Bergwind Botanical Surveys & Tours CC.

14A Thomson Road

Claremont

Cape Town

7708

17 August 2012

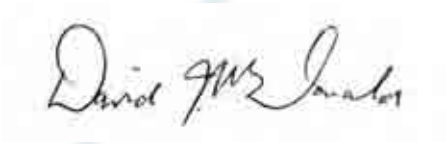
Ms Melissa Mackay
Cape EAPrac
P.O. Box 2070
GEORGE
6530

Dear Melissa

Lunsklip Wind Farm – Still Bay

The four alternatives of the layout for the proposed Lunsklip Wind Farm at Still Bay, Western Cape have been considered. I wish to confirm that in my professional opinion Alternative 4 would be the most appropriate from a botanical perspective and takes into account the recommendations made in the botanical assessment.

Yours sincerely



Dr D.J. McDonald Pr. Sci. Nat.
Botanical Specialist

tel +27 21 671-4056 mobile 082-876-4051 e-mail dave@bergwind.co.za
web www.bergwind.co.za

Botanical Assessment for the proposed Lunsklip Wind Farm near Still Bay, Hessequa Municipality, Western Cape Province

Ruschia calcicola

bergwind
Botanical Surveys & Tours

Report by Dr David J. McDonald
Bergwind Botanical Surveys & Tours CC.
14A Thomson Road, Claremont, 7708
Tel: 021-671-4056
Fax: 086-517-3806

Report prepared for *Cape EAPrac*
Client: Bergwind Energy (Pty) Ltd

National Legislation and Regulations governing this report

This is a 'specialist report' and is compiled in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended, and the Environmental Impact Assessment Regulations, 2010.

Appointment of Specialist

David J. McDonald of Bergwind Botanical Surveys & Tours CC was appointed by *Cape EAPrac* on behalf of Bergwind Energy (Pty) Ltd to provide specialist botanical consulting services for the Basic Assessment Process for the proposed Lunsklip Wind Farm near Still Bay, Hessequa Municipality, Western Cape Province. The consulting services comprise an assessment of potential impacts on the flora and vegetation in the designated study area by the proposed project.

Details of Specialist

Dr David J. McDonald Pr. Sci. Nat.
Bergwind Botanical Surveys & Tours CC
14A Thomson Road
Claremont
7708
Telephone: 021-671-4056
Mobile: 082-876-4051
Fax: 086-517-3806
e-mail: dave@bergwind.co.za
Professional registration: South African Council for Natural Scientific Professions No. 400094/06

Expertise

Dr David J. McDonald:

- Qualifications: BSc. Hons. (Botany), MSc (Botany) and PhD (Botany)
- Botanical ecologist with over 30 years' experience in the field of Vegetation Science.
- Founded Bergwind Botanical Surveys & Tours CC in 2006
- Has conducted over 300 specialist botanical / ecological studies.
- Has published numerous scientific papers and attended numerous conferences both nationally and internationally (details available on request)

Independence

The views expressed in the document are the objective, independent views of Dr McDonald and the survey was carried out under the aegis of, Bergwind Botanical Surveys and Tours CC. Neither Dr McDonald nor Bergwind Botanical Surveys and Tours CC has any business, personal, financial or other interest in the proposed development apart from fair remuneration for the work performed. **It should be clearly noted that there is no business connection whatsoever between Bergwind Botanical Surveys & Tours CC and Bergwind Energy (Pty) Ltd.**

Conditions relating to this report

The content of this report is based on the author's best scientific and professional knowledge as well as available information. Bergwind Botanical Surveys & Tours CC, its staff and appointed associates, reserve the right to modify the report in any way deemed fit should new, relevant or previously unavailable or undisclosed information become known to the author from on-going research or further work in this field, or pertaining to this investigation

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of the report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

Note: Aerial photo images based on Google Earth ™ in this report are used under a valid Google Earth Pro licence.

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

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

Application for authorisation in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2010

PROJECT TITLE

Lunsklip Windfarm, Still Bay

Specialist:	Dr David J. McDonald		
Contact person:	Dr D.J. McDonald		
Postal address:	14A Thomson Road, Claremont		
Postal code:	7708	Cell:	082-876-4051
Telephone:	021-671-4056	Fax:	086-517-3806
E-mail:	dave@bergwind.co.za		
Professional affiliation(s) (if any)	SACNASP Registration No. 400094/06 (D.J. McDonald)		

Project Consultant:	Cape Environmental Impact Assessment Practitioners (Pty) Ltd (*Cape EAPrac*)		
Contact person:	Melissa Mackay		
Postal address:	PO Box 2070, George		
Postal code:	6530	Cell:	071 603 4132
Telephone:	044 874 0365	Fax:	044 874 0432
E-mail:	mel@cape-eaprac.co.za		

bergwind

THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I **David Jury McDonald**, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Note: The terms of reference must be attached.

Signature of the specialist:

Bergwind Botanical Surveys & Tours CC

Name of company:

19 July 2012

Date:

CONTENTS

1. Introduction

Bergwind Energy (Pty) Ltd proposes to establish a renewable energy wind-farm near Still Bay on the Southern Cape Coast. This 20MW wind energy facility aims to supply electrical power to the National Grid (Eskom) and is named the Lunsklip Wind Farm. *Cape EAPrac* is conducting a Basic Assessment environmental application process on behalf of the proponents of the project and appointed Bergwind Botanical Surveys & Tours CC to conduct a specialist botanical investigation of the vegetation and flora of the area affected by the proposed project.

This report provides a description of the vegetation found in the study area (defined below), placing it in a regional context from a conservation perspective. The investigation follows published guidelines for evaluating potential impacts on the natural vegetation as they pertain to the study area (Brownlie 2005; De Villiers *et al.* 2005). The requirements and recommendations of Cape Nature and the Botanical Society of South Africa for proactive assessment of the biodiversity of proposed development sites are also taken into account.

2. Terms of Reference

- Provide a broad, baseline description of the vegetation of the study area, placing it in a regional context. Reference should also be made to any bioregional maps of the area.
- Provide specific information relating to the vegetation in the study area, with reference to any species of special concern and their conservation status, which can be used as baseline information for the assessment of potential impacts of the proposed project.
- Investigate ecological/biodiversity processes that could be affected by the proposed project.
- Identify, describe and assess the impacts of the proposed activities and any activity alternatives on the vegetation.
- Recommend appropriate, practicable mitigation measures that will reduce all major (significant) impacts or enhance potential benefits, if any.

3. Study Area

3.1 Locality

The study area lies in the undulating landscape north of Still Bay and east of the Goukou River approximately seven kilometres from the coastline of the Southern Cape Coast (Figure 1) and south of the N2 National Highway. The western extent of the study area is on Farm 480/135 near the R305 road and the eastern extent is on Farm 472/2 (Figures 2 & 3).

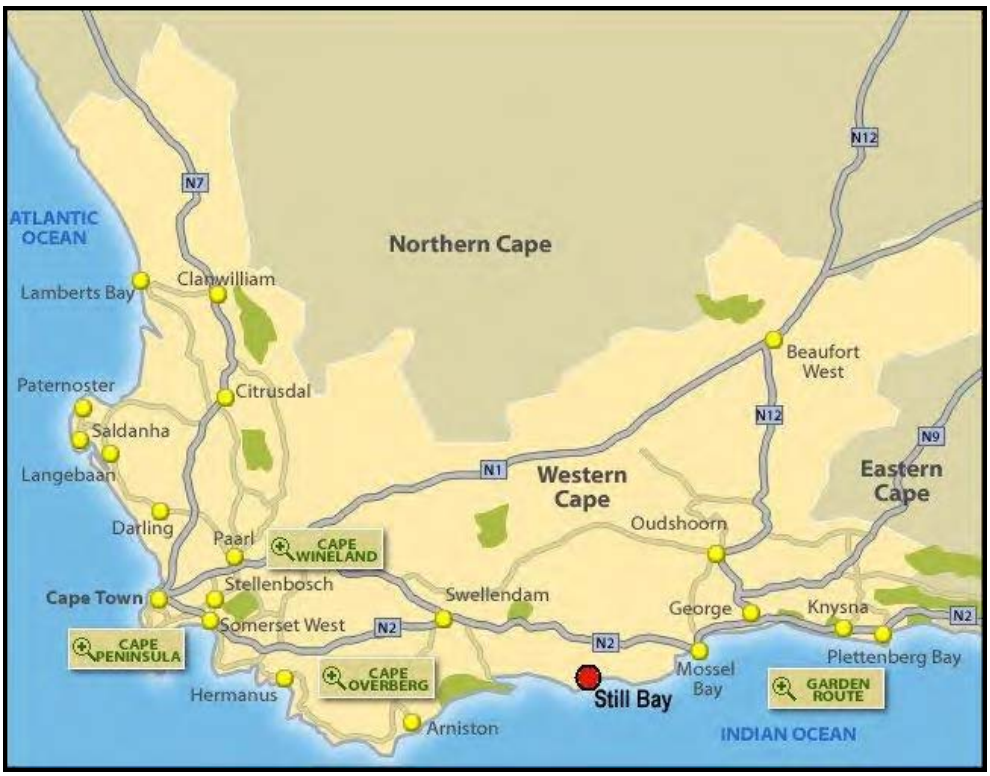


Figure 1. Location of Still Bay on the Southern Cape Coast – red dot
(Base-map source: http://www.rainbownation.com/travel/maps/index.asp?loc=18)

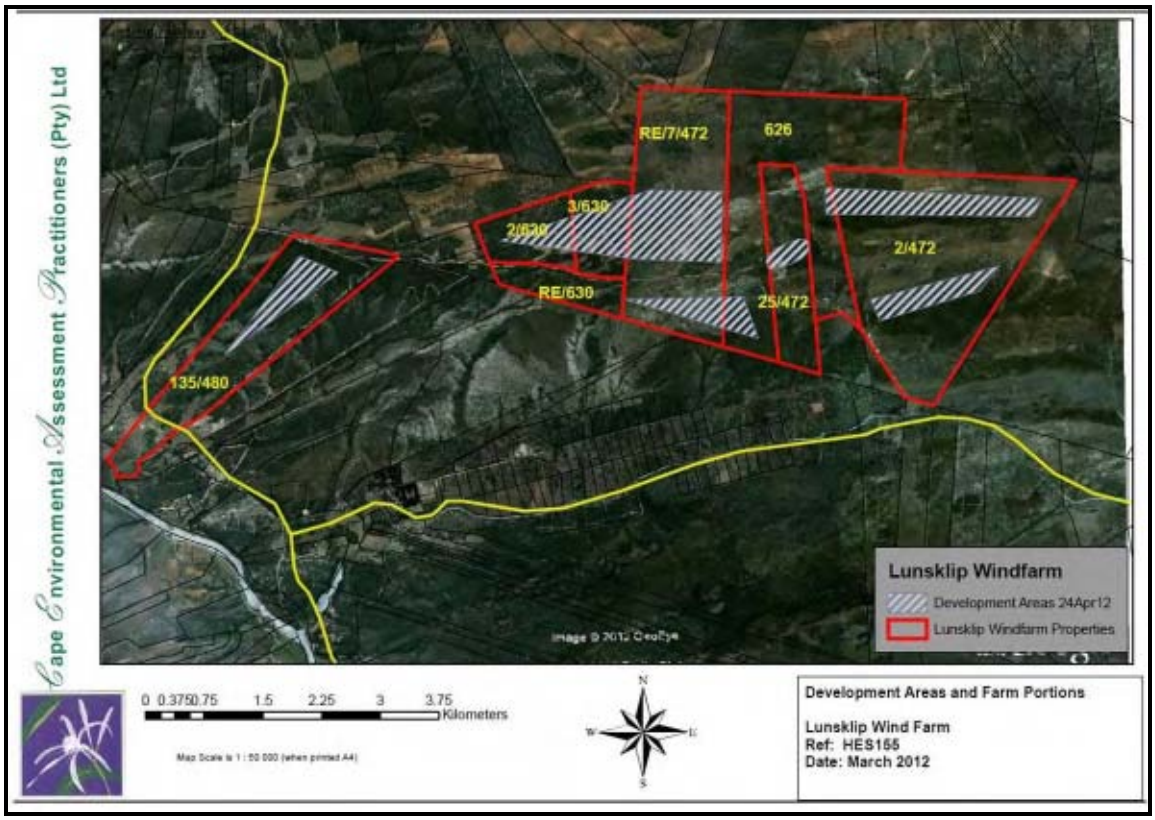


Figure 2. Development areas for the proposed Lunsklip Wind Farm (Diagram courtesy *Cape EAPrac*)

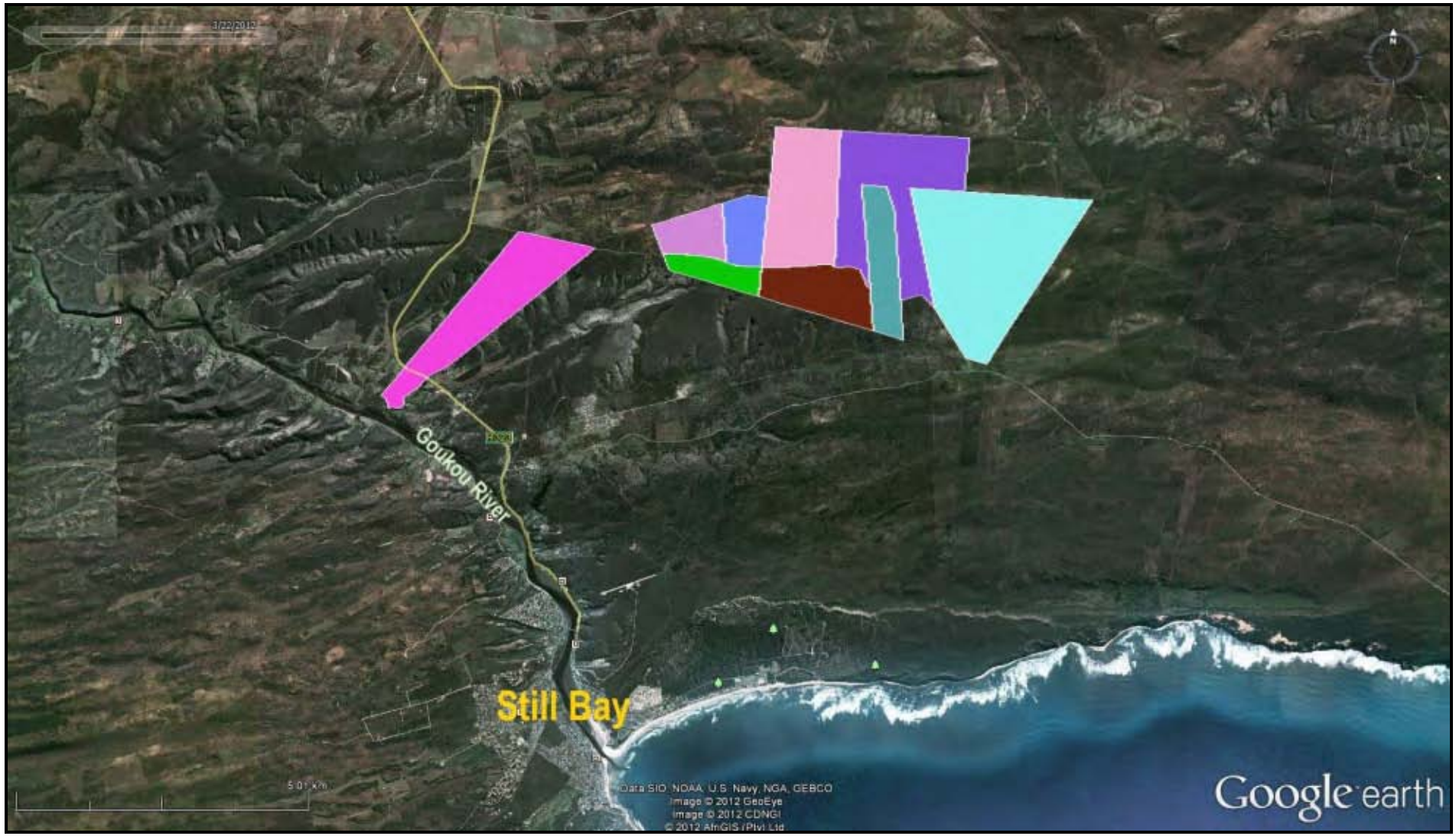


Figure 3. Aerial image (Google Earth ™) of Still Bay in relation to the properties constituting the development area of the Lunsklip Wind Farm.

3.2 Topography, Geology and Soils

Sedimentary shales and mudstones of the Bokkeveld Group (Cape Supergroup) deposited during the Palaeozoic Era underlie the whole region around Still Bay. Over these shales lie calcified dune formations of the De Hoopvlei and Wankoe Formations of the Bredasdorp Group laid down during the Cenozoic Era Roberts *et al.* 2006), which form the coastal plain, known as the Riversdale Coastal Plain, extending from the Duiwenhoks River in the West to the Gouritz River in the east (Oberholzer, 2010). A typical profile of the sediments on the Riversdale Coastal Plain is given by Oberholzer (2010) for the Vermaaklikheid area, west of Still Bay and this applies to the Still Bay area as well (Figure 4).

More specifically the study area is underlain by sediments of the Wankoe Formation of the Bredasdorp Group. Over this is a calcrete or limestone capping, seen as prominent plateaus and ridges, often with relatively flat 'pavements' of exposed, hard calcrete with pockets of shallow soil. The plateaus and ridges have been cut by tributaries of the Goukou River resulting in deeply incised valleys. Over a large part of the study area the limestone is covered with wind-blown regic sand of Quaternary age although this is not depicted on the geological map of the area (Figure 5).

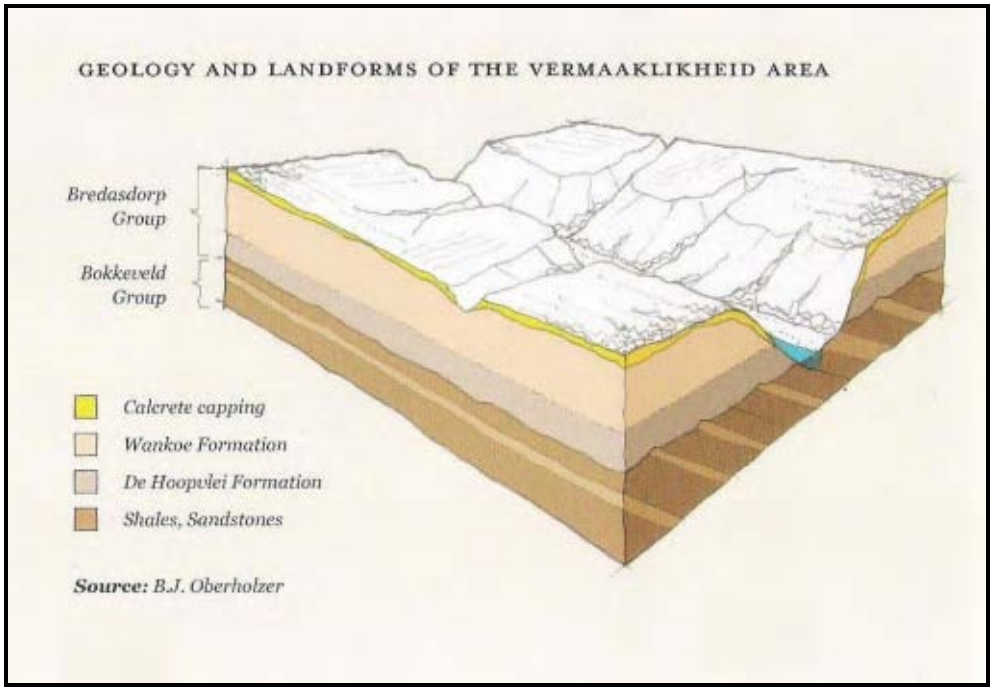


Figure 4. Profile of the geology of the Riversdale Coastal Plain as seen at Vermaaklikheid, west of Still Bay. The same geological sequence is seen at Still Bay. (Diagram from Oberholzer, 2010).

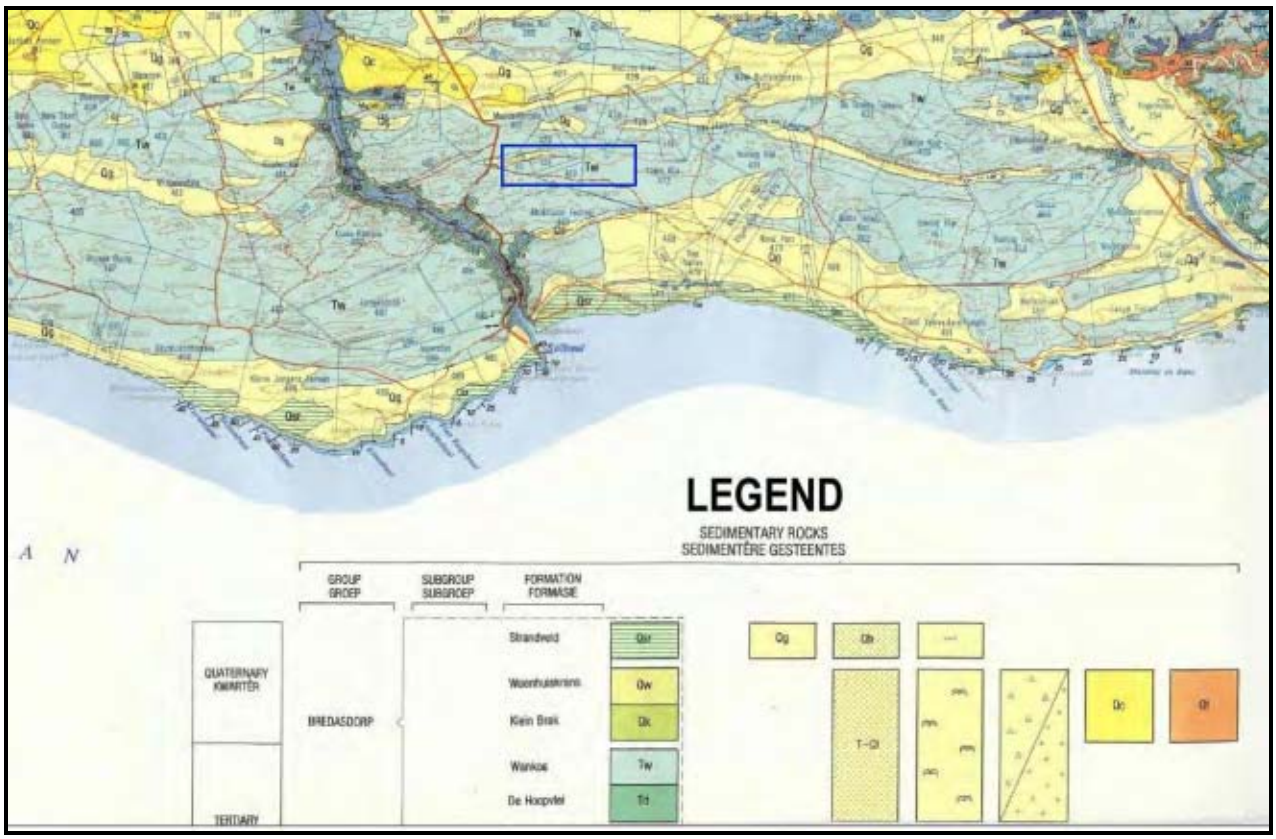


Figure 5. Geological map of the Still Bay district with the area of focus for the Lunsklip Wind Farm enclosed by a blue rectangle. The area is underlain by sediments of the Wankoe Formation, Bredasdorp Group with a covering of Quaternary Regic Sands in many places (Source: 1 250 00 Geological Series Map − Riversdale).

According to the Land Type classification of South Africa (Land Type Survey Staff 1972—2006) the whole study area is located in the Fc17 land-type described as calcified dune sand covered by younger sand and calcrete, with Mispah and Glenrosa soil forms.

3.3 Climate

Still Bay lies in the transition zone between the western winter-rainfall zone and the all-year-round rainfall zone of the George − Tsitsikamma region of the southern Cape. It is affected by the warm Agulhas Current which helps to ameliorate the climate. Rain originates from fronts moving along the coast from west to east and occurs mainly in winter (75%) with mean annual precipitation of 440 − 450 mm. The winters are mild to cold with the coldest month being July and the summers hot with the hottest and driest month being February. The climate is classified as an 'attenuated mesomediterranean climate' (Cowling *et al.* 1988). The most representative climate diagram for the study area would be that of Canca Limestone Fynbos (Rebelo *et al.* 2006 in Mucina & Rutherford, 2006), (Figure 6).

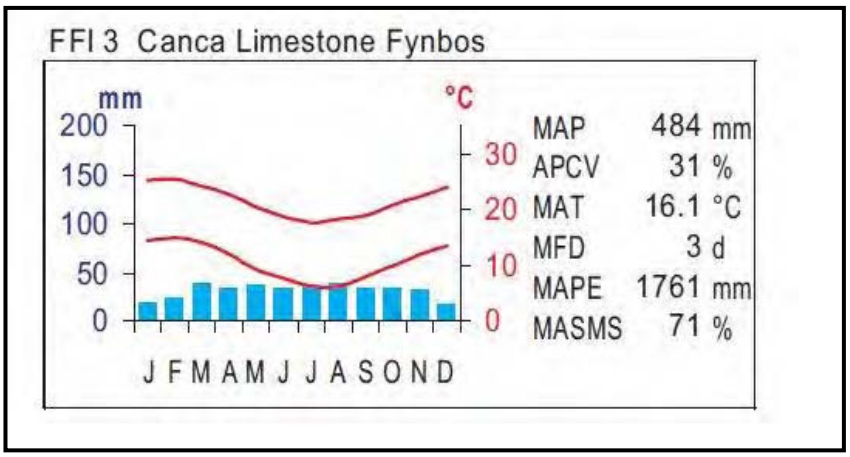


Figure 6. Climate diagram for Canca Limestone Fynbos (from Rebelo *et al.* 2006 in Rutherford & Mucina, 2006) showing MAP – Mean Annual Precipitation; ACPV = Annual Precipitation Coefficient of Variance; MAT = Mean Annual Temperature; MFD = Mean Frost Days; MAPE = Mean Annual Potential Evaporation; MASMA = Mean Annual Soil Moisture Stress.

4. Evaluation Method

The study area was visited on 5 and 6 July 2012, during winter. The botanical investigation was carried out by vehicle and on foot where vehicle access was restricted. Thirteen pre-determined sites of the proposed wind-turbines were visited where the vegetation and flora of each site was sampled. The sites were sampled more-or-less sequentially from east to west and the order of sampling does not imply any rating of importance of one site above any other. A hand-held Garmin ® GPSmap 62s was used to track the sampling route and for purposes of locating specific positions of importance. During the survey, notes together with a photographic record were compiled on the vegetation and landscape. (Some of the photographs are included in this report; those not included may be accessed from the author on request).

In order to facilitate sampling the three proposed alternatives and their respective locations were drawn up in a table for easy cross-referencing (Table 1).

The study area had experienced good winter rains prior to the site visit and although too early for many spring-flowering species, the vegetation was in an active growth phase and the majority of plant species could be recognized and either identified in the field and photographed for identification purposes. The season of the site visit was therefore not a limitation.

5. The Vegetation

5.1 General description

The vegetation of the Still Bay district has been described and mapped by various authors including Cowling *et al.* 1999, Vlok & Euston-Brown (2002), Mucina *et al.* (2005), Rebelo *et al.* (2006) and Vlok & de Villiers (2007). The map of Vlok & Euston-Brown (2002) (Figure 7) is slightly misleading since areas they mapped as Still Bay Dune Thicket according to their finer classification are part of Canca Limestone Fynbos. Following the national vegetation classification, the vegetation around Still Bay is classified into two main types, Canca Limestone Fynbos (FFl3) and Albertinia Sand Fynbos (FFd9), with small areas of Southern Coastal Forest (FOz6), Blombos Strandveld (FS8) along the coast and Southern Cape Valley Thicket (AT1) fringing the Goukou River (Rebelo *et al*., 2006, in Mucina & Rutherford, 2006) (Figure 8).

The National Vegetation Map (Mucina *et al.* 2005) is thus recognized nationally as the standard but the scale of mapping precludes recognition of small-scale mosaics of plant communities of 'limestone fynbos' on limestone outcrops and Albertinia Sand Fynbos on neutral to acid sands.

Vlok & De Villiers (2007) recognized a number of sub-units of the vegetation in the Riversdale – Still Bay – Albertinia area. The first habitat type is Dune Sandplain Mosaic Thicket which is a Sandplain Fynbos matrix with thicket bush-clumps, including only one vegetation unit Canca Thicket-Sandplain Fynbos. The second habitat type is Dune Sandplain Mosaic Forest and Thicket, also with only one vegetation unit, Ystervarkpunt Forest-Thicket Fynbos. The third habitat type is Dune Limestone Mosaic Thicket which has a matrix of 'limestone fynbos' and includes three vegetation units, (i) Hectorskraal Thicket-Limestone Fynbos, (ii) Vermaaklikheid Thicket-Limestone Fynbos and (iii) Windsor Thicket-Limestone Fynbos (see Appendix for extracted descriptions from Vlok & De Villiers, 2007). A fine-scale map of these units has not been published.

As much as it would be simpler to 'lump' all the vegetation encountered in the Lunsklip Wind Farm study area into the general 'catch-all' of Canca Limestone Fynbos, as indicated above, this would not reflect the difference between the vegetation on the deep sandy soils and that found on the shallow soils over calcrete or on the exposed calcrete. An attempt is therefore made to classify each of the Lunsklip Wind farm turbine sites according to the system of Vlok & De Villiers (2007) to provide a more accurate, fine-scale interpretation of the vegetation. This in turn provides greater accuracy in determining the sensitivity of the turbine sites in line with the

Biodiversity Sector Plan: Hessequa and Mossel Bay Municipalities (Maree & Vromans, 2010) and the mapping of Critical Biodiversity Areas.

5.2 Conservation Status

Canca Limestone Fynbos was rated as **Least Threatened** in the National Spatial Biodiversity Assessment (Rouget *et al.* 2004). According to more recent (national) interpretation this status has not changed and this vegetation type as a whole has not been included in the National List of Threatened Ecosystems in South Africa (Government Gazette, 2011). However, this is highly surprising, since Canca Limestone Fynbos is known for its many endemic and threatened species.

Vlok & De Villiers (2007) identified Dune Sandplain Fynbos; Dune Mosaic Sand Fynbos; Dune Sandplain Mosaic Thicket; Dune Limestone Mosaic Thicket; Grassy Fynbos; Mesic Renosterveld Mosaic Valley Thicket; Mesic Renosterveld Mosaic Limestone Fynbos; Dune Mosaic Renosterveld; and Valley Mosaic Renosterveld as the most threatened vegetation units (types) on the Riversdale Coastal Plain. Threats that have been identified include serious threat from woody alien invasive species, particularly *Acacia cyclops* (rooikrans) and *A. saligna* (Port Jackson Willow), water abstraction, poor fire regimes and competition from human settlement and agriculture (see Maree & Vromans, 2010).

The vegetation found in the Lunsklip Wind Farm study area falls squarely within the Dune Sandplain Mosaic Thicket and is vulnerable to on-going habitat degradation and **is threatened**, contrary to the impression given by the National List of Threatened Ecosystems. Consequently, the mapping of Critical Biodiversity Areas (CBAs) has recognized the threats posed to the ecosystem on the Riversdale Coastal Plain. The resultant map is given in Figure 9 with the sample waypoints for the Lunsklip Wind Farm.

Examination of Figure 9 indicates that seven of the proposed thirteen turbine sites are located in areas designated as CBAs (Note: Waypoint LSK8 is not a turbine site).

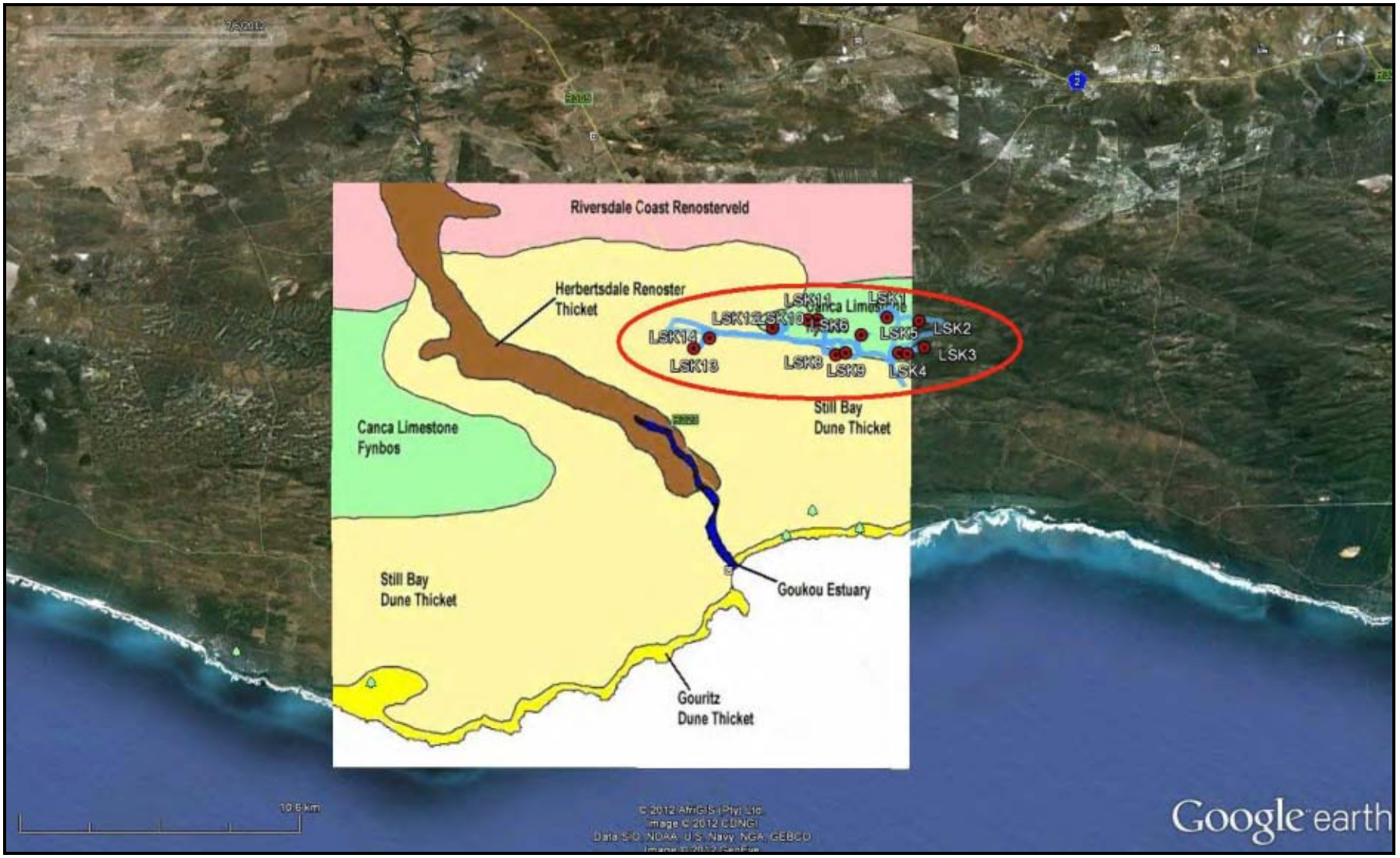


Figure 7. The vegetation map of the Still Bay area from (Vlok & Euston-Brown, 2002) superimposed on a Google Earth ™ aerial image, with the area of the Lunsklip Wind Farm within the red ellipse. According to this map the Lunsklip Wind Farm would be located in Still Bay Dune Thicket and Canca Limestone Fynbos.

Figure 8. Portion of the Vegetation Map of South Africa, Lesotho & Swaziland (Mucina *et al.* 2005) showing the vegetation types around Still Bay. The vegetation sample waypoints are given as LSK# and the light blue line is the sample track recorded during field-work, indicating that the proposed locations for wind turbines on the Lunsklip Wind Farm would all be in Canca Limestone Fynbos. The Lunsklip Wind farm would be located in an area mapped as Canca Limestone Fynbos.

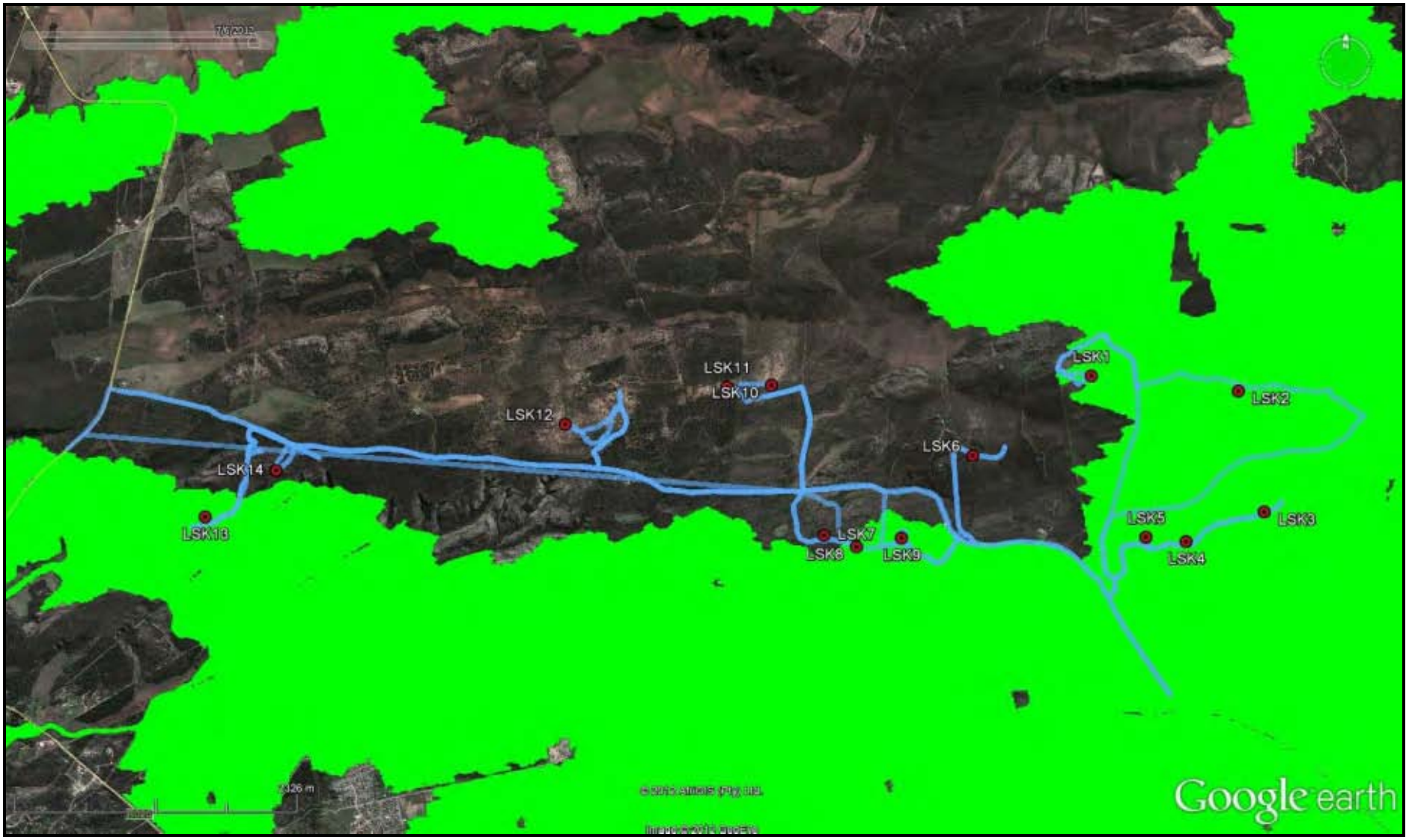


Figure 9. Map of the Critical Biodiversity Areas (CBAs) found north of Still Bay and in the area of the proposed Lunsklip Wind Farm. Seven of the sample waypoints (LSK#) designating the sites of proposed turbine location are in CBAs and six are located outside CBAs.

5.3 Vegetation of the Study Area and Impact Assessment for each proposed turbine site

The vegetation of the study area was recorded at 13 sites which were either at or close to the proposed locations of the wind turbines, except for one site, at waypoint LSK6, which is an additional alternative site. Within the study area there are distinctly sandy areas with deep sand and other areas where the sand is shallow over calcrete or the calcrete is exposed at the surface with hardly any soil. Different assemblages of plant species are recognized on these different substrates but there is enough overlap in species composition for them to be all grouped within Canca Limestone Fynbos.

The sites are described as Site 1 – Site 13; refer to Table 1 for cross-reference between site names, waypoints and turbine names. Brief descriptions of the sites and their vegetation, condition and conservation status are presented in the following sections. A rating of botanical sensitivity is applied following the system of Helme (2000) (see Appendix 1).

Table 1. Sensitivity ratings for proposed Turbine Sites for Lunsklip Wind Farm

Alternative	Sample Site	Waypoint	Turbine Name	Latitude	Longitude	Equivalence	Sensitivity Rating
Altenative 1	Site 12	LSK13	Alt 1 – WTG1	34°18'13.09"S	21°24'20.45"E	Same as Alt 2 – WTG1	High sensitivity (CBA)
	Site 11	LSK12	Alt 1 – WTG2	34°17'47.54"S	21°26'15.57"E	Same as Alt 2 – WTG3	Low sensitivity (not in CBA)
	Site 9	LSK10	Alt 1 – WTG3	34°17'36.65"S	21°27'20.92"E	Same as Alt3 – WTG5	High sensitivity (not in CBA)
	Site 8	LSK9	Alt 1 – WTG4	34°18'16.59"S	21°28'2.64"E	Same as Alt2 – WTG6	High sensitivity (CBA)
	Site 5	LSK5	Alt 1 – WTG5	34°18'15.76"S	21°29'20.53"E	Close to Alt2 – WTG8 (On its own)	High sensitivity (CBA)
	Site 3	LSK3	Alt 1 – WTG6	34°18'8.83"S	21°29'57.97"E	Same as Alt2 – WTG10	High sensitivity (CBA)
Alternative 2	Site 12	LSK13	Alt 2 – WTG1	34°18'13.09"S	21°24'20.45"E	Same as Alt 1 – WTG1	High sensitivity (CBA)
	Site 13	LSK14	Alt 2 – WTG2	34°18'0.61"S	21°24'43.67"E	Same as Alt3 – WTG1	Low sensitivity (not in CBA)
	Site 11	LSK12	Alt 2 – WTG3	34°17'47.54"S	21°26'15.57"E	Same as Alt1 –WTG2	Low sensitivity (not in CBA)
	Site 10	LSK11	Alt 2 – WTG4	34°17'37.28"S	21°27'0.70"E	Same as Alt3 – WTG3	Medium sensitivity (not in CBA)
	Site 7	LSK7	Alt 2 – WTG5	34°18'16.03"S	21°27'38.07"E	On its own near Alt2 – WTG4	Medium sensitivity
	Site 8	LSK9	Alt 2 – WTG6	34°18'16.59"S	21°28'2.64"E	Same as Alt 1 – WTG4 and Alt3 – WTG4	High sensitivity (CBA)
	Site 1	LSK1	Alt 2 – WTG7	34°17'33.44"S	21°29'2.57"E	Same as Alt 3 WTG6	High sensitivity (CBA)
	Site 4	LSK 4	Alt 2 – WTG8	34°18'16.82"S	21°29'33.22"E	On its own near Alt1 – WTG5	High sensitivity (CBA)
	Site 2	LSK2	Alt 2 – WTG9	34°17'36.95"S	21°29'49.53"E	On its own	High sensitivity (CBA)
	Site 3	LSK3	Alt 2 – WTG10	34°18'8.83"S	21°29'57.97"E	Same as Alt1 – WTG6	High sensitivity (CBA)
Alternative 3	Site 13	LSK14	Alt 3 – WTG1	34°18'0.61"S	21°24'43.67"E	Same as Alt2 – WTG2	Low sensitivity (not in CBA)
	Site 12	LSK13	Alt 3 – WTG2	34°18'13.09"S	21°24'20.45"E	Same as Alt 1 – WTG1 and Alt2—WTG1	High sensitivity (CBA)
	Site 10	LSK11	Alt 3 – WTG3	34°17'37.28"S	21°27'0.70"E	Same as Alt2 – WTG4	Medium sensitivity (not in CBA)
	Site 8	LSK9	Alt 3 – WTG4	34°18'16.59"S	21°28'2.64"E	Same as Alt2 – WTG6 and Alt 1 – WTG4	High sensitivity (CBA)
	Site 9	LSK10	Alt 3 – WTG5	34°17'36.65"S	21°27'20.92"E	Same as Alt1 –WTG3	High sensitivity (not in CBA)
	Site 1	LSK1	Alt 3 – WTG6	34°17'33.44"S	21°29'2.57"E	Same as Alt2 – WTG7	High sensitivity (CBA)
	Site 6	LSK6	Additional site	34°17'54.7"S	21°28'25.2"E	On its own	High sensitivity (not in CBA)

5.3.1 Site 1

Location: LSK1: S 34° 17′ 33.4″ E 21° 29′ 02.7″

Farm name: Farm 472 Portion 2

***Survey date*:** 5 July 2012

Vegetation type: National Vegetation Map: Canca Limestone Fynbos

Vlok & De Villiers (2007): Canca Thicket-Sandplain Fynbos

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; located within a CBA.

Description:

The vegetation at Site 1 is species-rich mid-high, mid-dense ericoid shrubland (Sandplain Fynbos) on deep, light-brown sandy soil. The fire history of the site is not known but from the appearance of the vegetation it is seven years old or less. It is therefore in the early stages of recovering from the last fire. The vegetation is in excellent condition and is free of woody alien invasive species (Figure 10). Species include *Amphithalea sp., Aspalathus cf. crassisepala, Bobartia cf. macrospatha, Carpobrotus cf. muirii, Cassytha ciliolata, Cullumia carlinoides, Disparago kraussii, Ehrharta villosa, Elegia muirii, Erica cerinthoides, Erica radicans subsp. radicans, Euchaetis cf. intonsa, Euclea racemosa, Helichrysum sp., Hellmuthia membranacea, Indigofera angustifolia, Lachnaea axillaris, Leucadendron salignum, Leucospermum praecox, Lobelia tomentosa, Mastersiella sp., Mesem. – red flower, Metalasia densa, Morella quercifolia, Passerina corymbosa, Pelargonium triste, Protea susannae, Searsia glauca, Searsia laevigata subsp. laevigata* forma *cangoana.*

Access to the site is along a sandy track that traverses an area of similar fynbos to that found around the sample waypoint. This track is 3.1 km from the closest public road to the site.

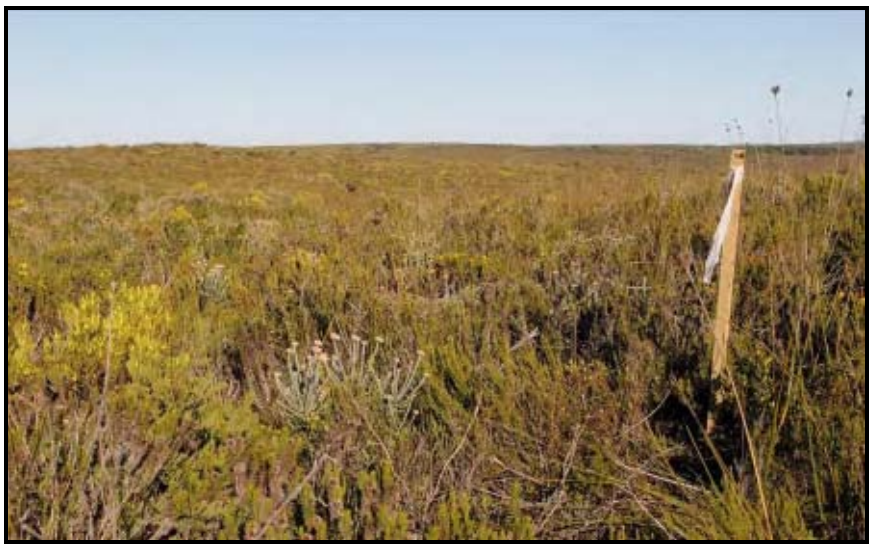


Figure 10. Mid-high, mid-dense Sandplain Fynbos at Site 1.

Impact assessment and mitigation:

The No Go scenario at **Site 1** could result in two possibilities in the medium to long term. Firstly, alien invasive species could gain a foothold and increase in density which would have a high negative impact. Secondly, the Sandplain Fynbos could be ploughed and / or intensively grazed, both with negative results. At face value at present, these seem unlikely because the present landowner conscientiously clears invasive alien species and the area is not overgrazed. Therefore the No Go scenario is rated as presently **High positive** (Table 2).

The construction of a turbine (and later operation) at Site 1 would have a locally high negative effect, requiring disturbance of high quality Sandplain Fynbos within a restricted area but within a CBA. The access road would also require that a considerable amount of good quality fynbos would be disturbed to upgrade the existing track to a standard high enough to allow for movement of heavy vehicles and equipment. The effect would be a locally **High negative** impact Table 2.

The only mitigation possible would be to actively restore the fynbos in the area disturbed during construction that would not be required during the operational phase. The mitigation would lower the impact from **High negative** to **Medium negative** (Table 2).

Table 2. Impact: Loss of natural vegetation at Site 1 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence

	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	+ve	Probable	High
Without mitigation	Site 1 turbine site and constructi on area	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 1 turbine site and constructi on area	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
Without mitigation	Site 1 access route	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 1 access route	Loss of natural, undisturbed	Local	Long-term	Medium	Medium	-ve	Probable	High

5.3.2 Site 2

Location: LSK2: S 34° 17' 37.0" E 21° 29' 49.6"

Farm name: Farm 472 Portion 2

***Survey date*:** 5 July 2012

Vegetation type: National Vegetation Map: Canca Limestone Fynbos

Vlok & De Villiers (2007): Canca Thicket-Sandplain Fynbos

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; located within a CBA.

Description:

Site 2 is located on the crest of a low dune. The upper part of the dune has species typical of thicket, notably *Diospyros dichrophylla*. The thicket vegetation is not well-developed here and has been impacted by fire (species marked with (T) below are thicket species).
Around the base of the dune on the north side is exposed calcrete with fynbos vegetation and species typical of shallow soil over limestone (Figure 11).

Species recorded at the site include, *Agathosma sp., Amphithalea sp., Aristea africana, Asparagus cf. aethiopicus* (T)*, Asparagus rubicundus* (T)*, Bobartia cf. macrospatha, Brunsvigia orientalis, Carpobrotus cf. muirii, Cissampelos capensis* (T)*, Cliffortia cf. stricta, Cliffortia ilicifolia* (T)*, Cullumia squarrosa, Diospyros dichrophylla* (T)*, Disparago kraussii, Elegia muirii, Erica cerinthoides, Erica cf. discolor, Erica radicans subsp.*

radicans, Erica spectabilis, Eriocephalus africanus, Eriocephalus racemosus, Euclea racemosa (T)*, Heliophila subulata, Indigofera angustifolia, Ischyrolepis leptoclados, Leucadendron salignum, Leucospermum praecox, Limonium sp., Lobelia tomentosa, Mastersiella sp., Metalasia densa, Morella quercifolia, Muraltia filiformis, Muraltia spinosa, Oedera imbricata, Passerina corymbosa, Protea susannae, Psoralea affinis, Searsia laevigata subsp. laevigata forma cangoana, Searsia glauca, Senecio – annual, Thamnochortus sp., Thamnochortus paniculatus, Tribolium hispidum, Trichocephalus stipularis.*

Access to the site is along a sandy track that traverses an area of similar fynbos to that found around the sample waypoint. The distance is 3.1 km from the closest public road to the site.

Figure 11. Site 2 is located on a low sandy dune (highest point) with incipient thicket vegetation, with exposure of calcrete hardpan in the foreground covered with low fynbos vegetation.

Impact assessment and mitigation:

The No Go scenario at Site 2 could result in a similar outcome in the medium to long term as at Site 1 although the vegetation is slightly different. Firstly, alien invasive species could gain a foothold and increase in density which would have a high negative impact. Secondly, the Sandplain Fynbos could be ploughed and / or intensively grazed, both with negative results. These possibilities currently appear unlikely due to good land

management with active clearing of invasive alien species and the area is not overgrazed. Therefore the No Go scenario is rated as presently **High positive** (Table 3).

The construction of a turbine (and later operation) at Site 2 would have a locally high negative effect, requiring disturbance of high quality Sandplain Fynbos within a restricted area but within a CBA. The access road would also require that a considerable amount of good quality fynbos would be disturbed to upgrade the existing track to a standard high enough to allow for movement of heavy vehicles and equipment. The effect would be a locally **High negative** impact Table 3.

The only mitigation possible would be to actively restore the fynbos in the area disturbed during construction that would not be required during the operational phase. The mitigation would lower the impact from **High negative** to **Medium negative** (Table 2).

Table 3. Impact: Loss of natural vegetation at Site 2 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	+ve	Probable	High
Without mitigation	Site 2 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 2 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
Without mitigation	Site 2 access route	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 2 access route	Loss of natural, undisturbed	Local	Long-term	Medium	Medium	-ve	Probable	High

5.3.3 Site 3

Location: LSK3: S 34° 18' 08.8" E 21° 29' 57.9"

Farm name: Farm 472 Portion 2

***Survey date*:** 5 July 2012

Vegetation type: National Vegetation Map: Canca Limestone Fynbos

Vlok & De Villiers (2007): Canca Thicket-Sandplain Fynbos

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; located within a CBA.

Description:

The vegetation at Site 3 is typical Sandplain Fynbos on deep, light brown sandy soil. This is the same plant community as found at Sites 1 & 2. It is a low closed restioid shrubland with restios and grasses co-dominant and an open to mid-dense shrub stratum dominated by the shrub *Leucadendron salignum*. *Thamnochortus insignis* (dekriet) not found at Sites 1 & 2 and *Bobartia* cf. *macrospatha* (abundant) are also emergent from the low stratum (Figure 12).

Near to the site waypoint is a limestone outcrop with incipient thicket vegetation. Plant species occurring include *Babiana sp., Diospyros dichrophylla, Disparago kraussii, Erica spectabilis, Leucadendron meridianum, Massonia echinata, Osyris compressa, Phylica parviflora, Protea lanceolata, Pterocelastrus tricuspidatus* and *Searsia glauca.*

Figure 12. Low to mid-high restioid shrubland of Canca Thicket-Sandplain Fynbos at Site 3.

Site 3 is 1.7 km from the closest public road and access is along a sandy track that follows a relatively high 'dune crest'.

Impact assessment and mitigation:

The impacts and possible mitigation at Site 3 (Table 4) are similar to those for Site 1 (see above for details).

Table 4. Impact: Loss of natural vegetation at Site 3 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	+ve	Improbable	High
Without mitigation	Site 3 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 3 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
Without mitigation	Site 3 access route	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 3 access route	Loss of natural, undisturbed	Local	Long-term	Medium	Medium	-ve	Probable	High

5.3.4 Site 4

Location: LSK4: S 34° 18′ 16.8″ E 21° 29′ 33.2″

Farm name: Farm 472 Portion 2

***Survey date*:** 5 July 2012

Vegetation type: National Vegetation Map: Canca Limestone Fynbos

Vlok & De Villiers (2007): Canca Thicket-Sandplain Fynbos

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; located within a CBA.

Description:

Site 4 has similar vegetation to Sites1, 3 and 5 (see below) – low to mid-high species rich Sandplain Fynbos. The low stratum has an approximately equal mix of restios and grasses, with the grass *Merxmuellera stricta* prominent. *Emergent Leucadendron salignum* is prominent (Figure 13).

Figure 13. Low to mid-high restioid shrubland of Canca Thicket-Sandplain Fynbos at Site 4. The yellow shrub is *Leucadendron salignum* and the tall reed-like restio is *Thamnochortus insignis*.

Site 4 is along the same road as Site 3 but is 1.1 km from the closest public road.

Impact assessment and mitigation:

The impacts and possible mitigation at Site 4 (Table 5) are similar to those for Sites 1, 3 and 5 (see above for details). The only major difference is the closer proximity to the public road.

Table 5. Impact: Loss of natural vegetation at Site 4 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	+ve	Improbable	High

Without mitigation	Site 4 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 4 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
Without mitigation	Site 4 access route	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 4 access route	Loss of natural, undisturbed	Local	Long-term	Medium	Medium	-ve	Probable	High

5.3.5 Site 5

Location: LSK5: S 34° 18′ 15.8″ E 21° 29′ 20.5″

Farm name: Farm 472 Portion 2

***Survey date*:** 5 July 2012

Vegetation type: National Vegetation Map: Canca Limestone Fynbos

Vlok & De Villiers (2007): Canca Thicket-Sandplain Fynbos

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; located within a CBA.

Description:

At Site 5 the vegetation is the same community as at Sites 1, 3 and 4. It is obviously in the early developmental stages after fire, giving the impression of being a low to mid-high closed restioid shrubland (as described for Sites 3 & 4) (Figure 14). However, the proteoid shrubs are young (±7 years) when compared with older, mature *Protea susannae* shrubs seen in a nearby stand of fynbos not burnt in the last fire (Figure 15).

Figure 14. Young Sandplain Fynbos at Site 5 with *Protea susannae* (shrub at left in illustration) in early growth stage.

Site 5 is approximately 0.7 km from the closest public road along the same sandy track as Sites 4 and 5.

Figure 15. Contrast between the young fynbos (foreground) and old, dense tall proteoid fynbos in the background, near Site 5.

Impact assessment and mitigation:

The impacts and possible mitigation at Site 5 (Table 6) are similar to those for Sites 1, 3 and 4 and 5 (see above for details). Site 5 is slightly closer to the public road. The access road would be common to Sites 3, 4 & 5.

Table 6. Impact: Loss of natural vegetation at Site 5 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	+ve	Probable	High
Without mitigation	Site 5 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 5 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
Without mitigation	Site 5 access route	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 5 access route	Loss of natural, undisturbed	Local	Long-term	Medium	Medium	-ve	Probable	High

5.3.6 Site 6

Location: LSK6: S 34° 17′ 54.7″ E 21° 28′ 25.2″

Farm name: Farm 472 Portion 25

***Survey date*:** 5 July 2012

Vegetation type: National Vegetation Map: Canca Limestone Fynbos

Vlok & De Villiers (2007): Canca Thicket-Sandplain Fynbos

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; not located within a CBA.

Description:

Site 6 is a site investigated as a possible alternative if other sites are not acceptable. The vegetation at the site was partly burnt in the last fire but stands of mature proteoid fynbos are found (Figure 16) with *Protea susannae* dominant. The younger vegetation is

the same as that found at Sites 1, 3, 4, and 5. Important indicator species are *Erica radicans* subsp. *radicans* and *Leucospermum praecox*.

This site is accessed along a sandy track that runs northwards from the nearest public road along the western boundary of Farm 472 Portion 25 for a distance of 0.96 km.

Figure 16. Low to mid-high restioid shrubland in the foreground at Site 6 with tall mid-dense to dense proteoid fynbos, dominated by *Protea susannae*, in the background.

Impact assessment and mitigation:

It is surprising that Site 6 is not mapped as a Critical Biodiversity Area since it is the same vegetation as Sites 1, 3, 4 & 5. The impact of construction of a turbine at Site 6 would therefore be **High negative** as at Sites 1, 3, 4 & 5. Site 6 would also require the access track which would serve only this site would need to be completely upgraded to carry heavy loads. This would also have a **High negative** impact on the vegetation (Table 7). The 'No Go' scenario would result in the *status quo* continuing into the foreseeable future. However, in the longer term the site could become infested with woody alien invasive species if they are not controlled.

Table 7. Impact: Loss of natural vegetation at Site 6 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	+ve	Probable	High
Without mitigation	Site 6 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 6 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
Without mitigation	Site 6 access route	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 6 access route	Loss of natural, undisturbed	Local	Long-term	Medium	Medium	-ve	Probable	High

5.3.7 Site 7

Location: LSK7: S 34° 18' 16.1" E 21° 27' 38.1"

Farm name: Farm Lunsklip 635 Portion 1

***Survey date*:** 6 July 2012

Vegetation type: 'Limestone Fynbos' (part of Canca Thicket-Sandplain Fynbos)

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; not located within a CBA.

Description:

At this site the soil is shallow over calcrete hardpan. In some places the calcrete is exposed at the surface and where it is not 'solid' there are small boulders and pebbles of calcrete on the soil surface. Structurally the vegetation is low, mid-dense fynbos shrubland with mid-high to tall emergent proteoid shrubs (Figure 17). This is typical 'limestone fynbos' in contrast with sandplain fynbos.

Species recorded at Site 7 include, *Anthospermum aethiopicum, Arctotis sp., Aspalathus sanguinea subsp. sanguinea, Aspalathus crassisepala, Babiana sp., Bobartia cf. macrospatha, Carpobrotus edulis, Chaenostoma revolutum, Chrysanthemoides*

monilifera, Clutia sp., Elegia macrocarpa, Erica regia subsp. mariae, Erica sp. (grey leaves), Erica spectabilis, Euclea racemosa, Euryops sp., Ficinia praemorsa, Freesia sp., Hermannia trifoliata, Indigofera angustifolia, Jamesbrittenia calciphila, Leucadendron meridianum, Leucadendron salignum, Lobelia tomentosa, Metalasia calcicola, Metalasia muricata, Metalasia pungens, Morella quercifolia, Muraltia filiformis, Oedera imbricate, Oedera squarrosa, Passerina corymbosa, Pentaschistis sp., Phylica parviflora, Protea obtusifolia, Searsia glauca, Thamnochortus insignis and *Thesium sp.*

Figure 17. Low, closed ericoid-restioid shrubland of 'limestone fynbos' with emergent proteoid shrubs of *Protea susannae* (mid-centre) and *Leucadendron meridianum.* Tall trees of invasive *Acacia cyclops* are seen scattered over the site.

The site has a moderate infestation of *Acacia cyclops* (rooikrans). The alien trees are not having a major suppressive effect on the fynbos at the site. According to the sensitivity rating of Helm (2000), the site has Medium Sensitivity due mainly to the presence of alien invasive trees. If this were not the case, the site would have High Sensitivity and would be included in a CBA.

Impact assessment and mitigation:

Site 7 is not mapped as a Critical Biodiversity Area but is has the same plant community as Site 8. The only difference is that it has more woody alien invasive trees. For this reason Site 7 is assessed as having 'Medium Sensitivity' (Table 1) although if the alien trees were removed the site condition would improve to 'High Sensitivity'. The impact of construction of a wind turbine at this site is therefore conservatively rated as **Medium**

negative which, with careful mitigation by restricting of the area of impact by the construction activities, may be reduced to **Low negative** (Table 8). The road access would result in High negative impact.

Important additional mitigation would be to eradicate all woody alien invasive species on the property where Site 7 is located. Invasion by alien herbaceous species such as Kikuyu grass (*Pennisetum clandestinum*) must be monitored in the short- to medium-term post-construction.

At this site, if the alien trees are not controlled the 'No Go' alternative could result in **High Negative** impacts (Table 8).

Table 8. Impact: Loss of natural vegetation at Site 7 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
Without mitigation	Site 7 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
With mitigation	Site 7 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	-ve	Probable	High
Without mitigation	Site 7 access route	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 7 access route	Loss of natural, undisturbed	Local	Long-term	Medium	Medium	-ve	Probable	High

5.3.8 Site 8

Location: LSK9: S 34° 18' 16.6" E 21° 28' 02.7"

Farm name: Farm Lunsklip 635 Portion 1

***Survey date*:** 6 July 2012

Vegetation type: 'Limestone Fynbos' (part of Canca Thicket-Sandplain Fynbos).

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; located within a CBA.

Description:

This site is near the existing wind test-mast. The marker is roughly south-east of the mast in old, well-developed vegetation. It is open to mid-dense, mid-high proteoid shrubland dominated by *Leucadendron meridianum*. *Protea obtusifolia* is present but less abundant. The understorey is a closed restioid shrubland with *Erica spectabilis*, a limestone endemic species, dominant (Figure 18).

Directly south of the test mast is an area where mid-high to tall shrubs are curiously absent. The area is covered with a mid-dense to closed restioids shrubland dominated by *Erica spectabilis* (Figure 19). This is attributed to the shallow soil over calcrete, however, the observed pattern could be the result of patchiness caused by historical fires in the area.

Figure 18. Mid-high to tall proteoid-ericoid fynbos (Limestone Fynbos) at Site 8.

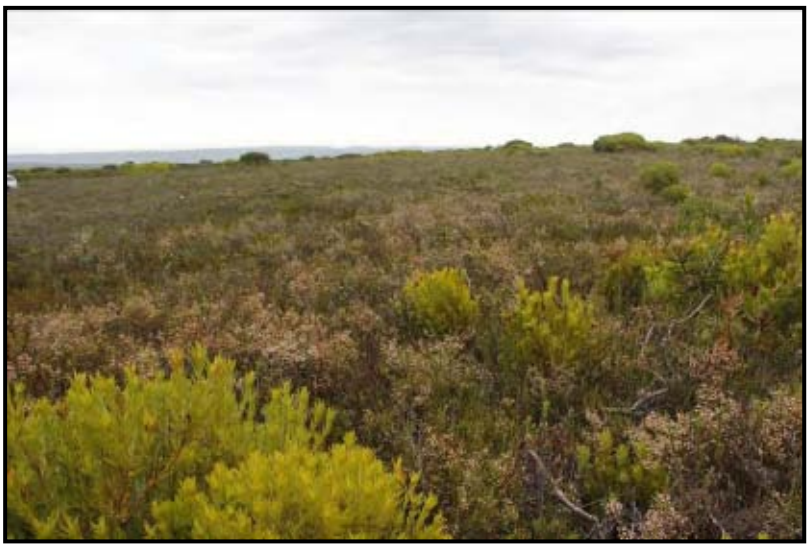


Figure 19. Low ericoid fynbos dominated by *Erica spectabilis* (endemic) and curiously lacking in mid-high proteoid shrubs.

Access to Sites 7 and 8 is along a farm track that would require considerable upgrading during construction to enable transportation of heavy equipment. The area at the site marker is free of woody alien invasives but clusters of *Acacia cyclops* (rooikrans) are found close to the wind test mast.

Impact assessment and mitigation:

Site 8 is located not far from Site 7 in the same plant community. However, it is considered to be within a CBA. The criteria for this difference are not clear and are most likely based on lower infestation by alien *Acacia* spp. For this reason the impact of construction of a turbine at Site 8 would be **High negative**. The access track (to be upgraded) would serve both Sites 7 and 8, therefore mitigating the need for a separate road. This would, however, result in a **High negative** impact as for Site 7.

The 'No Go' scenario would result in the *status quo* continuing into the foreseeable future. However, in the longer term the site could become infested with woody alien invasive species if they are not controlled.

Table 9. Impact: Loss of natural vegetation at Site 8 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	+ve	Improbable	High
Without mitigation	Site 8 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 8 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
Without mitigation	Site 8 access route	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 8 access route	Loss of natural, undisturbed	Local	Long-term	Medium	Medium	-ve	Probable	High

5.3.9 Site 9

Location: LSK10: S 34° 17′ 36.7″ E 21° 27′ 20.9″

Farm name: Farm 472 Remainder

***Survey date*:** 6 July 2012

Vegetation type: National Vegetation Map: Canca Limestone Fynbos

Vlok & De Villiers (2007): Canca Thicket-Sandplain Fynbos

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; not located within a CBA.

Description:

The vegetation at Site 9 is the same as at Sites 1, 3, 4, 5 and 6. It is marginally less dense that at the other sites. *Leucospermum praecox* is common and with *Leucadendron salignum* forms the upper shrub stratum. *Bobartia* cf*. macrospatha* is abundant as is *Erica radicans* subsp. *radicans* (Figure 20). The majority of plant species are the same as those listed for Sites 1 & 2. Additional species recorded at this site include *Argyrolobium sp., Haemanthus cf. sanguineus, Manulea cf. tomentosa* and *Microloma sagittatum.*

Figure 20. Young Sandplain Fynbos at Site 9. Note the prominence of the reed-like *Bobartia* cf. *macrospatha* (Iridaceae).

Access to the site is via a sandy track running north from the main public road in the area. The distance from the public road is 1.08 km. The terrain traversed by the access

route is covered with natural vegetation which is disturbed to some extent by the harvesting of wild-flowers and dekriet (*Thamnochortus insignis*).

Impact assessment and mitigation:

Once again it is surprising that Site 9 is not mapped as a Critical Biodiversity Area since it is the same vegetation as Sites 1, 3, 4, 5 and 6. The impact of construction of a turbine at Site 9 would therefore be **High negative** as at Sites 1, 3, 4, 5 & 6. The access track which would require upgrading would only have a **Medium negative** impact on the vegetation that it would cross (Table 10).

The 'No Go' scenario would result in the *status quo* continuing into the foreseeable future. However, in the longer term the site could become infested with woody alien invasive species if they are not controlled.

Two principal mitigation measures would be necessary. Firstly, control of alien invasive species and secondly restoration of any areas disturbed during the construction phase that would not be used during the operational phase.

Table 10. Impact: Loss of natural vegetation at Site 9 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	+ve	Probable	High
Without mitigation	Site 9 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 9 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
Without mitigation	Site 9 access route	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
With mitigation	Site 9 access route	Loss of natural, undisturbed	Local	Long-term	Low	Low	-ve	Probable	High

5.3.10 Site 10

Location: LSK11: S 34° 17′ 37.2″ E 21° 27′ 06.8″

Farm name: Farm 630 Portion 3

***Survey date*:** 6 July 2012

Vegetation type: National Vegetation Map: Canca Limestone Fynbos

Vlok & De Villiers (2007): Canca Thicket-Sandplain Fynbos

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; not located within a CBA.

Description:

During the vegetation survey, Site 10 was reached on foot from Site 9. Future access would require a new access road to be built over sandy terrain and through natural veld that has been impacted to some extent by harvesting of *Thamnochortus insignis* (dekriet).

The vegetation at Site 10 is partly old (Figure 21), mature fynbos and partly young fynbos in the northern part (Figure 22). The area has the same species composition as Site 9 except that it has a different appearance due to being much older. Important indicator species at this site which show its similarity to other sites on light brown sandy soil are *Elegia muirii, Erica radicans subsp. radicans, Lachnaea axillaris, Leucospermum praecox, Protea susannae, Staavia radiata* and *Thamnochortus paniculatus.*

The site itself is free of alien invasive trees but nearby are dense clusters of *Acacia cyclops* (rooikrans) that could be encouraged to spread by disturbance.

Figure 21. Mature Sandplain Fynbos at Site 10. Note the old *Leucadendron salignum* shrub (yellow) in the foreground. Behind is a dead tree of *Acacia cyclops* that was killed in the last fire.

Figure 22. Boundary between young regenerating fynbos (left) and old, mature fynbos (right) on light brown sandy soil at Site 10.

Impact assessment and mitigation:

Site 10 is not mapped as a Critical Biodiversity Area despite having similar vegetation to Sites 1, 3, 4, 5, 6 & 9. Impact of construction of a turbine at this site would be **Medium negative**, mitigated to **Low negative** (Table 11) since the site has medium sensitivity (Table1). Access to the site would be difficult but it is anticipated that the impact on the natural vegetation would remain at **Medium negative** (Table 11).

Table 11. Impact: Loss of natural vegetation at Site 10 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	+ve	Improbable	High
Without mitigation	Site 10 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
With mitigation	Site 10 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	-ve	Probable	High
Without mitigation	Site 10 access route	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
With mitigation	Site 10 access route	Loss of natural, undisturbed	Local	Long-term	Low	Low	-ve	Probable	High

5.3.11 Site 11

Location: LSK12: S 34° 17′ 47.5″ E 21° 26′ 15.5″

Farm name: Farm 630 Portion 2

***Survey date*:** 6 July 2012

Vegetation type: National Vegetation Map: Canca Limestone Fynbos

Vlok & De Villiers (2007): Canca Thicket-Sandplain Fynbos

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; not located within a CBA.

Description:

Access to Site 10 is via a winding, sandy track in an area that has a high concentration of alien invasive *Acacia cyclops* (rooikrans). The track distance is 640 m and when surveying the area, Site 11 was reached on foot, a distance of 470 m west of the track.

The whole area is covered with light-brown sandy soil and there is minimal exposure of calcrete on the surface. The natural vegetation is Sandplain Fynbos but it has been historically extremely heavily impacted by dense stands of *Acacia cyclops* (rooikrans) and *Acacia saligna* (Port Jackson Willow). A fire also swept through the area in the recent past and the intense heat has strongly negatively affected the natural plant community. The natural vegetation is recovering after the fire. At least 25 species were recorded, typical of the Sandplain Fynbos, but the general appearance at this early stage of recovery is the preponderance of pioneer species. The burnt skeletons of many alien invasive trees are seen and unfortunately the fire has stimulated the re-growth of the alien species that are once again vigorously taking over the area (Figure 23). The natural vegetation is therefore not in good condition and the site presently has low botanical sensitivity.

Figure 23. The vegetation at Site 11 in the early stages of recovery after fire. The highly disturbed nature of the site (heavily invaded by alien trees) prior to the fire has resulted in it being extremely negatively impacted by the heat of the fire.

Impact assessment and mitigation:

Site 11 is not in a CBA and it has been extremely negatively affected by alien invasive trees and fire. The site consequently has low botanical sensitivity and construction of a turbine at this site would result in **Low negative** impacts. A road to the site would also go through vegetation extremely heavily impacted by woody alien invasion. The impact of the access road would thus be **Low negative** (Table 12). The 'No Go' scenario would result in the *status quo* continuing into the foreseeable future. There is a strong likelihood that the alien trees will dominate again in a few years if uncontrolled resulting in continued **High negative** impact.

Table 12. Impact: Loss of natural vegetation at Site 11 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	+ve	Probable	High
Without mitigation	Site 11 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	-ve	Probable	High
With mitigation	Site 11 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	-ve	Probable	High
Without mitigation	Site 11 access route	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	-ve	Probable	High
With mitigation	Site 11 access route	Loss of natural, undisturbed	Local	Long-term	Low	Low	-ve	Probable	High

5.3.12 Site 12

Location: LSK13: S 34° 18' 12.9" E 21° 24' 20.7"

Farm name: Farm 480 Portion 135

***Survey date*:** 6 July 2012

Vegetation type: 'Limestone Fynbos' (part of Canca Thicket-Sandplain Fynbos).

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; located within a CBA.

Description:

Site 12 is the furthest west of the proposed wind turbine sites. It is located in an area of high exposure of calcrete, what may be described as a prominent plateau. The consequence is that the vegetation is generally low with scattered mid-high emergent shrubs. Species recorded include, *Adenandra alternifolia, Aspalathus* cf. *calcarea, Aspalathus sanguinea* subsp. *sanguinea, Erica spectabilis, Ficinia praemorsa, Hermannia trifoliate, Ischyrolepis leptoclados, Leucadendron meridianum, Leucadendron muirii, Metalasia calcicola, Metalasia muricata, Muraltia ericifolia, Muraltia filiformis, Muraltia* sp., *Passerina corymbosa, Protea obtusifolia, Ruschia calcicola, Seriphium capitatum, Tetraria* sp., *Thamnochortus fraternus* and *Thesium* sp.

This site is most typical of what may be described as the 'limestone pavement' community. *Acacia cyclops* (rooikrans) has invaded the site and reaches 2-3 m in height. However, the calcrete hardpan restricts its growth and the invasion is scattered and not dense. Skeletons of *Acacia cyclops* shrubs killed in past fires are scattered over the site (Figure 24).

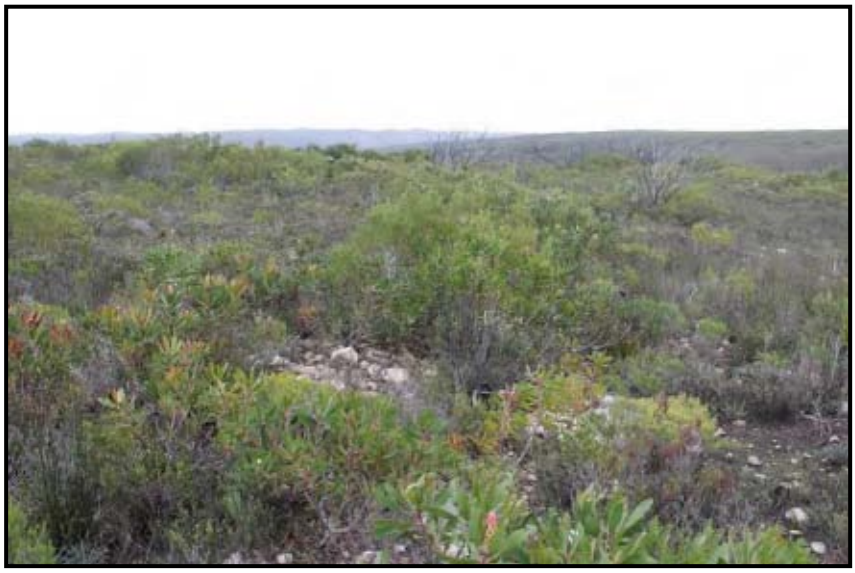


Figure 24. Highly sensitive 'limestone pavement' vegetation at Site 12. The skeletons of invasive *A. cyclops* killed in previous fires are seen scattered over the site.

Impact assessment and mitigation:

Site 12 is one of the most sensitive sites botanically despite the presence of alien invasive species. The site is within a CBA and it is strongly advised that this site should be excluded from further consideration for a wind turbine. Impact of a wind turbine and associated laydown areas etc. would result in **High negative** impacts. Notwithstanding the sensitivity of the site, the access road that would be required would also result in considerable loss of 'limestone fynbos' and the impact would be unacceptably **High**

negative. No mitigation measures are suggested that would offset the high negative impacts.

The 'No Go' scenario would result in the *status quo* continuing into the foreseeable future with **Medium negative** impact (Table 13). However, in the longer term the site could become more infested with woody alien invasive species if they are not controlled. A control programme should be implemented to eradicate the alien invasive species from this important vegetation.

Table 13. Impact: Loss of natural vegetation at Site 12 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	Medium	Medium	-ve	Probable	High
Without mitigation	Site 10 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 10 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
Without mitigation	Site 10 access route	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Probable	High
With mitigation	Site 10 access route	Loss of natural, undisturbed	Local	Long-term	High	High	-ve	Probable	High

5.3.13 Site 13

Location: LSK14 - S 34° 18' 00.4" E 21° 24' 43.6"

Farm name: Farm 480 Portion 135

***Survey date*:** 6 July 2012

Vegetation type: 'Limestone Fynbos' (part of Canca Thicket-Sandplain Fynbos).

National Threatened Ecosystem and Critical Biodiversity Area (CBA) Status:

National listing: **Least threatened**; not located within a CBA.

Description:

The soil at Site 13 is very shallow, in pockets of limestone. The site is fairly level but breaks away towards the west, becoming moderately steep. It has been heavily

disturbed by alien invasive species (*Acacia cyclops*), fire and grazing by cattle. The species composition of Site 13 indicates typical limestone fynbos on calcrete hardpan or 'limestone pavement'. However, the result of the intense disturbance is that the structure of the vegetation has been negatively impacted. Species recorded include *Anthospermum aethiopicum, Metalasia calcicola, Bobartia cf. macrospatha, Syncarpha sp., Hermannia trifoliate, Chaenostoma revolutum, Leucadendron meridianum, Carpobrotus cf. muirii, Babiana sp., Aspalathus* sp., *Oedera imbricata, Helichrysum auriculatum, Adenandra alternifolia, Clutia sp., Euryops sp., Erica regia subsp. mariae, Lobelia tomentosa, Helichrysum sp. (mat), Senecio sp., Osteospermum moniliferum, Osyris compressa, Myrsine africana* and *Protea obtusifolia.*

Figure 25. Degraded 'limestone fynbos' habitat at Site 13.

Impact assessment and mitigation:

Botanically Site 13 would be important were it not for the disturbance that it has experienced. The invasion by aliens *Acacia* spp., grazing and burning has resulted in the site becoming degraded with low botanical sensitivity. Construction of a turbine at this site would be acceptable with **Low negative** impact. The required access road to this site would be relatively short and would also traverse degraded vegetation with Low negative impact.

The 'No Go' scenario would result in the *status quo* continuing into the foreseeable future with **High negative** impact (Table 14). However, in the medium- to long-term the site is likely to become even more infested with woody alien invasive species if they are not controlled. A control programme should be implemented to eradicate the alien invasive species from this vegetation.

Table 14. Impact: Loss of natural vegetation at Site 13 due to construction of a wind turbine and required access road.

Action	Alternative	Impact	Extent	Duration	Intensity	Significance	Status	Probability of occurrence	Confidence
	No Go	Loss of natural, undisturbed vegetation	Local	Long-term	High	High	-ve	Improbable	High
Without mitigation	Site 10 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	-ve	Probable	High
With mitigation	Site 10 turbine site and construction area	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	-ve	Probable	High
Without mitigation	Site 10 access route	Loss of natural, undisturbed vegetation	Local	Long-term	Low	Low	-ve	Probable	High
With mitigation	Site 10 access route	Loss of natural, undisturbed	Local	Long-term	Low	Low	-ve	Probable	High

6. Summary of impacts on the vegetation by the proposed Lunsklip Wind Farm

The mosaic nature of the vegetation type in the study area means that the component plant communities are not easily mapped. The most botanically sensitive sites are the 'limestone fynbos' sites on exposed calcrete or very shallow soil over calcrete. Where possible such sites should be avoided and in particular Sites 2 and 12 should be excluded from further consideration since the impacts would be unacceptably **High negative**. Sites 7 and 8 are also sites that border on being unsuitable botanically. My considered opinion based on the survey conducted is that Sandplain Fynbos is more widespread and on balance, although a number of sights are included within Critical Biodiversity Areas, the vegetation is less sensitive and can therefore 'absorb' the impact of wind turbines and roads more readily than the 'limestone pavement' habitat.

7. Indirect Impacts

Indirect impacts are some of the most difficult to define and in this study no indirect impacts as they pertain to the vegetation were determined.

8. Cumulative Impacts

Numerous developments of various sorts are planned for the Still Bay area e.g. the proposed Still Bay Arterial Road and various residential developments on the outskirts of Still Bay West. These developments together with ongoing agricultural activities all impact natural vegetation and more specifically Canca Limestone Fynbos (in the broad sense). The question therefore is how much the proposed Lunsklip Wind Farm Turbines would contribute to cumulative loss of Canca Limestone Fynbos?

From the present study it is concluded that cumulative loss due to turbine and road construction of the Sandplain Fynbos component of Canca Limestone Fynbos would not be high whereas cumulative loss of 'limestone pavement' vegetation would indeed be high. This clearly indicates that the exposed limestone (or calcrete) habitat should be avoided wherever possible.

9. Recommendations and Conclusions

Thirteen sites have been identified as possible sites for wind turbines for the proposed Lunsklip Wind Farm. Each site has been assessed individually on its botanical merits and an attempt has been made to contextualize the wind farm in the receiving environment. There is no question that the receiving environment is botanically important and should be treated as such since it has numerous endemic species and is viewed as threatened habitat at a fine-scale planning level. However, this does not preclude scope for considering wind farm infrastructure on condition that the sensitivities of the environment are observed. On this basis it is concluded that from a botanical perspective Sites 2 and 12 should be completely excluded from further consideration. Sites 7 and 8 should only be accepted if strong mitigation measures such as protection of the whole of the remaining property (Farm Lunsklip 635 Portion 1) can be assured and active woody alien invasive eradication is guaranteed. In this way an important area of 'limestone fynbos' could be conserved.

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Report submitted: 19 July 2012

Appendix 1. Botanical Sensitivity Scale extracted from Helme (2000).

BOTANICAL SENSITIVITY

Criteria used to define sensitivity categories

Species and habitat diversity: This is one of the primary criteria used in defining habitat sensitivity, and is a measure of the number of indigenous plant species occurring in the area, as well as an indication of the variety of natural micro-sites (habitats) that may support different types of plant community. Another way of putting it, in more scientific terms, is to say that it reflects the alpha and beta diversity of the site. More sensitive sites usually have a greater species and habitat diversity.

Habitat uniqueness: This is a fairly subjective estimate of how rare that particular habitat is in local, regional, and national terms. Highly unusual habitats, even if degraded, would raise the conservation status of an area.

Viable populations of RDB plants: The presence of self-sustaining populations of RDB plants, as well as any local endemics, would raise the conservation sensitivity of an area.

Degree of alien invasion: Although dense aliens are not an adequate reason to downgrade the conservation status of an area (as areas can often be rehabilitated), the degree and period of alien invasion, when taken into account with the other listed criteria, helps to define the sensitivity of the area. The length of time that an area has been densely infested with aliens is probably of more ecological significance than the density of the aliens, with more than 40 years under aliens being regarded as too long for good rehabilitation of fynbos (Holmes and Cowling 1997).

Rehabilitation potential: Most alien invaded areas can be rehabilitated if the topsoil has not been seriously disturbed, and if dense aliens have been present for less than 40 years (Holmes and Cowling 1997), but the costs of rehabilitation obviously increase with alien density, the duration of infestation, and the number of fires during the invaded period.

Clearing costs alone for a densely infested area may run as high as R10 000/hectare.

Definition of botanical sensitivity categories

Very Low sensitivity: An area with very low species and habitat diversity; no viable populations of RDB plants; often greater than 75% alien plant cover; habitat uniqueness usually very low; and whose rehabilitation potential is very low without major financial input over a significant period.

Low sensitivity: An area with low species and habitat diversity; no viable populations of RDB plants; often greater than 75% alien plant cover; habitat uniqueness usually low; and whose rehabilitation potential is low without major financial input.

Medium sensitivity: An area with moderate species and habitat diversity, with the capacity to support small, potentially viable populations of a few RDB species; usually 25 - 75% alien cover; habitat uniqueness moderate; and whose rehabilitation potential is fairly good with moderate financial input.

High sensitivity: An area with moderate - high species and habitat diversity, with the capacity to support potentially viable populations of RDB species; usually less than 25% alien plant cover; habitat uniqueness may be high, but not necessarily; and whose rehabilitation potential is easily achieved with minimal financial input.

Very High sensitivity: An area with exceptionally high species and habitat diversity; with the capacity to support substantial populations of RDB species; usually less than 10% alien cover; habitat uniqueness often high; rehabilitation easily achieved with minimal financial input.

Appendix 2: Convention for assigning significance ratings to impacts.

Specialists will consider seven rating scales when assessing potential impacts. These include:

- extent;
- duration;
- intensity;
- status of impact;
- probability;
- degree of confidence; and
- significance.

In assigning significance ratings to potential impacts before and after mitigation specialists are instructed to follow the approach presented below:

1. The core criteria for determining significance ratings are "extent" (Section 6.3.1), "duration" (Section 6.3.2) and "intensity" (Section 6.3.3). The preliminary significance ratings for combinations of these three criteria are given in Section 6.3.7.

2. The status of an impact is used to describe whether the impact will have a negative, positive or neutral effect on the surrounding environment. An impact may therefore be negative, positive (or referred to as a benefit) or neutral.

3. Describe the impact in terms of the probability of the impact occurring (Section 6.3.5) and the degree of confidence in the impact predictions, based on the availability of information and specialist knowledge (Section 6.3.6).

4. Additional criteria to be considered, which could "increase" the significance rating if deemed justified by the specialist, with motivation, are the following:

- Permanent / irreversible impacts (as distinct from long-term, reversible impacts);
- Potentially substantial cumulative effects (see Item 7 below); and
- High level of risk or uncertainty, with potentially substantial negative consequences.

5. Additional criteria to be considered, which could "decrease" the significance rating if deemed justified by the specialist, with motivation, is the following:

    - Improbable impact, where confidence level in prediction is high.

6. When assigning significance ratings to impacts *after mitigation*, the specialist needs to:

- First, consider probable changes in intensity, extent and duration of the impact after mitigation, assuming effective implementation of mitigation measures, leading to a revised significance rating; and
- Then moderate the significance rating after taking into account the likelihood of proposed mitigation measures being effectively implemented. Consider:
    - Any potentially significant risks or uncertainties associated with the effectiveness of mitigation measures;
    - The technical and financial ability of the proponent to implement the measure; and
    - The commitment of the proponent to implementing the measure, or guarantee over time that the measures would be implemented.

7. The cumulative impacts of a project should also be considered. "Cumulative impacts" refer to the impact of an activity that may become significant when added to the existing activities currently taking place within the surrounding environment.

8. Where applicable, assess the degree to which an impact may cause irreplaceable loss of a resource. A resource assists in the functioning of human or natural systems, i.e. specific vegetation, minerals, water, agricultural land, etc.

9. The significance ratings are based on largely objective criteria and inform decision-making at a project level as opposed to a local community level. In some instances, therefore, whilst the significance rating of potential impacts might be "low" or "very low", the importance of these impacts to local communities or individuals might be extremely high. The importance which I&APs attach to impacts must be taken into consideration, and recommendations should be made as to ways of avoiding or minimising these negative impacts through project design, selection of appropriate alternatives and / or management.

The relationship between the significance ratings after mitigation and decision-making can be broadly defined as follows (see overleaf): substance

Significance rating	**Effect on decision-making**
VERY LOW; LOW	Will not have an influence on the decision to proceed with the proposed project, provided that recommended measures to mitigate negative impacts are implemented.
MEDIUM	Should influence the decision to proceed with the proposed project, provided that recommended measures to mitigate negative impacts are implemented.
HIGH; VERY HIGH	Would strongly influence the decision to proceed with the proposed project.

1. Extent

"Extent" defines the physical extent or spatial scale of the impact.

Rating	**Description**

LOCAL	Extending only as far as the activity, limited to the site and its immediate surroundings. Specialist studies to specify extent.
REGIONAL	Western Cape. Specialist studies to specify extent.
NATIONAL	South Africa
INTERNATIONAL	

2. Duration

"Duration" gives an indication of how long the impact would occur.

Rating	Description
SHORT TERM	0 - 5 years
MEDIUM TERM	5 - 15 years
LONG TERM	Where the impact will cease after the operational life of the activity, either because of natural processes or by human intervention.
PERMANENT	Where mitigation either by natural processes or by human intervention will not occur in such a way or in such time span that the impact can be considered transient.

3. Intensity

"Intensity" establishes whether the impact would be destructive or benign.

Rating	Description
ZERO TO VERY LOW	Where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected.
LOW	Where the impact affects the environment in such a way that natural, cultural and social functions and processes continue, albeit in a slightly modified way.
MEDIUM	Where the affected environment is altered, but natural, cultural and social functions and processes continue, albeit in a modified way.
HIGH	Where natural, cultural and social functions or processes are altered to the extent that it will temporarily or permanently cease.

4. Loss of resources

"Loss of resource" refers to the degree to which a resource is permanently affected by the activity, i.e. the degree to which a resource is irreplaceable.

Rating	Description
LOW	Where the activity results in a loss of a particular resource but where the natural, cultural and social functions and processes are not affected.
MEDIUM	Where the loss of a resource occurs, but natural, cultural and social functions and processes continue, albeit in a modified way.
HIGH	Where the activity results in an irreplaceable loss of a resource.

5. Status of impact

The status of an impact is used to describe whether the impact would have a negative, positive or zero effect on the affected environment. An impact may therefore be negative, positive (or referred to as a benefit) or neutral.

6. Probability

"Probability" describes the likelihood of the impact occurring.

Rating	Description
IMPROBABLE	Where the possibility of the impact to materialise is very low either because of design or historic experience.
PROBABLE	Where there is a distinct possibility that the impact will occur.
HIGHLY PROBABLE	Where it is most likely that the impact will occur.
DEFINITE	Where the impact will occur regardless of any prevention measures.

7. Degree of confidence

This indicates the degree of confidence in the impact predictions, based on the availability of information and specialist knowledge.

Rating	Description
HIGH	Greater than 70% sure of impact prediction.
MEDIUM	Between 35% and 70% sure of impact prediction.
LOW	Less than 35% sure of impact prediction.

8. Significance

"Significance" attempts to evaluate the importance of a particular impact, and in doing so incorporates the above three scales (i.e. extent, duration and intensity).

Rating	Description
VERY HIGH	Impacts could be EITHER: of ***high intensity*** at a ***regional level*** and endure in the ***long term***; OR of ***high intensity*** at a ***national level*** in the ***medium term***; OR of ***medium intensity*** at a ***national level*** in the ***long term.***
HIGH	Impacts could be EITHER: of ***high intensity*** at a ***regional level*** and endure in the ***medium term***; OR of ***high intensity*** at a ***national level*** in the ***short term***; OR of ***medium intensity*** at a ***national level*** in the ***medium term;*** OR of ***low intensity*** at a ***national level*** in the ***long term***; OR of ***high intensity*** at a ***local level*** in the ***long term***; OR of ***medium intensity*** at a ***regional level*** in the ***long term.***
MEDIUM	Impacts could be EITHER: of ***high intensity*** at a ***local level*** and endure in the ***medium term***; OR of ***medium intensity*** at a ***regional level*** in the ***medium term***; OR of ***high intensity*** at a ***regional level*** in the ***short term***; OR of ***medium intensity*** at a ***national level*** in the ***short term***; OR of ***medium intensity*** at a ***local level*** in the ***long term***; OR of ***low intensity*** at a ***national level*** in the ***medium term;*** OR of ***low intensity*** at a ***regional level*** in the ***long term.***
LOW	Impacts could be EITHER of ***low intensity*** at a ***regional level*** and endure in the ***medium term***; OR of ***low intensity*** at a ***national level*** in the ***short term***; OR of ***high intensity*** at a ***local level*** and endure in the ***short term***; OR of ***medium intensity*** at a ***regional level*** in the ***short term***; OR of ***low intensity*** at a ***local level*** in the ***long term***; OR of ***medium intensity*** at a ***local level*** and endure in the ***medium term.***
VERY LOW	Impacts could be EITHER of ***low intensity*** at a ***local level*** and endure in the ***medium term***; OR of ***low intensity*** at a ***regional level*** and endure in the ***short term***; OR of ***low to medium intensity*** at a ***local level*** and endure in the ***short term.***
INSIGNIFICANT	Impacts with: Zero to very low intensity with any combination of extent and duration.

Rating	Description
UNKNOWN	In certain cases it may not be possible to determine the significance of an impact.

9. Degree to which impact can be mitigated

This indicates the degree to which an impact can be reduced / enhanced.

Rating	Description
NONE	No change in impact after mitigation.
VERY LOW	Where the significance rating stays the same, but where mitigation will reduce the intensity of the impact.
LOW	Where the significance rating drops by one level, after mitigation.
MEDIUM	Where the significance rating drops by two to three levels, after mitigation.
HIGH	Where the significance rating drops by more than three levels, after mitigation.

10 Reversibility of an impact

This refers to the degree to which an impact can be reversed.

Rating	Description
IRREVERSIBLE	Where the impact is permanent.
PARTIALLY REVERSIBLE	Where the impact can be partially reversed.
FULLY REVERSIBLE	Where the impact can be completely reversed.

Appendix 3: Curriculum Vitae

Dr David Jury McDonald Pr.Sci.Nat.

Name of Company: Bergwind Botanical Surveys & Tours CC. (Independent consultant)

Work and Home Address: 14 A Thomson Road, Claremont, 7708

Tel: (021) 671-4056 **Mobile:** 082-8764051 **Fax:** 086-517-3806

E-mail: dave@bergwind.co.za

Website: www.bergwind.co.za

Profession: Botanist / Vegetation Ecologist / Consultant / Tour Guide

Date of Birth: 7 August 1956

Employment history:

- 19 years with National Botanical Institute (now SA National Biodiversity Institute) as researcher in vegetation ecology.
- Five years as Deputy Director / Director Botanical & Communication Programmes of the Botanical Society of South Africa
- Six years as private independent Botanical Specialist consultant (Bergwind Botanical Surveys & Tours CC)

Nationality: South African (ID No. 560807 5018 080)
Languages: English (home language) – speak, read and write
Afrikaans – speak, read and write

Membership in Professional Societies:

- South Africa Association of Botanists
- International Association for Impact Assessment (SA)
- South African Council for Natural Scientific Professions (**Ecological Science, Registration No. 400094/06**)
- Field Guides Association of Southern Africa

Key Qualifications :

- Qualified with a M. Sc. (1983) in Botany and a PhD in Botany (Vegetation Ecology) (1995) at the University of Cape Town.
- Research in Cape fynbos ecosystems and more specifically mountain ecosystems.
- From 1995 to 2000 managed the Vegetation Map of South Africa Project (National Botanical Institute)

- Conducted botanical survey work for AfriDev Consultants for the Mohale and Katse Dam projects in Lesotho from 1995 to 2002. A large component of this work was the analysis of data collected by teams of botanists.
- **Director: Botanical & Communication Programmes** of the Botanical Society of South Africa (2000—2005), responsible for communications and publications; involved with conservation advocacy particularly with respect to impacts of development on centres of plant endemism.

- Further tasks involved the day-to-day management of a large non-profit environmental organisation.

- **Independent botanical consultant** (2005 – to present) over 300 projects have been completed related to environmental impact assessments in the Western, Southern and Northern Cape, Karoo and Lesotho. A list of reports (or selected reports for scrutiny) is available on request.

Higher Education

Degrees obtained
and major subjects passed:

B.Sc. (1977), University of Natal, Pietermaritzburg
Botany III
Entomology II (Third year course)

B.Sc. Hons. (1978) University of Natal, Pietermaritzburg
Botany (Ecology /Physiology)

M.Sc - (Botany), University of Cape Town, 1983.
Thesis title: 'The vegetation of Swartboschkloof, Jonkershoek, Cape Province'.

PhD (Botany), University of Cape Town, 1995.
Thesis title: 'Phytogeography endemism and diversity of the fynbos of the southern Langeberg'.

Certificate of Tourism: Guiding (Culture: Local)
Level : 4 Code: TGC7 (Registered Tour Guide: WC 2969).

Employment Record :

January 2006 – present: Independent specialist botanical consultant and tour guide in own company:
Bergwind Botanical Surveys & Tours CC
August 2000 - 2005 : Deputy Director, later Director Botanical & Communication Programmes, Botanical Society of South Africa
January 1981 – July 2000 : Research Scientist (Vegetation Ecology) at National Botanical Institute
January 1979—Dec 1980 : National Military Service

Further information is available on my company website: www.bergwind.co.za