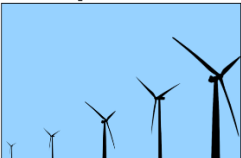



VISUAL IMPACT ASSESSMENT

Brandvalley Wind Energy Facility, Northern and Western Cape Provinces, South Africa

<p>Prepared for:</p>  <p>Brandvalley Wind Farm</p> <p>Brandvalley Wind Farm</p> <p>125 Buitengracht Street, 5th Floor Cape Town, 8001</p> <p>South Africa</p>	<p>Prepared by:</p>  <p>EOH Coastal & Environmental Services</p> <p>67 African Street, Grahamstown, 6140</p> <p>South Africa</p>	<p>Reviewed by:</p> <p>Henry Holland</p> <p>8 Cathcart Street Grahamstown, 6140</p> <p>South Africa</p>
---	---	--

MARCH 2016

TABLE OF CONTENTS

1 INTRODUCTION..... 8

1.1 Objective 8

2 BACKGROUND..... 9

2.1 Location and site description of the proposed development..... 9

2.2 Detailed description of the Brandvalley WEF 11

2.3 Grid Connection Infrastructure..... 11

2.4 Potentially Shared infrastructure 12

3 APPROACH TO STUDY..... 15

3.1 Terms of Reference 15

3.2 Methodology..... 15

3.2.1 Site visit 15

3.2.2 Data sources: project specific data 15

3.2.3 Data sources: the surrounding area 16

3.2.4 Data sources: elevation data 16

3.3 Legislative context 16

3.3.1 Seasonal changes 16

3.4 Assumptions and limitations 17

3.5 Author’s Details 17

3.5.1 Mr Thomas King, author 17

3.5.2 Mr Henry Holland, reviewer 17

4 BASELINE DESCRIPTION..... 18

4.1 Land use activities 18

4.2 Built environment..... 18

4.3 Topography 18

4.4 Vegetation 18

4.5 Identified sensitive receptors 18

4.6 Viewshed of the layout comprising 70 turbines 19

5 DESCRIPTION OF ALTERNATIVES..... 25

5.1 Fundamental alternatives 25

5.1.1 Location alternative..... 25

5.1.2 Access road location alternatives:..... 25

5.1.3 Construction camp alternatives..... 25

5.1.4 On-site substation location alternatives..... 25

5.1.5 Technology alternatives..... 25

5.2 Incremental alternatives..... 25

5.2.1 Turbine layout alternatives..... 25

5.3 No-go alternative 25

6 IMPACT ASSESSMENT 27

6.1 Design phase impacts 27

6.2 Construction phase impacts 27

6.2.1 Construction Phase Impact 1: Visual impact of construction activity 27

6.2.2 Construction Phase Impact 2: Construction camp alternatives 1, 2 and 3..... 28

6.3 Operation phase impacts..... 28

6.3.1 Operations Phase Impact 1: Impact of wind turbines on sensitive visual receptors 28

6.3.2 Operations Phase Impact 2: The access road, including alternatives 1 and 2..... 35

6.3.3 Operations Phase Impact 3: On-site substation alternatives 36

6.3.4 Operations Phase Impact 4: Shadow Flicker 36

6.4 Decommissioning phase impacts 37

6.4.1 Decommissioning Phase Impact 1: Visual impact of decommissioning activity 37

6.5 Cumulative Impacts 38

6.5.1 Cumulative Impact 1: Visual impact of facility construction and operation..... 38

6.6 No-Go Impacts 42

6.6.1 No-Go Impact 1: The Karoo’s sense of place and its value to residents and visitors.. 42

7 ENVIRONMENTAL MANAGEMENT PLAN..... 43

7.1 Conditions that should be included in the EMPr..... 43

7.1.1	Construction Phase	43
7.1.2	Operations Phase.....	43
8	CONCLUSIONS.....	44
8.1.1	Summary of impacts.....	44
8.1.2	Concluding points.....	45
9	SUBSEQUENT LAYOUT CHANGES	47
9.1	Introduction.....	47
9.2	Changes to layout.....	47
9.3	Impact on conclusions and recommendations	49
9.3.1	Access roads.....	49
9.3.2	Turbine layout.....	49
9.3.3	Conclusions.....	49
	REFERENCES	50
	APPENDIX A - VIEWSHED MAP	51
	APPENDIX B - CURRICULUM VITAE	53
	APPENDIX C - SPECIALIST DECLARATION	57
	APPENDIX D - CONTENTS OF A SPECIALIST REPORT (GNR 982)	59
	APPENDIX E - PHOTOMONTAGES	60

LIST OF FIGURES

Figure 2.1:	Location of the proposed Brandvalley Wind Energy Facility.	10
Figure 2.2:	Conceptual layout of the Brandvalley Wind Farm.....	13
Figure 2.3:	Conceptual view of a 120m high turbine, with 140m rotor diameter.....	14
Figure 5.1:	Alternative designs considered and assessed.....	26
Figure 6.1:	Shadow flicker affect.....	37
Figure 6.2:	Other WEF proposals within 50km of the Brandvalley WEF	41

LIST OF TABLES

Table 2.1:	Farm portions on which the proposed development is located.	9
Table 4.1:	The turbine layout's viewshed	19
Table 6.1:	Buildings within 5km of the border of BV WEF and number of turbines visible	28
Table 6.2:	Buildings within 5 to 10 km of the BV WEF and number of turbines visible.....	29
Table 6.3:	Buildings within 10 to 15 km of the BV WEF and number of turbines visible.....	30
Table 6.4:	Buildings within 15 to 20 km of BV WEF and number of turbines visible.....	30
Table 6.5:	Turbine / building visibility matrix for buildings within 10km of Brandvalley WEF	32
Table 6.6:	Renewable energy applications within 50km of Brandvalley WEF according to the South African Renewable Energy EIA Application Database, dated 21 December 2015.....	40

LIST OF PLATES

Plate 4.1:	Dorper sheep are farmed in the project area.....	20
Plate 4.2:	The R356 which links the R354 with Ceres.....	20
Plate 4.3:	The project area is characterised by open spaces and low levels of development	21
Plate 4.4:	Entrance to the Gatsrivier Guest Farm.....	21
Plate 4.5:	The vegetation of the area is very sparse.....	22
Plate 4.6:	Ridge above De Hoop Farm. 472687(x); 6369040(y). Distance to wind farm = 21km ...	23
Plate 4.7:	Bona Esperance Farm. 458479(x); 6357970(y). Distance to wind farm = 4.8km	23
Plate 4.8:	Gatsrivier Guest Farm. 436086 (x); 6360380 (y). Distance to wind farm = 3.2km.....	24
Plate 4.9:	Bantamsfontein farm. 422926 (x); 6352060 (y). Distance to wind farm = 14.5km	24

LIST OF ACRONYMS AND GLOSSARY

BV WEF	Brandvalley Wind Energy Facility
DEM	Digital Elevation Model
EIAR	Environmental Impact Assessment Report
EMPr	Environmental Management Programme
I&AP	Interested and Affected Party
masl	Metres above sea level
PV	Photo Voltaic
VIA	Visual Impact Assessment
WEF	Wind Energy Facility

EXECUTIVE SUMMARY

Brandvalley Wind Farm (Pty) Ltd proposes to develop a Wind Energy Facility (WEF) on the border of the Northern Cape and Western Cape Provinces of South Africa. In the Northern Cape, the proposed project falls within the Karoo Hoogland Local Municipality and within the Namakwa District Municipality. In the Western Cape, the WEF falls within the Witzenburg Local Municipality and the Laingsburg Local Municipality and within the Cape Winelands and the Central Karoo District Municipalities, respectively.

The proposed Brandvalley WEF falls across eleven (11) farm portions, which total 25,522ha in extent. The site is planned to host up to 70 wind turbines with an output between 1.5MW and 4MW each, each with a foundation of 25m in diameter and 4m in depth. Additional infrastructure will include:

- Construction Phase:
 - Temporary laydown areas;
 - A construction camp; and
 - Concrete batching plant.
- Operations Phase:
 - Hard-standing area for each turbine (70m x 50m);
 - Electrical turbine transformers (690V/33kV) adjacent to each turbine (typical footprint of 2m x 2m, but can be up to 10m x 10m at certain locations);
 - Underground 33kV cabling between turbines buried along access roads, where feasible. These will also connect to the on-site substation;
 - Internal access roads up to 12m wide, including structures for storm-water control;
 - Up to 4 x 120m tall wind measuring lattice masts to collect data on wind conditions;
 - 132kV overhead distribution lines will be required to connect the WEF from the onsite 33/132kV substation to the Eskom 400kV Komsberg substation.

A site visit to assess the character of the region and ground-truth features identified from aerial imagery was undertaken from 15 to 18 February 2016. The following land use activities were recorded on site and within 20km of the proposed WEF boundary:

- Sheep farming and other agricultural activities; and
- Tourist accommodation.

Three farms offering accommodation for tourists were discovered within 20km of the wind farm boundary. The closest was the Gatsrivier Guest Farm, located to the west of the wind farm and 8.6km from the nearest wind turbine (Wind Turbine 45). The second farm offering tourist accommodation was the Saaiplaas Guest House, located to the north-east of the wind farm and 10km from the nearest turbine (Wind Turbine 47). The third guest cottage is called "Keurkloof" and located on the farm of Mr Steve Swanepoel to the south of the wind farm, 17.5km from the nearest wind turbine (Wind Turbine 3).

The site and its surroundings are not highly developed. The site is remote and the sense of place is typically Karoo. A large 765kV Eskom transmission line, and a 400kV Eskom transmission line are the only features which currently detract from the otherwise high scenic quality of the area.

Within twenty kilometres of the WEF boundary, eighty (80) buildings were identified. These were identified using aerial imagery and were ground-truthed during the site visit. Thirty (30) of these were found to be the homesteads of surrounding farmers. The visual impact of the WEF on these homesteads is dependent on the number of turbines visible and their proximity to the turbines. Not all of these homesteads are necessarily sensitive to the proposed wind energy facility, as this depends on their perception of wind turbines: they may have a neutral or positive opinion towards them. Therefore, we consider tourist facilities and parties that have stated that they are opposed to the wind energy facility to be particularly sensitive. In terms of tourist facilities, the Gatsrivier and Saaiplaas guest farms have been identified as sensitive. Two interested and affected parties (I&APs) have submitted comments as they are neighbouring land owners. The first I&AP is Mr Warren Petterson whose farm "Zeekoegat" is located to the south of the proposed WEF site. The homestead on the farm is 17km from the nearest turbine (Wind Turbine 3). The mountain hut that he is refurbishing is 21km from the nearest turbine (Wind Turbine 3). The second I&AP is Mr Steve Swanepoel whose cottage on the farm "Keurkloof" is located 17.5km from the nearest wind turbine (Wind Turbine 3).

The following buildings are within 10km of the wind farm. The number of turbines potentially visible are shown on the right-hand side column.

Ref ¹	Type	Name	Owner	Y ³	X	Turbines Visible (distance in km to nearest turbine)
32	Homestead	Brandenburg	A.J. Du Plessis	6353100	431946	21-25 (11.8)
31	Derelict	Brandenburg	A.J. Du Plessis	6354080	427312	21-25 (16.6)
1	Homestead	Aurora	Gielie Hanekom	6349410	461339	11-15 (5.9)
16	Uncategorised ²	Aanstoot		6351610	462707	11-15 (6.3)
4	Guest accommodation	Gatsrivier		6360070	437350	11-15 (8.6)
30	Uncategorised	Haasvlei		6345530	430488	11-15 (12.9)
15	Substation	Komsberg		6356090	462164	6-10 (6.3)
18	Homestead ⁴	Bona Esperance	P.J. Conradie	6357820	456285	6-10 (4.9)
5	Guest accommodation	Gatsrivier		6360250	436216	6-10 (9.8)
7	Guest accommodation	Gatsrivier		6360370	434779	6-10 (11.2)
6	Guest accommodation	Gatsrivier		6360390	434684	6-10 (11.3)
8	Guest accommodation	Gatsrivier		6360590	432869	6-10 (13.1)
10	Uncategorised			6363470	444005	6-10 (6.6)
11	Uncategorised			6365000	449975	6-10 (8.6)
2	Uncategorised			6366240	445744	6-10 (9.3)
3	Uncategorised			6366990	443506	6-10 (10.2)
12	Uncategorised			6367770	449680	6-10 (11.3)
13	Uncategorised			6367940	450066	6-10 (11.7)
25	Uncategorised	Luipaardskloof		6339540	440740	6-10 (7.4)
26	Uncategorised	Luipaardskloof		6339940	440526	6-10 (7)
27	Uncategorised	Luipaardskloof		6340090	440492	6-10 (6.9)
24	Uncategorised	Luipaardskloof		6340750	443335	6-10 (5.7)
28	Uncategorised	Luipaardskloof		6340810	441002	6-10 (6.1)
23	Uncategorised			6347620	467446	6-10 (12.1)
22	Guest accommodation	Saaiplaas Guest House		6359790	464181	6-10 (10.1)
21	Homestead	Saaiplaas	F.D. Conradie	6360060	464865	6-10 (10.1)

Visual Impact Assessment

19	Uncategorised			6373200	447229	6-10 (16.4)
17	Uncategorised	Haasvlei		6348010	436268	1-5 (7.2)
14	Homestead	Swartland	T.J. Caldo	6358090	458174	1-5 (5.3)
9	Uncategorised			6363280	445269	1-5 (6.3)
29	Uncategorised			6339910	436431	1-5 (9.6)
20	Homestead	Ekkraal	K. Steenkamp	6368290	456549	1-5 (14.3)

1. See Appendix A - buildings identified are shown on a map showing the viewshed of the WEF
2. "Uncategorised" means the building was not accessible due to restricted access
3. Projection: UTM34S
4. Bona Esperance is also known as "Bon Espirange"

The following protected areas were identified within 50km of the WEF boundary:

- Anysberg Nature Reserve, Provincial Nature Reserve, 32km south of the WEF boundary;
- Touw Local Authority Nature Reserve, Local Nature Reserve, 46km south-west of the WEF boundary.

Visitors to these nature reserves will not have any views of the Brandvalley Wind Energy Facility due to their distance from the project. There will be no visual impact on these nature reserves.

The following alternatives¹ were considered:

- Access road alternatives:
 - Access road alternative 1, footprint = 4.8ha, viewshed = 3,028ha
 - Access road alternative 2, footprint = 14.7ha, viewshed = 5,500ha
- Construction camp alternatives:
 - Camp alternative 1, footprint = 11.5ha, viewshed = 461ha
 - Camp alternative 2, footprint = 11.5ha, viewshed = 1,061ha
 - Camp alternative 3, footprint = 12.5ha, viewshed = 883ha
- Substation alternatives (all footprints = 2.25ha)
 - Substation 1, viewshed = 418ha
 - Substation 2, viewshed = 816ha
 - Substation 3, viewshed = 1,231ha
 - Substation 4, viewshed = 1,397ha

All of the alternatives considered are acceptable but the following alternatives are preferred from a visual impact perspective, due to the fact that they have the smallest viewsheds:

- Access road alternative 1;
- Construction camp alternative 1;
- Substation alternative 1.

The wind energy facilities listed below are within 30km of the Brandvalley WEF and are seeking environmental authorisation or have received environmental authorisation.

- Konstabel Solar Project;
- Roggeveld Wind Project;
- Perdekraal Wind Project;
- Witberg Wind Project;
- Sutherland Wind and Solar Project;
- Hidden Valley Wind Project;

¹ Viewshed calculated based on the terrain within 5km of the road alternatives, camp alternatives, and substation alternatives.

- PV Solar Project, south of Sutherland;
- Suurplaat Wind Project;
- Gunstfontein Wind Project;
- Komsberg Substation; and
- Rietkloof Wind Project.

Although it makes sense from a business and engineering perspective to concentrate facilities in this way, there is no escaping the fact that the development of multiple wind energy facilities, at this scale, will change the character of this remote area significantly. However, it should also be noted that the area is located within a Renewable Energy Development Zone - "Komsberg Wind" - as identified in the Strategic Environmental Assessment undertaken by the Council for Scientific and Industrial Research (CSIR) and the Department of Environmental Affairs. The planning instruments therefore support the concentration of renewable energy development within this area.

Summary of visual impacts identified:

CONSTRUCTION PHASE IMPACTS		
Visual impact of construction activity		
	Without mitigation	MOD -
	With mitigation	MOD -
Construction camp alternatives 1, 2 and 3		
	Without mitigation	LOW -
	With mitigation	LOW -
OPERATION PHASE IMPACTS		
Impact of the layout on sensitive visual receptors		
	Without mitigation	HIGH -
	With mitigation	HIGH -
The access road, including alternatives 1 and 2		
	Without mitigation	MOD -
	With mitigation	MOD -
On-site substation alternatives		
	Without mitigation	MOD -
	With mitigation	MOD -
Shadow flicker		
		NO IMPACT
DECOMMISSIONING PHASE IMPACTS		
Visual impact of decommissioning activity		
	Without mitigation	MOD -
	With mitigation	MOD -
CUMULATIVE IMPACTS		
Visual impact of facility construction and operation		
	Without mitigation	HIGH -
	With mitigation	HIGH -
NO-GO IMPACTS		
The Karoo's sense of place and its value to residents and visitors		
	Without mitigation	HIGH +
	With mitigation	N/A

- The impact of the wind farm on its own, and when considered cumulatively with other wind farms in the region, will have a high negative visual impact for the following reasons:
 - The screening effect of vegetation in this arid environment is non-existent;
 - The construction of infrastructure of this type in this region will contract strongly with the sense of place of the region.

1 INTRODUCTION

Coastal and Environmental Services (CES) has been appointed by Brandvalley Wind Farm (Pty) Ltd, as independent environmental assessment practitioners to undertake an Environmental Impact Assessment (EIA) of a proposed wind farm in the Western and Northern Cape Provinces. The project is known as “Brandvalley Wind Farm”.

One of the required specialist studies as identified in the Final Scoping Report is that of a Visual Impact Assessment (VIA) of the proposed development.

This report is based on guidelines for visual assessment specialist studies as defined by Oberholzer (2005).

1.1 Objective

The Department of Environmental Affairs and Development Planning (DEA&DP) have issued South Africa’s only guidelines for visual impact assessments, which have been followed in the preparation of this report. According to the DEA&DP guidelines (Oberholzer 2005), the following specific concepts should be considered during visual input into the EIA process:

- An awareness that 'visual' implies the full range of visual, aesthetic, cultural and spiritual aspects of the environment that contribute to the area's sense of place.
- The consideration of both the natural and the cultural landscape, and their inter-relatedness.
- The identification of all scenic resources, protected areas and sites of special interest, together with their relative importance in the region.
- An understanding of the landscape processes, including geological, vegetation and settlement patterns, which give the landscape its particular character or scenic attributes.
- The need to include both quantitative criteria, such as 'visibility', and qualitative criteria, such as aesthetic value or sense of place.
- The need to include visual input as an integral part of the project planning and design process, so that the findings and recommended mitigation measures can inform the final design, and hopefully the quality of the project.
- The need to determine the value of visual/aesthetic resources through public involvement.

2 BACKGROUND

2.1 Location and site description of the proposed development

Brandvalley Wind Farm (Pty) Ltd proposes to develop a WEF on the border of the Northern Cape and Western Cape Provinces of South Africa. In the Northern Cape, the proposed project falls within the Karoo Hoogland Local Municipality and within the Namakwa District Municipality. In the Western Cape, the WEF falls within the Witzenburg Local Municipality and the Laingsburg Local Municipality and within the Cape Winelands and the Central Karoo District Municipalities, respectively.

Sutherland is the closest town within the Northern Cape Province and is situated approximately 60km north of the project area. The closest town within the Western Cape Province is Matjiesfontein, situated 30km south of the project area. Laingsburg is a further 30km east of Matjiesfontein, along the N1 national road in the Western Cape Province.

The project area can be accessed via the R354 that connects to the N1 between Matjiesfontein and Laingsburg. The R354 is the main arterial road providing access to the project area, where there are a number of existing local, untarred roads providing access within the project area.

The proposed Brandvalley WEF falls across eleven (11) farm portions, provided in Table 2-1 below. These land portions, collectively referred to as the project area for the Brandvalley WEF, are currently used for animal husbandry, game farming and agriculture including grazing of sheep.

Table 2.1: Farm portions on which the proposed development is located.

Description of affected farm portions			
Farm Name and Number	21 digit SG Code	Municipality/ Province	Farm size (ha)
The Remainder of Barendskraal 76	C04300000000007600000	Laingsburg LM/ Central Karoo DM/ Western Cape	1,523.7
Portion 1 of Barendskraal 76	C04300000000007600001	Laingsburg LM / Central Karoo DM / Western Cape	2,828.6
The Remainder of Brandvalley 75	C04300000000007500000	Laingsburg LM / Central Karoo DM / Western Cape	1,981.9
Portion 1 of Brandvalley 75	C04300000000007500001	Laingsburg LM / Central Karoo DM / Western Cape	56.3
The Remainder of Fortuin 74	C04300000000007400000	Laingsburg LM / Central Karoo DM / Western Cape	2,454.98
Portion 3 Fortuin 74	C04300000000007400003	Laingsburg LM / Central Karoo DM / Western Cape	1,868.4
The Remainder of Kabeltouw 160	C01900000000016000000	Witzenberg (Ceres) LM/ Cape Winelands DM/ Western Cape	1,082.8
The Remainder of Muishond Rivier 161	C01900000000016100000	Witzenberg (Ceres) LM/ Cape Winelands DM/ Western Cape	4,051.8
Portion 1 of Muishond Rivier 161	C01900000000016100001	Witzenberg (Ceres) LM/ Cape Winelands DM/ Western Cape	3391
Portion 1 of Fortuin 74 (Ou Mure)	C04300000000007400001	Laingsburg LM / Central Karoo DM / Western Cape	408.9
The Farm Rietfontein 197	C07200000000019700000	Karoo Hoogland LM/ Namakwa DM/ Northern Cape	5,873.6
Total hectares			25,521.98

The location of the proposed land properties is provided in Figures 2.1 below.

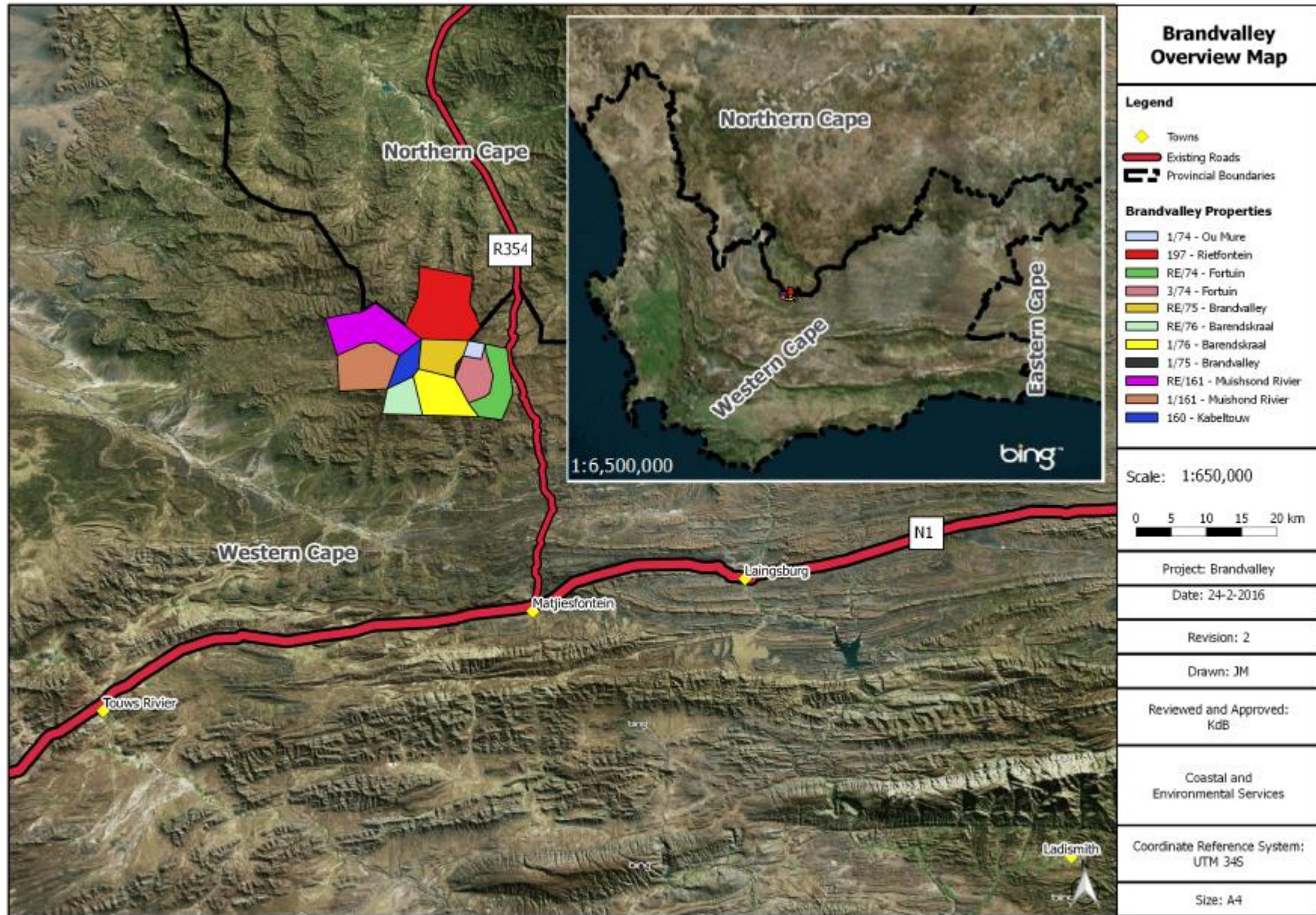


Figure 2.1: Location of the proposed Brandvalley Wind Energy Facility.

2.2 Detailed description of the Brandvalley WEF

Brandvalley WEF will have an energy generation capacity (at point of grid feed-in) of up to 140 megawatt (MW), and will include the following:

- Up to 70 potential wind turbine positions (between 1.5MW and 4MW in capacity each), each with a foundation of 25m in diameter and 4m in depth.
- The hub height of each turbine will be up to 120m, and the rotor diameter up to 140m.
- Permanent compacted hard-standing laydown areas for each wind turbine (70mx50m, total 24.5ha) will be required during construction and for on-going maintenance purposes.
- Electrical turbine transformers (690V/33kV) adjacent to each turbine (typical footprint of 2m x 2m, but can be up to 10m x 10m at certain locations) would be required to increase the voltage to 33kV.
- Internal access roads up to 12m wide, including structures for storm-water control would be required to access each turbine location and turning circles. Where possible, existing roads will be upgraded.
- 33kV overhead power lines linking groups of wind turbines to onsite 33/132kV substation(s). A number of potential electrical 33kV powerlines will be required in order to connect wind turbines or strings of turbines to the preferred onsite substation. The layout of the 33kV powerlines will be informed by sensitive features identified. The facility will consist of both above and below ground 33kV electrical infrastructure depending on what will require the shortest distance and result in the least amount of impacts to the environment.
- Underground 33kV cabling between turbines buried along access roads, where feasible.
- A number of potential 33/132kV onsite substation location(s) will be assessed. The footprint of these 33/132kV substation(s) will need to be assessed in both this EIA and the Basic Assessment² process for electrical infrastructure as the applicant will remain in control of the low voltage components of the 33/132kV substation (including isolators, control room, cabling, transformers etc.) (assessed in this EIA), whereas the high voltage components of this substation (assessed in BA) will likely be ceded to Eskom. The total footprint of this onsite substation will be approximately 200m x 200m. The exact coordinates of the low voltage components footprint (to be assessed in this EIA) and high voltage components footprint (to be assessed in the basic assessment process) will be provided in the EIA phase.
- Up to 4 x 120m tall wind measuring lattice masts strategically placed within the wind farm development footprint to collect data on wind conditions during the operational phase.
- Temporary infrastructure including a construction camp (~10ha) and an on-site concrete batching plant (~1ha) for use during the construction phase.
- Borrow pits and quarries for locally sourcing aggregates required for construction (~4.5ha), in addition to onsite turbine excavations where required. All materials excavated will eventually be used on the compacting of the roads and hard-standing areas and no material will be sold to any third parties. The number and size of the borrow pits depends on suitability of the subsurface soils and the requirement for granular material for access road construction and other earthworks. Alternative borrow pit locations will be assessed in a separate BA process.
- Fencing will be limited around the construction camp and the entire facility would not necessarily need to be fenced off. The height of fences around the construction camp are anticipated to be up to 4m.

It is important to note that the number of turbines and grid connection options will be subject to an iterative process based on the findings of the specialist reports and technical feasibility.

2.3 Grid Connection Infrastructure

The following infrastructure will likely be ceded to Eskom at a later stage and will therefore be assessed in a separate Basic Assessment process:

² The Basic Assessment process is being undertaken by CES.

- High voltage components of the 33/132kV onsite substation including transformers, isolators, cabling, light mast and other as required by Eskom. The onsite substation will have a footprint of up to 200m x 200m that will also house site offices, storage areas, ablution facilities and the maintenance building.
- 132kV above-ground distribution line to connect the onsite 33/132kV substation to the grid. The pylons for this line will have an average spacing of 250m to 300m.
- Extension of the Eskom high voltage infrastructure in order to connect the wind farm. There are three options being considered and the preferred option will be informed by environmental, technical considerations and Eskom's preference:
 - Extension of the existing 400kV Komsberg substation with several electrical components to be defined by Eskom (e.g. additional feeder bay, transformer bay) on the existing substation property;
 - Extension of the Bon Espirange satellite 132kV substation with several electrical components. The Bon Espirange satellite substation will be established by Eskom and other IPPs as an alternative to connecting all wind farms west of Komsberg directly to the Eskom Komsberg Substation; or
 - Construction of a central switching station (up to 200m x 200m) to be shared by both Brandvalley and Rietkloof if both are awarded preferred bidder status by the Department of Energy. If the central hub or switching station option is ultimately selected by Eskom, each project will build their own 33/132kV substation and connect to the central station. From there one 132kV line for both projects will lead to either the Komsberg or Bon Espirange substation.

2.4 Potentially Shared infrastructure

Depending on Eskom's requirements it might be feasible for both Brandvalley and Rietkloof to connect to a shared onsite 33/132kV substation, which could then be connected via an off-site overhead 132kV power line to Komsberg Substation. The latter could then be shared by both facilities. This would be assessed as a potential connection alternative in a separate Basic Assessment process as described above.

Access roads, laydown areas, borrow pit locations and buildings and other infrastructure will also be shared as far as feasibly possible.

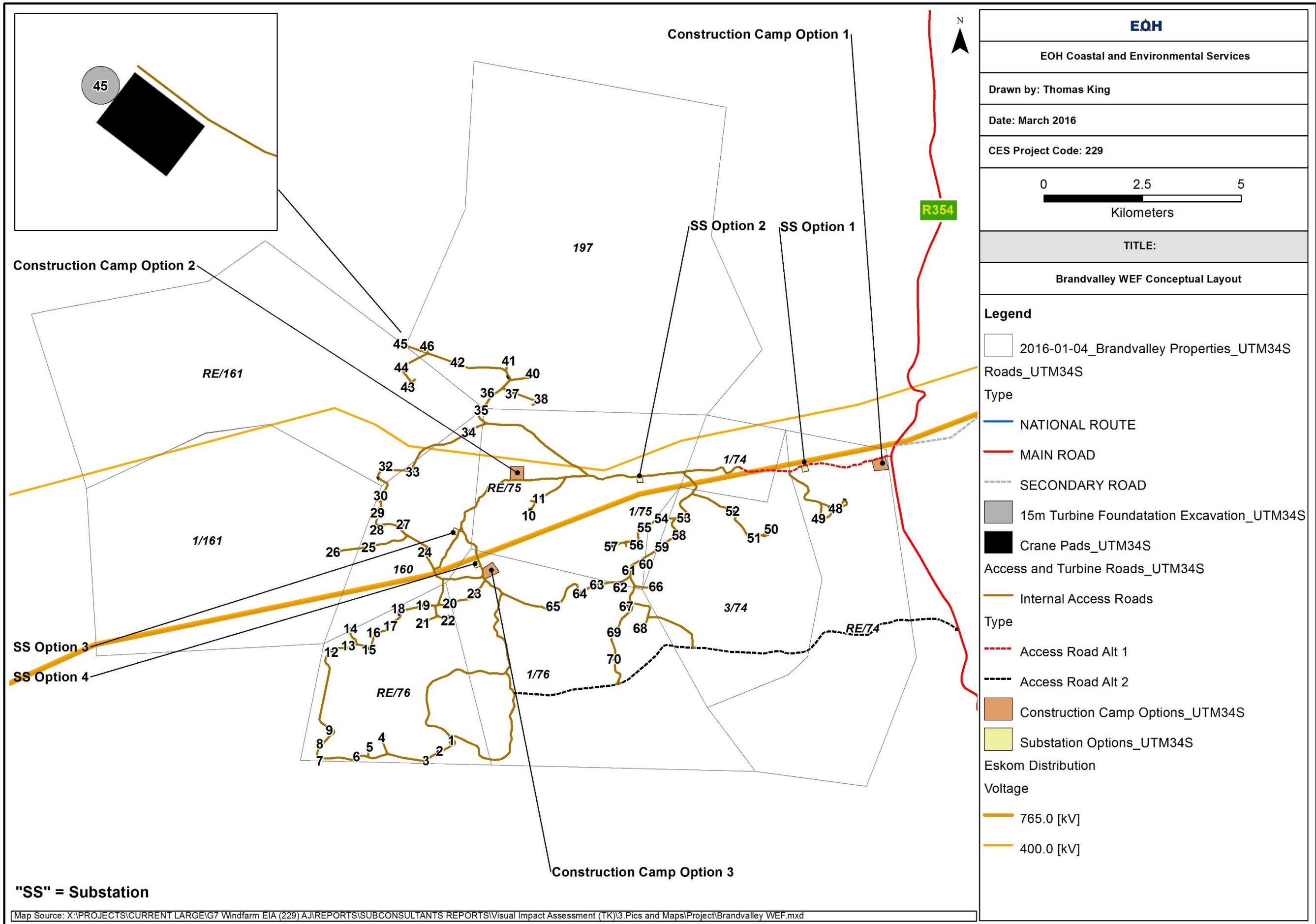


Figure 2.2: Conceptual layout of the Brandvalley Wind Farm

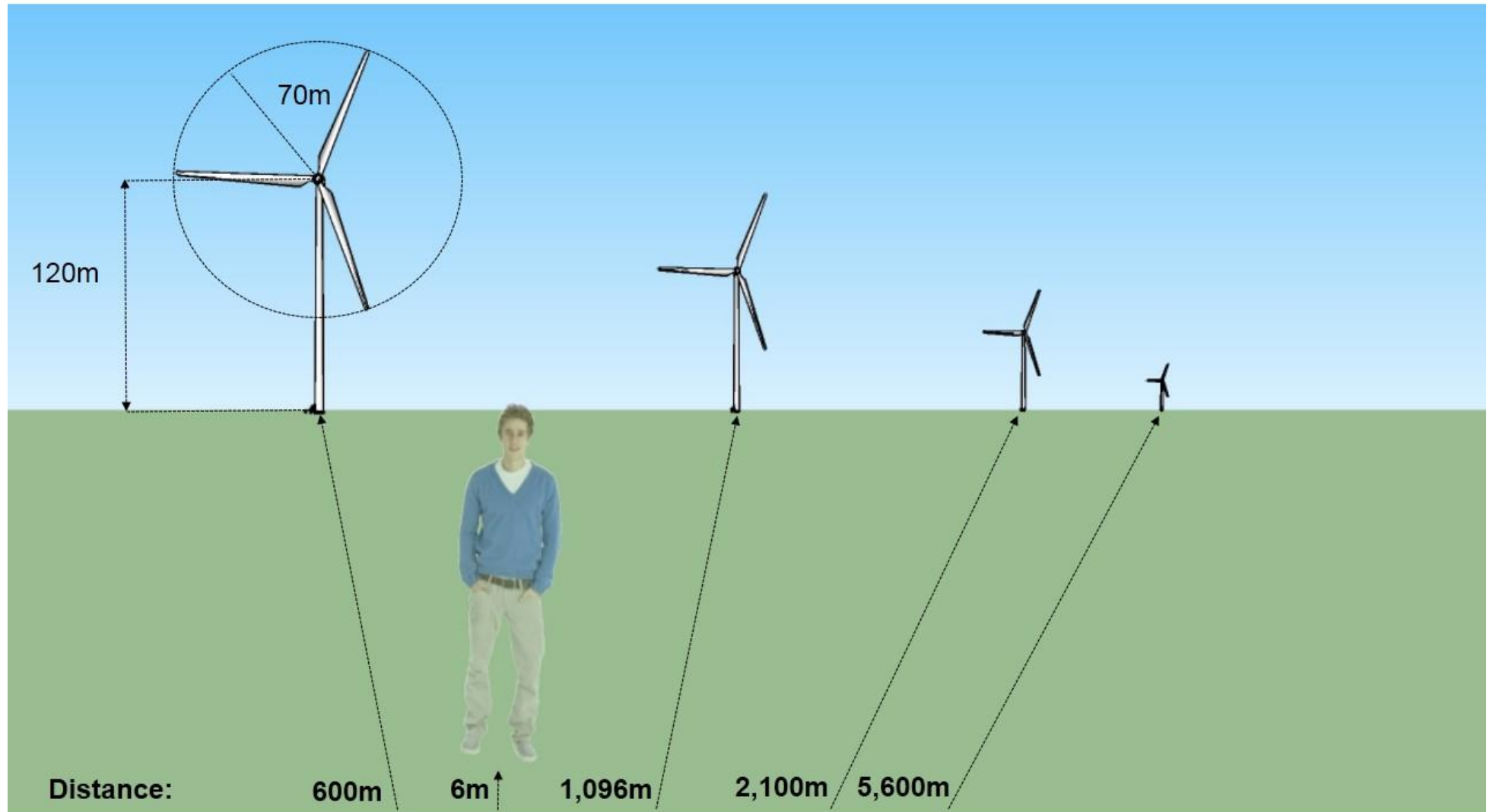


Figure 2.3: Conceptual view of a 120m high turbine, with 140m rotor diameter.

3 APPROACH TO STUDY

3.1 Terms of Reference

The overall aim of a Visual Impact Assessment (VIA) is to determine the current landscape quality (scenic views, visual sensitivity) and the visual impact of the proposed development. The terms of reference of the VIA will include the following tasks:

- Undertake a desktop survey using 1:50 000 survey maps, 1:10 000 orthophotos, any digital colour aerial photography and any other high resolution images.
- Conduct a site reconnaissance visit and photographic survey of the proposed project site. The focus of this survey should be on natural and cultural features, protected areas, coastal views and landscape, view sites, and scenic routes.
- Conduct a desk top mapping exercise and develop a Digital Elevation Model to establish visual sensitivity:-
 - Describe and rate the scenic character and sense of place of the area and site.
 - Establish extent of visibility by mapping the view-sheds and zones of visual influence.
 - Establish visual exposure to viewpoints.
 - Establish the inherent visual sensitivity and visual absorption capacity of the site by mapping slope grades, landforms, vegetation, special features and land use and overlaying all relevant map layers to assimilate a visual sensitivity map.
- Review relevant legislation, policies, guidelines and standards.
- Preparation of a Visual Baseline/Sensitivity report which shall include, *inter alia*:
 - Assessing visual sensitivity criteria such as extent of visibility, the sites inherent sensitivity, visual sensitivity of the receptors, visual absorption capacity of the area and visual intrusion on the character of the area.
 - Prepare photomontages of the proposed development.
 - Assess the proposed project against the visual impact criteria (visibility, visual exposure, sensitivity of site and receptor, visual absorption capacity and visual intrusion) for the site.
 - Assess impacts based on a synthesis of criteria for each site (criteria = nature of impact, extent, duration, intensity, probability and significance).
 - Establish mitigation measures/recommendations with regards to minimizing visual impacts.

3.2 Methodology

3.2.1 Site visit

A site visit was undertaken from Monday 15 February to Thursday 18 February 2016. The purpose of the site visit was as follows:

- To obtain a sense of the character and “sense of place” of the region;
- To take photos from selected viewpoints, this included particularly sensitive receptors and viewpoints that had a clear view of the project area;
- To determine the nature of the buildings identified from aerial imagery prior to the site visit;
- To take note of the existence of other infrastructure, tourist areas, nature reserves, heritage features, etc.

3.2.2 Data sources: project specific data

Brandvalley Wind Farm provided spatial data showing the layout of planned infrastructure. Brandvalley Wind Farm also provided an estimate of the height of the specific infrastructure components. These heights are used to calculate the viewshed of the infrastructure. The following heights have been used in the calculation of viewsheds:

- Turbine hub height = 120m;
- Rotor diameter = 140m (this means that a rotor tip height of 190m was used to calculate viewsheds);
- Construction camp options = 10m;
- Substation options = 10m.

3.2.3 Data sources: the surrounding area

Data on the surrounding area were collected during a site visit. The consultant visiting the site identified and recorded the geographic location of:

- Dwellings within a fixed distance of the development edge;
- Roads and railways;
- Potentially sensitive visual receptors such as:
 - Wildlife reserves;
 - Tourist areas;
 - Landmarks;
 - Or any other area deemed to be important in the particular environment and that could be expected to be sensitive to the proposed development.

Data on the surrounding areas was also digitised from the most recent aerial imagery available. Typically, dwellings are digitised in this manner.

Data was also downloaded from online, or supplied by other consultants. All data was checked for accuracy.

3.2.4 Data sources: elevation data

The calculation of viewsheds is based in the use of Digital Elevation Models (DEM) downloaded from the Advanced Spaceborne Thermal Emission and Reflection Radiometer (ASTER). These raster images have a resolution of 30 metres, which means that each pixel of the raster covers an area of 30 m x 30 m (900 m²), and is assigned a single height value.

When more detailed data is available, such as short-interval contours or a DEM for the specific areas, these are used.

3.3 Legislative context

A Scoping and Environmental Impact Assessment is being undertaken in accordance with Government Notice Regulation 982 published on 4 December 2014 (2014 EIA Regulations). This specialist report was compiled to meet the requirements set out in Appendix 6 of the 2014 EIA Regulations.

This visual impact assessment has been undertaken in accordance with the Western Cape Department of Environmental Affairs and Development Planning's Guideline: "Guideline for involving visual and aesthetic specialists in EIA processes" (Oberholzer, 2005).

Spatial Development Frameworks (SDFs) are considered and discussed in the Environmental Impact Assessment Reports.

3.3.1 Seasonal changes

In terms of Appendix 6 of the 2014 EIA Regulations, a specialist report must contain information on "the date and season of the site investigation and the relevance of the season to the outcome of the assessment". The site visit was undertaken in summer. The season in which the site visit was undertaken does not have any considerable effect on the significance of the impacts identified, the

mitigation measures, or the conclusions of the assessment since the vegetation cover does not vary significantly over the seasons.

3.4 Assumptions and limitations

The calculation of viewsheds does not take into account the screening effect of vegetation or buildings.

3.5 Author's Details

3.5.1 Mr Thomas King, author

Thomas holds a BSc degree with specialisation in Zoology from the University of Pretoria and an Honours degree in Biodiversity and Conservation from Rhodes University. As part of his Honours degree, Thomas was trained in Geographical Information Systems (GIS) in addition to the required biological sciences courses. With CES, he has been primarily in charge of all GIS related work, including database and software management. He has been the lead author of four Visual Impact Assessments. He has assisted in the compilation of numerous others. He is fully competent with the use of ArcGIS 10 including ArcMap, ArcCatalog, and ArcScene. He is also familiar with the use of supporting GIS software such as Oruxmaps, Quantum GIS, DNR Garmin, SketchUp, to name a few.

3.5.2 Mr Henry Holland, reviewer

Henry Holland has been applying his Geographic Information Systems knowledge and experience to visual impact assessments since 1997, and has conducted a number of assessments for wind farm developments in the Eastern Cape. These include wind farms near Jeffreys Bay, St Francis Bay, Grahamstown, Coega and Cookhouse. He has extensive practical knowledge in spatial analysis, landscape analysis and environmental modelling, and has been involved in many environmental management projects as GIS coordinator and analyst since 1992.

4 BASELINE DESCRIPTION

4.1 Land use activities

The following land use activities were recorded on site and within 20km of the proposed WEF boundary:

- Sheep farming and other agricultural activities; and
- Tourist accommodation.

The site and its surroundings are used for low-intensity sheep farming, mostly the black-headed Dorper breed. Three farms offering accommodation for tourists were also discovered within 20km of the wind farm boundary. The closest was the Gatsrivier Guest Farm, located to the west of the wind farm and 8.6km from the nearest wind turbine (Wind Turbine 45). The second farm offering tourist accommodation was the Saaiplaas Guest House, located to the north-east of the wind farm and 10km from the nearest turbine (Wind Turbine 47). However this guest house is located on a farm that will host the Karusa Wind Farm, so it is assumed that the landowner is not opposed to the presence of wind turbines. The third guest cottage is called “Keurkloof” and located on the farm of Mr Steve Swanepoel to the south of the wind farm, 17.5km from the nearest wind turbine (Wind Turbine 3). He has objected to the wind farm.

4.2 Built environment

The site and its surroundings are not highly developed. Most of the homesteads are not connected to the Eskom grid and rely on solar energy and gas. Most farms either have a Telkom line or rely on the Breedenet Radio Network for communication. There is very limited mobile telephone service reception in the area. The site lies on the western side of the R354 which connects Matjiesfontein and Sutherland. The broader area is accessible via good quality gravel roads. A large 765kV Eskom transmission line, and a 400kV Eskom transmission line cross the site from west to east. These lines are in stark contrast to the otherwise empty and unmodified nature of the landscape. These power lines have a negative impact on the scenic quality of the area.

4.3 Topography

The study area considered (the site and the area within 20km of the site boundary) varies in height between 674 metres above sea level (masl) and 1297 masl. The study area has a typically Karoo-like topography: vast open valleys separated by steep-sided hills. Dry river beds trace along the valley floors.

4.4 Vegetation

The vegetation of the area is better described in the Ecological Report for this project. From a visual impact assessment perspective, the most important features of the vegetation of the area are its height and density. There are virtually no naturally occurring plants taller than 0.5m throughout the viewshed area. Trees have been planted around most of the homesteads. Sometimes weeping willows (*Salix babylonica*) have established themselves adjacent to a river bed, but these are rare.

4.5 Identified sensitive receptors

Within twenty kilometres of the WEF boundary, eighty (80) buildings were identified. These were identified using aerial imagery and were ground-truthed during the site visit. Thirty (30) of these were found to be the homesteads of surrounding farmers. The visual impact of the WEF on these homesteads is dependent on the number of turbines visible and their proximity to the turbines (i.e. their visual exposure to the development). The visual impact on these homesteads is discussed in the impacts chapter (Chapter 6). Not all of these homesteads are necessarily sensitive to the proposed wind energy facility, as this depends on their perception of wind turbines: they may have

a neutral or positive opinion towards them. Therefore, we consider tourist facilities and interested and affected parties that have stated that they are opposed to the wind energy facility to be particularly sensitive. In terms of tourist facilities, the Gatsrivier and Saaiplaas guest farms have been identified as sensitive. Objections to the wind energy facility have been received from two nearby land owners during the scoping public participation process. The first objector is Mr Warren Petterson whose farm “Zeekoegat” is located to the south of the proposed WEF site. The homestead on the farm is 17km from the nearest turbine (Wind Turbine 3). The mountain hut that he is refurbishing is 21km from the nearest turbine (Wind Turbine 3). The second objector is Mr Steve Swanepoel whose cottage on the farm “Keurkloof” is located 17.5km from the nearest wind turbine (Wind Turbine 3).

The following protected areas were identified within 50km of the WEF boundary:

- Anysberg Nature Reserve, Provincial Nature Reserve, 32km south of the WEF boundary;
- Touw Local Authority Nature Reserve, Local Nature Reserve, 46km south-west of the WEF boundary.

4.6 Viewshed of the layout comprising 70 turbines

Of the 70 turbine layout, at least the tip of one turbine blade (at 190m) will be visible from an area of 272,546ha. This is the turbine layout’s viewshed. The total area assessed includes a buffer of 20km around the border of the properties upon which the wind farm is proposed. 16,696ha within the 20km border of the wind farm will not be able to see a single turbine. In the table that follows, the number of turbines visible (first column) and the size of the area affected (second column) is presented.

Table 4.1: The turbine layout’s viewshed

Number of turbines visible	Area (ha)
56-58	56
51-55	108
46-50	939
41-45	3 124
36-40	3 663
31-35	8 064
26-30	15 281
21-25	23 425
16-20	25 695
11-15	55 800
6-10	98 167
1-5	38 224
0	16 696
TOTAL	289 242

The operation of these large, industrial structures will change the character of the site and its surroundings.



Plate 4.1: Dorper sheep are farmed in the project area.



Plate 4.2: The R356 which links the R354 with Ceres.



Plate 4.3: The project area is characterised by open spaces and low levels of development



Plate 4.4: Entrance to the Gatsrivier Guest Farm



Plate 4.5: The vegetation of the area is very sparse

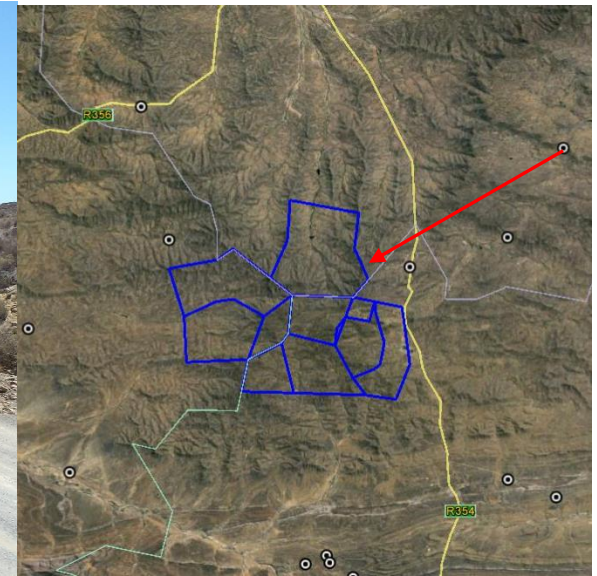


Plate 4.6: Ridge above De Hoop Farm. 472687(x); 6369040(y). Distance to wind farm = 21km

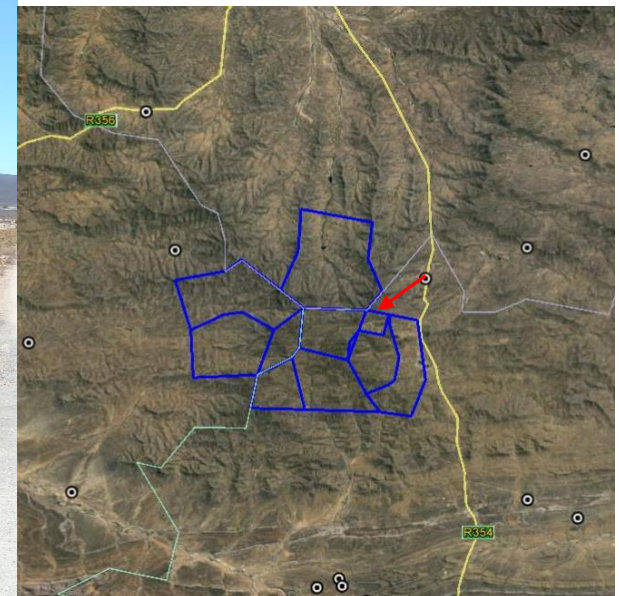


Plate 4.7: Bona Esperance Farm. 458479(x); 6357970(y). Distance to wind farm = 4.8km



Plate 4.8: Gatsrivier Guest Farm. 436086 (x); 6360380 (y). Distance to wind farm = 3.2km



Plate 4.9: Bantamsfontein farm. 422926 (x); 6352060 (y). Distance to wind farm = 14.5km

5 DESCRIPTION OF ALTERNATIVES

A detailed description of the process involved in selecting the preferred alternative, and other alternatives considered, is provided in the Environmental Impact Assessment Report (EIAR) for this project. For the purposes of this Visual Impact Assessment, the following alternatives have been assessed.

5.1 Fundamental alternatives

5.1.1 Location alternative

One project location alternative namely Brandvalley Wind Farm.

5.1.2 Access road location alternatives:

Two access road alternatives namely access road alternative 1 and access road alternative 2. Internal roads will form part of both access road alternatives 1 and 2.

5.1.3 Construction camp alternatives

Three construction camp alternatives: 1, 2, or 3.

5.1.4 On-site substation location alternatives

Four onsite substation location alternatives namely substation 1, 2, 3 and 4.

5.1.5 Technology alternatives

One technology alternative namely, a Wind Energy Facility.

5.2 Incremental alternatives

5.2.1 Turbine layout alternatives

One turbine layout of 70 positions has been assessed.

5.3 No-go alternative

The no-go alternative is considered in the assessment of impacts chapter.

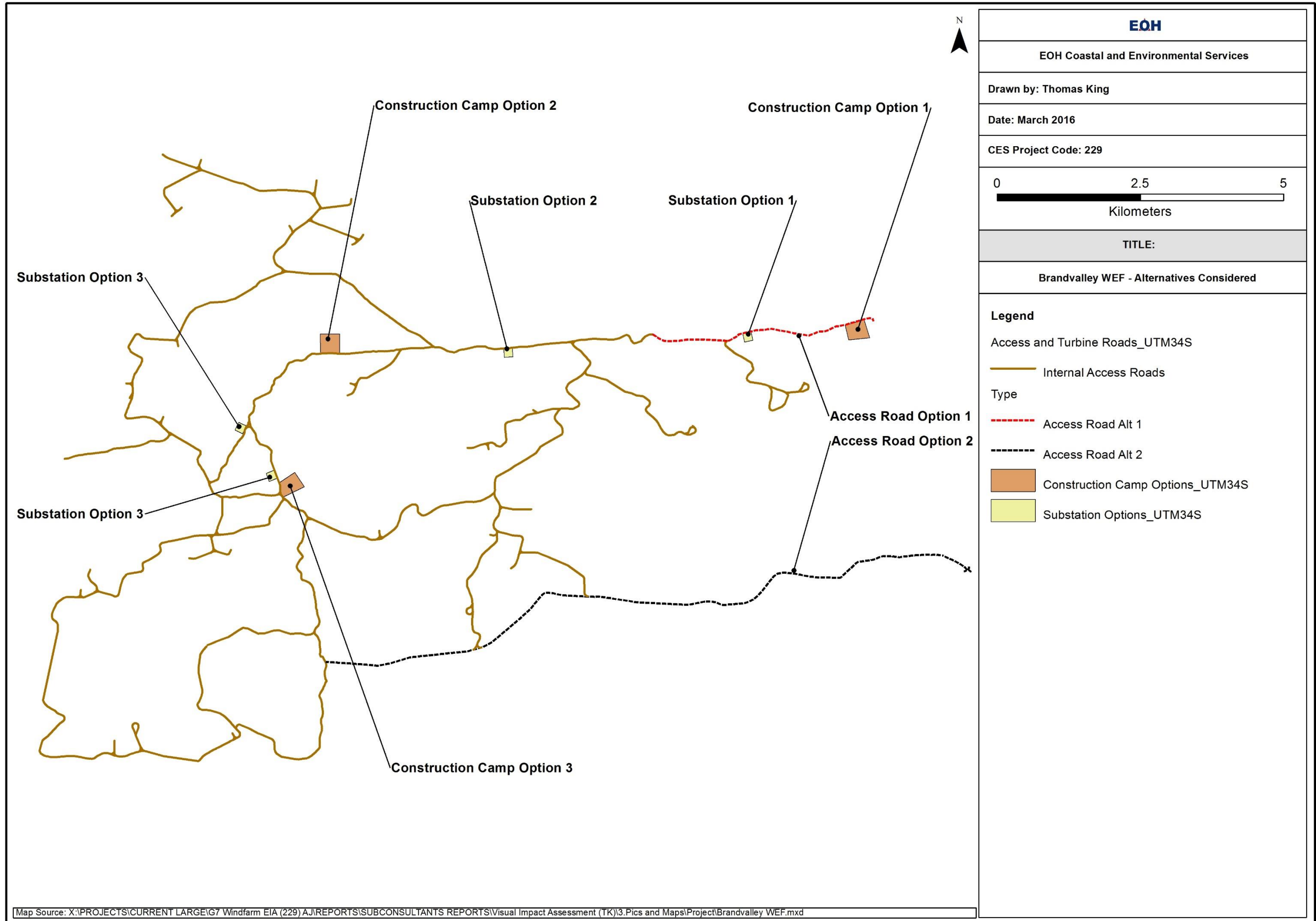


Figure 5.1: Alternative designs considered and assessed

6 IMPACT ASSESSMENT

6.1 Design phase impacts

Activities associated with the design and pre-construction phase pertain mostly to background studies, surveys and data collection. The visual impact in this phase is considered insignificant.

6.2 Construction phase impacts

The visual impacts during the construction phase of a wind farm are considered less significant than the impacts during the operations phase, due to the fact that:

- The construction phase has a much shorter duration than the operational phase,
- The size of the viewshed is much smaller, due to the fact that the construction equipment is much shorter than the erected wind turbines.

However, the construction of a wind farm of the size proposed will still require a large amount of construction activity, which will be a strong contrast to the current activity levels in the area.

6.2.1 Construction Phase Impact 1: Visual impact of construction activity

Cause and comment

There are various activities which will take place during construction which will have impacts on sensitive visual receptors:

- Large areas of vegetation will need to be cleared to make way for digging of the turbine foundations, hardstand areas, substation footprints, access roads, laydown areas, workshops and storage yards.
- Construction of wind turbines will potentially draw attention if they are exposed above the skyline.
- There will be a large increase in the movement of vehicles in the area: large trucks delivering supplies and construction material; graders, excavators and bulldozers; light vehicle movement around site; large trucks hauling rubble and construction waste, etc.
- Soil stockpiles and heaps of vegetation debris.
- Dust emissions from construction activity.

Mitigation measures

The following mitigation measures are proposed:

- The construction contractor should clearly demarcate construction areas so as to minimise site disturbance.
- Treat roads to reduce dust emissions.
- The site should be kept neat and tidy. Littering should be fined and the ECO should organise rubbish clean-ups on a regular basis.

Significance statement

The duration of the construction phase impacts will be “*Short Term*”. The extent is “*Regional*” as construction activity will be visible beyond the immediate environs of the site. The severity of the impact is expected to be “*Moderate*” should mitigation measures not be employed. If they are, the impact is expected to be “*Slight*”. The likelihood of surrounding farmers having their views impacted by construction activity is “*Definite*”.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without	Short term	Regional	Moderate	Definite	MOD -

Visual Impact Assessment

Mitigation					
With Mitigation	Short term	Regional	Slight	Definite	MOD -

6.2.2 Construction Phase Impact 2: Construction camp alternatives 1, 2 and 3.

Cause and comment

The footprint of the construction camp alternatives is largely similar, but the viewshed differs quite significantly based on their location in the landscape.

Camp alternative	Footprint (ha)	Viewshed area (ha)*	Visual receptors
1	11.5	461	0
2	11.5	1,061	0
3	12.5	883	0

*Viewshed calculated based on the terrain within 5km of the construction camp alternatives

Mitigation and management

Construction camp alternative 1 should be the preferred alternative due to it having the smallest viewshed.

Significance Statement

The duration of the construction camp impact (all three alternatives) will be “*Short term*”. The extent is “*Localised*”. The severity of the impact is expected to be “*Slight*”. The likelihood of surrounding farmers having their views impacted is “*Definite*”.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Short term	Localised	Slight	Definite	LOW -
With Mitigation	Short term	Localised	Slight	Definite	LOW -

6.3 Operation phase impacts

6.3.1 Operations Phase Impact 1: Impact of wind turbines on sensitive visual receptors

Cause and comment

The buildings listed in the table below are located within 5km of the border of the wind energy facility. The number of turbines potentially visible are listed in the column on the right-hand side.

Table 6.1: Buildings within 5km of the border of BV WEF and number of turbines visible

Ref	Type	Name	Owner	Y ¹	X ¹	Turbines Visible (distance in km to nearest turbine)
1	Homestead	Aurora	Gielie Hanekom	6349410	461339	11-15 (5.9) ³
16	Uncategorised ²	Aanstoot		6351610	462707	11-15 (6.3)
4	Guest accommodation	Gatsrivier		6360070	437350	11-15 (8.6)
15	Substation	Komsberg		6356090	462164	6-10 (6.3)

Visual Impact Assessment

18	Homestead	Bona Esperance	P.J. Conradie	6357820	456285	6-10 (4.9)
5	Guest accommodation	Gatsrivier		6360250	436216	6-10 (9.8)
7	Guest accommodation	Gatsrivier		6360370	434779	6-10 (11.2)
6	Guest accommodation	Gatsrivier		6360390	434684	6-10 (11.3)
8	Guest accommodation	Gatsrivier		6360590	432869	6-10 (13.1)
10	Uncategorised			6363470	444005	6-10 (6.6)
11	Uncategorised			6365000	449975	6-10 (8.6)
2	Uncategorised			6366240	445744	6-10 (9.3)
3	Uncategorised			6366990	443506	6-10 (10.2)
12	Uncategorised			6367770	449680	6-10 (11.3)
13	Uncategorised			6367940	450066	6-10 (11.7)
17	Uncategorised	Haasvlei		6348010	436268	1-5 (7.2)
14	Homestead	Swartland	T.J. Calldo	6358090	458174	1-5 (5.3)
9	Uncategorised			6363280	445269	1-5 (6.3)

(1) Projection: UTM34S

(2) Buildings that are labelled “Uncategorised” were not accessible due to locked gates or forbidden access.

(3) Note that the buildings are within 5km of the wind farm *boundary* but may be further than 5km from the nearest turbine due to the distance between the wind farm boundary and the location of the turbine within the wind farm boundary.

The following features are anticipated to be particularly highly affected by the wind energy facility due to the fact that they cater for tourists seeking a remote getaway and are within 5 kilometres of the wind farm:

- The guest cottages of the Gatsrivier Guest Farm.

The homesteads of three farmers also exist within 5km of the wind farm. Wind turbines will dominate views from these distances and visual receptors will be highly exposed to the development.

Table 6.2: Buildings within 5 to 10 km of the BV WEF and number of turbines visible

Ref	Type	Name	Owner	Y	X	Turbines Visible (distance in km to nearest turbine)
32	Homestead	Brandenburg	A.J. Du Plessis	6353100	431946	21-25 (11.8)
31	Derelict	Brandenburg	A.J. Du Plessis	6354080	427312	21-25 (16.6)
30	Uncategorised	Haasvlei		6345530	430488	11-15 (12.9)
25	Uncategorised	Luipaardskloof		6339540	440740	6-10 (7.4)
26	Uncategorised	Luipaardskloof		6339940	440526	6-10 (7)
27	Uncategorised	Luipaardskloof		6340090	440492	6-10 (6.9)
24	Uncategorised	Luipaardskloof		6340750	443335	6-10 (5.7)
28	Uncategorised	Luipaardskloof		6340810	441002	6-10 (6.1)
23	Uncategorised			6347620	467446	6-10 (12.1)
22	Guest accommodation	Saaiplaas Guest House		6359790	464181	6-10 (10.1)
21	Homestead	Saaiplaas	F.D. Conradie	6360060	464865	6-10 (10.1)
19	Uncategorised			6373200	447229	6-10 (16.4)
29	Uncategorised			6339910	436431	1-5 (9.6)
20	Homestead	Ekkraal	K. Steenkamp	6368290	456549	1-5 (14.3)

Within 5 to 10 km of the wind farm, the only sensitive receptor identified was the homestead of Mr A.J. Du Plessis at Brandenburg. The Saaiplaas Guest House and the homestead, and the homestead of Mr Kosie Steenkamp at Ekkraal are also within 5 to 10 kilometres of the wind farm. But since their farms are planned to host wind turbines associated with different projects, they are not considered to be sensitive receptors.

At these distances the wind turbines will not be dominant in views but they will be clearly recognisable by visual receptors (their visual exposure to the wind turbines will be moderate).

Table 6.3: Buildings within 10 to 15 km of the BV WEF and number of turbines visible

Ref	Type	Name	Owner	Y	X	Turbines Visible (distance in km to nearest turbine)
43	Homestead	Kareerivier		6353700	425810	21-25 (18)
42	Homestead	Bantamsfontein	Jan du Toit	6351780	423342	16-20 (20.3)
39	Homestead			6332810	439634	6-10 (14.1)
37	Uncategorised			6333490	454484	6-10 (15.2)
36	Uncategorised			6344930	469961	6-10 (15.6)
41	Uncategorised			6345960	424626	6-10 (18.7)
49	Homestead	Smitskraal		6358230	470231	6-10 (14.5)
48	Uncategorised			6374450	447197	6-10 (17.6)
34	Uncategorised			6374690	451129	6-10 (18.1)
35	Uncategorised			6375580	459658	6-10 (22.2)
46	Homestead			6375790	440387	6-10 (19.4)
47	Shed			6376980	440171	6-10 (20.7)
33	Uncategorised			6377650	449265	6-10 (20.9)
38	Homestead			6333010	449244	1-5 (13.7)
40	Homestead	Patatsrivier		6334800	433644	1-5 (15)
50	Uncategorised			6337390	468141	1-5 (19.4)
51	Uncategorised			6370650	438889	1-5 (15.1)
44	Uncategorised			6365340	425705	0 (N/A)
45	Uncategorised			6368100	432606	0 (N/A)

Within 10 to 15 km of the Brandvalley WEF, the following sensitive receptors were identified:

- The homestead on the farm “Kareerivier”;
- The homestead on the farm “Bantamsfontein” owned by Mr Jan du Toit;

To a lesser extent, the homesteads on the farms “Smitskraal” and “Patatsrivier” are also affected, although the number of turbines visible from these homesteads is low.

The wind turbines will be recognisable to these visual receptors and their visual exposure to the development will be moderate.

Table 6.4: Buildings within 15 to 20 km of BV WEF and number of turbines visible

Ref	Type	Name	Owner	Y	X	Turbines Visible (distance in km to nearest turbine)
62	Homestead			6326740	458131	21-25 (22.9)

Visual Impact Assessment

68	Shed	Zeekoegat		6326840	448815	16-20 (19.6)
64	Uncategorised			6326840	441771	16-20 (19.5)
71	Homestead	Sewesprong	Johan and Adele Nel	6349990	419595	16-20 (24.1)
61	Homestead	Boelhouer	C.M. Francois	6326760	461796	11-15 (24.8)
65	Homestead	Geelhoek		6329970	443495	11-15 (16.3)
75	Uncategorised			6330460	459609	11-15 (20.5)
66	Homestead	Polmietfontein		6330470	443040	11-15 (15.8)
72	Uncategorised			6355870	416665	11-15 (27.3)
58	Derelict			6363390	469775	11-15 (16.6)
57	Homestead			6365730	471127	11-15 (19.3)
56	Homestead	De Hoop		6369740	467409	11-15 (20.1)
55	Uncategorised			6373430	470463	11-15 (24.6)
59	Uncategorised			6344400	474314	6-10 (19.7)
70	Homestead	Klein Bantam		6346880	419809	6-10 (23.4)
67	Homestead	Zeekoegat	W & S Petterson	6329330	447026	6-10 (17)
63	Guest Accommodation	Keurkloof		6329490	451615	6-10 (17.8)
77	Uncategorised			6365180	419928	6-10 (26.7)
79	Homestead	Rooiheuvel	EJP Esterhuysen	6380420	440593	6-10 (23.8)
53	Uncategorised	Wolfhoek		6381620	455687	6-10 (26.1)
54	Uncategorised	Wolfhoek		6381880	452719	6-10 (25.9)
74	Homestead	Roodeheuvel		6382460	440456	6-10 (25.8)
52	Homestead			6382710	447660	6-10 (25.8)
76	Homestead	Patatsrivier		6334530	433541	1-5 (15.3)
69	Homestead	Bruwelsfontein		6337260	426272	1-5 (19.3)
60	Homestead	Roggekraal	J.O. Fourie	6336590	472657	0 (N/A)
80	Homestead	Klip Kraal		6370180	426558	0 (N/A)
73	Uncategorised			6374220	430149	0 (N/A)
78	Uncategorised			6375320	428203	0 (N/A)

Within 15 to 20 km of the wind farm, a number of buildings will have views of wind turbines as indicated in Table 5.4. The objectors to the wind farm, Mr Warren Petterson on the farm “Zeekoegat” and Mr Steve Swanepoel of the farm “Keurkloof” will each be able to see between 6 and 10 turbines from their homestead and guest cottage respectively. However, at a distance of 17km and 17.5km respectively from the nearest turbine (Wind Turbine 3), the wind turbines will not be easily noticeable during the day. However, at night, the red light on the turbine hub that blinks approximately every two seconds will be noticeable.

There are no structures similar in size and type to the proposed wind turbines in existing views and the turbines are likely to change these views to a considerable extent. The sense of place of the region is remote rural in many parts of the study area and wind turbines will, for some visual receptors, alter the remoteness of the region. Visual intrusion of the proposed development is therefore rated as high (although it should be noted that this will not be the case for all visual receptors in the region since the aesthetic appeal of wind turbines differ significantly among viewers).

It should also be noted that wind turbines have to be fitted with red lights that flash intermittently. It should be noted that these will be highly visible at night, especially at this particular site due to the almost total absence of other non-natural light emitters.

The 70-turbine layout’s viewshed is provided as Appendix A.

Visual Impact Assessment

62	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	4			
63	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	2	
64	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	3
65	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	3	
66	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	1	1	0	1	0	0	0	0	0	0	0	0	0	0	8		
67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	6		
68	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	4		
69	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	5		
70	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	4		
B	13	6	9	15	10	8	9	8	4	8	7	7	7	5	8	11	5	8	7	1	10	9	10	10	7	7	9	8	1	11	22	23								

Column "A" = total number of buildings affected by a particular turbine

Row "B" = total number of turbines visible from a particular building

Mitigation and management

Other than avoiding the site completely there are no mitigation measures that will reduce the visual intrusion of the wind turbines due to their size/height and visibility, and the lack of screening opportunities in the landscape.

Significance Statement

The duration of the impact will be “*Permanent*”. The extent is “*Study Area*”. The severity of the impact is expected to be “*Severe*”. The likelihood of surrounding farmers having their views impacted is “*Definite*”. The turbine’s presence will change the character of this remote area.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Study area	Severe	Definite	HIGH -
With Mitigation	Permanent	Study area	Severe	Definite	HIGH -

6.3.2 Operations Phase Impact 2: The access road, including alternatives 1 and 2

Cause and comment

Access road alternative 1 will have a total length of 4km, and will be up to 12m wide. This will have a footprint of 4.8ha. The viewshed of access road alternative 1 is 3,028ha in extent. Access road alternative 2 will have a total length of 12.3km, and will be up to 12m wide. This will have a footprint of 14.7ha. The viewshed of access road alternative 2 is 5,500ha in extent.

Road alternative	Length (m)	Width (m)	Footprint (ha)	Viewshed area (ha)*	Visual receptors
1	4,029	Up to 12m	4.8	3,028	0
2	12,279	Up to 12m	14.7	5,500	1

*Viewshed calculated based on the terrain within 5km of the road options

The access roads (excluding the alternatives considered above) will have a total length of 88,280.2m. Based on a width of 12m, these will have a footprint of 106ha. This road network will be visible from an area of 23,595ha, limited to within 5km of the road network. A part of this road network will be visible to Gielie Hanekom at his homestead on the farm “Aurora”.

Mitigation and management

Due to access road 1 having a smaller footprint and viewshed, it should be the preferred option.

Significance Statement

The duration of the impact will be “*Permanent*”. The extent is “*Localised*”. The severity of the impact is expected to be “*Slight*”. The likelihood of surrounding farmers having their views impacted is “*Definite*”.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Localised	Slight	Definite	MOD -

Visual Impact Assessment

With Mitigation	Permanent	Localised	Slight	Definite	MOD -
-----------------	-----------	-----------	--------	----------	--------------

6.3.3 Operations Phase Impact 3: On-site substation alternatives

Cause and comment

The substation options all have an identical footprint. Their viewsheds differ based on their location in the landscape.

Substation alternative	Footprint (ha)	Viewshed area (ha)	Visual receptors
1	2.25	418	0
2	2.25	816	0
3	2.25	1,231	0
4	2.25	1,397	00

*Viewshed calculated based on the terrain within 5km of the substation alternatives

Mitigation and management

Substation alternative 1 should be the preferred alternative due to it having the smallest viewshed. However, they are all four rated equally using the assessment methodology and therefore the other three locations can also be constructed if substation 1 is not technically feasible.

Significance Statement

The duration of the substation impact (all four alternatives) will be “*Permanent*”. The extent is “*Localised*”. The severity of the impact is expected to be “*Slight*”. The likelihood of surrounding farmers having their views impacted is “*Definite*”.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Localised	Slight	Definite	MOD -
With Mitigation	Permanent	Localised	Slight	Definite	MOD -

6.3.4 Operations Phase Impact 4: Shadow Flicker

Cause and comment

Shadow flicker results from the shade cast by a wind turbine and its rotating blades. The shade cast by the blades “flicker” from the point of view of a stationary observer as the blades rotate.

We have not performed detailed modelling of the shadow flicker effect, but have assessed this impact based on the rule of thumb that shadow flicker is potentially a problem if a turbine is located within 800 metres of an occupied building i.e. if a turbine is within 800m of an occupied building, the particular building and turbine and the topography of the area between them should be assessed to determine whether shadow flicker may be a problem. This can be analysed using basic trigonometry.

We assessed the potential for shadow flicker to impact buildings located within the project area i.e. buildings on the farms hosting the wind turbines. We found that none of the turbines was within 800m of a wind turbine, as indicated in the figure below.

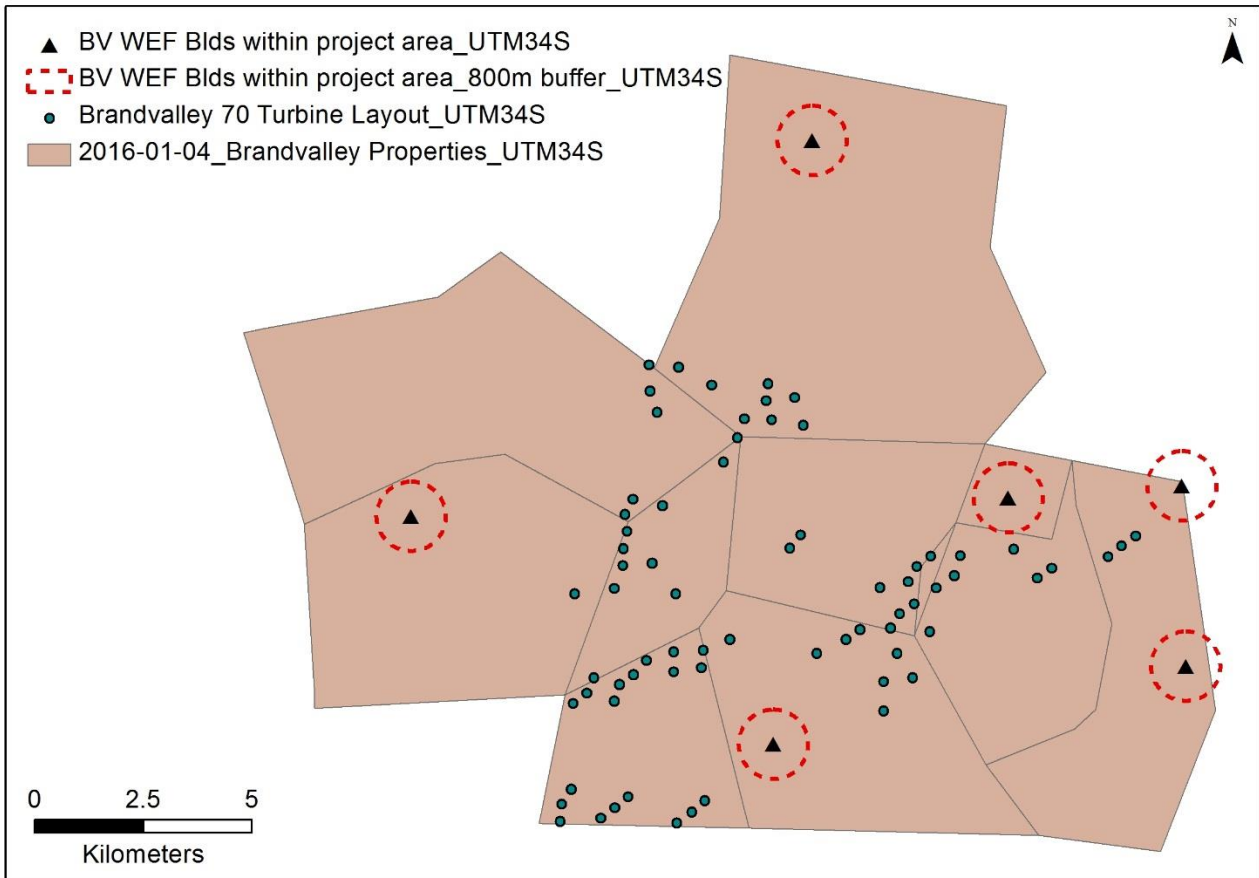


Figure 6.1: Shadow flicker

Mitigation and management

We recommend that if the turbine layout is adjusted and it is found that an occupied building is located within 800m of a wind turbine, then the potential for shadow flicker should be assessed. A building should not be affected for more than 30 hours per year, or for longer than 30 minutes in a day (Parsons Brinckerhoff, 2011).

Significance Statement

There is **NO IMPACT** anticipated as a result of shadow flicker based on the layout assessed.

6.4 Decommissioning phase impacts

6.4.1 Decommissioning Phase Impact 1: Visual impact of decommissioning activity

Cause and comment

Wind farms are typically designed for a 25 year life. After 25 years, the proposed Brandvalley Wind Farm may either be refurbished (re-powered) or decommissioned. If it is decommissioned, the impacts during the decommissioning phase will be very similar to those identified in the construction phase. The mitigation measures applicable to the construction phase will be applicable during the decommissioning phase as well.

Significance statement

The duration of the decommissioning phase impact will be “Short Term”. The extent is “Regional” as activity will be visible beyond the immediate environs of the site. The severity of the impact is expected to be “Moderate” should mitigation measures not be employed. If they are, the impact is

expected to be “*Slight*”. The likelihood of surrounding farmers having their views impacted by is “*Definite*”.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Short term	Regional	Moderate	Definite	MOD -
With Mitigation	Short term	Regional	Slight	Definite	MOD -

6.5 Cumulative Impacts

6.5.1 Cumulative Impact 1: Visual impact of facility construction and operation

Cause and comment

According to the South African Renewable Energy EIA Application Database, dated 21 December 2015 (Dataset Title: REEA_OR_2015_Q4.shp) the applications listed in Table 6.5 have applied for or have received environmental authorisation.

There are other wind energy developments and electrical infrastructure proposed and existing in close proximity to the Brandvalley WEF. These facilities are in various stages of development ranging from application phase to authorisation (environmental authorisation and preferred bidder).

The following projects are located within a 30km buffer around Brandvalley WEF:

- Konstabel Solar Project;
- Roggeveld Wind Project;
- Perdekraal Wind Project;
- Witberg Wind Project;
- Sutherland Wind and Solar Project;
- Hidden Valley Wind Project;
- PV Solar Project, south of Sutherland;
- Suurplaat Wind Project;
- Gunstfontein Wind Project;
- Komsberg Substation; and
- Rietkloof Wind Project.

Furthermore, there are high voltage transmission lines (one 786kV and two 400kV power lines) running immediate south of the project area, running between the Komsberg station and the Kappa substation.

The recently built 765kV line runs from the Gamma substation near Victoria West past the Kappa substation near Touwsriver (southwest of the project site) to connect to the Omega substation near Koeberg. This is part of Eskom’s grid strengthening project for power transmission and distribution in South Africa.

The Komsberg capacitor station located southeast of the project site has two 400 kV lines running through its capacitor banks from the Droerivier substation to the Bacchus and Muldersvlei substations, respectively, via the Kappa substation.

The approved renewable energy projects located in the vicinity are intended to be connected to the Komsberg station where new substation infrastructure will be built.

Although it makes sense from a business and engineering perspective to concentrate facilities in

this way, there is no escaping the fact that the development of multiple wind energy facilities, at this scale, will change the character of this remote area significantly. However, it should also be noted that the area is located within a Renewable Energy Development Zone - "Komsberg Wind" - as identified in the Strategic Environmental Assessment undertaken by the Council for Scientific and Industrial Research (CSIR) and the Department of Environmental Affairs.

Mitigation and management

There are no feasible mitigation measures to reduce the cumulative visual impact of the wind farms. If each wind farm implements the mitigation measures suggested in their individual Visual Impact Assessments and Environmental Management Programmes, this will serve to reduce the cumulative impact.

Significance Statement

The duration of the impact will be "*Permanent*". The extent is "*Regional*". The severity of the impact is expected to be "*Moderate*". The likelihood of the impact occurring is "*Definite*".

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Regional	Moderate	Definite	HIGH -
With Mitigation	Permanent	Regional	Moderate	Definite	HIGH -

Table 6.6: Renewable energy applications within 50km of Brandvalley WEF according to the South African Renewable Energy EIA Application Database, dated 21 December 2015

Key:

Approved and status known	Approved but status not known	EIA being undertaken	Lapsed / withdrawn
---------------------------	-------------------------------	----------------------	--------------------

DEA_REF	EIA_P ROCE S	PROJ_TITTL	APP_RECEIV	APPLICANT	TECHNOLOGY	MEGA WATT	PROJ_STA TU
12/12/20/1782	S&EIA	Proposed development of renewable Energy facility at the Sutherland site, Western and Northern Cape province	2010/10/14	Mainstream Renewable Power Sutherland	Onshore Wind	811	Approved
12/12/20/1783 /1	S&EIA	Proposed development of a renewable Energy facility at Perdekraal, Western Cape - Split 1	2012/12/01	South Africa Mainstream Renewable Power Perdekraal West Pty Ltd	Onshore Wind	150	Approved
12/12/20/1783 /2	S&EIA	Proposed development of a renewable Energy facility at Perdekraal, Western Cape - Split 2	2012/12/01	South Africa Mainstream Renewable Power Perdekraal West Pty Ltd	Onshore Wind	150	Approved
12/12/20/1783 /2/AM1	Amend ment	Proposed development of a renewable Energy facility at Perdekraal, Western Cape - Split 1	2014/10/03	South Africa Mainstream Renewable Power Perdekraal West Pty Ltd	Onshore Wind	0	Approved
12/12/20/1787	S&EIA	Proposed renewable energy facility at Konstabel	2010/01/29	South Africa Mainstream Renewable Power Development	Onshore Wind and Solar PV	170	Approved
12/12/20/1966	S&EIA	Proposed establishment of the Witberg Bay wind energy facility, Laingsburg Local Municipality, Central Karoo District, Western cape	2013/11/07	Witberg Wind Power Pty Ltd	Onshore Wind	140	Approved
12/12/20/1988	EIA	Proposed Construction Of The 140Mw Roggeveld Wind Farm Within The Karoo Hoogland Local Municipality Of The Northern Cape Province And Within The Laingsburg Local Municipality Of The Western Cape Province	2014/12/05	Roggeveld Wind Power (Pty) Ltd	Onshore Wind	140	Approved
12/12/20/2228	S&EIA	Proposed wind energy facility near Komsberg, Western Cape	2011/03/18	Inca Komsberg Wind Pty Ltd	Onshore Wind	300	Withdrawn/ Lapsed
12/12/20/2370	S&EIA	Proposed Hidden Valley wind energy facility , Northern cape	2013/01/01	ACED Renewables Hidden Valley, Northern Cape Province	Onshore Wind	650	Approved
12/12/20/2370 /1	S&EIA	Proposed Hidden Valley wind energy facility , Northern cape	2013/01/01	ACED Renewables Hidden Valley, Northern Cape Province	Onshore Wind	150	Approved
12/12/20/2370 /2	S&EIA	Proposed Hidden Valley wind energy facility , Northern cape	2013/01/01	ACED Renewables Hidden Valley, Northern Cape Province	Onshore Wind	150	Approved
12/12/20/2370 /3	S&EIA	Proposed Hidden Valley wind energy facility , Northern cape	2013/01/01	ACED Renewables Hidden Valley, Northern Cape Province	Onshore Wind	150	Approved
14/12/16/3/3/2 /395	S&EIA	Proposed 280 MW Gunstfontien Wind energy Facility, Northern Cape Province	2014/11/06	Networx Eolos Renewables (Pty) Ltd	Onshore Wind	280	Approved

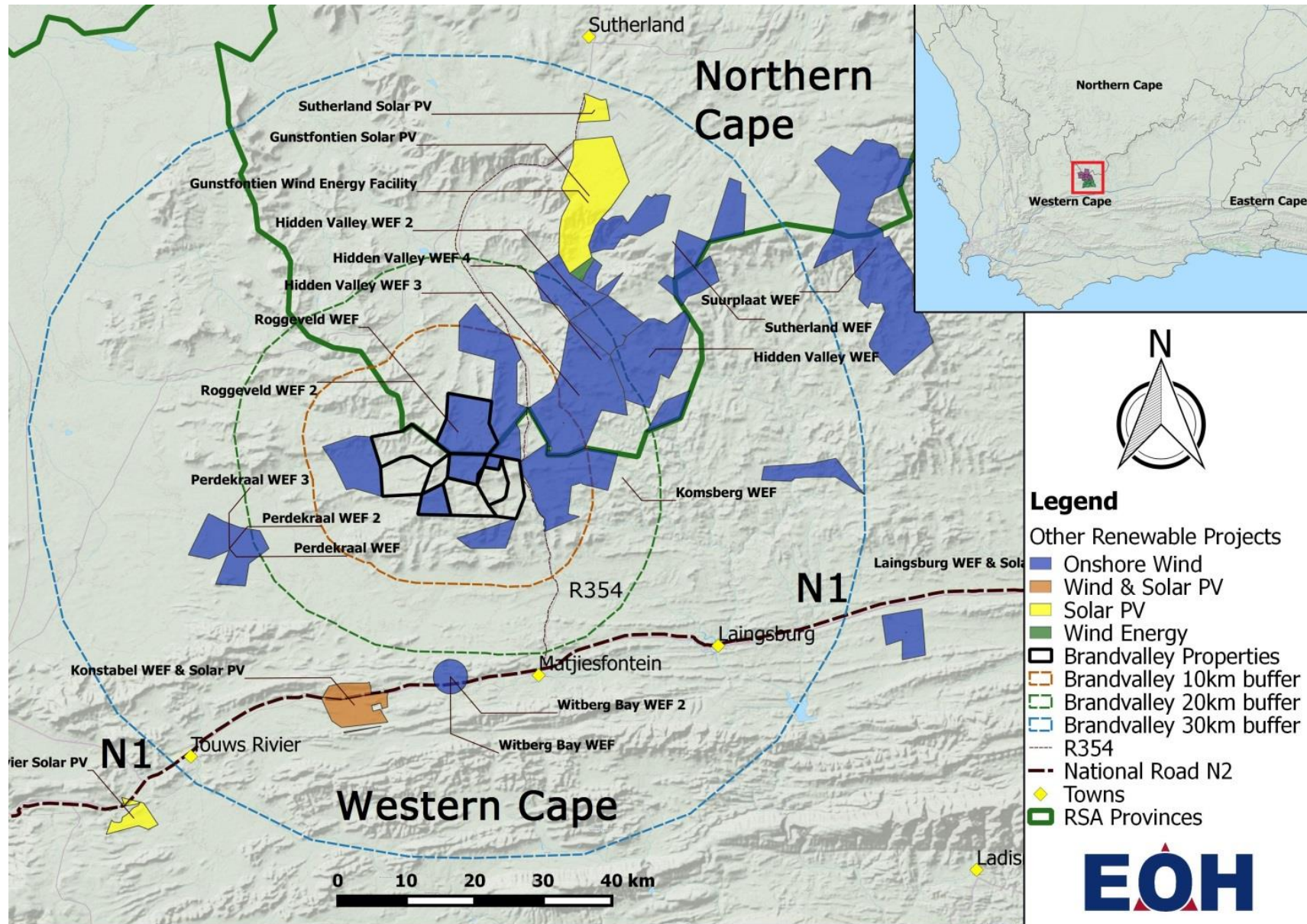


Figure 6.2: Other WEF proposals within 30km of the Brandvalley WEF

6.6 No-Go Impacts

6.6.1 No-Go Impact 1: The Karoo’s sense of place and its value to residents and visitors

Cause and comment

The low rainfall of the region has created the Karoo. It has defined the settlement patterns and the land use. The sense of place of the Karoo, including this region, is of vast open skies, long and straight roads, very few people, hot days and cold nights, creaky wind mills drawing what little water they can from underground aquifers, kranzts, isolated farms, imposing hills forming the horizon. It is not an industrial area. The people who live in the Karoo treasure this unique area, and derive pleasure from the tranquillity and peace it provides. It is also this sense of place that attracts visitors to the Karoo.

Mitigation and management

Not applicable.

Significance Statement

The duration of the impact is “*Permanent*”. The extent is “*Regional*”. The severity of the impact is expected to be “*Moderate*”. The likelihood of the impact occurring is “*Definite*”.

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Regional	Moderate	Definite	HIGH +
With Mitigation	N/A	N/A	N/A	N/A	N/A

7 ENVIRONMENTAL MANAGEMENT PLAN

7.1 Conditions that should be included in the EMPr

7.1.1 Construction Phase

- The construction contractor should clearly demarcate construction areas so as to minimise site disturbance.
- Treat roads to reduce dust emissions.
- The site should be kept neat and tidy. Littering should be fined and the ECO should organise rubbish clean-ups on a regular basis.
- Construction Camp Alternative 1 should be the preferred option due to it having the smallest viewshed.

7.1.2 Operations Phase

- Access Road 1 should be the preferred option due to it having the smallest viewshed.
- Substation Alternative 1 should be the preferred option due to it having the smallest viewshed.
- If the turbine layout is revised and it is found that a turbine is planned to be situated within 800m of an occupied building, a shadow flicker assessment should be undertaken to determine whether the building will be impacted.

8 CONCLUSIONS

8.1.1 Summary of impacts

Construction Phase Impacts:

- Impact 1: Visual impact of construction activity

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Short term	Study area	Moderate	Definite	MOD -
With Mitigation	Short term	Study area	Slight	Definite	MOD -

- Impact 2: Construction camp alternatives 1, 2 and 3

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Short term	Localised	Slight	Definite	LOW -
With Mitigation	Short term	Localised	Slight	Definite	LOW -

Operations Phase Impacts:

- Impact 1: Impact of the layout on sensitive visual receptors

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Study area	Moderate	Definite	HIGH -
With Mitigation	Permanent	Study area	Moderate	Definite	HIGH -

- Impact 2: The access road, including alternatives 1 and 2

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Localised	Slight	Definite	MOD -
With Mitigation	Permanent	Localised	Slight	Definite	MOD -

- Impact 3: On-site substation alternatives

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Localised	Slight	Definite	MOD -

Visual Impact Assessment

With Mitigation	Permanent	Localised	Slight	Definite	MOD -
-----------------	-----------	-----------	--------	----------	--------------

- Impact 4: Shadow flicker impact

No impact anticipated based on turbine layout assessed.

Decommissioning Phase Impacts:

- Impact 1: Visual impact of decommissioning activity

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Short term	Study area	Moderate	Definite	MOD -
With Mitigation	Short term	Study area	Slight	Definite	MOD -

Cumulative Impacts:

- Impact 1: Visual impact of facility construction and operation

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Regional	Moderate	Definite	HIGH -
With Mitigation	Permanent	Regional	Moderate	Definite	HIGH -

No-Go Impacts:

- Impact 1: The Karoo's sense of place and its value to residents and visitors

Impact	Effect			Risk or Likelihood	Overall Significance
	Temporal Scale	Spatial Scale	Severity of Impact		
Without Mitigation	Permanent	Regional	Moderate	Definite	HIGH +
With Mitigation	N/A	N/A	N/A	N/A	N/A

8.1.2 Concluding points

- The project area is typically Karoo. The sense of place is one of remoteness, low levels of development, peace and tranquillity.
- Sensitive receptors within 20km of the wind farm include 3 guest cottages and the homesteads of numerous farmers. The guest cottages are the following:
 - Gatsrivier Guest Farm:
 - 5 guest cottages located between 8.6 and 13 km from the nearest turbine;
 - Between 6 and 15 turbines visible.
 - Saaiplaas Guest House:
 - Located 10.1km from the nearest wind turbine;
 - Between 6 and 10 turbines visible.
 - Keurkloof Guest House:

- 17.8km from the nearest wind turbine;
 - Between 6 and 10 turbines visible.
- Two protected areas exist within 50km of the wind farm:
 - Anysberg Nature Reserve, 32km south of the WEF boundary;
 - Touw Local Authority Nature Reserve, 46km south-west of the WEF boundary.
- The site is located within a renewable energy development zone - “Komsberg Wind” - as identified by the CSIR and the Department of Environmental Affairs in their strategic environmental assessment.
- The impact of the wind farm on its own, and when considered cumulatively with other wind farms in the region, will have a high negative visual impact for the following reasons:
 - The screening effect of vegetation in this arid environment is non-existent;
 - The construction of infrastructure of this type in this region will contract strongly with the sense of place of the region.
- Of the alternatives presented, the following are preferred due to the fact that they have the smallest viewshed:
 - Access road alternative 1;
 - Construction camp alternative 1;
 - Substation alternative 1.

9 SUBSEQUENT LAYOUT CHANGES

9.1 Introduction

The purpose of this chapter is to discuss changes introduced to the original 70-turbine layout assessed and how these might affect the conclusions reached.

9.2 Changes to layout

Due to ecological sensitivities identified:

1. Access roads in the northern part of the study area have been re-routed to follow existing access roads;
2. Turbines 38 and 42 have been removed from the layout.

These changes are reflected in the map below.

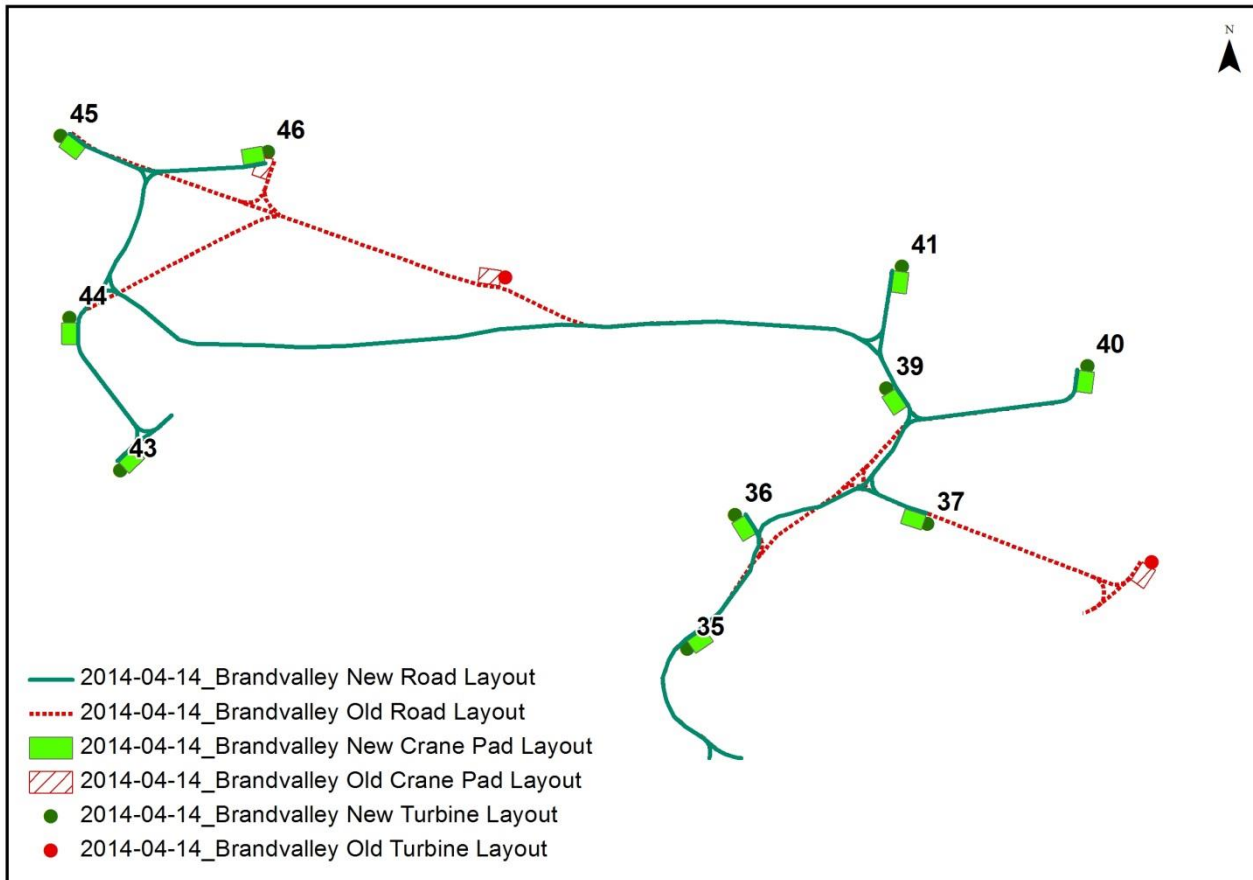
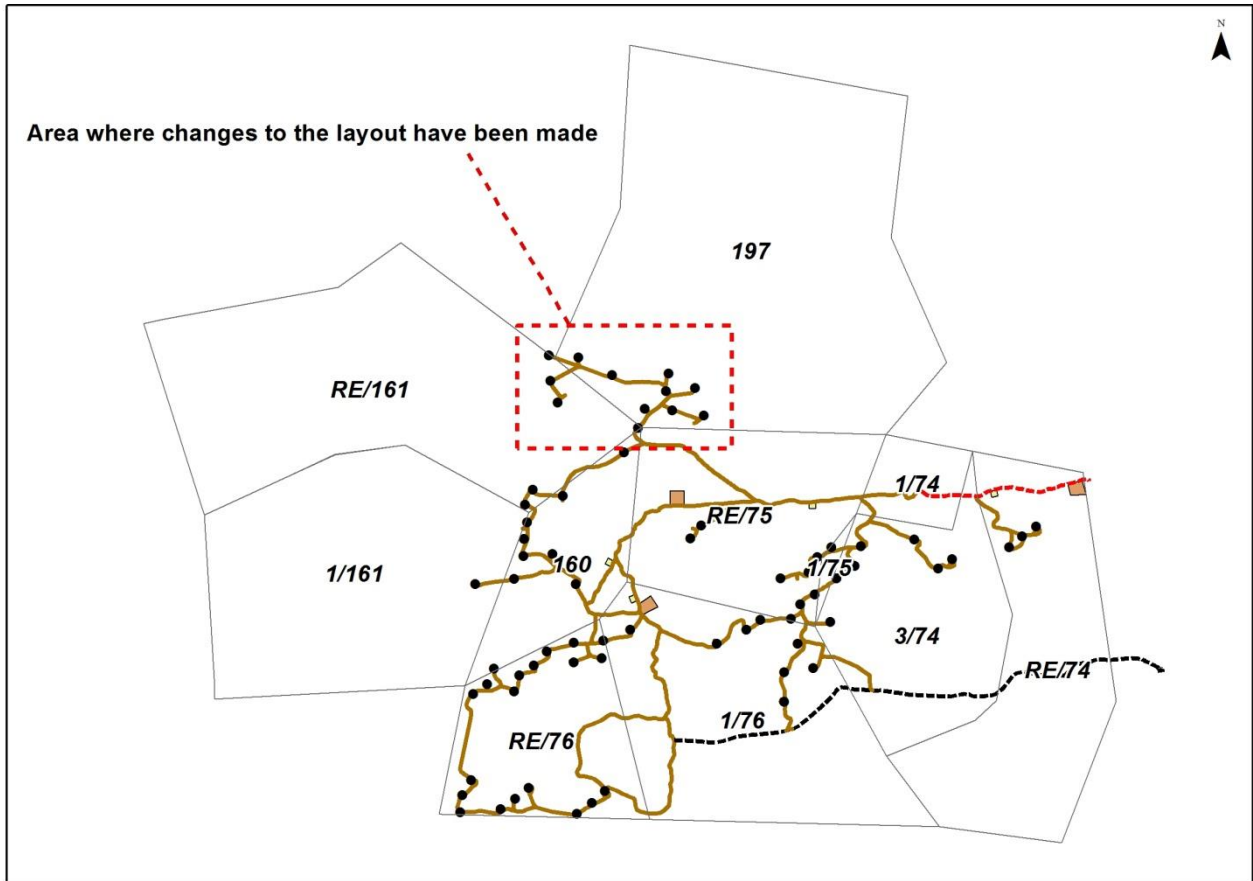


Figure 9.1: Changes to the Brandvalley WEF layout

9.3 Impact on conclusions and recommendations

9.3.1 Access roads

The key differences in the old and new access road layouts are provided in the table below.

Table 9.1: Old versus new access road layout

	Access Road (old)	Access Road (new)
Length ¹	88,280.2m	87,142.9
Footprint	106ha	105ha
Viewshed area	23,595ha	23,646ha

1. Excludes length of access road alternatives.

The new access road layout will not be visible to Gielie Hanekom at his homestead Aurora.

9.3.2 Turbine layout

Turbines 38 and 42 have been removed from the layout. Turbine 38 was not visible to any of the sensitive receptors³ identified. Turbine 42 had been visible to 8 sensitive receptors. All of these sensitive receptors will continue to be able to see turbines after the removal of Turbine 42.

9.3.3 Conclusions

The changes to the layout are minor and do not change the broad conclusions of the report and mitigation measures suggested.

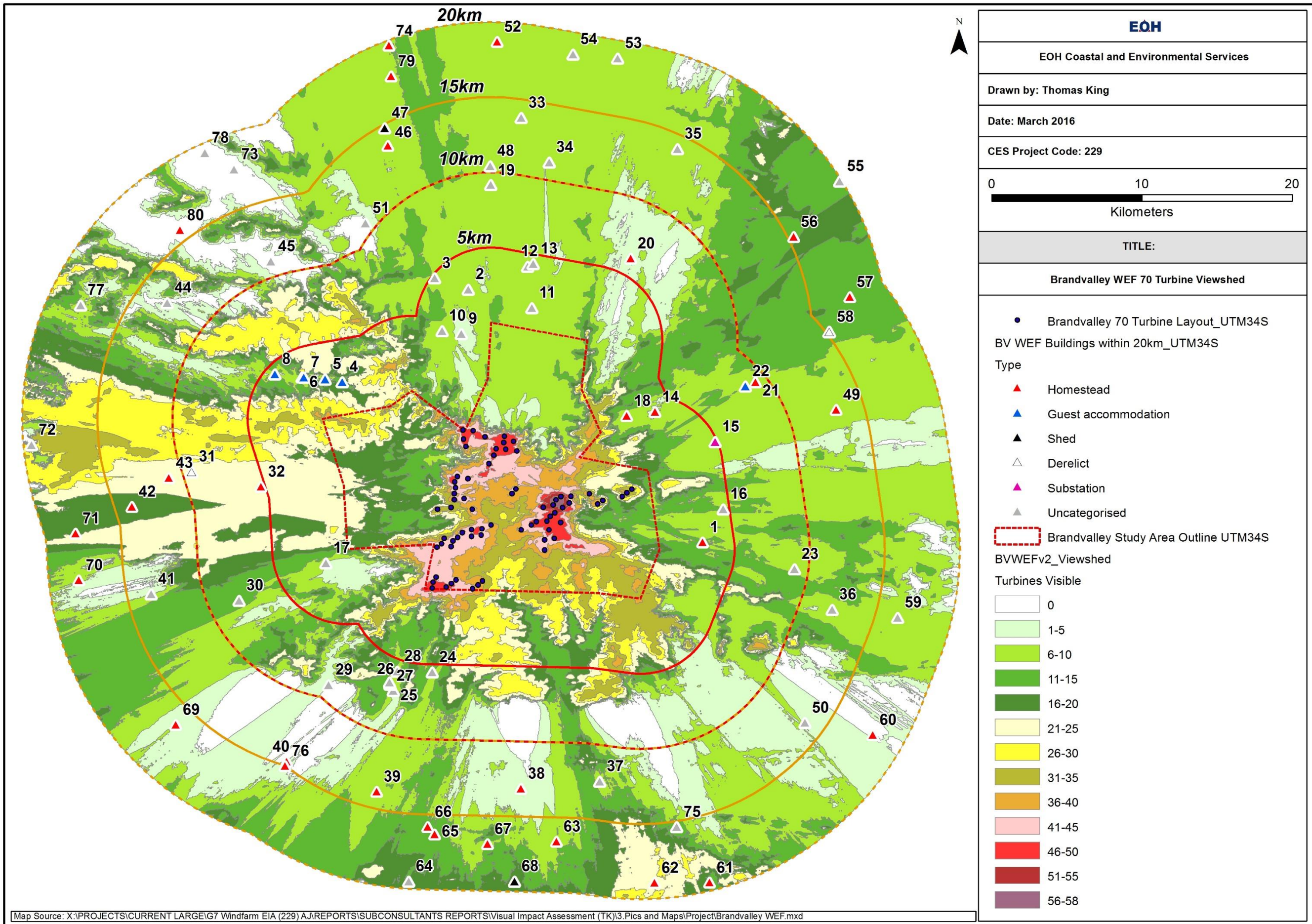
³ Note that only sensitive receptors (buildings) within 10km of the WEF border were assessed to determine which specific turbines are visible to them.

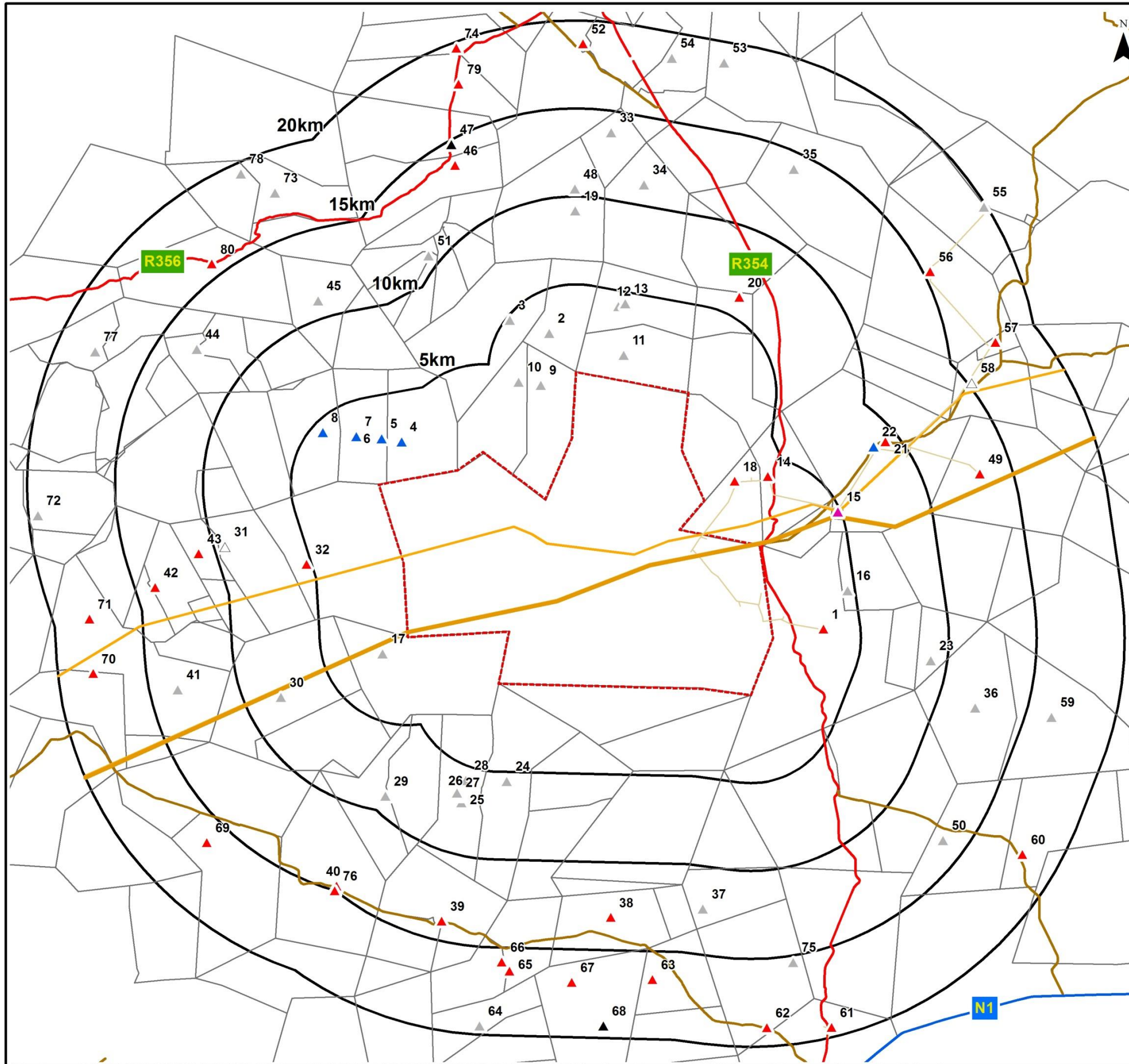
REFERENCES

Oberholzer, B. 2005. Guideline for involving visual & aesthetic specialists in EIA processes: Edition 1. CSIR Report No ENV-S-C 2005 053 F. Republic of South Africa, Provincial Government of the Western Cape, Department of Environmental Affairs & Development Planning, Cape Town.

Parsons Brinckerhoff, 2011. *Update of UK Shadow Flicker Evidence Base - Final Report*, London, England: Department of Energy and Climate Change.

APPENDIX A - VIEWSHED MAP





EOH	
EOH Coastal and Environmental Services	
Drawn by: Thomas King	
Date: March 2016	
CES Project Code: 229	
<div style="display: flex; justify-content: space-between; width: 100%;"> 0 10 20 </div> <div style="text-align: center;"> <p>Kilometers</p> </div>	
TITLE:	
Brandvalley WEF - Existing Infrastructure	
Type	<ul style="list-style-type: none"> ▲ Homestead ▲ Guest accommodation ▲ Shed △ Derelict ▲ Substation ▲ Uncategorised
Eskom Distribution Voltage	<ul style="list-style-type: none"> — 765.0 [kV] — 400.0 [kV] — 11.00 [kV]
Roads_UTM34S Type	<ul style="list-style-type: none"> — NATIONAL ROUTE — MAIN ROAD — SECONDARY ROAD
	<ul style="list-style-type: none"> Farm Portions_UTM34S Brandvalley Study Area Outline UTM34S Buffer_UTM34S

Map Source: X:\PROJECTS\CURRENT LARGE\G7 Windfarm EIA (229)\AJ\REPORTS\SUBCONSULTANTS REPORTS\Visual Impact Assessment (TK)\3.Pics and Maps\Project\Brandvalley WEF.mxd

APPENDIX B - CURRICULUM VITAE

THOMAS KING

QUALIFICATIONS

- BSc Honours Biodiversity and Conservation (Rhodes University)
- BSc Zoology (University of Pretoria)

PROFESSIONAL REGISTRATION AND DEVELOPMENT

Registrations

- South African Council for Natural Scientific Professions (Professional Natural Scientist)

Training

- CES short course: Conducting Environmental Impact Assessments – Completed and passed March 2011
- CFA Level II Candidate - June 2016

PROFESSIONAL EXPERIENCE

January 2006 – December 2006: Field assistant (Remote Exploration Services)

January 2011 – April 2011: GIS technician (Conservation Support Services)

April 2011 – Present: Environmental consultant (EOH Coastal & Environmental Services)

SELECTED CONSULTING EXPERIENCE

Environmental consulting experience as a project manager, report writing and GIS manager for various development types. Specific experience includes the following:

Forestry

- Lurio Green Resources Forestry Environmental and Social Impact Assessment.
- Niassa Plantation Environmental and Social Impact Assessment.
- Equatorial Palm Oil Liberia Environmental, Social and Health Impact Assessment.
- Ugandan Palm Oil Environmental and Social Impact Assessment.

Renewable energy

- EIA for Richards Bay Wind Energy Project, EAB Astrum Energy
- EIA for Hluhluwe Wind Energy Project, Kimocode (Pty) Ltd
- EIA for Plan 8 Wind Energy Project, Infinite Plan 8
- EIA for St Lucia Wind Farm, St Lucia Wind Farms (Pty) Ltd
- EIA for Coega Wind Farm, InnoWind (Pty) Ltd
- EIA for Brakkefontein Wind Farm, Terra Power Solutions

Agriculture and waste management

- Basic environmental assessment for the development of a chicken rearing facility in the Paterson district of the Eastern Cape, Eco Pullets (Pty) Ltd.

Mining

- Pre-feasibility risk assessment for the development of a heavy minerals mine on the West Coast of South Africa, Zirco Resources (Pty) Ltd.
- Environmental Control Officer for the Kenmare Heavy Mineral Mine, Nampula Province, Mozambique.
- Baobab Iron Ore Mine, Tete Province Mozambique.
- Alphamin Bisie Tin Project, Nord Kivu, Democratic Republic of the Congo.
- Syrah Resources Graphite Project, Cabo Delgado, Mozambique.
- Zirco Heavy Minerals Mine, Northern Cape, South Africa.

SPECIALIST ASSESSMENTS

Visual Impact Assessments:

- Syrah Resources Graphite Mine, Cabo Delgado, Mozambique. Completed: August, 2013.
- Zirco Roode-Heuwel Mine in the Northern Cape of South Africa. Completed: March, 2014.
- Baobab Iron Ore Mine, Tete, Mozambique. Completed: April 2014.
- Triton Minerals Nicanda Hills Graphite Project. Completed August 2015.

Traffic Impact Assessments:

- Trans-Caledon Tunnel Authority (TCTA) Mooi-Mnegi transfer scheme. Completed June 2012.
- Syrah Resources Graphite Mine, Cabo Delgado, Mozambique. Completed: August, 2013.
- Baobab Iron Ore Mine, Tete, Mozambique. Completed: April 2014
- Triton Minerals Nicanda Hills Graphite Project. Completed August 2015.
- Alphamin Bisie Tin Mining Project, Nord Kivu, DRC. Completed September 2015.

RESEARCH & TEACHING EXPERIENCE

I have completed a study on the rate at which Sub-tropical Thicket (an Eastern Cape vegetation type) recovers after heavy grazing by ostriches. This study was done as part of my honours degree at Rhodes University.

CURRICULUM VITAE – HENRY HOLLAND

Profession: GIS Consultant
 Date of Birth: 26 December 1968

BIOGRAPHICAL SKETCH

Henry has been doing GIS related work since 1992 when he started his M.Sc. in Geology. Since finishing his Masters he worked in Angola establishing a GIS department for a diamond exploration company, after which he worked on a freelance basis for eight years doing GIS related work and computer programming. In 2005 he established the Mapthis Trust which provides geospatial services for a range of environmental and geological companies and projects. Henry has been involved in Visual Impact Assessments (VIAs) since 1997.

TERTIARY EDUCATION

1996 M. Sc. Geology/GIS Rhodes University
 1986 B.Sc. Hons UOFS

KEY EXPERIENCE

The table below presents an abridged list of Henry's project experience relevant to this proposal:

Completion Date	Project description	Role	Client
2015	Scatec Kenhardt PV EIA, Northern Cape – VIA report	Author	CSIR
2015	Vredenburg Landfill Extension BA, Western Cape – Visual Impact Report	Author	Jeffares & Green (Pty) Ltd
2015	Umgeni Lovu and Tongaat Desalination Plants EIAs, KwaZulu-Natal	Author	CSIR
2015	Inyanda-Roodeplaat WEF, Uitenhage, EC	Author	SRK
2015	OTGC Oil Storage Terminal BA – Visual Impact, Durban, KZN	Author	CSIR
2014	Mainstream Dealesville Solar Plants VIA, Freestate Province	Author	CSIR
2014	Mulilo Solar Plants VIA, Northern Cape	Author	CSIR
2014	Frontier SRMOP EIA, Saldanha, WC	Author	CSIR
2013	Ishwati Emoyeni Wind Energy Facility VIA, Western Cape	Author	CSIR
2013	Venter Fert Composting and Fertiliser Plant	Author	Public Process Consultants
2013	Kipeto Power Line, Kenya	Author	Kipeto Energy Ltd.
2012	Ngqura Manganese Export Facility VIA, Coega, Eastern Cape	Author	CSIR
2012	Toliara Sands Mining Project VIA, Toliara, Madagascar	Author	CES
2012	Mkuze Biofuel Power Plant VIA, Mkuze, KwaZulu-Natal	Author	CSIR
2012	Vleesbaai WEF VIA, Western Cape	Author	CSIR
2012	Saldanha Desalination Plant VIA, Saldanha Bay, Western Cape	Author	CSIR
2012	Mossel Bay WEF, Western Cape	Author	CES
2012	Keimoes Solar Energy Facility, NC	Author	CSIR
2012	Douglas Solar Energy Facility, NC	Author	CSIR
2012	Richards Bay WEF VIA, KZN	Author	CES
2012	Hluhluwe WEF VIA, KZN	Author	CES
2012	Plan8 Grahamstown Wind Farm VIA, Eastern Cape	Author	CES
2012	Kipeto Wind Farm VIA, Kenya	Author	Galetech Energy Developments Ltd.
2011	Coega IDZ Zone 12 Wind Farm	Author	CSIR
2011	Haverfontein Wind Farm, Mpumalanga	Author	CES

Visual Impact Assessment

Completion Date	Project description	Role	Client
2011	Middleton Wind Farm, Cookhouse	Author	CES
2011	Broadlands PV Plant, Humansdorp	Author	CSIR
2011	Ubuntu Wind Farm, Jeffrey's Bay	Author	CSIR
2011	Lushington Park Wind Farm, East London	Author	CES
2011	Chaba Wind Farm, Komga	Author	CES
2010	Thomas River Wind Farm and PV Park VIA, Stutterheim	Author	CES
2010	Eskom Power Line VIA, Kouga	Author	CES
2010	Laguna Bay Resort VIA	Author	CES
2010	Kouga Wind Farm VIA	Author	Arcus GIBB
2010	Electrawinds Coega Wind Farm VIA	Author	CSIR
2010	Innowind Coega Wind Farm VIA	Author	CES
2010	Jeffrey's Bay Wind Farm VIA, Jeffrey's Bay	Author	CSIR
2010	Cookhouse Wind Farm VIA, Cookhouse	Author	CES
2009	Waainek Wind Farm VIA, Grahamstown	Author	CES
2009	Coega Wind Turbine BA (Visual Input)	Author	CSIR
2009	Sierra Leone Ethanol Plant VIA	Author	CSIR
2009	NamWater Desalination Plant VIA, Swakopmund, Namibia	Author	CSIR
2009	Nooitgedagt/Coega Water Supply VIA, Motherwell	Author	SRK
2009	CDM Brewery VIA, Nampula, Mozambique	Author	CES
2009	TankaTara Preliminary Visibility Analysis, Addo	Author	CES
2008	Kouga Wind Energy Project VIA, Jeffreys Bay	Author	CSIR
2008	Aston Bay VIA	Author	CES
2008	NPA Boundary Wall VIA, Port Elizabeth	Author	CSIR
2008	Elitheni Coal Mining VIA, Indwe	Author	Savannah Environmental (PTY) Ltd.
2008	Coegakamma Chicken Broiler Housing VIA	Author	Public Process Consultants
2008	Amanzi Country Lifestyle Estate VIA, Uitenhage	Author	Public Process Consultants
2008	Coegakammaskloof Chicken Broiler Housing VIA	Author	Public Process Consultants
2008	Ngqura Manganese Terminal Pre-Feasibility VIA	Specialist Input	CSIR
2007	Visual Impact Assessment for Stuytville Bulk Water Supply, Baviaanskloof	Author	Anton Bok and Associates
2007	Elitheni Coal Mining Scoping VIA	Author	Savannah Environmental (PTY) Ltd.

I, the undersigned, certify that to the best of my knowledge and belief, these data correctly describe my qualifications, my experience, and me, and that I am available to work on this project.



[Signature of staff member and authorized representative of the firm]
Full name of staff member: Henry Holland

Date: 11/01/16
Day/Month/Year

APPENDIX C - SPECIALIST DECLARATION



environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

File Reference Number:	(For official use only)
NEAS Reference Number:	
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

- (1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and
- (2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

EIA FOR THE PROPOSED BRANDVALLEY WIND ENERGY FACILITY

Specialist:	Thomas King	
Contact person:	Thomas King	
Postal address:	PO Box 934, Grahamstown	
Postal code:	6140	Cell:
Telephone:	046 622 2364	Fax:
E-mail:	t.king@cesne.co.za	
Professional affiliation(s) (if any)	SACNASP	

Project Consultant:	Coastal and Environmental Services	
Contact person:	Ms Belinda Huddy	
Postal address:	Suite 408, 4th Floor, 76 Regent Road, Sea Point, Cape Town	
Postal code:	8005	Cell:
Telephone:	021 045 0900	Fax:
E-mail:	b.huddy@cesnet.co.za	

4.2 The specialist appointed in terms of the Regulations

I Thomas King, declare that --

General declaration:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- all the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

EOH Coastal and Environmental Services

Name of company (if applicable):

10 March 2016

Date:

APPENDIX D - CONTENTS OF A SPECIALIST REPORT (GNR 982)

Section		NEMA 2014 Regulations - Appendix 6 Requirement	Section	Check
1	1	A specialist report prepared in terms of these Regulations must contain—		
	(a)	details of-		
		(i) the specialist who prepared the report; and	3.5	✓
		(ii) the expertise of that specialist to compile a specialist report;	Appendix B	✓
	(b)	a declaration that the person is independent in a form as may be specified by the competent authority;	Appendix C	✓
	(c)	an indication of the scope of, and the purpose for which, the report was prepared;	3.1	✓
	(d)	a description of the methodology adopted in preparing the report or carrying out the specialised process;	3.2	✓
	(e)	a description of any assumptions made and any uncertainties or gaps in knowledge;	3.4	✓
	(f)	a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment;	6.3	✓
	(g)	recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority;	7	✓
	(h)	a description of any consultation process that was undertaken during the course of carrying out the specialist report;	N/A	<input checked="" type="checkbox"/>
	(i)	a summary and copies of any comments that were received during any consultation process; and	N/A	<input checked="" type="checkbox"/>
	(j)	any other information requested by the competent authority.	N/A	<input checked="" type="checkbox"/>
	2	Where a proposed development and the geographical area within which it is located has been subjected to a pre-assessment using a spatial development tool, and the output of the pre-assessment in the form of a site specific development protocol has been adopted in the prescribed manner, the content of a specialist report may be determined by the adopted site specific development protocol applicable to the specific proposed development in the specific geographical area it is proposed in.	N/A	<input checked="" type="checkbox"/>

Notes:

- Point H: The EAP undertakes a public participation process in terms of the NEMA EIA regulations. The Issues and Response Trail was provided to the author who reviewed it, and the issues raised therein were considered in this study. The author was shown around the farm of Mr Warren Petterson by his farm manager.
- Point I: Comments on the EIA and the specialist studies are submitted to the EAP, who captures these in an Issues and Response Trail. The original copies are also provided in the EIA documents.
- Point J: No additional information has been requested by the competent authority.
- Point 2: The site is within a renewable energy development zone - Komsberg Wind - as identified in the Strategic Environmental Assessment undertaken by the CSIR and DEA.

APPENDIX E - PHOTOMONTAGES



Viewpoint name: Viewpoint 05 - Just east of Saaiplaas
X-coordinate: 467550 (UTM34S)
Y-coordinate: 6360758 (UTM34S)
Orientation: Facing south-east



Viewpoint name:	Viewpoint 05 - Just east of Saaiplaas
X-coordinate:	467550 (UTM34S)
Y-coordinate:	6360758 (UTM34S)
Orientation:	Facing south-east
Distance to nearest turbine:	13.5km



Viewpoint name: Viewpoint 11 - Bantamsfontein
X-coordinate: 422926 (UTM34S)
Y-coordinate: 6352060 (UTM34S)
Orientation: Facing east



Viewpoint name: Viewpoint 11 - Bantamsfontein
X-coordinate: 422926 (UTM34S)
Y-coordinate: 6352060 (UTM34S)
Orientation: Facing east
Distance to nearest turbine: 20.8km