

**TERRESTRIAL VEGETATION AND AQUATIC ASSESMENT FOR
VALLEY VIEWS RESIDENTIAL DEVELOPMENT, ERF 28/9
KABEGA, NMBM, EASTERN CAPE PROVINCE**

FOR

Habitat Link Consulting

BY



EnviroSci (Pty) Ltd

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10 July 2021

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.

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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 and or Department of Water and Sanitation



Signed:...

..... Date:....10 July 2021.....

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1. Introduction

Habitat Link Consulting on behalf of the developer appointed EnviroSci (Pty) Ltd to conduct an Ecological Assessment (Vegetation & Aquatic) as part of the proposed housing development project on **Erf 28/9 Kabega** within the Nelson Mandela Bay Municipality (NMBM) (Figure 1).

The proponent wishes to develop the property and commissioned this study to determine the boundary and condition of any sensitivity terrestrial habitats, wetlands and or watercourses that should be avoided. This assessment would also assist in the determination of any additional permitting requirements such as a Water Use Licence / General Authorisation as required by the Department of Water and Sanitation.

1.1 Aims and objectives

The aim of this report is to provide an assessment of the state and function of any aquatic and terrestrial habitats that may be affected, together with an assessment of the potential issues posed by the development.

Where possible this report also provides means to avoid additional impacts, with the provision of No-Go areas, with required buffers. This was based on a site visit conducted on 24 April 2021, after some significant rainfall and the appearance of a number of the early winter bulb species. Due to the lack of any significant growth being observed, and coupled to the potential sensitivity of the site, a second site visit was conducted on the 17 May 2021, with no increase in the number of plants being observed.

1.2 Assumptions and Limitation

To obtain a comprehensive understanding of the dynamics of any aquatic 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, with a significant portion of the adjoining areas have already been developed for the same purposes as that proposed, a long-term investigation of the 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 (Appendix 1) and aerial photography, with particular focus on determining the type and importance of the systems that may be impacted upon by the activities, coupled to a follow up site visit.

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: An aerial view of the study area within the surrounding landscape

2. Terms of Reference

Part 1 - Aquatic / Wetland assessment

- Initiated the assessment with a review of the available information for the region and the proposed projects, this also included the review of the proposed project in relation to any conservation plans or assessments known for the area, e.g. DFFE Screening Tool, Critical Biodiversity Area maps, National Waterbody Inventory etc.
- Conducted a detailed site visit to inspect the site and surrounding waterbodies within a 500m buffer of the site boundary. Sampling also included various techniques such as soil core sampling, vegetation surveying and GPS Groundtruthing to delineate the boundaries of the various aquatic features using standardised methods developed by DWS and used in the National Wetland Classification system, as required.
- Determined the Present Ecological State of any waterbodies incl. wetlands, estimating their biodiversity, conservation importance with regard ecosystem services during the site visit using recognised PES / EIS assessment methods to determine the state, importance and sensitivity of the respective wetland / watercourse systems
- Prepared a map demarcating the respective watercourses or wetland/s, i.e. the waterbody, its respective catchment and other areas within a 500m radius of the study area. This demonstrated, 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 demarcated waterbodies will be delineated to a scale of 1:10 000, following the methodology described by the DWS, together with an estimation of their functionality, Habitat Integrity (IHI), Wet-Ecosystems (Wet-Health) and Socio-Cultural Importance of the delineated systems, whichever is relevant to the systems.

- Recommended buffer zones using the Macfarlane & Bredin (2017) approach to indicate any No-go / Sensitive areas around any delineated aquatic zones supported by any relevant legislation, e.g. any bioregional plans, conservation guidelines or best practice.
- Compiled surface water impact assessment report that adhered to the following once the final layout was developed:
 - Reporting requirements as indicated by the appointed Environmental Assessment Practitioner (EAP).
 - Impact significance ratings according to the impact rating methodology provided by the appointed EAP.
 - Reporting requirements set out in Appendix 6 of the EIA Regulations, 2014 (as amended) or reporting requirements for environmental themes in terms of section 24(5)(a) and (h) of the NEMA
 - Assessment of cumulative impacts as a result of other activities in the area, including existing and proposed mines and developments. This must include a review of the specialist reports undertaken for other developments in the surrounding area and demonstrate how the mitigation measures of these studies have been considered.
 - Comparative assessment of alternatives to be provided by the appointed EAP if any.
 - Minor updates to the scoping phase reports in the EIA phase to investigate the layouts.
- Provided mitigations regarding project related impacts, including engineering services that could negatively affect demarcated wetland areas.
- Supplied the client with geo-referenced GIS shape files of the wetland / riverine areas.
- Provide a separate Risk Assessment Matrix as per the DWS 2016 requirements to determine the Water Use License Application Requirements, i.e. indication of future permitting requirements if required

Part 2 - Terrestrial Vegetation Assessment

The terrestrial vegetation was investigated after conducting a desktop assessment of any available plant distribution databases and relevant Biodiversity Conservation plans associated with the region;

Vegetation units were then be sampled by means of the following techniques during the site visit as follows:

- Data collection will be 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 included:
 - Threatened, endemic or rare species, with an indication of the relative functionality and conservation importance of the specific community in the area under investigation, aimed at identifying any permitting requirements for protected or listed species. **Also noting several sensitive species are listed in the Screening Tool Results**
 - Invasive or exotic species present in the area
 - The functional and conservation importance of any remaining vegetation communities in the investigation area
- Supplies the client with geo-referenced GIS shape files of the vegetation units and sensitivity.

The above mentioned information was the consolidated and included the following:

- Provide mitigations regarding project related impacts, including engineering services that have negatively affect any terrestrial sensitive areas.
- Impact assessment of the project on the aquatic and terrestrial environment once the layout has been completed
- Provide a separate Risk Assessment Matrix as per the DWS 2016 requirements to determine the Water Use License Application Requirements, i.e. indication of future permitting requirements if required, based on the proposed layout.

3. Project Description

It is understood that the developer proposes to construct houses within the study area, that will also require the associated infrastructure such as roads, water, electrical and stormwater management services.

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:

- | | |
|--|--|
| • <i>Pinus spp</i> (Pine trees) | • <i>Foeniculum vulgare</i> (Fennel) |
| • <i>Eucalyptus spp</i> (Blue / Red Gums) | • <i>Populus alba</i> (White Poplar) |
| • <i>Agave sisalana</i> (Sisal plant / Agave) | • <i>Cyperus rotundus subsp rotundus</i> (Nut grass) |
| • <i>Acacia mearnsii</i> (Black Wattle) | • <i>Pennisetum clandestinum</i> (Kikuyu) |
| • <i>Acacia cyclops</i> (Rooikrans) | • <i>Solanum mauritianum</i> (Bugweed) |
| • <i>Acacia longifolia</i> (Longleaf wattle) | • <i>Argemone Mexicana</i> (Mexican poppy) |
| • <i>Rubus cuneifolia</i> (Bramble) | • <i>Cirsium vulgare</i> (Scotch Thistle) |
| • <i>Arundo donax</i> (Giant / Spanish Reed) | • <i>Plantago lanceolate</i> (Buckhorn plantain) |
| • <i>Cortaderia selonna</i> (Pampas grass) | • <i>Cestrum laevigatum</i> (Inkberry) |
| • <i>Sisymbrium capense</i> (Cape wild mustard) | • <i>Schinus terebinthifolia</i> (Brazilian pepper tree) |
| • <i>Sisumbrium orientale</i> (Indian hedge mustard) | |

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 coastal region at ca. 680 mm per annum. Annual average temperatures range between 7.6 and 25 °C, with frost a rare occurrence of no more than 3 days per year (Mucina & Rutherford, 2007).

5.2 Geology and soils

The site is underlain with acidic lithosols derived from Ordovician sandstones of the Table Mountain Group. (Mucina & Rutherford, 2007).

5.3 Slope and aspect

The region is characterised by an open valley section associated with the Baakens (Bakens) River and approximately ranges between 143 and 155mASL (Above Sea Level).

5.4 Terrestrial environment

The study area spans one vegetation type defined by Mucina and Rutherford (2007), as amended in the National Vegetation Map 2012 and 2017/18 spatial information (Figure 2). This vegetation unit, known as Algoa Sandstone Fynbos (FFs 29), a form of Algoa Grassy Fynbos, is listed as Vulnerable and is therefore considered a Threatened Ecosystem (Figure 3), as per the National Environmental Management: Biodiversity Act.

The species associated with Algoa Sandstone Fynbos are dominated by a variety of grasses, Ericas and Proteas, and is only located within a narrow coastal belt between the Van Stadens River in the West and Summerstrand in the East, within NMBM. A potential species checklist is included in Appendix 1, however the species observed, did indicate that disturbance had taken place within the site in the past, evidenced by the high number of invasive plants species (Plate 1) listed above, illegal solid waste / building rubble disposal (Plate 2). However small areas of the natural vegetation still remain (ca. 1 ha) within the proposed development site (Plate 3).

Plant species that remained, therefore included mostly grasses, and fynbos associates such as Restios, Ericas, and Proteas (*Leucodendron* & *Leucospermum* species), as shown in Table 1 below.

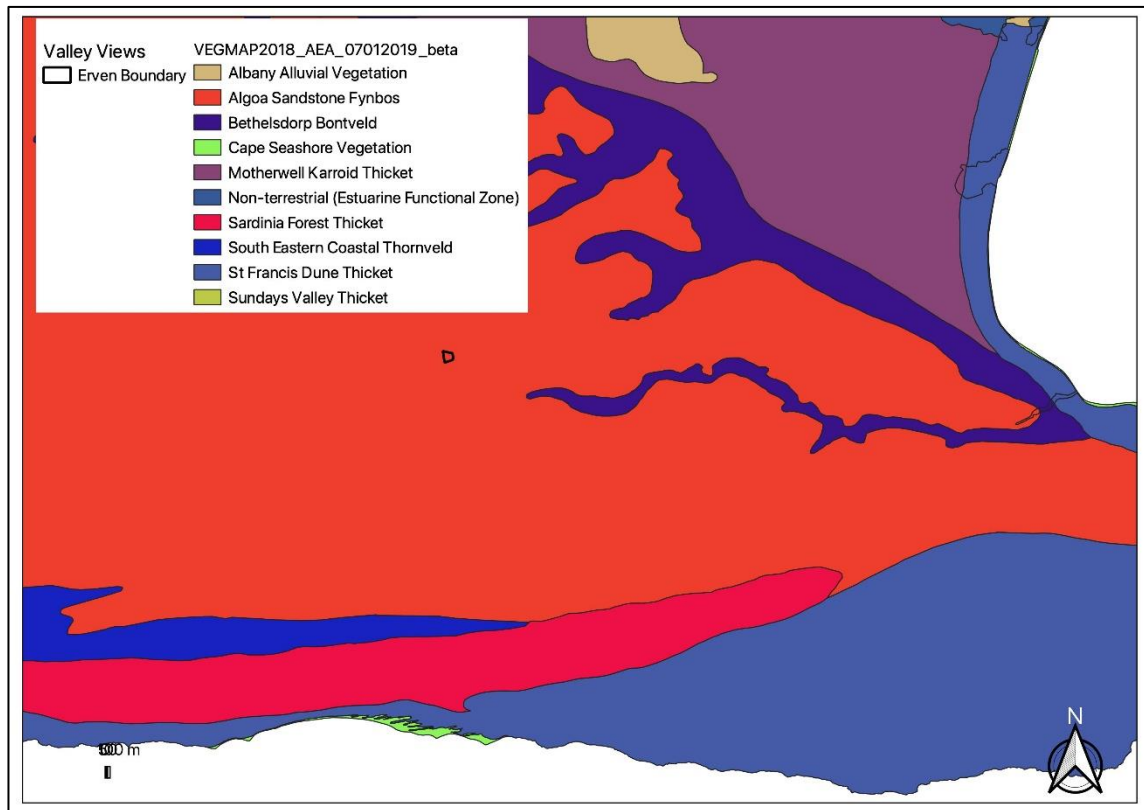


Figure 2: Vegetation South Africa VegMap as per Mucina & Rutherford (2007) revised 2018

Figure 3, indicates finer scale mapping of the site, with regard a vegetation and bioregional assessment conducted by SRK (2014) for NMBM, which indicates that the site is surrounded by Baakens Forest Thicket and Algoa Sandstone Fynbos. The latter unit is comparable to what was found on site in areas without alien vegetation, with the Baakens Forest Thicket represented by the riparian systems delineated in this assessment.



Figure 3: NMBM Vegetation map (SRK, 2014)



Plate 1: Southern portion of the site dominated by several species of alien tree



Plate 2: Several areas are being used for solid waste disposal



Plate 3: A view of the largely intact area of Algoa Sandstone Fynbos located within the proposed development footprint

Table 1: Important indigenous plant species observed within the study area

Plant taxa	Conservation Status / Importance
<i>Agathosma ovata</i> (Thunb.) Pillans	Least Concern
<i>Andropogon eucomus</i> Nees	Least Concern
<i>Brachiaria serrata</i> (Thunb.) Stapf	Least Concern
<i>Crassula pellucida</i> L. ssp. <i>marginalis</i> (Dryand. in Aiton) Toelken	Least Concern
<i>Cymbopogon pospischilii</i> (K.Schum.) C.E.Hubb.	Least Concern
<i>Cynodon dactylon</i> (L.) Pers.	Least Concern
<i>Digitaria eriantha</i> Steud.	Least Concern
<i>Ehrharta calycina</i> Sm.	Least Concern
<i>Erica etheliae</i> L.Bolus	Least Concern
<i>Erica zeyheriana</i> (Klotzsch) E.G.H.Oliv.	Least Concern
<i>Euryops ericifolius</i> (Bél.) B.Nord.	Least Concern
<i>Eustachys paspaloides</i> (Vahl) Lanza & Mattei	Least Concern
<i>Helichrysum appendiculatum</i> (L.f.) Less.	Least Concern
<i>Helichrysum teretifolium</i> (L.) D.Don	Least Concern
<i>Pentameris heptameris</i> (Nees) Steud.	Least Concern
<i>Restio capensis</i> (L.) H.P.Linder & C.R.Hardy	Least Concern
<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>hirsuta</i> Harv.	Least Concern
<i>Thamnochortus cinereus</i> H.P.Linder	Least Concern
<i>Themeda triandra</i> Forssk.	Least Concern
<i>Tristachya leucothrix</i> Trin. ex Nees	Least Concern
<i>Syncarpha</i> spp	Least Concern
<i>Gazania krebsianna</i>	Least Concern
<i>Watsonia</i> spp	Least Concern
<i>Drosera aliciae</i>	Least Concern
<i>Pelargonium</i> spp	Least Concern
<i>Elegia</i> spp	Least Concern
<i>Gladiolus floribundus</i>	Least Concern

Table 2, includes species highlighted by the DFFE Screening tool, that are rated as having a Medium Sensitivity within the site. These species were actively searched for, with only the species highlighted (Table 2) being observed.

Table 2: Sensitive plant species (Medium Sensitivity) that have the potential to occur within the site according to the DEFF Screening Tool Results.

Screening Tool Plant Species*	Conservation importance	Habitat	Observed Y/N
<i>Selago rotundifolia</i>	Vulnerable B1ab	Forest margins or grassy flats	No
Sensitive species 99	Near Threatened B1ab	It is localized to open patches on deep, lime-rich sand and clay loams in mesic and xeric succulent thicket, 10-400 m.	No
Sensitive species 445	Vulnerable B1ab	Sandy loam, clay or moderately fertile soils derived from the Witteberg slopes, mostly confined to the coastal plain	Similar species observed but will need a flowering specimen to confirm
<i>Bobartia macrocarpa</i>	Vulnerable A2c;	Flat open grassy patches	No
<i>Erica zeyheriana</i>	Vulnerable A4bc; B1ab+2ab	Remnant lowland grassy fynbos on sand.	No
<i>Erica chloroloma</i>		Coastal dune fynbos	No
<i>Gymnosporia elliptica</i>	Vulnerable B1ab	Coastal plains, with specimens recorded along the Baakens River in the past	Yes, but located just downstream of the proposed site
Sensitive species 695	Vulnerable B1ab	Between low scrub and sand dunes on lowland flats in areas with an annual rainfall of 400-800 mm	No
Sensitive species 141	Endangered B2ab	Coastal sands	No
Sensitive species 236	Vulnerable B1ab	Coastal forelands	Similar species observed but will need a flowering specimen to confirm
Sensitive species 249	Critically Endangered B1ab	Lowland fynbos in marshy drainage lines, 300 mASL.	Yes, but located just downstream of the proposed site
Sensitive species 264	Endangered B1ab	Flats and lower slopes in semi-arid areas	No
<i>Rapanea gilliana</i>	Endangered B1ab	Coastal sand dunes	No
Sensitive species 294			
<i>Argyrobium crassifolium</i>	Endangered A2c; B1ab	Grassland below 300mASL	No
<i>Holothrix longicornu</i>	Critically Endangered	Lower sandstone slopes thought to be extinct	No
<i>Agathosma gonaquensis</i>	Critically Endangered	Several known locations along the Baakens River	Similar species observed but will need a flowering specimen to confirm
<i>Lebeckia gracilis</i>	Endangered	Coastal fynbos in deep, sandy soil below 300 mABSL	No
<i>Lotononis acuminata</i>	Vulnerable B1ab	Disturbed renosterveld and grassy fynbos	No
<i>Corpuscularia lehmannii</i>	Critically Endangered B1ab	Quartzite outcrops	No

*Due to the sensitivity of some of the species, the names of which are not allowed to be shown

Table 3, includes the faunal species observed during this assessment, none of which are considered sensitive or conservation needy.

With regards \ mammal species, Species 5, listed by the DFFE Screening Tool, is may occur within the site as small dung pellet mounds were observed within the fynbos area, but this could also be from a similar sized mammal.

No other mammals were observed within the site, but it can be assumed that Mongoose and Otters, known in the Baakens River, with use the river as a movement corridor or for foraging.

Table 3: Faunal species observed within the site

Taxon	Common Name	Conservation status and habitat	Site observation
Invertebrates			
<i>Junonia hierta cebrene</i>	Yellow pansy	Least Concern (SABCA 2013)	Feeding or flying within the site
<i>Belenois aurota</i>	Brown veined white	Least Concern (SABCA 2013)	
<i>Locusta pardalina</i>	Brown locust	Least Concern	
<i>Phymateus viridipes</i>	Green milkweed locust	Least Concern	
Birds			
<i>Euplectes capensis</i>	Bishop, Yellow	RDB, 2015 Least Concern	Flyover
<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	Feeding within site
<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>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>Motacilla capensis</i>	Cape Wagtail	RDB, 2015 Least Concern	Feeding within site
Reptiles			
<i>Hemidactylus mabouia</i>	Common Tropical House Gecko	Least Concern (ARRSA, 2014) Widespread	Observed in building rubble

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 & Marienne 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. Safronics (Pty) Ltd., Johannesburg and Animal Demography Unit, Cape Town.

5.5 Aquatic environment

The proposed project is encircled by the Baakens River and one of its small drainage line tributaries (Figure 4), which over time has been modified through the growth of alien trees such as *Acacia mearnsi*, *Acacia longifolia*, *Datura stramonium* and *Eucalyptus spp* (Plate 4). All of the watercourse banks have also been further modified in terms of stormwater management or the installation of various sewer mains and the development of houses on the opposite banks upstream and downstream of the site. Dense alien tree thickets therefore occur within and downstream of the site, while the site also contain pine trees (*Pinus spp*).

The study area is located within the M20A Baakens River quaternary catchment as shown in Figure 4, situated within the Southern Eastern Coastal Belt Ecoregion. The study area does not however contain any known wetland clusters (Figure 5), International Bird Areas, although is located within a Threatened Ecosystems (Terrestrial) as listed by NEMA. Further the study area does not form part of a Strategic Water Resource Area (Figure 5).

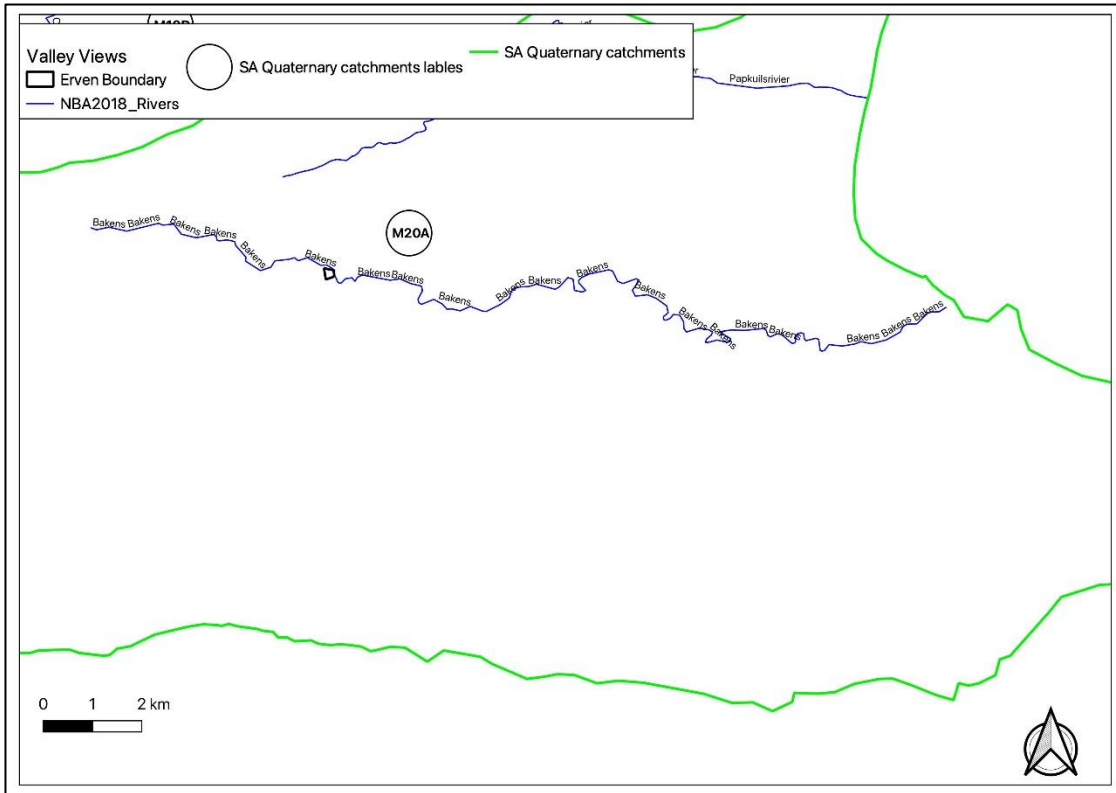


Figure 4: The Baakens River in relation to the Subquaternary Catchment Boundary and the site.

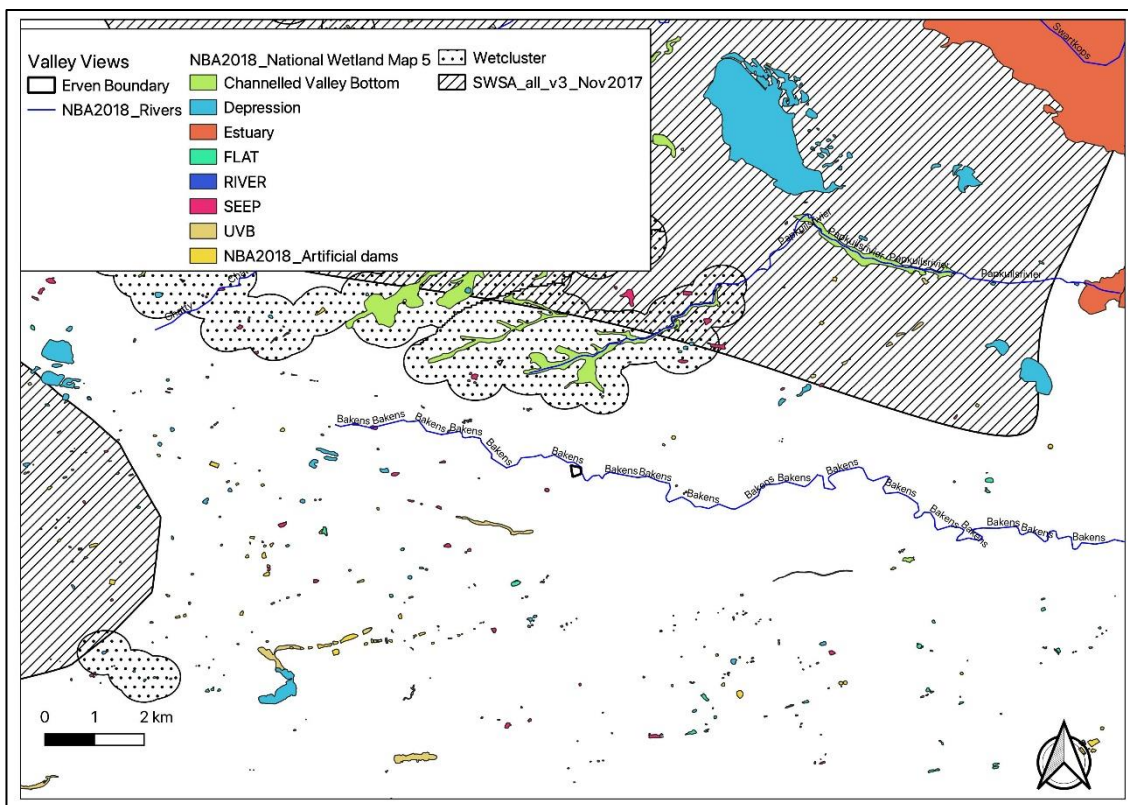


Figure 5: The National Wetland Inventory spatial database wetlands in relation to the site

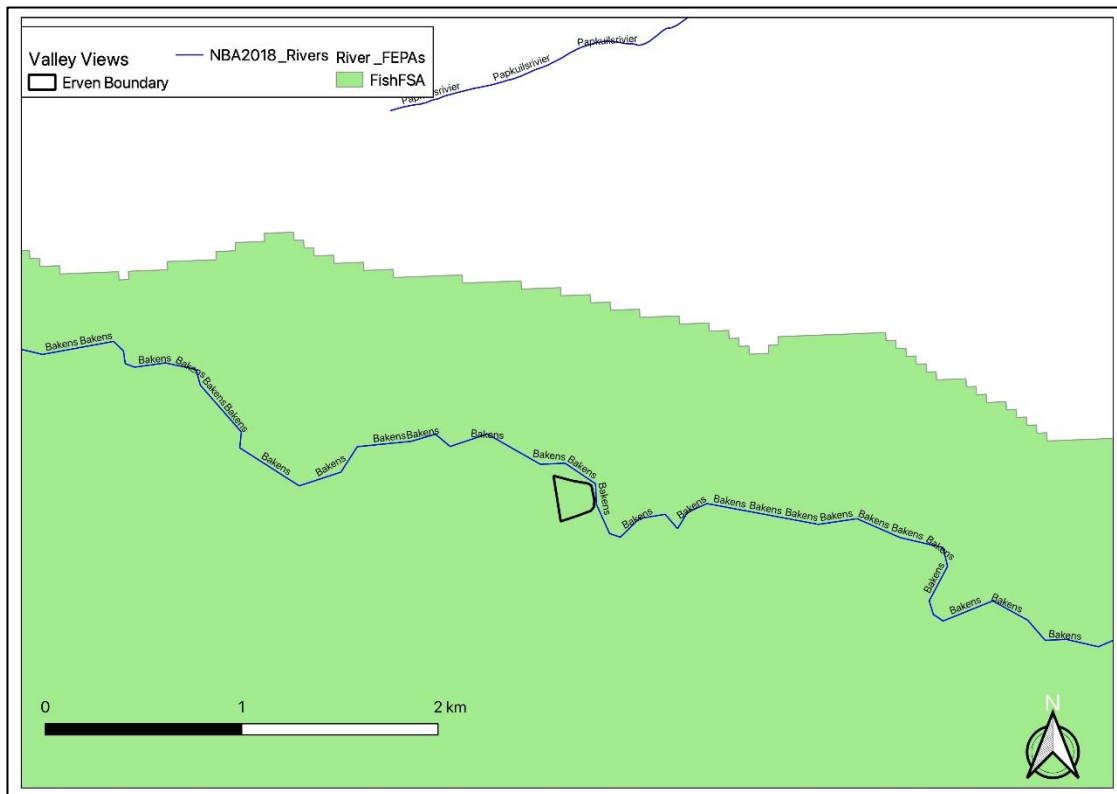


Figure 6: The NFEPAs data compared to the site, i.e. Priority Freshwater Ecosystems Atlas spatial data

The only natural species observed along the remaining riverbanks, included *Searsia undulata*, *Cyperus latifolia*, *Chrysanthemoides monilifera* but all these habitats are well removed from the development footprint.

With regard wetlands, none were observed within the site, substantiated by the National Wetland Inventory (SAIIE v2) spatial data, that indicates no wetlands (natural or artificial) occur within 1 km of the site (Figure 5).

The National Freshwater Ecosystems Priority Atlas (NFEPAs - Nel *et al.*, 2011) (Figure 6) and Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) (Figure 7) spatial databases have however indicated that the study area forms part of a Fish Support Area and an Ecological Support Area, as this system forms part of a hydrological connection between the upper catchment (Kabega) and the Baakens River itself. This is a similar case shown the Nelson Mandela Bay Municipality Bioregional Plan – Critical Biodiversity Area (CBA) (Figure 8). All of these projects were based largely on the same data that have identified the study area subquaternary catchments as important freshwater conservation areas due to the possible presence of rare /endemic fish, i.e. Eastern Cape Redfin (*Pseudobarbus afer*) and Eastern Cape Rocky (*Sandelia bainsii*).

Figure 9 below, indicates delineated systems adjacent the site. Thus, it is envisaged that no activities will require a WUL (possible GA) under Section 21 c & i of the NWA, 1998, assuming that no activities are located within the 1:100 year floodline.

No aquatic species of special concern were observed within development footprint



Plate 4: Aerial view of the alien vegetation (Australian Acacias, Eucalypts & Pine trees)

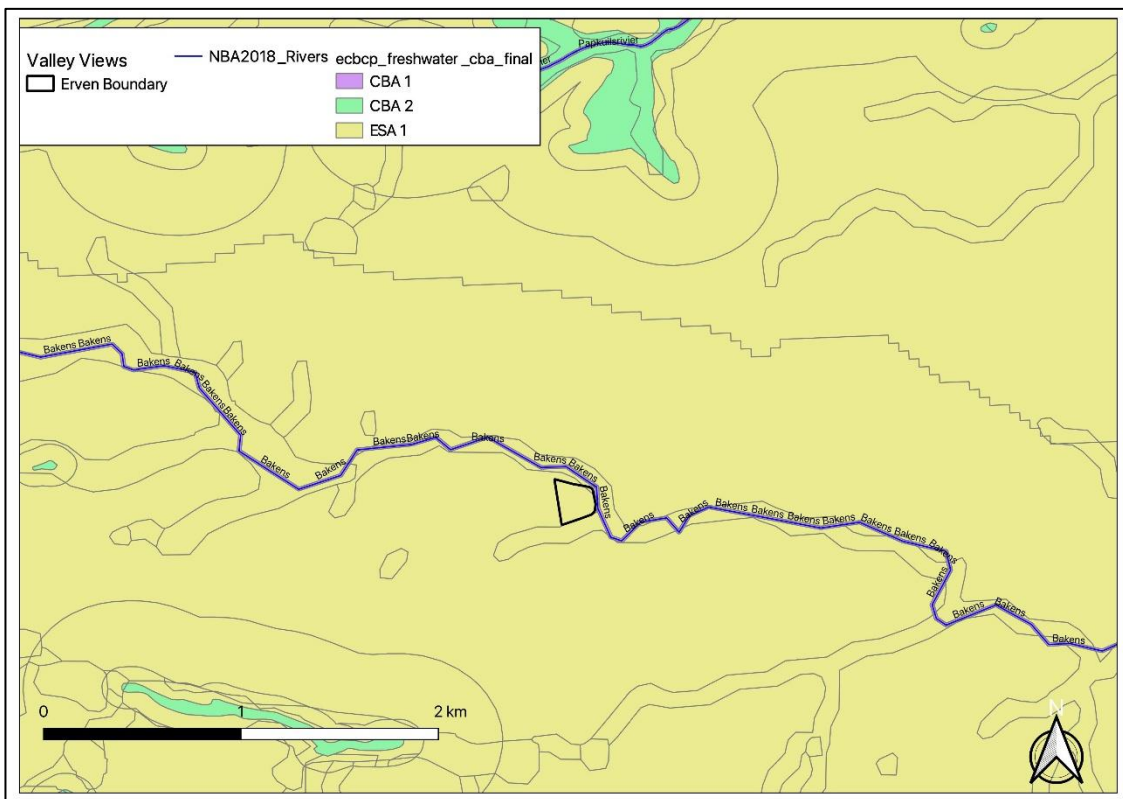


Figure 7: Eastern Cape Biodiversity Conservation Plan (ECBCP) Aquatic Critical Biodiversity Areas as per Desmet & Berliner (2007)

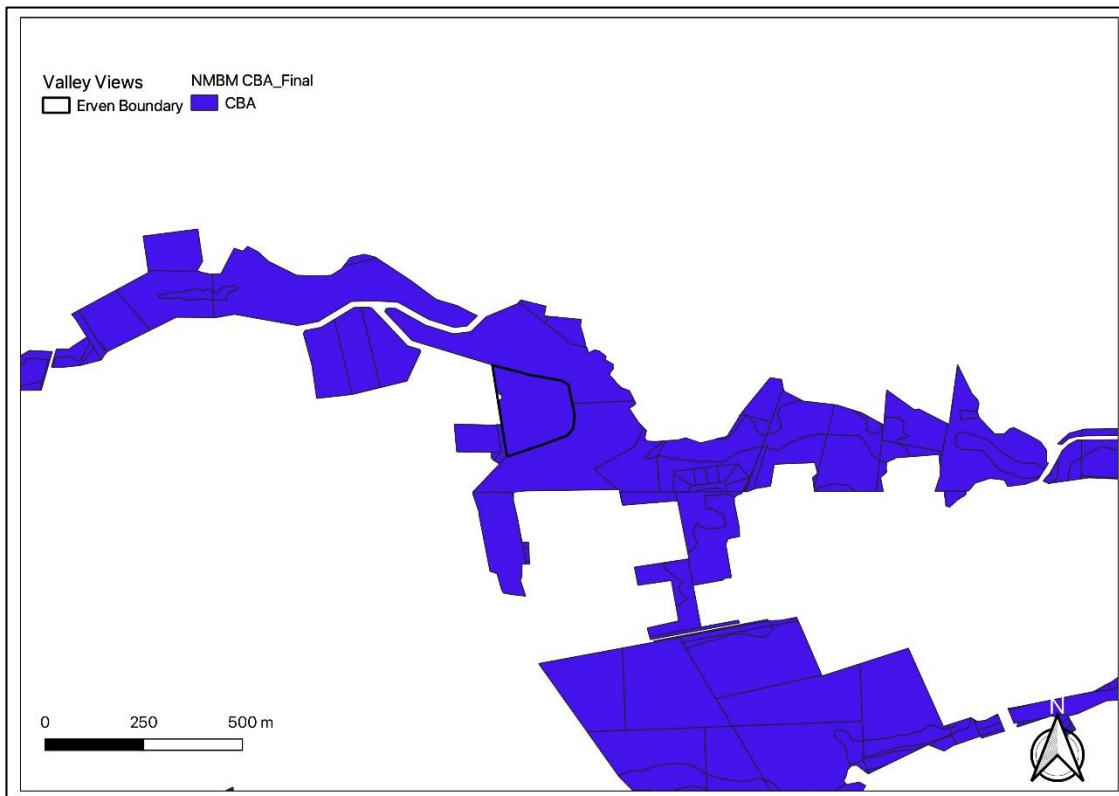


Figure 8: Critical Biodiversity Areas as per the NMBM Bioregional Plan (SRK, 2014)



Figure 9: Delineated aquatic zones = Vegetated Riparian Zones of the Baakens River

5.6 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 have been included (DWS, 2014 and to an extent revised in the National Spatial Biodiversity Assessment, 2018 data, released 2019). 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 9104) was rated as follows (DWS, 2014 /NSBA, 2018) where C = Moderately Modified:

Subquaternary Catchment Number	Present Ecological State	Ecological Importance	Ecological Sensitivity
9104	C	Moderate	High

These scores were adjusted by observations made in the field and specific to the watercourse in question and also due to the current impacts such as:

- Alien vegetation
- Vegetation clearing
- Solid waste dumping
- Trampling and disturbance; and
- Stormwater inputs;

The Present Ecological State for the riparian zones 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 based on field data, **while the Ecological Importance and Sensitivity score was Moderate.**

6. Permit requirements

In terms of Water Use Authorisation must obtained, if any activities are within the 1:100-year floodline with regard Section 21 c & i water uses. It has been assumed services such as water supply and sanitation will be connected to the municipal systems, thus not requiring any water use authorisation.

7. Site Sensitivity

Based then on the status of the environment Figure 10 indicates the sensitivity ratings of the various habitats observed. This would correspond then to the requirement from an aquatic and terrestrial standpoint, within the gazette Biodiversity Assessment Protocols, that development is excluded from delineated / groundtruthed Very High Sensitivity Areas. The site is however dominated by High to Low areas due to the disturbances and fragmentation that occurs. As such the development footprint will see a 0.5 ha loss of the High sensitivity area, which covers 1 ha within the development Erf. Several hectares of High sensitivity habitats will remain unaffected that adjoin the property.



Figure 10: Final site sensitivity rating of the respective habitats in relation to the proposed development layout

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 or habitat for fauna
- 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
- Impact 6: Cumulative impacts

The following impacts were not assessed as the habitat or ecosystem function in question was either previously disturbed or the respective habitat is outside of the proposed footprint area.

- Loss of Riparian / Instream habitat

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

<p>Environmental Impact: The clearing of terrestrial habitat with a HIGH sensitivity rating, notably Fynbos habitat associated with a Threatened Ecosystem (See Figure 10)</p>	<p>Activity/Aspect & Impact Source: 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 0.5 ha of Algoa Sandstone Fynbos that was rated as HIGH (Figure 10), although a significant portion of this habitat (High) is still found surrounding the development Erf, i.e. 0,5 ha will remain within the Erf, while 1.7 ha of intact fynbos adjoins the property, therefore a total of 2.2 ha of the habitat unit will remain.</p>		<p>Proposed Mitigation: Ideally all areas rated as HIGH should be excluded from the development proposal, however as this is not possible due to various development & economic constraints the following is proposed: Loss of any area rated High must be offset with protection of the any reaming areas within and adjacent the site. All alien cover must be removed then be allowed to fully recover and revegetate with climax fynbos species . These areas should remain free form alien plants and be monitored for any erosion. Where soils are slow to revegetate, these areas should be grubbed and planted with species suited to the region. A detailed walkdown must be conducted to determine the final list of species that will require DEDEAT & DFFE permits. As the majority of Fynbos species are difficult to relocate, alternative means of collecting seed and or propagules must be used to assist with the revegetation of any disturbed areas or areas clear od alien vegetation. Construction must be limited to the footprint only to minimise secondary disturbance, thus reducing the size of the areas that require revegetation to a minimum.</p>				
Impact Significance							
Without Mitigation:	Extent Local (2)	Duration Long-term (4)	Severity High (8)	Reversibility Completely (0)	Irreplaceable Loss Partly (0.5)	Probability Definite (5)	Impact Significance High (72.5)

With Mitigation:	Extent	Duration	Severity	Reversibility	Irreplaceable Loss	Probability	Impact Significance
	Site (1)	Long-term (4)	Low (4)	Completely (0)	Partly (0.5)	Probable (3)	Low (22.5)
Potential to Mitigate: Moderate potential / easy to mitigate				Assessment Confidence: Complete			

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

Environmental Impact: Based on the information collected during the assessment, that contained within the ECBCP (2019) and NMBM CBA maps, the potential for habitat fragmentation - reduction in ecosystem corridors for the terrestrial environment could occur, but unlikely within the aquatic environment	Activity/Aspect & Impact Source: Due to the nature of the project this will persist in the long term into the operational phase impact. The past disturbance and avoidance of any aquatic environment that has already occurred would not be exacerbated during the proposed activities, thus only the clearing of terrestrial vegetation was assessed.		Proposed Mitigation: Ideally all areas rated as HIGH should be excluded from the development proposal, however as this is not possible due to various development & economic constraints the following is proposed: Loss of any area rated High must be offset with protection of the any reaming areas within and adjacent the site. All alien cover must be removed then be allowed to fully recover and revegetate with climax fynbos species . These areas should remain free form alien plants and be monitored for any erosion. Where soils are slow to revegetate, these areas should be grubbed and planted with species suited to the region. 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 around the site will remain undeveloped in the near future.				
Impact Significance							
Without Mitigation:	Extent	Duration	Severity	Reversibility	Irreplaceable Loss	Probability	Impact Significance
	Site (1)	Long-term (4)	Moderate (4)	Completely (0)	Partly (0.5)	Definite (5)	Moderate (47.5)
With Mitigation:	Extent	Duration	Severity	Reversibility	Irreplaceable Loss	Probability	Impact Significance
	Site (1)	Long-term (4)	Minor (2)	Completely (0)	Partly (0.5)	Probable (3)	Low (22.5)
Potential to Mitigate: Moderate potential / easy to mitigate				Assessment Confidence: Complete			

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

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

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

Environmental Impact: increase amount of siltation in downstream areas when increase volumes of water are generated by the site	Activity/Aspect & Impact Source: Due to the nature of the project this will persist in the long term in the operational phase impact.		Proposed Mitigation: <ul style="list-style-type: none"> Suitable stormwater management must be included such as the proposed stormwater detention ponds. This will trap sediment, coupled to revegetation of bare soil areas with local plant species. 				
Impact Significance							
Without Mitigation:	Extent Site (1)	Duration Long-term (4)	Severity Moderate (4)	Reversibility Completely (0)	Irreplaceable Loss Partly (0.5)	Probability Definite (5)	Impact Significance Moderate (47.5)
With Mitigation:	Extent Site (1)	Duration Long-term (4)	Severity Minor (2)	Reversibility Completely (0)	Irreplaceable Loss Partly (0.5)	Probability Probable (3)	Impact Significance Low (22.5)
Potential to Mitigate: Moderate potential / easy to mitigate				Assessment Confidence: Complete			

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

Environmental Impact: This impact is mostly related to use of substances such as cement, oils and hydrocarbons during the construction process and to a limited degree solid waste		Activity/Aspect & Impact Source: Due to the nature of the project this will persist in the short term in the construction phase.		Proposed Mitigation: <ul style="list-style-type: none"> • Due care to prevent accidental leakage of pollutants e.g. oil, fuel, cement, must be an utmost priority during the construction phase • Proper solid waste disposal (e.g. bins, no littering or burning policy and the maintenance of ablution facilities, including the disposal of liquid and hazardous waste at a licensed waste disposal site must be adhered to by the contractors. • No re-fuelling of construction vehicles or maintenance activities occur proximate to the watercourse near the site 			
Impact Significance							
Without Mitigation:	Extent Site (1)	Duration Long-term (4)	Severity Moderate (4)	Reversibility Completely (0)	Irreplaceable Loss Partly (0.5)	Probability Definite (5)	Impact Significance Moderate (47.5)
With Mitigation:	Extent Site (1)	Duration Long-term (4)	Severity Minor (2)	Reversibility Completely (0)	Irreplaceable Loss Partly (0.5)	Probability Probable (3)	Impact Significance Low (22.5)
Potential to Mitigate: Moderate potential / easy to mitigate				Assessment Confidence: Complete			

8.6 Impact 6: Cumulative impacts

Environmental Impact: The cumulative impacts are related to the loss of fynbos associated with a Threatened Ecosystem		Activity/Aspect & Impact Source: 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 terrestrial environments.		Proposed Mitigation: Ideally all areas rated as HIGH should be excluded from the development proposal, however as this is not possible due to various development & economic constraints the following is proposed: Loss of any area rated High must be offset with protection of the any remaining areas within and adjacent the site. All alien cover must be removed then be allowed to fully recover and revegetate with climax fynbos species . These areas should remain free form alien plants and be monitored for any erosion. Where soils are slow to revegetate, these areas should be grubbed and planted with species suited to the region. 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 around the site will remain undeveloped in the near future.			
Impact Significance							
Without Mitigation:	Extent Site (1)	Duration Long-term (4)	Severity Moderate (4)	Reversibility Completely (0)	Irreplaceable Loss Partly (0.5)	Probability Definite (5)	Impact Significance Moderate (47.5)
With Mitigation:	Extent Site (1)	Duration Long-term (4)	Severity Minor (2)	Reversibility Completely (0)	Irreplaceable Loss Partly (0.5)	Probability Probable (3)	Impact Significance Low (22.5)
Potential to Mitigate: Moderate potential / easy to mitigate				Assessment Confidence: Complete			

9. Conclusion and Recommendations

The results indicated that important habitats could be affected by the proposed development. However, it is suggested that the following mitigations be considered:

- The intact areas rated as High be excluded from the development footprint as these areas contain important and sensitive protected plant species and habitat. If this is not possible the loss of the habitat should be offset with the clearing and protection of any other areas within and adjacent to the Erf to promote the regeneration of natural intact vegetation, free of any alien trees and or plants.
- Runoff from any areas should be managed using the proposed stormwater ponds to prevent any pollution and or erosion of downstream areas.
- Alien plant regrowth should also be monitored, and any such species should be removed on an ongoing basis from areas that won't be utilized as well as areas surrounding the property.

10. References

- Agenda 21 – Action plan for sustainable development of the Department of Environmental Affairs and Tourism (DEAT) 1998.
- Agricultural Resources Act, 1983 (Act No. 43 of 1983).
- Alexander, G. And Marais, J. 2010. A Guide to Reptiles of Southern Africa. Struik Nature, Cape Town. Animal Demography Unit, Department Of Zoology, University Of Cape Town. 2012. Summary Data Of The Frogs Of South Africa, Lesotho And Swaziland. Downloaded From: Http://Adu.Org.Za/Frog_Atlas.Php; Accessed On 2/02/2013.
- Berliner D. and Desmet P. 2007. Eastern Cape Biodiversity Conservation Plan: Technical Report. Department of Water Affairs and Forestry Project No 2005-012, Pretoria.
- Branch, W.R. 1998. Terrestrial reptiles and amphibians. In: A Field Guide to the Eastern Cape Coast, R. A. Lubke, F. W. Gess and M. N. Bruton (eds.), Grahamstown Centre for the Wildlife Soc. S. Afr., 251 264.
- Davies, B. and Day J., (1998). Vanishing Waters. University of Cape Town Press.
- Department of Water Affairs and Forestry - DWAF (2005). A practical field procedure for identification and delineation of wetland and riparian areas Edition 1. Department of Water Affairs and Forestry , Pretoria.
- Department of Water Affairs and Forestry - DWAF (2008). Manual for the assessment of a Wetland Index of Habitat Integrity for South African floodplain and channelled valley bottom wetland types by M. Rountree (ed); C.P. Todd, C. J. Kleynhans, A. L. Batchelor, M. D. Louw, D. Kotze, D. Walters, S. Schroeder, P. Illgner, M. Uys. and G.C. Marneweck. Report no. N/0000/00/WEI/0407. Resource Quality Services, Department of Water Affairs and Forestry, Pretoria, South Africa.
- Driver A., Sink, K.J., Nel, J.N., Holness, S., Van Niekerk, L., Daniels, F., Jonas, Z., Majiedt, P.A., Harris, L. & Maze, K. 2012. National Biodiversity Assessment 2011: An assessment of South Africa’s biodiversity and ecosystems. Synthesis Report. South African National Biodiversity Institute and Department of Environmental Affairs, Pretoria.
- Du Preez, L. And Carruthers, V. 2009. A Complete Guide To Frogs Of Southern Africa. Struik Nature, Cape Town
- Ewart-Smith J.L., Ollis D.J., Day J.A. and Malan H.L. (2006). National Wetland Inventory: Development of a Wetland Classification System for South Africa. WRC Report No. KV 174/06. Water Research Commission, Pretoria.
- IUCN (2019). Red List of Threatened Species. IUCN Species Survival Commission, Cambridge Available: <http://www.iucnredlist.org/>
- Kleynhans C.J., Thirion C. and Moolman J. (2005). A Level 1 Ecoregion Classification System for South Africa, Lesotho and Swaziland. Report No. N/0000/00/REQ0104. Resource Quality Services, Department of Water Affairs and Forestry, Pretoria.
- Kotze D.C., Marneweck G.C., Batchelor A.L., Lindley D.S. and Collins N. (2008). WET-EcoServices A technique for rapidly assessing ecosystem services supplied by wetlands. WRC Report No: TT 339/08.
- Macfarlane, D.M. & Bredin, I.P. 2017. Buffer Zone Guidelines for Rivers, Wetlands and Estuaries Buffer Zone Guidelines for Rivers, Wetlands and Estuaries. WRC Report No TT 715/1/17 Water Research Commission, Pretoria.
- Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002), as amended.
- Minter, L. Burger, M. A. Harrison, J. Braack, H. Bishop, P. & Kloepfer, D. (2004). Atlas and Red Data Book of the Frogs of South Africa, Lesotho and Swaziland. Smithsonian Institute.

- Mitsch, J.G. and Gosselink, G. (2000). *Wetlands 3rd Ed*, Wiley, NewYork, 2000, 920 pg.
- Mucina, L., & Rutherford, M.C., 2006. *The Vegetation of South Africa, Lesotho and Swaziland*, *Strelitzia* 19, South Africa.
- National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended.
- National Water Act, 1998 (Act No. 36 of 1998), as amended
- Nel, J., Maree, G., Roux, D., Moolman, J., Kleynhans, N., Silberbauer, M. and Driver, A. 2004. *South African National Spatial Biodiversity Assessment 2004: Technical Report. Volume 2: River Component*. CSIR Report Number ENV-S-I-2004-063. Council for Scientific and Industrial Research, Stellenbosch.
- Nel, J.L., Murray, K.M., Maherry, A.M., Petersen, C.P., Roux, D.J., Driver, A., Hill, L., Van Deventer, H., Funke, N., Swartz, E.R., Smith-Adao, L.B., Mbona, N., Downsborough, L. and Nienaber, S. (2011). *Technical Report for the National Freshwater Ecosystem Priority Areas project*. WRC Report No. K5/1801.
- Ollis, D.J., Snaddon, C.D., Job, N.M. & Mbona, N. 2013. *Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems*. SANBI Biodiversity Series 22. South African National Biodiversity Institute, Pretoria.
- Parsons R. (2004). *Surface Water – Groundwater Interaction in a Southern African Context*. WRC Report TT 218/03, Pretoria.
- Ramsar Convention, (1971) including the Wetland Conservation Programme (DEAT) and the National Wetland Rehabilitation Initiative (DEAT, 2000).
- Rowntree, K., Wadesone, R. and O’Keeffe, J. 2000. *The development of a geomorphological classification system for the longitudinal zonation of South African rivers*. *South African Geographical Journal* 82(3): 163-172.
- South African Bird Atlasing Project 2 (SABAP2). 2017. *Animal Demographic Unit*. Available online: <http://sabap2.adu.org.za/>
- Stuart, C and Stuart, T. 2007. *A field guide to the mammals of Southern Africa*. Struik Nature, Cape Town.
- van Deventer H., Smith-Adao, L. Petersen C., Mbona N., Skowno A., Nel, J.L. (2018) *Review of available data for a South African Inventory of Inland Aquatic Ecosystems (SAIIAE)*. *Water SA* 44 (2) 184-199.

11. Appendix 1: Species Checklists

PLANT GROWTH FORM	FAMILY	TAXON
Tall Shrubs	PROTEACEAE	<i>Protea eximia</i> (Salisb. ex Knight) Fourc.
Tall Shrubs	PROTEACEAE	<i>Protea neriifolia</i> R.Br.
Tall Shrubs	PROTEACEAE	<i>Protea repens</i> (L.) L.
Low Shrubs	RUTACEAE	<i>Agathosma hirta</i> (Lam.) Bartl. & H.L.Wendl.
Low Shrubs	RUTACEAE	<i>Agathosma ovata</i> (Thunb.) Pillans
Low Shrubs	ERICACEAE	<i>Erica zeyheriana</i> (Klotzsch) E.G.H.Oliv.
Low Shrubs	ASTERACEAE	<i>Euryops ericifolius</i> (Bél.) B.Nord.
Low Shrubs	ASTERACEAE	<i>Helichrysum appendiculatum</i> (L.f.) Less.
Low Shrubs	ASTERACEAE	<i>Helichrysum teretifolium</i> (L.) D.Don
Low Shrubs	PROTEACEAE	<i>Leucadendron salignum</i> P.J.Bergius
Low Shrubs	PROTEACEAE	<i>Leucadendron xanthoconus</i> (Kuntze) K.Schum.
Low Shrubs	PROTEACEAE	<i>Leucadendron spissifolium</i> (Salisb. ex Knight) I.Williams ssp. <i>phillipsii</i> (Hutch.) I.Williams
Low Shrubs	PROTEACEAE	<i>Leucospermum cuneiforme</i> (Burm.f.) Rourke
Low Shrubs	PROTEACEAE	<i>Protea cynaroides</i> (L.) L.
Low Shrubs	PROTEACEAE	<i>Protea foliosa</i> Rourke
Low Shrubs	FABACEAE	<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>acutifolia</i> E.Mey.
Low Shrubs	FABACEAE	<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>hirsuta</i> Harv.
Low Shrubs	FABACEAE	<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>capensis</i>
Low Shrubs	FABACEAE	<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>angustifolia</i> E.Mey.
Low Shrubs	FABACEAE	<i>Tephrosia capensis</i> (Jacq.) Pers. var. <i>longipetiolata</i> H.M.L.Forbes
Succulent Herb	CRASSULACEAE	<i>Crassula pellucida</i> L. ssp. <i>marginalis</i> (Dryand. in Aiton) Toelken
Graminoids	POACEAE	<i>Andropogon eucomus</i> Nees
Graminoids	POACEAE	<i>Brachiaria serrata</i> (Thunb.) Stapf
Graminoids	POACEAE	<i>Cymbopogon pospischilii</i> (K.Schum.) C.E.Hubb.
Graminoids	POACEAE	<i>Cynodon dactylon</i> (L.) Pers.
Graminoids	POACEAE	<i>Digitaria eriantha</i> Steud.
Graminoids	POACEAE	<i>Ehrharta calycina</i> Sm.
Graminoids	POACEAE	<i>Eustachys paspaloides</i> (Vahl) Lanza & Mattei
Graminoids	RESTIONACEAE	<i>Restio capensis</i> (L.) H.P.Linder & C.R.Hardy
Graminoids	POACEAE	<i>Pentameris heptameris</i> (Nees) Steud.
Graminoids	POACEAE	<i>Pentaschistis pallida</i> (Thunb.) H.P.Linder
Graminoids	RESTIONACEAE	<i>Thamnochortus cinereus</i> H.P.Linder
Graminoids	POACEAE	<i>Themeda triandra</i> Forssk.
Graminoids	POACEAE	<i>Tristachya leucothrix</i> Trin. ex Nees
Low Shrubs	RUTACEAE	<i>Agathosma gonaquensis</i> Eckl. & Zeyh.
Low Shrubs	FABACEAE	<i>Cyclopia pubescens</i> Eckl. & Zeyh.
Low Shrubs	ERICACEAE	<i>Erica etheliae</i> L.Bolus
Geophytic Herb	ORCHIDACEAE	<i>Holothrix longicornu</i> G.J.Lewis

Source SANBI ADU <http://vmus.adu.org.za/index.php?database> Accessed 12 September 2020

AMPHIBIANS			
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)
Colubridae	<i>Dispholidus typus typus</i>	Boomslang	Least Concern (SARCA 2014)

Cordylidae	<i>Pseudocordylus 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>		
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 sataspes</i>	Boland sandman	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 durhani</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 argyropilaga argyropilaga</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>Hypolimnas 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)
AVES (BIRDS)			
Common_group	Common_species	Genus	Species
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	Hadedda	<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>Coccyzygia</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>