BASIC ENVIRONMENTAL ASSESSMENT

DEA Reference Number: 14/12/16/3/3/1/1591
DEA&DP Reference Number: 16/3/3/6/4/1/1/B1/5/1158/16 (Region2)
DEA&DP Reference Number: 16/3/3/6/4/1/C1/7/0087/16 (Region 3)

132 kV OVERHEAD DISTRIBUTION LINE AND SUBSTATION FOR THE PROPOSED BRANDVALLEY WIND ENERGY FACILITY, MATJIESFONTEIN, NORTHERN AND WESTERN CAPE PROVINCES

FINAL (Version 1)

Prepared for:	**Prepared by:**
Brandvalley Wind Farm (Pty) Ltd	**EOH Coastal & Environmental Services**
5th Floor, 125 Buitengracht Street, 8001 Cape Town	The Point, Suite 408, 4th Floor, 76 Regent Road, Sea Point, 8005 Cape Town
South Africa	South Africa

8 August 2016

SECTION A: ACTIVITY INFORMATION

Has a specialist been consulted to assist with the completion of this section? [redacted] NO
If YES, please complete the form entitled "Details of specialist and declaration of interest" for the specialist appointed and attach in Appendix I.

1. PROJECT DESCRIPTION

a) Describe the project associated with the listed activities applied for

Background
Brandvalley Wind Farm (Pty) Ltd, a subsidiary of G7 Renewable Energies (Pty) Ltd, propose to develop electrical infrastructure in the form of a single 132 kilovolt (kV), above-ground electrical power line (distribution line) and one onsite 33/132kV substation. There's also a potential to construct one central hub 132kV substation, should both the Brandvalley and Rietkloof WEFs become preferred bidders as explained in the sections below. This line will be required to evacuate up to 140 megawatt (MW) of power from the proposed Brandvalley Wind Energy Facility (WEF), located near Laingsburg in the Northern and Western Cape Provinces, South Africa. This power will ultimately be distributed to the national grid, through connections with an external Eskom substation. While the two projects (wind farm and distribution infrastructure) are related, only the electrical distribution line and one 132kV onsite substation are being applied for in this application (i.e. this document only concerns the power line and not the wind farm). The need for separate applications is due to the fact that the 132kV transmission line and 132kV yard of the 33/132kV substation will likely be ceded to Eskom, while the Brandvalley Wind Farm (Pty) Ltd with retain ownership of the WEF.

The Brandvalley WEF has not yet been authorised, and is currently in the EIR phase under a separate and distinct EIA application (DEA Ref Number: 14/12/16/3/3/2/900). The intention is to bid these projects under the Renewable Energy Independent Power Producer Procurement Programme, as managed by the Department of Energy, with the aim to obtain preferred bidder status in order to construct the WEF and feed the electricity into the national grid. Please note: there has currently been no preferred bidder status awarded for Brandvalley or Rietkloof[1] WEFs.

This project is being submitted under the NEMA regulations for environmental authorisation, with the DEA acting as the competent authority. The proponent is Brandvalley Wind Farm (Pty) Ltd, who appointed EOH Coastal and Environmental Services (EOH CES) as the EAP.

The EOH CES project team is comprised of the following:

Mr. Marc Hardy – EAP and project leader, responsible for quality control and review;
Ms Amber Jackson – Project manager;
Mr. Gideon Raath – Report production and PPP.

This project is a Basic Assessment process for the construction of:

A. One 33/132kV on-site substation (please note that the 33kV substation yard is assessed as part of the EIA process and only the 132 kV yard form part of this application);
B. 200m wide corridor for the 132kV electrical distribution line; and
C. Grid connection via one of three alternatives.

A generalised depiction of the infrastructure associated with this application is shown in Figure 1 below. The project entails connection from an on-site 132kV substation (A), evacuation via a 132kV overhead line (B), and ultimate connection with an Eskom substation (C).

[1] Rietkloof WEF is a second 140MW WEF proposed adjacent to the Brandvalley project.

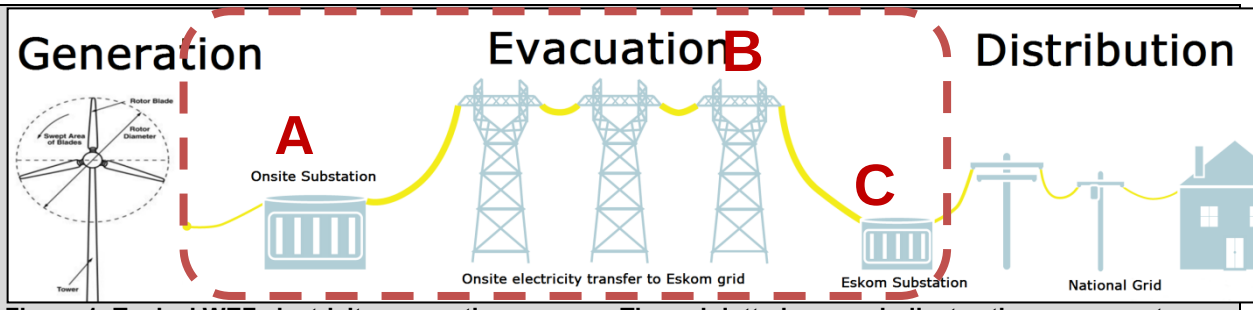


Figure 1: Typical WEF electricity evacuation process. The red dotted square indicates the components relevant to this application.

A. **One 132 kV Substation (A)**

Including the internal components such as transformers, isolators, cabling and light mast, as required by Eskom. This 132kV on-site substation will have a footprint of up to 200m x 200m that will be inclusive of site offices, storage areas, ablution facilities and the maintenance building. While there are a few alternative locations proposed for this substation, only one will be constructed for this project. This substation will be the interface between the different connections from the wind turbines (from the WEF mentioned above), by receiving all the 33kV connection cables and powerlines from the individual turbines, from where one 132kV line will evacuate the power to an external substation owned by Eskom. The on-site substation is denoted with a large, red "A" on Figure 1 above.

B. **132kV overhead distribution line (B)**

To connect the onsite 132kV substation mentioned above, to the national grid. The pylons for this line will have an average spacing of between 250m and 300m, and will consist of a mixture of self-supporting monopoles, guyed monopoles as well as lattice structures. The maximum height will be up to 32m, regardless of the design type used. The servitude will be up to 31m wide. A 200m wide corridor will be applied for to allow for micro-sitting. This distribution line is denoted with a large, red "B" on Figure 1 above.

C. **Connection to the national grid (C)**

In order to connect to the Brandvalley Wind Farm, three (3) alternatives for grid connection have been assessed as part of this report and the preferred alternative were informed by environmental and technical considerations and Eskom's preference:

1. **Alternative A:** Connection to the Bon Espirange satellite 132kV Substation (SS) located approximately 3.3km from the project boundary. The Bon Espirange satellite substation has not yet been built, but is planned by Eskom and other IPPs, as an alternative to connecting all the wind farms west of Komsberg SS, directly to the Eskom Komsberg Substation. The central idea to this SS is the location, whereby WEFs to the West and North of the project region may also connect to the national grid, and thus reduce the infrastructure required to service each project. The Bon Espirange SS will be managed by Eskom.
2. **Alternative B:** Connection to the existing Komsberg SS currently proposed to be upgraded with a 132/400kV transformer. This substation is located approximately 4.8km from the project site and is owned and managed by ESKOM; or
3. **Alternative C:** Construction of a 132kV central switching station (up to 200m x 200m) to be shared by both Brandvalley and Rietkloof WEFs (if both are awarded preferred bidder status). For the purposes of this application, this substation is referred to as the "Central Hub Substation". The construction of the 132kV Central Hub SS depends on the following factors:
   - The environmental sensitivities of the region;
   - The cost of the construction;
   - The existing potential of the Komsberg or Bon Espirange Substations to couple and successfully take off the combined power generated by the Brandvalley and Rietkloof WEFs (i.e. if the receiving Substation has the capacity to connect and receive such power);
   - Whether Eskom approve the connection (this will largely be based on the capacity available as well).

If the Central Hub Substation is ultimately approved for connection by Eskom, each project (Brandvalley WEF and Rietkloof WEF) will construct their own 132kV substation on-site, and connect to the Central Hub Substation from

there. From the Central Hub SS an additional, single 132kV line for both projects will then be constructed to lead to either the Komsberg or the Bon Espirange Substation, and ultimately the national grid. This option is denoted with a large, red "C" in the above Figure 1. The footprint of this Central Hub Substation is located within the Brandvalley project footprint and will therefore be applied for in this Basic Assessment report.

Construction phase

The following activities (Table 1) are proposed during the construction phase of the project.

Table 1: Construction phase activities

Phase	Duration	Activities
Construction phase	12-18 months	**Site Establishment** 1. Setting out of construction area 2. Delivery of equipment to site
Civil and Electrical Works		1. Topsoil stripping, where necessary, and bulk earthworks (if needed) for roads, hardstanding and pylon foundations. 2. Concrete works 3. Fixing reinforcement 4. Cable ducting, trenching and laying 5. Road and hardstanding construction (placement of aggregate layers) 6. Guy-wiring of pylons 7. Pylon erection and electrical cable stringing (where there is an overhead power line) 8. Above activities but within the substation and relevant to substation construction and including building construction works e.g. bricklaying, roofing, installation and testing of electrical equipment such as transformers and switchgear 9. Testing and commissioning of pylons and conductors

A borrow pit will not be established for this project as material will be sourced from the same source as for the WEF either from an existing/ new borrow pit. local staff will be appointed as far as possible to reduce the need for accommodation. Staff that cannot be sourced from the local community, will be accommodated in nearby towns such as Laingsburg or Matjiesfontein.

Operational phase

During the operational phase, the pylons and substation would need to be accessed for routine maintenance. The frequency will be on a needs be basis. In order to access the pylons, the access road would need to be maintained in a state that, at least, allows for 4x4 access. The servitude will be maintained and monitored to avoid erosion and the establishment of alien invasive plant species. The operational phase will last up to 25 years. Thereafter, Eskom will decide whether the infrastructure can continue to be used or whether there is a need to decommission.

Location

The proposed project is located within the same property and adjacent to the proposed Brandvalley WEF (DEA Reference Number: 14/12/16/3/3/2/900; DENC Reference Number: NC/NAT/ZFM/KHE/BLA1/2016), roughly 28km along the R354 heading north towards Sutherland. While some properties of the WEF and the distribution line overlap, some properties are unique to each project. This is because some of the properties are shared in terms of infrastructure. Regardless, the properties included in this report relate only to this application. Exact property number, portion number and farm name details are provided in Table 2 below.

The project footprint straddles the border of the Northern Cape (NC) and Western Cape (WC) Provinces. The project is located within three local municipalities, and three district municipalities. These are:

- Ward 3, Karoo Hoogland Local Municipality seated within the Namakwa District Municipality (located in the NC);
- Ward 12, Witzenberg Local Municipality seated within the Cape Winelands District Municipality (located in the WC);
- Ward 1, Laingsburg Local Municipalities seated within the Central Karoo District Municipality (located in the WC).

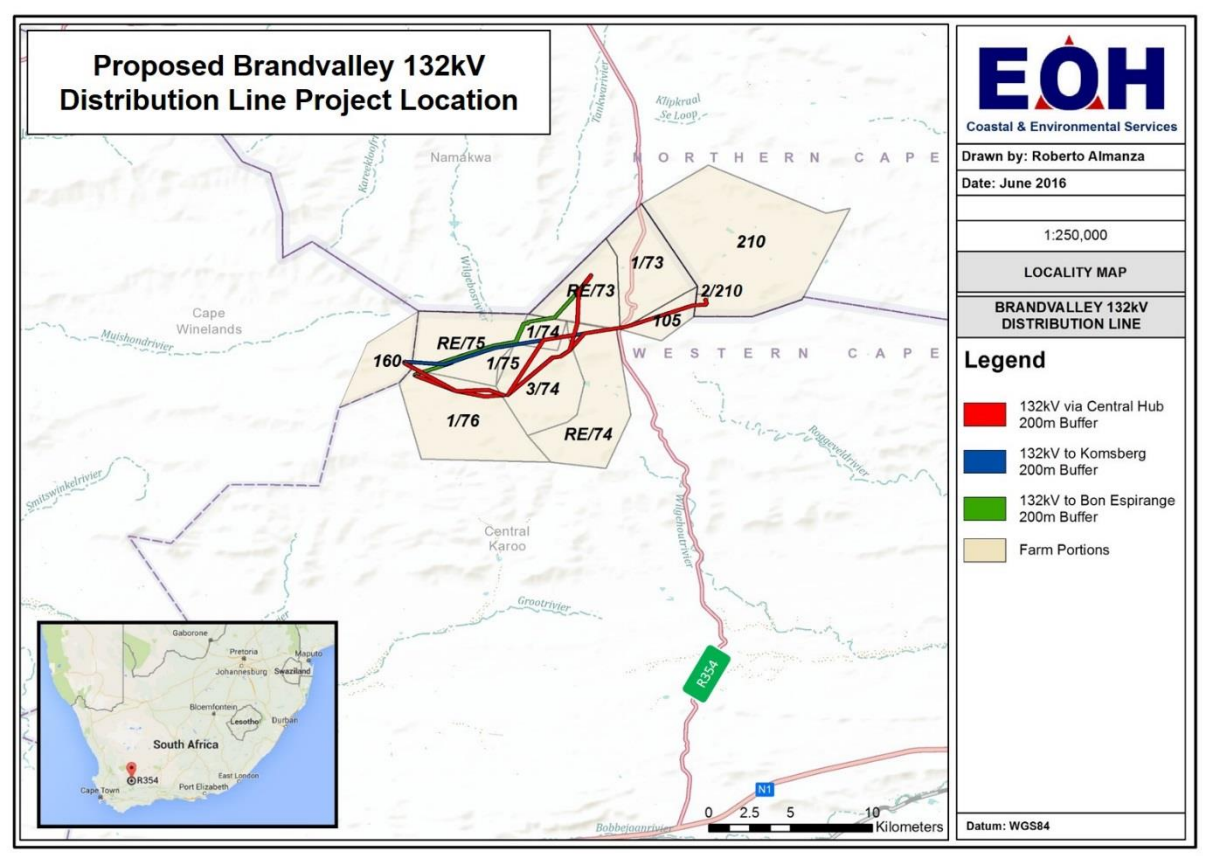


Figure 2: Project locality map, indicting the general location of the project study area, and the three substation alternatives. The property portions included in this application include all distribution lines and onsite substation alternatives.

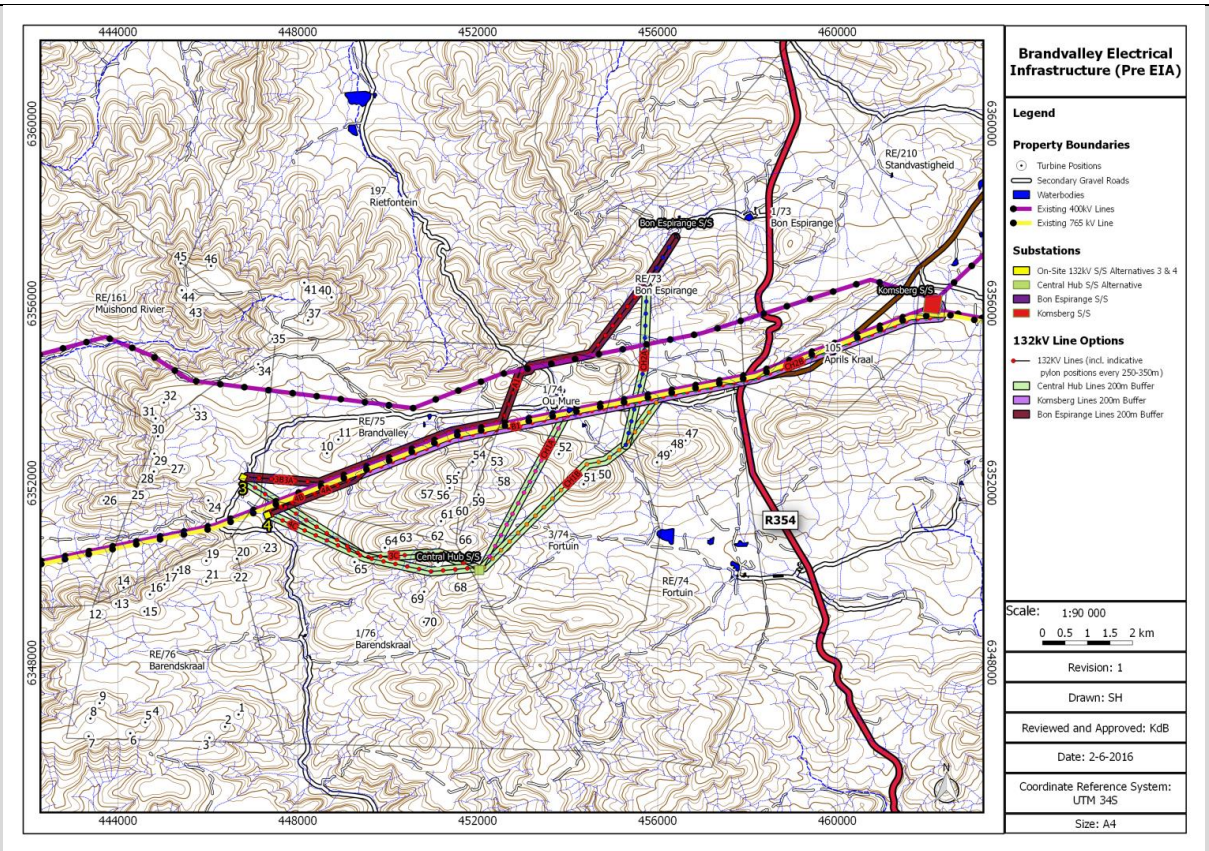


Figure 3: Proposed 132kV distribution line layout alternatives (pre-EA layout).

As the project is designed to form part of the Brandvalley Wind Energy Facility and the Rietkloof Wind Energy Facility (should both be awarded preferred bidder status), the broader context within which the powerline will operate is indicated below, as a means of providing context for the reader.

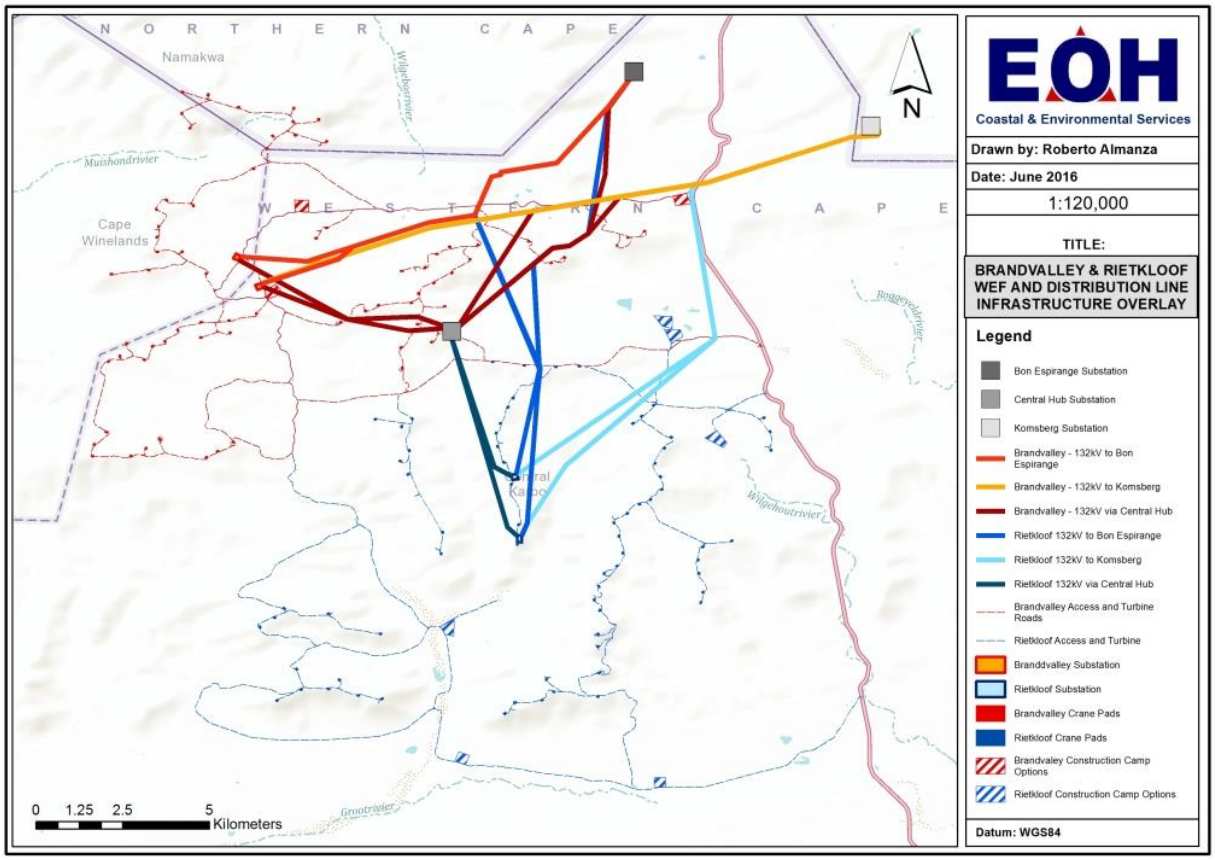


Figure 4: All distribution line alternatives (for both this project, and the Rietkloof 132kV distribution line project), overlain onto the proposed Brandvalley and Rietkloof Wind Energy Facilities.

Please note: The EIA process for both wind farms are still underway, with the process being in the EIA phase at the time of completion of this report. As such, the layout for the WEF's illustrated here are not final and likely to be amended as the project develops further. The layout of the WEF's are thus to be regarded as indicative only. Should precise location information be required for the WEF's, please consult the latest Brandvalley Wind Energy Facility and Rietkloof Wind Energy Facility documents.

Study Area

The study area for this application comprises the footprint of the infrastructure of this project. This currently includes all layout alternatives (i.e. the different locations considered for the power line), service access roads, servitudes necessary and pylon foundations. Additionally, a 100m corridor on each side of the different distribution line alternatives are also considered in this study, in order to allow for micro-sitting. The 100m corridor on each side of the distribution line thus represents the maximum extent of the project. The total power line corridor will thus be 200m in width. Micro-siting will inform the final placement of the infrastructure, however, the final placement will always remain within the proposed corridor.

Properties relevant to this application were determined by overlaying all potential infrastructure (including layout alternatives) onto a farm portion spatial data layer of this region, and determining which properties would be required should all of the infrastructure be developed. This ensured no properties were missed. All the relevant properties have thus been included in the extent of the study area, and are detailed in the Table 2.

2. ENVIRONMENTAL IMPACT STATEMENT

Taking the assessment of potential impacts into account, please provide an environmental impact statement that summarises the impact that the proposed activity and its alternatives may have on the environment after the management and mitigation of impacts have been taken into account, with specific reference to types of impact, duration of impacts, likelihood of potential impacts actually occurring and the significance of impacts.

Without implementing mitigation measures, the key concerns would be cumulative impacts on avifauna, heritage and visual impacts. As indicated in the Impacts Table 6 and 7, most impacts can be reduced to an acceptable low (-) or moderate (-) significance with the implementation of mitigation measures. There are positive social impacts associated with the proposed development.

Based on the summary above, all impacts can be mitigated to an acceptable level except for visual and heritage impacts. Heritage features will be buffered and avoided and will therefore not be impacted. It is requested that the visual impact be viewed in the light that the Brandvalley Wind Farm is located within an area earmarked for Renewable Energy Development in terms of the REDZ which motivates for wind and solar developments to be concentrated in specific areas to limit the areas affected by the visual impact typically associated with these developments. Additionally, the proposed overhead 132kV distribution line will run along the existing 400kV and 765kV Eskom power line within the project area and along the 11kV power line from the project area to the Bon Espirange. Therefore, there are likely to be no additional visual impacts as a result of the 132kV distribution line.

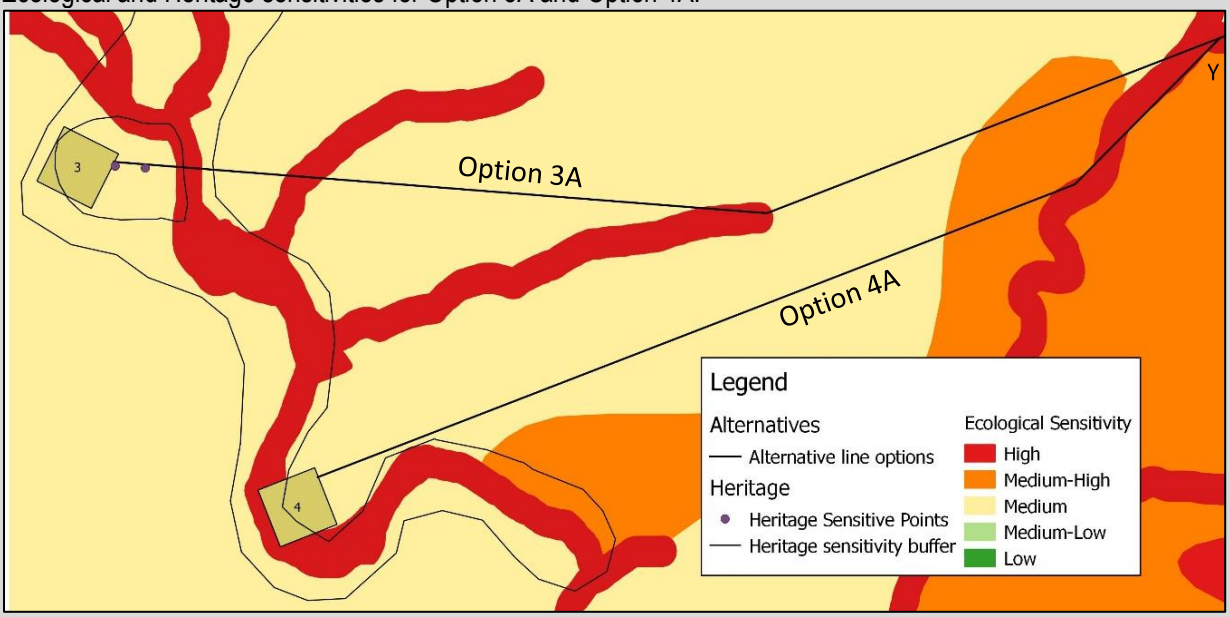
ALTERNATIVES

This section discusses assessment of the screened out layout alternatives based on the environmental significance methodology described in Appendix L. These layout alternatives were screened out from the initial layout alternatives described in section A2 based on environmental, economic and technical considerations. Therefore, only the screened out layout alternatives will be given further attention in the impact section below.

Alternative A

Alternative A: Section 1

Ecological and Heritage sensitivities for Option 3A and Option 4A.



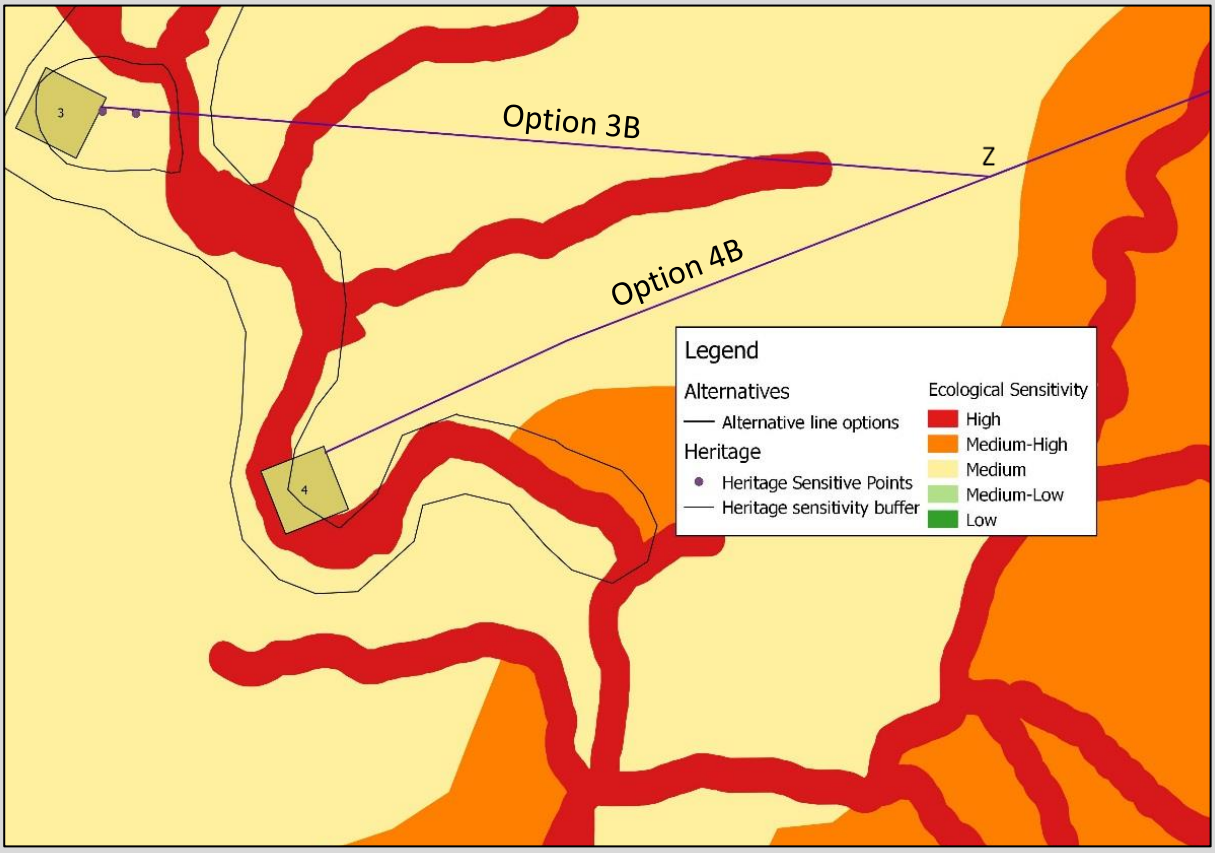
Alternative A: Section 1 Option 3A				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments

1. Birds sensitivity	Low	Achievable	Option preferred	This line is located outside of high bird sensitive areas
2. Heritage	Moderate	Achievable	Option preferred	Substation 3 occurs on two heritage sensitive points and the line crosses the heritage sensitive buffer
3. Ecological	High	Achievable	Option possibly viable	The line crosses four water courses, the majority of the line crosses medium ecological sensitivity and ±400m of Medium-High sensitivity
Alternative A: Section 1 Option 4A				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
1. Birds sensitivity	Low	Achievable	Option preferred	This line is located outside of high bird sensitive areas
2. Heritage	Low	Easily Achievable	Option preferred	Does not affect the heritage sensitivity buffer
3. Ecological	Moderate	Achievable	Option preferred	The line crosses two water courses, has ±600m in Medium-High sensitivity and runs along the water course
Conclusion	Option 4A is preferred over Option 3A from an ecological sensitive perspective. Line option 4A and associated pylons have fewer water crossing than 3A.			

Alternative B

Alternative B: Section 1

Ecological and Heritage sensitivities for Option 3B and Option 4B.



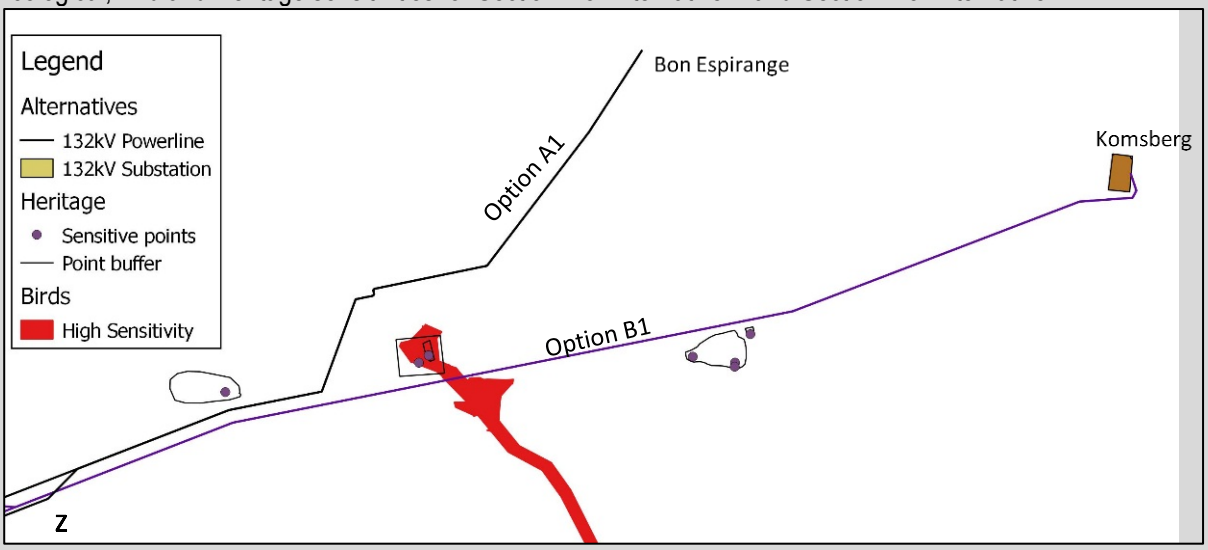
Alternative B: Section 1 Option 3B

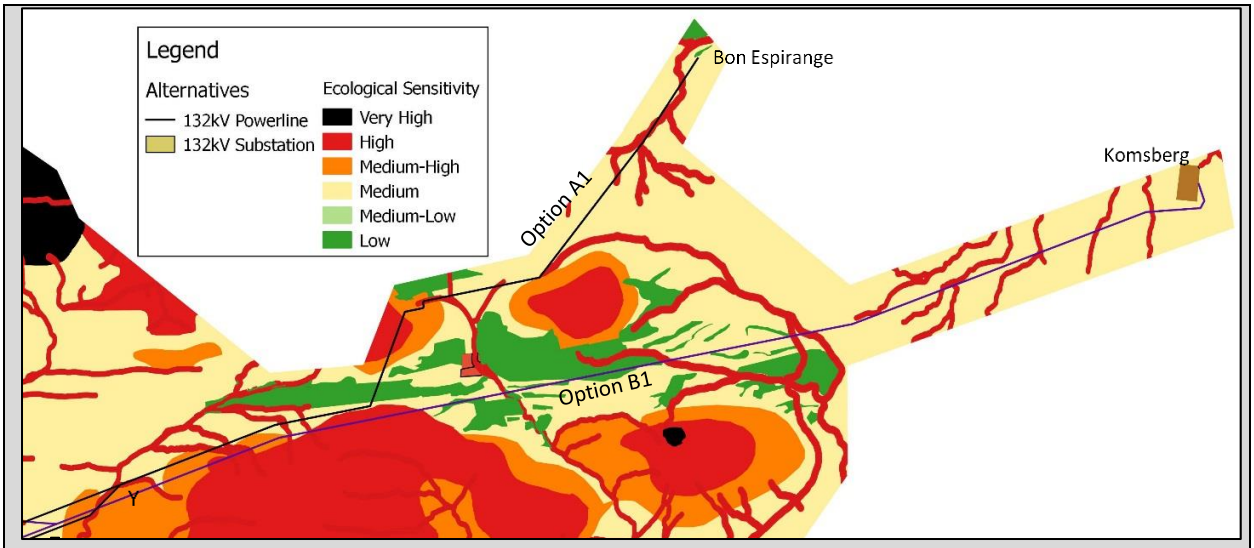
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
1. Birds sensitivity	Low	Achievable	Option preferred	This line is located outside of high bird sensitive areas
2. Heritage	Moderate	Achievable	Option preferred	The line and initial pylons are placed with two heritage sensitive points and the line crosses the heritage sensitive buffer
3. Ecological	High	Achievable	Option possibly viable	The line crosses three(3) water courses, the line crosses medium ecological sensitivity
Alternative B: Section 1 Option 4B				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
1. Birds sensitivity	Low	Achievable	Option preferred	This line is located outside of high bird sensitive areas
2. Heritage	Low	Achievable	Option preferred	The line occurs within the heritage sensitive buffer.
3. Ecological	Moderate	Achievable	Option preferred	The line crosses no water courses and is placed in medium ecological sensitivity.
Conclusion	Option 4B is preferred over option 3B. Line option 4B affects fewer Ecological and Heritage sensitive areas and is thus preferred over line option 3B.			

Alternative A and Alternative B

Alternative A (Section 2) and Alternative B (Section 2)

Ecological, Bird and Heritage sensitivities for Section 2 of Alternative A and Section 2 of Alternative B.





Alternative A: Section 2. Option A1 (Point Y to Bon Espirange)				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
Birds High sensitivity	Low	Achievable	Option preferred	This line is routed north of the high bird sensitive area and does not cross it
Heritage	Low	Achievable	Option preferred	Does not affect the heritage sensitivity points or associated buffers
Ecological	Moderate	Achievable	Option preferred	Crosses 13 Water courses, ±500m High sensitivity, ±980m of Medium-high sensitivity, ±6.7km of Medium sensitivity and ±240m Low
Alternative B: Section 2. Option B1 (Point Z to Komsberg)				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
Birds High sensitivity	Very High	Difficult	Option not viable	This line crosses the northern section of high sensitivity bird corridor and spans the length of the corridor for ±250m.
Heritage	Low	Achievable	Option preferred	Does not affect the heritage sensitivity points or associated buffers
Ecological	Moderate	Achievable	Option preferred	Crosses 16 Water courses, approx. ±1.9km High sensitivity, ±9.2km of Medium-high sensitivity, ±4km of Medium sensitivity and ±2km Low
Conclusion	Route option A1 (Point Y to Bon Espirange) is preferred over Route option B1. A1 does not cross the highly sensitive bird corridor, has fewer water crossing and is shorter than B1 thus will have fewer pylons and a lower overall ecological sensitivity. Option A1 is preferred, Option B1 bird sensitivity is considered to not be a viable option.			

Alternative C

Alternative C: Section 1

Section 1 has two route options: Option 3C (Substation 3 to Central Hub) and Option 4C (Substation 4 to Central Hub). The Ecological and Heritage sensitivities for Section 1 route options is presented below.

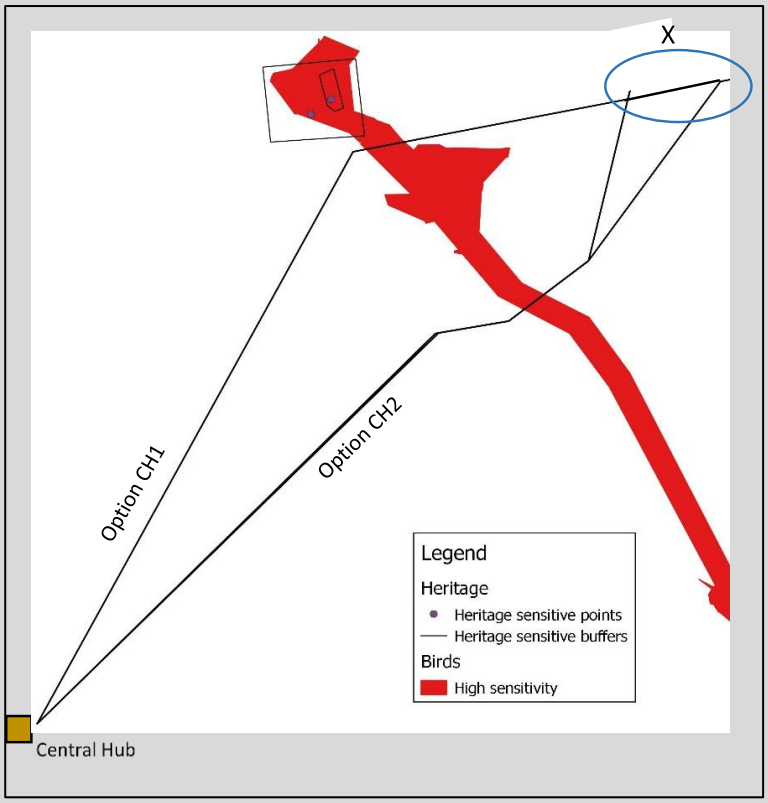
Alternative C: Section 1 Option 3C				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
1. Birds sensitivity	Low	Achievable	Option preferred	This line is located outside of high bird sensitive areas
2. Heritage	High	Achievable	Option possibly viable	The lines first pylon is on/within two he significant points and approximately 4 are placed within the heritage sensitive buffer
3. Ecological	High	Difficult	Option possibly viable	The line crosses seven(7) water cours eastern half of the line crosses ±2.3km high ecological sensitivity, ±1.2km of Medium-High sensitivity and ±1.3km r ecological sensitivity.

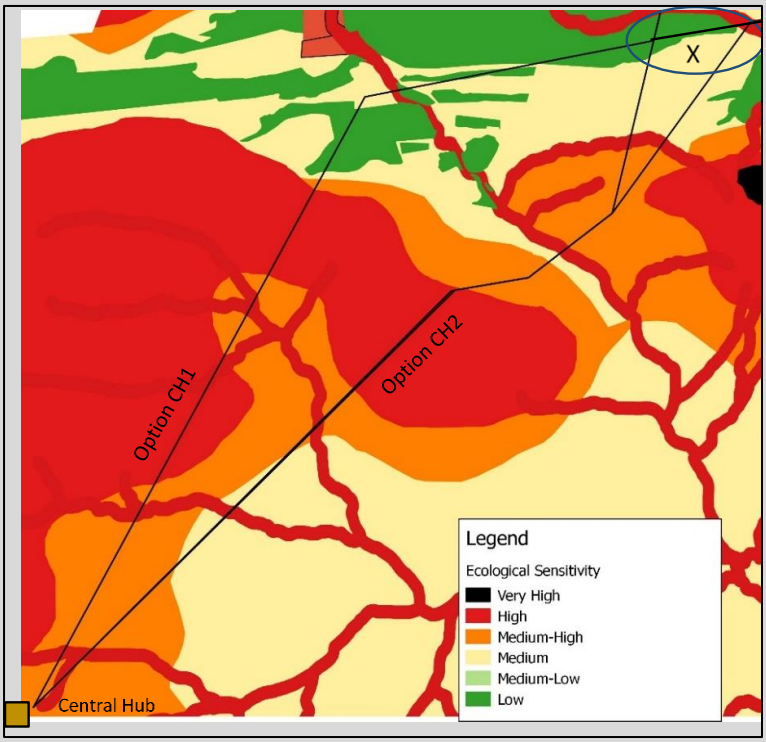
Alternative C: Section 1 Option 4C				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
1. Birds sensitivity	Low	Achievable	Option preferred	This line and its pylons are located ou high bird sensitive areas
2. Heritage	Low	Achievable	Option preferred	The lines first pylon is within the herita sensitive buffer
3. Ecological	High	Difficult	Option possibly viable	The line crosses eight(8) water course eastern half of the line crosses ±1.9km high ecological sensitivity, ±1.4km in Medium-High sensitivity and ±1.6km r ecological sensitivity.

Conclusion	Both line option 3C and 4C have similar ecological impacts, the pylons for both lines w located in high ecological sensitivity and they cross a similar number of water c Neither are considered the preferred option from an ecological perspective. Option 4C is the preferred over Option 3C as it impacts less on heritage sensitive provided the substation 4 is moved out of the sensitive areas and buffers.

Alternative C: Section 2

Section 2 has two route options: Option CH1 (Central Hub to Point X) and Option CH2 (Central Hub to Point X). Option CH2 has two paths to reach point X, these have been treated as one option given their proximity to each other and the minimal distance between them. Bird, Heritage and Ecological sensitivities maps for section 2 is presented below.





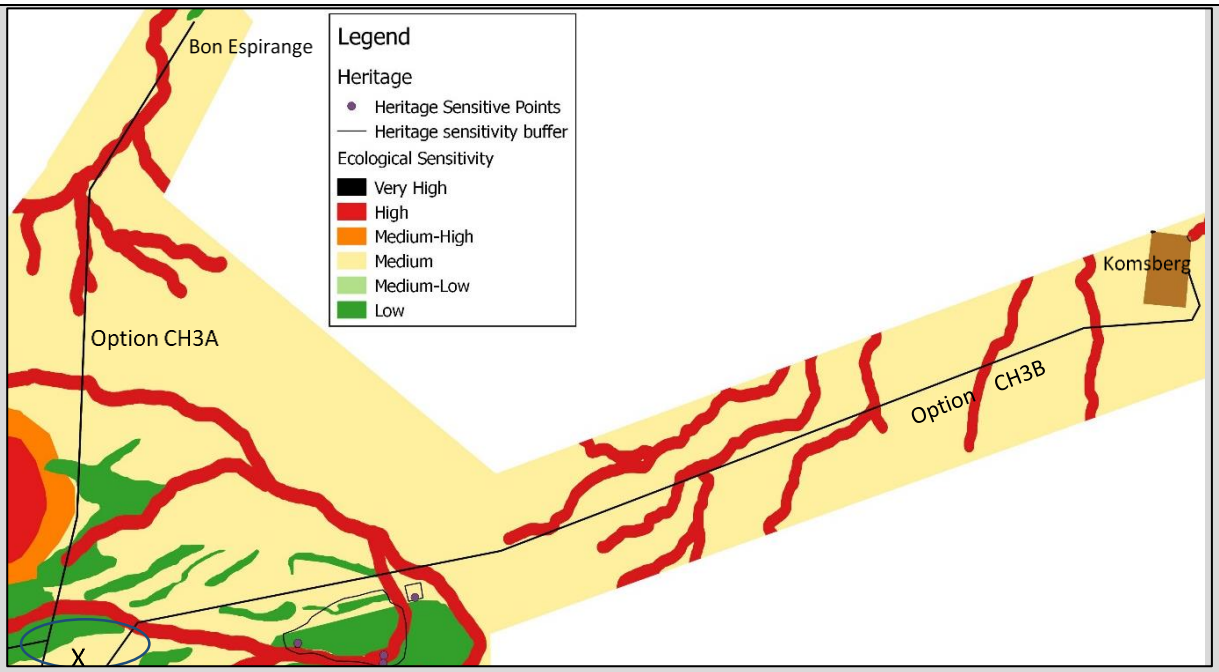
Alternative C: Section 2 Option CH1				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
1. Birds sensitivity	Very High	Difficult	Option not viable	This line crosses the northern section of high sensitivity bird corridor and spans the length of the corridor for ±250m of option CH1 powerline
2. Heritage	Low	Easily Achievable	Option preferred	This line and pylons are located outside of heritage sensitive areas
3. Ecological	High	Difficult	Option possibly viable	The line crosses five (5) water courses. The southern portion of the line crosses ±1.4km of high ecological sensitivity, ±1.6km of Medium-High sensitivity, ±0.5km medium ecological sensitivity and ±1.7km low ecological sensitivity.

Alternative C: Section 2 Option CH2				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
1. Birds sensitivity	Very High	Difficult	Option not viable	This line crosses the central section of the high sensitivity bird corridor and spans the length of the corridor for ±150m of option CH1 powerline
2. Heritage	Low	Easily Achievable	Option preferred	This line is located outside of heritage sensitive areas
3. Ecological	High	Difficult	Option possibly viable	The line crosses six (6) water courses, line crosses ±0.8km of high ecological sensitivity, ±.2.1km in Medium-High sensitivity and ±1.5km medium ecological sensitivity.

Conclusion	Both line option CH1 and CH2 cross the entire high sensitivity bird corridor. CH1 crosses a greater length (250m) then CH2 (150m). The bird sensitivity is considered higher in the centre of the bird corridor and thus option CH1 is preferred over CH2 from a bird sensitivity perspective. Both options are preferred from Heritage sensitivity. Both line option CH1 and CH2 have similar ecological impacts, the pylons for both lines would be located in high ecological sensitivity and they cross a similar number of water courses. Neither are considered the preferred option, both options are possibly viable from an ecological sensitivity but not viable from a bird sensitivity perspective.

Alternative C: Section 3

Section 3 has 2 route options: Option CH3A or Option CH3B. Option CH3A starts at Point X and ends at Bon Espirange Substation. Option CH3B starts at Point X and ends at the Komsberg Substation. Heritage and Ecological sensitivities for Section 3 is presented below.



Alternative C: Section 3 Option CH3A				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
1. Birds sensitivity	Low	Achievable	Option preferred	This line is located outside of high bird sensitive areas
2. Heritage	Low	Achievable	Option preferred	The line and its pylons is located outside of the heritage sensitive buffer and points
3. Ecological	Moderate	Achievable	Option preferred	The line crosses the water courses eight times and the northern section runs along the watercourse, the line crosses ±1.9km of Medium sensitivity and ±0.5km low ecological sensitivity.
Alternative C: Section 3 Option CH3B				
Specialist assessment	Impact rating	Mitigation rating	Option rating	Comments
1 Birds sensitivity	Low	Achievable	Option preferred	The line and its pylons is located outside of high bird sensitive areas
2. Heritage	Low	Achievable	Option preferred	The line and its pylons is located outside of the heritage sensitive buffer and points
3. Ecological	Moderate	Achievable	Option preferred	The line crosses eight (8) water courses, the eastern half of the line crosses ±5.5km of Medium ecological sensitivity and ±0.5km low ecological sensitivity.
Conclusion	Both line option CH3A and CH3B have similar ecological impacts, the majority of pylons for both lines would be located in medium, however CH3A is ±4km in length and CH3B is ±7.5km in legnth. Option CH3A is preferred over CH3B from an ecological perspective, since CH3A crosses fewer number of water courses and is 3km shorter as will have an overall lower impact.			

Route analysis of Alternatives and section options

a) Route analysis of Alternative section options

Although Alternative A, Alternative B and Alternative C have been split into options to aid discussion, it needs to be borne in mind that as the route must be continuous, the options within a section are not interchangeable and one cannot mix and match the different options between the two sections. Thus we need to look at viable options for each Alternative.

Route options:

Alternative A
Option 4A and 1A (preferred alternative)
Option 3A and 1A

Alternative B
Option 3B and 2A
Option 4B and 2A

Alternative C
Option 3C and CH1/CH2 and CH3A
Option 4C and CH1/CH2 and CH3A
Option 3C and CH1/CH2 and CH3B
Option 4C and CH1/CH2 and CH3B

Each alternative (Alternative A, B and C) has different sub-alternatives (route options within each alternative) for distribution line connection. The table below summarises the impact of each sub-alternative assessed in detail in the impact statement above.

Each alternative was subject to a bird, ecology and heritage impact assessment and each sub-alternative was rated as either preferred, possibly viable or not viable based on these assessments.
A score of:

- One (1) indicates that the option has been chosen by one (1) of the specialist impact assessments,
- Two (2) indicates that the option has been chosen by two (2) of the specialist impact assessments and
- Three (3) indicates that the option has been chosen by three (3) of the specialist impact assessments

Thus a sub-alternative could score a minimum option rating of 0 and a maximum of 3.

The most preferred Alternative will be the alternative with the greatest number of sub-alternatives (Section/option) in the 'Option Preferred' category (yellow row). As illustrated below Alternative A Section 1 Option 4A and Section 2 Option A1 entire route is preferred over all other line routes.

Table 8: Summary of Alternative ratings for each Section.

	Alternative A		
	Section 1		**Section 2**
	Option 3A	**Option 4A**	**Option A1 (Bon Espirange)**
Option not viable	0	0	0
Option possibly viable	1	0	0
Option preferred	2	3	3
	Alternative B		
	Section 1		**Section 2 (Komsberg)**
	Option 3B	**Option 4B**	**Option B1**

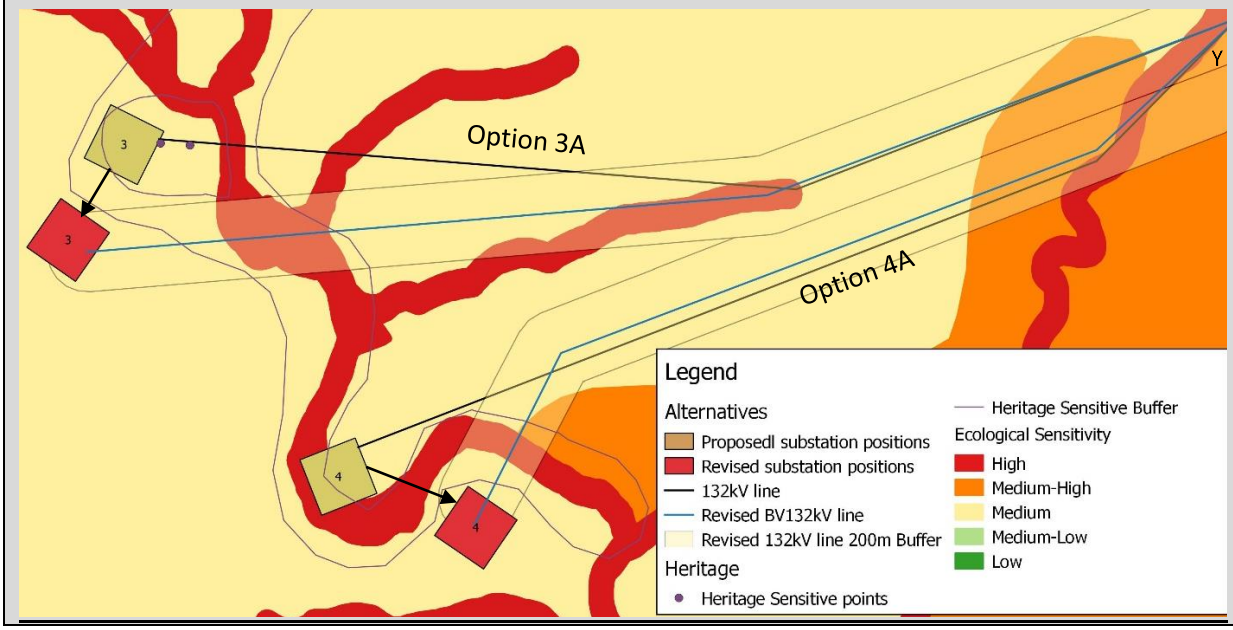
Option not viable	0	0	1			
Option possibly viable	1	0	0			
Option preferred	2	3	2			
	Alternative C					
	Section 1		Section 2		Section 3	
	Option 3C	Option 4C	Option CH1	Option CH2	Option CH3A	Option CH3B
Option not viable	0	0	1	1	0	0
Option possibly viable	2	1	1	1	0	0
Option preferred	1	2	1	1	3	3

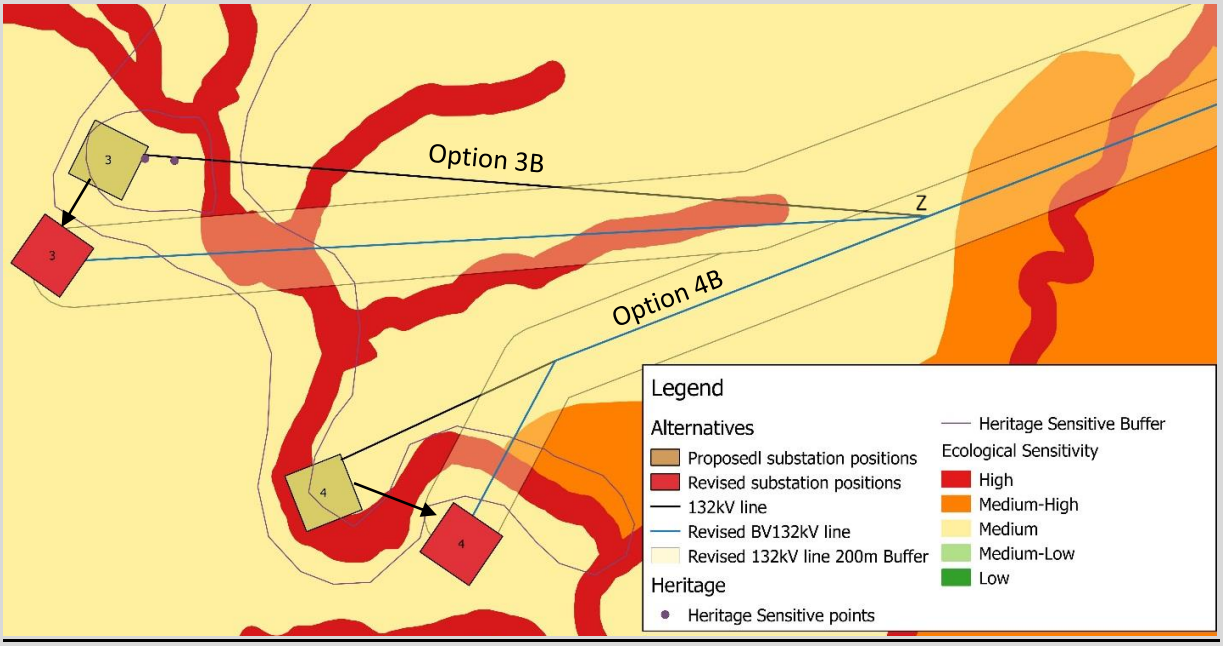
a) Revised Layout following Authority comment

Substation alternative 3 was moved 130m south-west from the initial proposed location in order to avoid the identified watercourses and associated 32m buffer and the stone artefacts identified by the heritage specialist. The amended layout of substation alternative 3 are still located within an area of medium ecological sensitivity. There were no avifaunal sensitive areas identified in the vicinity of the 33/132kV onsite substation 3.

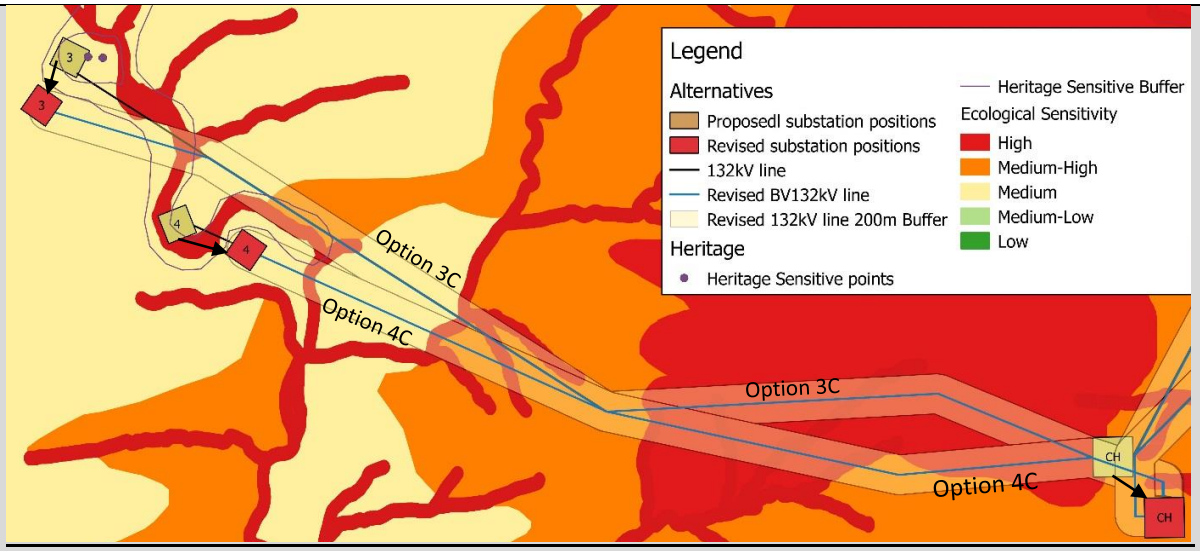
Substation alternative 4 (preferred alternative) was moved 190m south-east from the initial proposed location in order to avoid the identified watercourses and associated 32m buffer. The amended position of substation alternative 4 overlaps the area previously assessed for a potential construction camp for use during the construction of the Brandvalley WEF. The amended layout of substation alternative 4 is still located within an area of medium ecological sensitivity and therefore no further amendments are required. There were no heritage features or avifaunal sensitive areas identified in the vicinity of the preferred 33/132kV onsite substation 4.

132kV distribution line 200m buffer corridors. The majority of the corridors remained unchanged as the sensitive features identified can be avoided through micro-sitting the pylon positions. However, a slight shift in the corridors were needed in order for it to align with the newly amended positions for the onsite substations 3 and 4. The 132kV distribution line corridors (200m) were shifted south-west in order to connect with the amended substation position 3. The 132kV distribution line corridors (200m) were shifted south-east in order to connect with the amended substation position 4. Slight changes were also made to the central hub 132kV distribution line corridors in order to connect to amended central hub substation position. The majority of the corridor remained unchanged as the watercourses and 32m buffer zone, wetlands, heritage features and associated buffers and avifaunal sensitive areas can be avoided through micro-sitting within the 200m corridor.





The central hub substation was moved approximately 100m south from the initial proposed location in order to avoid the very-high sensitive ecological area. The amended layout avoids all watercourses and 32m buffer zones. There are no avifaunal or heritage sensitive features within the vicinity of the central hub substation.



The only change to the alternative ratings is to the Alternative C section 1 option 3C. Option 3C changed from **two** impact rated as ""option possibly viable" and **one** impacts as "option preferred" TO **one** impact rated as ""option possibly viable" and **two** impacts as "option preferred".

b) Conclusion

As each of the alternatives proposed have similar societal benefit (i.e. short term job creation, infrastructure creation), no significant differences between them in terms of community impact was determined. As such, community impacts were regarded as a secondary consideration as compared to the above mentioned environmental screening process. Final decision making on the preferred route thus rested on the environmental screening, technical and financial considerations, with societal benefit and impact being roughly equal between the different options.

Route **Alternative A (Option 4A and 1A)** covers the shortest distance and eliminates impacts associate with the highly sensitive bird corridor, option A1 is placed north of the bird corridor and does not cross it. **Alternative A starting at Substation 4 and ending at Bon Espirange substation is the environmentally preferred alternative**. This preferred route alternative is illustrated in the Figure 24 below and includes the showing approximate size of the servitude.

Preferred Alternative

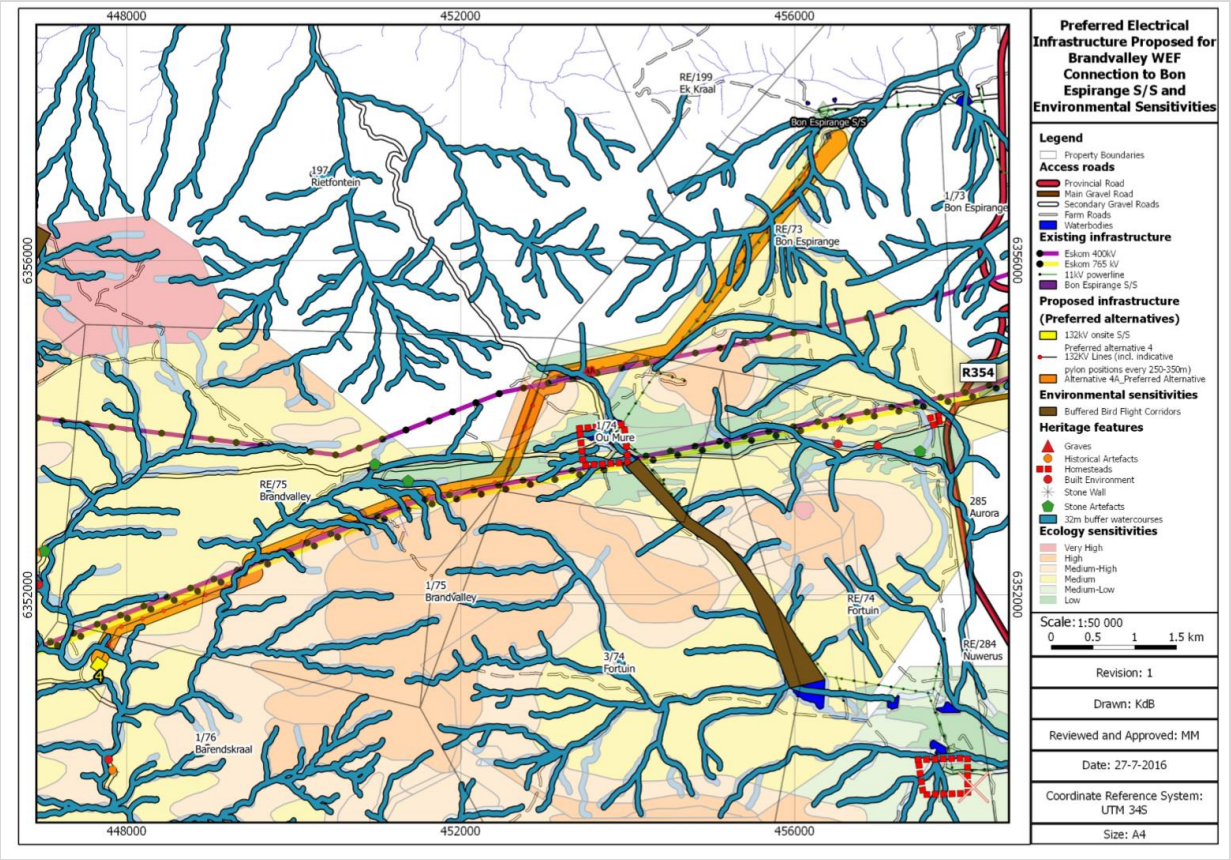


Figure 24: Preferred route alternative (from substation 4 to Bon Espirange).

Impact summary after mitigation

The following summarises the impact categories after mitigation for all three alternatives.

Impact description	Significance category – AFTER mitigation
Archaeological Impact Assessment	
Destruction of precolonial / stone age material during construction	**MODERATE -**
Destruction of Stone Walling Features during construction	**MODERATE -**
Impact to Homesteads / Farmhouse Complexes during construction	**MODERATE -**
Impact of the construction of the proposed Substation and Powerlines on the cultural landscape	**MODERATE -**
Cumulative impacts on heritage resources	**MODERATE -**
Palaeontological Impact Assessment	
Impact to fossil heritage resources	**LOW -**
Cumulative Impact to fossil heritage resources	**LOW -**
Avifaunal Impact Assessment	
Disturbance during construction of the sub-stations and power lines (relevant to all power line alternatives and all four sub-station locations).	**LOW -**
Loss of habitat as result of grounded features – namely the sub-stations, pylon bases, and associated service tracks during the construction phase.	**MODERATE -**
Bird mortality through collision with the overhead lines during the operational phase (relevant to all powerline alternatives).	**MODERATE -**
Cumulative Impact : • Electrocution	**LOW -**

• Habitat Destruction • Displacement • Solar Array Collision • Wind Turbine Collision • Powerline Collision	
Social Impact Assessment	
Social and visual impact of power line	**LOW -**
Cumulative impact	**LOW -**
Ecological Impact Assessment	
Impact on vegetation and listed plant species due to transformation within the development footprint.	**LOW -**
Direct faunal impacts due to construction phase noise and physical disturbance.	**LOW -**
Following construction, the site will be highly vulnerable to soil erosion	**LOW -**
Following construction, the site will be highly vulnerable to alien plant invasion	**LOW -**
Faunal Impacts due to Decommissioning Phase activities such as noise and disturbance due to the presence of construction staff and the operation of heavy machinery	**LOW -**
Soil Erosion Risk	**LOW -**
Alien plant invasion will be highly likely within disturbed areas following decommissioning	**LOW -**
Impacts on Critical Biodiversity Areas and broad-scale ecological processes	**LOW -**
Traffic Impact Assessment	
he transport of electrical components, including mast, cables, connectors and transformers will contribute to the overall traffic in the area.	**LOW -**
6.2 Although unlikely, should the construction phase of the project coincide with many of the other regional WEF and 132kV line projects, an elevated traffic impact will occur.	**LOW -**

Summary impact assessment for impacts assessed by EAP.

Impact summary	Significance category – AFTER mitigation
Visual Impacts	
Visual impact on sense of place.	**LOW -**
Combined visual impact from WEF and power line type projects within the region.	**MODERATE -**
Surface Water Impacts	
Micro-siting of pylons may induce impact on river or wetland features	**LOW -**
Cumulative impact	**LOW -**
Erosion Impacts	
Areas disturbed during construction will remain vulnerable to disturbance for some time into the operational phase and will require regular maintenance to ensure that erosion is minimised.	**LOW -**
Decommissioning will result in disturbance which will leave the site vulnerable to erosion.	**LOW -**
Cumulative soil erosion from adjacent project works	**LOW -**
Impact to soil and land capabilities	
Loss of agricultural land.	**LOW -**
Cumulative soil erosion from adjacent project works	**LOW -**
Impact on energy production	
Positive indirect impact to national energy production nationally	**MODERATE +**
Noise impact	
Noise impacts associated with the construction phase	**LOW –**
Dust impact	
Impact of dust on SALT, SKA or SAAO during construction phase	**LOW –**

Cumulative Impacts

The cumulative impacts for the power lines need to be considered against all other planned or proposed renewable energy projects surrounding the project area and within Renewable Energy Development Zone (REDZ), given that

the WEF itself will result in more spatially spread and significant cumulative impacts than the power line project in isolation. Accordingly, the specialist findings indicate that the cumulative impact of the proposed project is of low (negative) significance after mitigation, with the exception of archaeological cumulative impacts (moderate negative) and visual cumulative impacts (moderate negative). Archaeological and visual impacts can be mitigated from high (negative) to moderate (negative) while ecological impacts can be mitigated from moderate (negative) to low (negative).

The interconnecting power lines are deemed to be of low overall environmental significance in relation to other renewable energy projects and their associated infrastructure due to the limited development footprint and the fact that the visual impacts are limited to the direct landowners and run within the existing servitude of the 765kV Eskom power line for 5km and the existing 400kV power line before linking to the Bon Espirange substation. The proposed power line application should be viewed within the context of the WEF located within the REDZ, an area identified for the development of renewable energy projects.

No-go alternative (compulsory)

The following summarises the impact categories for this option. Please note, with the no-go option mitigation is not included.

Impact summary	Significance category – NO mitigation
Loss of plant Species of Conservation Concern	LOW -
Cumulative impacts for loss of plant Species of Conservation Concern	MODERATE -
Loss of animal SCC	LOW -
Faunal disturbance	LOW -
Farming activities damage existing heritage resources in the future	MODERATE -
Modification of natural flow regime from agricultural activities (dams, boreholes etc)	MODERATE -
Erosion from ongoing farming activities	MODERATE -
Invasive species encroachment	MODERATE -
Cumulative infestation from the combined disturbance of soil through grazing and other agricultural activities	HIGH -

The no-go option is represented by the development not proceeding, and the dominant land use of the region, in this case that of agricultural, to persists into the indefinite future. While many of the project related impacts will thus be absent, the notable societal benefits will also be removed. Additionally, the option of continued agriculture is not without its own impacts, stemming mainly from plant and animal SCC loss through disturbance, mortality and habitat loss, as well as creation an environment for the proliferation of invasive alien plant species.

While this option still has less impact than the overall project related impacts (regardless of which alternative is selected), the loss of societal benefit makes this the less attractive option, especially in the light of the fact that this project proceeding will not reduce the agricultural potential and capacity already present within the project area.

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	

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).

No further aspects are deemed necessary.

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.

EAP opinion

The decision regarding whether to proceed with the proposed development was based on weighing up of the positive and negative impacts as identified and assessed by the independent specialists. In addition to the findings of the specialist studies, it is also necessary to consider the following when making a decision:

- The majority of the impacts associated with the proposed project can be mitigated by applying specialist study findings and recommendations;
- The nature of the site on which the facility is to be sited is suited to the development proposal, and falls within a strategically identified REDZ;
- The project applicant has taken the issues raised by interested and affected parties into consideration;
- The project has extensive potential environmental and socio-economic benefits including the generation of clean energy for the Western Cape, and
- The project will contribute directly and significantly to social upliftment through a community development trust and skills transfer.

Based on the above, it is believed that with appropriate mitigation, the benefits of the proposed Brandvalley electrical infrastructure will outweigh the negative impacts and it is the opinion of the EAP that the No-Go option should not be considered any further and that the proposed development for the preferred alternative should be granted authorisation.

Preferred alternatives

The technically feasibility results have indicated that the shorter lines are favourable, as they incur less construction and operation costs, and are more effective in terms of power transmission and loss (cost effective per unit metre of conductor). Environmental concerns also dictate that the shorter line will be preferred, provided it does not incur other environmental impacts. This is because a shorter line would incur less avifaunal impact, which is a major concern for distribution line type projects.

Based on the different grid connection options available to the developer (Komsberg, shared central Hub Substation or Bon Espirange) and the various onsite 132kV substation positions, the selection of the preferred distribution line was dependant on the following factors:

- What the environmental sensitivities indicate regarding the line layout;
- What the costs involved and practical considerations are for the line layout; and
- What the technical considerations are regarding the line layout.

Based on the findings of the specialist studies and the EAP screening process, the following alternatives are environmentally, socially and technically preferred:

- **Location alternatives: Brandvalley project area**
- **Layout alternatives: Substation 4 and the 132kV overhead distribution line to Bon Espirange (Alternative A, section option 4A and 1A)**
- **Technology alternative: overhead 132kV distribution**

The following should be conditions to the Environmental Authorisation:

Recommendations of the Heritage Specialist:

- The heritage impact assessment must be submitted to Heritage Western Cape (HWC), the heritage authority for any Western Cape developments. A Notice of Intention to Develop will be submitted to the HWC together with the copies of the impact assessment reports in order to satisfy this recommendation.
- An archaeological heritage walk-through survey of the final layout of the power lines must be conducted to assess the changes where further recommendations and mitigatory measures may be made if necessary.
- To avoid negative impacts to these features a 20-30m buffer is recommended around Stone Wall Features and Historical Artefact Scatters.

Recommendations of the Avifaunal Specialist:

- Clear only areas where absolutely necessary, not from the entire servitude of the power line;
- Minimize the number of service tracks;
- Power line routes should be avoided:
  - Near Fortuin dam;
  - Through or across the col between Ou Mure and Fortuin farms, or for these localities only burying of the cables should be allowed;
- Should it not be possible to avoid the col, diverters at 5m intervals along all power line spans between across the col;
- Any powerlines across the col between Ou Mure and for that section to have day night visible bird flight diverters at 2m intervals;
- Avoid constructing the substations during the main breeding season for local birds, which is the period August to October inclusive, as far as possible.

Recommendations of the Ecological Specialist:

- All above-ground infrastructure should be removed from the site at decommissioning and rehabilitation. Below-ground infrastructure such as cabling can be left in place if it does not pose a risk, as removal of such cables may generate additional disturbance and impact.
- All cleared areas should be revegetated with indigenous perennial shrubs and grasses from the local area. These can be cut when dry and placed on the cleared areas if natural recovery is slow.
- All construction vehicles should adhere to a low speed limit (40km/h for cars and 30km/h for trucks) to avoid collisions with susceptible species such as snakes and tortoises and rabbits or hares. Speed limits should apply within the facility as well as on the public gravel access roads to the site.
- All disturbed and cleared areas should be revegetated with indigenous perennial shrubs and grasses from the local area.
- All erosion problems observed should be rectified as soon as possible, using the appropriate erosion control structures and revegetation techniques.
- All hazardous materials should be stored in the appropriate manner to prevent contamination of the site. Any accidental chemical, fuel and oil spills that occur at the site should be cleaned up in the appropriate manner as related to the nature of the spill.
- All personnel should undergo environmental induction with regards to fauna and in particular awareness about not harming or collecting species such as snakes, tortoises and owls.
- All roads and other hardened surfaces should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- Any potentially dangerous fauna such snakes or fauna threatened by the construction, operational or decommissioning activities should be removed to a safe location.
- Any roads that will not be rehabilitated should have runoff control features which redirect water flow and dissipate any energy in the water which may pose an erosion risk.
- Avoid impact to potential corridors such as the riparian corridors associated with the larger drainage lines within the facility area.
- Demarcate all areas to be cleared with construction tape or similar material. However, caution should be exercised to avoid using material that might entangle fauna.
- Development within the Very High Sensitivity areas should be avoided.
- Due to the disturbance at the site alien plant species are likely to be a long-term problem at the site following decommissioning and regular control will need to be implemented until a cover of indigenous species has returned.
- Due to the disturbance at the site as well as the increased runoff generated by the hard infrastructure, alien plant species are likely to be a long-term problem at the site and a long-term control plan will need to be implemented. Problem woody species such as *Prosopis* are already present in the area (mainly along riverine habitats) and are likely to increase rapidly if not controlled.
- During construction any fauna directly threatened by the construction activities should be removed to a safe location by the ECO or other suitably qualified person.
- Ensure that temporary infrastructure areas are within low sensitivity areas, preferably previously

transformed areas if possible.
- Erosion management should take place according to the Erosion and Rehabilitation Plan.
- If any parts of site such as construction camps must be lit at night, this should be done with low-UV type lights (such as most LEDs), which do not attract insects and which should be directed downwards.
- No dogs or cats should be allowed on site apart from that of the landowners.
- No fires should be allowed within the site as there is a risk of runaway veld fires.
- No fuelwood collection should be allowed on-site.
- Preconstruction environmental induction for all construction staff on site to ensure that basic environmental principles are adhered to. This includes awareness as to no littering, appropriate handling of pollution and chemical spills, avoiding fire hazards, minimizing wildlife interactions, remaining within demarcated construction areas etc.
- Regular alien clearing should be conducted using the best-practice methods for the species concerned. The use of herbicides should be avoided as far as possible.
- Regular monitoring for alien plants within the development footprint as well as adjacent areas which receive runoff from the facility as there are also likely to be prone to invasion problems.
- Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance.
- The illegal collection, hunting or harvesting of any plants or animals at the site should be strictly forbidden. Personnel should not be allowed to wander off the construction site.
- The recovery of the indigenous shrub layer should be encouraged through leaving some areas intact through the construction phase to create a seed source for adjacent cleared areas.
- Topsoil should be set aside and replaced after construction to encourage natural regeneration of the local indigenous species.

Recommendations of Palaeontologist:
- Given the low impact significance and the fact that the entire development footprint has been previously assessed, no further specialist palaeontological studies are considered necessary in this regard.
- Given the potential for scientifically important chance fossil finds during the construction phase, the following recommendations for palaeontological monitoring and mitigation should be included within the Environmental Management Programme for the 132 kV distribution lines:
    - The Environmental Control Officer (ECO) responsible for the 132 kV distribution lines should be made aware of the possible occurrence of scientifically-important fossil remains within the development footprint.
    - During the construction phase all major clearance operations (e.g. for new access roads, pylon placements) and deeper (> 1 m) excavations should be monitored for fossil remains on an on-going basis by the ECO.
    - Should substantial fossil remains - such as vertebrate bones and teeth, or petrified logs of fossil wood - be encountered at surface or exposed during construction, the ECO should safeguard these, preferably in situ. They should then alert the relevant Heritage Management Authority as soon as possible (i.e. Western Cape: Heritage Western Cape (HWC). Protea Assurance Building, Green Market Square, Cape Town 8000. Private Bag X9067, Cape Town 8001. Tel: 086-142 142. Fax: 021-483 9842. Email: hwc@pgwc.gov.za. Northern Cape: South African Heritage Resources Agency (SAHRA). Dr Ragna Redelstorff. Heritage Officer Archaeology, Palaeontology & Meteorites Unit, SAHRA. 111 Harrington Street, Cape Town, 8001. Tel: +27 (0)21 202 8651. Fax: +27 (0)21 202 4509. Email:rredelstorff@sahra.org.za). This is to ensure that appropriate action (i.e. recording, sampling or collection of fossils, recording of relevant geological data) can be taken by a professional palaeontologist at the developer's expense.

Recommendations of the Transport Engineer:
- The imported freight will preferably be transported from Saldanha Port to the site. The preferred freight route from Saldanha Port, via Moorreesburg (a distance of 342km), comprises surfaced roads for the majority of the way (only the final road section to the site consists of gravel roads). This route is predominantly on National or Provincial Roads, with suitable conditions for the transport of normal freight,

or abnormal loads with permits. No toll fees are required on this route, however, abnormal permits will be required for the transport of the transformers and turbine components, irrespective of the final route determined by the logistics contractor.

- Building materials will most likely be transported from Worcester, while certain elements will be transported from various manufacturing centres in South Africa - most likely Cape Town for tower sections and Johannesburg for transformers. The transport of elements from these manufacturing centres will be predominantly on National and Provincial roads, which presents no limitations for normal freight.
- Due to the distance from Worcester to site (approximately 155km), significant reductions in heavy vehicle trips could be achieved by sourcing road building materials and concrete aggregate from new quarries or borrow pits in proximity to the site, provided that it is a feasible with respect to the target implementation programme. The possible siting of quarries and/or borrow pits will be confirmed prior to construction, once a geotechnical investigation has been conducted.
- There is a limited risk of delays to the various deliveries required for the construction of the facility, due to potential routine maintenance works (such as repairs and reseals). The impact of such activities is dependent on the scheduling of deliveries and of roads contracts, and may be mitigated by the use of the alternative routes proposed in this report.
- In general, no obvious problems were identified associated with the transport of freight along the proposed routes to the site, nor for the accesses required for the construction and maintenance of the facility. It will, however, be necessary to confirm certain aspects such as clearances, bridge capacities, etc., by the logistics contractor as part of their preparation as this will be dependent on the actual vehicles configuration used.

Recommendations from the Social specialist:

- It is recommended that the Brandvalley WEF be supported, subject to the implementation of the recommended mitigation measures and management actions contained in the SIA report.
- In this regard it is recommended that the Western and Northern Cape Provincial Governments, in consultation with the KHLM, LLM and WLM and the proponents involved in the development of renewable energy projects in the Komsberg REDZ, consider the establishment of a Development Forum to co-ordinate and manage the development and operation of renewable energy projects in the Komsberg REDZ, with the specific aim of mitigating potential negative impacts and enhancing opportunities.

Recommendations of the EAP:

It is the recommendation of the EAP that the Brandvalley 132kV distribution line project can be considered acceptable from an environmental perspective. Based on the nature and extent of the proposed project, the potential impacts associated with the proposed project can be mitigated to an acceptable level. As such, it can be authorised for line option: **Substation 4 and the overhead 132kV distribution line Alternative A (Route 4A and 1A)(preferred alternative)**, should the following mitigation measures be applied:

- The EMPr should form part of the contract with the Contractor appointed to construct the proposed package plant, and must be used to ensure compliance with environmental specifications and management measures.
- An independent Environmental Control Officer (ECO) should be appointed to monitor compliance with the specifications of the EMPr for the duration of the construction period.
- An alien species monitoring and management plan should be developed for the construction phase and the first three years of operation, to ensure as little as possible establishment and maximum control of invasive species on site. This is important mainly due to the agricultural damage that spreading invasive species may have, in a predominantly agricultural setting.
- Disturbed areas should be rehabilitated as soon as possible once construction is complete in an area.
- A walk-through survey of the final substation site and power line tower positions should be undertaken by an ecologist and heritage specialist to determine any additional site-specific mitigation which should be implemented.
- The ecologist should scan the area for any frog and reptile micro-habitats when undertaking the final site walkthrough to inform the final site development plan.
- All bird nests identified during the 12 month bird monitoring campaign should be avoided. The developer

should obtain all necessary permits prior to the commencement of construction.
- The developer should obtain all necessary permits prior to the commencement of construction.
- All feasible mitigation measures recommended by the specialist's studies should be strictly adhered to.
- Final EMPr should be approved by DEA prior to construction.

Proposed project description for authorisation:

1. 132kV onsite substation yard 200m x 200m in extent (Substation Alternative 4).
2. 200m corridor (100m buffer either side) for the 132kV overhead distribution line between Substation 4 and the Bon Espirange Substation. Final servitude will be 31m.
3. Roads up to 6m wide within the servitude.

Coordinates of the preferred 132kV overhead distribution line and substation for Brandvalley Wind Energy Facility

Table 9: Coordinates of the proposed onsite 132kV substations and 132kv powerline.

Alternative	Latitude	Longitude
Substation 4 (preferred alternative)		
Centre point	-32.97671	20.43995
Corner point 1	-32.97688	20.43883
Corner point 2	-32.97577	20.43974
Corner point 3	-32.97654	20.44106
Corner point 4	-32.97765	20.44015
132kv Powerline (Preferred route option 4A and 1A (200m corridor from substation 4 to Bon Espirange substation) 11.586km in length		
Start	-32.97671	20.43995
Bend point 1	-32.97275	20.44227
Bend point 2	-32.96820	20.45677
Bend point 3	-32.96522	20.46061
Bend point 4	-32.95895	20.48014
Bend point 5	-32.95701	20.49210
Centre	-32.95395	20.49351
Bend point 6	-32.94704	20.49652
Bend point 7	-32.94667	20.49874
Bend point 8	-32.94654	20.49890
Bend point 9	-32.94605	20.49879
Bend point 10	-32.94592	20.49895
Bend point 11	-32.94348	20.51344
End	-32.92001	20.53372

Way forward

This Final BAR is prepared for submission to the DEA for decision-making. Upon thorough examination of this Final BAR, the authority will issue a decision which either accepts or rejects the report. Should the BAR be accepted, the authority will then issue an authorisation which will either grant (positive) environmental authorisation or not grant (negative) authorisation. Should an Environmental Authorisation (EA) be granted, it usually carries Conditions of Approval. The applicant is obliged to adhere to the EA conditions.

Within a period determined by the competent authority, all registered I&APs will be notified in writing of (i) the outcome of the application, (ii) the reason for the decision and the (iii) process to appeal the decision.

Is an EMPr attached? YES

The EMPr must be attached as Appendix G.