APPENDIX A: FLORA REPORT

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Flora Assessment

of

ELSBURGSPRUIT CANAL ON PORTION 731 OF THE FARM DRIEFONTEIN 87 IR

October 2013

Report author: Mrs. P. Lemmer (Cert. Sci. Nat: B.Sc.)
Report verified/reviewed by: Dr. L.A. Coetzer (D.Sc., Prof. Nat. Sci.)

VERIFICATION STATEMENT

Petro Lemmer is a Certified Natural Scientist with the S.A. Council for Natural Scientific Professions. This communication serves to verify that the flora report compiled by Petro Lemmer has been prepared under my supervision, and I have verified the contents thereof.

Declaration of Independence: I, Dr. L.A. Coetzer (421009 5029 089) declare that I:

- am committed to biodiversity conservation but concomitantly recognize the need for economic development. Whereas I appreciate the opportunity to also learn through the processes of constructive criticism and debate, I reserve the right to form and hold my own opinions and therefore will not willingly submit to the interests of other parties or change my statements to appease them
- abide by the Code of Ethics of the S.A. Council for Natural Scientific Professions
- act as an independent specialist consultant in the field of botany
- am subcontracted as specialist consultant by Galago Environmental CC for the proposed Elsburg Spruit canal project described in this report
- have no financial interest in the proposed development other than remuneration for work performed
- have or will not have any vested or conflicting interests in the proposed development
- undertake to disclose to the Galago Environmental CC and its client as well as the competent authority any material information that have or may have the potential to influence the decision of the competent authority required in terms of the Environmental Impact Assessment Regulations, 2006.

Dr. L.A. Coetzer

DECLARATION OF INDEPENDENCE

I, Petro Lemmer (440129 0025 085) declare that I:

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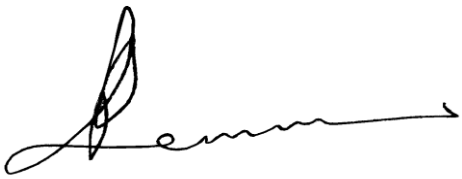

Petro Lemmer

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1. INTRODUCTION

Galago Environmental was appointed to conduct a vegetation survey along the proposed route for the Elsburgspruit canal on portion 731 of the farm Driefontein 87-IR, scheduled for construction. The objective was to determine which species might still occur in the vicinity of the proposed route. Special attention had to be given to the habitat requirements of all the Red Data species that may occur in the area. This survey focuses on the current status of threatened plant species occurring, or which are likely to occur in the vicinity of the proposed route, and a description of the available and sensitive habitats in the vicinity of the proposed route.

2. OBJECTIVES OF THE STUDY

- To assess the current status of the habitat component and current general conservation status of the area;
- To list the perceptible flora in the vicinity of the proposed route and to recommend steps to be taken should threatened plant species, plant species of conservation concern and protected plant species be found;
- To highlight potential impacts of the proposed route on the flora in the vicinity of the route; and
- To provide management recommendations to mitigate negative and enhance positive impacts should the proposed route be approved.

3. SCOPE OF STUDY

This report:

- Pertains to the study site as described in subsection 4.2 and is not meant as a report of the general vegetation of the area (subsection 4.1).
- Lists the more noticeable trees, shrubs, herbs, geophytes and grasses observed during the study;
- Indicates medicinal plants recorded and lists alien species;
- Comments on connectivity with natural vegetation on adjacent sites;
- Comments on ecological sensitive areas;
- Evaluates the conservation importance and significance of the area along the proposed route with special emphasis on the current status of resident threatened species; and
- Offers recommendations to reduce or minimise impacts, should the proposed route be approved.

4. STUDY AREA

4.1 Regional vegetation

The study route lies in the quarter degree square 2627BB (Roodepoort). Mucina & Rutherford (2006) classified the area as Soweto Highveld Grassland, a gently to moderately undulating landscape on the Highveld plateau supporting short to medium high, dense, tufted grassland dominated almost entirely by *Themeda triandra,* and accompanied by a variety of other grasses such as *Elionurus muticus, Eragrosyis racemosa, Heteropogon contortus* and *Tristachya leucothrix*. It is in places undisturbed, with scattered small wetlands, narrow stream alluvia and pans. Occasional ridges or rocky outcrops interrupt the continuous grassland cover. This vegetation unit comprises shale, sandstone or mudstone, or the intrusive Karoo Suite dolerites which feature prominently. The soil is deep and red on the flat plains.

The area has summer rainfall and cool-temperate climate with high extremes between maximum summer and minimum winter temperatures, frequent frosts and large thermic diurnal

differences, especially in autumn and spring. This vegetation unit is considered endangered. Its conservation target is 24%. Only few patches are conserved in statutory reserves and a few private nature reserves. Almost 50% of the unit is already transformed by cultivation, urbanization, mining and road infrastructure and some areas have been flooded by dams.

4.2 The study site

The proposed route runs southward along the Elsburg Spruit from the point where the tributary from Witfield dam enters the Spruit. The route then runs between the Driefontein 87-IR opencast mine and the purification plant west of Waverley Care Centre to end at Main Reef Road (Road R29) in the south.

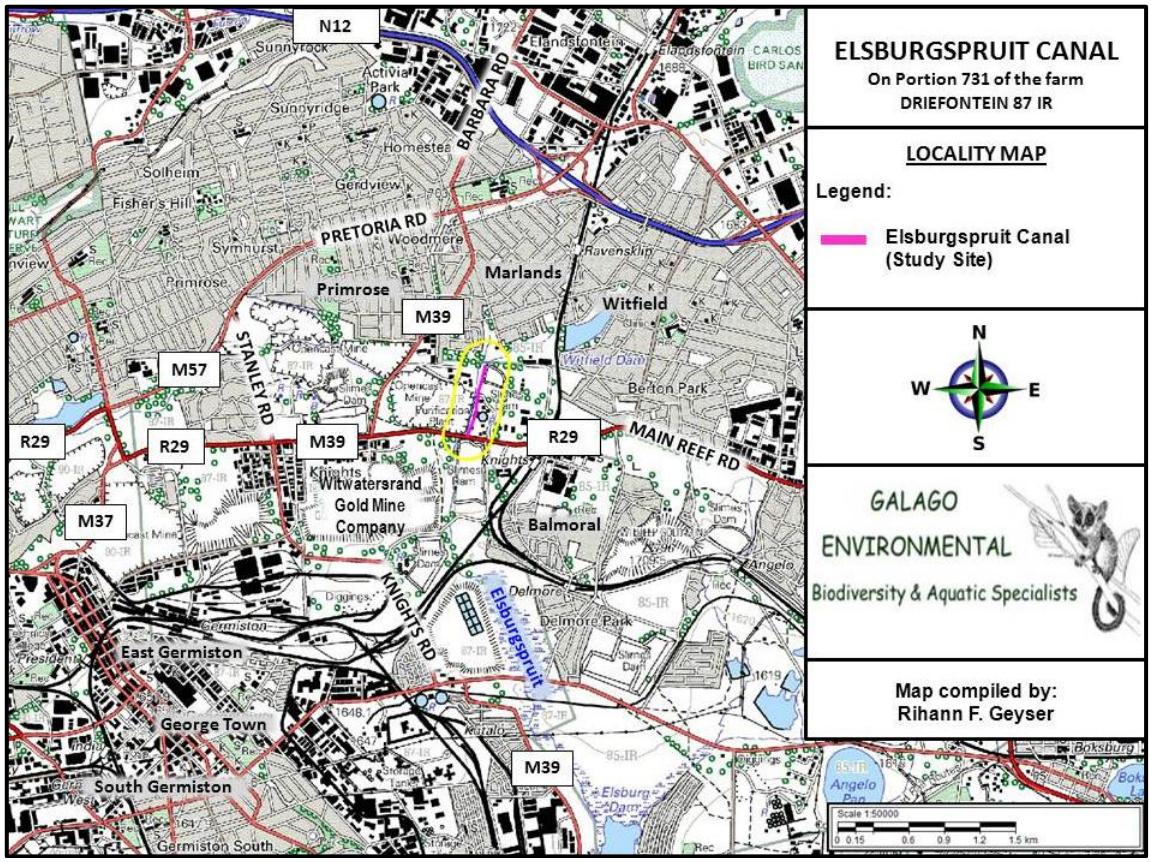

Figure 1: Locality map of the study area

5. METHOD

A desktop study of the habitats of the Red List and Orange List species known to occur in the area was done before the site visit. Information about the Red List and Orange List plant species that occur in the area was obtained from GDARD. The Guidelines issued by GDARD to plant specialists as well as various publications (see Section 11) were consulted about the habitat preferences of the Red- and Orange List species concerned.

The list of plants recorded in the 2628AA quarter degree square was obtained from SANBI and consulted to verify the record of occurrence of the plant species seen along the proposed route. The vegetation map published in Mucina and Rutherford (2006) was consulted about the composition of Soweto Highveld Grassland.

The study site was inspected on 24 August 2013 to determine whether suitable habitat for the Red List species known to occur in the quarter degree square existed. The study units within 200 meters of the proposed route were identified (see Figure 2) and the vegetation recorded in a random zigzag fashion, paying particular attention to areas that at first sight appeared to be sensitive. These areas were meticulously searched for the presence of Red List species.

6. RESULTS

6.1 Vegetation Study units

Two vegetation study units were identified:

- Drainage line vegetation; and
- Mixed alien and indigenous vegetation.

Tables 3 and 4 list the trees, shrubs, geophytes, herbs and grasses actually found on each of the surveyed areas in the vicinity of the proposed route. Figure 2 shows the study units.

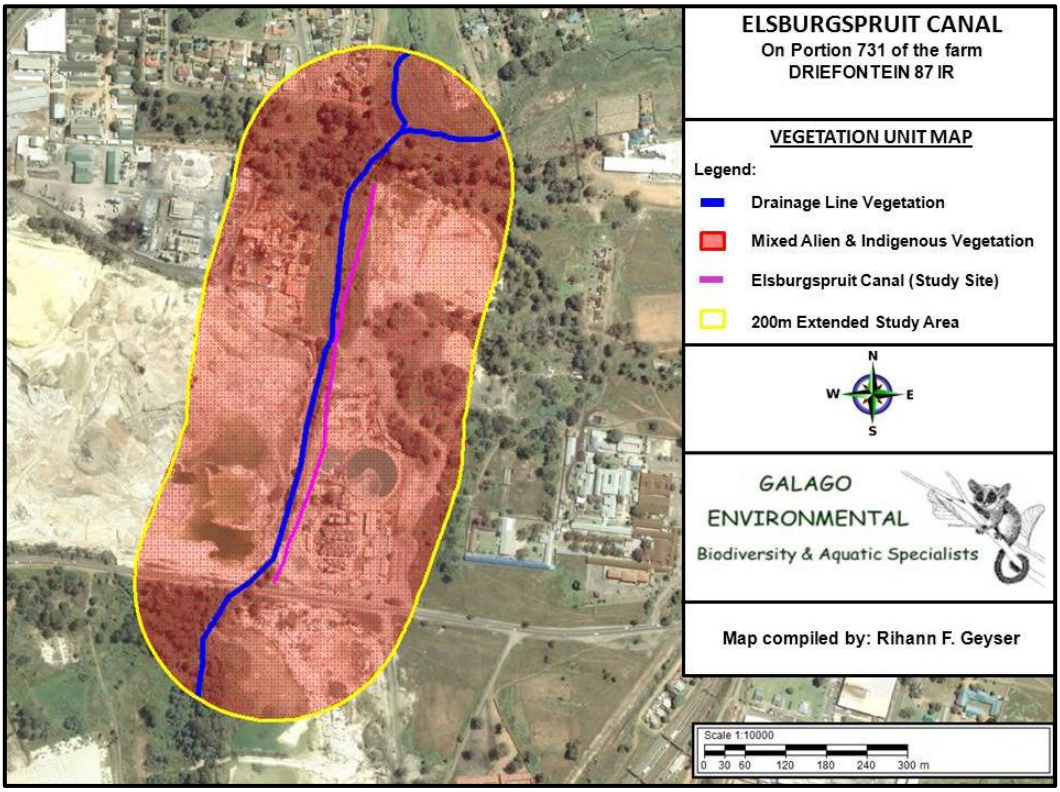

Figure 2: Vegetation study units identified on the study site

6.2 Medicinal plants

The names of known medicinal plants are marked with numbers to footnotes in Table 3 and the footnotes themselves appear at the end of the table. Of the 15 plant species recorded within the study site, one species with medicinal properties were found. Their distribution in the five study units is as follows:

Table 1: Number of medicinal species in the various study units

STUDY UNIT	TOTAL NO OF SPECIES IN STUDY UNIT	NO OF MEDICINAL SPECIES IN STUDY UNIT
Drainage line vegetation	8	1
Mixed alien and indigenous vegetation	10	0

6.3 Alien plants

Alien plants are not listed separately, but are included in the lists as they form part of each particular study unit. Their names are marked with an asterisk in Tables 3 and 4. Nine alien plant species, of which two species were Category 1 Declared weeds, two were Category 2 Declared invaders and one was a Category 3 Declared invader, were recorded within the

boundaries of the study site. The number of alien species in each study unit is reflected in table 2.

Table 2: Number of Alien species in each study unit

STUDY UNIT	NO. OF ALIEN SPECIES	CAT 1	CAT 2	CAT 3	NOT DECLARED
Drainage line vegetation	3	1	1	0	1
Mixed alien and indigenous vegetation	8	2	2	1	3

The alien plant names printed in **bold** in the plant tables are those of Category 1 Declared Weeds and the removal of these plants is ***compulsory*** in terms of the regulations formulated under "The Conservation of Agricultural Resources Act" (Act No. 43 of 1983), as amended.

In terms of these regulations, Category 2 Declared invaders may not occur on any land other than a demarcated area and should likewise be removed.

Although the regulations under the above Act require that Category 3 Declared invader plants may not occur on any land or inland water surface other than in a biological control reserve, these provisions shall not apply in respect of category 3 plants already in existence at the time of the commencement of said regulations. If this is the case, a land user must take all reasonable steps to curtail the spreading of propagating material of Category 3 plants.

6.4 Orange List species along the proposed route

Four Orange List plant species are known to occur in the 2628AA quarter degree square. The habitat was, however, not suitable for any of these species. (See Annexure A for a list of the Orange- and Red List species known to occur in the quarter degree square.)

6.5 Red List species along the proposed route

Eleven Red List plant species are known to occur in the 2628AA quarter degree square, one of them within 5 km of the proposed route. The habitat was, however, not suitable for this species or for any of the other Red List species known to occur in the q.d.s.

6.6 Drainage line vegetation

6.6.1 Compositional aspects and Connectivity

The Drainage line vegetation study unit consisted of very degraded reed and bulrush beds severely infested by *Eucalyptus* sp. Some sedges and grasses were also present, but few could be identified as the area had been burned during winter. The species diversity of this study unit was very low. Of the 15 plant species recorded in the vicinity of the proposed route eight were recorded in the Drainage line vegetation study unit. Of these, only four were indigenous species. The following number of species in each life form was noted:

LIFE FORM	NUMBER OF SPECIES
Annual & perennial herbaceous species	1
Tree species	1
Grasses	3
Geophytes	1
Sedges	2
Total No of species	8

6.6.2 Red– and Orange List species

The habitat of this study unit was not suitable for any of the Red List species or Orange List species known to occur in the quarter degree square

6.6.3 Medicinal and alien species

Three of the nine alien species recorded along the proposed route were found in this study unit. Of these, one was a Category 1 Declared weed and one was a Category 2 Declared invader. One medicinal species was recorded in this study unit.

6.6.4 Sensitivity

As wetlands / drainage lines form corridors for the movement of species, which include pollinators of plant species, this study unit was considered sensitive.

Figure 3: Dense reed and bulrush beds of the Drainage line vegetation.

Figure 4: Drainage line infested with Eucalyptus sp.

Table 3: Plants recorded in the Drainage line vegetation

SCIENTIFIC NAME	INV CAT	COMMON NAMES
Cortaderia* cf *jubata*	**1**	Pampas grass/ Pampasgras
Cyperus sp		
*Eucalyptus sp**	2	Gum tree / Bloekom
Hyparrhenia tamba		Blue thatching grass / Blou tamboekiegras
Juncus effusus		
Phragmites australis		Fluitjiesriet
*Rumex crispus**		Curley dock / Krultongblaar
Typha capensis[1,2]		Bulrush / Papkuil

[1)] Van Wyk, B-E., Van Oudtshoorn, B. & Gericke, N. 2002.
[2)] Watt, J.M. & Breyer-Brandwijk, M.G. 1962.

6.7 Mixed alien and indigenous vegetation

6.7.1 Compositional aspects and Connectivity

The Mixed alien and indigenous vegetation study unit comprised alien *Acacia* and *Eucalyptus* woodland with a few indigenous grass species. Large patches of this study unit were burned. Heaps of dumped soil occurred scattered along the banks of the drainage line. Of the 15 plant species recorded in the vicinity of the proposed route 10 were recorded in this study unit. Of these, two were indigenous species. The following number of species in each life form was noted:

LIFE FORM	NUMBER OF SPECIES
Annual & perennial herbaceous species	1
Tree species	5
Grasses	4
Total No of species	10

6.7.2 Red– and Orange List species

The habitat of this study unit was not suitable for any of the Red List species or Orange List species known to occur in the quarter degree square.

6.7.3 Medicinal and alien species

Eight of the nine alien species recorded along the proposed route were found in this study unit. Of these, two were Category 1 Declared weeds, two were Category 2 Declared invaders and one was a Category 3 Declared invader. No medicinal species were recorded in this study unit.

6.7.4 Sensitivity

This study unit was not considered sensitive.

Figure 5: Mixed alien and indigenous vegetation

Table 4: Plants recorded in the Mixed alien and indigenous vegetation

SCIENTIFIC NAME	INV CAT	COMMON NAMES
*Acacia dealbata**	2	Silver wattle / Silwerwattel
*Acacia decurrens**		Green wattle / Groenwattel
Acacia longifolia*	**1**	Long-leaved wattle / Langblaarwattel
Cortaderia* cf *jubata*	**1**	Pampas grass/ Pampasgras
Cynodon dactylon		Couch grass / Kweek
*Eucalyptus sp**	2	Gum tree / Bloekom
Hyparrhenia tamba		Blue thatching grass / Blou tamboekiegras
*Pennisetum clandestinum**		Kikuyu / Kikoejoe
Schinus molle*	**3**	**Pepper tree / Peperboom**
*Tagetes minuta**		Tall khaki weed / Lang kakiebos

7. LIMITATIONS, ASSUMPTIONS AND GAPS IN KNOWLEDGE

Because the site was visited in the middle of winter when large patches of the study site had been burned, most of the herbaceous plants and geophytes have become dormant and grasses have lost their inflorescences, many plants could not be identified.

8. FINDINGS AND POTENTIAL IMPLICATIONS

The proposed route runs mostly along the drainage line. The species diversity of the drainage line was very low. Removal of the alien species in and along the drainage line will be of great benefit to the wetland.

9. RECOMMENDED MITIGATION MEASURES

The following mitigation measures were developed by GDARD (Directorate of Nature Conservation, 2012) and are applicable to the study site.

- The appropriate agency should implement an ongoing monitoring and eradication program for all invasive and weedy plant species growing within the servitude.
- Rehabilitation of natural vegetation should proceed in accordance with a rehabilitation plan compiled by a specialist registered in terms of the Natural Scientific Professions Act (No. 27 of 2003) in the field of Ecological Science.
- Any post-development re-vegetation or landscaping exercise should use species indigenous to South Africa. Plant species locally indigenous to the area are preferred. As

far as possible, indigenous plants naturally growing along the proposed route, but would otherwise be destroyed during construction, should be used for re-vegetation / landscaping purposes.

- Where a canal is to traverse a wetland, measures are required to ensure that the canal has minimal effect on the flow of water through the wetland.
- Prior to construction, fences should be erected in such a manner to prevent access and damage to any sensitive areas identified in a sensitivity mapping exercise.
- Sealing of surfaces under a bridge or gabion construction should be avoided.
- Disturbance to any wetlands during construction should be minimized. A plan for the immediate rehabilitation of damage caused to wetlands should be compiled by a specialist registered in accordance with the Natural Scientific Professions Act (No. 27 of 2003) in the field of Ecological Science. This rehabilitation plan should form part of the EMP and a record book should be maintained on site to monitor and report on the implementation of the plan.
- Engineering measures are recommended to lower the risk of spillages into any wetlands located within 200m of the canal.

10. CONCLUSION

The species diversity of both study units of the site was very low in comparison with other areas in the 2628AA q.d.s. All Declared Weeds and invaders and other alien species in the vicinity of the proposed canal must be removed and a management plan for the continuing control of the aliens be implemented.

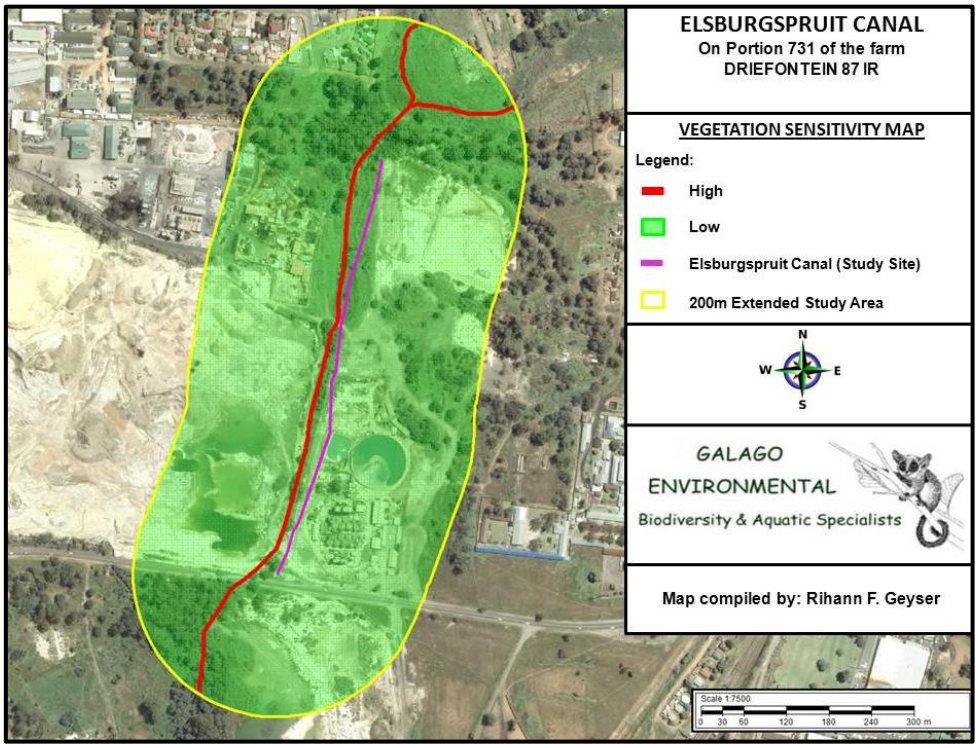

Figure 6: Vegetation sensitivity map

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ANNEXURE A: Red– and Orange List* plants of the 2628AA q.d.s.

Species	Flower season	Suitable habitat	Priority group	Conserv status	PRESENT ON SITE
Adromischus umbraticola subsp *umbraticola*	Sep-Jan	Rock crevices on rocky ridges, usually south-facing, or in shallow gravel on top of rocks, but often in shade of other vegetation.	A2	Near threatened[1]	Habitat not suitable
Callilepis leptophylla	Aug-Jan & May	Grassland or open woodland, often on rocky outcrops or rocky hillslopes.	N/A	Declining[2]	Habitat not suitable
Cineraria austrotransvaalensis	Mar-Jun	Among rocks on steep slopes of hills and ridges as well as at the edge of thick bush or under trees, on all aspects and on a range of rock types quartzite, dolomite & shale. 1400 – 1700m	A3	Near threatened[1]	Habitat not suitable
Cineraria longipes	Mar-May	Grassland, on koppies, amongst rocks and along seep lines exclusively on basalt on south-facing slopes.	A1	Vulnerable[1]	Habitat not suitable
Delosperma purpureum	Nov-Apr	South-facing slopes, grows in shallow soils among quartzitic rocks of crystalline or coglamoratte type in open or broken shade rarely in shade, in grassland with some trees. .	A1	Endangered[1]	Habitat not suitable
Eucomis autumnalis	Nov-Apr	Damp open grassland and sheltered places.	N/A	Declining[2]	Habitat not suitable
Gunnera perpensa	Oct-Mar	In cold or cool continually moist localities, mainly along upland streambanks.	N/A	Declining[2]	Habitat not suitable
Habenaria bicolor	Jan-Apr	Well-drained grassland, at about 1600m.	B	Near Threatened[2]	Habitat not suitable
Habenaria mossii	Mar-Apr	Open grassland on dolomite or in black sandy soil.	A1	Endangered[1]	Habitat not suitable
Holothrix micrantha	Oct	Terrestrial on grassy cliffs, recorded from 1500 to 1800m.	A1	Endangered[1]	Habitat not suitable
Holothrix randii	Sep-Jan	Grassy slopes & rock ledges, usually southern aspects.	B	Near Threatened[2]	Habitat not suitable
Hypoxis hemerocallidea	Sep-Mar	Occurs in a wide range of habitiats. From sandy hills on margins of dune forests to open rocky grassland. Also on dry, stony grassy slopes, mountain slopes and plateaux. Appears to be drought and fire tolerant. Grassland and mixed woodland.	N/A	Declining[2]	Habitat not suitable
Khadia beswickii	Jul-Apr	Open areas on shallow surfaces over rocks in grassland.	A1	Vulnerable[1]	Habitat not suitable
Stenostelma umbelluliferum	Sep-Mar	Deep black turf in open woodland mainly in the vicinity of drainage lines.	A3	Near threatened[1]	Habitat not suitable
▲ *Trachyandra erythrorrhiza*	Sep-Nov	Marshy areas, grassland, usually in black turf marshes.	A3	Near Threatened[1]	Habitat not suitable

[1)] global status
[2)] national status
* Orange listed plants have no priority grouping and are designated 'N/A'
▲ Has been recorded within 5km of the study site. Should suitable habitat be present, it is highly likely that this species occur on the study site.