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BOTANICAL BASELINE ASSESSMENT OF FIVE POTENTIAL HOUSING SITES IN SWELLENDAM.

Submitted to: EcoImpact Legal Consulting (Pty) Ltd

Client: Swellendam Municipality

29 Nov 2017

DECLARATION OF INDEPENDENCE AND EXPERTISE

In terms of Section 33 of the National Environmental Management Act (No. 107 of 1998) (NEMA) Environmental Impact Assessment (EIA) Regulations specialists involved in Impact Assessment processes must declare their independence and present the details of the person who prepared the report and their expertise.

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:

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Surname : HELME
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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 Greater Cape Floristic Region.

A selection of relevant previous botanical work is as follows:

Baseline assessment of two sites in Struisbaai (EcoImpact 2017); Botanical assessment of proposed N2 upgrade Riversdale – Heidelberg (Gibb 2017); Assessment of proposed petrol station site, Cape Town Film Studios (Chand Environmental 2016); botanical assessment of portion of Afdaksrivier 525, Hawston (E Terblanche & Associates 2016); specialist review of botanical IA studies for proposed Kapteinsklip development node, Mitchells Plain (Khula Environmental 2016); assessment of proposed development on farm Palmiet Valley 54, Wellington (Doug Jeffery Environmental Consultants 2015); ecological assessment of proposed Arcelor Mittal power station, Saldanha (ERM 2015); Klawer pipeline assessment, Redhill (TEP 2015); De Grendel SDF inputs (Footprint Environmental 2015); Communicare Morningstar assessment (mlh

Architects 2015); Wolwerivier constraints (TEP 2014); assessment of proposed Hoek van de Berg development, Hawston (PHS Consulting 2014); Garden Cities corridor (mlh Architects 2014); Mitchells Plain & Brentwood Park scans (TEP 2014); CoCT BioSolids Beneficiation IA, Vissershok (RMS; 2013); De Grendel 24G study (De Grendel; 2013); Koeberg Visitors Centre constraints study (Stauch Vorster; 2013); Scarborough Erf 766 IA (Terramanzi; 2013); Protea Ridge IA, Kommetjie (Doug Jeffery; 2013); Delft Sand Mine (EnviroSci Africa; 2012); Atlantic Beach study (Kantey & Templer; 2012); Capri Erf 953 rehabilitation plan (Madigan Trading, 2012); Phillipi erf (SEC 2012); Constantia Erf 3035 (SEC 2012); Ocean View Erf 5144 (GNEC 2011); Oakhurst farm, Hout Bay (SEC 2010); Ocean View infill housing (IW Terblanche & Associates 2010); Rondebosch Common running path (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); Dassenberg 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 extension (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); 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 & SANParks; 2002); Elsies Peak development (private client, 2003); Edith Stephens Wetland Park Survey (Botanical Society of SA 2002); Chapman's Peak toll road IA (MALA 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).

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1. INTRODUCTION

This botanical baseline assessment was commissioned in order to help inform the possible development and environmental authorisation process for five Municipal sites in the Swellendam area (see Figure 1). The study is intended to provide baseline botanical information that can be used to guide the potential development process for some or all of these. The sites range in size from 8ha to 50ha, as shown in Figure 1.

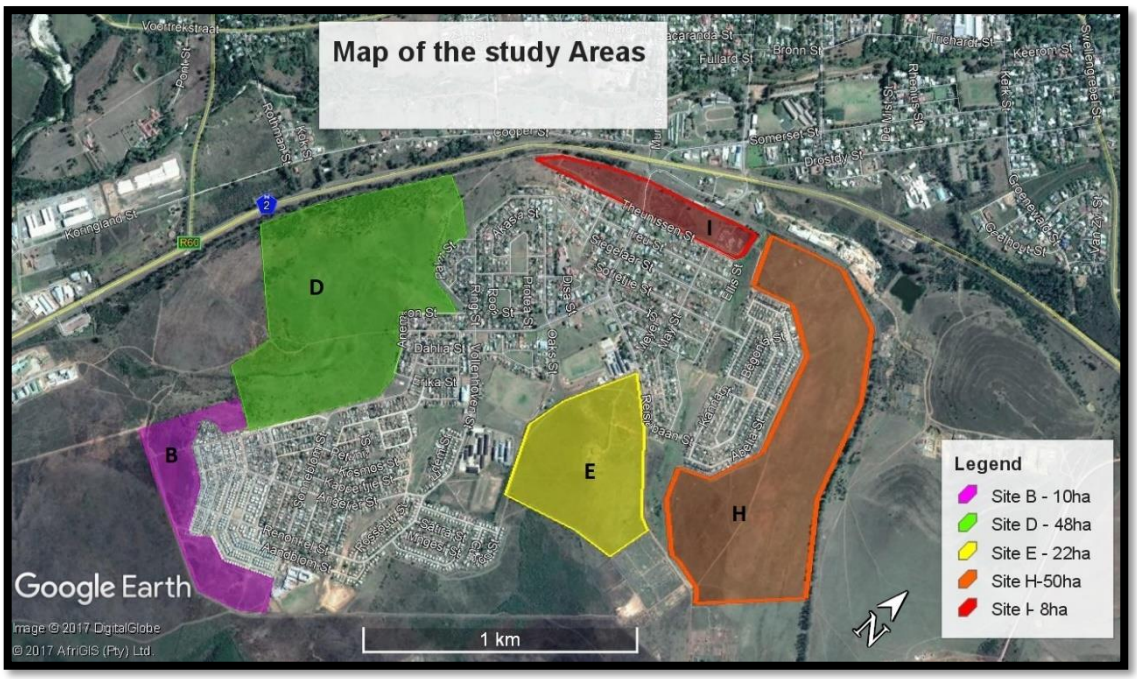

Figure 1: Aerial image showing the five study areas.

2. TERMS OF REFERENCE

The Terms of Reference for this study were as follows:

- undertake a site visit to assess the vegetation in the study areas
- compile a baseline report that describes the vegetation in the study areas and places it in a regional context, including its status in terms of the latest CapeNature Biodiversity Spatial Plan (Pence 2017)
- identify and locate any plant Species of Conservation Concern (as per Redlist website) in the study areas
- provide an overview and map (providing Google Earth kmz files) of the ecological conservation significance (sensitivity) of the sites. This will essentially be a constraints study that should be used to inform any potential development layout.

- Identify likely ecological issues that need to be taken into account in the planning and IA phases, including a preliminary summary of the likely botanical significance of site development.

3. LIMITATIONS, ASSUMPTIONS AND METHODOLOGY

The study areas were visited on 9 November 2017. The site visit was undertaken relatively late in what is normally considered the optimal peak, spring flowering period in this primarily winter rainfall region, but the area often receives significant early summer rain and I was able to identify nearly all perennial species on site, and some (but not all) of the annual and geophytic species were visible and identifiable. The overall confidence level in the accuracy of the botanical findings is moderate to high. The study areas were walked and sometimes driven, and all plants were noted, and various photographs and plant specimens were taken. The author has undertaken extensive work within the region over the last twenty years, which facilitates the making of local and regional comparisons and inferences of habitat quality and conservation value.

Botanical sensitivity was determined based partly on the regional and national products noted below, in combination with 20 years of experience in botanical surveys in the Western Cape, drawing on knowledge of species diversity, distribution of rare plant species, habitat rarity and integrity, ecological connectivity, and rehabilitation potential.

Reference is made to the South African Vegetation Map (Mucina & Rutherford 2006 and 2012 updates), to the National Spatial Biodiversity Assessment (Rouget *et al* 2004), and to the National List of Threatened Ecosystems (DEA 2011). In addition, the CapeNature Biodiversity Spatial Plan (Pence 2017) was also referenced.

Given that the all the sites support a Vulnerable vegetation type (see Discussion) all examples of this habitat that are in good condition and support at least 35% of the expected species diversity are rated as being of <u>High sensitivity</u> areas. These areas also typically support particularly high numbers of plant Species of Conservation Concern (SCC; Raimondo *et al* 2009), and it is not uncommon to find more than ten SCC within a single hectare!

<u>Medium sensitivity</u> areas have been partly disturbed and typically support 10 - 30% of the original species diversity (prior to disturbance), may have limited

numbers of a few plant Species of Conservation Concern, and have moderate rehabilitation potential.

Low sensitivity areas have been heavily disturbed, with changes to the soil structure and composition, and support less than 10% of the expected indigenous plant diversity, no plant Species of Conservation Concern, and rehabilitation potential is considered to be low, at least without substantial investments in time, materials and money.

No development proposal or layouts were provided for assessment. No formal definition of the No Go alternative was provided by the applicant or their team, and in the absence of a definition this author has assumed that it implies maintenance of the status quo, which (from a botanical perspective) means little or no physical disturbance, except along the edges of the existing tracks, ongoing illegal dumping on parts, heavy grazing in places, and some alien invasive plant management.

4. DESCRIPTION OF THE VEGETATION

4.1 General Physical Characteristics of the Study Areas

Soils in all the sites are generally loamy, with a mix of sand and clay, and are typically very stony. The stones are alluvial, river worn pebbles and boulders derived from Table Mountain Group sandstones (many of them manganese rich), and there are occasional patches of exposed silcrete on some of the sites. The central portion of site D supports a wetland and drainage line, but none of the other sites have any wetland vegetation. Vegetation age ranges from recently burnt to more than ten years without fire. As discussed in the site specific descriptions some parts or all of some of the sites have been previously cultivated (e.g. sites H and I), whilst others have never been cultivated (sites E and D). Most of the sites have significant slopes, but none are very steep. Site E has very little flat ground, and parts of site B are very steep.

4.2 National and Regional Context

The study area is within the Southwest Fynbos bioregion (Mucina & Rutherford 2006), and is part of the Fynbos biome, located within what is now known as the Core Region of the Greater Cape Floristic Region (GCFR; Manning & Goldblatt 2012). The GCFR is one of only six Floristic Regions in the world, and is the only one largely confined to a single country (the Succulent Karoo component extends into southern Namibia). It is also by far the

smallest floristic region, occupying only 0.2% of the world's land surface, and supporting about 11500 plant species, over half of all the plant species in South Africa (on 12% of the land area). At least 70% of all the species in the Cape region do not occur elsewhere, and many have very small home ranges (these are known as narrow endemics). Many of the lowland habitats are under pressure from agriculture, urbanisation and alien plants, and thus many of the range restricted species are also under severe threat of extinction, as habitat is reduced to extremely small fragments. Data from the nationwide plant Red Listing project indicate that 67% of the threatened plant species in the country occur only in the southwestern Cape, and these total over 1800 species (Raimondo *et al* 2009)! It should thus be clear that the southwestern Cape is a major national and global conservation priority, and is quite unlike anywhere else in the country in terms of the number of threatened plant species.

The CapeNature Spatial Biodiversity Plan (Pence 2017) indicates that large parts of the study areas are mapped as Environmental Support Areas (ESAs) or Critical Biodiversity Area (CBA 2), and only a small portion as CBA1. It should be noted that I do not agree with much of this automated mapping, as it is clearly inaccurate and misrepresents the real conservation priorities in the area.

The CBA2 category is supposed to reflect degraded areas that still have biodiversity value, whereas the CBA1 category is supposed to apply to undisturbed areas, and ESAs are also generally partly degraded areas and are of lower status than CBAs. All CBAs are considered essential for the maintenance of biodiversity and for meeting national conservation targets for species and ecological processes. In reality large parts of the areas mapped as ESA and CBA 2 are essentially pristine areas which should actually be mapped as CBA1. The mapping would seem to indicate that sites B, D and E are of higher conservation value than I and H, which is supported. The mapping overstates the conservation case for sites I and H, as both are previously cultivated.

The Swellendam – Riversdale Plain, of which the study area is a part, is an acknowledged centre of plant diversity in the Cape Region, with high levels of plant endemism (*i.e.* species restricted to the region; Manning & Goldblatt 2012). The vegetation in the area is under severe threat from loss to agricultural expansion, expanding urban development, and ongoing alien plant invasion. Although there are a few small conservation areas (Bontebok National Park and Werner Frehse NR) there are still large areas of critical habitat that are unconserved, and thus vulnerable to loss.

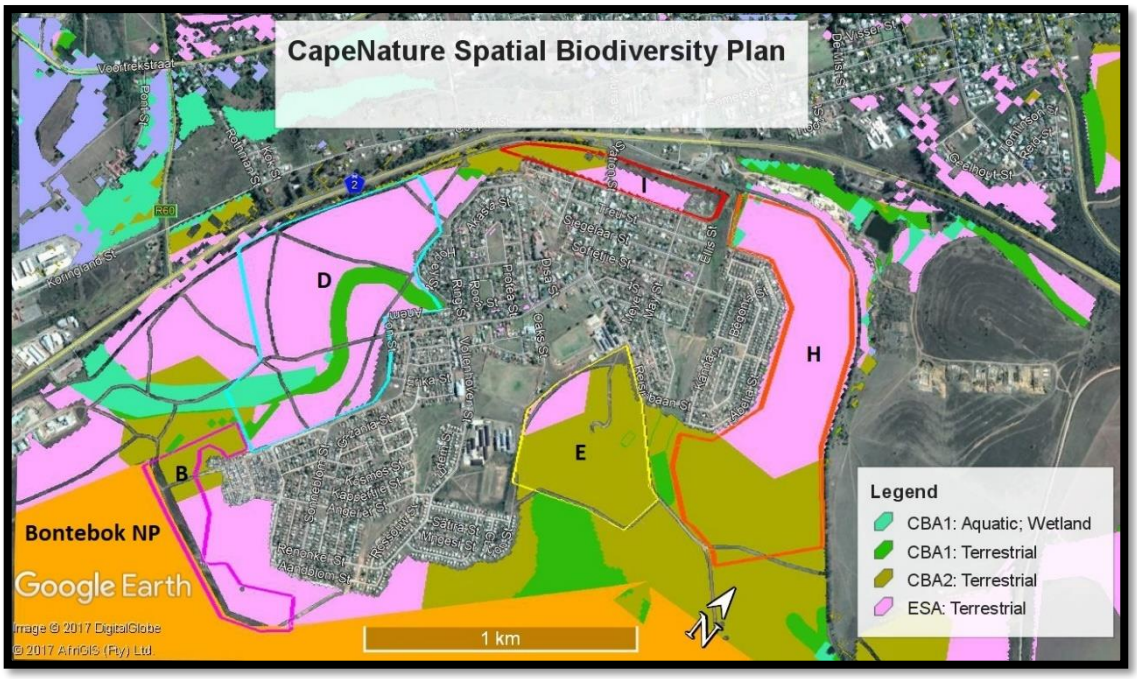

Figure 2: Extract of the CapeNature 2017 Spatial Biodiversity Plan, showing that large parts of the study areas are mapped as Environmental Support Areas (ESAs) or Critical Biodiversity Area (CBA 2), and only a small portion as CBA1. It should be noted that I do not agree with much of this automated mapping, as it is clearly inaccurate and misrepresents the real conservation priorities in the area.

The vegetation map of South Africa (Mucina & Rutherford 2012) indicates that the study areas would originally all have been dominated by **Swellendam Silcrete Fynbos**, and this classification is supported by observations. No vegetation map is shown as all sites are mapped as this unit. The National List of Threatened Ecosystems (DEA 2011) classifies **Swellendam Silcrete Fynbos** as **Vulnerable** on a national basis (DEA 2011), and has less than 56% of its total original extent remaining, some 4% is conserved, and the national conservation target is 30% of its original total extent (Rouget *et al* 2004). The unit is thus poorly conserved, and is vulnerable to further habitat loss, which is ongoing.

Site B

This site lies between the Bontebok National Park (to the south) and existing shack and housing settlements (to the north). Some patches of vegetation have been burnt in the last year, whilst others were last burnt more than ten years ago.

Plant diversity is high in the least disturbed areas, and low to moderate in the more disturbed areas. There is limited woody alien invasive vegetation (<2%

cover), as much of it (*Acacia mearnsii*; black wattle) has been cut, presumably by both local residents and possibly by the Municipality. Impacts include grazing and trampling by cattle and goats, littering and dumping, and use of the areas as a toilet.

Plate 1: View of *Protea repens* (suikerbos) dominated veld in Area D, looking northwest. This area is of High sensitivity. The area to the left has been recently burnt.

Plate 2: View of eastern part of site B, looking northeast, showing degraded area, which extends east toward ate school in the distance.

Indigenous species noted in the higher sensitivity areas include *Protea repens, Leucadendron salignum, Serruria acrocarpa, Athanasia trifurcata, Dodonaea*

angustifolia, Cliffortia ruscifolia, Berkheya armata, Ehrharta calycina, Melinis repens, Pelargonium crispum, Albuca cooperi, Hebenstretia sp., Cymbopogon plurinodis, Lobelia coronopifolia, Restio capensis, Osteospermum moniliferum, Helichrysum cymosum, H. cylindriflorum, Hermannia scabra, H. lavandulifolia, Tritonia flabellifolia, Searsia pallens, S. rosmarinifolia, S. rehmanniana, Centella affinis, Aspalathus spp., Senecio spp., Hibiscus pusillus, Lanaria lanata, Barleria pungens, Crassula nudicaulis, Phylica velutina, Lebeckia sp., Aspalaths quinquefolius, Ursinia discolour, Athanasia juncea, Tribolium hispidum, Wahlenbergia tenella, Holothrix sp., Polygala affinis, Ficinia sp., Tephrosia capensis, Metalasia densa, Erica sp., Pelargonium proliferum, Cyanella hyacinthoides, P.chamaedryfolium, Cynodon dactylon and *Passerina corymbosa*.

The more disturbed areas are typified by weedy indigenous species such as *Cynodon dactylon, Athanasia trifurcata*, and aliens such as *Pennisetum clandestinum* (kikuyu), *Conyza bonariensis*, *Senecio pterophorus, Pennisetum sphacelatum* and *Plantago lanceolata*.

Only one plant Species of Conservation Concern (SCC) was recorded in this area. *Phylica velutina* is Redlisted as Near Threatened, and is relatively common along the southern base of the Langeberg mountains, and its presence here in low numbers is not particularly significant.

About 75% of the site is of Low sensitivity, about 5% of High sensitivity and about 20% of Medium – High sensitivity (see Figure 3).

Site D

The eastern edges of the site are degraded, along the existing edge of development, but 95% of this site is of High botanical sensitivity, and includes a fine, extensive wetland that runs most of the length of the site (see Plate 3). Most of the vegetation on site has been burnt in the last five years. There is also a well tended grave on site.

Wetland species include *Zantedeschia aethiopica, Pennisetum macrourum, Fuirena coerulescens, Typha capensis, Conyza scabrida, Cliffortia strobilifera, Cyperus sp* and *Watsonia meriana*.

The high diversity vegetation in the drier areas includes all or most of those noted for site B, plus the following additional species: *Acrodon bellidiflorus, Macledium*

spinosum, Gnidia laxa, Anacampseros lanceolata, Bulbine mesembryanthemoides, Themeda triandra, Scabiosa columbaria, Heterolepis peduncularis, Brachiaria serrata, Aristida junciformis, Cephalophyllum diversiphyllum, Tripteris tomentosa, Arctopus echinatus, Ornithogalum thyrsoides, Crossyne guttata, Aspalathus grobleri, Aspalathus joubertiana, Euryops tenuissimus, Muraltia acerosa, Satyrium longicolle, *Arctotis acaulos* and *Protea piscina*.

There are a few plants of alien invasive *Hakea sericea*, plus some quite dense patches of alien black wattle (*Acacia mearnsii*), plus an old plantation of gum trees (*Eucalyptus* sp.) along the northern edge of the site overlooking the N2 highway (see Plate 5).

At least eleven plant Species of Concern Concern were recorded on the High sensitivity parts of this site (see Table 1), including two very localised species that are listed as Critically Endangered. This large number is indicative of the high conservation value of this site.

Species	**Redlist Status**	**Abundance on site**
Freesia fergusoniae	Endangered	Uncommon
Cephalophyllum diversiphyllum	Near Threatened	Rare
Cyrtanthus odorus	Critically Endangered	Rare
Cyrtanthus leptosiphon	Critically Endangered	Rare
Pelargonium fergusoniae	Endangered	Rare
Elegia squamosa	Endangered	Uncommon
Muraltia acerosa	Vulnerable	Rare
Aspalathus grobleri	Endangered	Uncommon
Gladiolus bilineatus	Vulnerable	Rare
Agathosma minuta	Endangered	Rare
Phylica velutina	Near Threatened	Uncommon

Table 1: List of plant Species of Conservation Concern recorded in site D.

Plate 3: View, looking north, of wetland in valley bottom, running through most of Site D. This entire area is of High botanical and ecological sensitivity.

Plate 4: View of High sensitivity natural vegetation in Site D, looking north.

Plate 5: View of old gum plantation along the N2 highway in Site D, which is the only part of the area that it is Low botanical sensitivity.

Site E

This site is the local high point, surrounding the municipal water reservoir. The lower north side is partly disturbed (and hence of lower sensitivity), but the remainder is largely pristine and is of High sensitivity. The vegetation would appear to be about three years old. The species recorded were very similar to those on Site D, but there is no wetland element, and hence no wetland species.

Plant SCC recorded in this area include *Phylica velutina* (NT), *Cyrtanthus leptospihon* (CR), *Muraltia acerosa* (VU), *Elegia squamosa* (EN) and *Aspalathus grobleri* (EN).

Site H

This large area was previously a cultivated field (more than ten years ago), and is now dominated by a mix of agricultural grasses and herbs, and some pioneer indigenous species. Species include *Eragrostis curvula, Cynodon dactylon, Trifolium angustifolium, Metalasia acuta, Athanasia juncea, Selago glutinosa, Cotula turbinata, Hyparrhenia hirta, Elytropappus rhinocerotis, Ursinia discolor, Anthospermum spathulatum, Gnidia laxa, Protea repens, Pelargonium crispum, P. chamaedryfolium, Aristida juncifolia, Melinis repens, Corycium orobanchoides* and *Tritonia disticha*.

No plant SCC were recorded, and none are expected to occur. Botanical sensitivity is Low.

Plate 6: Site E in the foreground, looking northeast towards site H (on hill between houses and the line of gum trees). The area in the foreground is of High sensitivity.

Plate 7: View of previously cultivated area in Site H, looking northeast. This area was previously cultivated and is of Low botanical sensitivity.

Site I

This area was also previously a cultivated field (more than ten years ago), and is now also dominated by a mix of agricultural grasses and herbs, and some pioneer indigenous species. Species include *Eragrostis curvula, Cynodon dactylon, Trifolium angustifolium, Metalasia acuta, Athanasia juncea, Selago glutinosa, Cotula turbinata, Gymnosporia buxifolia, Hermannia scabra, Hyparrhenia hirta,*

Elytropappus rhinocerotis, Anthospermum spathulatum, Gnidia laxa, Pelargonium crispum, P. chamaedryfolium, Aristida juncifolia and *Melinis repens.*

No plant SCC were recorded, and none are expected to occur. Botanical sensitivity is Low.

4.4 Botanical Sensitivity Assessment

More than 90% of Sites D and E are of High botanical sensitivity (see Figure 3), as they support near pristine examples of high diversity Swellendam Silcrete Fynbos, which is a Vulnerable vegetation type (DEA 2011). These areas also support at least five plant Species of Conservation Concern (SCC).

Sites H and I have been previously cultivated and are now of Low botanical sensitivity, notwithstanding the fact that parts of these areas are mapped as ESAs and CBAs. These areas offer the best potential for development due to their low botanical diversity and lack of plant SCC.

About 30% of Site B is of High or Medium to High botanical sensitivity, and these parts should ideally not be developed, but the remainder (Low sensitivity) could be developed.

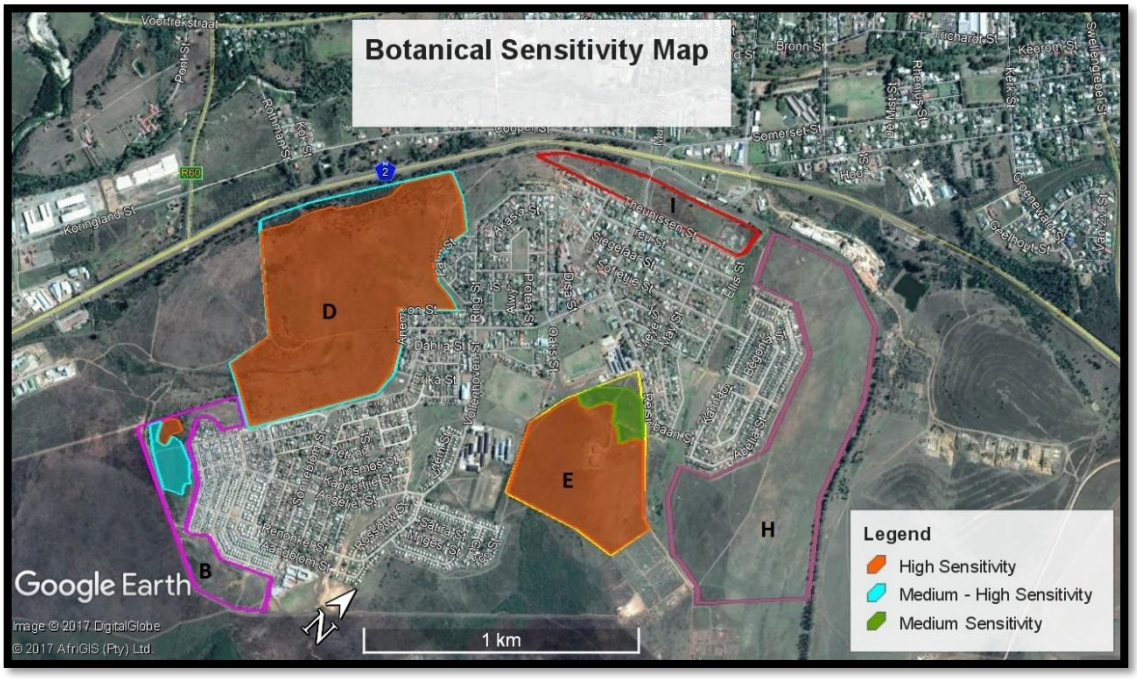

Figure 3: Botanical Sensitivity Map of the study areas. Unshaded areas within the study areas are of Low botanical sensitivity.

5. IDENTIFICATION OF LIKELY BOTANICAL IMPACTS

Development of the study areas will effectively result in the loss of all existing natural and partly natural vegetation on site. This loss will occur at the construction phase and is regarded as a direct impact. An additional important direct construction phase impact will be the loss of the site populations of the plant Species of Conservation Concern on site.

Indirect impacts usually occur at the operational phase. Indirect impacts are often related to the loss of ecological connectivity and habitat fragmentation associated with development, and the impacts on fire return intervals for adjacent natural vegetation.

Site	Duration of impact	Status of the impact	Degree of confidence	Level of significance
B (development of entire site)	Permanent	Negative	High	**High negative**
B (development of only Low sensitivity portion)	Permanent	Negative	High	**Low negative**
D	Permanent	Negative	High	**High negative**
E	Permanent	Negative	High	**High negative**
H	Permanent	Negative	High	**Low negative**
I	Permanent	Negative	High	**Low negative**

Table 2: Summary impact Assessment table assuming total development of each site. The impacts are both construction and operational phase botanical impacts, as outlined above.

6. CONCLUSIONS AND RECOMMENDATIONS

- Areas of High botanical sensitivity (see Figure 3) should not be developed, and should ideally be designated formal conservation areas by the Municipality. These areas have a high plant diversity, support at least five plant Species of Conservation Concern, and the vegetation type is Vulnerable on a national basis. Loss of these areas to development would be associated with a High negative botanical impact.
- This essentially means that Areas D and E should not be developed at all, and only a portion of Area B should be developed. The mitigation hierarchy should be observed, which begins with avoidance of the impact.
- Areas H and I present no significant botanical constraints to the proposed development, and these areas thus present the best opportunities for the expansion of housing in the study area, along with the Low sensitivity portion of Area B.
- Area B presents a tricky scenario, as ideally the Medium – High and High sensitivity areas should be incorporated within the adjacent Bontebok National Park, as should the open areas between here and the industrial area to the north, along with the whole of area D. However, the feasibility of this is not known, and if these portions of Area B are not developed they are anyway likely to become degraded over time, by dumping, grazing and even informal cultivation. This begs the question should they not be authorised for development now, in return for formal conservation of the other High sensitivity areas (e.g. Areas D and E)?
- The small Low sensitivity areas on sites D and E could be developed without significant botanical impact, but are probably too small to be economically viable development areas.
- The landowner (Municipality) should be required to implement their duty of care under NEMBA and CARA, and should clear all invasive alien vegetation in the High sensitivity areas, using CapeNature approved methodology. All woody invasive alien vegetation should be removed from from these areas as soon as possible, and certainly by the end of 2018. A qualified alien clearing contractor should be employed to undertake the work, as they should have the tools and knowledge to do the work properly. In this regard it is essential that no spraying of herbicide be allowed on site, due to the high risk of collateral damage to non-target plants. Appropriate herbicide must be hand painted onto the cut stumps of all felled *Acacia* within ten minutes of felling, in order to prevent resprouting. All cut alien material must be removed by hand from the

conservation area, and can then be chipped for mulch, or should be neatly stacked into pyramids on site.

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