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**BOTANICAL BASIC ASSESSMENT OF PROPOSED
DARLING COUNTRY CLUB DEVELOPMENT.**

Prepared for: CK Rumboll, Malmesbury

Client: Darling Golf and Country Estate (Pty) Ltd

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1. INTRODUCTION AND STUDY AREA

This botanical basic assessment was compiled in order to help inform decisions regarding the proposed subdivision and development of Erf 401 and Portions 8 & 11 of Farm 577, Darling. The proposed development includes single residential units, group housing and a retirement village, in addition to an extension of the golf course. The total site is estimated to be about 80ha in size, and lies south of the railway, and north of the road from Mamre to Darling (see Figure 1). The existing golfcourse and an approved new development lie to the west, with farmland to the east. The property (zoned Agriculture) slopes gently from south to north, with a significant seasonal wetland (pan) in the lowpoint of the northern area (see Figure 1). Apart from the pan the rest of the site has been ploughed and is currently also grazed by sheep.

Although the site is within the high priority conservation region of the Swartland (albeit the Darling outlier of the main Swartland) the site was not identified in the Cape Lowlands Project as a key Renosterveld remnant, and was not included in the 5 year or 20 year priority conservation areas (Von Hase *et al* 2003). This can be attributed to the lack of natural vegetation on the site.

The only outcropping rock occurs on site around the pan, where there are patches of ferricrete (koffieklip) amongst the clays, and this hardpan layer is clearly the reason that the seasonal pan has formed in this area. The soils on the rest of the site are deep granitic loams, overlain in areas by granitic sands (especially in the north).

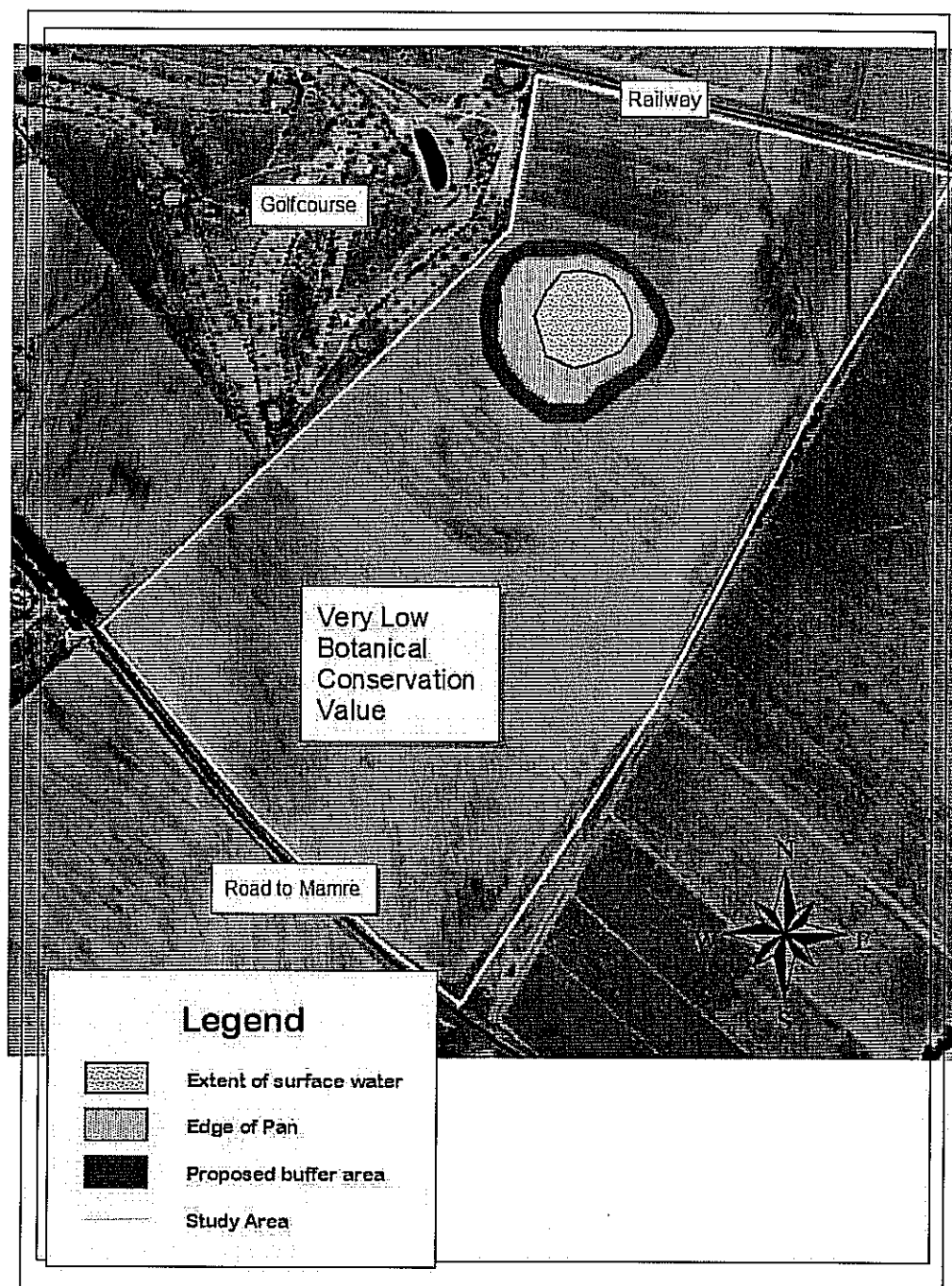


Figure 1 : Satellite image of the area, showing the site and features of the seasonal pan that need to be taken into account by the development planning.

2. TERMS OF REFERENCE

The terms of reference for this study were the standard CapeNature recommended TOR for biodiversity specialists, and 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 the 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. new SA vegetation map/National Spatial Biodiversity Assessment, etc.*)

Species level

- a. Red Data Book species (give location if possible using GPS)
- b. The viability of and estimated population size of the RDB species 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)
- c. The likelihood of other RDB species, or species of conservation concern, occurring in the vicinity (include degree of confidence).

Other pattern issues

- b. Any significant landscape features or rare or important vegetation associations such as seasonal wetlands, alluvium, seeps, quartz patches or salt marshes in the vicinity.
- c. 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).

- d. The condition of the site in terms of current or previous land uses.
 - In terms of **biodiversity process**, identify or describe:
 - a. The key ecological “drivers” of ecosystems on the site and in the vicinity, such as fire.
 - b. 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)
 - c. Any possible changes in key processes, e.g. increased fire frequency or drainage/artificial recharge of aquatic systems.
 - d. Would the conservation of the site lead to greater viability of the adjacent ecosystem?
 - Would the site or neighbouring properties potentially contribute to meeting regional conservation targets for both biodiversity pattern and ecological processes?
 - Is this a potential candidate site for conservation stewardship?
 - What is the significance of the potential impact of the proposed project – with and without mitigation – on biodiversity pattern and process at the site, landscape, and regional scales?
 - Provide a map, at suitable scale, of key conservation areas and corridors.
 - 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 AND ASSUMPTIONS

The botanical survey was undertaken on 6 May 2008, which is not ideal, as the first winter rains had not yet fallen and virtually all plants were still dormant. Any bulbs (geophytes) and annuals that might be present were thus not visible or identifiable. Nevertheless a fairly good understanding of the vegetation and its conservation importance was probably obtained merely by taking a habitat based approach, and the overall conclusions are likely to be accurate in spite of the constraints. The long

history of cultivation on most of the site has more than likely destroyed all but the most resilient weedy indigenous plant species on site. Because of the seasonal limitations this assessment cannot be considered a full account of the species present on site, and must thus be regarded as an underestimation of the true flora. A follow-up survey in spring 2008 would certainly help increase confidence levels in the findings of this report.

I have been able to access the rare species GIS database maintained by CapeNature, and have made reference to that where necessary.

A single development layout was presented for assessment (see Figure 2), and it is thus assumed that large parts of the site will be lost to development. Little detail is provided in this layout in terms of the exact golfcourse layout, and it is thus assumed to be fairly flexible.

The No Go alternative is assumed to mean no development on the site, and the maintenance of the *status quo* (ongoing agriculture and grazing).

4. THE VEGETATION

The new vegetation map of South Africa (Mucina & Rutherford 2006) indicates that Swartland Granite Renosterveld is the natural vegetation type in this area.

Swartland Granite Renosterveld is considered a Critically Endangered vegetation type according to the National Spatial Biodiversity Assessment (Rouget *et al* 2004), with less than 21% of its original extent remaining, and a now unreachable national conservation target of 26%. This means that all remaining examples of this vegetation type need to be conserved in order to move towards this national target, and in addition some disturbed examples of this vegetation type will need to be restored to actually reach the target. A mere 0.2% of the original extent is formally conserved, with another 2% conserved on private land (Rouget *et al* 2004), which means that most of the remaining fragments are highly vulnerable to loss. The primary threats are regarded as agriculture and urbanisation, with alien invasive vegetation as a secondary threat. The vegetation type is restricted to the southwestern Cape, in the area between Darling, Malmesbury and Somerset West, in lowland and foothill areas with granite-derived soils. As these soils are relatively

fertile large areas have been ploughed up for cultivation. Seasonally wet areas may be common within this vegetation type.



Plate 1: View of site from the Mamre road, looking northeast over ploughed lands. The vlei / pan has been indicated in blue, and the golfcourse is visible to the left.

As can be seen from Plate 1 there is essentially no natural vegetation remaining on the site, due to a long history of ploughing and related agricultural activities. The entire ploughed portion of the site thus has a Very Low botanical conservation value.

The most important feature of the site is now the seasonal pan and associated vlei area (see Figure 1 and Plates 2 & 3). The word pan is here used to describe the hard, flat bottomed central portion of the wetland (Plate 2), and the word vlei is used to describe the seasonally wet but vegetated edge of the pan (Plate 3). This area could be described as a Cape Vernal Pool, which is a recognised vegetation type according to Mucina & Rutherford (2006). This is a Critically Endangered vegetation type (Rouget et al 2004) found mostly in the Swariland region, and is essentially a seasonal vlei area with a distinct flora, and many Red Data Book listed plant species.

At the time of the survey only a single unidentified species of perennial *Cotula* (gansogie; Plate 4) was found in the pan. Based on discussion with the experts on this group of plants it appears that the *Cotula* is an undescribed species, or a species known only from the southern Cape, and is thus either way or real scientific and conservation interest. Given the presence of this perennial *Cotula* there is a distinct possibility that various bulbs and annuals may still also be present in the unploughed bottom of the pan – but this could only be confirmed during a spring site visit. If there is indeed any seasonal vegetation still present in this pan there is a good possibility that at least some of the species will be Red Data Book listed species, as this habitat is known to support a number of rare habitat endemic species (see Sect 4.1).



Plate 2: View looking southwest towards eastern edge of Darling, showing pan edge and scattered ferricretes.

The most prominent species in the vlei section is the paintbrush sedge *Eleocharis limosa* (Plate 3), which is a widespread species of shale and granite wetlands. The unpalatable and weedy shrub *Galenia africana* (kraalbos) is present on the drier northern edge of the vlei, along with a couple of plants of *Asparagus rubicundus* (katnaels). No other indigenous species were observed during the survey.



Plate 3: View of western edge of the pan, with the paintbrush sedge *Eleocharis limosa* prominent in the upper part of the pan (vlei portion).

4.1 Rare Species

In addition to the possible new *Cotula* species found in the pan (see Plate 4) the potential exists for at least three rare species to occur in this vlei and pan area, as all three have been recorded in a similar pans within about 6km of the site. All three are bulbs (geophytes) that are dormant in summer and autumn and only become visible once the pans are full of water and the bulbs start growing. It is however also possible that the pans have been too heavily grazed, destroying the original populations of such species on this site.

Cadiscus aquaticus is Red Data Book listed as Critically Endangered (Raimondo et al – in prep.), and was recently recorded from a pan just east of the new low cost housing some 1km north of the site (pers. obs.). *Oxalis disticha* (not currently Red Data listed) is a rare floating aquatic, and *Lachenalia bachmanii* is restricted to the same seasonal pan habitat in the Swartland and is Red Data Book listed as Endangered (Raimondo et al – in prep.). *Oxalis natans* (Critically Endangered) was historically recorded from pools in the area but seems to be extinct in all but two localities (Stellenbosch and Gouda).

All these species should be searched for during a spring site visit, and all stock should be removed from this area by end of June in order to avoid grazing damage.

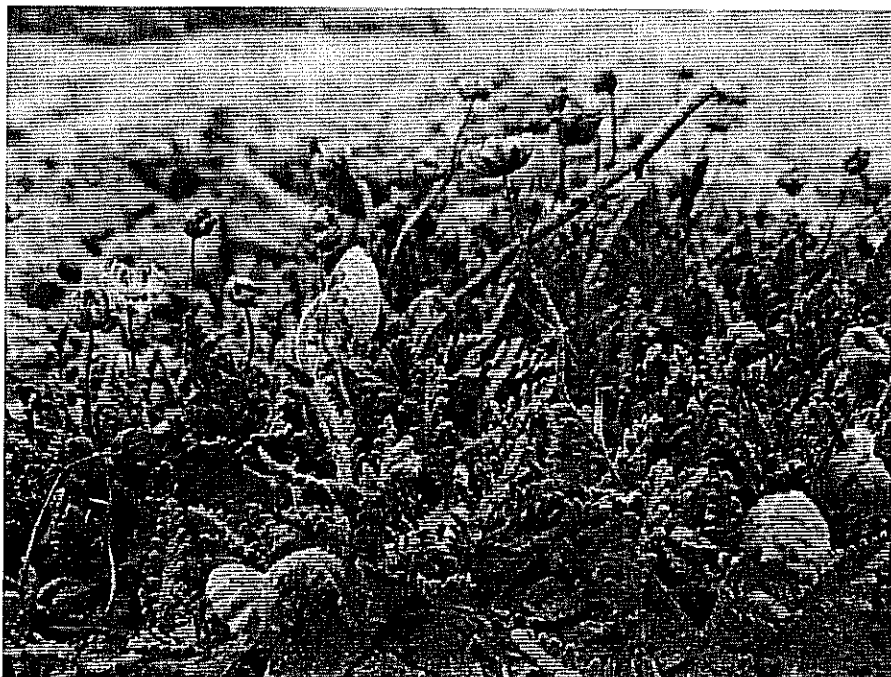


Plate 4: This *Cotula* (*gansogii*) growing in the bottom of the pan seems to be either an undescribed (new) species or the first record on the west coast of a southern Cape species, and is thus of real interest.

5. CONSERVATION ASSESSMENT

The regularly ploughed areas have a Very Low botanical conservation value, as virtually all indigenous plant species have been eliminated from this area, and natural recovery potential is low, given that development borders the site to the west, and existing agriculture on all other sides. Note however that rehabilitation of the vegetation in certain areas could be undertaken with specialist intervention, by means of reseedling with suitable indigenous species.

The vlei / pan area has a High ecological conservation value, and the botanical conservation value cannot be assessed until after a spring site visit. It is suggested that the botanical conservation value would be likely to be High to Very High, as even if the rare species noted in Sect 4.1 are not present the habitat is still perfect for reintroduction of these and other highly threatened species. The reintroduction of

these species would also create a very attractive feature of the vlei, at least for three months of the year when it is likely to contain water (July – Sep).

Most of the site is not suitable for the Stewardship Program of CapeNature, as there is not enough natural habitat remaining on site. However, the vlei and buffer area could become an important conservation area, especially if the rare species noted are present, or are reintroduced, and then some sort of formal conservation status for the vlei and buffer area would be strongly recommended, and the Stewardship Program could consider signing up just this portion of the site, as ecological management will be required, and the Stewardship Program could help advise with this.

6. IMPACT ASSESSMENT

The only real area of concern on the site is the area around the vlei/pan, including its proposed 20 to 30m buffer area, and this is thus the focus of mitigation suggestions. As there is no significant natural vegetation elsewhere on site and botanical conservation value is Very Low the impacts of development on the bulk of the site is correspondingly Very Low.

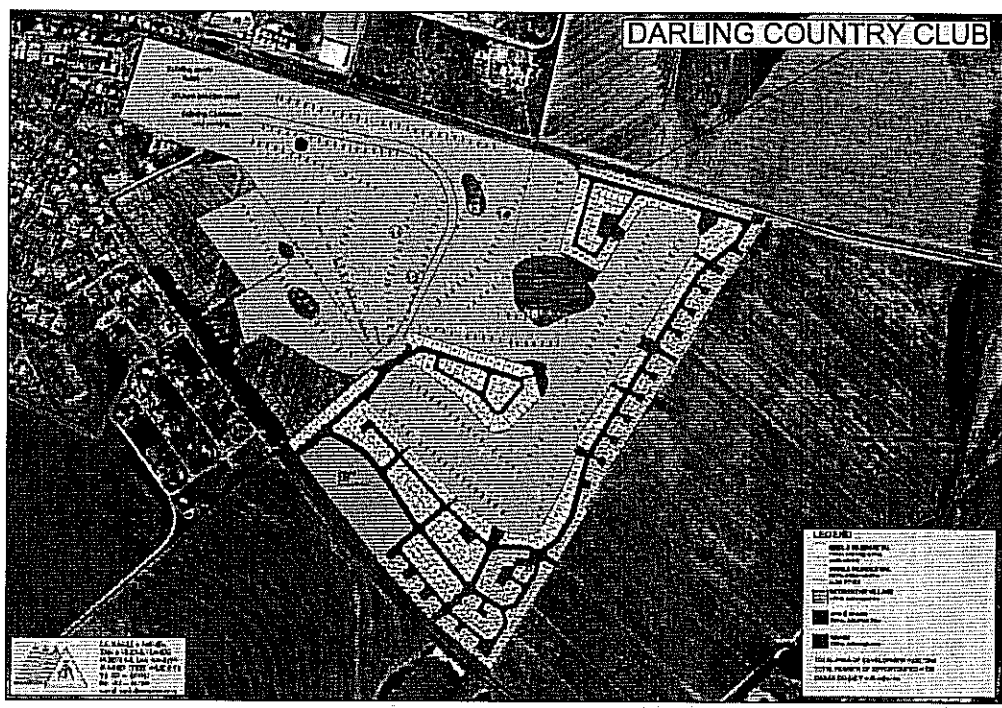


Figure 2: Proposed layout provided for assessment.

Assessment of Direct impacts:

It appears that the current layout would impact directly (and indirectly) on about 10% of the proposed wetland buffer area, in the area northeast of the vlei. The first five erven should thus be moved back (to the northeast by about 20m) to accommodate the proposed buffer area.

Holes 5, 16 and 17 of the proposed new golfcourse may have a direct impact on the vlei and its buffer area. It is essential that no disturbance of the vlei or its buffer area occurs, and thus a more detailed golf course design should be produced which recognises the 20-30m buffer area around the vlei.

Overall direct impacts are deemed to be Medium negative at this stage (prior to mitigation).

<u>Nature of impact</u>	<u>Extent of impact</u>	<u>Duration of impact</u>	<u>Intensity</u>	<u>Probability of occurrence</u>	<u>Status of the impact</u>	<u>Degree of confidence</u>	<u>Level of significance</u>	<u>Significance after mitigation</u>
Intrusion of 5 erven into vlei buffer area on NE side of vlei	Local & regional	Permanent	Medium	High	Negative	High	Medium negative	Low negative

Table 1: Summary table of direct botanical impacts.

Assessment of Indirect impacts:

Indirect impacts usually occur at the operational phase, and in this instance the effects of concern would be those on the vlei and pan area (part of a Critically Endangered vegetation type).

It is likely that the estate and home owners and managers would (even if not initially then some time in the future) want to make a permanent wetland feature of the vlei and pan area, as most people believe that a pond full of water is more attractive than a seasonal wetland that is dry for 8 months of the year. However, the impacts of this would be High negative, as permanent water in the vlei would completely change the nature of the wetland and would drown and rot all the rare bulbs potentially occurring in this habitat. Even a leaking irrigation pipe from the golfcourse irrigation system could have negative impact if leakage occurred into the vlei during the dry season.

Alien grasses from the golfcourse (notably kikuyu – *Pennisetum clandestinum*) would be likely to invade the wetland and its edges. The golfcourse is likely to use kikuyu grass as this is the most commonly used grass on golfcourses (including on current course), but it is highly invasive and very aggressive, especially in damp areas. Invasion of this area by alien grasses would eventually have a Medium negative impact.

Fertiliser and herbicide leachate from the golfcourse could become an issue. This would be likely to drain into the vlei area and cause eutrophication (unnatural nutrient enrichment) and associated algal blooms, and possible plant mortality.

Overall indirect impacts could thus be High negative prior to mitigation.

<u>Nature of impact</u>	<u>Extent of impact</u>	<u>Duration of impact</u>	<u>Intensity</u>	<u>Probability of occurrence</u>	<u>Status of the impact</u>	<u>Degree of confidence</u>	<u>Level of significance</u>	<u>Significance after mitigation</u>
High probability of permanent water in vlei; nutrient & herbicide leaching into vlei; alien grasses	Local & regional	Long term to Permanent	Medium to High	High	Negative	Medium to High	High negative	Low to Medium negative

Table 2: Summary table of indirect botanical impacts.

6.1 Assessment of No Go Scenario

The No Go scenario is usually defined as maintenance of the status quo. In this case this would mean no development of this Agriculture zoned site, but it would also mean no opportunity to rehabilitate the vlei and its buffer area, and no opportunity to reintroduce locally indigenous Renosterveld vegetation in gardens and open spaces.

The potentially High conservation value of the vlei area is not recognised in this scenario, and as nothing will be done to conserve or manage the vlei or the rare species that could occur there (or be reintroduced), and presumably over time they will all but disappear.

It is concluded that the No Go scenario is likely to have a Low negative ecological impact in the medium to long term.

6.2 Overall Assessment

The High negative impacts associated with this development are primarily a result of possible negative impacts on the vlei area, and can be easily mitigated, so that post mitigation impacts range from Low positive to Low negative. In addition, further mitigation, such as planting of only suitable indigenous species on the estate would help enhance the positive effects of the development.

<u>Nature of impact</u>	<u>Extent of impact</u>	<u>Duration of impact</u>	<u>Intensity</u>	<u>Probability of occurrence</u>	<u>Status of the impact</u>	<u>Degree of confidence</u>	<u>Level of significance</u>	<u>Significance after mitigation</u>
Current Proposal	Local & regional	Long term to Permanent	Medium to High	High	Negative	Medium to High	High negative	Low Positive to Low negative
No Go scenario	Local & regional	Long term to Permanent	Low to Medium	Medium	Negative	Medium to High	Low negative	Not Applicable

Table 3: Summary table for botanical impacts – development proposal and No Go alternative. Mitigation as per Section 7.

7. ESSENTIAL MANAGEMENT MITIGATION

The following mitigation is factored into the assessment as it is considered both achievable and essential.

- The vlei and pan area must remain as a seasonal wetland, and must not become a permanent waterbody. All the rare bulb species potentially associated with this habitat will rot and disappear if the area becomes a permanent wetland, and tall reedbeds are likely to develop in the vlei.
- There must be a 20 - 30m buffer (variable according to contours – wider in lower gradient areas) of natural vegetation around the outside edge of the vlei, as depicted in Figure 1. As there is currently no natural vegetation in this area it will have to be rehabilitated. This buffer is essential to provide the highly sensitive seasonal vlei environment from invasive species that will be associated with the development and the golfcourse, as well as to protect the vlei from any herbicide and fertiliser leaching or drift from the golfcourse. In addition, it will also serve to create a more attractive feature of the area.
- The rehabilitation of the buffer area and vlei must be undertaken by a suitably qualified restoration ecologist, with inputs from the botanist and freshwater

ecologist. The applicant must pay all costs associated with rehabilitation of the vlei area and buffer.

- Portions of holes 5, 15, 16 and 17 will have to be realigned to accommodate the wetland buffer area.
- No alien invasive vegetation (as per CARA legislation) may be used, cultivated or maintained on the estate. Note that kikuyu grass may however be used on the golfcourse, but only on holes not adjacent to the vlei area. This means that no kikuyu may be used on holes 5, 15, 16 and 17. Possible alternatives in this area are *Cynodon dactylon* (fynkweek) or *Paspalum vaginatum*.
- All private and public open space areas should be planted with a selection of suitable, waterwise and locally indigenous Renosterveld and Fynbos species approved by the botanist. This replanting of natural vegetation will help increase biodiversity in this currently heavily agricultural area. It is suggested that wild olives (*Olea europaea* ssp. *africana*) and wild peaches (*Kiggelaria africana*) be the main indigenous trees used on the estate, and *Rhus pendulina* (karee) and *Ekebergia capensis* (wild plum) could also be used, although not locally indigenous.
- The applicant must ensure that an Environmental Management Fund is set up to provide ongoing funding for ecological management of the vlei area and its buffer. Management should be in accordance with an operational phase EMP prepared with inputs from all specialists, and incorporating all management requirements listed in Section 7 of this report.

8. CONCLUSIONS AND RECOMMENDATIONS

- The vlei area should be the subject of a follow up spring botanical survey to assess the presence or absence of a number of potential rare plant species.
- A freshwater ecologist should be asked to provide additional input on the extent of the seasonal wetland (vlei) and its buffer area, and on management requirements for this area.
- No bulk services or roads should be routed within the vlei/pan area or its buffer area.
- Final layouts of the golfcourse and erven should be approved in writing by the botanist.
- The No Go scenario is not likely to be positive for the site as the remaining vlei vegetation is likely to be continually degraded by agriculture and grazing.

- If all the mitigation in Section 7 is implemented the overall impact of the development on the vegetation could be reduced to a level of Low positive (at best) or Low negative (at worst, if certain mitigation is not carried out successfully).
- The vlei area could become the subject of a Stewardship Program agreement with CapeNature, pending the results and recommendations of a spring botanical survey.

9. REFERENCES

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