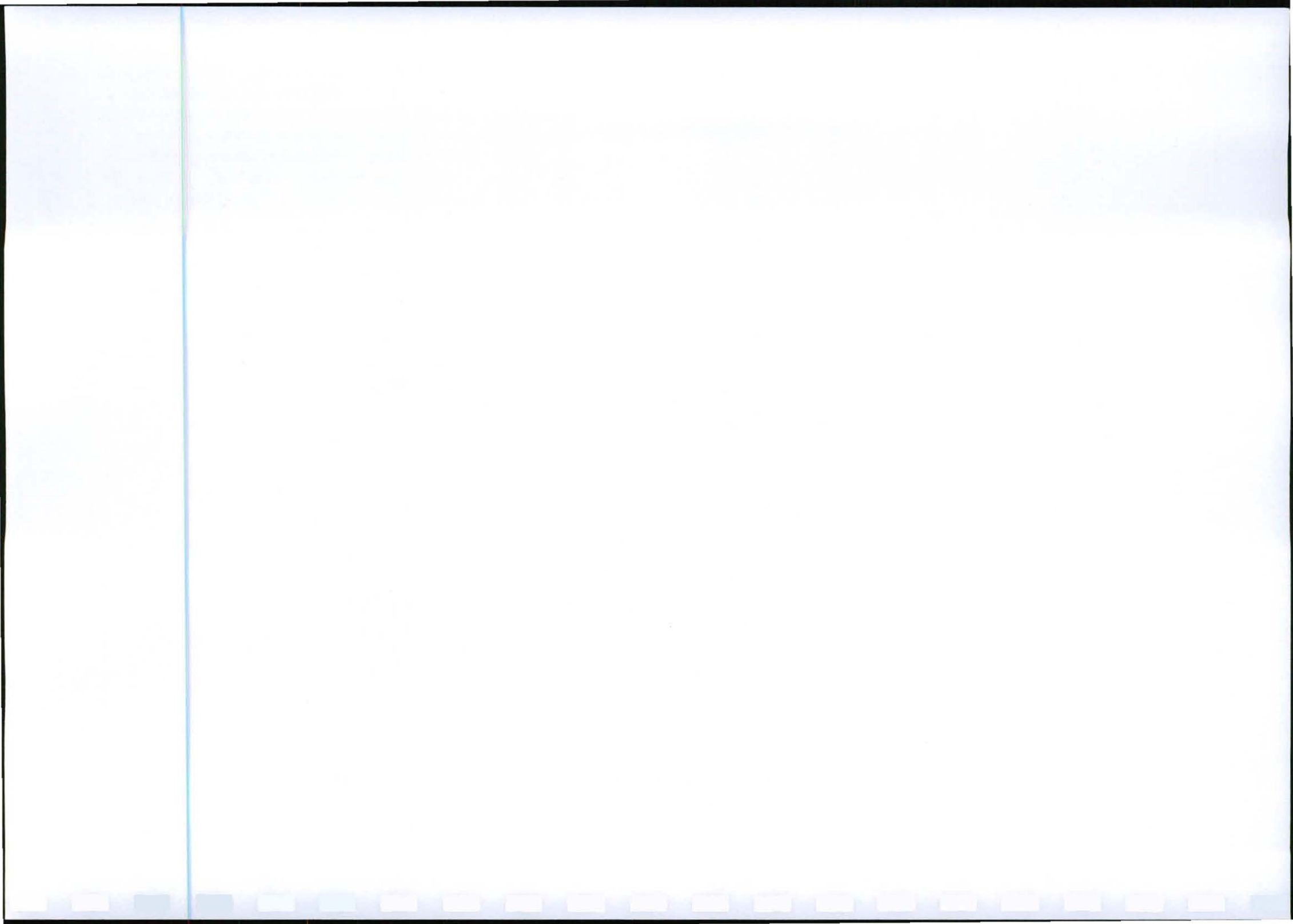






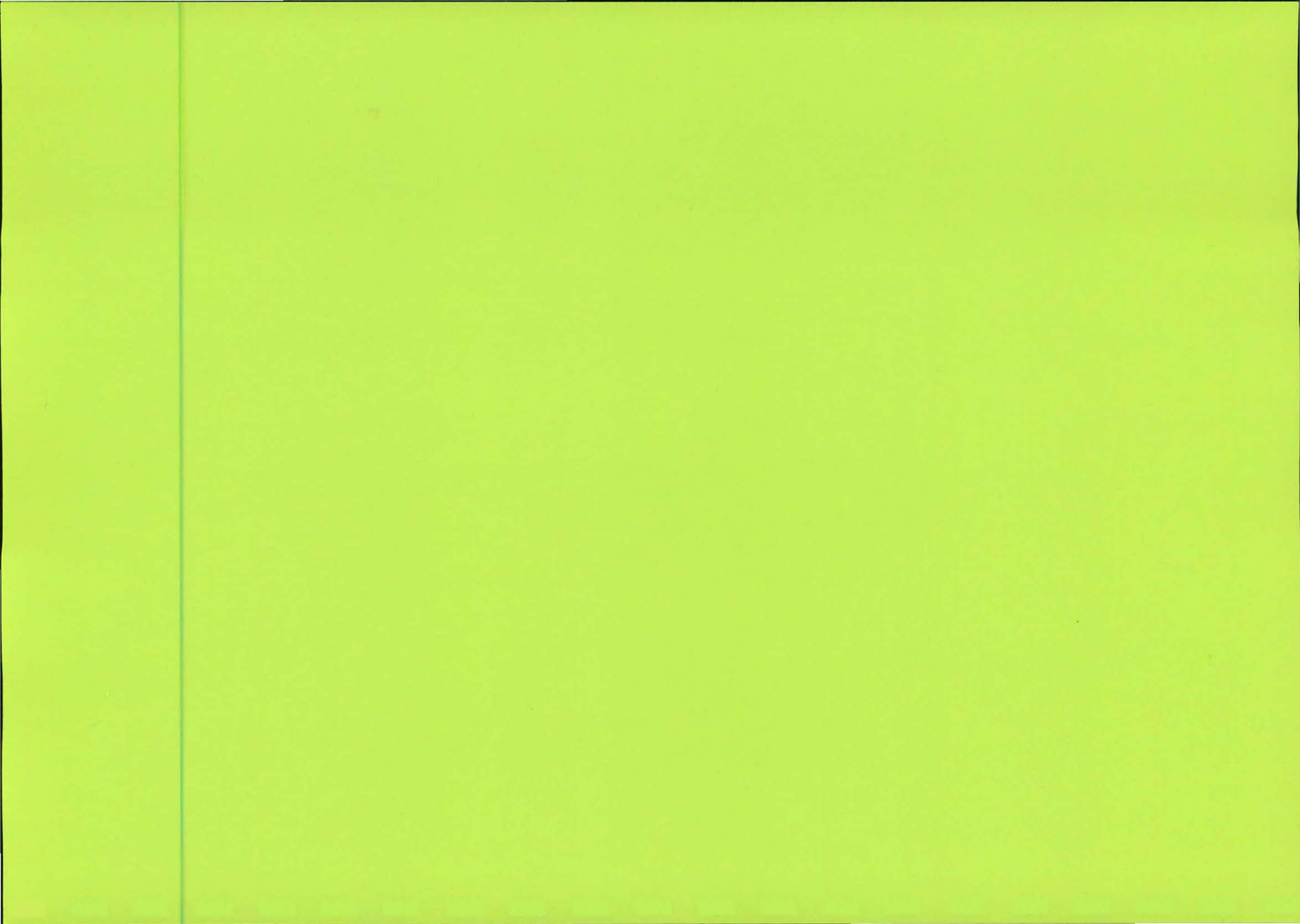
**Legend to Map Detail – Route Alternatives (Portion 2)**

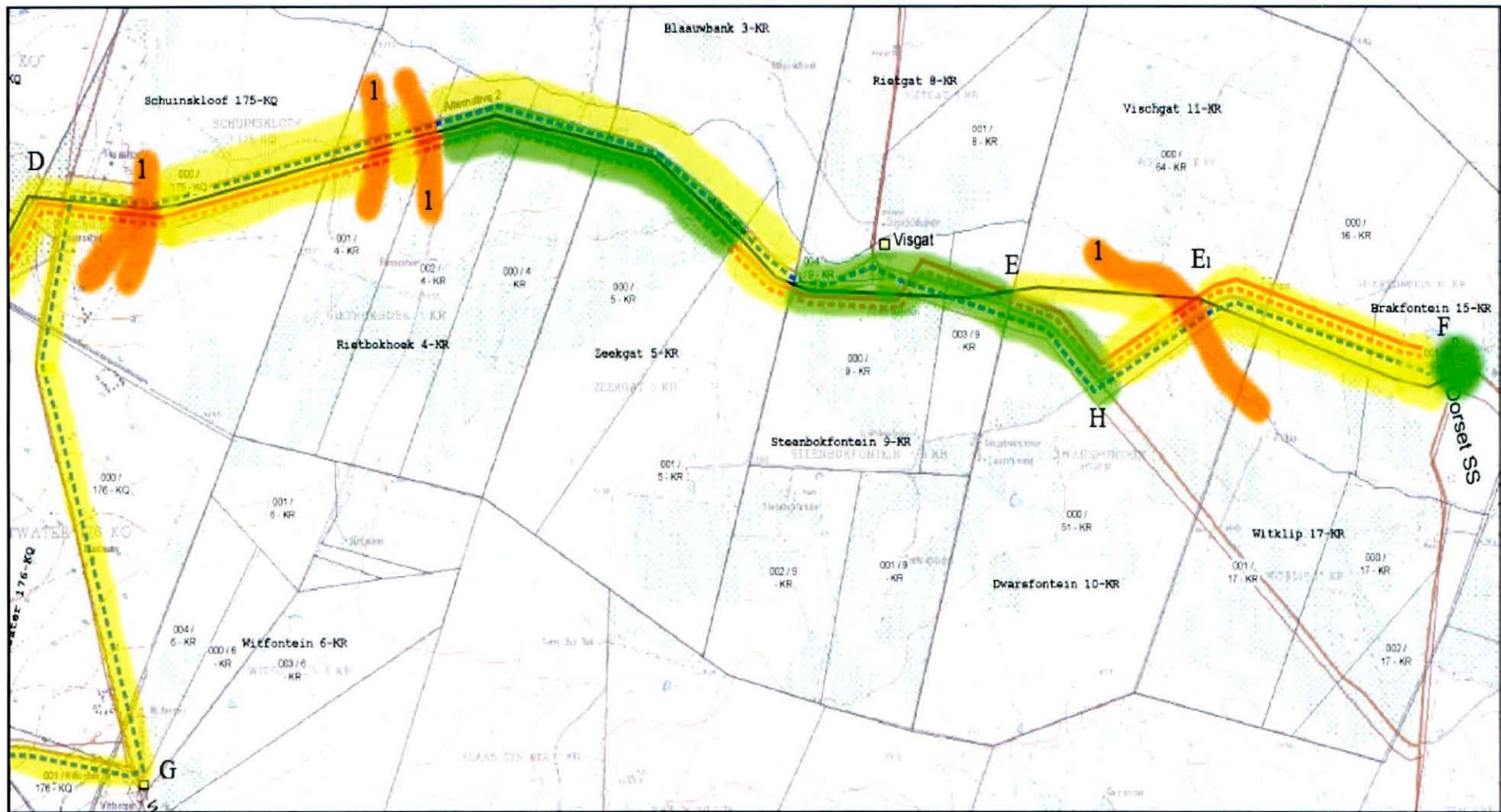
- Areas of High ecological sensitivity. No-Go areas.
- Areas of Medium / High ecological sensitivity. Go-But areas.
- Areas of Medium ecological sensitivity. Go-Slow areas.
- Areas of Low to Medium / Low ecological sensitivity. Go areas.
- 1 Rivers, streams and major drainage lines.
- 2 "No-Go" zone of Camel thorn trees (*Acacia erioloba*)



**Appendix A10:  
Sensitivity map: Portion 3**







**Legend to Map Detail – Route Alternatives (Portion 3)**

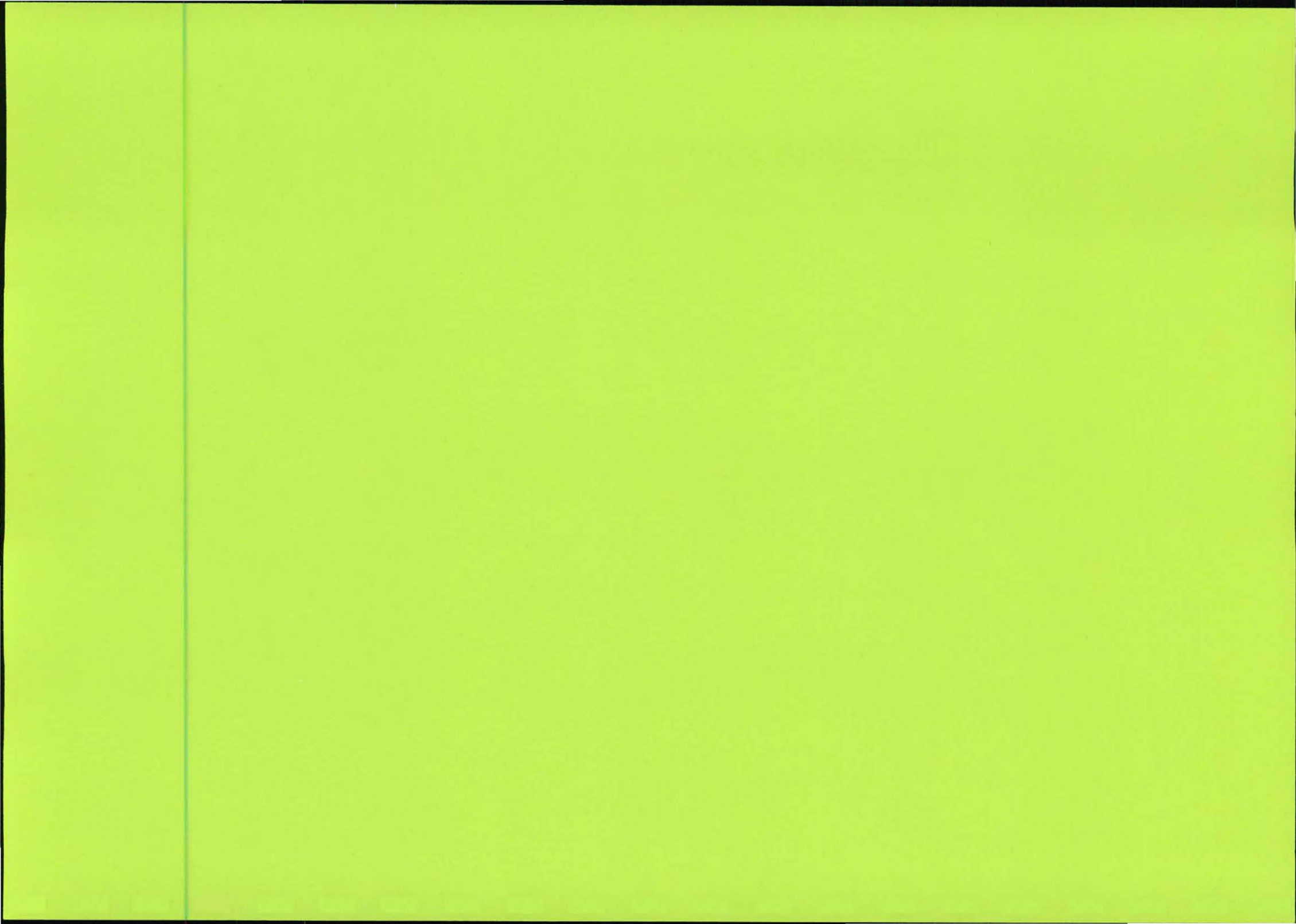
- Areas of High ecological sensitivity. No-Go areas.
- Areas of Medium / High ecological sensitivity. Go-But areas.
- Areas of Medium ecological sensitivity. Go-Slow areas.
- Areas of Low to Medium / Low ecological sensitivity. Go areas.
- 1 Rivers, streams and major drainage lines.
- 2 "No-Go" zone of Camel thorn trees (*Acacia erioloba*)

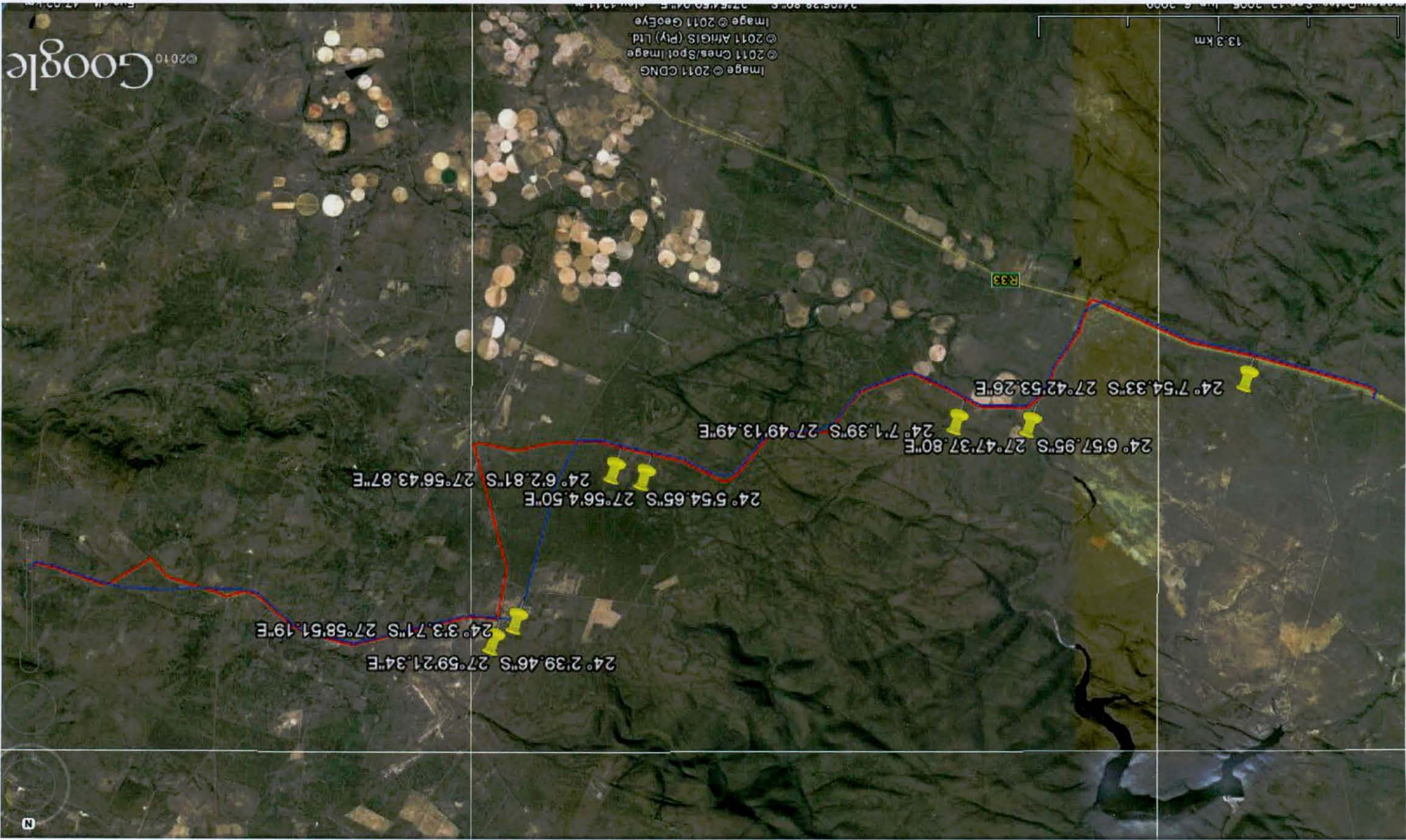


**Appendix A11:  
Sensitivity map: Bird Impact**

Mark areas with bird flight diverters (BFDs)







Google ©2010

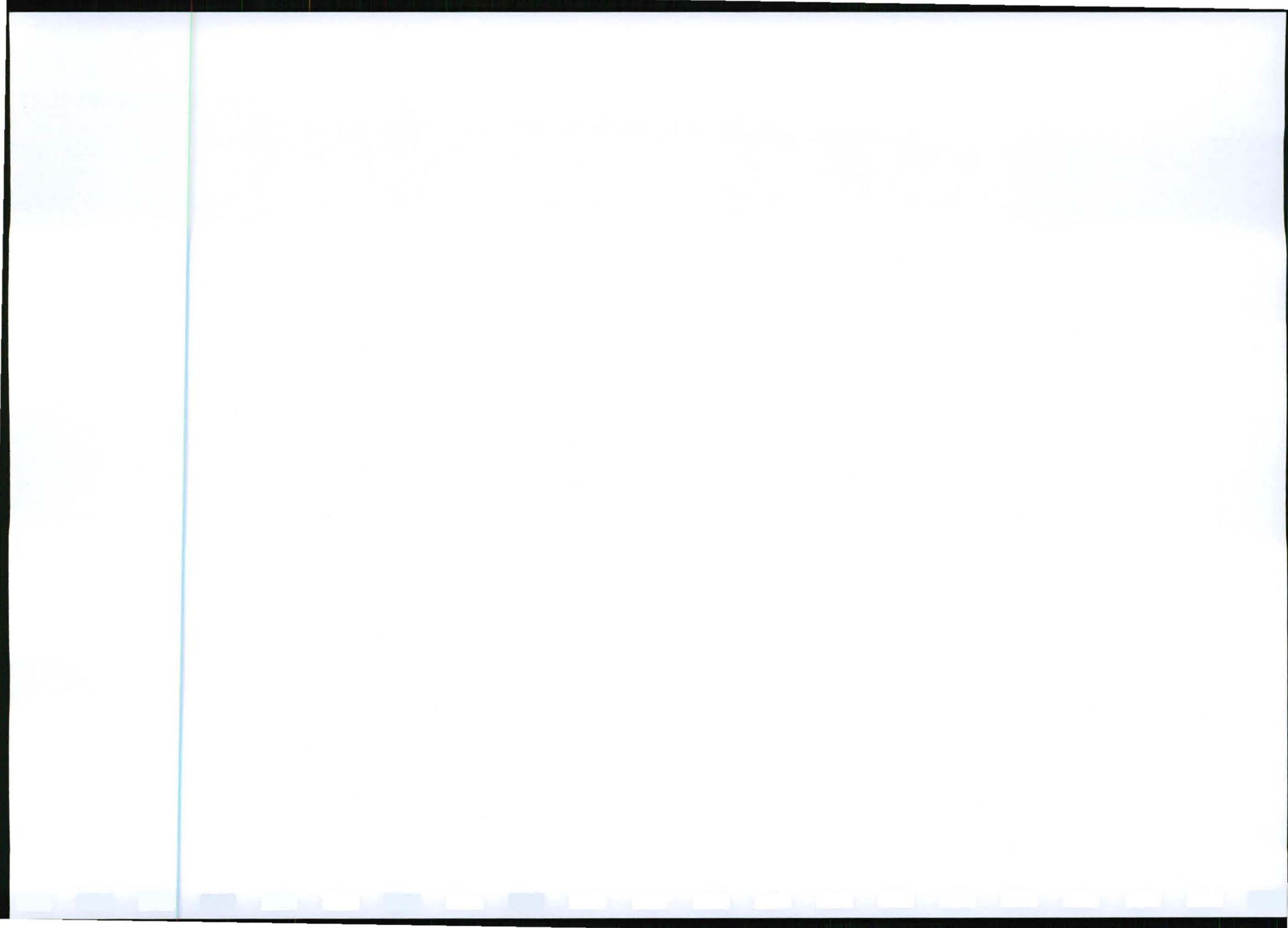
Image © 2011 CDNG  
© 2011 Gnes/Spot Image  
© 2011 AirGIS (Pty) Ltd.  
Image © 2011 GeoEye

13.3 km

R33

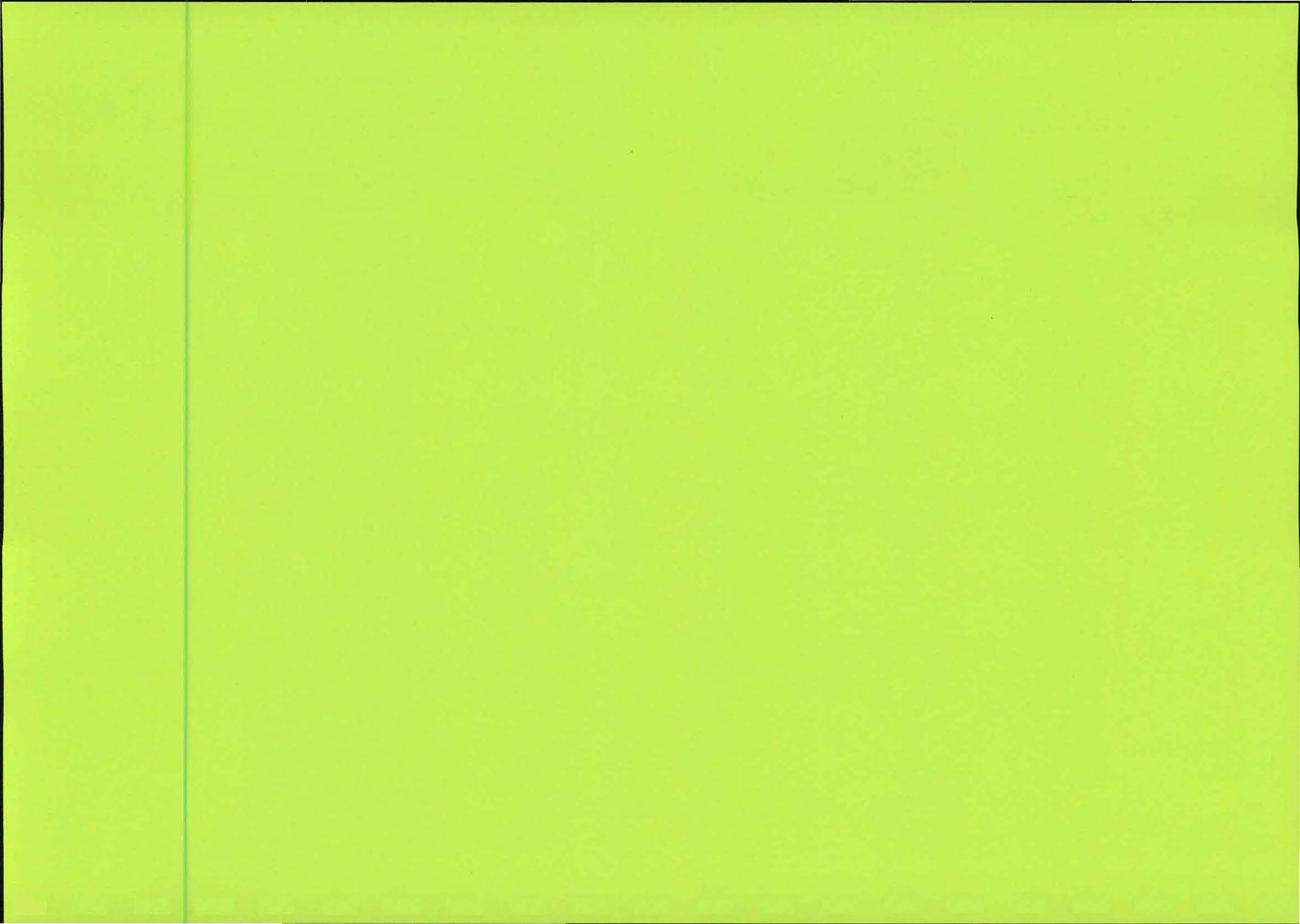
N





## Appendix B1: Photos of the study area





# Photos of proposed Bulge-Dorset 132kV line project

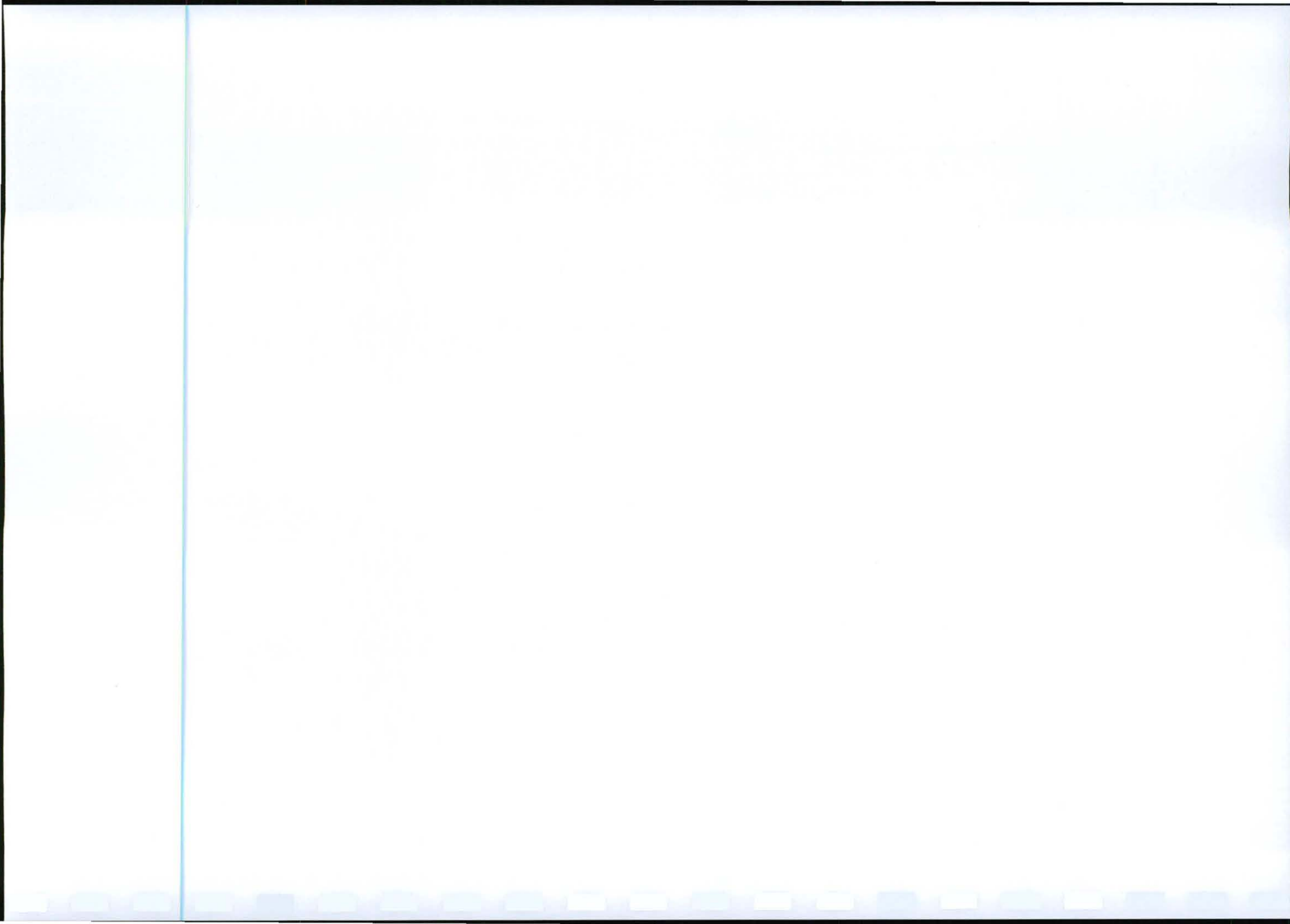


a.



b.

- a) The site of the new Bulgerivier substation (to be constructed)
- b) View from sand road (D1882) that runs from Hermanusdoorns towards Witfontein





# Photos of proposed Bulge-Dorset 132kV line project



a.



b.



c.



d.

- a) Aerial view of the Mokolo river that has to be crossed by the power line route
- b) View of rocky area to the east of the Mokolo River along the D1882 sand road, especially on the northside. The area is viewed as sensitive
- c) The veld south of the sand road (D1882) tends to be less rocky in areas, compared to the north, as shown here
- d) District roads D1882; D1005; and D1162 are affected by the proposed power line servitude. These are typical sand roads





# Photos of proposed Bulge-Dorset 132kV line project

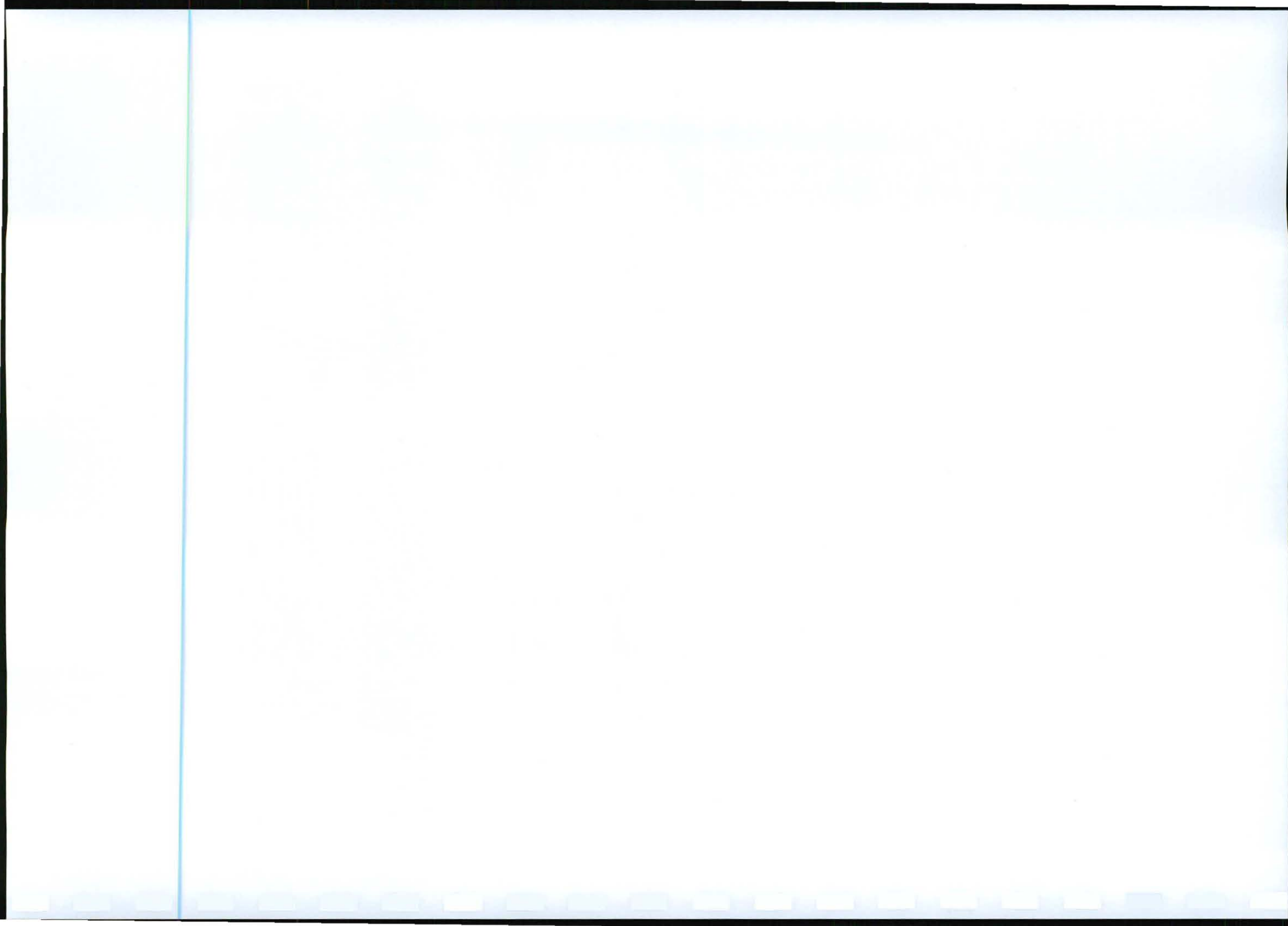


a.



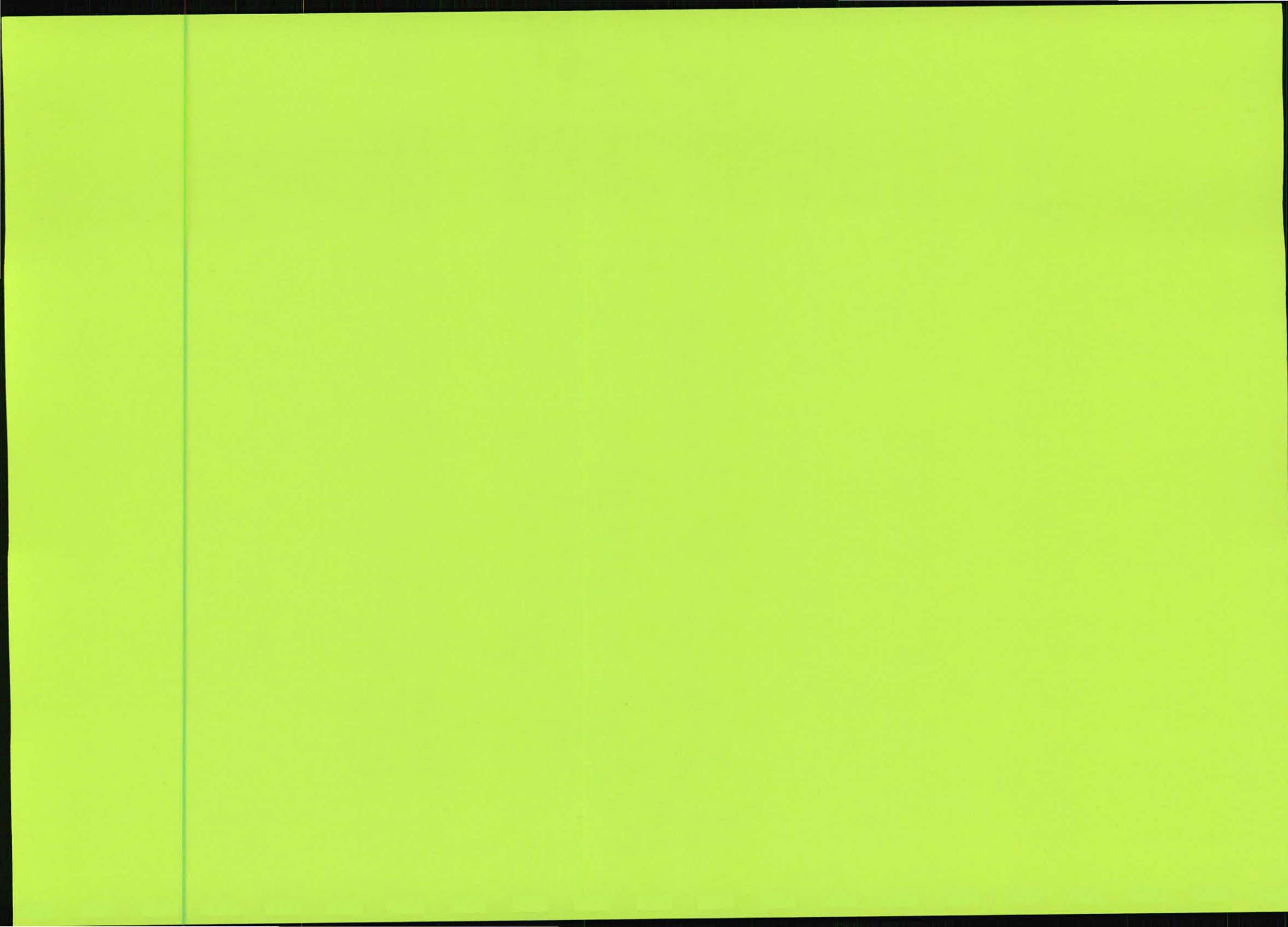
b.

- a) Bushveld of the study area and surrounding region. With the Dorset Substation construction site in the upper right
- b) View of the construction site of the Dorset Substation



**Appendix C1: Facility illustration(s)  
Eskom Scope of works**

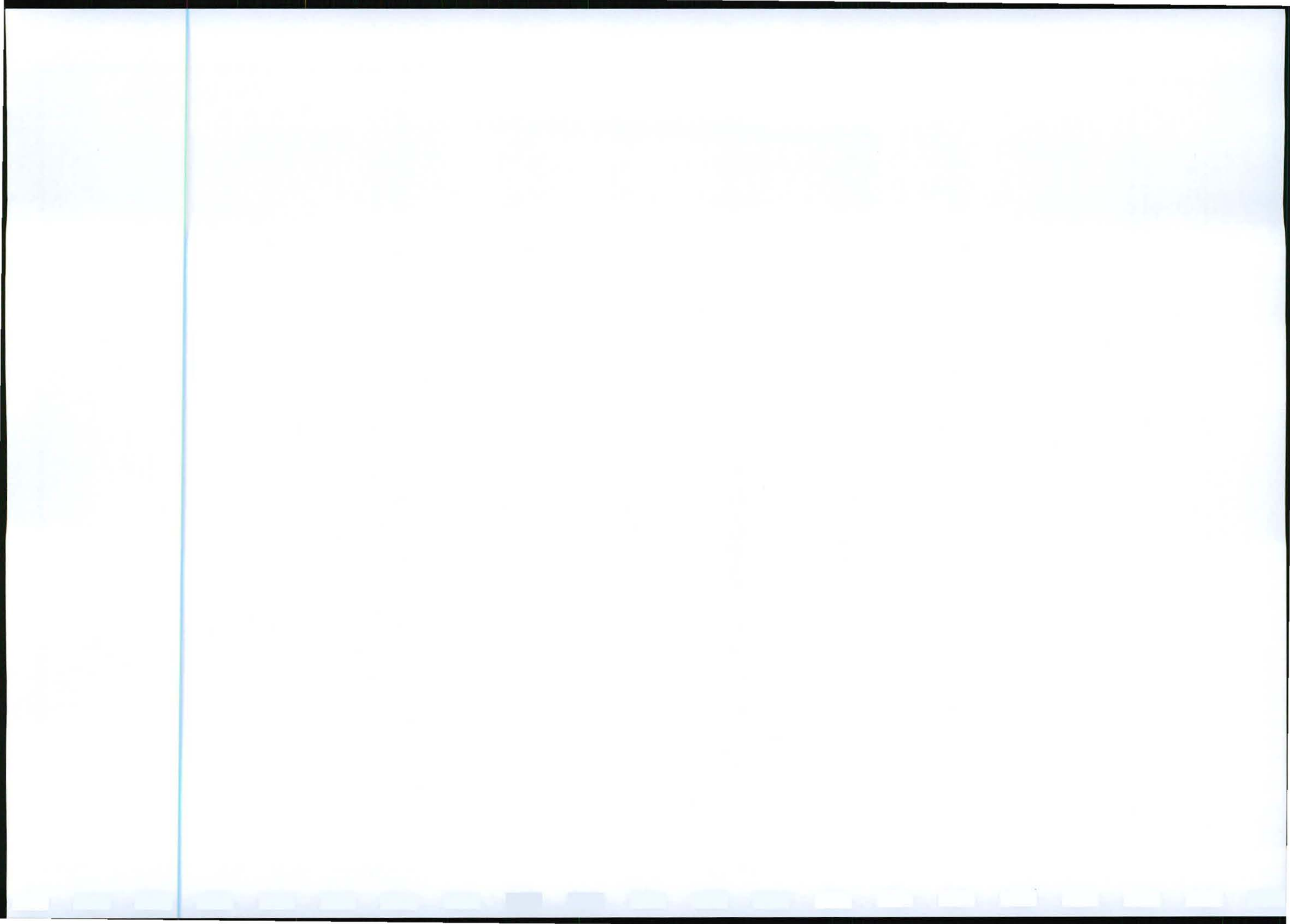




# **ESKOM**

## **NORTHERN REGION ENGINEERING PLANNING INVESTIGATION REPORT**

**Bulgerivier – Dorset Network Investigation**



## **EXECUTIVE SUMMARY**

It was identified in the Vaalwater Network Development plan that 2 new substations be built to improve the network performance in the area. These two new substations are Bulgerivier and Dorset. These substations will have their own electrification loads as well as picking up load from reticulation feeders from Theunispan, Flamingo and Vaalwater substations respectively.

At present, there is no 66kV line between Bulgerivier substation and Dorset substation. The purpose of this investigation was to determine the network flexibility and network performance, with N – 1 contingencies at strategic points, with a 66kV Chickadee line between Bulgerivier substation and Dorset substation. The results of this investigation will assist in analysing the options of either refurbishing or rebuilding the 66kV Hare line between Nylstroom substation and Vaalwater substation and the 66kV Hare line between Warmbad substation and Nylstroom substation.

## **BACKGROUND**

Currently, the Bulgerivier substation and the Dorset substation are in the design stages and should be completed towards the last quarter of 2006. Also, the intention is to equip Bulgerivier substation with a single 132/22 10MVA transformer and to equip Dorset substation with a single 66/22kV 10MVA transformer. A 132kV switching station will be built at the Flamingo T-off and a 43km 132kV Chickadee line will be built to Bulgerivier substation. Dorset substation will be supplied from the Vaalwater substation by a single 39km 66kV Chickadee line. The current planned network can be seen in the figure on the next page.





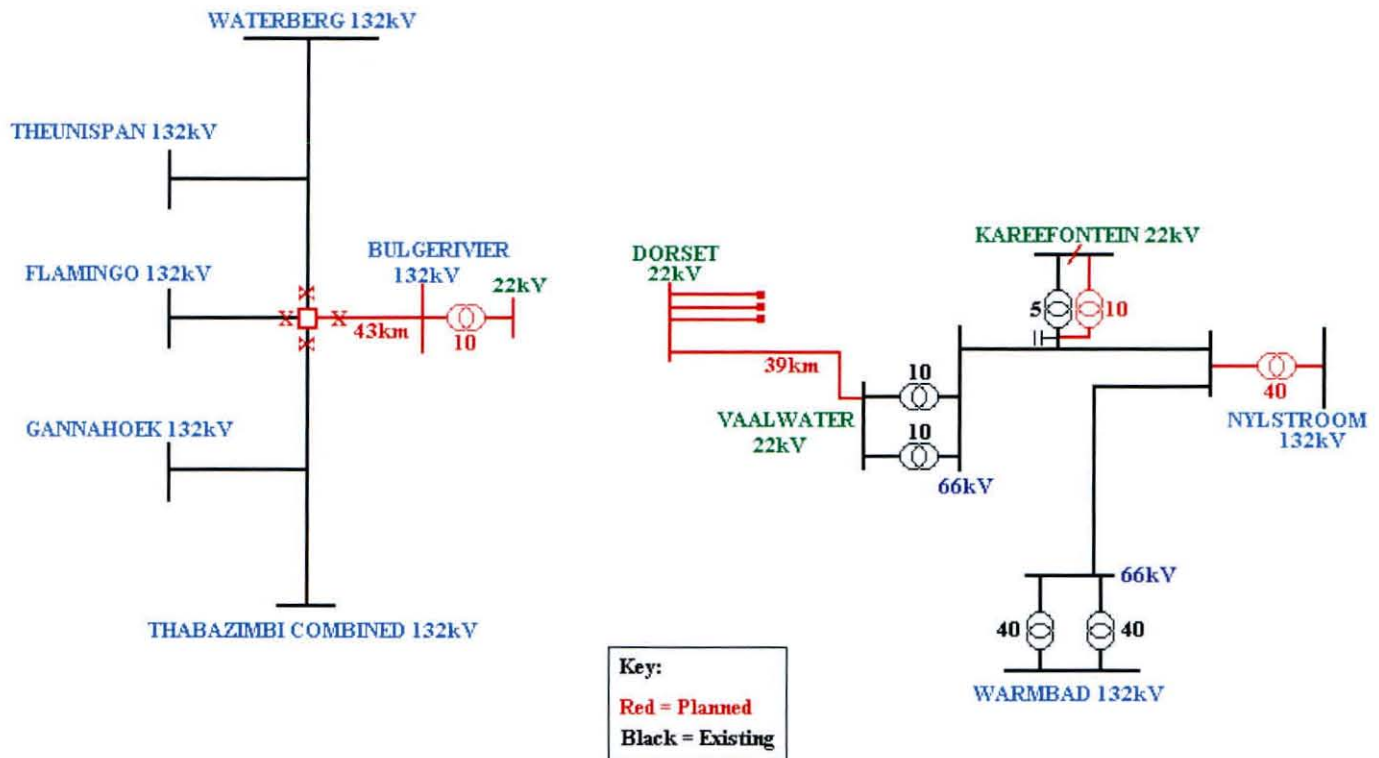


Figure 1 – Current Network Development Plans

In this investigation, the following additional network changes were made.

- 132/66kV 40MVA transformer at Bulgerivier substation
- 52km 66kV Chickadee line between Bulgerivier substation and Dorset substation
- 132/66kV 40MVA transformer at Nylstroom substation
- Normally open point on the 22km 66kV Hare line between Warmbad substation and Nylstroom substation

The network was investigated under the following three conditions:

- Option 1 – 132/66kV 40MVA transformers at Bulgerivier substation and at Nylstroom substation (with N – 1 contingencies)
- Option 2 – 132/66kV 40MVA transformer at Nylstroom substation only (with N – 1 contingencies)
- Option 3 (i) – 132/66kV 40MVA transformer at Bulgerivier substation only (with N – 1 contingencies)
- Option 3 (ii) – 132/66kV 40MVA transformer at Bulgerivier substation only with a 22kV 10MVA capacitor bank at Vaalwater (with N – 1 contingencies)
- Option 3 (iii) – 132/66kV 40MVA transformer at Bulgerivier substation only with a 22kV 10MVA capacitor bank at Vaalwater and Warmbad – Vaalwater line upgraded to Chickadee conductor (with N – 1 contingencies)
- Option 4 – 132kV network interconnect between Flamingo-T switching station to Warmbad substation

The above options can be seen in the figures on the next page.



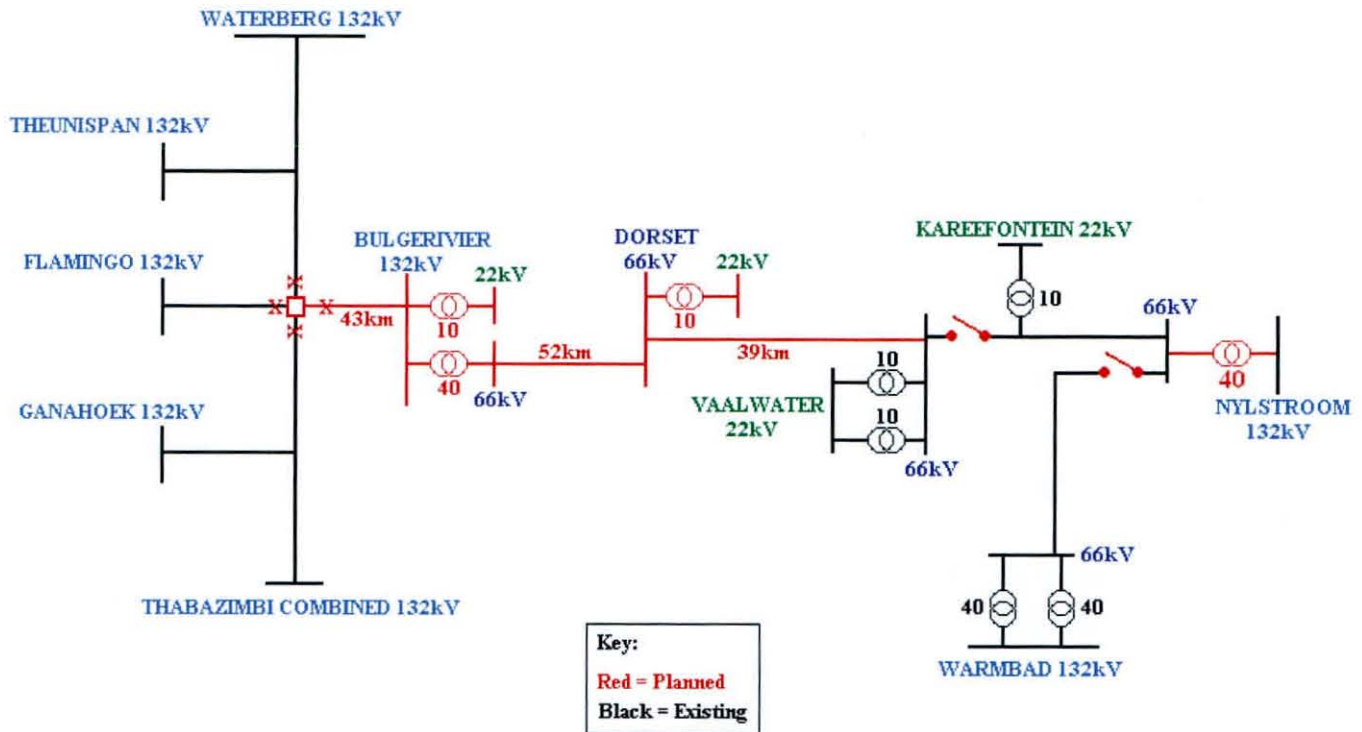


Figure 2 – Option 1: 66kV

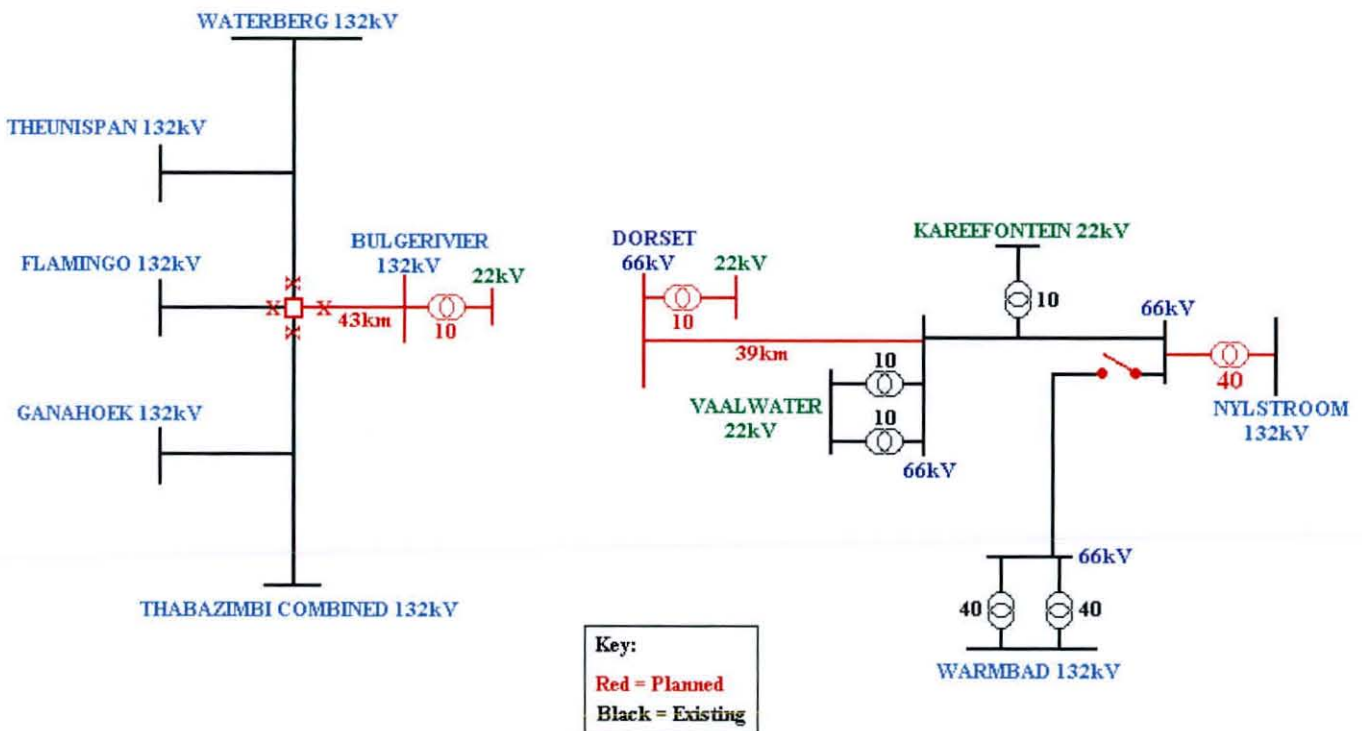
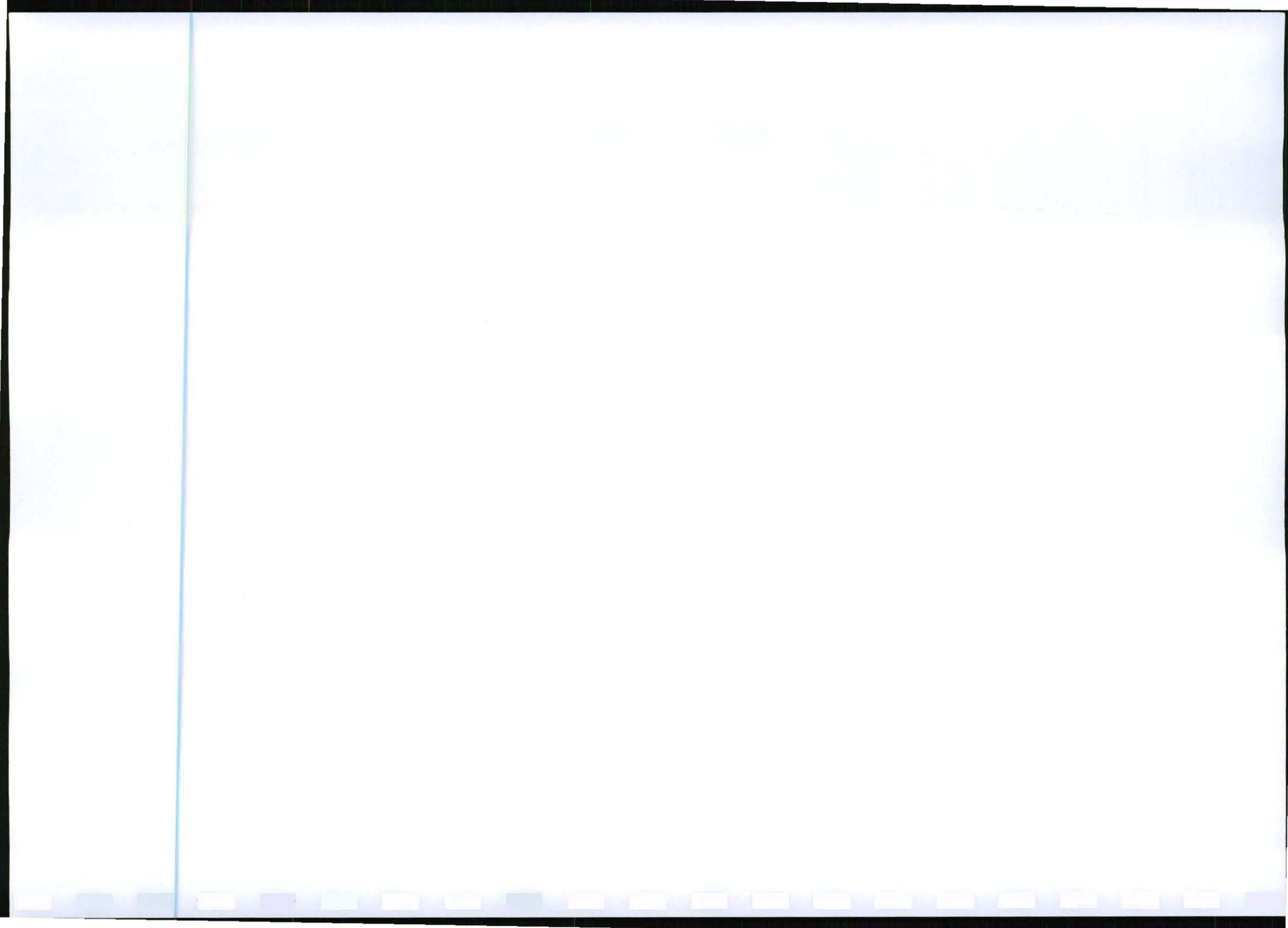
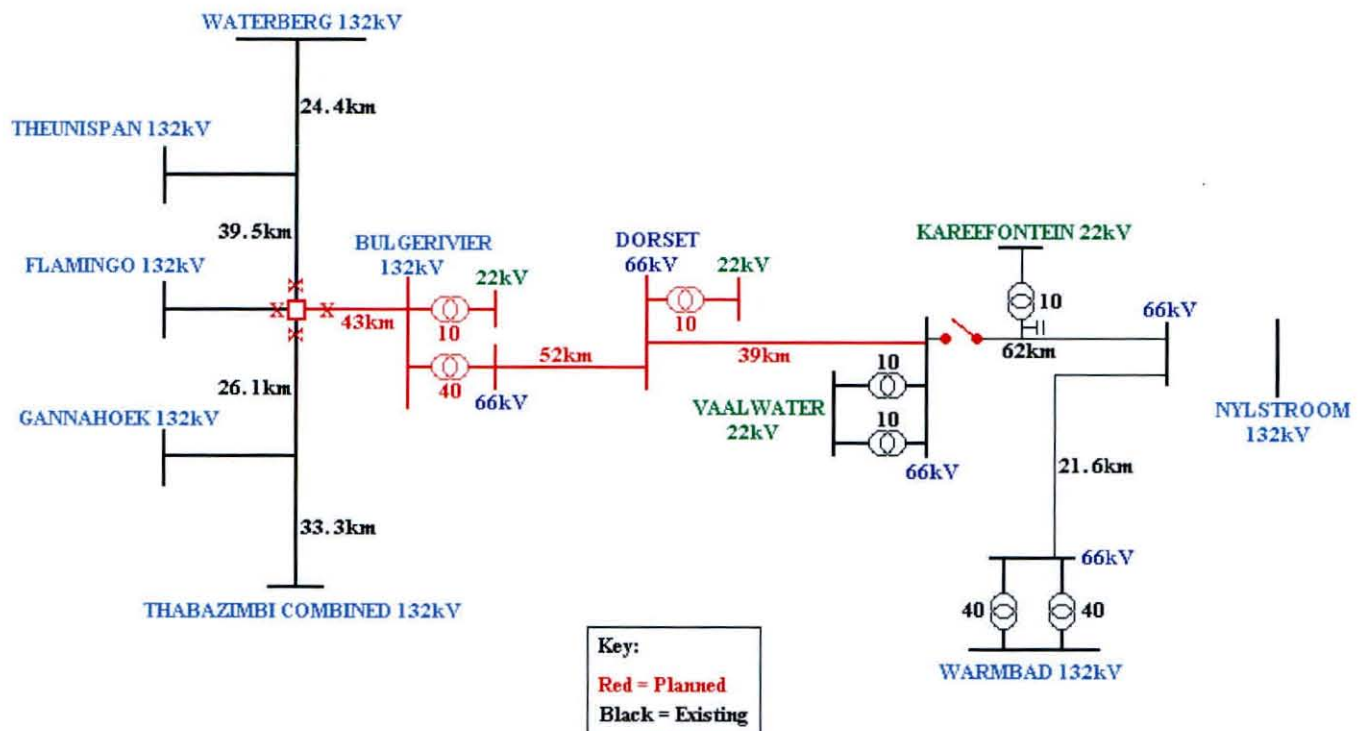


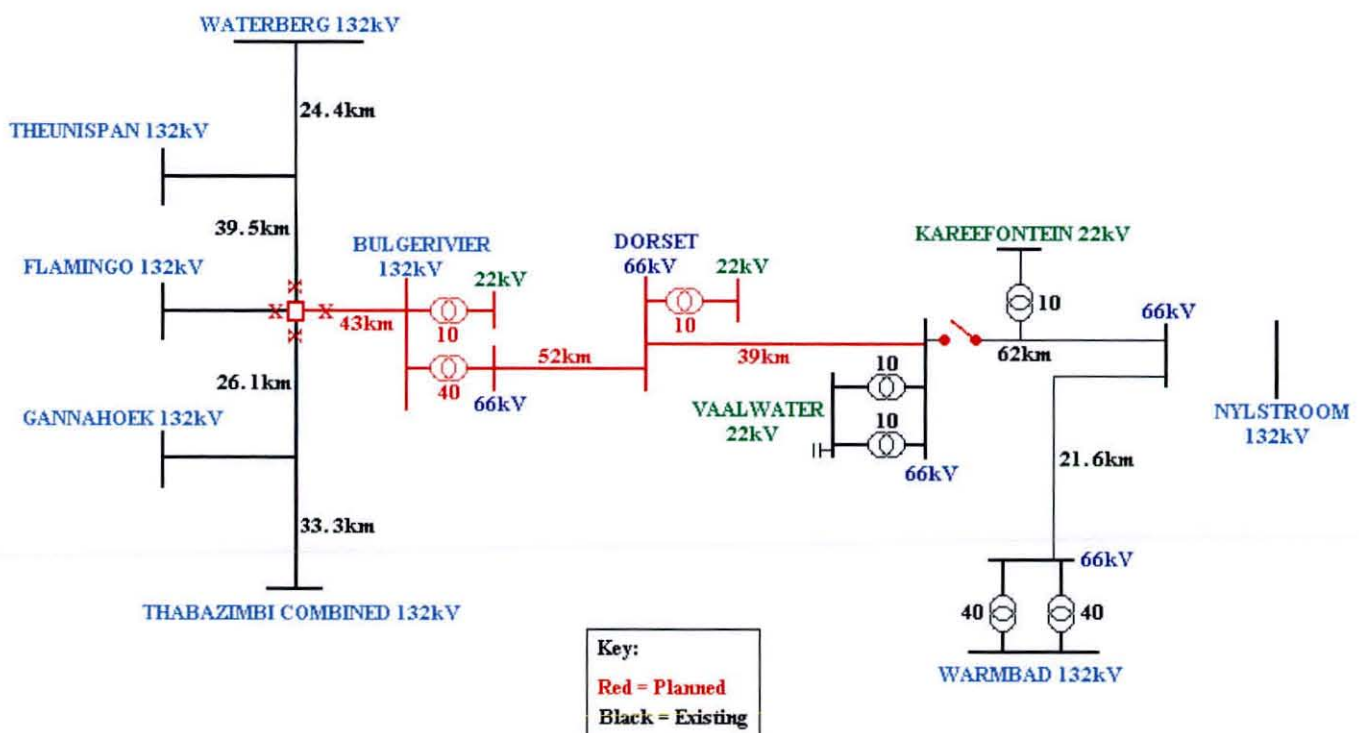
Figure 3 – Option 2: 66kV



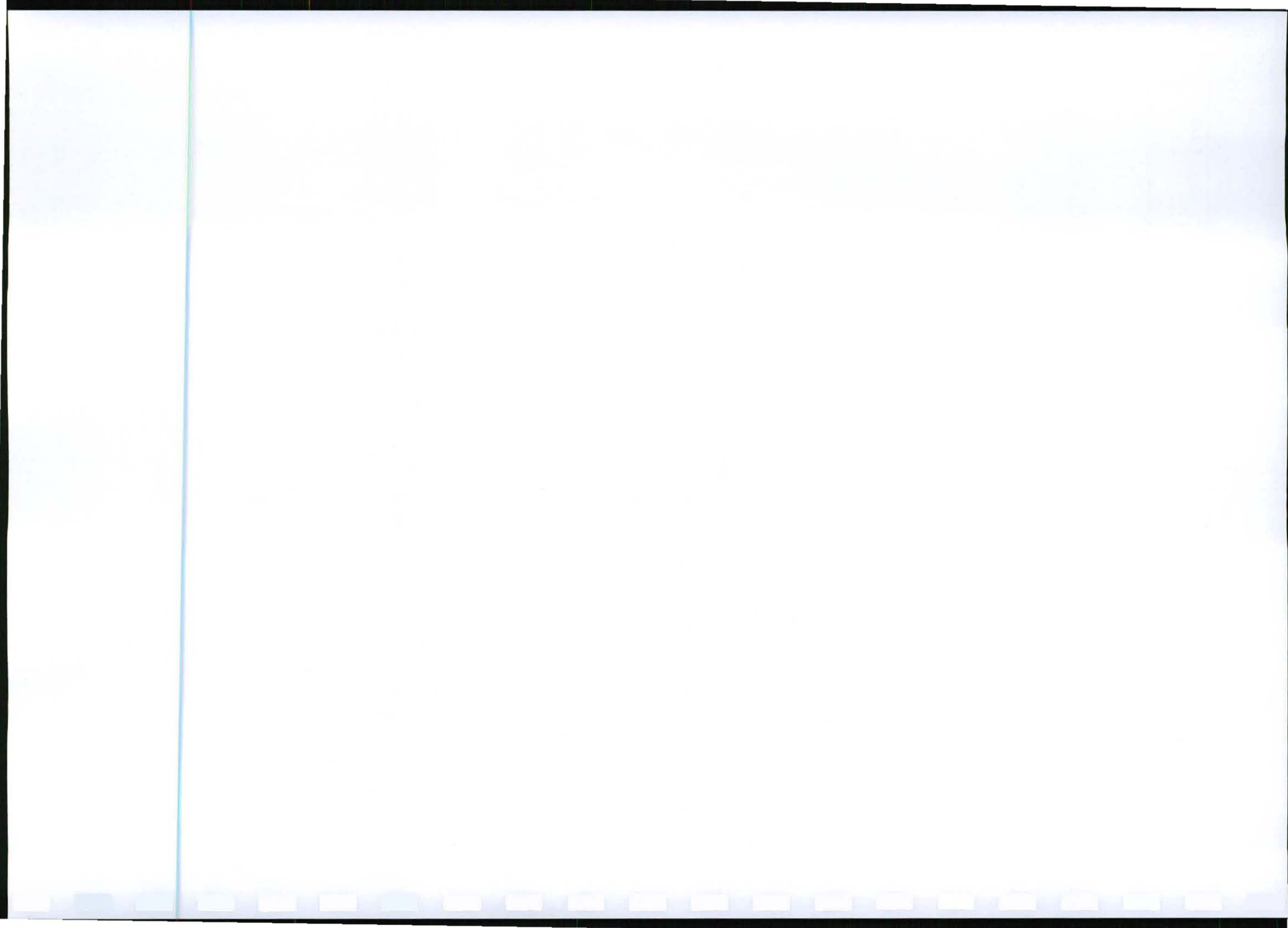


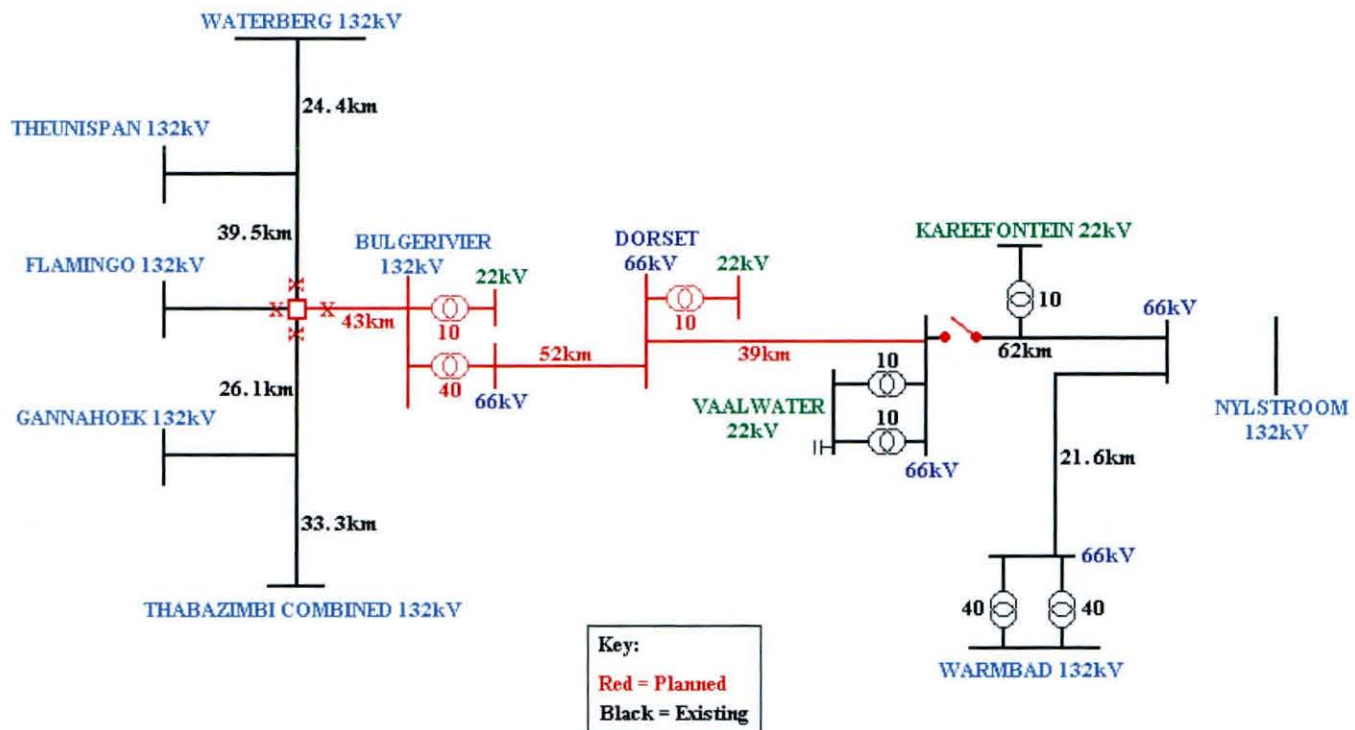


**Figure 4 – Option 3 (i): 66kV**

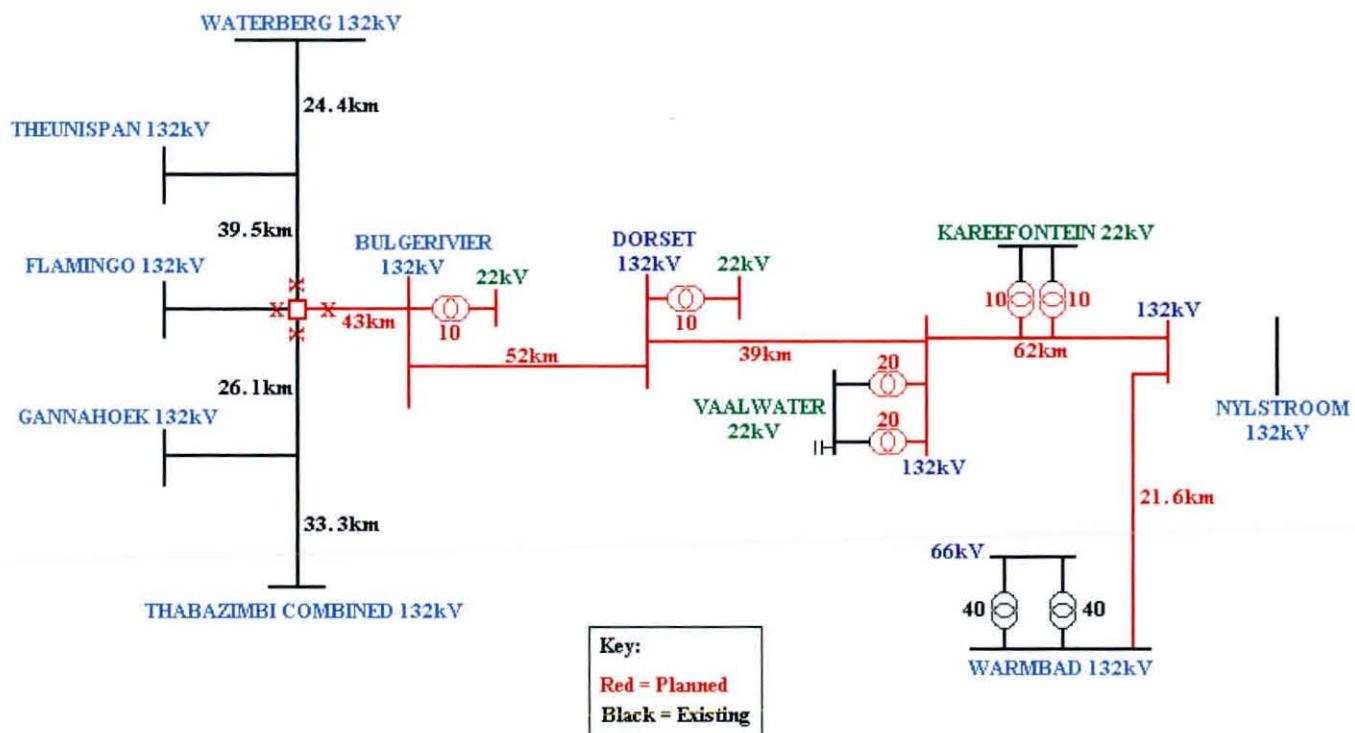


**Figure 5 – Option 3 (ii): 66kV**



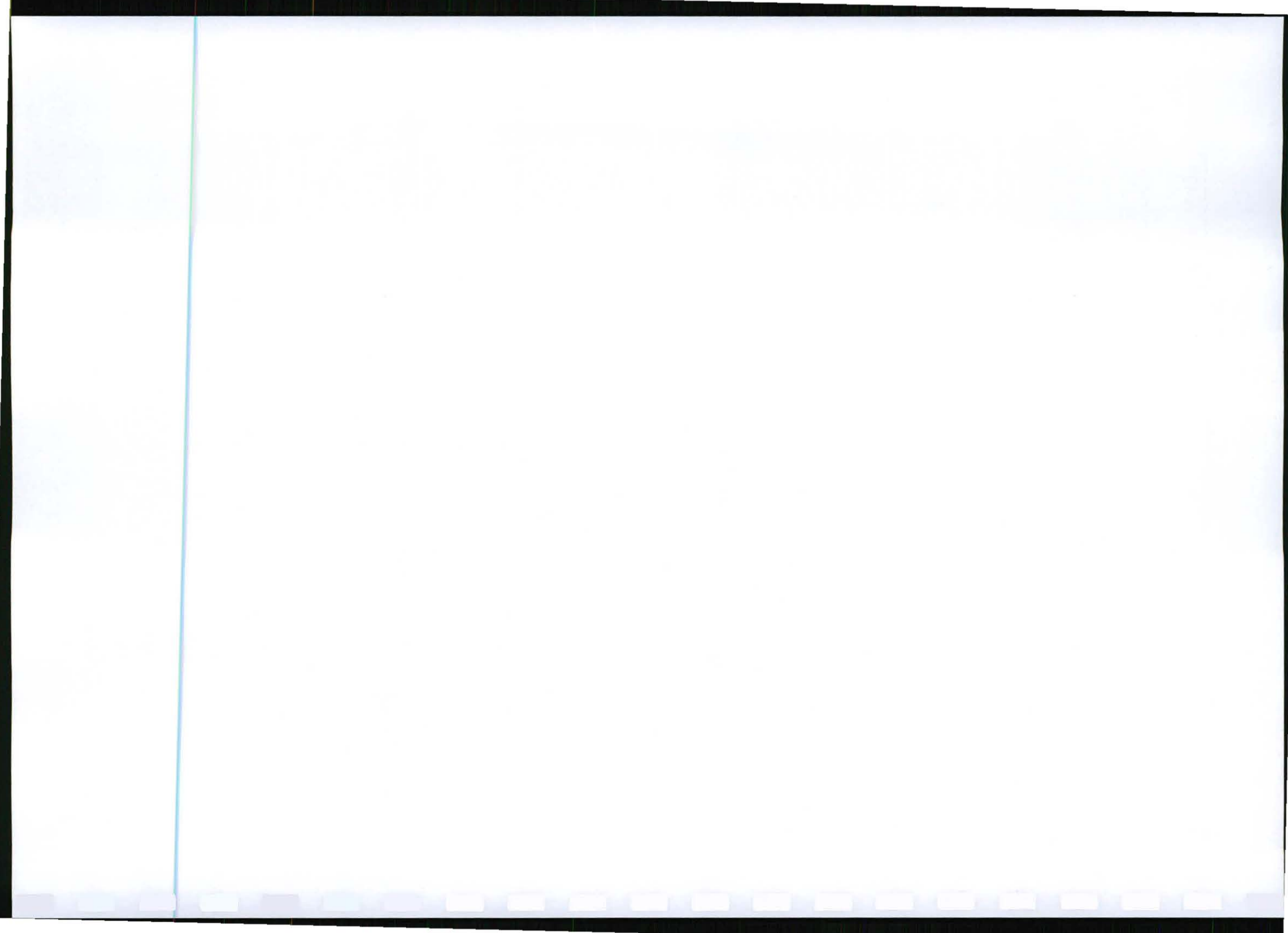


**Figure 6 – Option 3 (iii): 66kV**



**Figure 7 – Option 4: 132kV**



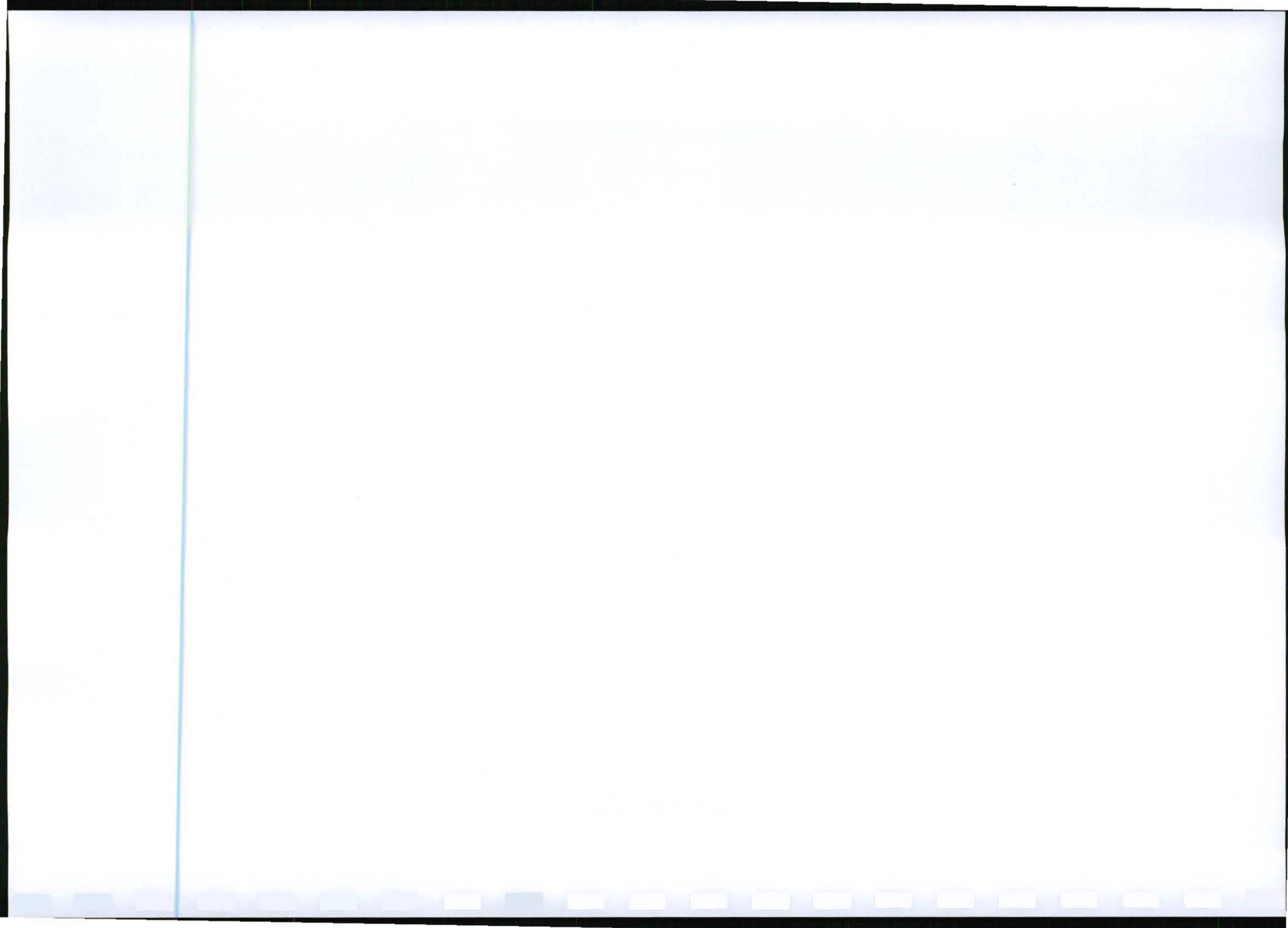


**DISCUSSION & FINDINGS**

The network, shown in the above figures, was analysed using the load forecast. The various loadings were either obtained from the Vaalwater Network Development Plan (NDP) or the regional load forecast (LF). The 132kV network voltages were found the best.

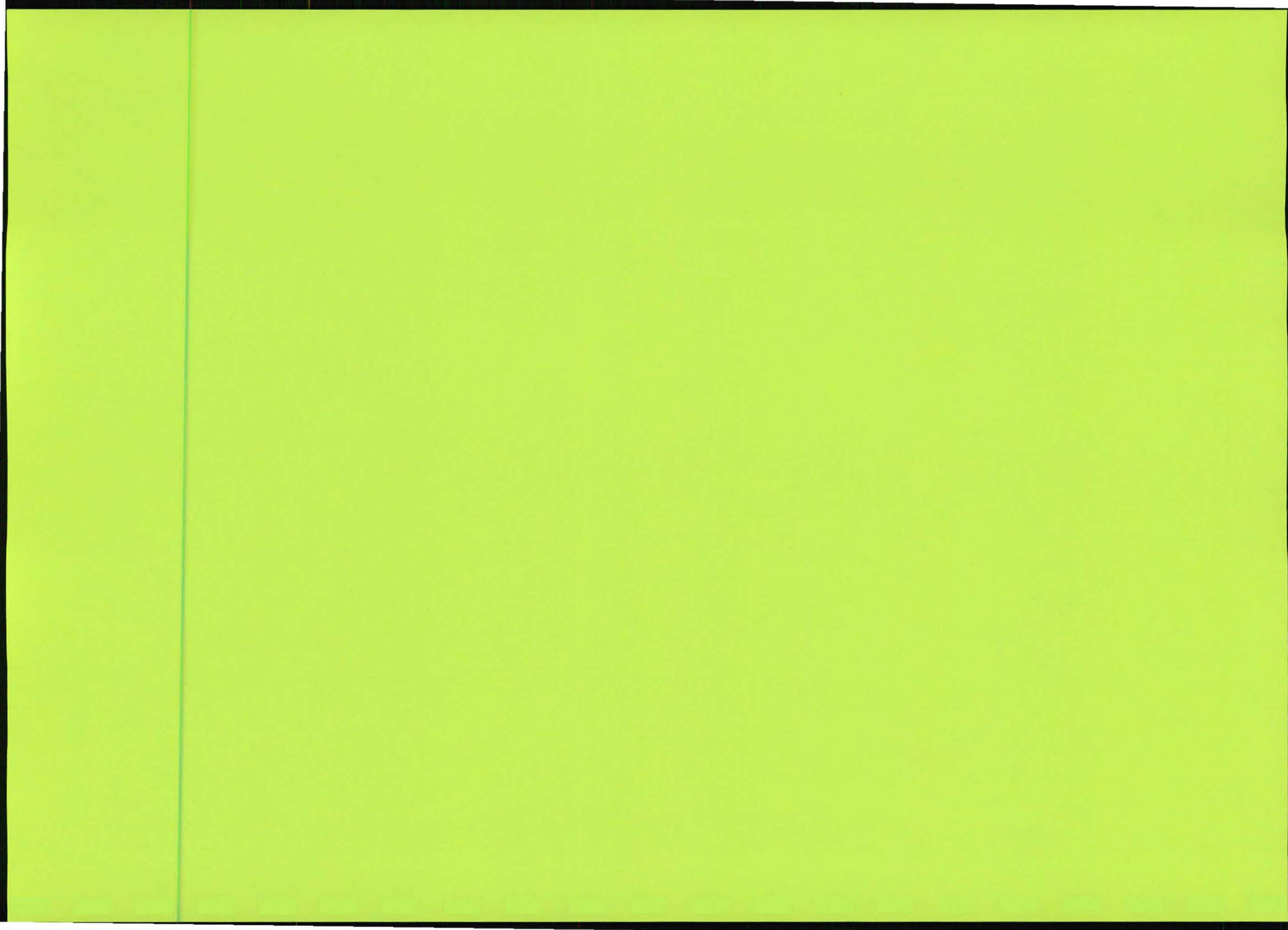
**RECOMMENDATIONS**

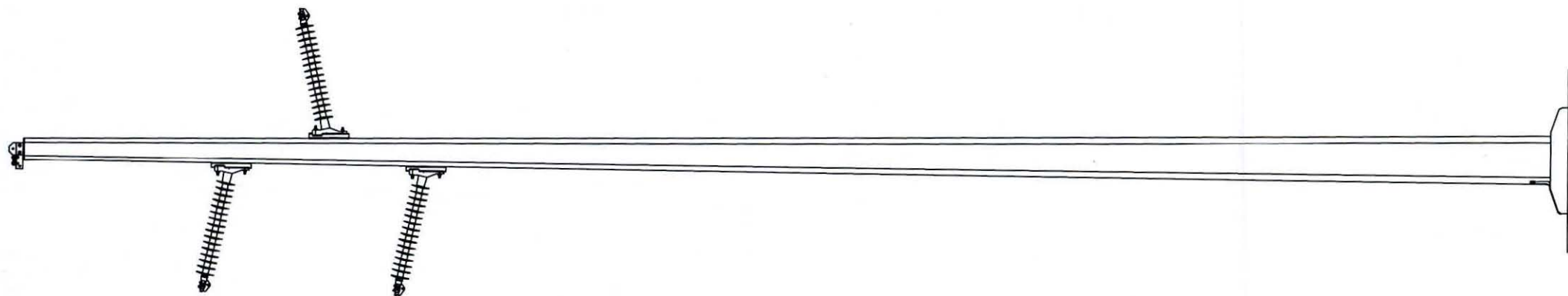
Invest in the construction and implementation of 132kV network strengthening plan (i.e. Option 4)

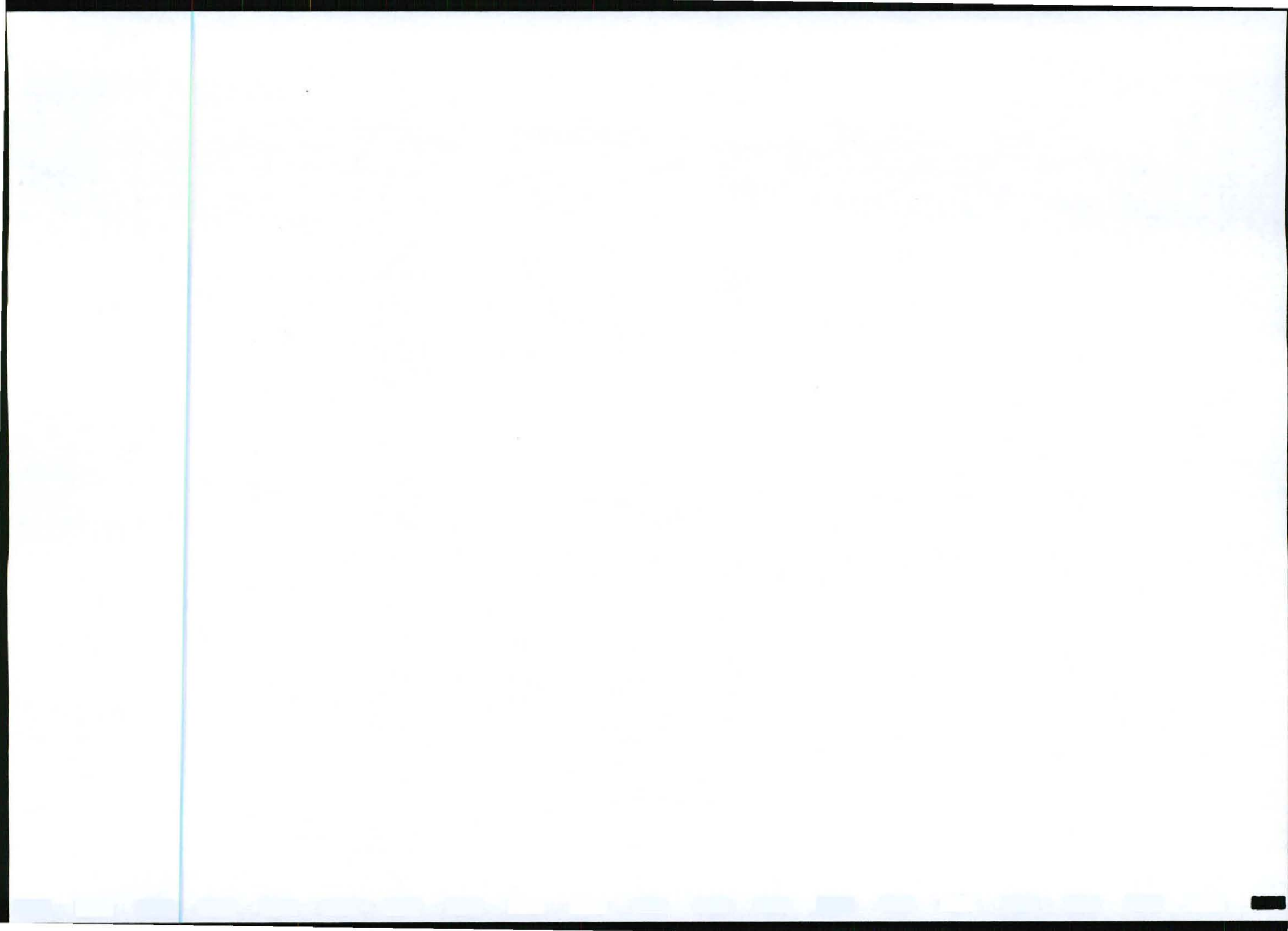


**Appendix C2: Facility illustration(s)  
Visual of monopole steel structure  
Eskom 132kV Type 259 Intermediate structure/pylon**



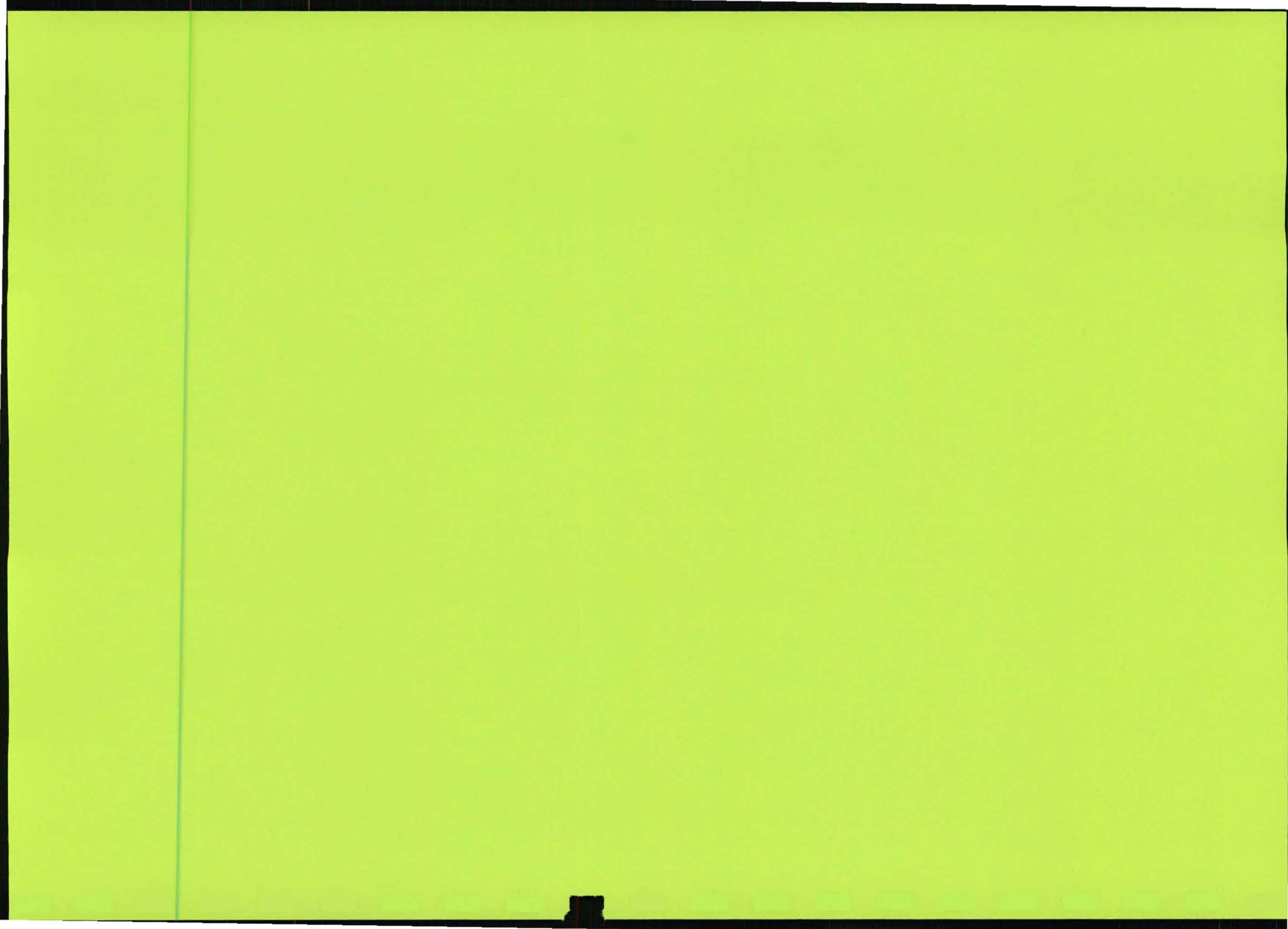


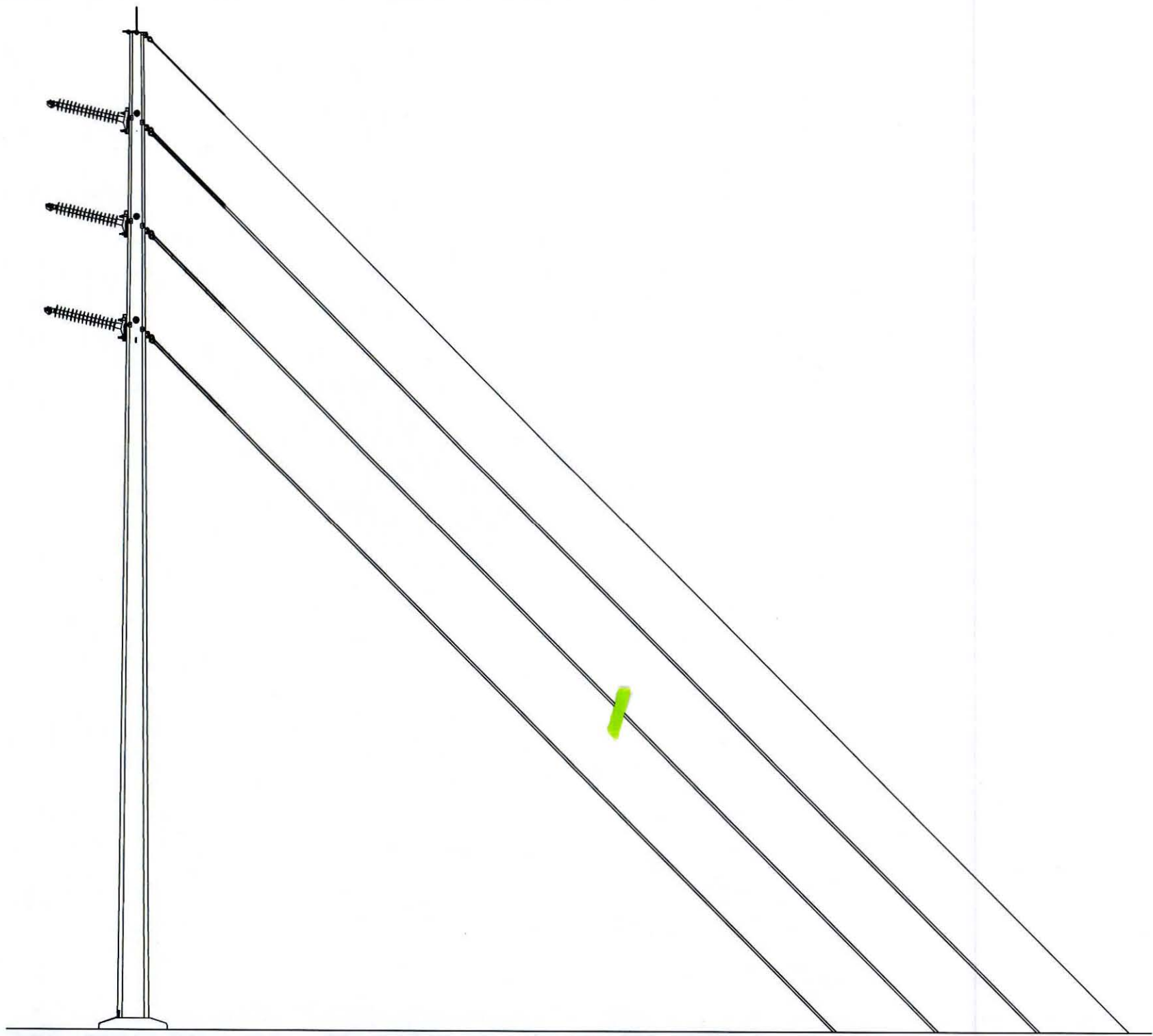


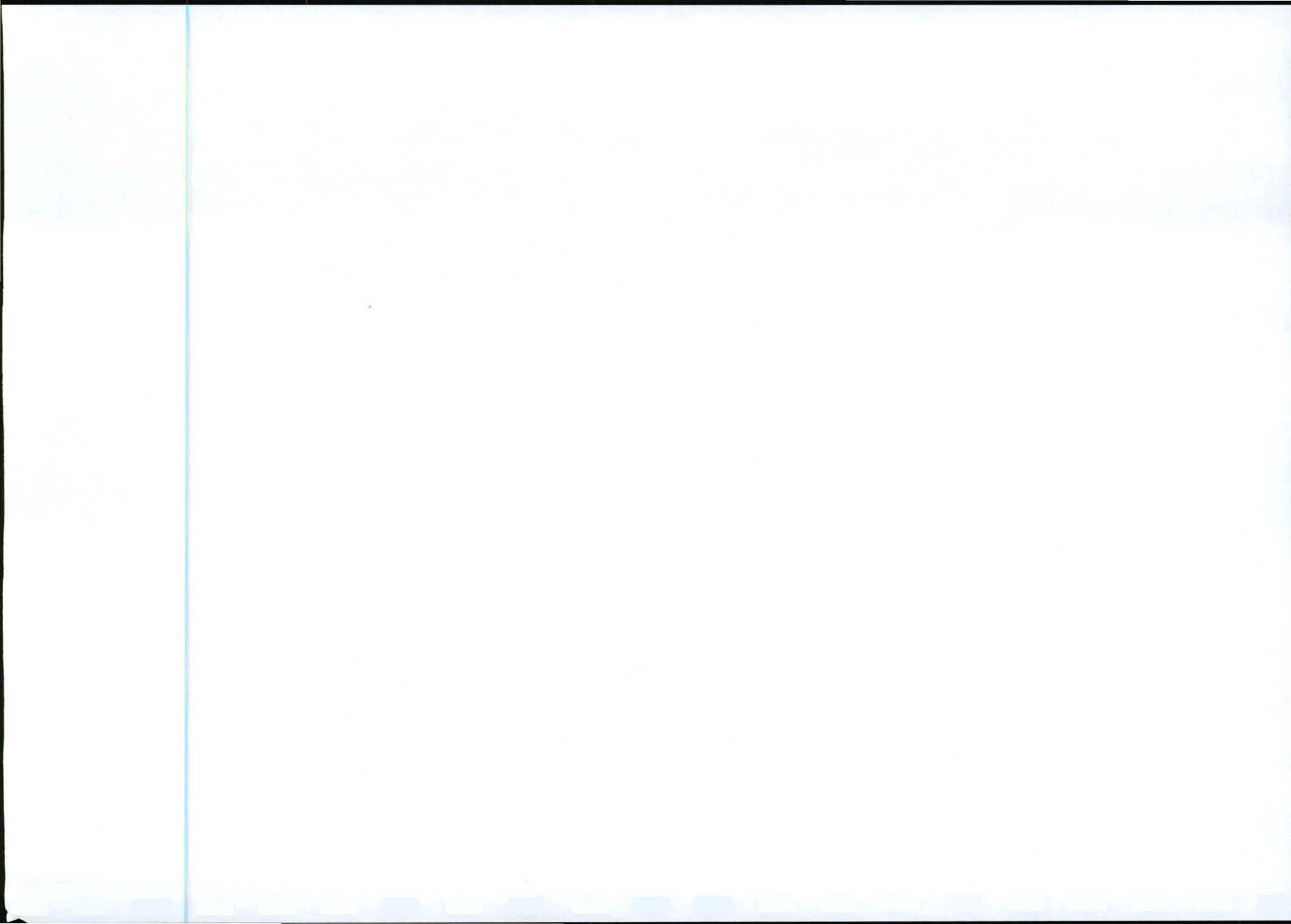


**Appendix C3: Facility illustration(s)  
Visual of monopole steel structure  
Eskom 132kV Type 259 Angle Strain Structure**



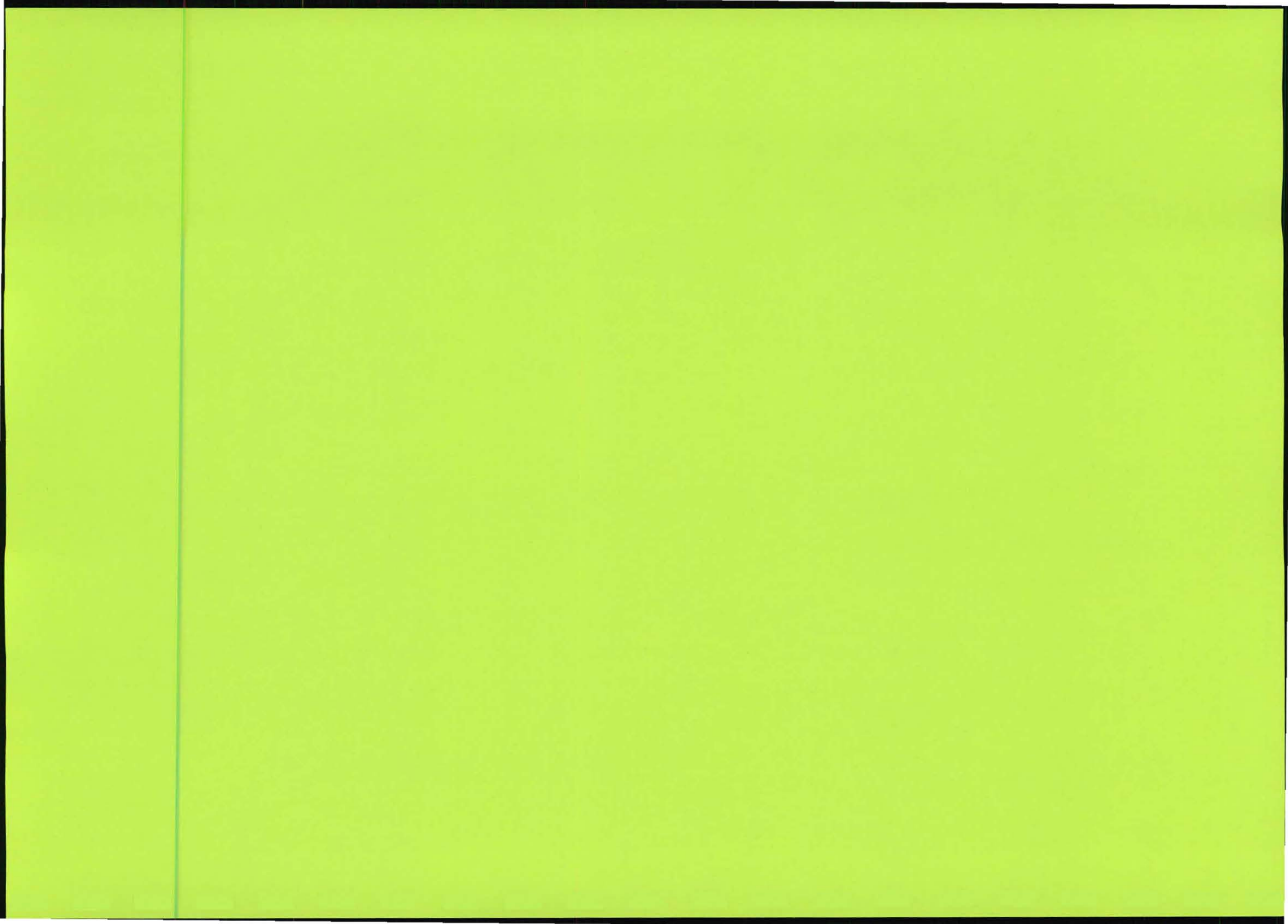






**Appendix D1: Specialist reports  
Ecological Status Report**





# **BULGE-DORSET 132kV LINE PROJECT**

**CONSTRUCTION OF A 132kV POWERLINE FROM BULGE RIVER  
SUBSTATION TO DORSET SUBSTATION**

## **SPECIALIST REPORT ECOLOGICAL ENVIRONMENT**

**Texture Environmental Consultants**

**COMPILED BY  
Flori Horticultural Services cc**

**JULY 2011**



**STUDY NAME:** BULGE-DORSET 132kV LINE PROJECT  
Construction of a 132kV powerline from Bulge River substation  
to Dorset substation

**PROJECT TITLE:** Specialist report – Ecological Environment

**COMPILED BY:** Flori Horticultural Services cc

**AUTHORS:** Johannes Maree, MSc. *Pr.Sci.Nat.* MBA

**DATE:** July, 2011

**REPORT STATUS:** Final Draft ammended

**REPORT NUMBER:** BG-DT02

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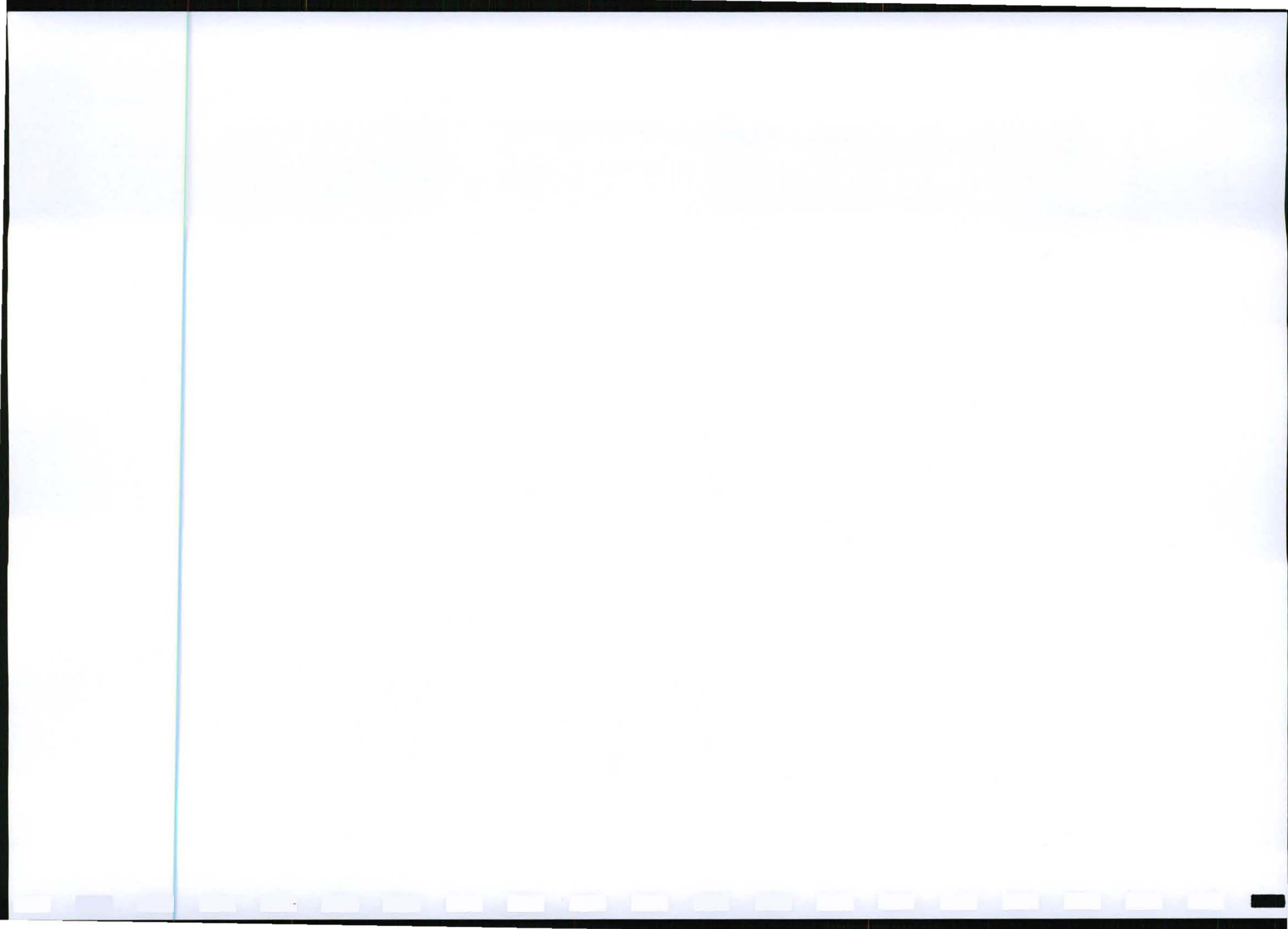
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## 1. EXECUTIVE SUMMARY

Eskom is planning the construction of a 132kV powerline from Bulge River Substation, over a distance of approximately 61 to 65km, to the Dorset Substation. A specialist investigation of the floristic and faunal environment was conducted. Sensitive attributes within the study area have been highlighted, along with broad descriptions of the various elements. A desktop study and field investigations were conducted of the surrounding areas and the specific study area. Based on these findings pertinent mitigating actions were recommended and a specific route for the line recommended.

The study area falls within the Savanna Biome. Three vegetation types are encountered in the area. Namely, Central Sandy Bushveld (Mixed Bushveld – Low & Rebelo, 1996; Mixed Bushveld and Sourish Mixed Bushveld – Acocks, 1953); Western Sandy Bushveld (Mixed Bushveld – Low & Rebelo, 1996; Mixed Bushveld - Acocks, 1953) and Waterberg Mountain Bushveld (Waterberg Moist Mountain Bushveld – Low & Rebelo, 1996; Sour Bushveld – Acocks, 1953).

Red data species and protected species found in the area include Camel thorn (*Acacia erioloba*), Leadwood (*Combretum imberbe*) and Marula (*Sclerocarya birrea* subsp. *caffra*). Other protected trees and shrubs that potentially occur in the study area, but that were not observed during field investigations include, Shepherd's tree (*Boscia albitrunca*), Wild pear (*Dombeya rotundifolia* var. *rotundifolia*), Bushveld saffron (*Elaeodendron transvaalense*), Bushveld red balloon (*Erythrophysa transvaalensis*) and Violet tree (*Securidaca longipedunculata*). No threatened or protected mammal, butterfly or amphibian species were observed in the study area, although some are most likely present. These include African rock python (*Python natalensis*), Giant bullfrog (*Pyxicephalus adspersus*), Honey badger (*Mellivora capensis*), Pangonlin (*Manis temmincki*) and Southern African hedgehog (*Atelerix frontalis*).

The soils in the proposed powerline servitude routes and immediate vicinity are predominantly shallow to deep sandy and gravelly soils with a low clay content. The





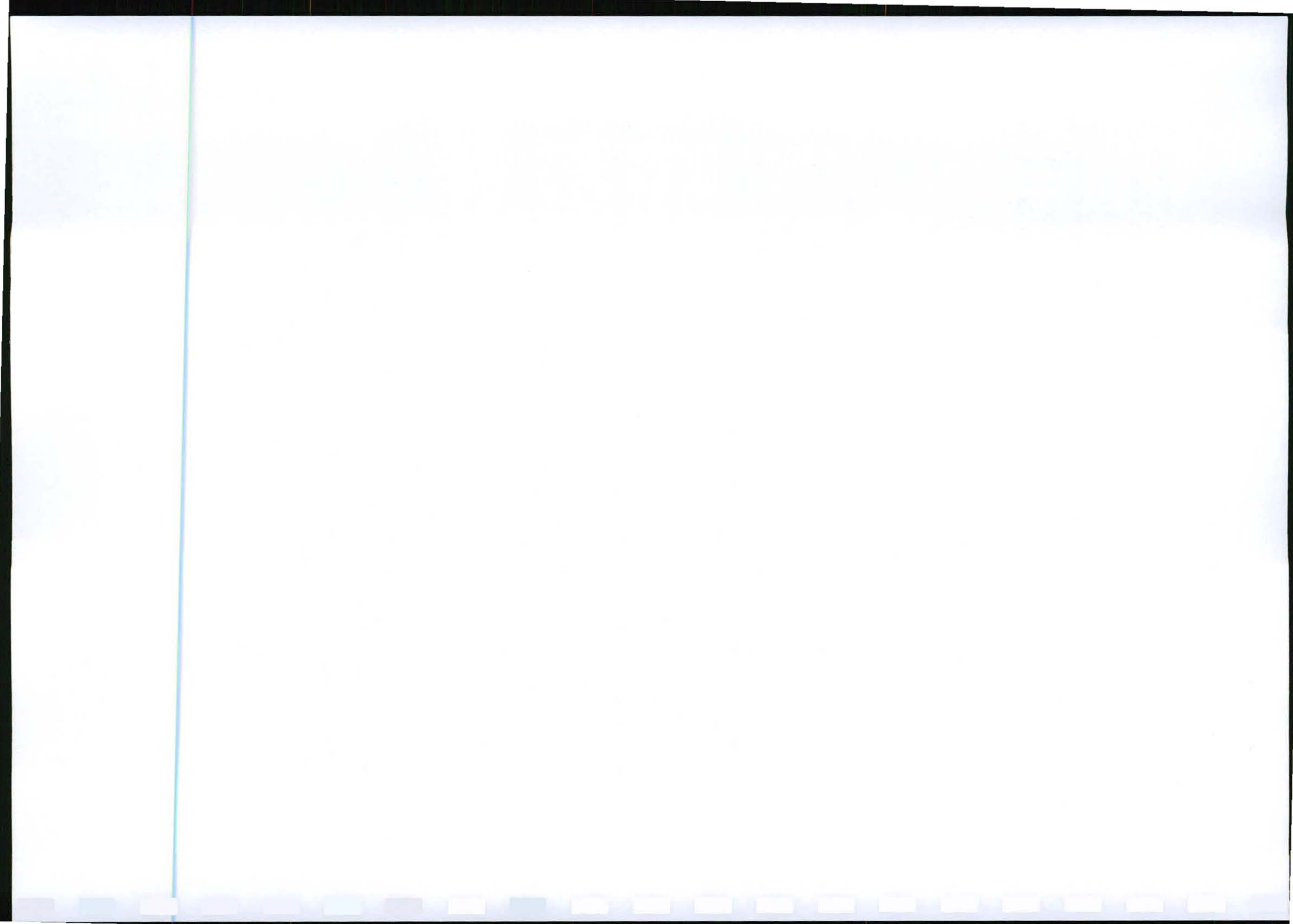
colours of which are generally red to yellowish. A number of highly eroded areas and slopes have a high presence of large surface and sub-surface rocks. Large areas of the bushveld in the region are undisturbed, with a number of formal nature reserves, private game ranches and lodges. The area is home to the Big Five. Other land-uses in the area include agriculture in the form of pivot-irrigated, cultivated lands and cattle farming. Urbanisation and human development of the immediate region are low.

Floristic and faunal sensitivity calculations were done for the various distinctive units found within the study area. A large percentage of the vegetation in the study area can be viewed as pristine. The vegetation is fairly uniform with no small ecosystems or islands of uniqueness being present. Floristic sensitivity calculations were as follows: Regional vegetation – medium (Go-Slow zone); Rivers – medium/high (Go-But zones); Rocky areas – medium/high (Go-But zones); Camel thorns – high (No-Go zone). Faunal sensitivity calculations were as follows: Regional vegetation – medium (Go-Slow zone); Rivers – medium/high (Go-But zones); Rocky areas – medium/high (Go-But zones); Camel thorns – medium (Go-Slow zone).

The ecological sensitivity of the study area is determined by combining the sensitivity analyses of both the floral and faunal components. The highest calculated value is taken to represent the ecological sensitivity of that unit, whether it is floristic or faunal in nature. The ecological sensitivity analyses produced the following outcomes: Regional vegetation – medium (Go-Slow zone); Rivers – medium / high (Go-But zones); Rocky areas - medium/high (Go-But zones); and the small area of Camel thorns – high (No-Go zone).

A number of mitigating actions were recommended. The proper implementation and management of these measures will ensure that potential impacts on the ecology of the area are reduced and kept to low, acceptable levels. These measures include staying out of No-Go zones (highly sensitive areas such as the camel thorn grove); not placing any pylons closer than 30m from the edge of river banks or 10m from the edge of drainage lines; an ongoing management programme to mechanically control alien plant species that invade the disturbed soils around the newly erected pylons; to inspect the powerline corridor every year (before and after the summer rain

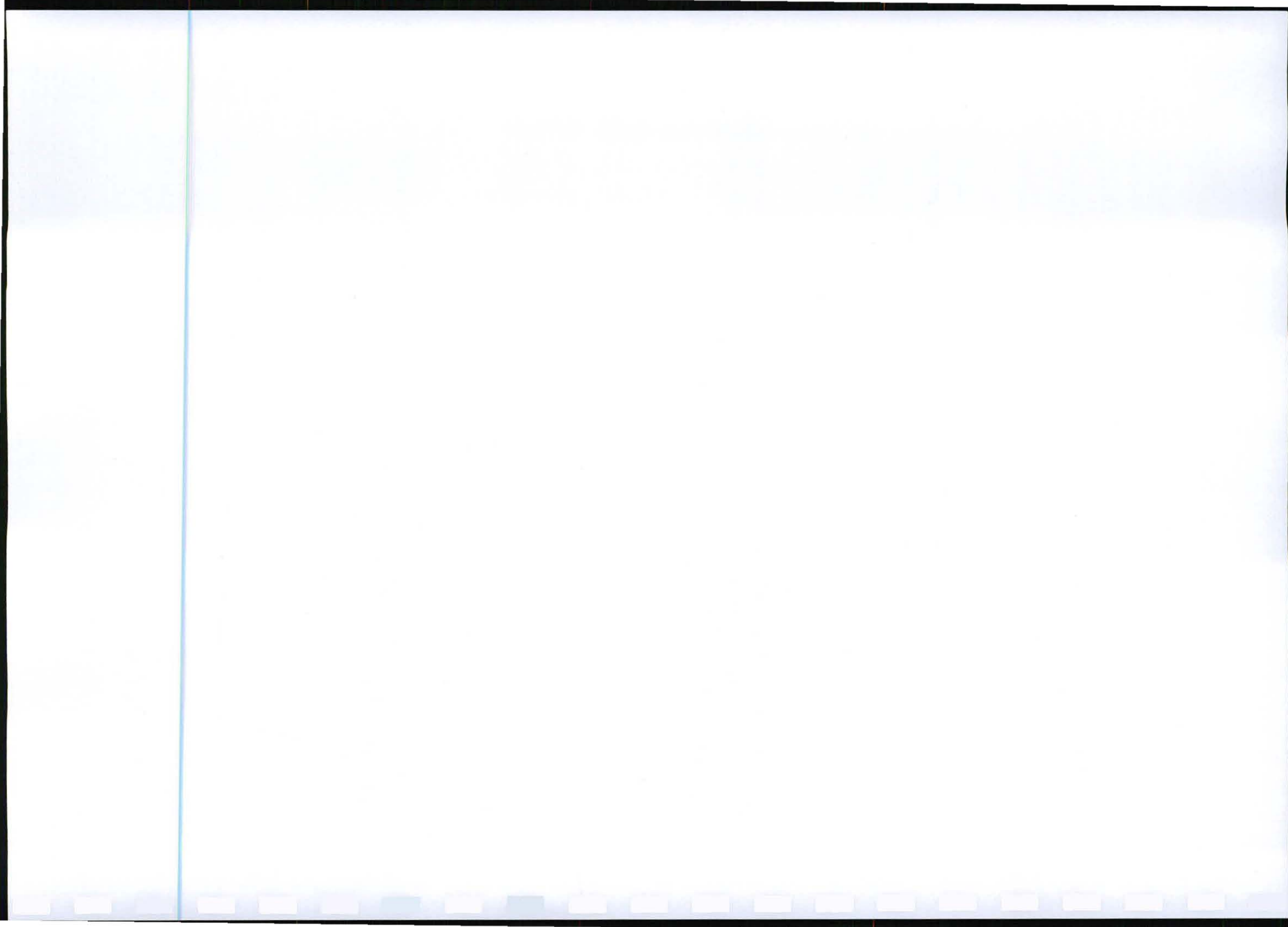




season) for soil erosion and if found to rehabilitate; to not use chemicals in the control of weeds; to use wide spacing of pylons in the rocky areas to limit the physical footprint on the actual ground; and to remove all left over construction materials, rubble etc. upon completion of the project.

Assessment of possible impacts on the various distinctive ecological units in the study area (before and after) mitigating and management measures were deemed to be as follows: Regional vegetation – medium (before), low (after); Rivers – medium, bordering on high (before), low (after); Rocky areas – medium, bordering on high (before), low (after). No rating matrix is given for the small area of camel thorns or the Mokolo River simply because there are no possible mitigating measures to reduce the negative impact and the area must be seen as a “No-Go” zone.

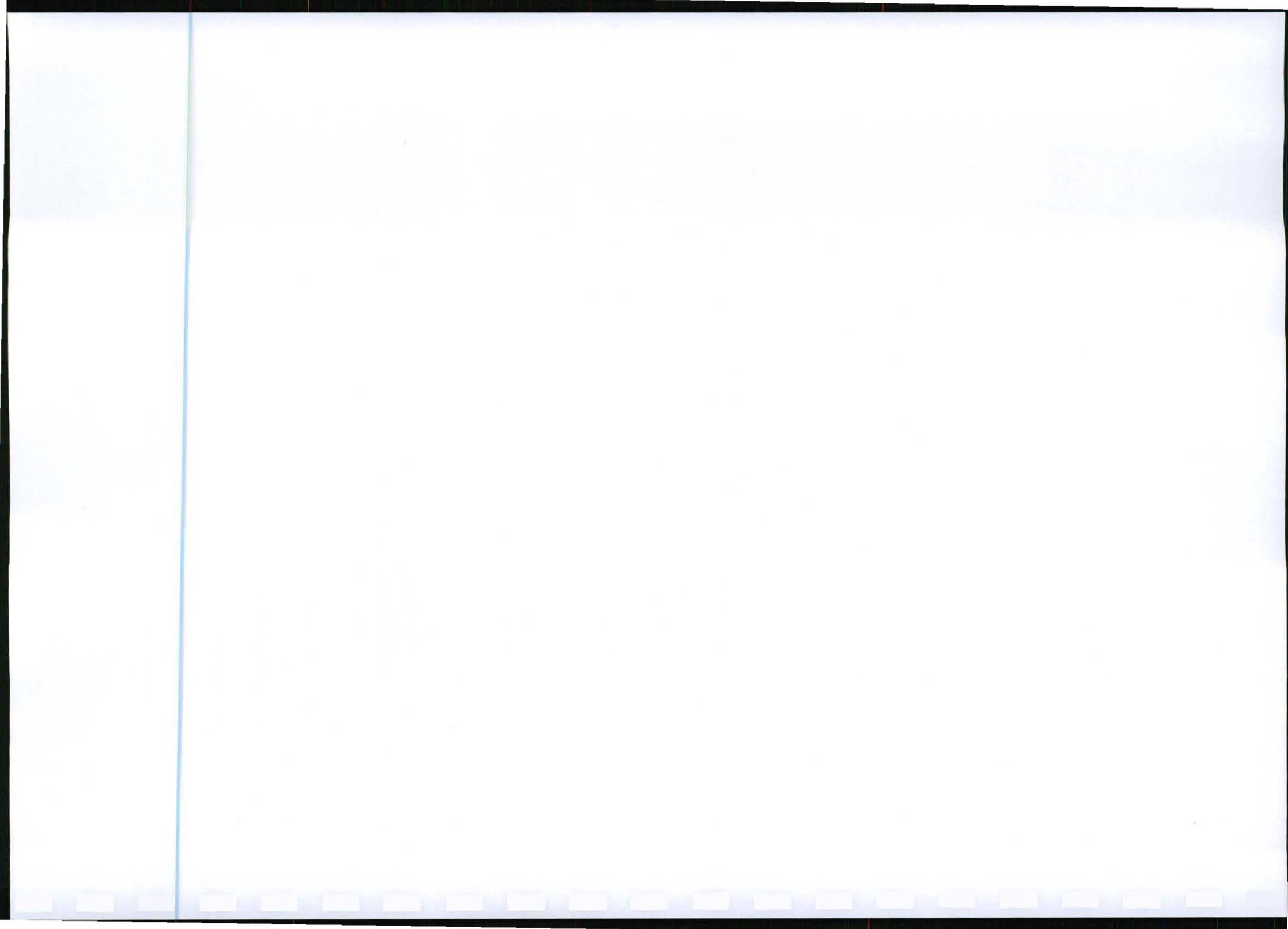
Having taken all aspects of the investigation into account the following line variant is recommended - **Alternative Route 4 (A-B<sub>1</sub>-C<sub>2</sub>-C<sub>1</sub>-D-H-F)**. However, between map points (C<sub>1</sub> – D) both sections of Alternative Routes 4 & 3 are equally ecologically acceptable and either made be used across this section.



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## **2. INTRODUCTION**

Eskom is planning the construction of a 132kV powerline from the Bulge River substation to the Dorset substation. The substations and powerline corridors are to the south of Lephalale (Ellisras) and north-east of Vaalwater in the Limpopo Province. The study area is north of the well-known Waterberg mountain range and the Marakele National Park. At the time of the study Dorset Substation was under construction, while work on the Bulge River Substation had not yet started.

Flori Horticultural Services cc, was appointed as independent specialist investigators, to conduct a strategic impact assessment of the floristic and faunal environment that will or could be affected by the proposed development. Field investigations were carried out during December 2010, January 2011 and May 2011.

General grid references for the study area are as follows:

1:50 000 maps – 2327DC; 2327DD; 2328CC; 2427BA; 2427BB; 2428AA.

## **3. AIMS AND OBJECTIVES**

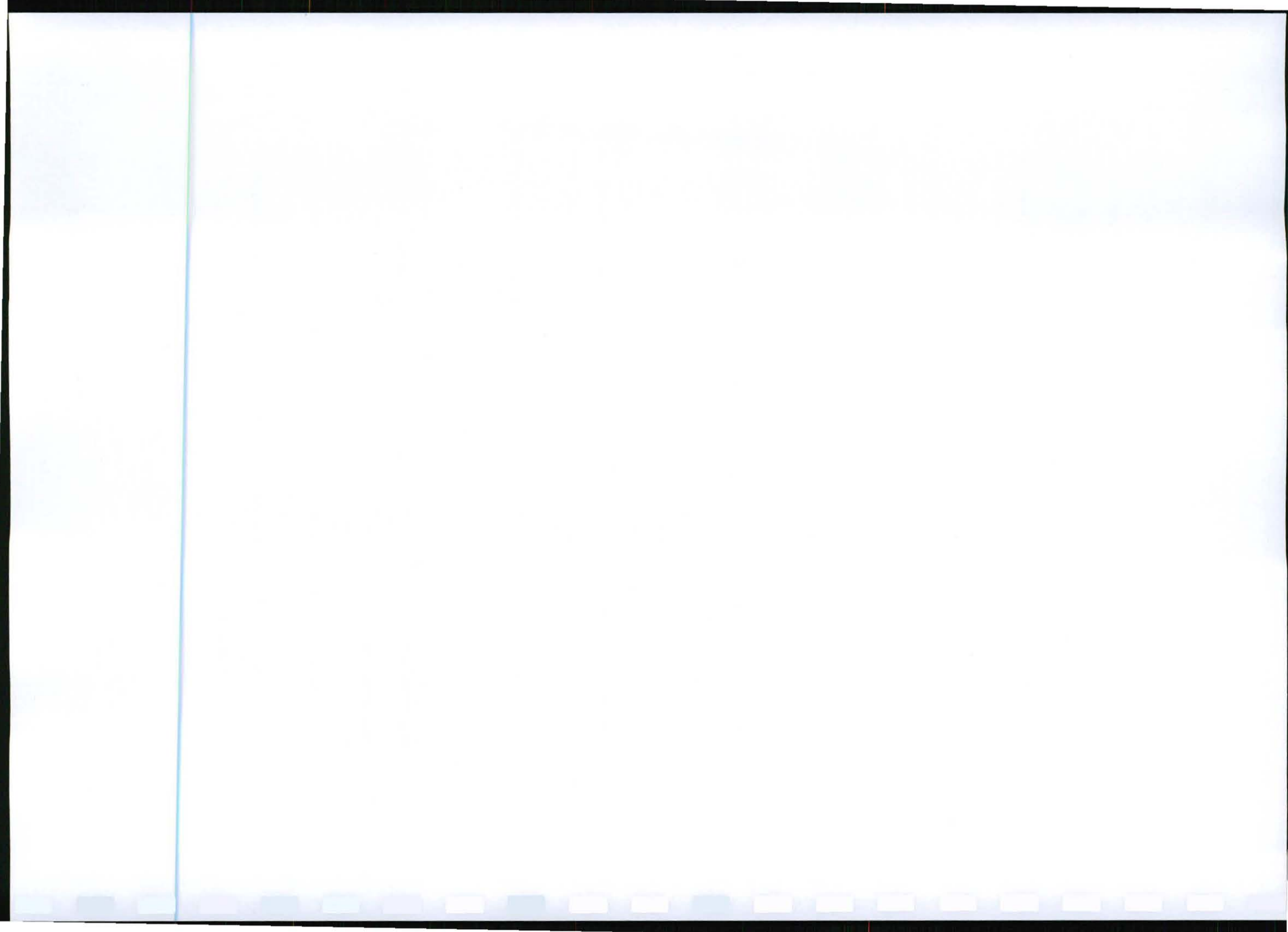
The aim of the impact assessment was to present broad descriptions of floristic and faunal elements encountered within the study area and to highlight sensitive attributes and areas within the environment that might be adversely affected by the proposed development. The impacts were evaluated and pertinent mitigating actions recommended to negate the negative affects on the environment that could arise. Various alternative routes for the proposed powerline were evaluated and recommendations made as to the best line variant to follow in terms of ecological impact.

## **4. METHODOLOGY**

### **Desktop assessment**

A literature review was conducted regarding the main vegetation types and fauna of the general region and of the specific study area. The main references for vegetation types used were those of Mucina & Rutherford (eds) (2006), Low & Rebelo (1996) and Acocks (1988)<sup>1,2,3</sup>. The classification and naming system of Mucina & Rutherford





was used as the standard throughout the report. Background data regarding soils, geology, climate and general ecology were also consulted. These are useful in determining what species of fauna and flora can be expected to be present within the different habitats of the study area, as there is a close relationship between all these parameters.

Lists of plant species for the relevant grids (2327DC; 2327DD; 2328CC; 2427BA; 2427BB; 2428AA), within which the proposed servitudes are situated, were obtained from the South Africa National Biodiversity Institute's (SANBI) database<sup>4</sup>. The lists represent all plant species that have been identified and recorded within the designated grid coordinates. The main aim was to investigate whether any protected species or Red Data species were known to occur in the study area or in the immediate vicinity of the study area.

Red data and protected species listed by the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) were consulted and taken into account. Alien invasive species and their different Categories (1, 2 & 3) as listed by the Conservation of Agricultural Resources Act (Act No. 43 of 1983) and the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) was also consulted.

#### **Field survey**

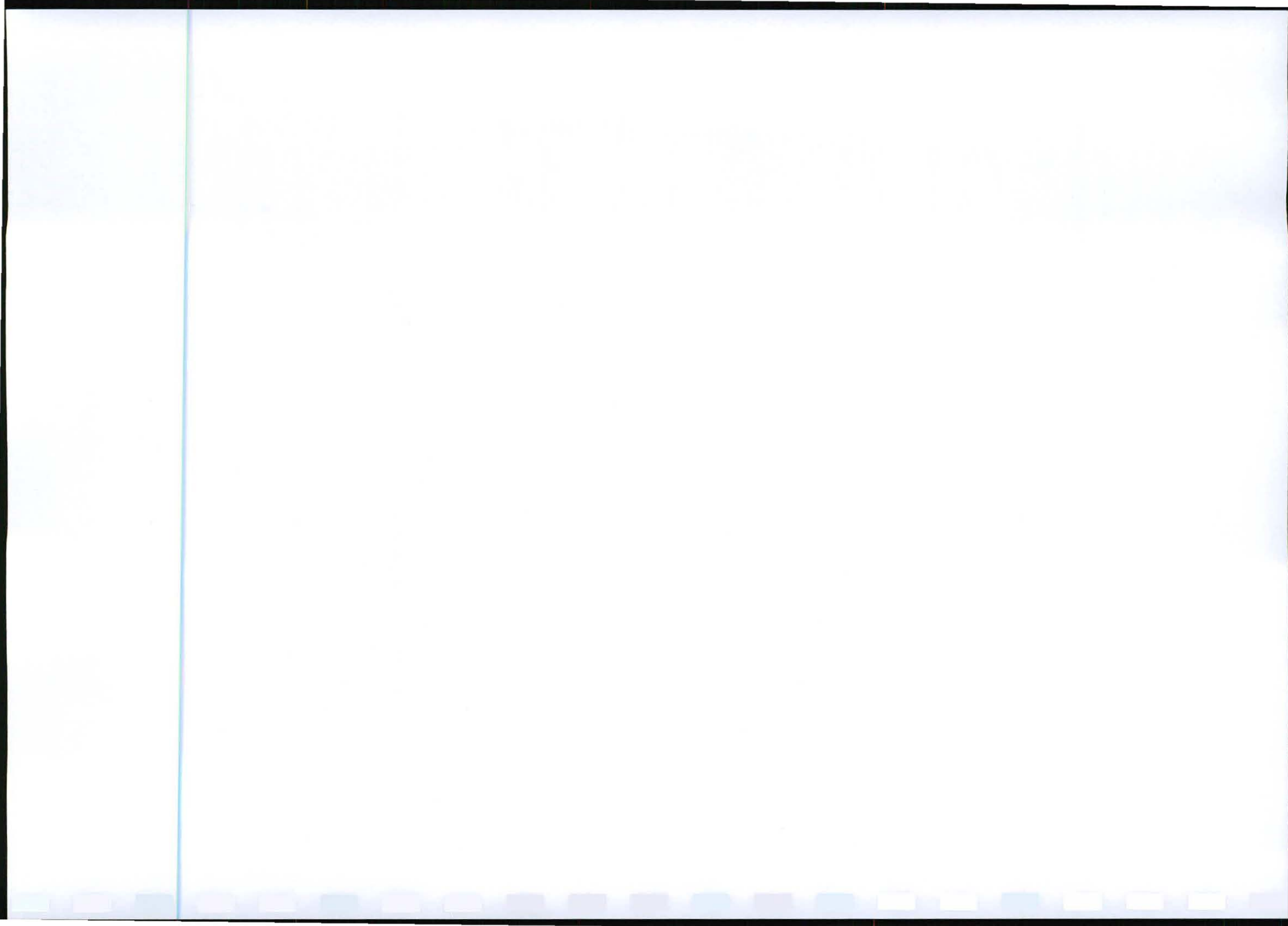
A field survey was conducted, involving a number of field trips during December 2010. Cognisance was taken of the following environmental features and attributes:

- Biophysical environment
- Regional and site specific vegetation
- Habitat ideal for potential red data faunal species
- Red data fauna and flora species
- Protected fauna and flora species

#### **Floristic Sensitivity**

The methodology used to estimate the floristic sensitivity is aimed at highlighting floristically significant attributes and is based on subjective assessments of floristic attributes. Floristic sensitivity is determined across the spectrum of communities that

Flori Horticultural Services



typify the study area. Phytosociological attributes (species diversity, presence of exotic species, etc.) and physical characteristics (human impacts, size, fragmentation, etc.) are important in assessing the floristic sensitivity of the various communities.

Criteria employed in assessing the floristic sensitivity vary in different areas, depending on location, type of habitat, size, etc. The following factors were considered significant in determining floristic sensitivity:

- Habitat availability, status and suitability for the presence of Red Data species
- Landscape and/or habitat sensitivity
- Current floristic status
- Floristic diversity
- Ecological fragmentation or performance.

Floristic Sensitivity Values are expressed as a percentage of the maximum possible value and placed in a particular class or level, namely:

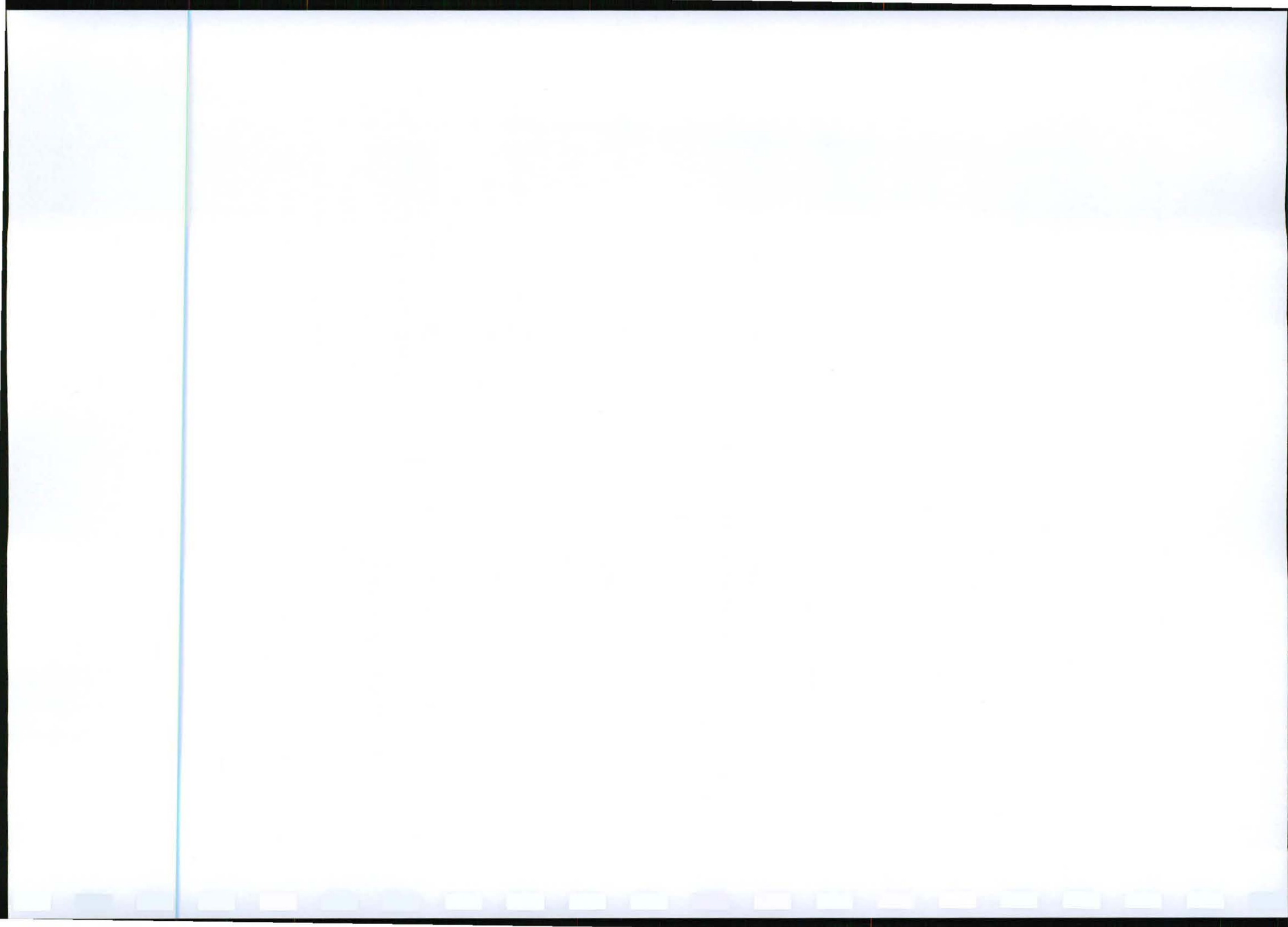
- High: 80 – 100%
- Medium/high: 60 – 80%
- Medium: 40 – 60%
- Medium/low: 20 – 40%
- Low: 0 – 20%

High Sensitivity Index Values indicate areas that are considered pristine, unaffected by human influences or generally managed in an ecological sustainable manner. Nature reserves or even well managed game farms typify these areas.

Low Sensitivity Index Values indicate areas of poor ecological status or importance in terms of floristic attributes, including areas that have been negatively affected by human impacts or poor management.

Each vegetation unit is subjectively rated on a scale of 1 to 10 (Sensitivity Values) in terms of the influence that the particular Sensitivity Criterion has on the floristic status of the plant community. Separate Values are multiplied with the respective Criteria





Weighting, which emphasises the importance or triviality that the individual Sensitivity Criteria have on the status of each community.

Ranked Values are then added and expressed as a percentage of the maximum possible value (Floristic Sensitivity Value) and placed in a particular class or level, namely:

- High: 80% – 100%
- Medium/high: 60% – 80%
- Medium: 40% – 60%
- Medium/low: 20% – 40%
- Low: 0% – 20%

#### GO, NO - GO criteria

The sensitivity analyses are also expressed in terms of whether the “Go Ahead” has or has not been given for development in a specific area or ecological unit, with regards to the ecological sensitivity along with mitigating measures. The criteria are directly linked to all the other analyses used in the study and can be expressed as follows:

- GO: Areas of low sensitivity

These would typically be areas where the veld has been totally transformed.

- GO-SLOW: Areas of low to moderate/low sensitivity

These would typically be areas where large portions of the veld has been transformed and/or is highly infested with alien vegetation and lacks any real faunal component. Few mitigating measures are typically needed, but it is still always wise to approach these areas properly and slowly.

- GO-BUT: Areas of medium to medium/high sensitivity

These are areas that are sensitive and should generally be avoided if possible. But, with the correct implementation of mitigating and management measures can be entered if need be.

- NO-GO: Areas of high sensitivity

These are areas of high sensitivity and should be avoided at all cost. In these areas mitigating measures are typically futile in limiting impacts.