

**The proposed agricultural development on the Remainder of  
Farm Diepkloof No. 351, within the Kou-Kamma Local  
Municipality, Eastern Cape Province**

**BIODIVERSITY / ECOLOGICAL ASSESSMENT**

**FOR**

**Habitat Link Consulting**

**BY**



**EnviroSci (Pty) Ltd**

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**DATE**

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**REVISION 1**

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## SPECIALIST REPORT DETAILS

This report has been prepared as per the requirements of the Environmental Impact Assessment Regulations and the National Environmental Management Act (Act 107 of 1998), any subsequent amendments and any relevant National and / or Provincial Policies related to biodiversity assessments. This also includes the minimum requirements as stipulated in the National Water Act (Act 36 of 1998), as amended in Water Use Licence Application and Appeals Regulations, 2017 Government Notice R267 in Government Gazette 40713 dated 24 March 2017, which also includes the minimum requirements for a Wetland Delineation Report.

**Report prepared by:** Dr. Brian Colloty Pr.Sci.Nat. (Ecology) / Member SAEIES.

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I, **Dr. Brian Michael Colloty** declare that this report has been prepared independently of any influence or prejudice as may be specified by the National Department of Environmental Affairs Fisheries & Forestry (DEFF) and or Department of Water and Sanitation (DWS).



Signed:...

..... Date:....14 August 2020.....

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# 1. Introduction

Habitat Link Consulting appointed EnviroSci (Pty) Ltd to conduct a biodiversity assessment as part of the application being submitted for the **clearance of vegetation for the proposed agricultural development on the Remainder of the Farm Diepkloof No. 351** (Figure 1).

## 1.1 Aims and objectives

The aim of this report is to provide an assessment of the state and function of the terrestrial and aquatic habitats that occur, together with an assessment of the potential issues posed by the development of the apple and pear orchards.

Where possible this report also provides means to avoid additional impacts or issues, such as where search and recues, rehabilitation and or alien invasive vegetation management will be required. This was based on a site visit conducted on 14 May 2020.

This assessment was also conducted with the NEMA Biodiversity Assessment Protocols, with reference to the DEA Screening Tool results as discussed in Section 7 of this report.

## 1.2 Assumptions and Limitation

To obtain a comprehensive understanding of the dynamics of both the flora and fauna of communities within a study site, as well as the status of endemic, rare or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time constraints these long-term studies are not feasible and are thus mostly based on instantaneous sampling.

Therefore, due to the scope of the work presented in this report, a long-term investigation of the proposed site was not possible and as such not perceived as part of the Terms of Reference. However, a concerted effort was made to assess as much of the potential site, as well as make use of any available literature, species distribution data and aerial photography.

It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without detailed investigation.

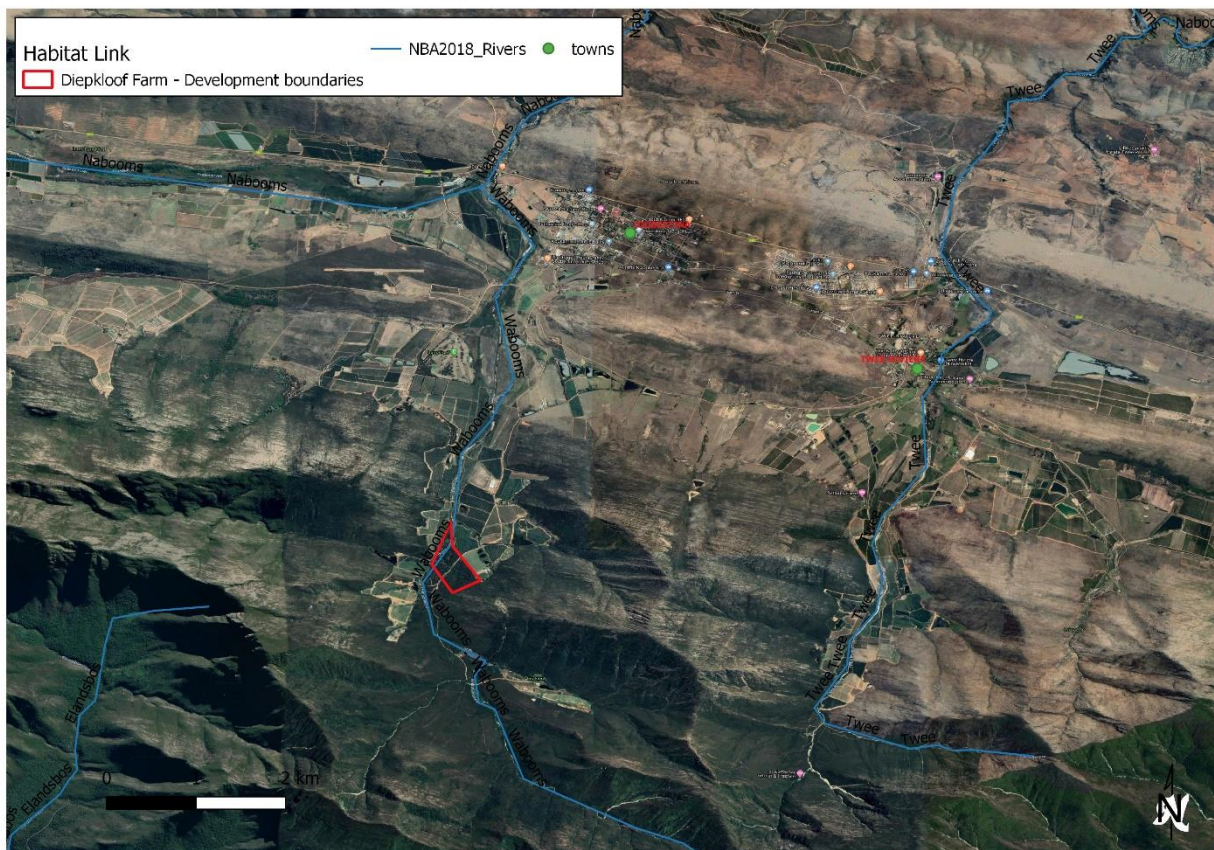


Figure 1: The proposed development boundary on the remainder of Farm 351 Diepkloof, near Joubertina

## 2. Terms of Reference

The following scope of work and methods was used as the basis of this study to fulfil the above requirements:

A desktop and literature review of the area under investigation was conducted to collate as much information as possible prior to any detailed fieldwork. The purpose of the desktop assessment was to rank the level of ecological integrity. This is also in line with the draft Biodiversity Assessment Protocols, with reference to the DEA Screening Tool results. The results of which are assessed as required in more detail in this report.

Other relevant literature for e.g. South African National Biodiversity Institute (distribution databases), relevant Red Data books, ordinances and all systematic bioregional / conservation plans, were also consulted.

Fieldwork was limited to visual sightings by means of transect walks and plot-based sampling, while particular attention was also paid to the occurrence of any remaining Red Data species or Protected species.

Vegetation units were sampled by means of the following techniques as per each site:

- Data collection was plot-based and in the form of vegetation samples within selected reference areas to categorise the various vegetation units.
- Results from the data analysis provided a description of the dominant and typical species occurring on the site(s), and will include:

- Threatened, endemic or rare species, with an indication of the relative functionality and conservation importance of the specific community in the area under investigation
- Invasive or exotic species present in the area
- The functional and conservation importance of all vegetation communities under investigation.

### Aquatic systems

The affected aquatic systems were assessed as follows with reference to the promulgated (20 March 2020) Aquatic Theme Biodiversity Assessment Protocol:

- The assessment was initiated with a review of the available information for the region and activities that had occurred. This will also include review of the development in relation to any conservation plans or assessments known for the area, e.g. Critical Biodiversity Area maps, National Waterbody Inventory etc.
- Determine the Present Ecological State of any waterbodies incl. wetlands, estimating their biodiversity, conservation importance with regard ecosystem services using recognised PES / EIS assessment methods to determine the state, importance and sensitivity of the respective systems
- Prepared a map demarcating the respective watercourses or wetland/s, within a 500m radius of the study area. This demonstrates, from a holistic point of view the connectivity between the site and the surrounding regions, i.e. the hydrological zone of influence while classifying the hydrogeomorphic type of the respective water courses / wetlands in relation to present land-use and their current state. The maps depicting demarcated waterbodies will be delineated to a scale of 1:10 000, following the methodology described by the DWS.
- Buffer zones were recommended using the Macfarlane & Bredin (2017) approach to indicate any No-go / Sensitive areas around any delineated aquatic zones should these be thought necessary, supported by any relevant legislation, e.g. any bioregional plans, conservation guidelines or best practice if still applicable.
- Assessed the potential impacts, based on a supplied methodology, including cumulative impacts and for construction (should any additional activities still be required, particularly if the construction was halted), operations and decommissioning phases.
- Provide mitigations regarding observed impacts, which could negatively affect demarcated wetland or water course areas.
- Supply the client with geo-referenced GIS shape files of the wetland / estuarine areas with buffers as required.

### 3. Project Description

The applicant (Letabakop Farms (Pty) Ltd) proposes to clear 19 hectares of potentially indigenous vegetation in order to establish apple and pear orchards. The proposed development includes the following aspects:

- Site clearance;
- Establishment of apple and pear orchards;
- Construction of water reticulation system for irrigation purposes;
- Electricity supply from the existing ESKOM transformers;
- Construction of new internal access roads; and
- Provision of storm water drains and pipes.

The proposed development will require a footprint of approximately 19 hectares of the 1 426-hectare property. The study area was cleared in the 1990s and the land was previously used for the planting of potatoes. The study area was not used for any agriculture activities within the past 10 years and natural vegetation has started to regrow. Some parts of the site consist of transformed agricultural land and are predominantly invaded by alien vegetation, while other parts of the study area are undeveloped and consist out of natural vegetation (Tsitsikamma Sandstone Fynbos). The Wabooms River, a perennial river, is located along the north-western part of the study area and the proposed development will need to ensure that the use of fertiliser and pesticides is correctly managed in order to avoid pollution of the watercourse (Figure 2).



Figure 2: The proposed orchard blocks, based on the results of this report i.e. avoid sensitive areas



## 4. Relevant legislation and policy

The following is pertinent to this study:

- Section 24 of The Constitution of the Republic of South Africa;
- Agenda 21 – Action plan for sustainable development of the Department of Environmental Affairs and Tourism (DEAT) 1998;
- National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) inclusive of all amendments, as well as the NEM: Biodiversity Act;
- National Water Act, 1998 (Act No. 36 of 1998);
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983); and
- Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).
- Nature and Environmental Conservation Ordinance (No. 19 of 1974)
- National Forest Act (No. 84 of 1998)
- National Heritage Resources Act (No. 25 of 1999)

NEMA and the Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983) would also apply to this project. These Acts have categorised many invasive plants together with associated obligations on the land owner. Several Category 1 & 2 plants were observed in several areas of the site under investigation.

Alien Invasive Plant Species (AIS) within or adjacent the site observed included amongst others:

- *Pennisetum clandestinum* (Kikuyu)
- *Solanum mauritianum* (Bugweed)
- *Opuntia ficus-indica* (Prickly pear)
- *Pinus spp* (Pine trees)
- *Argemone Mexicana* (Mexican poppy)
- *Acacia mearnsii* (Black wattle)
- *Acacia longifolia* (Long-leaf wattle)
- *Populus alba* (White popular)
- *Hakea sericea* (Silky hakea)
- *Quercus spp.* (Oak trees)

### 4.7 Provincial legislation and policy

Provincial Nature Conservation Ordinance (PNCO of 1974) – Protected Flora as listed in Schedule 3 and 4 where relevant. Any such species must be removed or relocated with the applicable permits in place, issued by DEDEAT.

Several were found within the study area and are indicated in Section 5 of the report.

Schedule 2 – applies to the protection of animals and any significant populations or species can also only be removed with the request permits.

## 5. Description of the affected environment

### 5.1 Climate

The site is located within the bimodal rainfall region of South Africa, with a Mean Annual Precipitation (MAP) for the Langkloof (valley between the Kouga & Tsitsikamma mountains) and can range from 480 to 1230 mm per annum. Annual average temperatures range between 5.8 and 25.5 °C, with frost a rare occurrence of no more than 10 days per year (Mucina & Rutherford, 2007).

### 5.2 Geology and soils

The site is underlain with acidic lithosols derived from the Ordovician sandstones of the Table Mountain Group. Areas closer to the watercourses of the region, that do contain wetlands also show distinctive plinthic catenas, i.e. soil colour variation in areas where soils are at times saturated with water (Mucina & Rutherford, 2007).

### 5.3 Slope and aspect

The region is characterised by the mountain areas with steep sloping valleys, that also contained rocky outcrops

### 5.4 Vegetation and flora

The site is located within Tsitsikamma Sandstone Fynbos (FFs 20) as defined by the National Vegetation Type Map (Mucina & Rutherford, 2007, updated in 2017/2018) (Figure 3 – Plate 1).

The Tsitsikamma Sandstone Fynbos vegetation type is not listed as a Threatened Ecosystem as per the National Environmental Management Biodiversity Act. The proposed site is however 1300m from an area that contains the Endangered Eastern Coastal Shale Band Vegetation type. During the site visit, this was confirmed, but the development site won't impact any portions of this listed vegetation type, and little Eastern Coastal Shale Band Vegetation actually remains.

Table 1 lists the typical species associated with Tsitsikamma Sandstone Fynbos, highlighting those that were observed. Overall, the species assemblage was not depauperate, with 42 of the 90 potential Genera being observed (46%). A higher number of forbs (bulbs) and grasses could occur but were not observed due to the prevailing dry conditions at the time of the survey, combined to the high level of disturbance and alien invasive tree cover. This was also reflected in the low number of Protected Plant species (PNCO & NFA), with only 17 (19%) species being observed (Table 1). High numbers were anticipated within the more intact areas of fynbos (Plate 1), but this could be ascribed to the degradation / secondary habitat that has now colonized most of the lower slopes towards the river (Plate 2).

Based on the number, density and type of species observed within the site, it was clear that three separate habitat units were observed. These included the following:

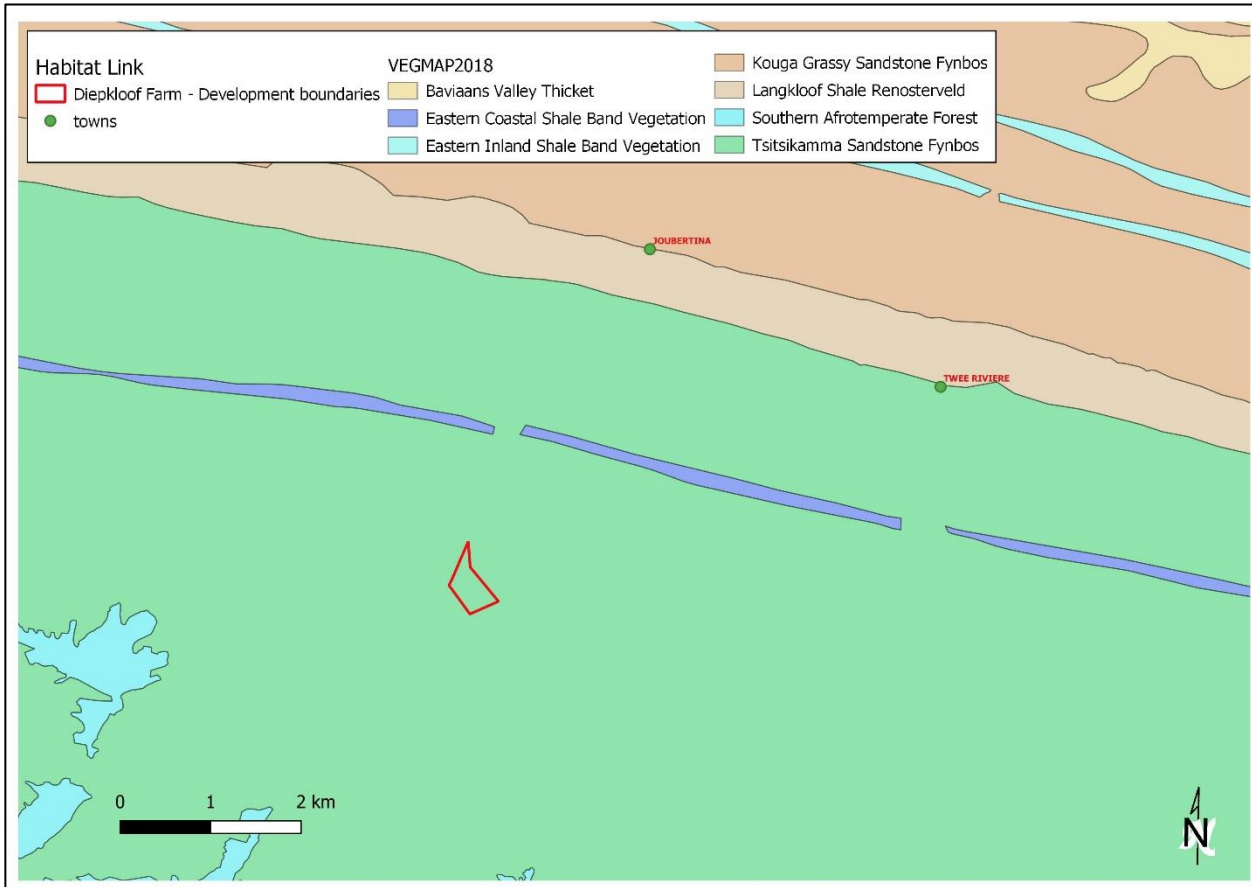
1. High mountain / steep slopes with rocky outcrops – species and density closely resembled the natural vegetation unit, with little disturbance and a minimal number of alien invasive species (Plate 1)
2. Secondary Fynbos - number of species and species density 50-60% lower than anticipated, with a high number of secondary or colonizing species such as *Passerina spp*, *Seriphium plumosum* and Alien Invasive Plants. These are all indicators of past disturbance, or a vegetation unit that was cleared in the past and is thus in a state of recovery (Plate 2)
3. Disturbed or cleared areas – only grass, ruderal forbs and or Alien Invasive Plants found present (Plate 3).

These three units are shown in the sensitivity mapping shown in Section 7 of this report.

**Table 1: Typical plant species associated with the Tsitsikamma Sandstone Fynbos vegetation type, with growth form and dominance indicated. Species highlight in Grey were observed within the site while plant species listed in BOLD = Protected under the Eastern Cape Provincial Nature Conservation Ordinance of 1974, or National Forestry Act (NFA) and require the respective permits from either DEDEAT and DEFF for removal if the project proceeds with Environmental Approval**

Growth Form	Taxon name	Dominant	Family
Tall Shrubs	<i>Cliffortia serpyllifolia</i> Cham. & Schltld.	[d]	ROSACEAE
<b>Tall Shrubs</b>	<b><i>Leucadendron conicum</i> (Lam.) I.Williams</b>	<b>[d]</b>	<b>PROTEACEAE</b>
<b>Tall Shrubs</b>	<b><i>Leucadendron eucalyptifolium</i> H.Buek ex Meisn.</b>	<b>[d]</b>	<b>PROTEACEAE</b>
<b>Tall Shrubs</b>	<b><i>Leucadendron uliginosum</i> R.Br. ssp. <i>glabratum</i> I.Williams</b>		<b>PROTEACEAE</b>
Tall Shrubs	<i>Leucospermum glabrum</i> E.Phillips		PROTEACEAE
Tall Shrubs	<i>Metalasia densa</i> (Lam.) P.O.Karis		ASTERACEAE
Tall Shrubs	<i>Metalasia trivialis</i> P.O.Karis		ASTERACEAE
<b>Tall Shrubs</b>	<b><i>Mimetes pauciflorus</i> R.Br.</b>		<b>PROTEACEAE</b>
Tall Shrubs	<i>Passerina vulgaris</i> (Meisn.) Thoday		THYMELAEACEAE
Tall Shrubs	<i>Passerina falcifolia</i> (Meisn.) C.H.Wright		THYMELAEACEAE
<b>Tall Shrubs</b>	<b><i>Protea eximia</i> (Salisb. ex Knight) Fourc.</b>		<b>PROTEACEAE</b>
<b>Tall Shrubs</b>	<b><i>Protea lorifolia</i></b>		<b>PROTEACEAE</b>
<b>Tall Shrubs</b>	<b><i>Protea neriifolia</i> R.Br.</b>		<b>PROTEACEAE</b>
<b>Tall Shrubs</b>	<b><i>Protea nitida</i></b>		<b>PROTEACEAE</b>
Tall Shrubs	<i>Pterocelastrus tricuspidatus</i> (Lam.) Walp.		CELASTRACEAE
Low Shrubs	<i>Erica discolor</i> Andrews var. <i>puberula</i> Benth.	[d]	ERICACEAE
<b>Low Shrubs</b>	<b><i>Erica discolor</i> Andrews var. <i>discolor</i></b>	<b>[d]</b>	<b>ERICACEAE</b>
Low Shrubs	<i>Erica sparsa</i> Lodd. var. <i>glanduloso-pedicellata</i> Dulfer	[d]	ERICACEAE
Low Shrubs	<i>Erica sparsa</i> Lodd. var. <i>sparsa</i>	[d]	ERICACEAE
Low Shrubs	<i>Ursinia scariosa</i> (Aiton) Poir. ssp. <i>scariosa</i>	[d]	ASTERACEAE
Low Shrubs	<i>Agathosma ovata</i> (Thunb.) Pillans		RUTACEAE
Low Shrubs	<i>Anisodonteia scabrosa</i> (L.) Bates		MALVACEAE
Low Shrubs	<i>Aspalathus ciliaris</i> L.		FABACEAE
Low Shrubs	<i>Berzelia intermedia</i> (D.Dietr.) Schltld.		BRUNIACEAE
Low Shrubs	<i>Carpacoce vaginellata</i> T.M.Salter		RUBIACEAE
Low Shrubs	<i>Erica diaphana</i> Spreng.		ERICACEAE
<b>Low Shrubs</b>	<b><i>Erica glandulosa</i> Thunb. ssp. <i>fourcadei</i> (L.Bolus) E.G.H.Oliv. &amp; I.M.Oliv.</b>		<b>ERICACEAE</b>
Low Shrubs	<i>Erica glandulosa</i> Thunb. ssp. <i>bondiae</i> (Compton) E.G.H.Oliv. & I.M.Oliv.		ERICACEAE
Low Shrubs	<i>Erica glandulosa</i> Thunb. ssp. <i>breviflora</i> (Bolus) E.G.H.Oliv. & I.M.Oliv.		ERICACEAE
Low Shrubs	<i>Erica glandulosa</i> Thunb. ssp. <i>glandulosa</i>		ERICACEAE
Low Shrubs	<i>Erica rosacea</i> (L.Guthrie) E.G.H.Oliv. ssp. <i>rosacea</i>		ERICACEAE
Low Shrubs	<i>Erica uberiflora</i> E.G.H.Oliv.		ERICACEAE
Low Shrubs	<i>Euryops munitus</i> (L.f.) B.Nord.		ASTERACEAE
Low Shrubs	<i>Euryops pinnatipartitus</i> (DC.) B.Nord.		ASTERACEAE
Low Shrubs	<i>Helichrysum teretifolium</i> (L.) D.Don		ASTERACEAE
Low Shrubs	<i>Indigofera flabellata</i> Harv.		FABACEAE
Low Shrubs	<i>Leucadendron salignum</i> P.J.Bergius		PROTEACEAE
Low Shrubs	<i>Leucadendron xanthoconus</i> (Kuntze) K.Schum.		PROTEACEAE
Low Shrubs	<i>Leucadendron spissifolium</i> (Salisb. ex Knight) I.Williams ssp. <i>phillipsii</i> (Hutch.) I.Williams		PROTEACEAE
<b>Low Shrubs</b>	<b><i>Leucospermum cuneiforme</i> (Burm.f.) Rourke</b>		<b>PROTEACEAE</b>
Low Shrubs	<i>Metalasia pulcherrima</i> Less. forma <i>pallescens</i> (Harv.) P.O.Karis		ASTERACEAE
Low Shrubs	<i>Otholobium carneum</i> (E.Mey.) C.H.Stirt.		FABACEAE
Low Shrubs	<i>Passerina pendula</i> Eckl. & Zeyh. ex Thoday		THYMELAEACEAE

Growth Form	Taxon name	Dominant	Family
Low Shrubs	<i>Penaea cneorum</i> Meerb. ssp. <i>gigantea</i> R.Dahlgren		PENAEACEAE
Low Shrubs	<i>Phylica axillaris</i> Lam. var. <i>lutescens</i> (Eckl. & Zeyh.) Pillans		RHAMNACEAE
Low Shrubs	<i>Phylica axillaris</i> Lam. var. <i>densifolia</i> Pillans		RHAMNACEAE
Low Shrubs	<i>Phylica axillaris</i> Lam. var. <i>pulchra</i> Pillans		RHAMNACEAE
Low Shrubs	<i>Phylica axillaris</i> Lam. var. <i>microphylla</i> (Eckl. & Zeyh.) Pillans		RHAMNACEAE
Low Shrubs	<i>Phylica axillaris</i> Lam. var. <i>hirsuta</i> Sond.		RHAMNACEAE
Low Shrubs	<i>Phylica axillaris</i> Lam. var. <i>axillaris</i>		RHAMNACEAE
Low Shrubs	<i>Phylica axillaris</i> Lam. var. <i>gracilis</i> Pillans		RHAMNACEAE
Low Shrubs	<i>Phylica axillaris</i> Lam. var. <i>maritima</i> Pillans		RHAMNACEAE
Low Shrubs	<i>Phylica axillaris</i> Lam. var. <i>cooperi</i> Pillans		RHAMNACEAE
Low Shrubs	<i>Phylica imberbis</i> P.J.Bergius var. <i>imberbis</i>		RHAMNACEAE
Low Shrubs	<i>Phylica imberbis</i> P.J.Bergius var. <i>eriphoros</i> (P.J.Bergius) Pillans		RHAMNACEAE
Low Shrubs	<i>Phylica imberbis</i> P.J.Bergius var. <i>secunda</i> Sond.		RHAMNACEAE
<b>Low Shrubs</b>	<b><i>Protea cynaroides</i> (L.) L.</b>		<b>PROTEACEAE</b>
<b>Low Shrubs</b>	<b><i>Mimetes splendidus</i></b>		<b>PROTEACEAE</b>
Low Shrubs	<i>Seriphium plumosum</i> L.		ASTERACEAE
Herbs	<i>Commelina africana</i> L. var. <i>africana</i>		COMMELINACEAE
Herbs	<i>Commelina africana</i> L. var. <i>barberae</i> (C.B.Clarke) C.B.Clarke		COMMELINACEAE
Herbs	<i>Commelina africana</i> L. var. <i>lancispatha</i> C.B.Clarke		COMMELINACEAE
Herbs	<i>Commelina africana</i> L. var. <i>krebsiana</i> (Kunth) C.B.Clarke		COMMELINACEAE
Herbs	<i>Gazania krebsiana</i> Less. ssp. <i>krebsiana</i>		ASTERACEAE
<b>Herbs</b>	<b><i>Watsonia knysnana</i></b>		<b>IRIDACEAE</b>
<b>Herbs</b>	<b><i>Watsonia lacata</i></b>		<b>IRIDACEAE</b>
Herbs	<i>Leonotis leonurus</i>		Lamiaceae
Geophytic Herbs	<i>Geissorhiza fourcadei</i> (L.Bolus) G.J.Lewis		IRIDACEAE
<b>Geophytic Herbs</b>	<b><i>Geissorhiza inconspicua</i> Baker</b>		<b>IRIDACEAE</b>
<b>Geophytic Herbs</b>	<b><i>Romulea pratensis</i> M.P.de Vos</b>		<b>IRIDACEAE</b>
Graminoids	<i>Restio triticeus</i> Rottb.	[d]	RESTIONACEAE
Graminoids	<i>Tetraria capillacea</i> (Thunb.) C.B.Clarke	[d]	CYPERACEAE
Graminoids	<i>Diheteropogon filifolius</i> (Nees) Clayton		POACEAE
Graminoids	<i>Elegia juncea</i> L.		RESTIONACEAE
Graminoids	<i>Epischoenus adnatus</i> Levyns		CYPERACEAE
Graminoids	<i>Heteropogon contortus</i> (L.) Roem. & Schult.		POACEAE
Graminoids	<i>Hypodiscus synchronolepis</i> (Steud.) Mast.		RESTIONACEAE
Graminoids	<i>Tetraria robusta</i> (Kunth) C.B.Clarke		CYPERACEAE
Graminoids	<i>Thamnochortus fruticosus</i> P.J.Bergius		RESTIONACEAE
Graminoids	<i>Thamnochortus glaber</i> (Mast.) Pillans		RESTIONACEAE
Graminoids	<i>Themeda triandra</i> Forssk.		POACEAE
Graminoids	<i>Tristachya leucothrix</i> Trin. ex Nees		POACEAE
Low Shrubs	<i>Aspalathus teres</i> Eckl. & Zeyh. ssp. <i>thodei</i> R.Dahlgren (Endemic)		FABACEAE
Low Shrubs	<i>Erica trachysantha</i> Bolus (Endemic)		ERICACEAE
Low Shrubs	<i>Erica zitzikammensis</i> Dulfer var. <i>glutinosa</i> Dulfer (Endemic)		ERICACEAE
Low Shrubs	<i>Erica zitzikammensis</i> Dulfer var. <i>zitzikammensis</i> (Endemic)		ERICACEAE
Low Shrubs	<i>Felicia tsitsikamae</i> Grau (Endemic)		ASTERACEAE
Low Shrubs	<i>Helichrysum outeniquense</i> Hilliard (Endemic)		ASTERACEAE
Low Shrubs	<i>Prionium serratum</i>		PRIONACEAE
<b>Herbs</b>	<b><i>Kniphofia uvaria</i> (around existing dam)</b>		<b>ASPHODELACEAE</b>



**Figure 3: Project locality map indicating regional vegetation types as per the National Vegetation Type map updated 2017/2018**



**Plate 1: A view of the Protea dominant fynbos on the steep ridge with large outcrops that will be excluded from the development footprint**



**Plate 2: A view of the disturbed valley side with secondary habitat that resulted from previous disturbance and high levels of alien tree invasion (Pines)**



**Plate 3: A view of an area completely transformed by alien vegetation, that is being cleared**

## 5.5 Terrestrial fauna

A detailed review of past literature as well as spatial species databases / atlases was also conducted to produce a species checklist prior to the field work being conducted (Appendix 1). The animal species observed were limited to invertebrates, small mammals (buck), birds and reptiles shown in Table 2.

Faunal diversity observed due to the state of the site was thus low, when compared to the anticipated species known to occur in the region. Several duiker spoor tracks were observed along the roads and tracks within the study area, and based on the size of the spoor it would possibly be Common Duiker (*Sylvicapra grimmia*), while Vervet monkeys (*Chlorocebus pygerythrus*) were observed in various groups particularly along the remaining alien vegetation along the river banks.

The number of invertebrate and reptile species observed was low, as it was anticipated to be higher, but this was possibly limited due to the cool conditions associated with this early winter period, when the survey was conducted.

No species of special concern (IUCN Red Data species) were observed, but all are listed under the PNCO as protected as these are indigenous to South Africa. Further no Important Bird Area, with international importance are located near the site (>14km away).

**Table 2: Faunal species observed within the site**

Taxon	Common Name	Conservation status and habitat	Site observation
<b>Invertebrates</b>			
<i>Locusta pardalina</i>	Brown locust	Least Concern	Flying or feeding within site
<i>Belenois aurota</i>	Brown veined white	Least Concern (SABCA 2013)	
<i>Junonia hierta cebrene</i>	Yellow pansy	Least Concern (SABCA 2013)	
<b>Birds</b>			
<i>Corvus albus</i>	Crow, Pied	RDB, 2015 Least Concern	Flyover
<i>Streptopelia senegalensis</i>	Dove, Laughing	RDB, 2015 Least Concern	Feeding within site
<i>Bubulcus ibis</i>	Egret, Cattle	RDB, 2015 Least Concern	Flyover
<i>Bostrychia hagedash</i>	Ibis, Hadedda	RDB, 2015 Least Concern	Feeding within site
<i>Passer melanurus</i>	Sparrow, Cape	RDB, 2015 Least Concern	Feeding within site
<i>Anas capensis</i>	Cape Teal	RDB, 2015 Least Concern	Flyover
<i>Nectarinia [Cinnyris] veroxii</i>	Grey (Mouse-coloured) Sunbird	RDB, 2015 Least Concern	Feeding within site
<i>Pycnonotus capensis</i>	Cape Bulbul	RDB, 2015 Least Concern	Feeding within site
<i>Alopochen aegyptiacus</i>	Egyptian Goose	RDB, 2015 Least Concern	Flyover
<i>Motacilla capensis</i>	Cape Wagtail	RDB, 2015 Least Concern	Feeding within site
<i>Ardea cinerea</i>	Grey Heron	RDB, 2015 Least Concern	Feeding within site
<i>Turtur chalcospilos</i>	Emerald-spotted Wood Dove	RDB, 2015 Least Concern	Calling within site
<i>Lamprotornis nitens</i>	Cape Starling	RDB, 2015 Least Concern	Feeding within site
<i>Nectarinia famosa</i>	Malachite Sunbird	RDB, 2015 Least Concern	Feeding within site
<i>Promerops cafer</i>	Cape sugar bird	RDB, 2015 Least Concern	Feeding within site
<i>Chalcomitra amethystine</i>	Amethyst sunbird	RDB, 2015 Least Concern	Feeding within site
<i>Upupa africana</i>	African Hoopoe	RDB, 2015 Least Concern	Feeding within site
<i>Telophorus zeylonus</i>	Bokmakierie	RDB, 2015 Least Concern	Feeding within site
<i>Dicrurus adsimilis</i>	Fork-tailed Drongo	RDB, 2015 Least Concern	Feeding within site
<b>Reptiles</b>			
<i>Dispholidus typus</i>	Boomslang	Least Concern (ARRSA, 2014)	In dense tree cover
<i>Philothamnus occidentalis</i>	Western Natal Green Snake	Least Concern (ARRSA, 2014)	In dense tree cover
<i>Psammophis crucifer</i>	Cross-marked Grass Snake	Least Concern (ARRSA, 2014)	Secondary fynbos

### Where:

ARRSA = Atlas and Red List of the Reptiles of South Africa, Lesotho and Swaziland. 2014. Edited by Michael F. Bates, William R. Branch, Aaron M. Bauer, Marius Burger, Johan Marais, Graham J. Alexander & Marianne S. de Villiers. SANBI, Pretoria.

RDB, 2015 = Taylor MR, Peacock F, Wanless RM (eds) 2015. The 2015 Eskom Red Data Book of birds of South Africa, Lesotho and Swaziland. BirdLife South Africa, Johannesburg.

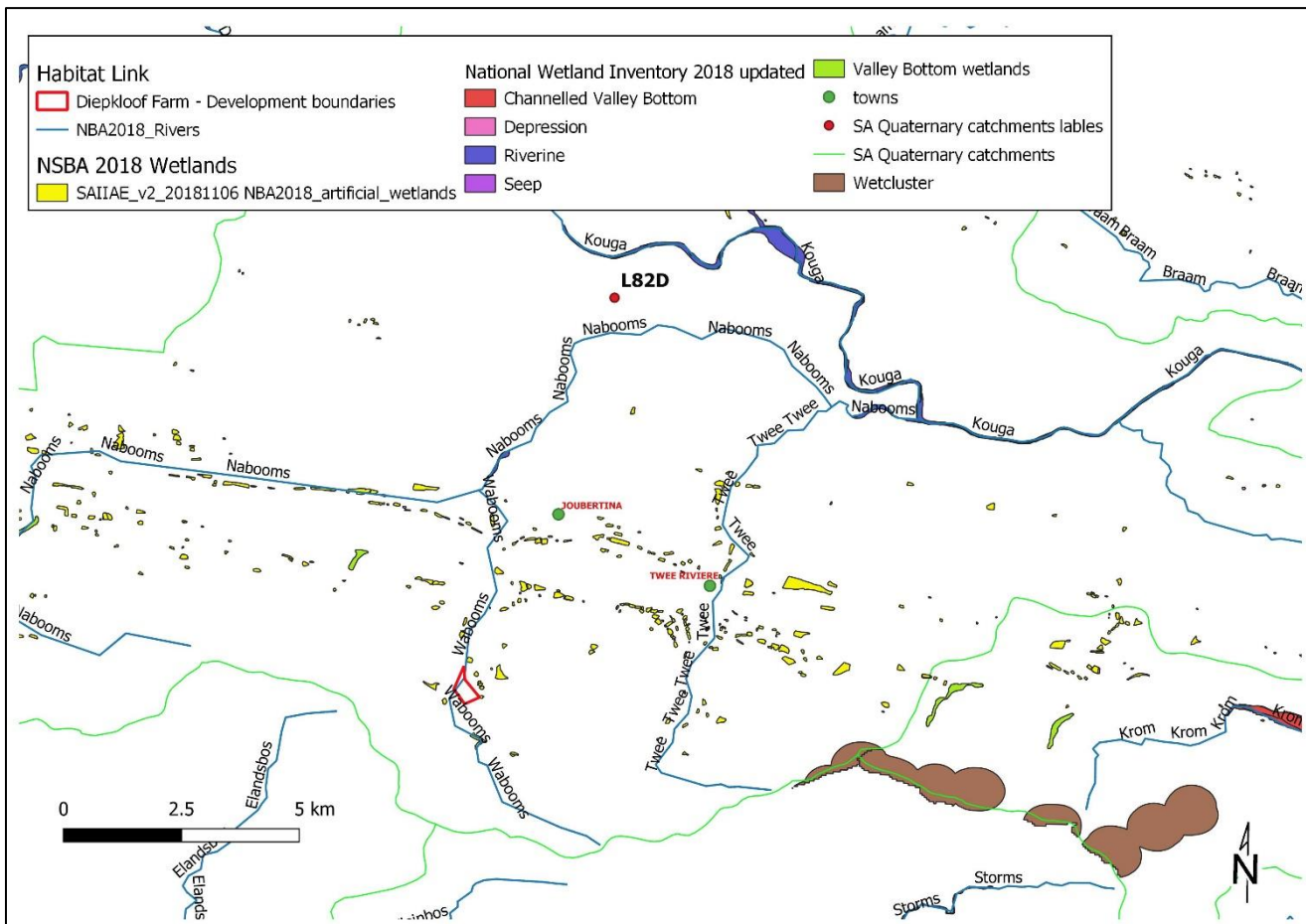
SABCA = Mecenero, S., J.B. Ball, D.A. Edge, M.L. Hamer, G.A. Hening, M. Krüger, E.L. Pringle, R.F. Terblanche & M.C. Williams (eds). 2013. Conservation assessment of butterflies of South Africa, Lesotho and Swaziland: Red List and atlas. Saftronics (Pty) Ltd., Johannesburg and Animal Demography Unit, Cape Town.

## 5.6 Aquatic environment

The study area contains a short 400m reach of the Waboom River located within the L82D Nabooms / Kouga rivers catchment as shown in Figure 4, within the Southern Eastern Coastal Belt Ecoregion. The study area due to the importance of these catchments are also considered a Strategic Water Supply Area for surface water within the Mzimvubu / Tsitsikamma Water Management Area.

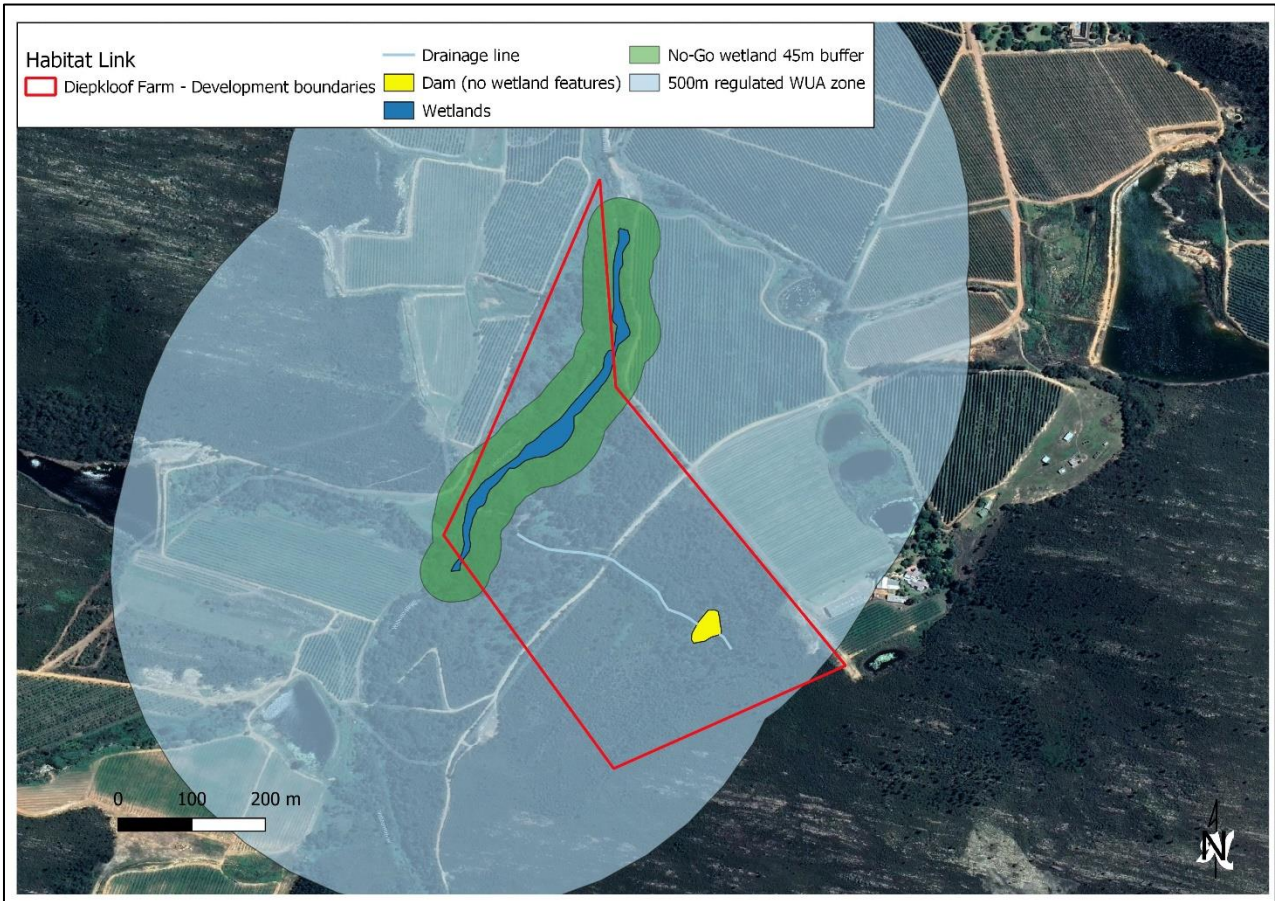
No natural wetlands or wetland clusters were shown in National Wetland Inventory (NWI) Version 5 released by van Deventer *et al.* (2020) (Figure 4). With the exception of the dams (artificial), the presence of a natural riverine wetland systems was confirmed during the site visit, and was dominated by Palmiet (*Prionium serratum*) (Plate 4). No natural riparian vegetation remained along the banks of the river, as this zone was colonised by various species of alien tree (Plate 4). The proposed buffer for the riverine wetland system, based on the Macfarlane & Bredin (2017) approach was define as 45m (Final). This was based on the current state as well as the proposed activities, and would require the management / reinstatement of this buffer area back to natural fynbos / riverine thicket appropriate for the region. This must also be coupled to the continued removal of alien vegetation that has already started.

The only additional aquatic features were the 1:50 000 watercourse located within the site, but was delineated at 1:2000 scale as shown in Figure 5 shown later in this report. As this system functions only as a drainage line, with no aquatic features, habitats or species (Plate 5), no buffer or no-go area is proposed. This is also coupled to the fact there is no natural connection with any natural systems due to the position of the current dam (Plate 6), i.e. habitat fragmentation with no drainage line continuity and the 100% cover by alien vegetation.



**Figure 4: Project locality indicating the various quaternary catchments, mainstem rivers and known wetlands or wetland clusters (Source DWS, NWI and NGI)**





**Figure 5: Delineated extent of riverine wetland and drainage line with dam**



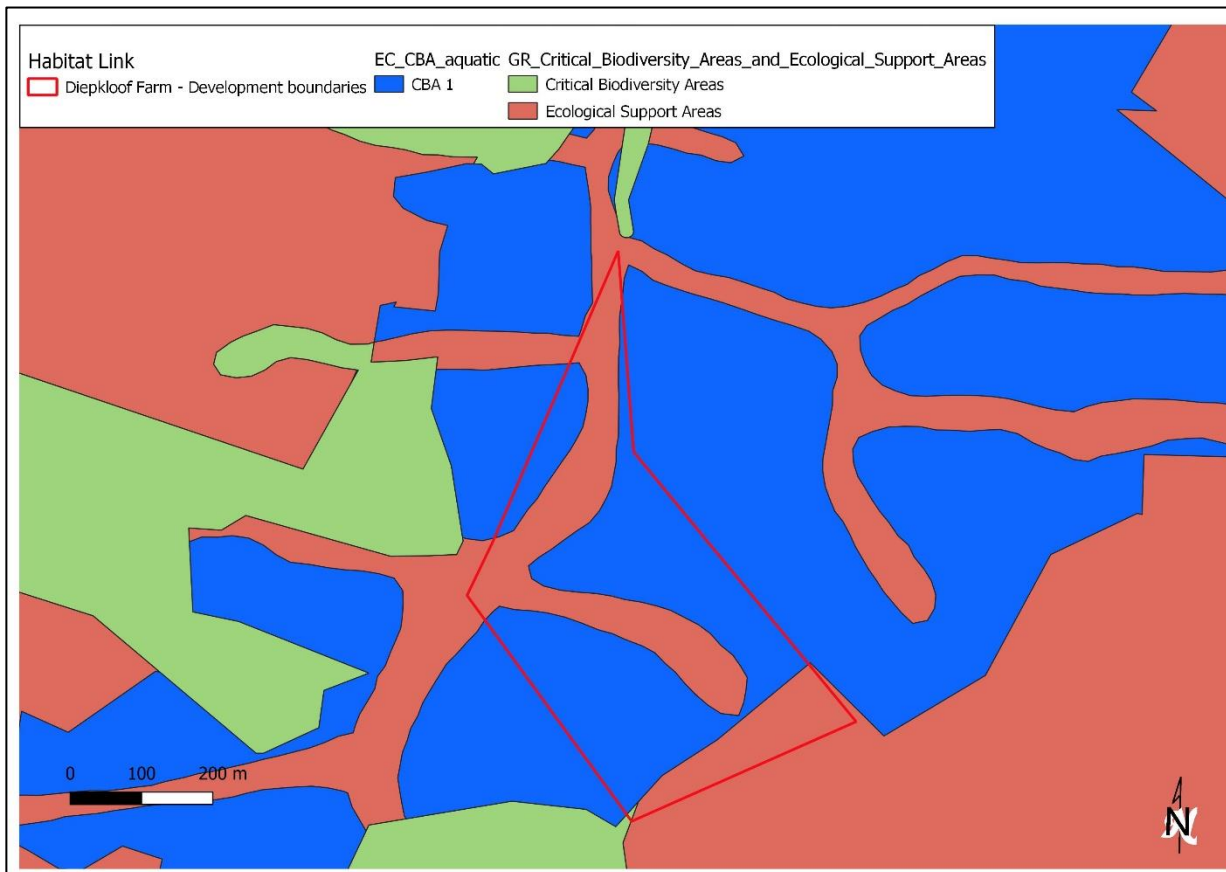
**Plate 4: A view of the Palmiet riverine wetland, and the alien vegetation dominating the upper riverbanks along the entire study area reach**



**Plate 5: The transformed drainage line within the site, that drains into the small dam**



**Plate 6: A view of the existing dam, with no aquatic or wetland habitat evident**



**Figure 6: Critical Biodiversity Areas as per the Eastern Cape Biodiversity Conservation Plan (Desmet & Berliner, 2007) and Garden Route Initiative Ecological Support Areas**

It is still important to note that the project area spans an Aquatic Critical Biodiversity Area Type 1 (Figure 6) as shown in the Eastern Cape Biodiversity Conservation Plan (Desmet & Berliner, 2007), this due to the region containing important riverine elements, coupled to the region being linked to the important catchments associated with the Kouga Mountains (important fish & frog species). This was further substantiated by the Garden Route Initiative projects (Vromans *et al.*, 2010), that highlighted the importance of the Ecological Support Role (Figure 6) of these riverine systems as corridors, but unfortunately did not take into consideration the lack of habitat continuity due to alien tree invasion. However, with the proposed buffers, these corridors for the site, could be reinstated over time, which would then also protect any valuable frog and fish habitat within this upper catchment area.

### **5.7 Present Ecological State and conservation importance (Aquatic environment)**

The PES of a river, watercourse or wetland represents the extent to which it has changed from the reference or near pristine condition (Category A) towards a highly impacted system where there has been an extensive loss of natural habit and biota, as well as ecosystem functioning (Category E).

The PES scores have been revised for the country and based on the new models, aspects of functional importance as well as direct and indirect impacts (DWS, 2014). The new PES system also incorporates Ecological Importance (EI) and Ecological Sensitivity (ES) separately as opposed to Ecological Importance and Sensitivity (EIS) in the old model, although the new model is still heavily centred on rating rivers using broad fish, invertebrate, riparian vegetation and water quality indicators. The Recommended Ecological Category (REC) is still contained within the new models, with the default REC being B, when little or no information is available to assess the system or when only one of the above-mentioned parameters are assessed or the overall PES is rated between a C or D.

The PES for the study river system (Subquaternary catchment 9013) was rated as follows (DWS, 2014 – where C = Moderately Modified):

Subquaternary Catchment Number	Present Ecological State	Ecological Importance	Ecological Sensitivity
9013	C	Moderate/Medium	High

These scores were adjusted by observations made in the field, due to the current impacts such as:

- Alien vegetation
- Impoundments (several above and below the site, including the Diepkloof Dam); and
- Potential agricultural return flow

The Present Ecological State for the site was thus rated as **D = Largely Modified**, i.e. less than 40 % of the natural riparian vegetation remains based on the Riparian Vegetation Responses Assessment Index (VEGRAI) model.

The Ecological Importance and Sensitivity Score were rated as Moderate by DWS for the Subquaternary catchment (2014), due to the importance of the habitat they provide (fish & invertebrates), filter pollutants and support the downstream systems, while forming part of an Ecosystem Priority area (FEPA) as shown in Figure 7. The High ES score was related to areas that contained important habitat. In this assessment attention was also paid to the possible presence of important fish and or amphibians known to occur within the region. Therefore, based on available information and the presence of wetland habitat, the EIS of HIGH for the site is substantiated.

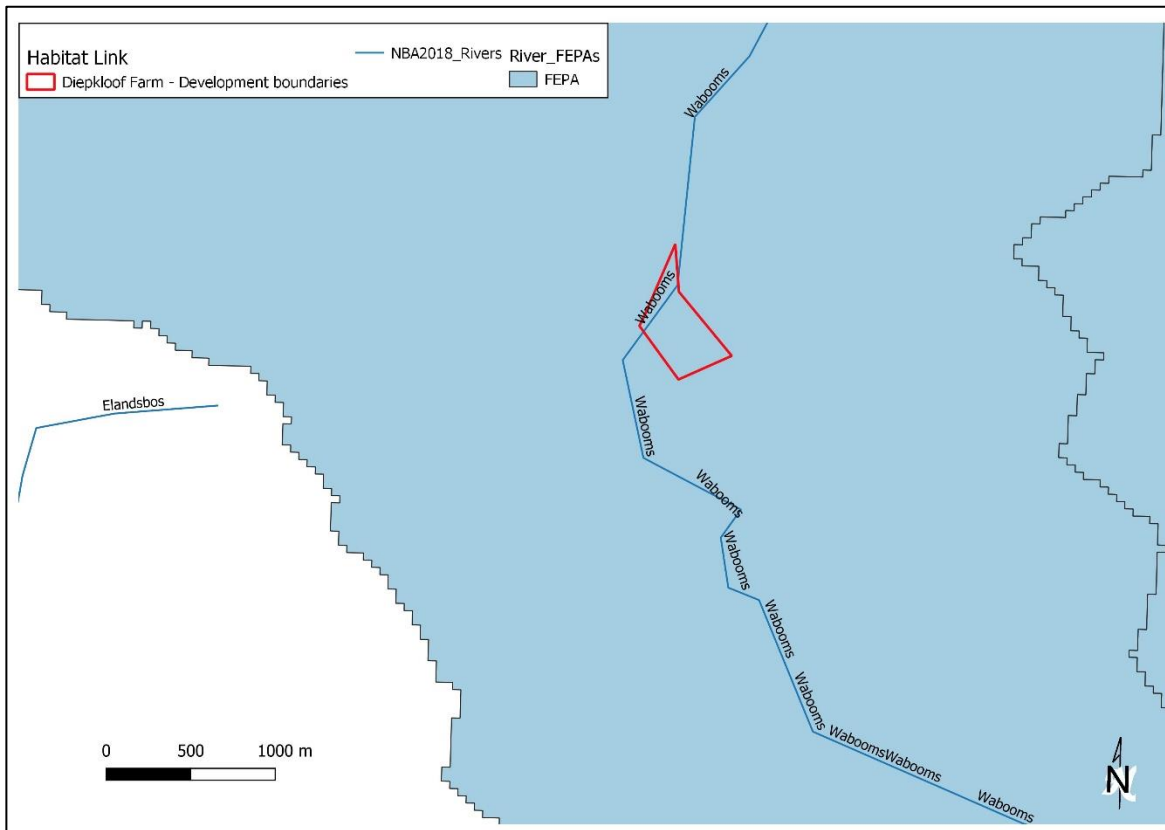


Figure 7: NFEPA Priority Ecosystem Areas

## **6. Permit requirements**

Several protected or listed plant / tree species were observed during this assessment, but as stated previously, this should be confirmed during a detailed walkdown, once summer veld conditions have improved. This will provide a detailed species locality list needed for the permit applications to DEDEAT and DEFF.

In terms of Water Use Authorisation the proposed activities would need a Water Use Licenses (Possibly GA) under Section 21b, c and i as most of the site is located within 500m of a wetland boundary – Refer to Figure 5 above.

## 7. Site Sensitivity

The site sensitivity was based on the following criteria, used to establish the importance, overall integrity and corridor function of the habitat units observed. Note this is according to best practice with a standardise approach as follows, with the results of which are shown in Figure 9 and will be used as the basis of the impact assessment and or proposed mitigations. Note that the sensitivity assessment also included and species or habitats that were rated as sensitivity by the DEA Screening Tool, and are also listed below:

### Very High / High

This vegetation unit contains components of the following, that is stable and largely unfragmented:

1. Contains high number of Listed and or Protected species, and in this instance, this included:
2. The habitat unit is largely intact with little disturbance and or erosion. Coupled to this is an increase in habitat complexity, and species abundance;
3. Alien Invasive Species occurrence is limited to a few individuals;
4. Habitat fragmentation is limited and the vegetation is not isolated from other intact vegetation units beyond the study area boundary, thus presents an important animal movement corridor;
5. Faunal (invertebrates, birds and mammals) presence is high, and or contains habitat / species linked to important taxa; and
6. DEA Screening Tool features that are still intact or provide function habitat listed in the Screening Report as follows:
  - a. Rivers
  - b. Critical Biodiversity Area 2 (Terrestrial – Figure 8)
  - c. Ecological Support Area 2 (GRI only)
  - d. Freshwater ecosystem priority area quinary catchments
  - e. Strategic Water Source Area.

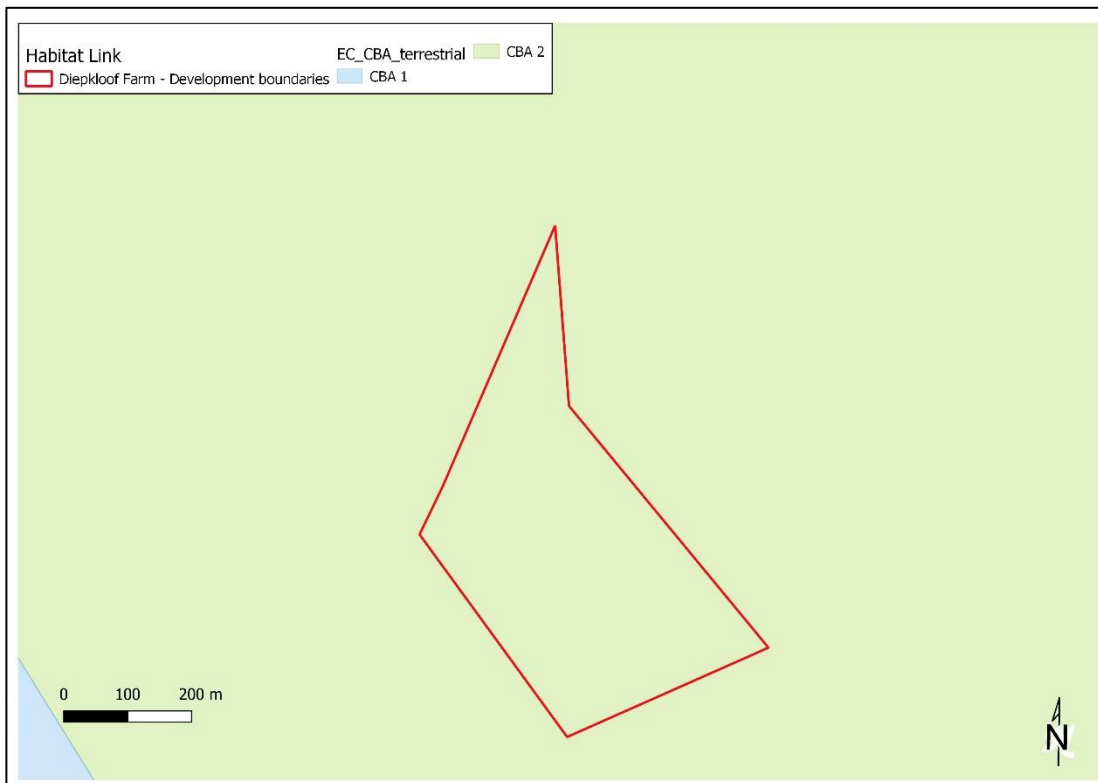
### Moderate

1. Protected or listed species are present, but not in the densities observed in the High areas, i.e. these are the same protected / listed species shown above but in lower numbers;
2. Degree of disturbance is higher, seen in lower aerial cover of plants / trees, i.e. more exposed soils and low ground cover species. Secondary or recovery growth is prevalent;
3. Increased number of Alien Invasive species, starting to dominate portions of the habitat;
4. This vegetation unity is more isolated with fragmentation from other intact habitats being observed; and
5. Faunal species diversity and numbers lower with potential presence of the Medium Rated (DEA Screening Tool) species such as:
  - a. Insecta-*Aloeides pallida juno* (Giant Copper) – Likely as habitat and larval/adult food plants are present within areas adjacent to the study area, but survey occurred outside of flight period.
  - b. Reptilia-*Tetradactylus fitzsimonsi* – Species listed as Vulnerable. Presence unlikely due to the high level of alien trees, within the area that is developable (Figure 9)

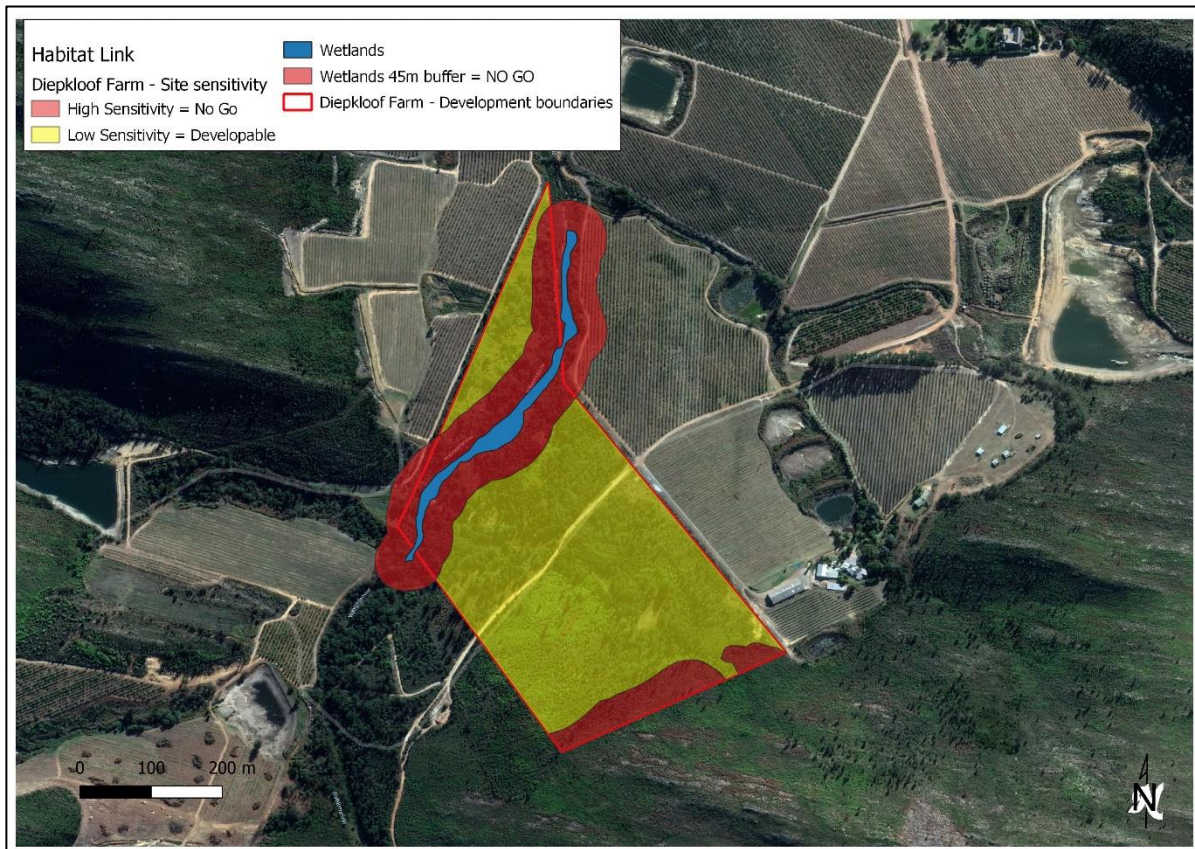
- c. Plant Sensitive species 445 – not observed on site, with limited potential habitat remaining
- d. Plant Sensitive species 770 – not observed on site, but may occur in the high lying areas, excluded from the development
- e. Plant *Erica stylaris* – potential for occurrence High as habitat outside developable areas remain
- f. Plant *Zyrphelis outeniquae* – not observed
- g. Plant *Indigofera hispida* - potential for occurrence High as habitat outside developable areas remain
- h. Plant *Mimetes splendidus* – Observed within area that was rated as Very High and will be excluded from the development footprint

**Low**

- 1. Vegetation unit largely modified, with only a few indigenous species still evident or prevalence of secondary / recovery species is high;
- 2. Soil disturbance or lack of any ground cover evident, with the potential for erosion high;
- 3. High densities of plant Alien Invasive Species; and
- 4. Habitat unit isolated, with little resemblance to natural corridors within the region.



**Figure 8: Eastern Cape Biodiversity Conservation Plan ECBCP (Berliner & Desmet, 2007) Terrestrial Critical Biodiversity Areas**



**Figure 9: Habitat sensitivity rating results based on the criteria shown in Section 7, noting the surrounding habitat**

## 8. Impact Assessment

During the impact assessment a number of potential key issues / impacts were identified, and these were assessed based on the methodology supplied by Habitat Link Consulting:

- Impact 1: Loss of terrestrial vegetation or habitats that could contain various species of special concern, and then replaced with apple and pear orchards and associated infrastructure;
- Impact 2: Habitat fragmentation (aquatic and terrestrial);
- Impact 3: Impact on surface water runoff patterns;
- Impact 4: Increase in sedimentation and erosion;
- Impact 5: Risks on the aquatic environment due to water quality impacts; and
- Impact 6: Cumulative impacts

The direct loss of Riparian / Wetland habitat impact was not assessed as the habitat or ecosystem function in question will be excluded from the development area with a 45m buffer, coupled to the fact that this area must be cleared of all alien vegetation that will promote the regrowth of natural vegetation over time. The caveat being that not erosion occurs while the areas revegetates, but that impact is assessed separately below.



**8.1 Impact 1: Loss of terrestrial vegetation or habitats that could contain various species of special concern, and then replaced with orchards and associated infrastructure – direct construction impact**

<p><b>Environmental Impact:</b> The clearing of terrestrial habitat with a VERY HIGH / HIGH sensitivity rating, notably high slope areas shown in Figure 9</p>	<p><b>Activity/Aspect &amp; Impact Source:</b> Due to the nature of the project this will persist in the long term into the operational phase impact and would impact on particular on remaining fynbos that was rated as VERY HIGH/HIGH (Figure 9), while a significant amount of important vegetation will remain on the remainder of the farm portion outside of the development area.</p>		<p><b>Proposed Mitigation:</b> Ideally all areas rated as VERY HIGH / HIGH should be excluded from the development proposal, however as this is not possible due to various development &amp; economic constraints the following is proposed:</p> <ul style="list-style-type: none"> <li>• Complete avoidance of near intact fynbos habitat (Figure 9)</li> <li>• Loss of the secondary habitat must be offset with protection of the area rated as VERY HIGH / HIGH, remain free from alien plants and be monitored for any erosion.</li> </ul> <p>A detailed walkdown must be conducted to determine the final list of species that will require DEDEAT &amp; DEFF permits, and if there are high numbers then a search and rescue plan should be initiated. Any plants that require relocation could be planted within areas that won't be developed, noting that S&amp;R has not been used to reduce the impact rating, but the avoidance of the intact areas has.</p>				
<p><b>Impact Significance</b></p>							
<p><b>Without Mitigation:</b></p>	<p><b>Extent</b> Local (2)</p>	<p><b>Duration</b> Long-term (4)</p>	<p><b>Severity</b> High (8)</p>	<p><b>Reversibility</b> Completely (0)</p>	<p><b>Irreplaceable Loss</b> Partly (0.5)</p>	<p><b>Probability</b> Definite (5)</p>	<p><b>Impact Significance</b> High (72.5)</p>
<p><b>With Mitigation:</b></p>	<p><b>Extent</b> Site (1)</p>	<p><b>Duration</b> Long-term (4)</p>	<p><b>Severity</b> Low (4)</p>	<p><b>Reversibility</b> Completely (0)</p>	<p><b>Irreplaceable Loss</b> Partly (0.5)</p>	<p><b>Probability</b> Probable (3)</p>	<p><b>Impact Significance</b> Low (22.5)</p>
<p><b>Potential to Mitigate:</b> Moderate potential / easy to mitigate</p>				<p><b>Assessment Confidence:</b> Complete</p>			

**8.2 Impact 2: Habitat fragmentation (aquatic and terrestrial) – direct construction and operational phase impact**

<p><b>Environmental Impact:</b> Based on the information collected during the assessment, that contained within the ECBCP (Study area is within Critical Biodiversity Areas), the natural vegetation type and the proposed development activities, habitat fragmentation - reduction in ecosystem corridors</p>	<p><b>Activity/Aspect &amp; Impact Source:</b> Due to the nature of the project this will persist in the long term into the operational phase impact.</p>	<p><b>Proposed Mitigation:</b> All areas rated as Very High / HIGH will be excluded from the development footprint. In adhering to the above, habitat fragmentation within and more importantly the connection with intact habitats still surrounding the site will be promoted, assuming that the areas above the site will remain undeveloped in the future.</p>
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for the terrestrial environment could occur, but unlikely within the aquatic environment							
<b>Impact Significance</b>							
<b>Without Mitigation:</b>	<b>Extent</b> Site (1)	<b>Duration</b> Long-term (4)	<b>Severity</b> Moderate (4)	<b>Reversibility</b> Completely (0)	<b>Irreplaceable Loss</b> Partly (0.5)	<b>Probability</b> Definite (5)	<b>Impact Significance</b> Moderate (47.5)
<b>With Mitigation:</b>	<b>Extent</b> Site (1)	<b>Duration</b> Long-term (4)	<b>Severity</b> Minor (2)	<b>Reversibility</b> Completely (0)	<b>Irreplaceable Loss</b> Partly (0.5)	<b>Probability</b> Probable (3)	<b>Impact Significance</b> Low (22.5)
<b>Potential to Mitigate:</b> Moderate potential / easy to mitigate				<b>Assessment Confidence:</b> Complete			

### 8.3 Impact 3: Impact on surface water runoff patterns – direct operational impact

<p>The clearing of dense vegetation that will be replaced with irrigated areas that have the ability to increase run-off due to reduce vegetation cover / change in vegetation cover. By intercepting and slowing precipitation hitting the ground, vegetation substantially reduces the volume and rate of runoff. This then prevents soil erosion.</p>	<p><b>Activity/Aspect &amp; Impact Source:</b></p> <p>Due to the nature of the project this will persist in the long term in the operational phase impact.</p>	<p><b>Proposed Mitigation:</b></p> <ul style="list-style-type: none"> <li>No run-off should be allowed to leave the site directly. Any flows should be contained as part of a stormwater management plan.</li> </ul>					
<b>Impact Significance</b>							
<b>Without Mitigation:</b>	<b>Extent</b> Site (1)	<b>Duration</b> Long-term (4)	<b>Severity</b> Moderate (4)	<b>Reversibility</b> Completely (0)	<b>Irreplaceable Loss</b> Partly (0.5)	<b>Probability</b> Definite (5)	<b>Impact Significance</b> Moderate (47.5)
<b>With Mitigation:</b>	<b>Extent</b> Site (1)	<b>Duration</b> Long-term (4)	<b>Severity</b> Minor (2)	<b>Reversibility</b> Completely (0)	<b>Irreplaceable Loss</b> Partly (0.5)	<b>Probability</b> Probable (3)	<b>Impact Significance</b> Low (22.5)
<b>Potential to Mitigate:</b> Moderate potential / easy to mitigate				<b>Assessment Confidence:</b> Complete			

#### 8.4 Impact 4: Increase in sedimentation and erosion – direct operational phase

<b>Environmental Impact:</b> Several areas with disturbed soils coupled to the creation of additional roads / access tracks could increase amount of siltation in downstream areas		<b>Activity/Aspect &amp; Impact Source:</b> Due to the nature of the project this will persist in the long term in the operational phase impact.		<b>Proposed Mitigation:</b> <ul style="list-style-type: none"> <li>Suitable stormwater management must be included in the steep access roads. This should include swales and or small ponds to trap sediment, coupled to revegetation of bare soil areas with local plant species.</li> </ul>			
<b>Impact Significance</b>							
<b>Without Mitigation:</b>	<b>Extent</b> Site (1)	<b>Duration</b> Long-term (4)	<b>Severity</b> Moderate (4)	<b>Reversibility</b> Completely (0)	<b>Irreplaceable Loss</b> Partly (0.5)	<b>Probability</b> Definite (5)	<b>Impact Significance</b> Moderate (47.5)
<b>With Mitigation:</b>	<b>Extent</b> Site (1)	<b>Duration</b> Long-term (4)	<b>Severity</b> Minor (2)	<b>Reversibility</b> Completely (0)	<b>Irreplaceable Loss</b> Partly (0.5)	<b>Probability</b> Probable (3)	<b>Impact Significance</b> Low (22.5)
<b>Potential to Mitigate:</b> Moderate potential / easy to mitigate				<b>Assessment Confidence:</b> Complete			

#### 8.5 Impact 5: Risks on the aquatic environment due to water quality impacts – indirect operational phase

<b>Environmental Impact:</b> This impact is mostly related to the proposed agricultural activities that would generate return flows, especially if areas are over irrigated, which could then contain elevated nutrient loads.		<b>Activity/Aspect &amp; Impact Source:</b> Due to the nature of the project this will persist in the long term in the operational phase impact.		<b>Proposed Mitigation:</b> <ul style="list-style-type: none"> <li>It is important that no surface water runoff is allowed to be directed into any water courses.</li> <li>Any flows should be contained using the existing dam as part of a stormwater management plan.</li> </ul>			
<b>Impact Significance</b>							
<b>Without Mitigation:</b>	<b>Extent</b> Site (1)	<b>Duration</b> Long-term (4)	<b>Severity</b> Moderate (4)	<b>Reversibility</b> Completely (0)	<b>Irreplaceable Loss</b> Partly (0.5)	<b>Probability</b> Definite (5)	<b>Impact Significance</b> Moderate (47.5)
<b>With Mitigation:</b>	<b>Extent</b> Site (1)	<b>Duration</b> Long-term (4)	<b>Severity</b> Minor (2)	<b>Reversibility</b> Completely (0)	<b>Irreplaceable Loss</b> Partly (0.5)	<b>Probability</b> Probable (3)	<b>Impact Significance</b> Low (22.5)
<b>Potential to Mitigate:</b> Moderate potential / easy to mitigate				<b>Assessment Confidence:</b> Complete			

## 8.6 Impact 6: Cumulative impacts

<p><b>Environmental Impact:</b> The cumulative impacts are related to the loss of natural fynbos and the further expansion of orchards</p>	<p><b>Activity/Aspect &amp; Impact Source:</b> Due to the nature of the project this will persist in the long term in the operational phase impact. However, this is mostly related to adjacent terrestrial environments.</p>		<p><b>Proposed Mitigation:</b> Ideally all areas rated as VERY HIGH / HIGH should be excluded from the development proposal, however as this is not possible due to various development &amp; economic constraints the following is proposed:</p> <ul style="list-style-type: none"> <li>• Complete avoidance of near intact fynbos habitat (Figure 9)</li> <li>• Loss of the secondary habitat must be offset with protection of the area rated as VERY HIGH / HIGH, remain free from alien plants and be monitored for any erosion. A detailed walkdown must be conducted to determine the final list of species that will require DEDEAT &amp; DEFF permits, and if there are high numbers then a search and rescue plan should be initiated. Any plants that require relocation could be planted within areas that won't be developed, noting that S&amp;R has not been used to reduce the impact rating, but the avoidance of the intact areas has.</li> </ul>				
<p><b>Impact Significance</b></p>							
<p><b>Without Mitigation:</b></p>	<p><b>Extent</b> Site (1)</p>	<p><b>Duration</b> Long-term (4)</p>	<p><b>Severity</b> Moderate (4)</p>	<p><b>Reversibility</b> Completely (0)</p>	<p><b>Irreplaceable Loss</b> Partly (0.5)</p>	<p><b>Probability</b> Definite (5)</p>	<p><b>Impact Significance</b> Moderate (47.5)</p>
<p><b>With Mitigation:</b></p>	<p><b>Extent</b> Site (1)</p>	<p><b>Duration</b> Long-term (4)</p>	<p><b>Severity</b> Minor (2)</p>	<p><b>Reversibility</b> Completely (0)</p>	<p><b>Irreplaceable Loss</b> Partly (0.5)</p>	<p><b>Probability</b> Probable (3)</p>	<p><b>Impact Significance</b> Low (22.5)</p>
<p><b>Potential to Mitigate:</b> Moderate potential / easy to mitigate</p>				<p><b>Assessment Confidence:</b> Complete</p>			

## 9. Conclusion and Recommendations

The results indicated that several important habitats (Aquatic & Terrestrial only) are located within the proposed development site and for the most part, the areas rated with the highest sensitivity will be avoided, as the No-go areas were provided to the applicant before finalization of this assessment.

It is further recommended that rehabilitation of any remaining areas should thus focus on removing the aliens, and then allow the normal succession of plants to occur, i.e. the secondary species are replaced by climax species. This will take a number of years, therefore it is important to protect this area from any disturbance. Further it is recommended that the remainder of the farm portion also remain development to promote habitat corridors and conservation of valuable fynbos and catchment environment, particularly in that the remainder of the farm portion is possibly too steep for agricultural development.

However, with the mitigations, the overall significances of the impacts were rated as LOW. This only applies to the physical changes to the observed environment. Lastly it must also be reiterated, that a detailed walkdown must be conducted to determine the final list of species that will require DEDEAT & DEFF permits, and if there are high numbers then a search and rescue plan should be initiated. Any plants that require relocation could then be planted within areas that won't be developed, especially within the riverine / wetland buffer.

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## 11. Appendix 1: Species Checklists

Source SANBI ADU <http://vmus.adu.org.za/index.php?database> Accessed 20 May 2020

AMPHIBIANS			
Brevicipitidae	<i>Breviceps adpersus</i>	Bushveld Rain Frog	Least Concern
Bufoidea	<i>Sclerophrys capensis</i>	Raucous Toad	Least Concern
Heleophrynidae	<i>Heleophryne hewitti</i>	Hewitt's Ghost Frog	Critically Endangered
Hyperoliidae	<i>Hyperolius marmoratus</i>	Painted Reed Frog	Least Concern (IUCN ver 3.1, 2013)
Pipidae	<i>Xenopus laevis</i>	Cape Clawed Toad	Least Concern
Pyxicephalidae	<i>Amietia delalandii</i>	Delalande's River Frog	Least Concern (2017)
Pyxicephalidae	<i>Amietia fuscigula</i>	Cape River Frog	Least Concern (2017)
Pyxicephalidae	<i>Cacosternum boettgeri</i>	Common Caco	Least Concern (2013)
Pyxicephalidae	<i>Cacosternum nanum</i>	Bronze Caco	Least Concern (2013)
Pyxicephalidae	<i>Strongylopus fasciatus</i>	Striped Stream Frog	Least Concern
Pyxicephalidae	<i>Strongylopus grayii</i>	Clicking Stream Frog	Least Concern
REPTILES			
Agamidae	<i>Agama aculeata aculeata</i>	Common Ground Agama	Least Concern (SARCA 2014)
Agamidae	<i>Agama atra</i>	Southern Rock Agama	Least Concern (SARCA 2014)
Chamaeleonidae	<i>Bradypodion sp. (Groendal)</i>	Groendal Dwarf Chameleon	
Chamaeleonidae	<i>Bradypodion taeniabronchum</i>	Elandsberg Dwarf Chameleon	Endangered (SARCA 2014)
Colubridae	<i>Dispholidus typus typus</i>	Boomslang	Least Concern (SARCA 2014)
Cordylidae	<i>Pseudocordylus microlepidotus microlepidotus</i>	Cape Crag Lizard	Least Concern (SARCA 2014)
Elapidae	<i>Naja nivea</i>	Cape Cobra	Least Concern (SARCA 2014)
Gekkonidae	<i>Afroedura nov sp. 1 (Kouga)</i>	Flat Gecko sp. 1 (Kouga)	
Lacertidae	<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard	Least Concern (SARCA 2014)
Lacertidae	<i>Tropidosaura gularis</i>	Cape Mountain Lizard	Least Concern (SARCA 2014)
Lamprophiidae	<i>Lycodonomorphus rufulus</i>	Brown Water Snake	Least Concern (SARCA 2014)
Lamprophiidae	<i>Psammophylax rhombeatus</i>	Spotted Grass Snake	Least Concern (SARCA 2014)
Scincidae	<i>Acontias orientalis</i>	Eastern Legless Skink	Least Concern (SARCA 2014)
Testudinidae	<i>Chersina angulata</i>	Angulate Tortoise	Least Concern (SARCA 2014)
Viperidae	<i>Bitis arietans arietans</i>	Puff Adder	Least Concern (SARCA 2014)
LEPIDOPTERA			
HESPERIIDAE	<i>Spialia satespes</i>	Boland sandman	Least Concern (SABCA 2013)
HESPERIIDAE	<i>Tsitana uitenhaga</i>	Uitenhage sylph	Least Concern (SABCA 2013)



LYCAENIDAE	<i>Aloeides aranda</i>	Aranda copper	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Aloeides damarensis damarensis</i>	Damara copper	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Aloeides depicta</i>	Depicta copper	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Aloeides juana</i>	Juana copper	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Aloeides pallida liversidgei</i>	Giant copper	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Cacyreus marshalli</i>	Common geranium bronze	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Capys alpheus alpheus</i>	Orange banded protea	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Chrysoritis beulah</i>	Beulah's opal	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Chrysoritis chrysaor</i>	Burnished opal	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Chrysoritis zeuxo cottrelli</i>	Cottrell's daisy copper	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Lachnocnema durbani</i>	D'Urban's woolly legs	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Lampides boeticus</i>	Pea blue	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Lepidochrysops sp.</i>		
LYCAENIDAE	<i>Lepidochrysops ketsi ketsi</i>	Ketsi blue	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Lepidochrysops patricia</i>	Patricia blue	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Lepidochrysops poseidon</i>	Baviaanskloof blue	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Lepidochrysops robertsoni</i>	Robertson's blue	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Lepidochrysops variabilis</i>	Variable blue	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Leptomyrina lara</i>	Cape black-eye	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Tarucus thespis</i>	Vivid dotted blue	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Thestor murrayi</i>	Murray's skolly	Least Concern (SABCA 2013)
LYCAENIDAE	<i>Trimenia argyroplaga argyroplaga</i>	Large silver-spotted copper	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Acraea neobule neobule</i>	Wandering donkey acraea	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Aeropetes tulbaghia</i>	Table mountain beauty	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Charaxes pelias</i>	Protea charaxes	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Danaus chrysippus orientis</i>	African monarch, Plain tiger	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Hypolimnias misippus</i>	Common diadem	Least Concern (SABCA 2013)

NYMPHALIDAE	<i>Junonia hierta cebrene</i>	Yellow pansy	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Pardopsis punctatissima</i>	Polka dot	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Precis archesia archesia</i>	Garden commodore	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Precis octavia sesamus</i>	Gaudy Commodore	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Pseudonympha magus</i>	Silver-bottom brown	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Pseudonympha trimenii ruthae</i>	Trimen's brown	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Stygionympha vigilans</i>	Western hillside brown	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Stygionympha wichgrafi williami</i>	Wichgraf's hillside brown	Least Concern (SABCA 2013)
NYMPHALIDAE	<i>Vanessa cardui</i>	Painted lady	Least Concern (SABCA 2013)
PAPILIONIDAE	<i>Papilio demodocus demodocus</i>	Citrus swallowtail	Least Concern (SABCA 2013)
PIERIDAE	<i>Belenois aurota</i>	Brown-veined white	Least Concern (SABCA 2013)
PIERIDAE	<i>Pontia helice helice</i>	Common meadow white	Least Concern (SABCA 2013)
PIERIDAE	<i>Teracolus eris eris</i>	Banded gold tip	Least Concern (SABCA 2013)
<b>AVES (BIRDS)</b>			
<b>Common_group</b>	<b>Common_species</b>	<b>Genus</b>	<b>Species</b>
Apalis	Bar-throated	<i>Apalis</i>	<i>thoracica</i>
Apalis	Yellow-breasted	<i>Apalis</i>	<i>flavida</i>
Barbet	Acacia Pied	<i>Tricholaema</i>	<i>leucomelas</i>
Barbet	Black-collared	<i>Lybius</i>	<i>torquatus</i>
Batis	Cape	<i>Batis</i>	<i>capensis</i>
Bishop	Southern Red	<i>Euplectes</i>	<i>orix</i>
Bokmakierie	Bokmakierie	<i>Telophorus</i>	<i>zeylonus</i>
Boubou	Southern	<i>Laniarius</i>	<i>ferrugineus</i>
Brownbul	Terrestrial	<i>Phyllastrephus</i>	<i>terrestris</i>
Bulbul	Cape	<i>Pycnonotus</i>	<i>capensis</i>
Bunting	Cinnamon-breasted	<i>Emberiza</i>	<i>tahapisi</i>
Bunting	Golden-breasted	<i>Emberiza</i>	<i>flaviventris</i>
Bush-shrike	Olive	<i>Telophorus</i>	<i>olivaceus</i>
Buzzard	Jackal	<i>Buteo</i>	<i>rufofuscus</i>
Buzzard	Steppe	<i>Buteo</i>	<i>vulpinus</i>
Camaroptera	Green-backed	<i>Camaroptera</i>	<i>brachyura</i>
Canary	Brimstone	<i>Crithagra</i>	<i>sulphuratus</i>
Canary	Cape	<i>Serinus</i>	<i>canicollis</i>
Canary	Forest	<i>Crithagra</i>	<i>scotops</i>
Canary	Yellow-fronted	<i>Crithagra</i>	<i>mozambicus</i>
Chat	Anteating	<i>Myrmecocichla</i>	<i>formicivora</i>
Chat	Familiar	<i>Cercomela</i>	<i>familiaris</i>

Cisticola	Grey-backed	<i>Cisticola</i>	<i>subruficapilla</i>
Cisticola	Lazy	<i>Cisticola</i>	<i>aberrans</i>
Cisticola	Levaillant's	<i>Cisticola</i>	<i>tinniens</i>
Cisticola	Zitting	<i>Cisticola</i>	<i>juncidis</i>
Coot	Red-knobbed	<i>Fulica</i>	<i>cristata</i>
Cormorant	Reed	<i>Phalacrocorax</i>	<i>africanus</i>
Cormorant	White-breasted	<i>Phalacrocorax</i>	<i>carbo</i>
Coucal	Burchell's	<i>Centropus</i>	<i>burchellii</i>
Crane	Blue	<i>Anthropoides</i>	<i>paradiseus</i>
Crested-flycatcher	Blue-mantled	<i>Trochocercus</i>	<i>cyanomelas</i>
Crow	Cape	<i>Corvus</i>	<i>capensis</i>
Crow	Pied	<i>Corvus</i>	<i>albus</i>
Cuckoo	Black	<i>Cuculus</i>	<i>clamosus</i>
Cuckoo	Klaas's	<i>Chrysococcyx</i>	<i>klaas</i>
Cuckoo	Red-chested	<i>Cuculus</i>	<i>solitarius</i>
Cuckoo-shrike	Black	<i>Campephaga</i>	<i>flava</i>
Cuckoo-shrike	Grey	<i>Coracina</i>	<i>caesia</i>
Dove	Laughing	<i>Streptopelia</i>	<i>senegalensis</i>
Dove	Lemon	<i>Aplopelia</i>	<i>larvata</i>
Dove	Red-eyed	<i>Streptopelia</i>	<i>semitorquata</i>
Dove	Tambourine	<i>Turtur</i>	<i>tympanistria</i>
Drongo	Fork-tailed	<i>Dicrurus</i>	<i>adsimilis</i>
Duck	African Black	<i>Anas</i>	<i>sparsa</i>
Duck	Yellow-billed	<i>Anas</i>	<i>undulata</i>
Eagle	African Crowned	<i>Stephanoaetus</i>	<i>coronatus</i>
Eagle	Martial	<i>Polemaetus</i>	<i>bellicosus</i>
Eagle	Verreaux's	<i>Aquila</i>	<i>verreauxii</i>
Eagle-owl	Spotted	<i>Bubo</i>	<i>africanus</i>
Egret	Cattle	<i>Bubulcus</i>	<i>ibis</i>
Firefinch	African	<i>Lagonosticta</i>	<i>rubricata</i>
Fiscal	Common (Southern)	<i>Lanius</i>	<i>collaris</i>
Fish-eagle	African	<i>Haliaeetus</i>	<i>vocifer</i>
Flycatcher	African Dusky	<i>Muscicapa</i>	<i>adusta</i>
Flycatcher	Fiscal	<i>Sigelus</i>	<i>silens</i>
Flycatcher	Spotted	<i>Muscicapa</i>	<i>striata</i>
Goose	Egyptian	<i>Alopochen</i>	<i>aegyptiacus</i>
Goose	Spur-winged	<i>Plectropterus</i>	<i>gambensis</i>
Goshawk	African	<i>Accipiter</i>	<i>tachiro</i>
Goshawk	Southern Pale Chanting	<i>Melierax</i>	<i>canorus</i>
Grassbird	Cape	<i>Sphenoeacus</i>	<i>afer</i>
Grebe	Little	<i>Tachybaptus</i>	<i>ruficollis</i>
Greenbul	Sombre	<i>Andropadus</i>	<i>importunus</i>
Guineafowl	Helmeted	<i>Numida</i>	<i>meleagris</i>
Gull	Kelp	<i>Larus</i>	<i>dominicanus</i>
Harrier	Black	<i>Circus</i>	<i>maurus</i>
Harrier-Hawk	African	<i>Polyboroides</i>	<i>typus</i>
Heron	Black-headed	<i>Ardea</i>	<i>melanocephala</i>

Heron	Grey	<i>Ardea</i>	<i>cinerea</i>
Honeyguide	Greater	<i>Indicator</i>	<i>indicator</i>
Honeyguide	Lesser	<i>Indicator</i>	<i>minor</i>
Honeyguide	Scaly-throated	<i>Indicator</i>	<i>variegatus</i>
Hoopoe	African	<i>Upupa</i>	<i>africana</i>
Hornbill	Crowned	<i>Tockus</i>	<i>alboterminatus</i>
Ibis	African Sacred	<i>Threskiornis</i>	<i>aethiopicus</i>
Ibis	Hadeda	<i>Bostrychia</i>	<i>hagedash</i>
Indigobird	Dusky	<i>Vidua</i>	<i>funerea</i>
Kestrel	Rock	<i>Falco</i>	<i>rupicolus</i>
Kingfisher	Brown-hooded	<i>Halcyon</i>	<i>albiventris</i>
Kingfisher	Half-collared	<i>Alcedo</i>	<i>semitorquata</i>
Kingfisher	Malachite	<i>Alcedo</i>	<i>cristata</i>
Kingfisher	Pied	<i>Ceryle</i>	<i>rudis</i>
Kite	Black-shouldered	<i>Elanus</i>	<i>caeruleus</i>
Kite	Yellow-billed	<i>Milvus</i>	<i>aegyptius</i>
Lapwing	Blacksmith	<i>Vanellus</i>	<i>armatus</i>
Lapwing	Crowned	<i>Vanellus</i>	<i>coronatus</i>
Lark	Red-capped	<i>Calandrella</i>	<i>cinerea</i>
Longclaw	Cape	<i>Macronyx</i>	<i>capensis</i>
Marsh-harrier	African	<i>Circus</i>	<i>ranivorus</i>
Martin	Brown-throated	<i>Riparia</i>	<i>paludicola</i>
Martin	Rock	<i>Hirundo</i>	<i>fuligula</i>
Masked-weaver	Southern	<i>Ploceus</i>	<i>velatus</i>
Moorhen	Common	<i>Gallinula</i>	<i>chloropus</i>
Mousebird	Red-faced	<i>Urocolius</i>	<i>indicus</i>
Mousebird	Speckled	<i>Colius</i>	<i>striatus</i>
Neddicky	Neddicky	<i>Cisticola</i>	<i>fulvicapilla</i>
Olive-pigeon	African	<i>Columba</i>	<i>arquatrix</i>
Oriole	Black-headed	<i>Oriolus</i>	<i>larvatus</i>
Palm-swift	African	<i>Cypsiurus</i>	<i>parvus</i>
Paradise-flycatcher	African	<i>Terpsiphone</i>	<i>viridis</i>
Pigeon	Speckled	<i>Columba</i>	<i>guinea</i>
Plover	Three-banded	<i>Charadrius</i>	<i>tricoloris</i>
Prinia	Karoo	<i>Prinia</i>	<i>maculosa</i>
Puffback	Black-backed	<i>Dryoscopus</i>	<i>cubla</i>
Quelea	Red-billed	<i>Quelea</i>	<i>quelea</i>
Raven	White-necked	<i>Corvus</i>	<i>albicollis</i>
Robin-chat	Cape	<i>Cossypha</i>	<i>caffra</i>
Rock-thrush	Cape	<i>Monticola</i>	<i>rupestris</i>
Rush-warbler	Little	<i>Bradypterus</i>	<i>baboecala</i>
Saw-wing	Black (Southern race)	<i>Psalidoprocne</i>	<i>holomelaena</i>
Scrub-robin	Brown	<i>Cercotrichas</i>	<i>signata</i>
Scrub-robin	White-browed	<i>Cercotrichas</i>	<i>leucophrys</i>
Seedeater	Streaky-headed	<i>Crithagra</i>	<i>gularis</i>
Sparrow	Cape	<i>Passer</i>	<i>melanurus</i>
Sparrow	House	<i>Passer</i>	<i>domesticus</i>

Sparrow	Southern Grey-headed	<i>Passer</i>	<i>diffusus</i>
Sparrowhawk	Black	<i>Accipiter</i>	<i>melanoleucus</i>
Sparrowhawk	Little	<i>Accipiter</i>	<i>minullus</i>
Spoonbill	African	<i>Platalea</i>	<i>alba</i>
Spurfowl	Red-necked	<i>Pternistis</i>	<i>afer</i>
Starling	Black-bellied	<i>Lamprotornis</i>	<i>corruscus</i>
Starling	Cape Glossy	<i>Lamprotornis</i>	<i>nitens</i>
Starling	Common	<i>Sturnus</i>	<i>vulgaris</i>
Starling	Pied	<i>Spreo</i>	<i>bicolor</i>
Starling	Red-winged	<i>Onychognathus</i>	<i>morio</i>
Stilt	Black-winged	<i>Himantopus</i>	<i>himantopus</i>
Stonechat	African	<i>Saxicola</i>	<i>torquatus</i>
Stork	White	<i>Ciconia</i>	<i>ciconia</i>
Sugarbird	Cape	<i>Promerops</i>	<i>cafer</i>
Sunbird	Amethyst	<i>Chalcomitra</i>	<i>amethystina</i>
Sunbird	Collared	<i>Hedydipna</i>	<i>collaris</i>
Sunbird	Greater Double-collared	<i>Cinnyris</i>	<i>afer</i>
Sunbird	Grey	<i>Cyanomitra</i>	<i>veroxii</i>
Sunbird	Malachite	<i>Nectarinia</i>	<i>famosa</i>
Sunbird	Orange-breasted	<i>Anthobaphes</i>	<i>violacea</i>
Sunbird	Southern Double-collared	<i>Cinnyris</i>	<i>chalybeus</i>
Swallow	Barn	<i>Hirundo</i>	<i>rustica</i>
Swallow	Greater Striped	<i>Hirundo</i>	<i>cucullata</i>
Swallow	Lesser Striped	<i>Hirundo</i>	<i>abyssinica</i>
Swallow	White-throated	<i>Hirundo</i>	<i>albigularis</i>
Swamp-warbler	Lesser	<i>Acrocephalus</i>	<i>gracilirostris</i>
Swift	Alpine	<i>Tachymarptis</i>	<i>melba</i>
Swift	Horus	<i>Apus</i>	<i>horus</i>
Swift	Little	<i>Apus</i>	<i>affinis</i>
Swift	White-rumped	<i>Apus</i>	<i>caffer</i>
Tchagra	Southern	<i>Tchagra</i>	<i>tchagra</i>
Teal	Cape	<i>Anas</i>	<i>capensis</i>
Thrush	Olive	<i>Turdus</i>	<i>olivaceus</i>
Tinkerbird	Red-fronted	<i>Pogoniulus</i>	<i>pusillus</i>
Tit-babbler	Chestnut-vented	<i>Parisoma</i>	<i>subcaeruleum</i>
Trogon	Narina	<i>Apaloderma</i>	<i>narina</i>
Turaco	Knysna	<i>Tauraco</i>	<i>corythaix</i>
Turtle-dove	Cape	<i>Streptopelia</i>	<i>capicola</i>
Wagtail	Cape	<i>Motacilla</i>	<i>capensis</i>
Warbler	Knysna	<i>Bradypterus</i>	<i>sylvaticus</i>
Warbler	Victorin's	<i>Cryptillas</i>	<i>victorini</i>
Waxbill	Common	<i>Estrilda</i>	<i>astrild</i>
Waxbill	Swee	<i>Coccopygia</i>	<i>melanotis</i>
Weaver	Cape	<i>Ploceus</i>	<i>capensis</i>
Weaver	Dark-backed	<i>Ploceus</i>	<i>bicolor</i>
Weaver	Spectacled	<i>Ploceus</i>	<i>ocularis</i>
Weaver	Thick-billed	<i>Amblyospiza</i>	<i>albifrons</i>

Weaver	Village	<i>Ploceus</i>	<i>cucullatus</i>
White-eye	Cape	<i>Zosterops</i>	<i>virens</i>
Whydah	Pin-tailed	<i>Vidua</i>	<i>macroura</i>
Wood-dove	Emerald-spotted	<i>Turtur</i>	<i>chalcospilos</i>
Wood-hoopoe	Green	<i>Phoeniculus</i>	<i>purpureus</i>
Woodland-warbler	Yellow-throated	<i>Phylloscopus</i>	<i>ruficapilla</i>
Woodpecker	Cardinal	<i>Dendropicos</i>	<i>fuscescens</i>
Woodpecker	Knysna	<i>Campethera</i>	<i>notata</i>
Woodpecker	Olive	<i>Dendropicos</i>	<i>griseocephalus</i>