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Pri.Sci.Nat # 400045/08

# UPDATED BOTANICAL BASELINE AND IMPACT ASSESSMENT OF PROPOSED PROTEA RIDGE DEVELOPMENT SITE (REMAINDER OF FARM 948 KOMMETJIE ESTATES), KOMMETJIE, CAPE PENINSULA.

Compiled for: Doug Jeffery Environmental Consultants, Klapmuts

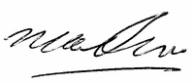
Applicant: Kommetjie Estates (Pty) Ltd., Kommetjie

14 November 2011

**DECLARATION OF INDEPENDENCE**

In terms of Chapter 5 of the National Environmental Management Act of 1998 specialists involved in Impact Assessment processes must declare their independence and include an abbreviated Curriculum Vitae.

I, N.A. Helme, do hereby declare that I am financially and otherwise independent of the client and their consultants, and that all opinions expressed in this document are substantially my own.



NA Helme

**ABRIDGED CV:**

Contact details as per letterhead.

Surname : HELME

First names : NICHOLAS ALEXANDER

Date of birth : 29 January 1969

University of Cape Town, South Africa. BSc (Honours) – Botany (Ecology & Systematics), 1990.

Since 1997 I have been based in Cape Town, and have been working as a specialist botanical consultant, specialising in the diverse flora of the south-western Cape. Since the end of 2001 I have been the Sole Proprietor of Nick Helme Botanical Surveys, and have undertaken over 900 site assessments in this period.

**South Peninsula and Cape Flats** botanical surveys include: Ocean View Erf 5144 updated baseline (GNEC; 2011), Ocean View infill housing BA (I. Terblanche & Associates; 2010), Oakhurst farm, Hout Bay (SEC 2010); Protea Ridge Corridor study (Doug Jeffery; 2009); Oudekraal botanical constraints study (Doug Jeffery 2009); Mitchells Plain hospital site (Doug Jeffery; 2006, 2008); Eerste River Erf 5540 (CCA 2008); Eerste River Erf 5541 (EnviroDinamik 2008); Kommetjie Riverside IA (Doug Jeffery 2008); Strandfontein Road widening (CoCT 2008); Pelikan Park IA (CoCT 2008); Blue Downs Erf 1897 (Environmental Partnership 2008); Driftsands NR Sensitivity Study (CapeNature 2006); Assessment of Driftsands South (Environmental Partnership 2006); Woodgreen housing Mitchell's Plain (CCA; 2006);

Assessment of new Eskom Briers Substation and new 66kV overhead powerline (Eskom 2006); Muizenberg erf 108161 (CndeV; 2005); Muizenberg erf 159848 (Headland; 2005); Muizenberg erf 159850 (Headland; 2005); Kommetjie Riverside Ext 2. (Headland; 2005); Ocean View Mountain View extension IA (Ecosense; 2005); Imhoffs farm (Headland; 2005); Rocklands, Simonstown (CCA; 2005); Erf 35069 and Ptn. Erf 3418, Kuils River (SEC; 2005); Erf 550 & 552, Phillippi (Amathemba Environmental; 2005); proposed Grand Prix site next to CT International, Belhar (EnviroDinamik; 2005; Environmental Partnership 2007); Dreamworld film studio survey and Impact Assessment (Environmental Partnership; 2004 & 2005); Kompanjiestuin survey and Impact Assessment (Ecosense; 2004); Scarborough Erf 766 IA (ERM; 2004), Erf 11825, Fish Hoek (private client, 2004); R300 Cape Flats Ring Road surveys (Ecosense and Ecosense/Chand jv; 2003-2007); Bordjiesrif environmental education centre in the TMNP (for SRK & NPB; 2002); Elsies Peak development (private client, 2003); Edith Stephens Wetland Park Survey (Botanical Society of SA 2002); Chapman's Peak toll road IA (Megan Anderson Landscape Architects 2002); Pelican Park, Capricorn Park, Millers Point, and Soetwater (for CoCT and Jessica Hughes, Afridev; 2000 & 2001); Plateau Road (SPM & EEU; 1999); survey of remaining areas of natural vegetation in the eastern portion of the Cape Flats (Botanical Society of SA; 1999 - 2000).

**CONDITIONS RELATING TO THIS REPORT:**

The methodology, findings, results, conclusions and recommendations in this report are based on the author's best scientific and professional knowledge, and on referenced material and available knowledge. Nick Helme Botanical Surveys and its staff reserve the right to modify aspects of the report, including the recommendations and conclusions, if and when additional relevant information becomes available.

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## EXECUTIVE SUMMARY

This updated botanical baseline and impact assessment report was commissioned in order to help inform decisions regarding the proposed development of a portion of the Remainder of Farm 948, Kommetjie, on the southern Cape Peninsula. The original baseline study was undertaken in 2008 (Helme 2008), and was updated in July 20011 after fire swept through the site in early 2011.

The vegetation of the Cape Peninsula is of elevated national and international importance, due partly to high levels of range restricted species, and this needs to be taken into account. In addition, the study area forms the western edge of the only viable link between the northern and southern parts of the Table Mountain National Park – the so called Protea Ridge Ecological Corridor. The City of Cape Town regularly updates and revises its Biodiversity Network as sites are lost and new information becomes available (Holmes et al 2008), and the latest map (2010) indicates that the western arm of the study area has been categorised as Other Natural Vegetation (and is thus not a selected Critical Biodiversity Area or CBA), and that the whole eastern part of the site has been selected as a CBA1a, which is the highest ranking of CBA. CBA1a areas are regarded as Irreplaceable Core Flora Conservation Areas, and should not be developed, with appropriate activities being conservation, environmental education and low impact recreation (Holmes et al 2008). The accuracy of this categorisation is discussed in Section 5 of this report.

About 40% of the site has been heavily disturbed and is regarded as being of Low regional conservation value, whilst most of the remainder is of High conservation value, with at least seven plant Species of Conservation Concern having been recorded in the natural areas on site. Five of these are found within the western arm of the site, and this part of the site is thus regarded as an important area in terms of plant and habitat conservation. Peninsula Sandstone Fynbos, Cape Flats Dune Strandveld and Hangklip Sand Fynbos are the three natural vegetation types present on site, with the latter two dominant. All three are regarded as threatened habitats (vegetation types) on a national basis, and additional impacts on any of these will thus have cumulative (regional) botanical impacts. Development should ideally thus be restricted to the Low conservation value parts of the site, in which case botanical impacts could be kept to an acceptable level, and positive ecological impacts maximised.

Three development alternatives were assessed, along with the No Go alternative.

Alternative 1 would result in permanent loss of all natural vegetation on the site and thus has unacceptably high negative botanical impacts, and should not be considered further.

Alternative 2 is a significant improvement over Alternative 1, but would have a significantly greater botanical impact than Alternative 3, and is consequently not recommended.

Alternative 3 is the best of the development alternatives put forward, and its overall botanical impacts are likely to be at a Low negative level, prior to mitigation (and after mitigation).

The development of Alternative 3 (with an acceptable Low negative level of botanical impact) would be slightly preferable to the No Go alternative (with a Low to Medium negative botanical impact). Alternative 3 has a number of important positive ecological attributes which help balance out its negative impacts.

It is thus recommended that Alternative 3 be approved, but with all essential mitigation requirements outlined in Section 9. These mitigation requirements include construction phase mitigation and operational phase mitigation.

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## 1. INTRODUCTION

This updated botanical baseline study and impact assessment was commissioned in order to help inform the proposed rezoning, subdivision and development of a portion of the remainder of Farm 948 Kommetjie Estates. The property is located at the current eastern edge of Kommetjie, on the Cape Peninsula.

The original botanical baseline of the study area (henceforth also known as the site) was undertaken in 2008 (Helme 2008). The total study area is 10.38ha in extent.

Three development alternatives have been put forward for assessment, along with the statutory requirement of the No Go (no development) alternative. Alternative 3 is the applicant's preferred alternative, and is the result of numerous revisions and iterations, many of which were responding to biophysical constraints identified during the period 2008 to August 2011.

**Alternative 1** was the originally proposed layout (as in Helme 2008), and makes provision for the development of 102 residential erven and associated infrastructure, including a crèche, place of worship and some public open space. Access would be via Wireless Road and Riverside Drive, with an emergency access via Klein Slangkop Estate.

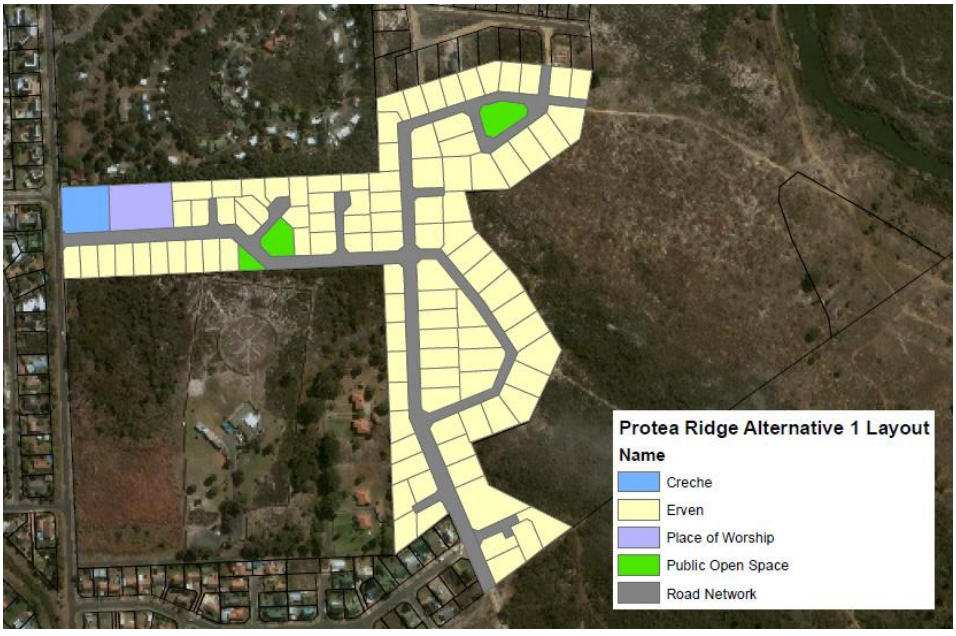


**Figure 1:** Alternative 1 proposed layout.

**Alternative 2** makes provision for 63 residential erven and associated infrastructure, as well as a crèche and more substantial public open space areas. Access would be

via Wireless Road and Riverside Drive. This was the layout alternative that was used as the Preferred Alternative during the advertising of the initial Draft Basic Assessment Report. For a number environmental reasons this was then amended to form the new preferred alternative - Alternative 3.

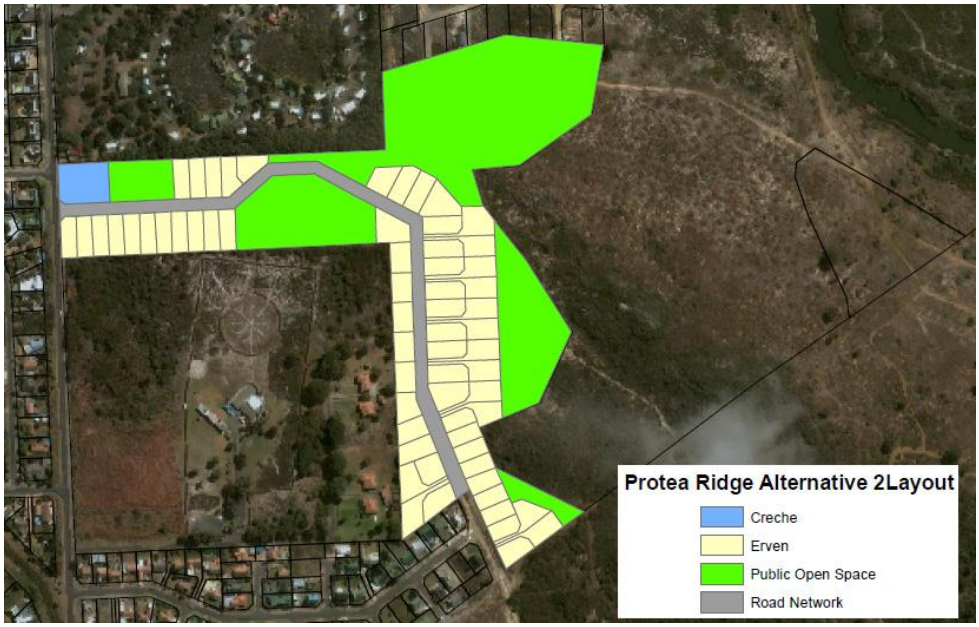


**Figure 2:** Alternative 2 layout.

**Alternative 3** was the result of environmental inputs subsequent to the fire on site in early 2011, and includes 102 single residential erven, but no crèches or places of worship. Single residential zoning would cover about 32% of the site, and private open space about 57% (5.8ha; including an 870m$^2$ detention pond), and roads would cover about 11% of the area.

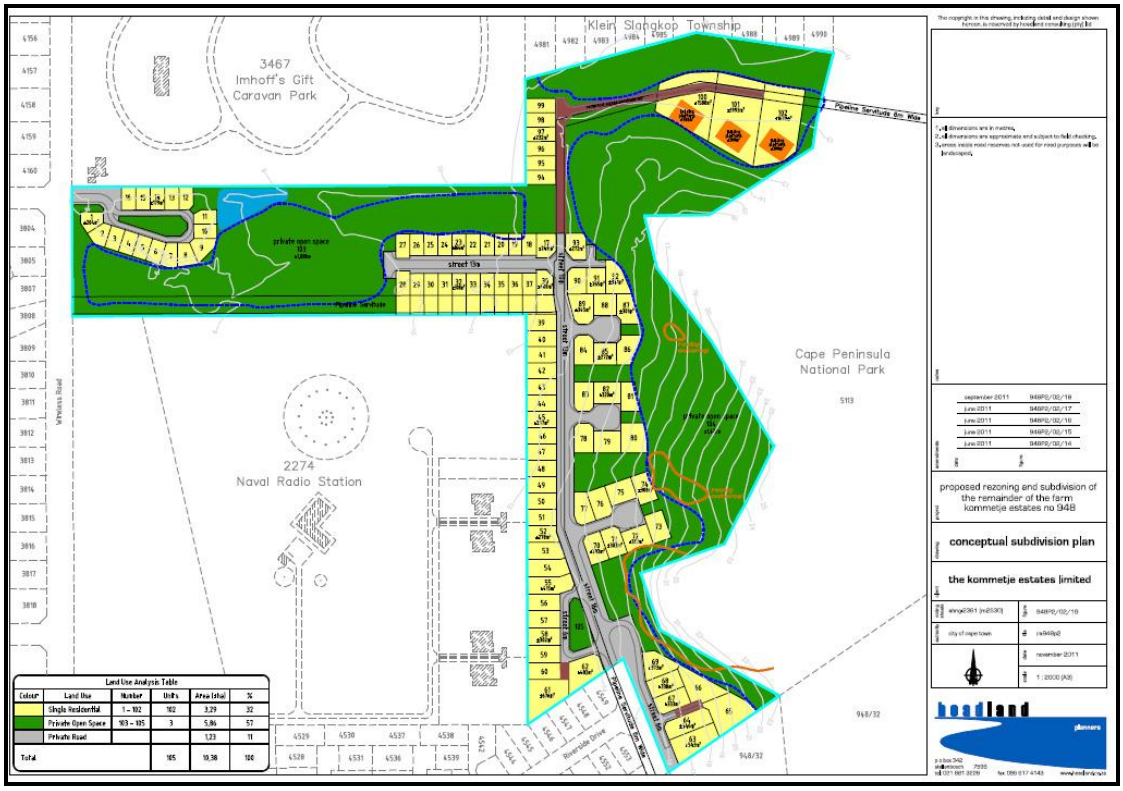


**Figure 3:** Alternative 3 layout (dated November 2011). The dotted blue line indicates the primary areas of botanical sensitivity, as modified in June 2011.

## 2. TERMS OF REFERENCE

The standard CapeNature and Botanical Society of South Africa recommended TOR for biodiversity specialists were used, and these are as follows:

- Produce a baseline analysis of the botanical attributes of the property as a whole.
- This report should clearly indicate any constraints that would need to be taken into account in considering any development proposals further.
- The baseline report must include a map of the identified sensitive areas as well as indications of important constraints on the property. It must also:
    - Describe the broad ecological characteristics of the site and its surrounds in terms of any mapped spatial components of ecological processes and/or patchiness, patch size, relative isolation of patches, connectivity, corridors, disturbance regimes, ecotones, buffering, viability, etc.

In terms of biodiversity pattern, identify or describe:

***Community and ecosystem level***

a. The main vegetation type, its aerial extent and interaction with neighbouring types, soils or topography;

b. The types of plant communities that occur in the vicinity of the site
c. Threatened or vulnerable ecosystems (*cf. SA vegetation map/National Spatial Biodiversity Assessment, etc.)*

***Species level***

d. Plant Species of Conservation Concern (SCC; give location if possible using GPS)
e. The viability of and estimated population size of the SCC that are present (include the degree of confidence in prediction based on availability of information and specialist knowledge, i.e. High=70-100% confident, Medium 40-70% confident, low 0-40% confident)
f. The likelihood of other SCC occurring in the vicinity (include degree of confidence).

***Other pattern issues***

g. Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
h. The extent of alien plant cover of the site, and whether the infestation is the result of prior soil disturbance such as ploughing or quarrying (alien cover resulting from disturbance is generally more difficult to restore than infestation of undisturbed sites).
i. The condition of the site in terms of current or previous land uses.

In terms of **biodiversity process**, identify or describe:

j. The key ecological "drivers" of ecosystems on the site and in the vicinity, such as fire.
k. Any mapped spatial component of an ecological process that may occur at the site or in its vicinity (i.e. *corridors* such as watercourses, upland-lowland gradients, migration routes, coastal linkages or inland-trending dunes, and *vegetation boundaries* such as edaphic interfaces, upland-lowland interfaces or biome boundaries)
l. Any possible changes in key processes, e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.

- What is the significance of the potential impact of the proposed project – with and without mitigation – on biodiversity pattern and process at the site and regional scale?

- Recommend actions that should be taken to prevent or mitigate impacts. Indicate how these should be scheduled to ensure long-term protection, management and restoration of affected ecosystems and biodiversity.
- Indicate limitations and assumptions, particularly in relation to seasonality.

## 3. LIMITATIONS, ASSUMPTIONS AND METHODOLOGY

The site was first visited on 19 and 25 January 2008. This is in the middle of the summer dry season, and thus many bulbs (geophytes) and annuals would not have been recorded. Some of these were recognisable as dry stems or flowerheads, in which case they were recorded. A follow-up site visit was undertaken in June 2011, fairly early in the winter – spring growing and flowering season, and after a wildfire had burnt most of the site in early 2011. This allowed for collection of additional plant species data, and proved to be very useful in terms of delineating the habitats of conservation concern, as the fire had removed the grassy layer and had made it easier to observe soil surface characteristics, which are an important determinant of habitat. In addition, various threatened plant species were noted, and this resulted in a modification to the botanical constraints map, and ultimately to the preferred development alternative. The area within the dotted blue line in the western part of the site (in Figure 3) is the botanically sensitive part of this area. From a purely botanical point of view there were minor seasonal constraints on the comprehensiveness of the botanical observations, but these should not significantly alter or detract from the accuracy of the overall findings.

In 2009 the dotted blue line in the eastern half of the site shown in Figure 3 was surveyed on site, and is thus the result of a focussed effort to delineate what had been identified as the easternmost appropriate development edge (from an ecological perspective).

I was able to reference previous botanical surveys in the area (Helme 2005a & b; Helme & Harrison 2009; Cowling 1991), the collections of the Bolus and Compton Herbaria, the Cape Rares GIS layers of the CREW (Custodians of Rare and Endangered Wildflowers) project of SANBI, plus extensive personal experience in the south Peninsula region. The CapeRares data indicates the presence of the rare and threatened *Gladiolus jonquilliodorus* in the vicinity (the locality says only “near Imhoffs Caravan Park”, recorded in 1980), but this species was not found on site during the current survey, possibly because it is now extinct on the site, or possibly

because it flowers from November to late December, and the author was thus on site outside its probable flowering season. During the site visits the author walked the site and made notes on all plant species present and took photographs and gps coordinates of various species. Initial sensitivity mapping was handdrawn onto hardcopy aerial images of the site, and then mapped directly onto Google Earth, which resulted in kmz files which could be exported directly to the project planner.

Google Earth imagery dated November 2010 was used to verify vegetation patterns observed on the ground, and was used as a base image for the sensitivity mapping.

The No Go alternative is defined as the continuation of the status quo, which implies a Rural zoning, no development and no agriculture (including no livestock grazing), with occasional alien vegetation management. The Rural zoning would allow development of up to 800m$^2$ of housing and associated infrastructure.

No bulk services layout was provided for assessment, and it is thus assumed (as was previously indicated) that all such services would be located entirely within the road reserves, or within the existing pipeline servitude shown on Figure 3.

## 4. REGIONAL CONTEXT OF THE VEGETATION

The site lies a minimum of 0.5km north of Kommetjie Main Road, west of Imhoff's farm and Wildevoelvlei, and west of the proposed Protea Ridge conservation corridor that links the Wildevoelvlei and Noordhoek wetlands with the Slangkop Protected Nature Area south of Kommetjie Main Road. To the north is the Klein Slangkop development, to the northwest is the Imhoff's Gift caravan park, with the Navy radio facility to the southwest, as well as various private erven along Riverside Road.

The Protea Ridge corridor, as it has become known, was identified many years ago (process reviewed in Arcus Gibb 2003) as the key ecological corridor linking the Noordhoek wetlands and Sand Fynbos (terrestrial) areas with the Slangkop ridge (both areas now within the Table Mountain National park – TMNP), and thus providing the only feasible ecological link between the north and south Peninsula. The western edge of the corridor was at that stage surveyed and partly staked out, judging by the presence of marked steel dropper poles along the eastern edge of the current study site, and these mark what was then (in about 2003) identified as the western edge of the corridor. The approach taken to delineate this corridor was more of a broad brush study looking at habitat integrity and connectivity than detailed site specific floristics (Arcus Gibb 2003). A much more detailed study of this corridor was

undertaken in 2009 (Helme & Harrison 2009), and resulted in the identification of a revised, optimal corridor from a botanical and faunal perspective. The optimal corridor included a significant portion of the eastern edge of the current study area.

Basically the whole site is included within the Kommetjie Slangkop Core Flora Conservation Area, which was identified by Maze & Rebelo (1997) as one of 36 key botanical conservation areas within the City of Cape Town. A significant portion of this Core Flora area now falls within the TMNP (notably the Noordhoek wetland area), but an important part of it still lies outside the Park, within the current study area, within the Klein Slangkop development, and in private property to the east.

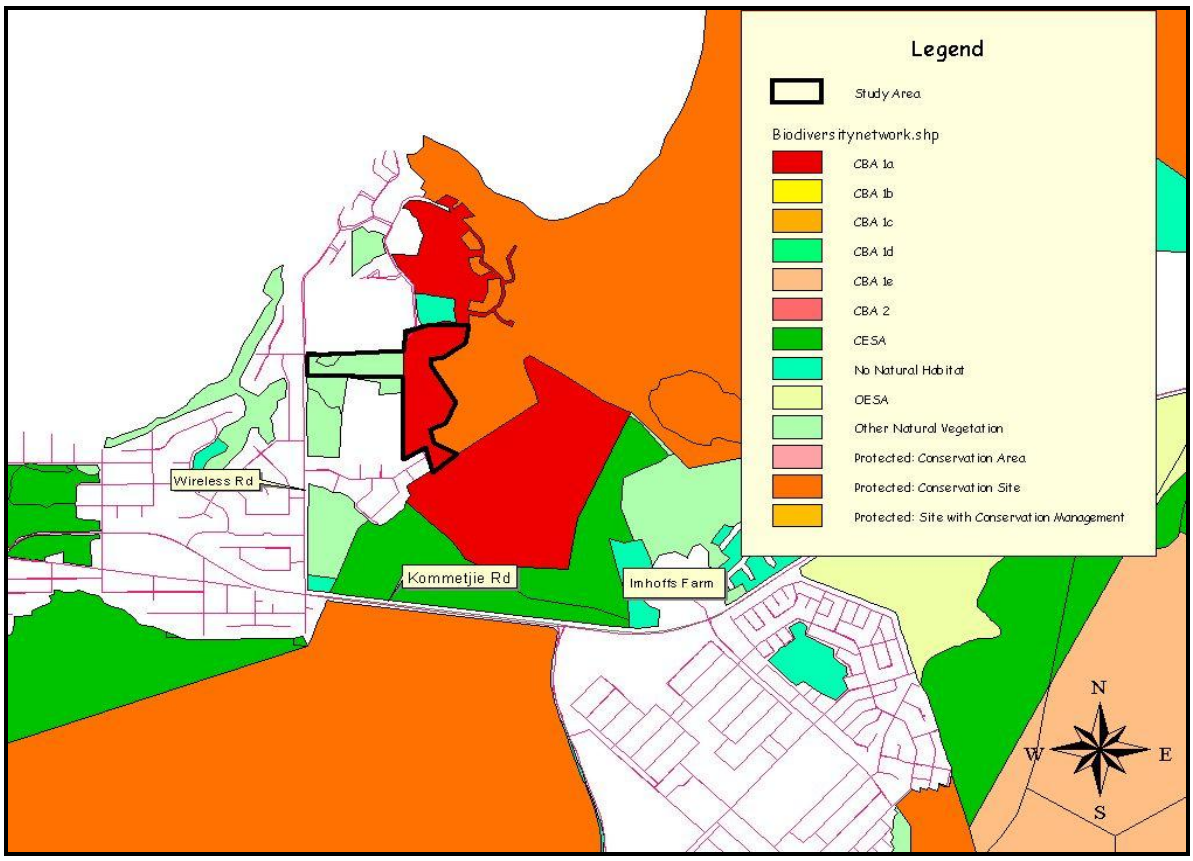


**Figure 4:** Extract of latest City of Cape Town Biodiversity Network (2010) for the eastern Kommetjie area, showing relevant categories based on groundtruthing and a revised conservation planning analysis. Note that the western arm of the study area has been categorised as Other Natural Vegetation (thus not a selected CBA), and that the whole eastern part of the site has been selected as a CBA1a. CBA stands for Critical Biodiversity Area, and white areas are urban. The bright orange areas are essentially Table Mountain National Park, and the Protea Ridge corridor would be the ecological corridor connecting the two main orange areas, across Kommetjie Road, large parts of which need to be rehabilitated.

The City of Cape Town regularly updates and revises its Biodiversity Network as sites are lost and new information becomes available (Holmes et al 2008), and the latest map (Figure 4) indicates that the western arm of the study area has been categorised as Other Natural Vegetation (and is thus not a selected Critical Biodiversity Area or CBA), and that the whole eastern part of the site has been selected as a CBA1a, which is the highest ranking of CBA. CBA1a areas are regarded as Irreplaceable Core Flora Conservation Areas, and should not be developed, with appropriate activities being conservation, environmental education and low impact recreation (Holmes et al 2008). The accuracy of this categorisation is discussed in Section 5 of this report.

Parts of the site (especially in the south and west) appear to have been heavily disturbed at some stage in the fairly distant past, and the existing seasonal wetland in the far west of the site is in fact an excavated feature. Prior to the fire in early 2011 most of the site had not been burnt for well over twenty years, and many of the plants were in fact becoming senescent (dying of old age), and the fire thus came at a highly appropriate time.

The bulk of the site has sandy, acid soils that are derived from the Table Mountain Group sandstones, which outcrop along the eastern boundary. Sandstones are also visible in the western areas, but some of these have been dumped on the site. There are no true soil (edaphic) interfaces on site, but one of the important ecological gradients is a soil moisture gradient, which is in fact a complex mosaic in parts of the western area. Parts of the western arm of the site could technically be classed as a seasonal wetland, as peaty (humic) soils are present, along with plants associated with seasonal soil moisture, and these areas border on well drained sands that dominate the rest of the site. It appears that the wetlands are significantly drier now than they were in the past, probably because the water source has been disrupted by development in the area, notably in the Riverside road area. It is likely that the seasonal wetlands in the area were once part of the Bokramspruit floodplain, but unfortunately this has been channelled and now has virtually no floodplain. No upland areas are found on the site, the maximum altitude being about 25masl, and thus no upland-lowland gradients are present on site.

It would appear (from remaining stumps) that large and possibly dense alien shrubs and trees occupied much of the site at some stage about twenty or thirty years ago, but these were felled at least seven years ago, and now most of the site is largely alien free, except for rather numerous small *Acacia saligna* plants (see Plates 1 & 2).

The construction of a sewer line across the central part of the site some years ago has also resulted in localised disturbance, some of which is the result of a persistent leak in the system.

The Fish Hoek – Noordhoek / Kommetjie flats have been extensively transformed by agricultural and residential developments, with ongoing pressures associated primarily with urbanization. Very few natural areas remain in this lowland area, and those that do therefore have a relatively high local and regional conservation value. The Cape Peninsula is an international "hotspot" of plant diversity (Cowling *et al* 1996; Helme & Trinder Smith 2006), with a phenomenal 161 endemic plant species (*i.e.* found only in this area; Helme & Trinder Smith 2006). The lowland areas are particularly poorly conserved within the region, and are where many of the threatened plant species are concentrated, and any lowland site must be viewed in this context.

## 5. THE VEGETATION ON SITE

The vegetation in the study area has been mapped for the new vegetation map of South Africa (Mucina & Rutherford 2006) as Peninsula Sandstone Fynbos and Cape Flats Dune Strandveld. In reality there are also significant elements of Hangklip Sand Fynbos on the site, which are on the aforementioned map shown as occurring only north of the Wildevoelvlei. The site is thus part of a transitional (ecotonal) area, although these transitions may not be obvious to the casual observer. It is also not possible to say exactly where one vegetation type begins and another ends, partly because of previous disturbance, and partly because these boundaries are often not clear cut at a fine scale. No map of vegetation types on site is thus presented. Essentially the true Peninsula Sandstone Fynbos occurs on the rocky areas on the east of the site (and in the main Protea Ridge ecological corridor; see Helme & Harrison 2009), and Hangklip Sand Fynbos (often very degraded) occupies most of the rest of the site, but mixed in with elements of Cape Flats Dune Strandveld. A brief overview of the vegetation types and habitats is provided below.

### Cape Flats Dune Strandveld

Indigenous species on site that are most typical of Cape Flats Dune Strandveld include *Ehrharta villosa* (pypgras), *Metalasia muricata* (blombos), *Passerina corymbosa* (gonna), *Chrysanthemoides monilifera* (bietou), *Hermannia pinnata* (poprosie), *Thamnochortus erectus* (dekriet)*, Helichrysum rutilans, H. niveum, Pentaschistis patula, Leucadendron coniferum (*Flats conebush*),Colpoon compressum* (pruimbas)*, Searsia glauca* (blue kunibush)*, Searsia lucida*

(blinktaaibos*), Searsia laevigata* (dune taaibos), *Muraltia spinosa* (tortoiseberry)*, Tetragonia fruticosa* (klimopkinkelbossie), *Stenotaphrum secundatum* (buffalo grass), *Pterocelastrus tricuspidatus* (kershout), *Wiborgia obcordata, Willdenowia teres* and *Calopsis viminea*. Bulbs recorded in this area include *Moraea fugax, Brunsvigia orientalis* (kandelaarlelie), *Albuca cooperi* and *Trachyandra divaricata* (duinekool). Interestingly, no milkwoods (*Sideroxylon inerme*) occur on site.

Cape Flats Dune Strandveld is severely threatened over large parts of its range, with over 40% of its original extent already transformed, and is thus regarded as an Endangered vegetation type (Rouget *et al* 2004; DEA 2009). Urbanization pressures on the Cape Flats are particularly severe, and a recent analysis has shown that this vegetation type is already Critically Endangered on the Cape Flats (Rebelo et al 2011). On the Cape Peninsula the vegetation type is now largely restricted to Cape of Good Hope NR (now part of TMNP), the Witsands area, and the Noordhoek flats, with large areas having been lost in the Noorhoek – Fish Hoek valley, and in the Hout Bay valley.

**Peninsula Sandstone Fynbos**

Typical Peninsula Sandstone Fynbos species on site include *Leucospermum conocarpodendron* (kreupelhout), *Protea nitida* (dwarf form of waboom), *Leucadendron salignum*, *Anthospermum spathulatum, Euryops abrotanifolius* (geelmargriet), *Coleonema pulchellum* (confetti bush), *Felicia filifolia, Agathosma imbricata* (buchu), *Lobelia setacea, Searsia rosmarinifolia, Lobostemon glaucophyllus*, *Thamnochortus obtusus, Chironia foveolatus, Olea capensis* (ironwood)*, Pelargonium cucullatum, P. suburbanum*, *Aristea africana*, and *Hypodiscus willdenowiana*. One of the most prominent bulbs typical of this vegetation type is *Watsonia tabularis*, which is a Peninsula endemic common in the rocky outcrops and in the High conservation value area in the western arm of the site.

*Aspalathus chenopoda* is fairly common on site, and is a Peninsula endemic common on the mountains and lower slopes in the first six years after fire. The species is not regarded as threatened (Raimondo *et al* 2009).

Peninsula Sandstone Fynbos was regarded as a Least Threatened vegetation type in terms of the National Spatial Biodiversity Assessment (Rouget *et al* 2004), but has a very high number of rare and/or endemic plant species, and it is thus important to

bear this in mind. This was in fact the primary reason for a recent rerating of this vegetation type as Endangered (DEA 2009).

**Plate 1:** View of the eastern parts of the site in 2009 (before the fire), looking north towards Imhoff's Caravan Park (behind gum trees) and Klein Slangkop development. Note scattered alien *Acacia saligna* on flats, and denser indigenous bush on rocky outcrops in the foreground (close to eastern edge of site).

**Plate 2:** View of the western arm of the site, looking east, before the fire.

**Hangklip Sand Fynbos**

Hangklip Sand Fynbos usually occurs on acid sand flats and low plateaus, from the Cape Peninsula to the Hermanus area. Urbanization and alien plant invasion have had substantial negative impacts on the vegetation type, and only 68% remains (as of 1996), with national conservation target of 30%, while some 17% is conserved (Rouget *at al* 2004). The vegetation type is listed as Vulnerable in terms of the NSBA (Rouget *at al* 2004), and as Endangered in terms of the Draft List of Threatened Ecosystems (DEA 2009). The habitat on site may be well drained or seasonally damp (mainly in the west).

Typical species on this site include *Protea scolymocephala* (witskollie), *Trichocephalus stipularis* (baboonface), *Caesia contorta*, *Arctotis* sp*., Elegia nuda* (dekriet), *Monopsis lutea, Vellereophyton dealbatum, Crassula vaillantii, Psoralea laxa, Cliffortia obcordata, Centella tridentata, Pelargonium myrrhifolium, Lampranthus explanatus, Erica mammosa, Staberoha cernua, Staavia radiata* (altydbossie), *Trichogyne pilulifera*, and *Salvia africana-caerulea*.

A single tall stone pine (*Pinus pinea*) occurs within this area. This species is exotic and slightly invasive, but is nowhere near as invasive as the alien *Acacia saligna* (Port Jackson) that is present throughout the site. There is estimated to be between 300 and 500 plants of the latter on site.

This habitat supports the bulk of the threatened species on site, with significant populations of four threatened species, and consequently this is the core of the High conservation value habitat on site. In 2008 the habitat was in need of a fire, as this is a fire driven vegetation type (see De Villiers *et al* 2005) and the site had not burnt for over twenty years (10-15 years would be an optimal period between fires), and consequently many species were dying of old age (senescing). The fire of early 2011 thus came at a very appropriate time.

## 5.1 Assessment of Botanical Conservation Value

Conservation value is essentially a compound index of indigenous plant diversity, presence of localised or threatened plant species, extent and magnitude of soil disturbance, ecological connectivity, rehabilitation potential, habitat rarity and habitat vulnerability and irreplaceability, and is a useful guide for responsible planning.

Areas rated as being of Low botanical conservation value have been disturbed in some way or another, usually by agriculture or some other operations involving disturbance of the upper soil structure. The Low conservation value areas on site are also very likely to have been densely invaded by alien invasive shrubs after the original soil disturbance ceased. Plant species diversity in these areas is typically less than 15% of what would be expected in a typical undisturbed example of this habitat, and there is very unlikely to be a viable population of any rare, localised or threatened plant species. Rehabilitation potential is considered to be low, at least without substantial investments in time, expertise, and money. The plant communities are usually composed of weedy, widespread species of no real conservation value, and are often dominated by alien invasives.

It is worth noting that at least half of the Critical Biodiversity Area (CBA) 1a identified by Holmes et al (2008) in the eastern half of the site (see Figure 4) is located within a previously disturbed area that is mapped for the current study as an area of Low conservation value. The designation of this part of the site as CBA1a is not supported by the findings of this study, and the fact that the important western arm of the site (with at least five plant Species of Conservation Concern) is mapped only as “Other Natural Vegetation” rather than a CBA further undermines the usefulness of the Biodiversity Network mapping in the area. Although generally a very useful reference the metropole wide Biodiversity Network cannot always be as accurate as a detailed site analysis (with various follow-ups), such as the one undertaken for the current study, and the two must be used together.

Areas of Medium botanical conservation value support a relatively low plant diversity of 15 - 75% of what would be expected in undisturbed veld of the same type, and there is unlikely to be a viable population of any rare, localised or threatened plant species, although scattered such plants may be present. Numerous weedy alien and indigenous species typically occur, usually due to a history of at least some soil disturbance. Rehabilitation potential is moderate. This is typically a habitat of medium vulnerability and irreplaceability, in that the area does not support unique assemblages of species, but it is a habitat vulnerable to further degradation.

Areas of High botanical conservation value support a rich plant diversity of 75 -100% of what would be expected in undisturbed veld of the same type, and there are likely to be viable populations of rare, localised or threatened plant species. Although weedy alien and indigenous species may occur, they do not dominate the vegetation.

Rehabilitation potential is good, or not even needed. The habitat often supports unique species assemblages, and may be very vulnerable to disturbance. The area may also be a key link or ecological corridor, or may be important in terms of maintaining ecological processes.

Conservation value is usually assessed at both a local (site specific) and regional (Cape Peninsula) context, and in the case of this site the two are largely interchangeable, as the site is part of a key ecological corridor on the Cape Peninsula.

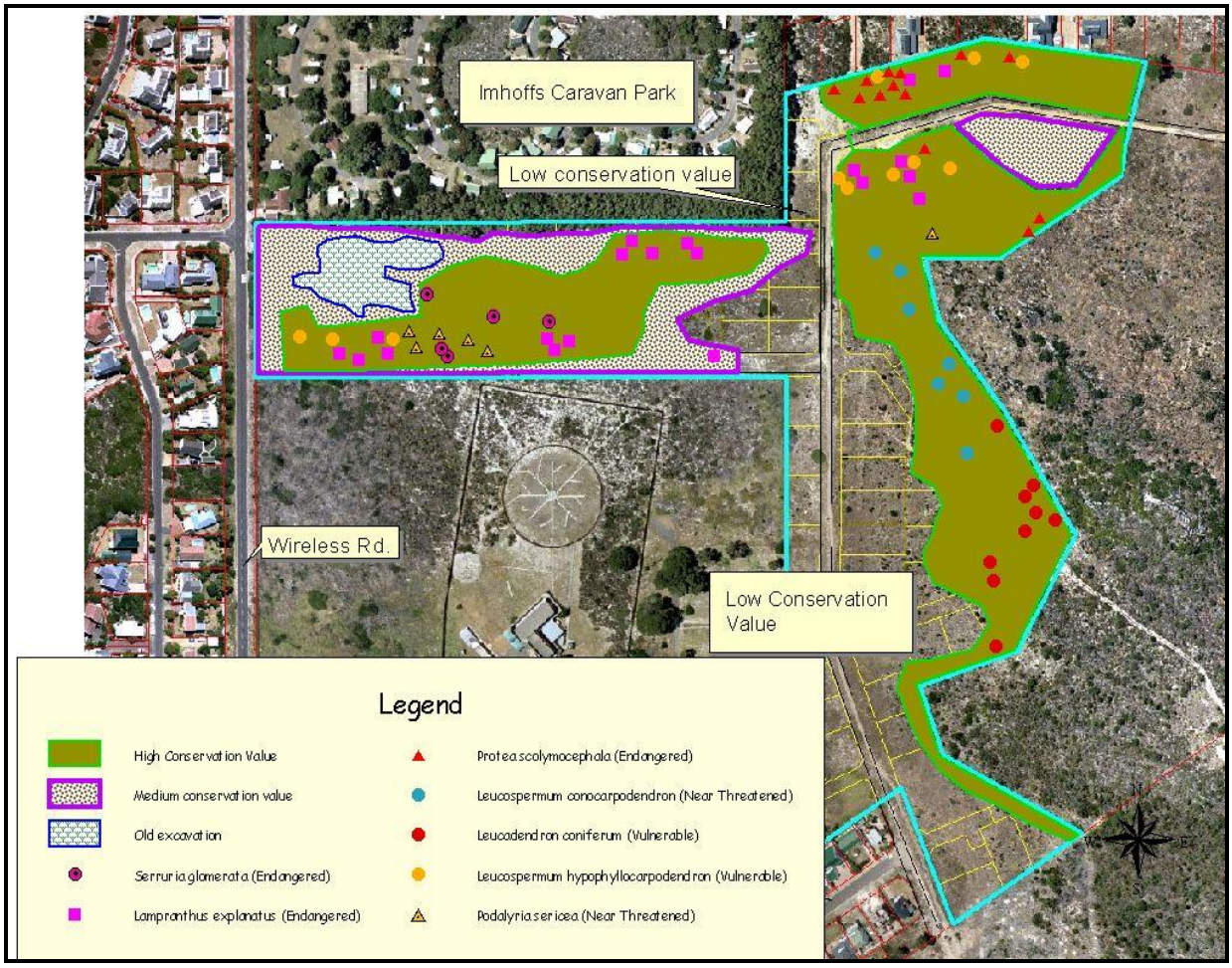


**Figure 5:** Updated map of botanical conservation value of the site, showing location of most plant Species of Conservation Concern. Unhatched areas on site are of Low conservation value. Superimposed on the proposed layout of Alternative 1.

## 5.2 Plant Species of Conservation Concern

At least seven plant Species of Conservation Concern[1] (see Raimondo et al 2009) were recorded on site (see Figure 5), and these are outlined below.

*Serruria glomerata* (Plate 3) is a species indicative of seasonally wet lowland acid sands, and is restricted to the Cape Flats and Cape Peninsula. The species is Red Listed as Endangered (Raimondo et al 2009), and a small but viable and significant population is found in the western arm of the site.

**Plate 3**: *Serruria glomerata* (Endangered) in the western arm of the site before the fire. This species is indicative of seasonally wet sands. The fence visible in the picture is the northern boundary of the Radio facility.

*Lampranthus explanatus* is a Sand Fynbos vygie (Plate 4) known from the west coast as far north as Redelinghuys, but has suffered massive habitat loss due to urbanization (especially in the Cape Flats), aliens, and agriculture (mainly rooibos and potatoes), and is consequently Red Listed as Endangered (Raimondo et al 2009). Four small patches occur on site, totalling about thirty plants. There are old records of this species from the Kommetjie area (Adamson & Salter 1950; CapeRares database), but this is the only place where it occurs on the Cape Peninsula. It does not appear to have been recorded in the area since about 1960, so it is noteworthy to find it here now.

[1] The recent Red List of South African Plants (Raimondo et al 2009) has assessed all plant species in South Africa, and all indigenous species are now technically Red Listed or Red Data Book species, and thus it is preferable to use the term Species of Conservation Concern to refer to species that are listed as either Threatened or Rare.

**Plate 4:** The bright yellow flowers of the vygie *Lampranthus explanatus* (Endangered) flowering on the site in 2008. This is the only place where this species occurs on the Cape Peninsula.

*Protea scolymocephala* is a small shrub restricted to Sand Fynbos habitats on the Peninsula and southern west coast, and is Red Data listed as Endangered (Rebelo *et al* – In prep., Raimondo et al 2009). At least 20 old plants occurred on site prior the fire in 2011, with the main patches indicated in Figure 5. The species is fire dependant, and seldom lives much more than 20 years.

*Leucospermum hypophyllocarpodendron ssp. hypophyllocarpodendron* is a small protea (pincushion) with a very long name! The species creeps along the sand and has scented yellow flowers, and is Red Listed as Vulnerable (Rebelo *et al* – In prep., Raimondo *et al* 2009). There are about ten plants on site and their distribution is indicated in Figure 5.

*Leucospermum conocarpodendron ssp. viridum* (Peninsula pincushion) is Red Listed as Near Threatened (Raimondo *et al* 2009), and has substantial populations on the Peninsula mountains, including the area behind Ocean View. The small population on site (<20 plants, on the eastern fringes) is not considered significant in terms of the greater Peninsula, or indeed in the context of the south Peninsula.

*Leucadendron coniferum (*Flats conebush) usually occurs on stabilised wind blown sands, such as old dune plumes, and is Red Listed as Vulnerable (Rebelo *et al* – in prep.; Raimondo *et al* 2009), ranging from the Peninsula to the Agulhas area. A small population occurs in the eastern fringes of the site.

A single plant of the vygie *Lampranthus bicolor* was found on site (prior to the fire), in the western arm of the site, along the Radio facility fence. This species is fairly common on sandy plateaus on the south Peninsula, but is currently Red Listed as Vulnerable due to habitat loss within its range, which extends as far east as Albertinia (Raimondo *et al* 2009). The single plant on site is neither a significant nor a viable population, and has consequently not been mapped.

*Podalyria sericea* (pink keurtjie; Fabaceae) is an increasingly rare species found in lowland granite and sandstone areas between the Cape Peninsula and Saldanha, and has been Red Listed as Near Threatened (Raimondo *et al* 2009). Although a few plants (<30) were found on site in 2008 a large population is likely to have germinated from soil stored seedbanks after the 2011 fire. The species was found in the western arm of the site, and is still quite common in the Kommetjie area.

*Gladiolus jonquilliodorus* is Red Listed as Endangered (Raimondo *et al* 2009) and is known from historical records (CapeRares) to have occurred "near Imhoffs Caravan Park". This is likely to refer to this site, but it has not been collected here since at least 1965, and it may be locally extinct. However, the species flowers late in the season (November – January), when few botanists are in the field, and it may thus just be overlooked. It is most likely to occur in the western arm of the site, as it prefers slightly damp sands.

There is a slight probability of other, currently undetected threatened plant species occurring on site, and most of these would probably be post-fire annuals or bulbs.

## 6. IDENTIFICATION OF LIKELY BOTANICAL IMPACTS

- Loss of existing natural and partly natural vegetation (Endangered and Vulnerable vegetation types) during the construction stage is the primary direct botanical impact. Most of the loss would be permanent.
- Indirect negative impacts. Various indirect impacts of the proposed development are likely to occur, including habitat fragmentation and loss of current ecological connectivity across the site, disruption of optimal natural fire regime, and possible introduction and spread of alien invasive plants and insects. Most of these impacts would be most pronounced during the operational phase, and would be long term to permanent.

- Cumulative negative effects are likely to be important given the number of similar proposed projects in the area, and the extent of existing development within the habitats concerned (Kommetjie to Fish Hoek, plus elsewhere within the metro).

The following potentially positive ecological impacts have been identified:

- Opportunity to formally conserve significant priority areas of natural habitat in the study area (basically on-site offset or conservation contribution). This would be a private conservation area in the western sector and the eastern parts would preferably be donated to Table Mountain National Park as part of the key Protea Ridge ecological corridor.
- Opportunity to fund and implement an Operational Environmental Management Plan (OEMP) throughout the remaining natural areas on site (mainly within the private conservation area in the west, as the eastern parts could be managed by TMNP), focussing on the most important issues, which are alien vegetation control, access control, fire management and rehabilitation of the ecological corridors.

## 7. IMPACT ASSESSMENT

### 7.1 Assessment of likely direct botanical impacts

The loss of natural or partly natural vegetation in all Low sensitivity areas on site (about 40% of the site) would be of Low botanical significance, and presents no constraints to the proposed development. However, loss of Medium and High conservation value areas on site, and the associated plant Species of Conservation Concern in these areas, is of concern, and would constitute the primary direct botanical impacts. All original vegetation types present on site are either Endangered or Vulnerable on a national basis (Rouget et al 2004; DEA 2009).

Alternative 1 would effectively result in the permanent loss of all Low, Medium and High conservation value vegetation on the site, and with it the entire on site populations of at least seven plant Species of Conservation Concern. This would be an impact of High negative significance at the local and regional scale, especially given that the whole eastern part of the site is classified as a CBA1a in terms of the City of Cape Town's Biodiversity Network (Holmes et al 2008).

Alternative 2 is a significant improvement over Alternative 1, and would result in the conservation of about 35-40% of the natural vegetation on site, including about 75% of the priority High conservation value areas, and about 75% of the on site populations of the seven known plant Species of Conservation Concern. The main problem with this layout is that it was drawn up prior to the fire in 2011 and that it is does not adequately conserve the priority conservation areas in the western arm, and would result in significant loss of the associated plant Species of Conservation Concern. About 50% of the CBA1a area on the eastern part of the site would be lost, although at least half of this is within an area deemed to be of Low botanical conservation value. Overall significance of the botanical impact is likely to be Medium to High negative, at a local and regional scale.

Alternative 3 is a significant improvement over Alternatives 1 and 2, and would result in the conservation of about 70% of the natural or partly natural vegetation on site, including over 98% of the priority High conservation value areas, and over 98% of the on site populations of the seven known plant Species of Conservation Concern. The main advantage of this layout is that it takes into account the priority conservation area in the western arm of the site, and would conserve all of the key habitat and threatened species in this area. However, about 40% of the CBA1a area on the eastern part of the site would be lost, although more than half of this is within an area deemed to be of Low botanical conservation value. Overall significance of the botanical impact of this Alternative is likely to be Low negative prior to mitigation, at a local and regional scale.

**Table 1:** Summary of the likely direct botanical impacts (mostly at the construction phase) of the project.

| Altern-ative | Nature of impact | Extent of impact | Duration of impact | Intensity | Probability of occurrence | Status of the impact | Degree of confidence | Level of significance | Significance after mitigation |
|---|---|---|---|---|---|---|---|---|---|
| **1** | Loss of most (>80%) natural vegetation on site, including at least 7 SCC | Local & regional | Permanent | High | Definite | -ve | High | High | High -ve |
| **2** | Loss of up to 25% of High conservation value vegetation on site, part of local populations of 7 SCC | Local & regional | Permanent | Medium - High | Definite | -ve | High | Medium - High | Depends on mitigation (see Alt 3) |
| **3** | Loss of up to 2% of High conservation value vegetation on site, up to 2% of local sub-populations of certain SCC | Local & regional | Permanent | Low | Definite | -ve | High | Low | Low -ve |
| **No Go** | None | N/A | Temporary | Low | Unknown to Low | Neutral | Medium | Neutral | Neutral |

### 7.2 Assessment of likely indirect botanical impacts

Various indirect botanical impacts of the proposed development are likely to occur, including habitat fragmentation and loss of current ecological connectivity across the site, disruption of optimal natural fire regime, and possible introduction and spread of alien invasive plants and insects. Most of these impacts would be most pronounced during the operational phase, and would be long term to permanent.

In the case of Alternative 1 development would cover most of the site and thus there would be no indirect impacts on the vegetation on site, as effectively nothing would remain. However, there would be indirect impacts on the adjacent areas of natural vegetation, and because development would extend right to the eastern boundary of the site the impacts would extend further east than for Alternatives 2 or 3, and would thus have more of a negative impact on the adjacent Protea Ridge corridor.

Alternative 2 allows for an ecological corridor between the conservation area in the western arm and the Protea Ridge area, and for a buffer onto the latter at the eastern

edge of the site, but because the former is surrounded by development there will be indirect impacts acting on it. These edge effects include increased chance of soil disturbance along development edges, associated alien plant invasion, and possible disruption of natural seed dispersal syndromes by alien Argentine ant invasions associated with human settlement. Additional indirect impacts include possible disruption of optimal fire regimes, and increased trampling (dogs, people) and flower picking in the remaining natural areas. The partial buffer onto the Protea Ridge corridor would help minimise indirect negative impacts on this area. Many of these impacts can be at least partly mitigated by good environmental management. An overall assessment of the various likely indirect negative impacts is difficult to make for this alternative, but the significance thereof is on average likely to be Medium negative.

Alternative 3 allows for a fairly wide (at least 30m) ecological corridor between the conservation area in the western arm and the Protea Ridge area, and for a minimum of a 15m buffer onto the latter at the eastern edge of the site, both of which will help minimise indirect negative impacts, such as edge effects. These edge effects include increased chance of soil disturbance along development edges, associated alien plant invasion, and possible disruption of natural seed dispersal syndromes by alien Argentine ant invasions associated with human settlement. Additional indirect impacts include possible disruption of optimal fire regimes, and increased trampling (dogs, people) and flower picking in the remaining natural areas. The partial buffer onto the Protea Ridge corridor would help minimise indirect negative impacts on this area. Many of these impacts can be at least partly mitigated by good environmental management. An overall assessment of the various likely indirect negative impacts is difficult to make for this alternative, but the significance thereof is on average likely to be Low to Medium negative.

**Table 2:** Summary of the likely indirect botanical impacts (mostly at the operational phase) of the project.

| Altern-ative | Nature of impact | Extent of impact | Duration of impact | Intensity | Probability of occurrence | Status of the impact | Degree of confidence | Level of significance | Significance after mitigation |
|---|---|---|---|---|---|---|---|---|---|
| **1** | Mostly edge effects on Protea Ridge corridor | Local and adjacent areas | Permanent | Low to Medium | Definite | -ve | High | Low to Medium | Low to Medium -ve |
| **2** | Edge effects, alien plant & ant invasion; trampling, fire regime disruption. | Local & adjacent areas | Temporary to Permanent | Medium | Definite | -ve | High | Medium | Low - Medium -ve |
| **3** | Edge effects, alien plant & ant invasion; trampling, fire regime disruption. | Local & adjacent areas | Temporary to Permanent | Low | Definite | -ve | High | Low | Low -ve |
| **No Go** | Alien plant invasion; possible lack of appropriate fire regime | Site | Temporary | Low to Medium | Fairly probable | -ve | Low - Medium | Low - Medium | Low-Medium -ve |

### 7.3 Assessment of Cumulative Botanical Impacts

In many respects an assessment of botanical impacts at the regional scale is effectively an assessment of cumulative botanical impacts, as cumulative impacts are those experienced by the habitat and vegetation type concerned, which usually also occur elsewhere within the region (rather than just at the site scale). There has been extensive loss of all three vegetation types represented on site, and particularly so for Hangklip Sand Fynbos and Cape Flats Sand Fynbos, and both are hence regarded as threatened on a national basis. This loss is ongoing, due mainly to ongoing urban expansion, as well as alien plant invasion and other threats (sand mining, etc). At the Peninsula scale the site occupies a critical position adjacent to the only feasible ecological corridor linking the northern and southern halves of the Table Mountain National Park, and in this sense the cumulative or regional impacts are perhaps more important than for many other sites. Development has been proposed on the site immediately to the south (Helme 2005a), and will no doubt be considered on portions of the privately owned land to the east, and there is thus significant development pressure on the remaining natural and partly natural habitats in the area.

On balance the overall cumulative botanical impacts of the preferred Alternative 3 are considered to be Low negative, largely because the development layout has been very much informed by the key ecological constraints, and because the development actually allows for the formalised conservation of most of the sensitive habitat on the site, and facilitates the expansion of the important Protea Ridge corridor immediately to the east.

### 7.4 Positive Impacts of Alternative 3

Alternative 3 could result in the long term conservation of most of the key botanical habitat on the site. However, the survival of this habitat and the important species will be dependant on ongoing environmental management, including alien vegetation and fire management. The eastern natural areas (due to the location east of the development) could be donated to TMNP and managed by them, whilst the western areas will have to be managed by a Home Owners Association (HOA) or this management could be subcontracted by them to a specialist environmental management company such as The Nature Conservation Corporation.

The other development alternatives and the No Go alternative have significantly fewer potential positive impacts, although the latter also has significantly lower direct negative impacts.

## 8. COMPARISON OF ALTERNATIVES

**Alternative 1** would have an unacceptably High negative botanical impact and is not considered further.

**Alternative 2** would have a Medium to High negative impact on the High conservation value areas in the western arm of the site, and the five associated threatened plant species. If any mitigation was to be considered it would essentially have to involve a layout similar to that proposed for Alternative 3, plus all other mitigation noted for Alternative 3.

**Alternative 3** is the best of the proposed development alternatives from a botanical perspective, and would have an acceptable Low negative botanical impact prior to mitigation. Alternative 3 would be strongly favoured over the No Go alternative if ongoing environmental management of key open space is put in place, but the No Go alternative may prove to be the preferred alternative in the absence of this

mitigation. There are significant positive impacts associated with both the current and the fully mitigated Alternative 3 (Section 7.4) which are not likely to be realised in the No Go alternative.

The **No Go alternative** is often a compelling alternative from an environmental perspective, at least at first glance. Direct impacts will obviously be absent (positive from a botanical point of view), at least in the short term (although of course it does not exclude the possibility of future development). However, an array of indirect negative impacts could impact on the vegetation on site, including heavy grazing, partial development (according to its zoning), inappropriate fire regime management, and lack of alien invasive plant management. The likelihood of any or all of these actually happening depends on a range of factors that cannot be predicted, but it is likely that at least some negative impacts may be felt. The No Go alternative also essentially means that the eastern parts of the site would not be contracted into the Protea Ridge Corridor and would not then be managed by TMNP.

## 9. ESSENTIAL MITIGATION

Essential mitigation is factored into the assessment of post mitigation impact, and is regarded as both feasible and reasonable.

**Design phase:**

- No bulk services should impact on mapped areas of High botanical sensitivity, except where this is unavoidable, such as where these are within existing designated pipeline servitudes (see Figure 3 for existing servitudes).

**Construction Phase:**

- The outer boundaries of all approved development footprints and erven must be surveyed and demarcated prior to construction of any bulk services. Demarcation should be by means of posts that are at least 1m tall, and strung with coloured rope. The proposed detention pond position should also be demarcated before development.
- No heavy machinery or personnel on site should be allowed outside the demarcated development areas at any stage.
- No temporary dumping of building materials or sand should be allowed outside the demarcated development areas.

- No invasive alien grasses (such as ryegrass or oat straw) may be planted or introduced for sand stabilisation or any other purposes.
- An ECO should be regularly on site (at least once a day) during the bulk services phase, and should be responsible for adherence to all environmental requirements, and the fining and reporting of any infringements.

**Operational Phase**

- Presumably a Home Owners Association (HOA) will be set up, which should then become the managing authority for the conservation area (Private Open Space) area of at least 1.88ha in the western arm of the development. The developer should ensure that there is adequate funding for all ongoing environmental management requirements that will have to be overseen or subcontracted by the HOA. This funding usually comes out of a HOA levy and this may be an appropriate method in this case.
- No alien invasive vegetation (as per CARA legislation) may be planted or maintained anywhere on the development. In this regard it is worth specifying that kikuyu grass (*Pennisetum clandestinum*) is a highly invasive species and perhaps the biggest threat to the natural vegetation on site, and may not be maintained or planted anywhere on the development, neither within private erven nor within public areas.
- Ongoing alien invasive management must be undertaken every year throughout the development and conservation area. Appropriate, DWA approved methodology should be used, and no herbicide may be sprayed anywhere within the conservation areas, due to significant impacts on adjacent non-target species
- Gardens on private erven may cultivate exotic but non-invasive species, but all landowners should be encouraged to plant only suitable locally indigenous Strandveld and Fynbos species.
- The Fynbos in the conservation area is part of a fire driven system, and thus needs fire once every 10 -15 years. As the entire site burned in 2011 this gives the HOA some leeway prior to the next fire being necessary. A fire management plan must form part of the overall Environmental Management Plan (EMP) for the site, which is to be overseen by the HOA. Drawing up this plan and the carrying out thereof could be subcontracted to a person or organisation with experience thereof. The entire conservation area should be

burnt once every 10-15 years, ideally in late March or April. 5m wide firebreaks around the edges could be cut by hand no more than two weeks prior to the controlled fire.

- Monitoring of the environmental management on site should be undertaken by an independent professional, or by City of Cape Town Environmental Management staff. This should commence within one year of any approval of this project, and should thereafter be once a year for the first five years after approval, and thereafter every two years. The person monitoring should focus on condition of the natural vegetation in the conservation area, presence of alien vegetation, and any other disturbances that need to be controlled, and they should prepare a report for the HOA.

## 10. CONCLUSIONS AND RECOMMENDATIONS

- Alternative 1 has unacceptably high negative botanical impacts and should not be considered further.
- Alternative 2 is a significant improvement over Alternative 1, but would have a significantly greater botanical impact than Alternative 3, and is consequently not recommended.
- Alternative 3 is the best of the development alternatives put forward, and its overall botanical impacts are likely to be Low negative, prior to mitigation. If the main operational phase mitigation requirements are put in place the overall botanical impact would probably not be reduced beyond the acceptable Low negative level. This would be slightly preferable to the No Go alternative (with a Low to Medium negative botanical impact).
- It is thus recommended that Alternative 3 be approved, but with all essential mitigation requirements outlined in Section 9.

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