

# Botanical Assessment for Proposed Parking Extension at Koeberg Nuclear Power Station, City of Cape Town



Paul Emms in association with



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**Prepared for Advisian (Worley Parsons Group)**

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## **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, 2014.

## **Appointment of Specialist**

Bergwind Botanical Surveys & Tours CC was appointed by Advisian (Worley Parsons Group) to provide specialist botanical consulting services for the proposed parking extension at Koeberg Nuclear Power Station, City of Cape Town. The consulting services comprise a botanical impact assessment of the flora and vegetation in the designated study area by the proposed project.

## **Details of Specialists**

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## **Expertise**

Dr David J. McDonald:

- Qualifications: BSc. Hons. (Botany), MSc (Botany) and PhD (Botany).

- Botanical ecologist with over 35 years' experience in the field of Vegetation Science.
- Founded Bergwind Botanical Surveys & Tours CC in 2006.
- Has conducted over 400 specialist botanical / ecological studies.
- Has published numerous scientific papers and attended numerous conferences both nationally and internationally (details available on request).

Mr Paul I. Emms

- Qualifications: ND Horticulture, BSc. (Biodiversity & Conservation Biology), Hons. (Botany), MSc (Botany).
- Botanist with seven years' experience in the field of botanical surveys.
- Has conducted over 130 specialist botanical studies.

## **Independence**

The views expressed in the document are the objective, independent views of Dr McDonald and Mr Emms and the survey was carried out under the aegis of Bergwind Botanical Surveys and Tours CC. Neither Dr McDonald, Mr Emms, nor Bergwind Botanical Surveys and Tours CC have any business, personal, financial or other interest in the proposed development apart from fair remuneration for the work performed.

## **Conditions relating to this report**

The content of this report is based on the authors' 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 authors. 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.

## THE SPECIALIST

I, Paul Ivor Emms, as the appointed specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
  - other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
  - am not independent, but another specialist that meets the general requirements set out in Regulation 13 have been appointed to review my work (Note: a declaration by the review specialist must be submitted);
- in terms of the remainder of the general requirements for a specialist, am fully aware of and meet all of the requirements and that failure to comply with any the requirements may result in disqualification;
- have disclosed/will disclose, to the applicant, the Department and interested and affected parties, all material information that have or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application;
- have ensured/will ensure that information containing all relevant facts in respect of the application was/will be distributed or was/will be made available to interested and affected parties and the public and that participation by interested and affected parties was/will be facilitated in such a manner that all interested and affected parties were/will be provided with a reasonable opportunity to participate and to provide comments;
- have ensured/will ensure that the comments of all interested and affected parties were/will be considered, recorded and submitted to the Department in respect of the application;
- have ensured/will ensure the inclusion of inputs and recommendations from the specialist reports in respect of the application, where relevant;
- have kept/will keep a register of all interested and affected parties that participate/d in the public participation process; and
- am aware that a false declaration is an offence in terms of regulation 48 of the 2014 NEMA EIA Regulations.

Note: The terms of reference of the review specialist must be attached.

Signature of the specialist:



Name of company: Bergwind Botanical Surveys & Tours CC.....

Date: .....1 May 2016.....

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## **1. Introduction**

Koeberg Nuclear Power Station (KNPS) requires an extension of its parking area at Access Control Point (ACP) 2. The proposed extension of ACP 2 would provide an additional 200 permanent and 200 temporary parking bays. The additional parking capacity would accommodate contract staff during outages and maintenance activities during the operational lifespan of the KNPS. The proposed parking area would potentially impact natural vegetation and requires an application for Environmental Authorization (EA) as a Basic Assessment (BA). The BA is a requirement in terms of the National Environmental Management Act (Act 107 of 1998), EIA Regulations (2014) as amended. Advisian (Worley Parsons Group) is managing the EIA and has appointed Bergwind Botanical Surveys & Tours CC to carry out the botanical impact assessment.

**NOTE:** The objective of this report is not to provide a full description of the vegetation, wetlands, geology and dunes systems of the KNPS. For a more comprehensive description the reader is referred to the Management Plan for the Koeberg Nature Reserve, Chapter 2 (Revision 0). This report concerns the habitats of the project footprint area only, and the associated impacts that would result from the development of the proposed parking extension at ACP 2.

## **2. Terms of Reference**

### **2.1. Terms of Reference**

Botanical assessments must follow guidelines set out in the following documents:

- Department of Environmental Affairs and Development Planning (DEA&DP) Guidelines for Involving Biodiversity Specialists in the EIA Process (Brownlie, 2005);
- The requirements of the Botanical Society of South Africa (BotSoc) in developing an approach to the botanical investigation;
- CapeNature's requirements for providing comments on agricultural, environmental, mine planning and water-use related applications; and
- Appendix 6 of the Environmental Impact Assessment Regulations, 2014 (Government Gazette, 2014).

### **2.2. Specific Terms of Reference**

The following specific terms of reference were followed:

- Provide a description of the vegetation and areas of sensitivity at the proposed site;

- Identify and describe biodiversity patterns at community and ecosystem level (main vegetation type, plant communities in the vicinity and threatened/vulnerable ecosystems), at species level (threatened Red List species, presence of alien species) and in terms of significant landscape features;
- Identify and assess potential impacts of the project and the alternatives, if any, including impacts associated with the construction and operation phases,
- Identify and describe potential cumulative impacts of the proposed development in relation to proposed and existing developments in the surrounding area;
- Outline mitigation measures, if applicable, that would need to be carried out if the parking area extension is to be approved; and
- Review previous botanical work applicable to the area and any relevant biodiversity plans (i.e. City of Cape Town Biodiversity Network) compiled in terms of the National Environmental Management Biodiversity Act (No. 10 of 2004).

### **3. The Study Area**

#### **3.1. Locality**

The existing parking area at ACP 2 is located east of the KNPS (Figure 1). The proposed site is located immediately adjacent to, and on the south-eastern side, of the existing parking extension at ACP 2 (Figure 2).

#### **3.2. Geology, topography and soils**

The study area supports deep calcareous sands of marine origin (Rebelo *et al.* in Mucina & Rutherford, 2006) with flat to slightly undulating terrain. The terrain surrounding the developed areas of the KNPS comprises stabilized parabolic dunes. The proposed parking extension area probably supported low dunes prior to development of the area as these characterize the immediate surrounds.

#### **3.3 Climate**

The climate within the region is Mediterranean (i.e. cool wet winters and hot dry summers), with rainfall occurring mainly between May and August. Mean Annual Precipitation (MAP) is from 270 – 670 mm (Rebelo *et al.* in Mucina & Rutherford, 2006). Temperatures range from mean summer high of 29 °C (February) to winter low of 7 °C (July) respectively ([www.worldweatheronline.com](http://www.worldweatheronline.com)), with

relatively frequent coastal fog occurring in winter. Rainfall diminishes northwards along the West Coast (Rebello *et al.* in Mucina & Rutherford, 2006).

#### **4. Evaluation Method**

The site was visited and surveyed on foot on 20 May 2016. An Eskom employee, Mr. Martin Krause supervised the survey for security reasons. Mr Krause was responsible for providing approved photographs. The sample photographs were georeferenced using a Garmin GPSmap 60CSx. The sensitivity of the site was determined using the following criteria:

- *Ecological condition*: this is the actual condition of the various habitats, which considers (1) quality of the vegetation; (2) species composition; (3) disturbance regime; (4) degree of intactness; (5) the sites spatial connectivity with adjoining habitats; (6) and non-botanical elements that form part of the broader biodiversity picture and that inform to what degree the botanical component supports biodiversity.
- *Ecosystem status*: informed by the List of Threatened Terrestrial Ecosystems (Government Gazette, 2011). The ecosystems are based on the vegetation types in *The Vegetation of South Africa, Lesotho and Swaziland* (Mucina & Rutherford, 2006).
- *Biodiversity planning*: The City of Cape Town Biodiversity Network (Holmes, Stipinovitch & Purves, 2011; City of Cape Town, shapefile version 2015/06/20) is crucial to determining the conservation importance of the affected habitat. Ground-truthing is an essential component in terms of determining the habitat condition.
- *Important species*: the presence or absence of threatened (i.e. Red List) and ecologically important species informs the ecological condition and sensitivity of the site.
- *Botanical literature*: these were used to gain a better local contextual understanding of the botanical importance of the site.

#### **5. Limitations and assumptions**

The study area was surveyed outside the peak spring-flowering period for most geophytes of the region. However, this limitation does not influence the proposed site since the area was in such a degraded to transformed state that if any geophytes were present they would have been observed by their vegetative parts (stems and leaves), yet these were not found.



Figure 1. Locality map (Google Earth™) showing the proposed site (red outline) in relation to the Koeberg Nuclear Power Station and the existing parking area.



**Figure 2.** Rotated aerial image with overlay of the proposed parking extension (Worley Parsons, May 2016).

## **6. The Vegetation**

### **6.1 General description**

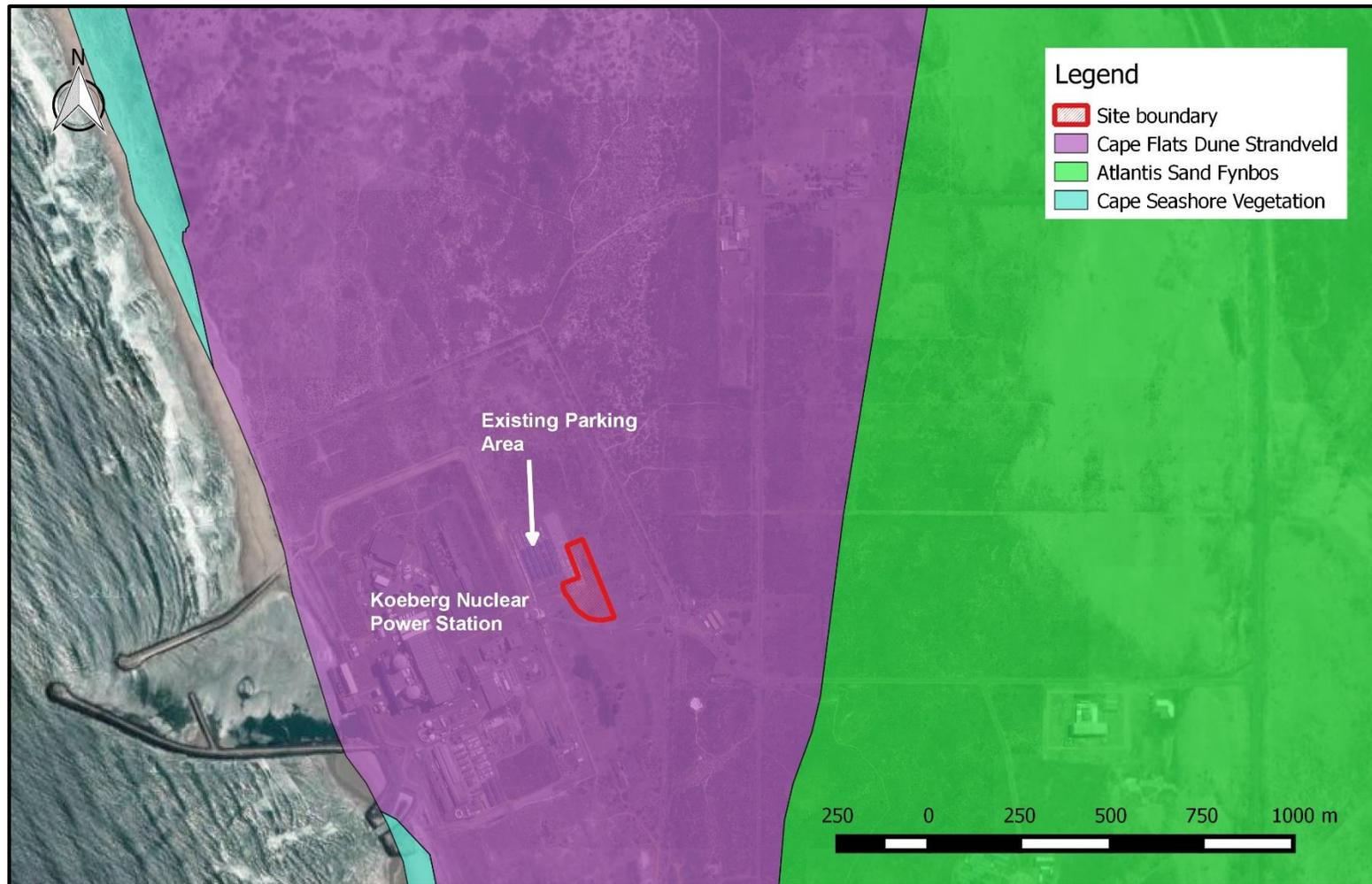
The study area supports, or would historically have supported intact Cape Flats Dune Strandveld according to *The Vegetation Map of South Africa, Lesotho and Swaziland* (VEGMAP) (Mucina, Rutherford and Powrie, 2005) (Figure 3). Cape Seashore Vegetation and Atlantis Sand Fynbos occur within close proximity to the study area but these units are not transitional with Cape Flats Dune Strandveld at the proposed parking area. The landscape and vegetation unit for Cape Flats Dune Strandveld is described by Mucina and Rutherford (2006) as follows:

*“Flat to slightly undulating (dune fields) landscape covered by tall, evergreen, hard-leaved shrubland with abundant grasses and annual herbs in gaps.”*

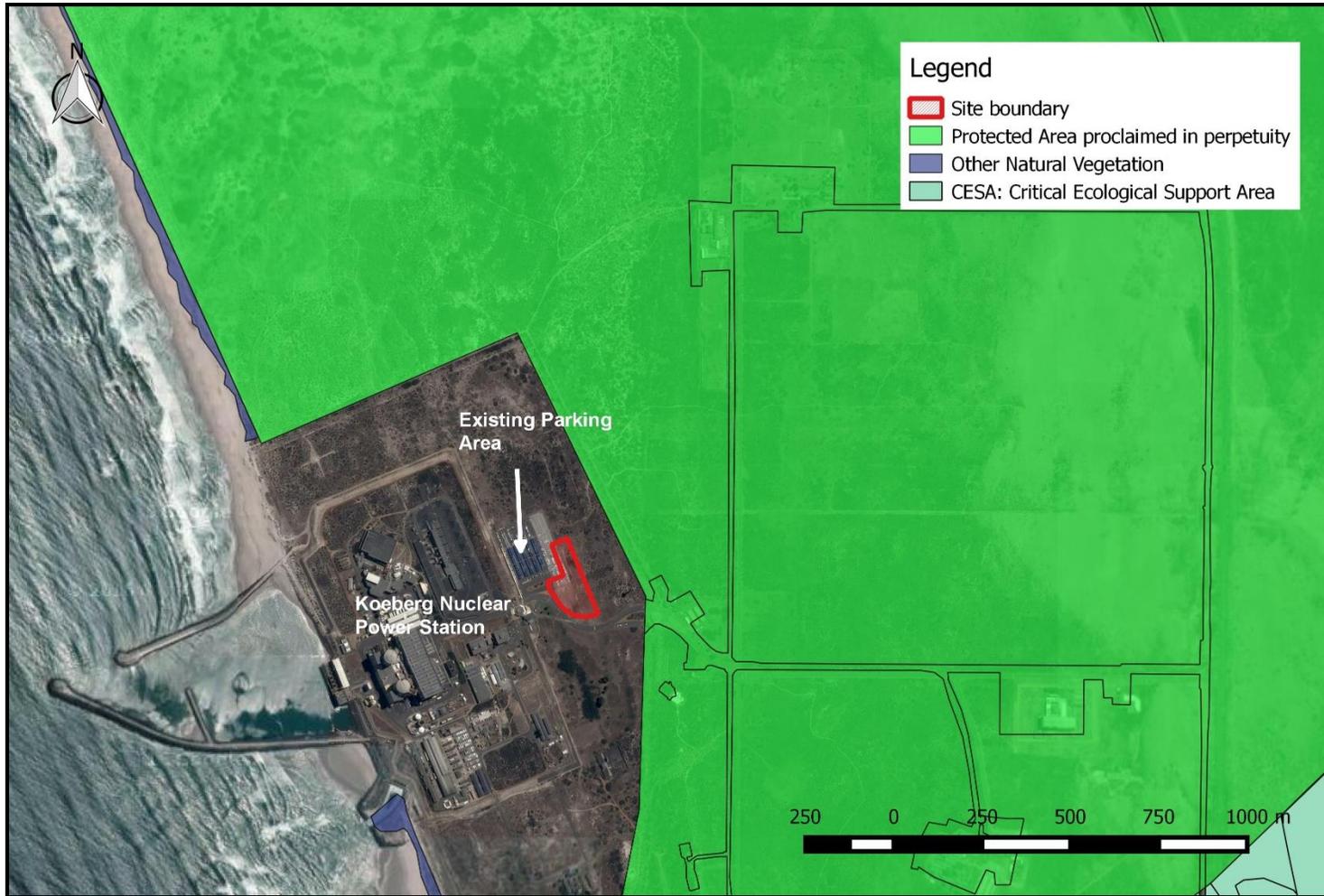
The ecological condition of the vegetation generally improves with increasing distance from the KNPS. The perimeter surrounding the power station and parking area, specifically the landward sides and the area west of the existing parking area at ACP 2, were cleared in the past for security purposes. The parabolic dunes that would have characterized the KNPS footprint prior to its development appear to have been markedly altered (i.e. within the disturbed edge). The soils at the proposed development site have been altered due to movement of excavated material during the initial construction of the KNPS (Mr Martin Krause pers. comm.)

#### **6.1.1. Conservation status and Biodiversity Plans**

Cape Flats Dune Strandveld is listed in the List of Threatened Terrestrial Ecosystems in South Africa (Government Gazette, 2011) as an ENDANGERED (D1) vegetation type or ecosystem. Criterion D1 pertains to threatened species associations. The site does not fall within the City of Cape Town Biodiversity Network (BioNet) (Holmes, Stipinovitch & Purves, 2011; City of Cape Town, shapefile version 2015/06/20) (Figure 4).



**Figure 3.** The study area superimposed on a map portion of *The Vegetation Map of South Africa, Lesotho and Swaziland* (Mucina, Rutherford and Powrie, 2009).



**Figure 4.** The study area in relation to the City of Cape Town Biodiversity Network (City of Cape Town, 2015/05/20) overlaid on a Google Earth™ satellite image.

## 6.2. The vegetation of the study area

The vegetation at the proposed parking extension comprises highly degraded habitat that is considered to have low to very low conservation value (Figures 5 to 9; waypoint indicated in Figure 10). The area resembles a field with only a few naturally occurring species present, including dominant patches of duinekool (*Trachyandra divaricata*), sour fig (*Carpobrotus edulis*), with a few plants of duinetaaibos (*Searsia laevigata*), thatching reed (*Thamnochortus spicigerus*) and grysbietou (*Osteospermum incanum*). The shrub component is almost completely absent, with only a few plants of duinetaaibos and grysbietou occurring on the eastern boundary.

The ecological condition of the vegetation gradually improves from the eastern boundary of the site eastwards. The most abundant species include: *Bromus cf. diandrus* (exotic weed), turknael (*Erodium moschatum*) (exotic weed), small mallow (*Malva parviflora*) (exotic weed), and cf. *Emex australis* (*Kaapse dubbeltjie*) (exotic weed). Additional indigenous species include skaapbostee (*Otholobium bracteolatum*), goose daisy (*Cotula turbinata*), wild cineraria (*Senecio elegans*) and geelgifbos (*Senecio burchelli*).



**Figure 5.** Highly degraded vegetation at waypoint 001 (33°40' 25.13" S; 18° 26' 13.37" E). The dark green tufted plants in the foreground is the natural pioneer species, duinekool (*Trachyandra divaricata*).



**Figure 6.** North-facing view from waypoint 005 (33° 40' 29.27" S; 18° 26' 13.98" E) showing the altered landscape that would have been defined by parabolic dunes prior to development of the KNPS.



**Figure 7.** South-facing view from waypoint 005 (33° 40' 29.27" S; 18° 26' 13.98" E) with three plants of thatching reed (*Thamnochortus spicigerus*).



**Figure 8.** Transformed south-western corner at waypoint 007 (33°40'28.86"S; 18°26'12.50"E) dominated by a weed resembling Kaapse dubbeltjie (*Emex australis*).



**Figure 9.** View of the vegetation outside the eastern boundary at waypoint 003 (33°40'27.23"S; 18°26'14.39"E) with gradual transition from highly degraded to shrubby semi-intact vegetation which grades into good quality ecologically intact vegetation.



**Figure 10.** Google Earth™ aerial image showing the proposed parking extension (red outline) with sample waypoints (numbered yellow circle icons).

## 7. Impact Assessment

The impact assessment is a measure of the impacts likely to occur on the affected environment, specifically the vegetation, ecological processes, important species and habitats. They are considered for (a) the 'No Go' scenario and (b) the direct, indirect and cumulative impacts.

### 7.1. 'No Go' or No Development Scenario

The No Go or no development scenario takes into consideration the impact associated with the no construction option. It is a prediction of the future state of the affected area in the event of no development taking place based on the current and/or anticipated future land use. The No Go scenario would not result in any changes to the *status quo* since the vegetation is unlikely to either improve or become ecologically more degraded in the event of no development taking place.

### 7.2. Direct impacts

Direct impacts are those that would occur as a direct result of the proposed construction of the new parking area. Direct impacts are assessed in Table 1 according to the following interrelated components:

- Loss of vegetation type – including intact vegetation, ecologically important species and species of conservation concern.
- Loss of ecological processes – associated with the loss of intact vegetation, ecologically important species and species of conservation concern.

**Table 1. Impact and Significance – Loss of vegetation & ecological processes**

[Note: This table includes an assessment of impacts that would result from a loss of vegetation due to construction at the site. The proposed mitigation includes ‘best practice mitigation’ but not ‘essential mitigation’. Essential mitigation measures are those measures that would reduce the impact significance rating whereas best practice mitigation includes the most appropriate actions in terms of duty of care and steps required to reduce the negative effects on the receiving environment.

ECOSYSTEM STATUS	PROJECT ELEMENTS	POTENTIAL ENVIRONMENTAL IMPACT/NATURE OF IMPACT	<u>Nature of impact</u>	<u>Duration</u>	<u>Extent</u>	<u>Intensity</u>	<u>Irreplaceability</u>	<u>Reversibility</u>	<u>Degree to which impact can be mitigated</u>	<u>Cumulative impacts</u>	<u>Significance</u>
VULNERABLE ECOSYSTEMS	NO GO	Loss of vegetation & ecological processes	Neutral (No activity)	Short-term	Site-specific	Negligible	Fully replaceable	Fully reversible	Not applicable	Negligible	No significance
	Cape Flats Dune Strandveld (without mitigation)	Loss of vegetation & ecological processes (without mitigation)	Negative (Loss of vegetation)	Long-term	Site-specific	Low negative	Irreplaceable	Irreversible	Cannot be mitigated	Low	Low negative
	Cape Flats Dune Strandveld (with mitigation)	Loss of vegetation & ecological processes (with mitigation)	Negative (Loss of vegetation)	Long-term	Site-specific	Low negative	Irreplaceable	Irreversible	Cannot be mitigated	Low	Low negative

### **7.3 Loss of vegetation & ecological processes**

Loss of vegetation is assessed in relation to the vegetation type occurring at the site. This is assessed according to (1) the ecosystem status of the vegetation type, (2) the ecological condition of the vegetation, (3) the restorability potential, (4) the geographical position, and (5) the position of the site in relation to the units of the City of Cape Town BioNet. If the site were to be developed, the overall impacts are expected to be **Low Negative**. This is largely due to the poor ecological condition (highly degraded). It is noted that the site does not fall within the City of Cape Town BioNet nor is the area considered to be of significant value in terms of maintaining ecological processes. The site lies immediately adjacent to the existing parking area and access road and is therefore considered to be a favorable site in this regard since loss of intact natural vegetation would be zero. If the parking area were to be positioned further to the east than the proposed position it would lead to a higher impact. The vegetation is in better condition further east.

### **7.4. Mitigation**

Mitigation options are generally considered in terms of the following hierarchy: (1) avoidance, (2) minimization, (3) restoration and (4) offsets.

Mitigation would not reduce the overall impact significance rating; however, if the development is approved the following best practice mitigation should be adhered to:

- *Strict site control:* The construction area would need to be cordoned off with 'danger tape' and monitored by the Environmental Control Officer (ECO) during the construction so that no damage occurs to adjacent vegetation falling outside the intended construction area.

### **7.5. Indirect impacts**

Indirect impacts are those that do not occur as a direct result of the activity on site but that occur further away. No indirect impacts were identified during the study.

### **7.6. Cumulative impacts**

Cumulative impacts are those impacts linked to increased loss of vegetation type or the ecosystems listed in the List of Threatened Terrestrial Ecosystems (Government Gazette, 2011). Cumulative impacts are assessed as the overall impact of loss of habitat in relation to loss of the

same or similar habitat at a local scale due to past, present and future habitat loss. In the case of Cape Flats Dune Strandveld, remaining natural vegetation in relation to the original extent for each vegetation type equates to 18 060 ha (Government Gazette, 2011), however, in terms of the remaining vegetation in a natural or near-natural state, the area is 16 474 ha (Cape Nature, 2013). The vegetation that would be lost at the proposed parking extension is in a near-natural to degraded state. If the entire site is considered as near-natural, this equates to loss of 1.36 ha or 0.007% of the remaining near natural to natural habitat of the ecosystem. Cumulative loss of vegetation would therefore result in **Very Low Negative** impact.

## **8. Conclusions and Recommendations**

The proposed parking extension would result in loss of only highly degraded Cape Flats Dune Strandveld. The result would be a **Low Negative** impact on any natural vegetation. The remaining vegetation at the site has been heavily disturbed in the past and is of low conservation value. The site is regarded as the most appropriate location for the new parking area and the development of this site is supported. However, it must be emphasized that if construction goes ahead the adjacent natural vegetation must be either fenced off or clearly demarcated so that no unnecessary damage to the adjacent habitat occurs.

## **9. References**

- Brownlie, S. 2005. Guideline for involving biodiversity specialists in EIA processes: Edition 1. *CSIR Report No. ENV-S-C 2005-053 C*. Provincial Government of the Western Cape: Department of Environmental Affairs and Development Planning.
- CapeNature. 2013. Ecosystem Threat Status: Western Cape Province: Criterion A1 only. Data obtained from Kerry Maree (kmaree@capenature.co.za).
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Mucina, L., Rutherford, M.C., & Powrie, L.W. (Eds.). 2005. *Vegetation map of South Africa, Lesotho, and Swaziland 1:1 000 000 scale sheet maps*. South African National Biodiversity Institute, Pretoria. ISBN 1-919976-22-1.

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Report submitted: 1 June 2016

## Appendix 1: Curriculum Vitae: Paul Emms

### Experience

- Expertise in field work in the CFR and Succulent Karoo ecosystems – vegetation surveys, plant identification, plant collection and propagation, ecological monitoring of dryland and wetland habitats; including physiological studies
- Data management and analysis – data sets and statistical analysis
- Proficiency in Google Earth, QGIS and related GIS programs.
- Vegetation and species mapping
- Completed an MSc thesis entitled “*Long-term vegetation monitoring – a 33-year record from Table Mountain*”. Graduation date: March 2014
- Experience leading teams of field assistants in remote mountainous areas
- Completed over 100 botanical survey/assessment reports

### Career History

- March 2011 - present - botanical specialist - associate of Bergwind Botanical Surveys & Tours CC
- March 2008 - March 2010 - field botanist - Coastec (Coastal & Environmental Consultants)
- January 2006 – December 2007 - Kirstenbosch Scholar/horticultural research/plant identification instructor - South African National Biodiversity Institute.

### Education and qualifications

- MSc (Botany) – University of the Western Cape (2014).
- BSc: Hons (Botany) – University of the Western Cape (2005)
- BSc: Biodiversity and Conservation Biology - University of the Western Cape (2002 – 2004)
- National Diploma in Horticulture - Cape Peninsula University of Technology (1998 – 2000)

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