



**DRAFT**

# Terrestrial Biodiversity Specialist Assessment



ENVIRONMENTAL AND SOCIAL ADVISORY SERVICES

**PROPOSED TWFT PIGGERY NEAR TSITSIKAMMA,  
KOUKAMMA LOCAL MUNICIPALITY IN THE EASTERN CAPE PROVINCE**

**DRAFT TERRESTRIAL BIODIVERSITY SPECIALIST ASSESSMENT**

**Prepared for:**



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## REVISIONS TRACKING TABLE

### *CES Report Revision and Tracking Schedule*

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## Contents of the Specialist Report

The contents of this specialist report complies with the legislated requirements as described in the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020).

SPECIALIST REPORT REQUIREMENTS ACCORDING TO GN R. 320		SECTION OF REPORT
3.1	The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	
3.1.1	Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Page ii and Chapter 1
3.1.2	A signed statement of independence by the specialist;	Section 1.2
3.1.3	A statement of the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	Section 2.4
3.1.4	A description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	Chapter 3
3.1.5	A description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	Section 2.4
3.1.6	A location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	Section 9.1.3
3.1.7	Additional environmental impacts expected from the proposed development;	Chapter 8 and Section 9.1
3.1.8	Any direct, indirect and cumulative impacts of the proposed development;	Chapter 8 and Section 9.1
3.1.9	The degree to which the impacts and risks can be mitigated;	Chapter 8
3.1.10	The degree to which the impacts and risks can be reversed;	
3.1.11	The degree to which the impacts and risks can cause loss of irreplaceable resources;	
3.1.12	Proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	Chapter 8 and Section 9.2
3.1.13	A motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a “low” terrestrial biodiversity sensitivity and that were not considered appropriate;	N/A
3.1.14	A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	Chapter 9
3.1.15	Any conditions to which this statement is subjected.	Section 9.2
3.2	The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report, including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr where relevant.	✓
3.3	A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	Refer to Section 1.2



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## LIST OF ACRONYMS AND ABBREVIATIONS

ADU	Animal Demography Unit
BA	Basic Assessment
BAR	Basic Assessment Report
CARA	Conservation of Agricultural Resource Act
CBA	Critical Biodiversity Area
CITES	Convention on International Trade in Endangered Species
CR	Critically Endangered
DAFF	Department of Agriculture, Forestry and Fisheries
DEDEAT	Department of Economic Development, Environmental Affairs and Tourism
DEFF	Department of Environmental Affairs, Forestry and Fisheries
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
ECBCP	Eastern Cape Biodiversity Conservation Plan
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GIS	Geographical Information System
GN	Government Notice
Ha	Hectares
IBA	Important Bird Area
IUCN	International Union for Conservation of Nature
LC	Least Concern
LM	Local Municipality
NBA	National Biodiversity Assessment
NBF	National Biodiversity Framework
NBSAP	National Biodiversity Strategy and Action Plan
NEMA	National Environmental Management Act
NEM:BA	National Environmental Management: Biodiversity Act
NEM:PAA	National Environmental Management: Protected Areas Act
NFA	National Forest Act
NFEPA	National Freshwater Ecosystem Priority Areas
NPAES	National Protected Areas Expansion Strategy
NSBA	National Spatial Biodiversity Assessment
NWA	National Water Act
PA	Protected Area
PNCO	Provincial Nature Conservation Ordinance
POSA	Plants of Southern Africa
PPP	Public Participation Process
SANBI	South African National Biodiversity Institute
SANLC	South African National Land-Cover
SANRAL	South African National Roads Agency SOC Ltd
SCC	Species of Conservation Concern
TOPS	Threatened or Protected Species
VU	Vulnerable
WMA	Water Management Area
WUA	Water Use Authorisation



# 1 PROJECT TEAM

## 1.1 DETAILS AND EXPERTISE OF THE SPECIALISTS

### **Ms Nicole Wienand** (*Role: Junior Botanical Specialist and Report Writer*)

Ms Nicole Wienand is an Environmental Consultant based in the Port Elizabeth branch. Nicole obtained her BSc Honours in Botany (Environmental Management) from Nelson Mandela University (NMU) in December 2018. She also holds a BSc Degree in Environmental Management (Cum Laude) from NMU. Nicole's honours project focused on the composition of subtidal marine benthic communities on warm temperate reefs off the coast of Port Elizabeth and for her undergraduate project she investigated dune movement in Sardinia Bay. Nicole's key interests include marine ecology, botanical specialist assessments, GIS Mapping, the general EIA process, Public Participation Process (PPP) and Ecological Impact Assessments. Since her appointment with CES in January 2019, Nicole has undertaken a number of Ecological Impact Assessments under the guidance of Dr Greer Hawley and Tarryn Martin.



### **Dr Greer Hawley-McMaster** (*Role: Ecological Specialist and Report Review*)

Dr Greer Hawley has a BSc degree in Botany and Zoology and a BSc Honours in Botany from the University of Cape Town. She completed her PhD thesis (Microbiology) at Rhodes University. Greer has been involved in a number of diverse activities. The core academic focus has been in the field of taxonomy both in the plant and fungal kingdom. Greer's research ranges from fresh water and marine algae, estuarine diatoms, plant species classification in the fynbos and forest vegetation and fungal species identification and ecology. Greer has been involved in environmental and biodiversity impact assessments and environmental and biodiversity management projects both in South Africa and other African countries. Greer has recently assisted with the completion of the Eastern Cape Biodiversity Conservation Plan (2019), the Eastern Cape Biodiversity Strategy and Action Plan and assisted with the generation of the Western Cape State of the Coast Report. She is currently involved with revising the City of Ekurhuleni Bioregional Plan.

## 1.2 DECLARATION

Role on Study Team	Declaration of independence
<b><i>Report production</i></b>	<ul style="list-style-type: none"> <li>• I, Nicole Wienand, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017;</li> <li>• I act as the independent specialist in this application;</li> <li>• I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;</li> <li>• I declare that there are no circumstances that may compromise my objectivity in performing such work;</li> <li>• I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;</li> <li>• I will comply with the Act, Regulations and all other applicable legislation;</li> </ul>



	<ul style="list-style-type: none"> <li>• I have no, and will not engage in, conflicting interests in the undertaking of the activity;</li> <li>• I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;</li> <li>• All the particulars furnished by me in this report are true and correct; and</li> <li>• I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.</li> </ul> <p style="text-align: right;">20 November 2020</p> <p>..... SIGNED  .....</p> <p style="text-align: right;">..... DATE</p>
<p><b>Report Reviewer &amp; Final Sign-off</b></p>	<ul style="list-style-type: none"> <li>• I, Greer Hawley, declare that, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Amended Environmental Impact Assessment Regulations, 2017;</li> <li>• I act as the independent specialist in this application;</li> <li>• I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;</li> <li>• I declare that there are no circumstances that may compromise my objectivity in performing such work;</li> <li>• I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;</li> <li>• I will comply with the Act, Regulations and all other applicable legislation;</li> <li>• I have no, and will not engage in, conflicting interests in the undertaking of the activity;</li> <li>• I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;</li> <li>• All the particulars furnished by me in this report are true and correct; and</li> <li>• I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.</li> </ul> <p style="text-align: right;">26 November 2020</p> <p>..... SIGNED  .....</p> <p style="text-align: right;">..... DATE</p>



## 2. INTRODUCTION

### 2.1 PROJECT DESCRIPTION AND LOCATION

The Tsitsikamma Community Wind Farm (TCWF) is a 95 MW wind farm comprising 31 wind turbines on the farm Wittekleibosch in the Tsitsikamma area, situated within the Koukamma Local Municipality, Eastern Cape Province. The Project was awarded Preferred Bidder in the Department of Energy (DoE's) Renewable Energy Independent Power Producer Procurement Programme ("RE IPPPP") in May 2012 and reached Commercial Operation date in August 2016.

As part of the REIPPP, TCWF committed to spending 2.1% of its revenue on socio-economic and enterprise development programmes in communities located within 50km radius of the wind farm. Cennergi, the management service provider and shareholder of the Tsitsikamma Community Wind Farm, founded the Tsitsikamma Wind Farm Trust (TWFT) to solely manage and decide on the disbursements of the Socio-Economic Development (SED) and Enterprise Development (ED) funds.

The TWFT, as part of the enterprise development initiative, is funding the development of a proposed TWFT Piggery on a section of Portion 7 of Farm 788, approximately 2.4 km south of Clarkson and 40 km west of Humansdorp. This area falls within the Koukamma Local Municipality (KLM), seated in the Sarah Baartman District Municipality (SBDM) of the Eastern Cape Province (Figure 2.1). The total development footprint of the proposed TWFT Piggery is approximately 7.2 hectares (Ha). The proposed facility will include the following infrastructure (Figure 2.2):

- Project Boundary (71,326 m<sup>2</sup>);
- Bathroom facilities (6 m<sup>2</sup>);
- Sleeping facilities (12 m<sup>2</sup>);
- Administration office (2,669m<sup>2</sup>);
- Feed storage (36 m<sup>2</sup>);
- Pig House (8,012 m<sup>2</sup>);
- Pig Shed - 50 sows, 3 boars and 500 piglets (3,083m<sup>2</sup>);
- Slurry pit area (1,567 m<sup>2</sup>), Volume: (10 m<sup>3</sup>);
- Water tank (16 m<sup>2</sup>), Volume: (10 m<sup>3</sup>);
- A 200m gravel road, 6m wide (16,370 m<sup>2</sup>); and
- Electricity connection.

Operation of the proposed TWFT Piggery will require approximately 183 m<sup>3</sup> of water per month which will be sourced from a combination of rainwater and borehole water. The borehole will ideally be located within the boundaries of the facility. However, the feasibility of the borehole location still needs to be determined.

It is anticipated that the proposed TWFT Piggery will produce approximately 60 tonnes of solid waste per month and 2 tonnes of effluent per day. The effluent will consist of a mixture of dung, urine and wash water which will be stored in a slurry pit, with a portion of the solids (60m<sup>2</sup>/month) used as compost.



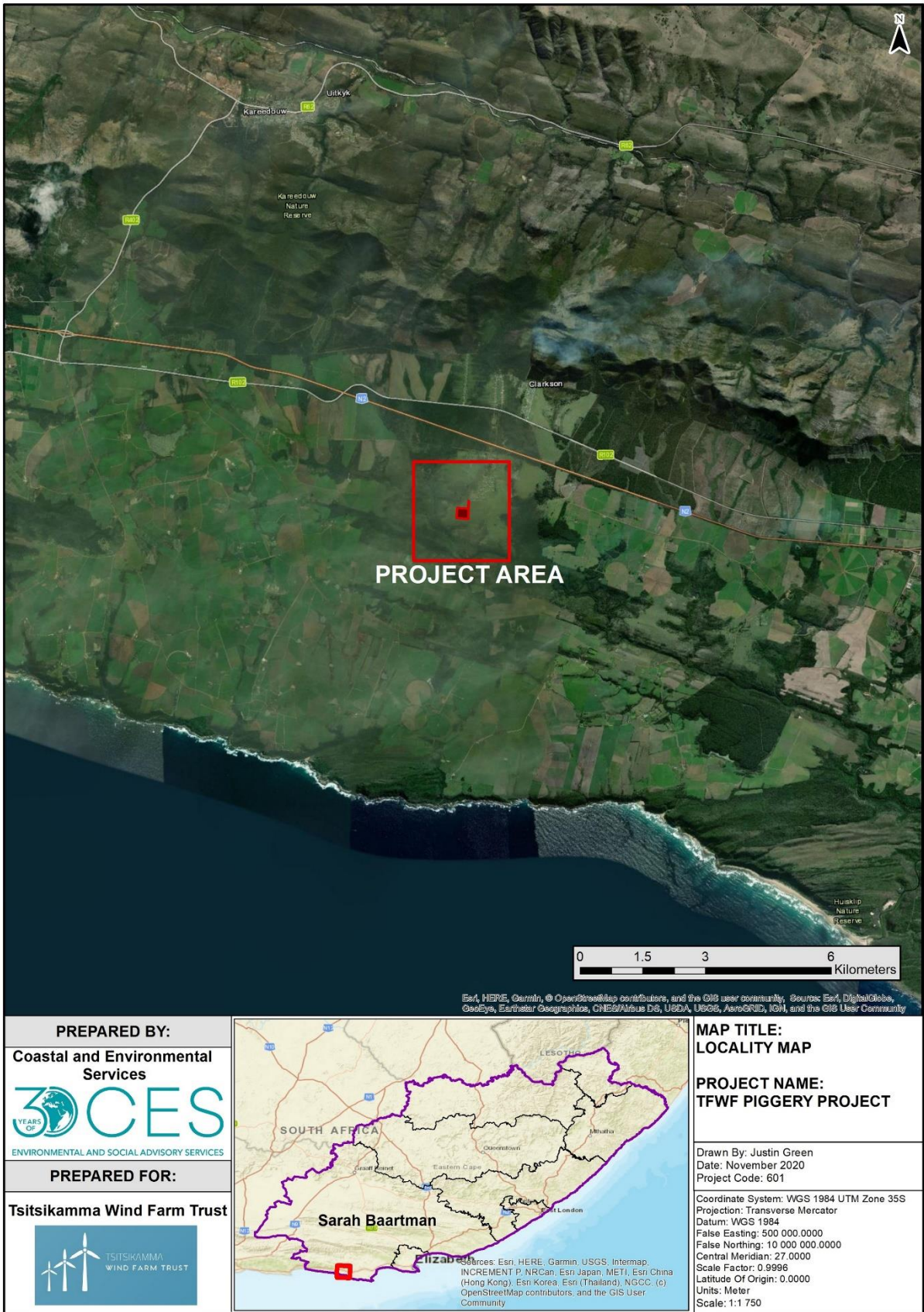


Figure 2.1: Locality Map of the proposed TWFT Piggery.



CES has been appointed by the Tsitsikamma Wind Farm to apply for Environmental Authorisation (EA) in terms of the National Environmental Management Act (NEMA) (Act No. 107 of 1998 and subsequent amendments) Environmental Impact Assessment (EIA) Regulations (2014 and subsequent amendments) by means of conducting a Basic Assessment (BA) Process, inclusive of the relevant specialist studies. This Terrestrial Biodiversity Specialist Assessment forms part of the BA Process for the proposed TWFT Piggery.



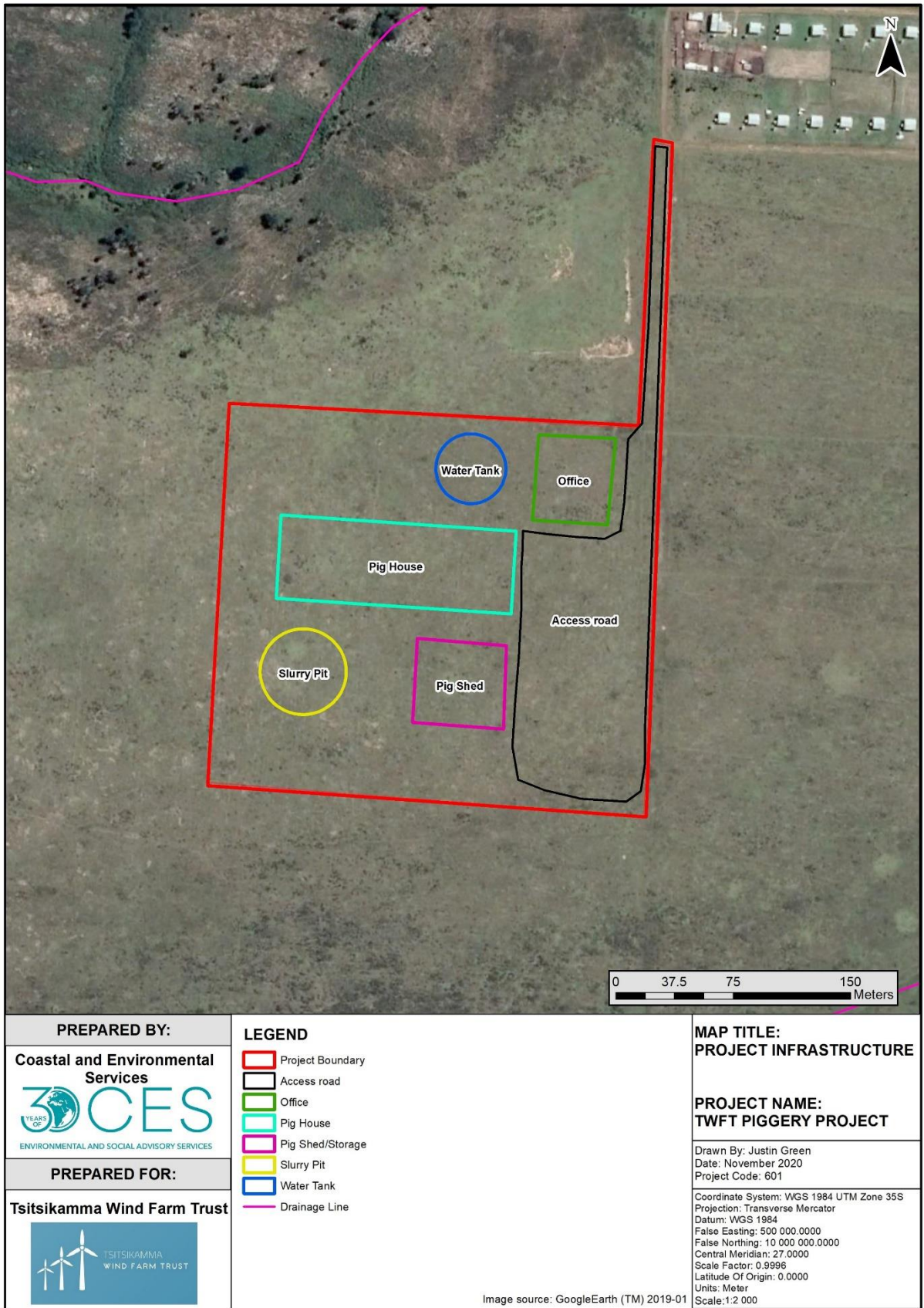


Figure 2.2: Layout Map of the proposed TWFT Piggery.



## 2.2 SITE SENSITIVITY VERIFICATION AND MINIMUM REPORT CONTENT REQUIREMENTS

In terms of the Protocol for the Specialist Assessment and Minimum Reporting Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 of 2020), prior to the commencement of a specialist assessment, the current use of the land and the potential environmental sensitivity of the site under consideration as identified by the screening tool, must be confirmed by undertaking a site sensitivity verification. The results of the screening tool, together with the site sensitivity verification, ultimately determines the minimum report content requirements.

According to the results of the Screening Report generated for the proposed TWFT Piggery site, the relative terrestrial biodiversity theme sensitivity is classified as VERY HIGH due to the site occurring within an Ecological Support Area (ESA) 1 and 2, Strategic Water Source Area and a vulnerable ecosystem. According to Section 3 (1) of GN R. 320, '*an applicant intending to undertake an activity identified in the scope of this protocol, on a site identified on the screening tool as being of "very high sensitivity" for terrestrial biodiversity, must submit a Terrestrial Biodiversity Specialist Assessment*'.

Due to the high sensitivity rating of the site, a full **Terrestrial Biodiversity Specialist Assessment** (this report) has been undertaken as part of the BA Process for the proposed TWFT Piggery

## 2.3 OBJECTIVES AND TERMS OF REFERENCE

The main objective of this report is to determine the baseline terrestrial ecological environment of the study site and to assess the potential impacts the proposed development may have on the terrestrial habitat.

The following terms of reference were used for the objectives of this study:

- Describe the study site in terms of land cover and terrestrial habitat. This will include a full desktop analysis of the fauna and flora.
- Review relevant legislation, policies, guidelines and standards.
- Conduct a site survey to determine the baseline ecological conditions of the study site. This will entail the identification of any Species of Conservation Concern (SCC), areas that may be susceptible to invasion by alien plant species, and existing environmental degradation.
- Produce a sensitivity map that illustrates areas with significant development constraints.
- Describe the likely scope, scale and significance of direct and indirect positive and negative impacts resulting from the proposed development both in terms of the footprint and the immediate surrounding area during construction and operation, as well as the no-go option.
- Provide a detailed description of appropriate mitigation measures that could be adopted to reduce negative impacts for each phase of the project, where required.
- Identify any need for future permitting. **[NB: It is not the purpose of the study to comply with or apply for any permitting requirements at this stage.]**



## 2.4 ASSUMPTIONS AND LIMITATIONS

This report is based on the information available at the time of compiling the report and, as a result, is subject to the following assumptions and limitations:

- The report is based on the project description and the site layout provided to CES by the Proponent;
- Descriptions of the natural environments are based on limited fieldwork and available literature. However, the time available in the field was sufficient to provide enough information to make a decision on the status of the affected area;
- A detailed faunal survey was not conducted. The faunal survey was mainly a desktop study, using information from previous ecological surveys conducted in the area, supplemented by opportunistic recording animal species that were observed during the site survey;
- The report is based on a combination of desktop and on-site analysis;
- It should be emphasised that sampling could only be carried out at one stage in the annual or seasonal cycle – in this case Spring. Therefore, it is possible that some late spring or summer flowering plant species may have gone undetected;
- A separate Aquatic Impact Assessment was undertaken as part of the BA Process for the proposed TWFT Piggery. As such, this report does not cover aspects relating to the aquatic environment of the study site;
- The information, as presented in this document, only has reference to the study site as indicated on the project maps. Therefore, this information cannot be applied to any other area without a detailed investigation being undertaken.

## 2.5 PUBLIC CONSULTATION

The Public Participation Process (PPP) followed to date has been described in detail in the Draft Basic Assessment Report. The Draft BAR, together with the Draft Terrestrial Biodiversity Specialist Assessment Report, will be made available for a 30-day commenting and public review period. Any comments received on the Draft Terrestrial Biodiversity Specialist Assessment Report will be included in the Final Terrestrial Biodiversity Specialist Assessment Report.



## 3. ASSESSMENT METHODOLOGY

### 3.1 THE ASSESSMENT

The study site and surrounding areas were assessed using a two-phased approach. Firstly, a desktop and baseline assessment of the project area was conducted in terms of current vegetation classifications and biodiversity programmes and plans. Published literature on the ecology of the area was referenced in order to describe the study site in the context of the region and the Eastern Cape Province. The following documents/plans are referenced:

- South African Vegetation Map (SA VEGMAP) (Mucina *et al.*, 2018);
- Council for Geoscience (2013);
- Soil and Terrain (SOTER) Database of South Africa (2008);
- Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019);
- The National Freshwater Ecosystem Priority Areas (NFEPA, 2011);
- The National Environmental Management: Biodiversity Act (NEMBA), 2004: List of Threatened Ecosystems (2011);
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Threatened or Protected Species (2007);
- The National Protected Areas Expansion Strategy (NPAES, 2010);
- South African Protected Areas Database (SAPAD, 2019).
- Review of the SANBI Red Data List;
- The National Biodiversity Assessment (NBA) (SANBI, 2018);
- The Animal Demography Unit (ADU);
- International Union for Conservation of Nature (IUCN);
- Provincial Nature Conservation Ordinance (PNCO);
- Plants of Southern Africa (POSA) – Quarter degree square level;
- National Environmental Management: Biodiversity Act (NEM:BA) List of Alien Invasive Vegetation; and
- National Forest Act: List of Protected Trees (2014).

In addition to the above, a site visit was conducted on the 15<sup>th</sup> of September 2020. The aim of the assessment was to assess the site-specific ecological conditions, identify areas of ecological importance and to evaluate these in terms of their conservation importance. In order to do so, the ecological sensitivity of the area was assessed and potential plant and animal Species of Conservation Concern (SCC) that may occur in habitats present in the area were identified. To a large extent, the condition and sensitivity of the vegetation also provided the basis for identifying areas of high biodiversity. The site survey also served to identify potential impacts the proposed development may have on the surrounding natural environment and to inform the significance of those impacts.

### 3.2 SPECIES OF CONSERVATION CONCERN

Data on the known distribution and conservation status for each potential plant SCC was obtained in order to develop a list of SCC. In general, these will be species that are already known to be threatened or at risk and which will be most affected by the proposed activity.





SCC have been selected for conservation/protection by means of a combination of applicable legislation, guidelines and conservation status lists. The following publications were utilised to cross reference conservation and protection statuses of various species:

- National Environmental Management: Biodiversity Act (No. 10 of 2004) - Chapter 4, Part 2 - Threatened and Protected Species (TOPS list);
- Endangered and Protected Flora in the 1974 Provincial Nature Conservation Ordinance (PNCO) – Schedule 3 and 4;
- 1976 List of Protected Trees (Government Gazette No. 9542 Schedule A) in the 1998 National Forest Act (NFA) as amended in November 2014; and
- SA Red Data List (<http://redlist.sanbi.org>).

The South African Red Data List of plants use the internationally recognised IUCN Red List Categories and Criteria to measure a species risk of extinction. The Red List of South African plants is used widely for conservation management and planning throughout South Africa.

Species that are afforded special protection and are protected by CITES (Convention on International Trade in Endangered Species of Wild Flora and Fauna) are also regarded as SCC (see <http://www.cites.org/>).

### 3.3 SAMPLING PROTOCOL

The study area was visually surveyed to evaluate vegetation composition and to provide detailed information on the plant communities present. The aim of the site visit was to characterise and describe each vegetation community within the study site as well as identify areas of high sensitivity and SCC. Visible species within the study site were identified using plant identification guides and other published literature. Vegetation types within the study area were assessed and surveyed and vegetation communities were then described according to the dominant set of species recorded from each type. These were mapped and assigned a sensitivity score.

### 3.4 VEGETATION MAPPING

The revised SA VEGMAP (2018) maps “floristically-based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before.” The map was developed using a wealth of data provided by a network of ecologists, biologists and conservation planners that make periodic contributions to the project. These contributions have allowed for the best national vegetation map to date, the last being that of Acocks developed over 50 years ago. The SA VEGMAP informs finer scale bioregional plans and includes an additional 47 new vegetation units since its refinement in 2012.

The SA VEGMAP is compared to actual conditions of vegetation observed onsite during the site assessment through mapping from satellite images, literature descriptions (e.g. SANBI and ECBCP) and related data gathered on the ground.

### 3.5 SENSITIVITY ASSESSMENT



The approach used to determine the vegetation sensitivity of the study area is described below. Zones of low, moderate and highly sensitive areas were delineated according to a system developed by CES and used in numerous ecological studies. Ultimately sensitivity was determined based on the presence or lack of the following:

- Degree of disturbance and transformation;
- Presence of floral Species of Conservation Concern (SCC);
- Vegetation types (which also constitute faunal habitats) of conservation concern;
- Areas of high biodiversity as determined by species composition and community structure; and
- The presence of important process areas such as:
  - Ecological corridors
  - Topographical features (especially steep and rocky slopes that provide niche habitats for both plants and animals).

It must be noted that the sensitivity zonings in this study are based solely on ecological characteristics and social and economic factors have not been taken into consideration. The sensitivity analysis described here is based on twelve (12) criteria which are considered to be of importance in determining ecosystem and landscape sensitivity. The method predominantly involves identifying sensitive vegetation or habitat types, topography and land transformation, biodiversity patterns (hotspots) and biodiversity process areas (ecological infrastructure and corridors) (Table 3.1).

Although very simple, this method of analysis provides a good, yet conservative and precautionary assessment of the ecological sensitivity.

**Table 3.1: Criteria used for the analysis of the sensitivity of the area.**

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	<b>Topography</b>	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	<b>Vegetation</b> - Extent or habitat type in the region	Extensive	Restricted to a particular region / zone	Restricted to a specific locality / site
3	<b>Conservation status</b> of fauna / flora or habitats	Well conserved independent of conservation value	Not well conserved, moderate conservation value	Not conserved - has a high conservation value
4	<b>Species of special concern</b> - Presence and number	None, although occasional regional endemics	No endangered or vulnerable species, some indeterminate or rare endemics	One or more endangered and vulnerable species, or more than 2 endemics or rare species
5	<b>Habitat fragmentation</b> leading to loss of viable populations	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation	Reasonably extensive areas of preferred habitat elsewhere and habitat susceptible to fragmentation	Limited areas of this habitat, susceptible to fragmentation





CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
6	<b>Biodiversity contribution</b>	Low diversity or species richness	Moderate diversity, and moderately high species richness	High species diversity, complex plant and animal communities
7	<b>Erosion potential</b> or instability of the region	Very stable and an area not subjected to erosion	Some possibility of erosion or change due to episodic events	Large possibility of erosion, change to the site or destruction due to climatic or other factors
8	<b>Rehabilitation potential</b> of the area or region	Site is easily rehabilitated	There is some degree of difficulty in rehabilitation of the site	Site is difficult to rehabilitate due to the terrain, type of habitat or species required to reintroduce
9	<b>Disturbance</b> due to human habitation or other influences (alien invasive species)	Site is very disturbed or degraded	There is some degree of disturbance of the site	The site is hardly or very slightly impacted upon by human disturbance
10	<b>Ecological function</b> in the landscape (corridor, niche habitats)	Low ecological function. No corridors or niche habitats	N/A (There are NO moderate ecological functions. It is considered either high or low)	High ecological function. Portions of entire sections of the site contains corridors or niche habitats
11	<b>Ecological services</b> (food, water filter, grazing, etc.)	Low to no ecological services on site	Some sections of the site contains ecological services	Most of the site contains ecological services
12	<b>Aquatic environments</b> (Rivers, wetlands, drainage line etc)	Outside of the 32m watercourse buffer. Outside of the 500m wetland buffer	Within 32m of the watercourse. Within 500m of a natural wetland, but outside of 50m wetland buffer	Development within the watercourse.

A sensitivity map was developed with the aid of a satellite image so that the sensitive regions and vegetation types could be plotted (see Chapter 7).

## 3.6 ECOLOGICAL IMPACT ASSESSMENT

### 3.6.1 Impact rating methodology

To ensure a balanced and objective approach to assessing the significance of potential impacts, a standardized rating scale was adopted which allows for the direct comparison of specialist studies. This rating scale has been developed in accordance with the requirements outlined in Appendix 1 of the NEMA EIA Regulations (2014 and subsequent 2017 amendments).

The details of this rating scale are included in Appendix C.



## 4. RELEVANT LEGISLATION

Environmental legislation relevant to the biodiversity assessment of the proposed development is summarised in Table 4.1 below. Biodiversity Plans and Programmes are discussed in Chapter 5 where they are used to describe the desktop ecological conditions of the study area.

**Table 4.1: Environmental legislation considered in the preparation of the Terrestrial Biodiversity Specialist Assessment for the proposed TWFT Piggery.**

LEGISLATION/POLICY	DESCRIPTION
The Constitution (Act 108 of 1996)	<p>The Constitution of the Republic of South Africa is the supreme law of the land. As a result, all laws, including those pertaining to this Management Plan, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, everyone has the right:</p> <p>a) <i>To an environment that is not harmful to their health or well-being; and</i>  b) <i>To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:</i></p> <p>i. <i>Prevent pollution and ecological degradation;</i>  ii. <i>Promote conservation; and</i>  iii. <i>Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</i></p>
<p>National Environmental Management Act (NEMA) (Act 108 of 1998), and its subsequent amendments.</p> <p>NEMA Amended EIA Regulations (GNR. 326) (2017)</p>	<p>Relevant Sections of the Act: Section 2, 23, 24, 24-1, 28-33</p> <ul style="list-style-type: none"> <li>• Application of the NEMA principles (e.g. need to avoid or minimise impacts, use of the precautionary principle, polluter pays principle, etc.)</li> <li>• Application of fair decision-making and conflict management procedures are provided for in NEMA.</li> <li>• Application of the principles of Integrated Environmental Management and the consideration, investigation and assessment of the potential impact of existing and planned activities on the environment; socio-economic conditions; and the cultural heritage.</li> </ul> <p>NEMA introduces the duty of care concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution and may lead to the prosecution of managers or directors of companies for the conduct of the legal persons.</p> <p>In addition, NEMA introduced a framework for environmental impact assessments, the Amended EIA Regulations (2017). The NEMA EIA Regulations aim to avoid detrimental environmental impacts through the regulation of specific activities that cannot commence without prior environmental authorisation.</p>
National Environmental Management: Biodiversity Act (Act 10 of 2004), and its subsequent amendments.	<p>The National Environmental Management: Biodiversity Act (NEMBA), No. 10 of 2004, aims to assist with the management and conservation of South Africa's biological diversity through the use of legislated planning tools. These planning tools include the declaration of bioregions and the associated bioregional plans as well as other mechanisms for managing and conserving biodiversity.</p> <p>The objectives of the Act include inter alia:</p>



LEGISLATION/POLICY	DESCRIPTION
<p>Threatened Ecosystems</p> <p>Threatened and Protected Species</p> <p>Alien Invasive Species Regulations, 2014.</p>	<p>To provide for:</p> <ul style="list-style-type: none"> <li>• The management and conservation of biological diversity within the Republic and of the components of such biological diversity;</li> <li>• The use of indigenous biological resources in a suitable manner;</li> <li>• The fair and equitable sharing of benefits arising from bio-prospecting of genetic material derived from indigenous biological resources; and</li> <li>• To give effect to ratified international agreements relating to biodiversity which are binding on the Republic.</li> <li>• To provide for co-operative governance in biodiversity management and conservation; and</li> <li>• To provide for a South African National Biodiversity Institute to assist in achieving the objectives of the Act.</li> </ul> <p>In addition to this, Sections 50-62 of the Act provide details relating to the protection of threatened or protected ecosystems and species, while Sections 63-77 of the Act provide details relating to alien and invasive species with the purpose of preventing their introduction and spread, managing, controlling and eradicating of alien and invasive species.</p> <p>The NEMBA Alien and Invasive Species List (Government Notice 599 of 2014) lists Alien and Invasive species that are regulated by the NEMBA Alien and Invasive Species Regulations (Government Notice 98 of 2014).</p>
<p>Conservation of Agricultural Resources Act, (Act 43 of 1983).</p>	<p>The Conservation of Agricultural Resources Act, No. 43 of 1983 aims to control over-utilisation of the natural agricultural resources to promote the conservation of soil, water sources and vegetation through the combat of weeds and invader plants. Regulations 15 and 16 under this Act, which relate problem plants were amended in March 2001.</p> <p><i>It should be noted that the CARA regulations for the legal obligations regarding alien invasive plants in South Africa have been superseded by the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations which was promulgated on 1 October 2014. However, CARA has not been repealed and is still included as a reference point to use in terms of the management of AIS where certain species may not be included in the NEM:BA AIS list.</i></p>
<p>National Forest Act (Act 84 of 1998) and its subsequent amendments.</p>	<p>The NFA provides the legal framework for the protection and sustainable use of South Africa’s indigenous forests. Any area that has vegetation which is characterised by a closed and contiguous canopy and under storey plant establishment is defined as a ‘forest’ and as a result falls under the authority of the Department of Environmental Affairs, Forestry and Fisheries (DEFF): Forestry sector.</p>
<p>National Water Act (Act 36 of 1998)</p>	<p>The purpose of this Act (Section 2) is to ensure that the Nation’s water resources are protected, used, developed, conserved and controlled in ways that take into account, including:</p> <ol style="list-style-type: none"> <li>(a) Promoting sustainable use of water</li> <li>(b) Protection of aquatic and associated ecosystems and their biological diversity</li> <li>(c) Reducing and preventing pollution and degradation of water resources</li> </ol> <p><u>Protection of Water Resources (Sections 12-20)</u> Provides details of measures intended to ensure the comprehensive protection of all water resources, including the water reserve and water quality.</p> <p>Section 19 deals with Pollution Prevention (Part 4)</p>



LEGISLATION/POLICY	DESCRIPTION
	<p>The person (including a municipality) who owns, controls occupies or uses the land in question, is responsible for taking reasonable measures to prevent pollution of water resources. If such measures are not taken, the catchment management agency concerned, may itself do whatever is necessary to prevent the pollution or remedy its effects and recover all reasonable costs from the persons responsible for the pollution.</p> <p><u>Section 21 deals with the Use of Water</u> Section 21 (a-k) describes activities defined as a water use under the Act. These activities may only be undertaken subject to the application for, and issue of, a water use licence.</p>
National Environmental Management: Protected Areas Amendment Act (No. 31 of 2004)	The purpose of this Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes.
Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity (GN R. 320 March 2020)	This Protocol provides the criteria for the assessment and reporting of impacts on terrestrial biodiversity for activities requiring Environmental Authorisation (EA). The assessment and minimum reporting requirements outlined in the Protocol are based on the outcomes of the environmental sensitivity identified by the national web-based Environmental Screening Tool. For a site identified as being 'very high sensitivity' in terms of terrestrial biodiversity, a Terrestrial Biodiversity Specialist Assessment must be undertaken while for a site identified and confirmed as 'low sensitivity' in terms of terrestrial biodiversity, a Terrestrial Biodiversity Compliance Statement can be compiled.
Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Plant Species (GN R. 1150 October 2020)	The Protocol provides the criteria for the assessment and minimum report content requirements for impacts on terrestrial plant species for activities requiring Environmental Authorisation (EA) and replaces the requirements outlined in Appendix 6 of the EIA Regulations. The assessment and minimum reporting requirements outlined in the Protocol are based on the outcomes of the environmental sensitivity identified by the national web based Environmental Screening Tool and the site sensitivity verification undertaken by a qualified Environmental Assessment Practitioner (EAP) or a specialist.



## 5. DESCRIPTION OF THE BIOPHYSICAL ENVIRONMENT

### 5.1 CLIMATE

Tsitsikamma has a Mediterranean Maritime climate with moderately hot summers and mild to cold winters. It is situated in a high rainfall area, on the boundary of the winter and summer rainfall areas. Average maximum daily temperatures reach a high of 26°C in February while average minimum temperatures reaching a low of 7°C in July. Rainfall occurs throughout the year with an average annual rainfall of 1 400 mm, the wettest months being October and November (Figure 5.1). The prevailing wind direction is from the south (Meteoblue, 2020).

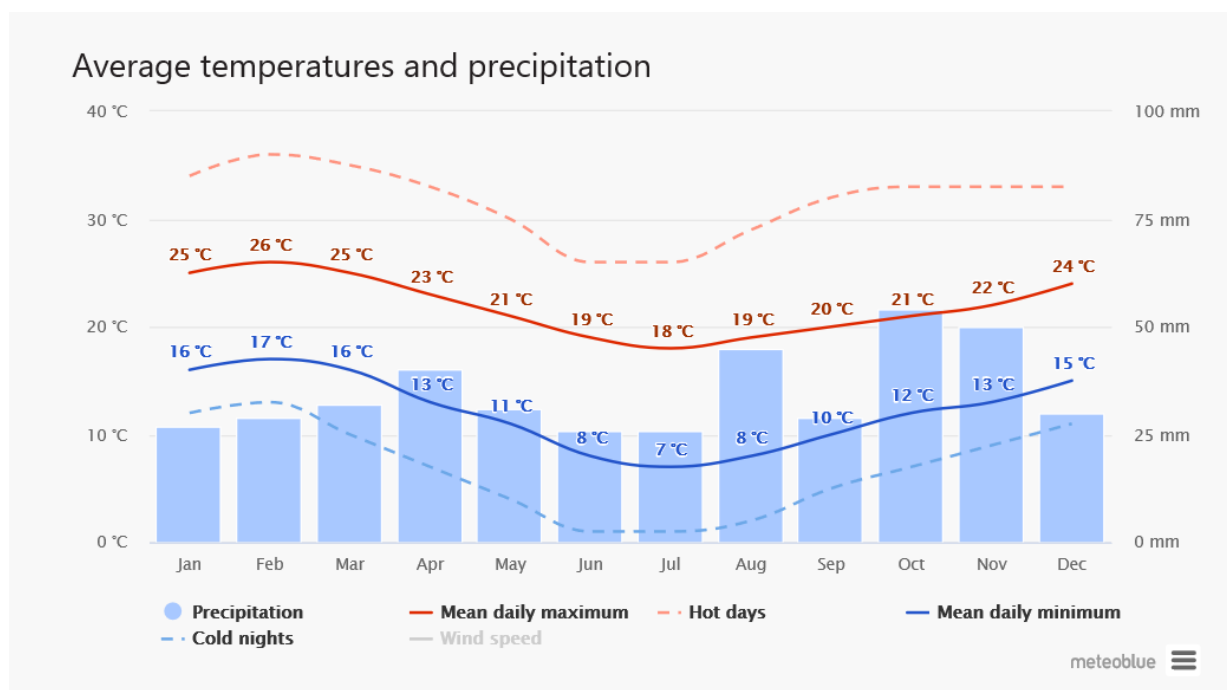


Figure 5.1: Climate data for Tsitsikamma, Eastern Cape Province (source: <https://www.meteoblue.com>).

### 5.2 TOPOGRAPHY

The topography of the study site is relatively flat, ranging between 185 meters above sea-level (m.a.s.l) and 200 m.a.s.l. Elevation decreases towards the south to west as a result of the incision by the Tsitsikama River and surrounding drainage lines (Figure 5.2).



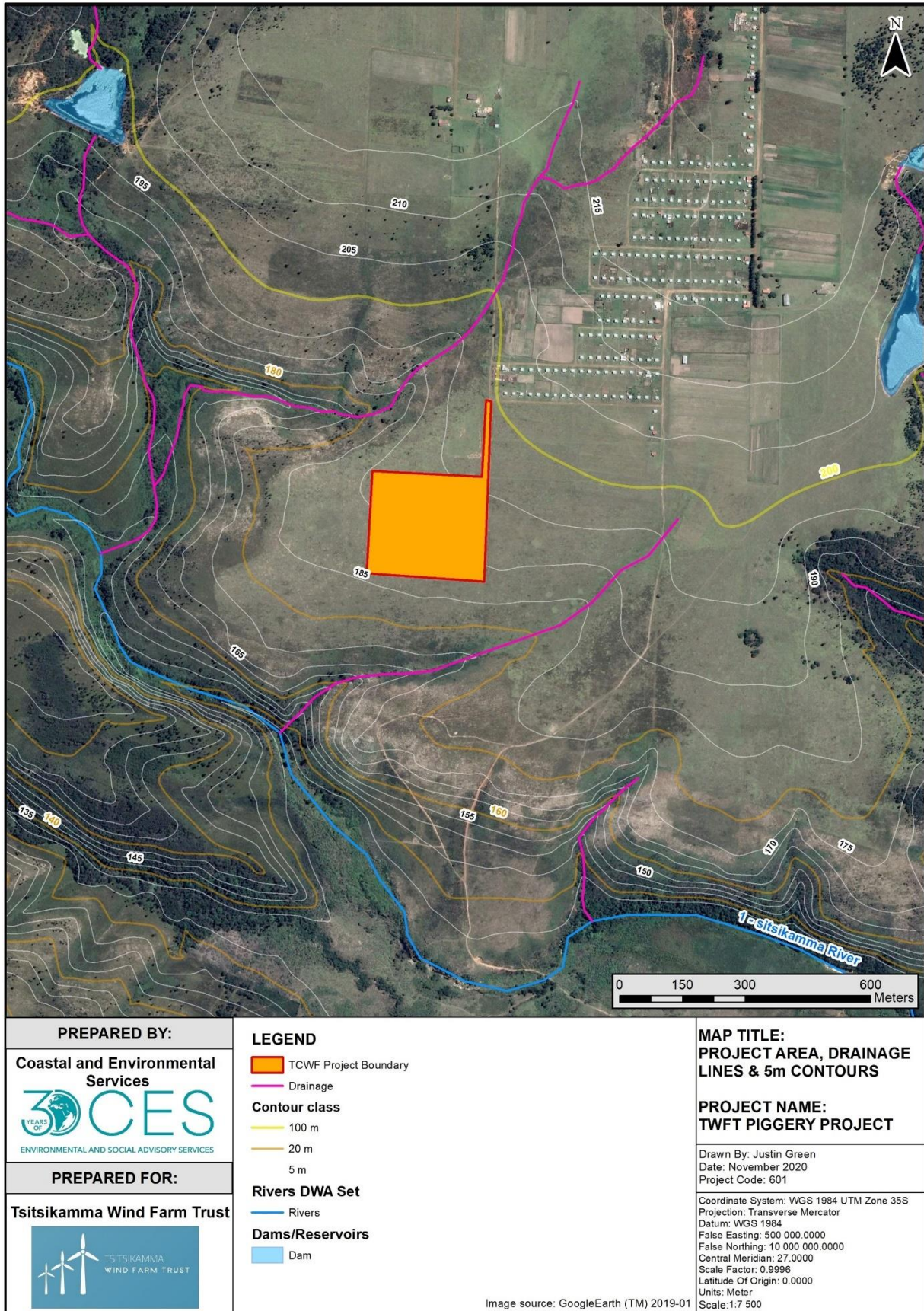


Figure 5.2 Contour Map of the study area.



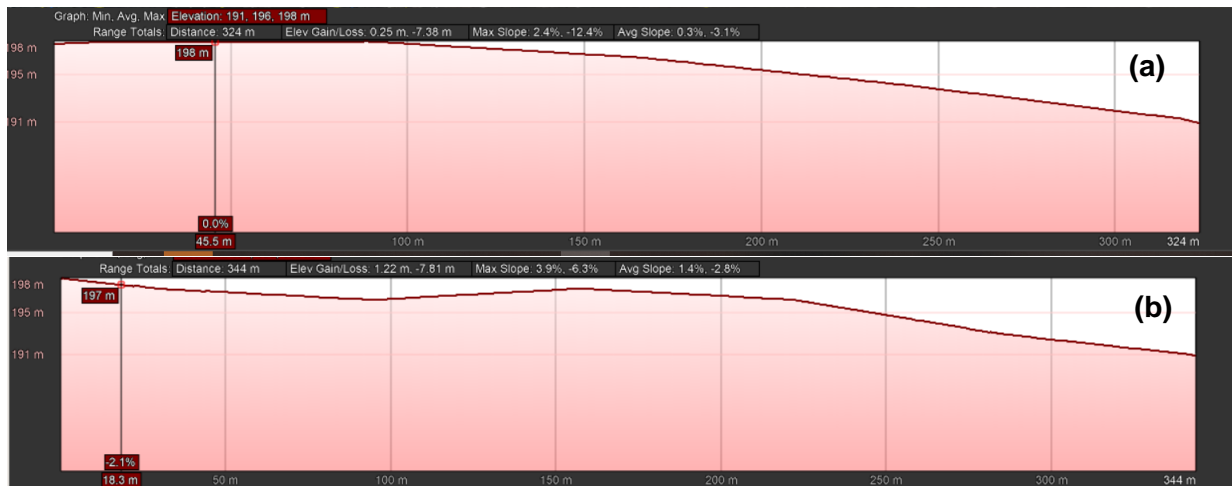


Figure 5.3: Elevation profile of the study site from (a) north to south and (b) east to west.

### 5.3 GEOLOGY AND SOILS

Vegetation types are influenced by a range of biotic and/or abiotic factors at different spatial and temporal scales, which together influence the distribution, composition, structure and diversity of plant communities (Rodrigues *et al.*, 2016). Among the abiotic factors influencing vegetation types, topography (landform), geology, and soils are considered three of the major factors determining habitat heterogeneity and species diversity. A large portion of the site occurs within Tsitsikamma Sandstone Fynbos, while a small section of the site occurs within Eastern Coastal Shale Band Vegetation. Tsitsikamma Sandstone Fynbos occurs on acidic lithosol soils derived from sandstones of the Table Mountain Group while Eastern Coastal Shale Band Vegetation occurs on clays derived from shale of the Cedarberg Formation (Table Mountain Group).

The soils underlying the study site are classified as Eutric Planosols. Planosols are typically poor in plant nutrients and are characterised by a subsurface layer of clay accumulation. These soils are found in wet, low lying areas (Figure 5.4).

The geology underlying the study site belongs to the Nardouw Subgroup of the Table Mountain Group (Cape Super Group). The Nardouw Subgroup is an arenaceous, coarse grained sequence which overlays the Cedarberg, Pakhuis and Peninsula Formations (Thamm, 1986) (Figure 5.5).

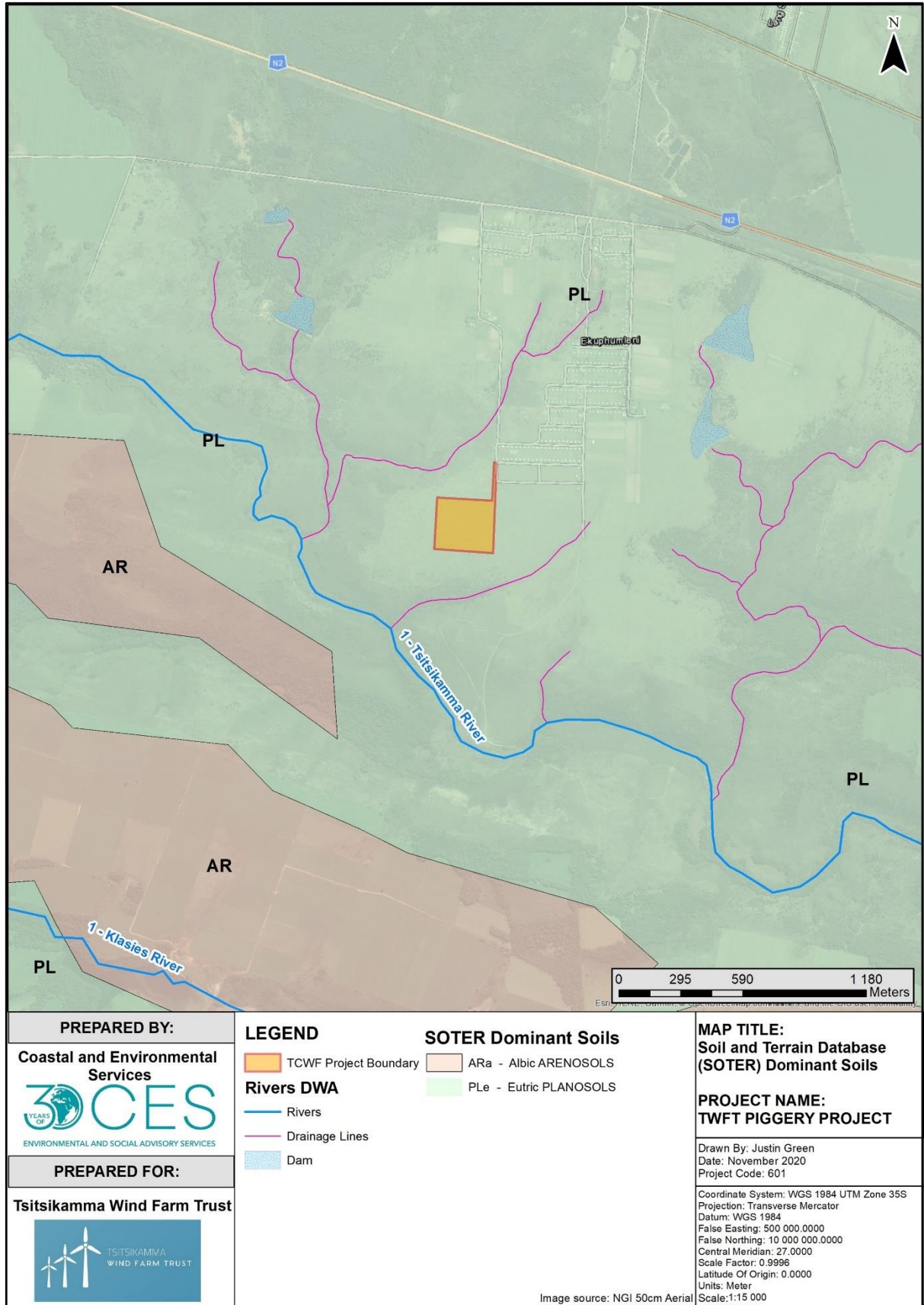


Figure 5.4: Soil Map of the study area.

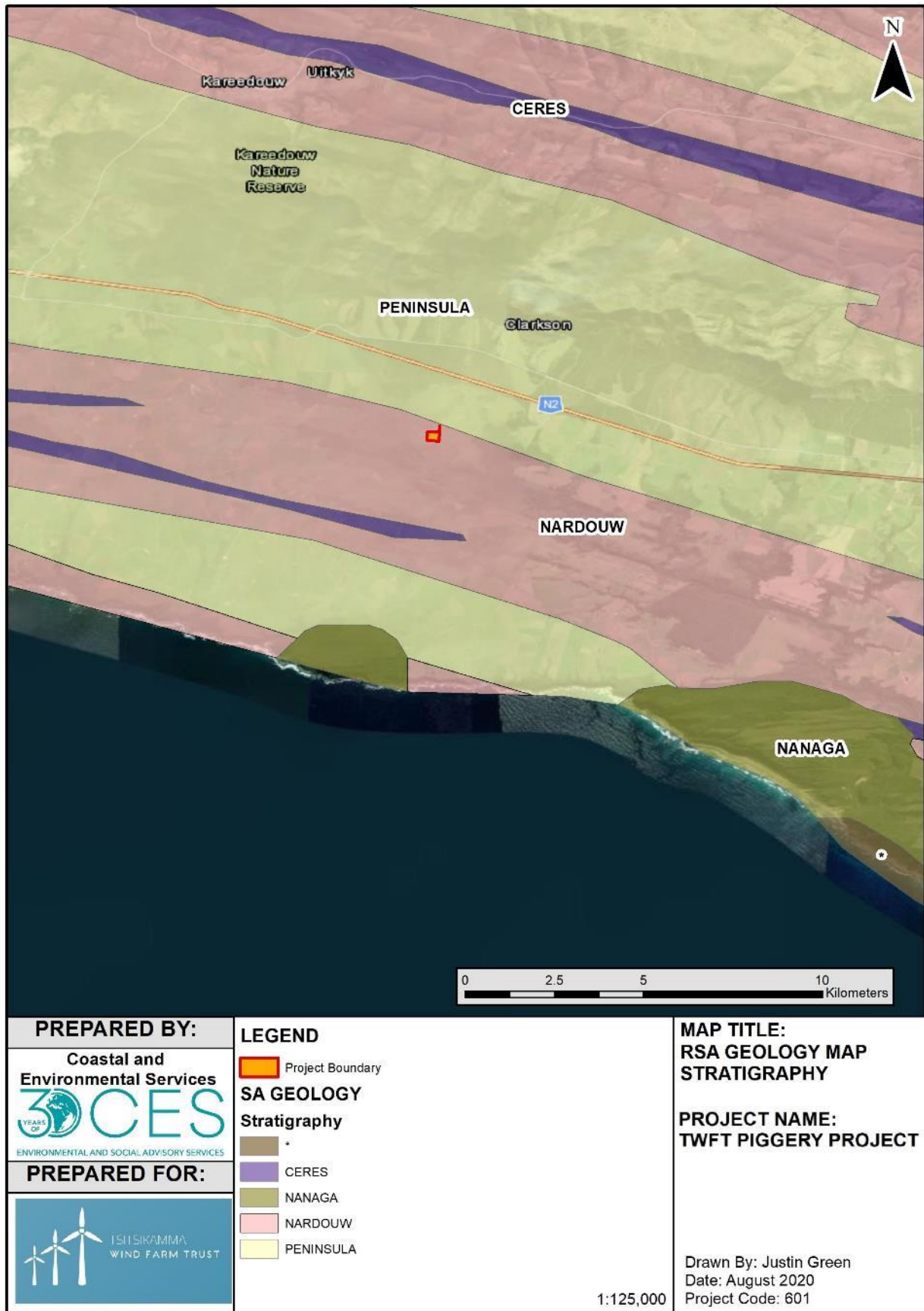


Figure 5.5: Geology Map of the study site.



## 5.4 LAND COVER

According to the South African National Land-Cover (2018) spatial dataset, the study site occurs within *Commercial Annuals Crops Rain-Fed / Dryland / Non-Irrigated* (Figure 5.6). Analysis of historical Google Earth Imagery suggests that the site was previously cultivated, indicated by the presence of old cultivation contours. This explains why the vegetation observed on site does not conform to either of the SA VEGMAP (2018) vegetation types. The site is currently utilised for livestock grazing.





Land Cover 9-class (DEA, 2018)



Legend

Land Cover 2018 (9 class)

- |  |               |  |                  |
|--|---------------|--|------------------|
|  | Barren Land   |  | Grassland        |
|  | Built-up      |  | Mines & Quarries |
|  | Cultivated    |  | Shrubland        |
|  | Forested Land |  | Waterbodies      |
|  |               |  | Wetlands         |

0 0.17 0.35 0.7 km

Scale: 1:18 056

Date created: December 3, 2020

Compiled with CapeFarmMapper



Figure 5.6: South African National Land-Cover (SANLC, 2018) Map of the project area.



## 5.5 VEGETATION AND FLORISTICS

### 5.5.1 SA VEGMAP (Mucina *et al.*, 2018)

The South African Vegetation Map (SA VEGMAP) of 2018 is an important resource for biodiversity monitoring and conservation management in South Africa. The map provides a detailed description of each of South Africa's unique vegetation types along with a comprehensive list of the important species associated with each, including endemic and biologically important species.

#### **Fynbos Biome**

The project area falls within the Fynbos biome. This biome is well defined geographically based on climate (summer- and winter-rainfall regions), corresponding life forms, patterns and major natural disturbances. Fynbos is endemic to South Africa and renowned for its high diversity and species richness. It is characterised by small-leaved, evergreen shrubs and strictly comprises of three different vegetation groups, namely fynbos, renosterveld and strandveld, the regeneration and composition of which is intimately linked to disturbance regime (i.e. fire) (Rebelo *et al.*, 2006). Fire is the key ecological driver in fynbos, however frequency (timing and interval), seasonality (time of year), intensity (hot and fast or slow and cool) and the extent (size) are key aspects of fire management (de Villiers *et al.*, 2016).

According to the SA VEGMAP (2018), the vegetation type of the majority of the study site is Tsitsikamma Sandstone Fynbos while a small section of the site occurs within Eastern Coastal Shale Band Vegetation (Figure 5.7).

#### **Tsitsikamma Sandstone Fynbos**

Tsitsikamma Sandstone Fynbos occurs within the Western and Eastern Cape Provinces in the Tsitsikamma Mountains from Uniondale to Cape St Francis, north of the Keurbooms River and south of the Langkloof. It comprises of mainly proteoid, restioid and ericoid fynbos, with fynbos thicket in wetter areas, and is characterised by a medium dense, tall proteoid shrubland over a dense moderately tall, ericoid shrubland (Rebelo *et al.*, 2006). Tsitsikamma Sandstone Fynbos is classified as **Least Concern** (Skowno *et al.*, 2019), with a conservation target of 23%. More than 40% of this vegetation type is statutorily conserved in Garden Route National Park while more than 33% has been transformed for cultivation and pine plantations. Scattered aliens include *Pinus pinaster* and *Hakea sericea*.

#### **Eastern Coastal Shale Band Vegetation**

Eastern Coastal Shale Band Vegetation occurs within both the Western and Eastern Cape provinces, on narrow shale bands (80-200 m) in the eastern Outeniqua, Langkloof, Tsitsikamma and Kareedouw Mountains and along the Southern Cape Coastal Plains. It is characterised by various shrublands, from thicket to renosterveld and fynbos at higher altitudes. The fynbos component includes all structural types, often grassy in character. Eastern Coastal Shale Band Vegetation is classified as **Endangered** (Skowno *et al.*, 2019), with a conservation target of 27%. Approximately 16% of this vegetation type is statutorily conserved in the Garden Route national Park (including the Tsitsikamma National Park), Koomans Bush State Reserve as well as in Lottering Forest Reserve, Plaatbos Nature Reserve, Kraaibrand and Langebosch Forest Reserves and several other private conservation areas. Approximately 65% of Eastern Coastal





Shale Band Vegetation has been transformed due to cultivation and pine plantations. Scattered aliens include *Pinus pinaster* and *Hakea sericea* (Rebelo *et al.*, 2006).

It should be noted that the defining characteristics of both Tsitsikamma Sandstone Fynbos and Eastern Coastal Shale Band Vegetation at the study site were absent. The vegetation of the study site was significantly degraded and heavily grazed by cattle and sheep and subsequently represented more of a degraded grassland (please refer to Section 6.1).

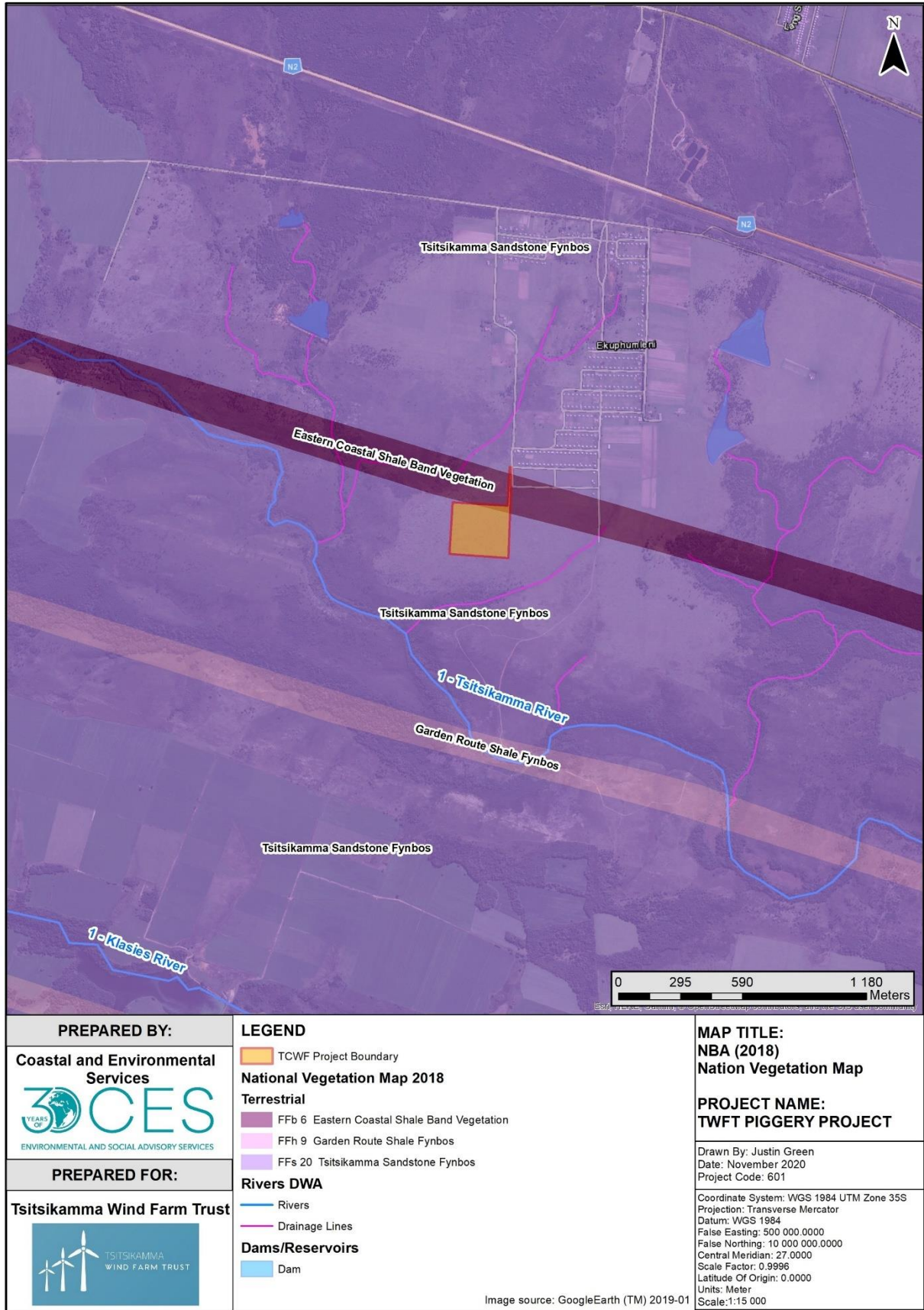


Figure 5.7: South African (2018) Vegetation Map of the project area.



## Plant Species of Conservation Concern

Plant species of conservation concern comprise those species that are either threatened (Critically Endangered, Endangered, Vulnerable), rare or declining. The South African National Biodiversity Institute (SANBI) Plants of Southern Africa (POSA) plant database (<http://posa.sanbi.org>) and the list of important taxa common to Tsitsikamma Sandstone Fynbos and Eastern Coastal Shale Band Vegetation (Rebelo *et al.*, 2006) was consulted, along with the categories indicated in the SANBI Threatened Species Programme website (<http://redlist.sanbi.org/species.php?species>) to identify potential species of conservation concern within the proposed development footprint (Table 5.2).

The following list of plant SCC that may **potentially** be found within the development footprint has been derived from current literature for possible vegetation found in the area and cross-referenced against the South African Red Data List, NFA protected trees, the Schedule 3&4 of the Provincial Nature Conservation Ordinance (PNCO), NEM:BA TOPS list, and List of Endemic Taxa (from vegetation type description Mucina *et al.*, 2018). A list of plant species that were identified during the site survey can be found in Section 6.2 (Table 6.1) while the full list of the potential species that could occur within the project area are listed in Appendix A.

**Table 5.2: Species of Conservation Concern that may occur within the proposed development footprint according to POSA database.**

FAMILY	SPECIES	ECOLOGY	Conservation status
Asteraceae	<i>Osteospermum pterigoideum</i>	Indigenous; Endemic	EN
	<i>Felicia westae</i>	Indigenous; Endemic	EN
Ericaceae	<i>Erica inconstans</i>	Indigenous; Endemic	VU
	<i>Erica glandulosa</i>	Indigenous; Endemic	VU
	<i>Erica humansdorpensis</i>	Indigenous; Endemic	CR
Fabaceae	<i>Indigofera hispida</i>	Indigenous; Endemic	VU

According to the results of the Screening Report, the relative plant species sensitivity of the study site is classified as MEDIUM. The plant species contributing towards the sensitivity of the site are listed in Table 5.1 below.

**Table 5.1: Sensitivity features contributing to the plant species sensitivity of the study site according to the Screening Report.**

SENSITIVITY	SPECIES	SANRBI Red List	IUCN	PNCO	NEMBA
Medium	<i>Selago rotundifolia</i>	VU	-	-	-
Medium	Sensitive species 445 <sup>1</sup>	VU	-	Schedule 4	-
Medium	<i>Bobartia macrocarpa</i>	VU	-	Schedule 4	-
Medium	Sensitive species 273	VU	-	-	-
Medium	<i>Erica glandulosa</i> <i>subsp. fourcadei</i>	VU	-	Schedule 4	-
Medium	<i>Erica glumiflora</i>	VU	-	Schedule 4	-
Medium	Sensitive species 695	VU	-	-	-

<sup>1</sup> Some SCC are sensitive to illegal harvesting. As such, their names are obscured and listed as “Sensitive species #”. As per the best practice guideline that accompanies the protocol and screening tool, the name of the sensitive species may not appear in any BAR or EIA report, nor any specialist reports released into the public domain.



Medium	<i>Felicia westae</i>	EN	-	-	-
Medium	<i>Osteospermum pterigoideum</i>	EN	-		
Medium	<i>Indigofera hispida</i>	VU	-	-	-

### 5.5.2 Forest Classification (NFA)

No natural forest, or forest patches, will be impacted by the proposed development.

## 5.6 BIODIVERSITY INDICATORS

South Africa's policy and legislative framework for biodiversity is well developed, providing a strong basis for the conservation and sustainable use of biodiversity. South Africa is one of the few countries in the world to have a Biodiversity Act and a National Biodiversity Institute.

Key assessments and legal publications provide a framework for, and access to, biodiversity information. Some of these include:

- The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA);
- NEMBA List of Ecosystems in need of Protection;
- NEMBA List of Threatened or Protected Species;
- NEMBA List of Alien Invasive Species;
- The National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEMPAA);
- The National Biodiversity Assessment (NBA) (2018);
- The National Biodiversity Framework (2008) (NBF);
- The National Protected Area Expansion Strategy (2008) (NPAES); and
- Important Bird Areas (2015) (IBA).

In addition to the above publications, some provinces have their own provincial biodiversity legislation. The Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019) covers the entire Eastern Cape Province.

### 5.6.1 Provincial - Eastern Cape Biodiversity Conservation Plan (ECBCP, 2019)

The ECBCP (2019) replaces the ECBCP (2007) in its entirety and provides a map of important biodiversity areas, outside of the Protected Areas network, which must be used to inform land use and resource-use planning and decision making. The objectives of the ECBCP (2019) are to:

- 1) Identify the minimum spatial requirements needed to maintain a living landscape that continues to support all aspects of biodiversity and retain/maintain essential ecological infrastructure. This is achieved through the selection of areas, based on achieving targets, which represent important biodiversity pattern AND ecological processes;
- 2) Serve as the primary source of biodiversity information for land use planning and decision-making; and
- 3) Inform conservation and restoration action in important biodiversity areas.

The aim of the ECBCP (2019) was to map biodiversity priority areas through a systematic conservation planning process. The main outputs of the ECBCP include Protected Areas (PA), Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Other Natural Areas (ONA) and No Natural Habitat Remaining (NNR) for both terrestrial and aquatic ecosystems.



The ECBCP (2019) has been adopted by DEDEAT as a systematic biodiversity plan for the Eastern Cape Province. According to the ECBCP (2019), the study site occurs within a terrestrial and aquatic ESA 1 (Figure 5.8 and Figure 5.9, respectively).

According to the ECBCP 2019 Handbook, ESAs are not essential for meeting biodiversity targets but are essential in terms of:

- **Terrestrial landscape:** Ensuring connectivity between CBAs, strengthening climate change resilience, and proper function of ecosystem infrastructure for delivery of ecosystem services. ESAs may include riparian areas, coastal corridors, ridges, etc.
- **Aquatic landscape:** ESAs extend into catchments that are essential for the maintenance of CBA rivers and wetlands.

In terms of the ECBCP (2019), ESAs need to be maintained in a semi-natural, if not natural state.

The management requirements of ESAs are outlined in Table 5.3 below.

**Table 5.3: Management requirements of the biodiversity priority areas identified by the ECBCP (2019).**

Biodiversity Priority Area	Management requirements
ESA 1	<p>Maintain ecological function within the localised and broader landscape. A functional state in this context means that the area must be maintained in a semi-natural state such that ecological function and ecosystem services are maintained.</p> <p>For areas classified as ESA1, the following objectives apply:</p> <ul style="list-style-type: none"> <li>• These areas are not required to meet biodiversity targets, but they still perform essential roles in terms of connectivity, ecosystem service delivery and climate change resilience.</li> <li>• These systems may vary in condition and maintaining function is the main objective, therefore:                             <ul style="list-style-type: none"> <li>○ Ecosystems still in natural, near natural state should be maintained.</li> <li>○ Ecosystems that are moderately disturbed/degraded should be restored.</li> </ul> </li> </ul>

It should be noted that both the aquatic biodiversity sensitivity of the site as well as the terrestrial biodiversity of the site is classified as VERY HIGH in the Screening Report due to the following sensitive features:

- Ecological Support Area 1
- Ecological Support Area 2
- Strategic Water Source Area
- Vulnerable Ecosystem



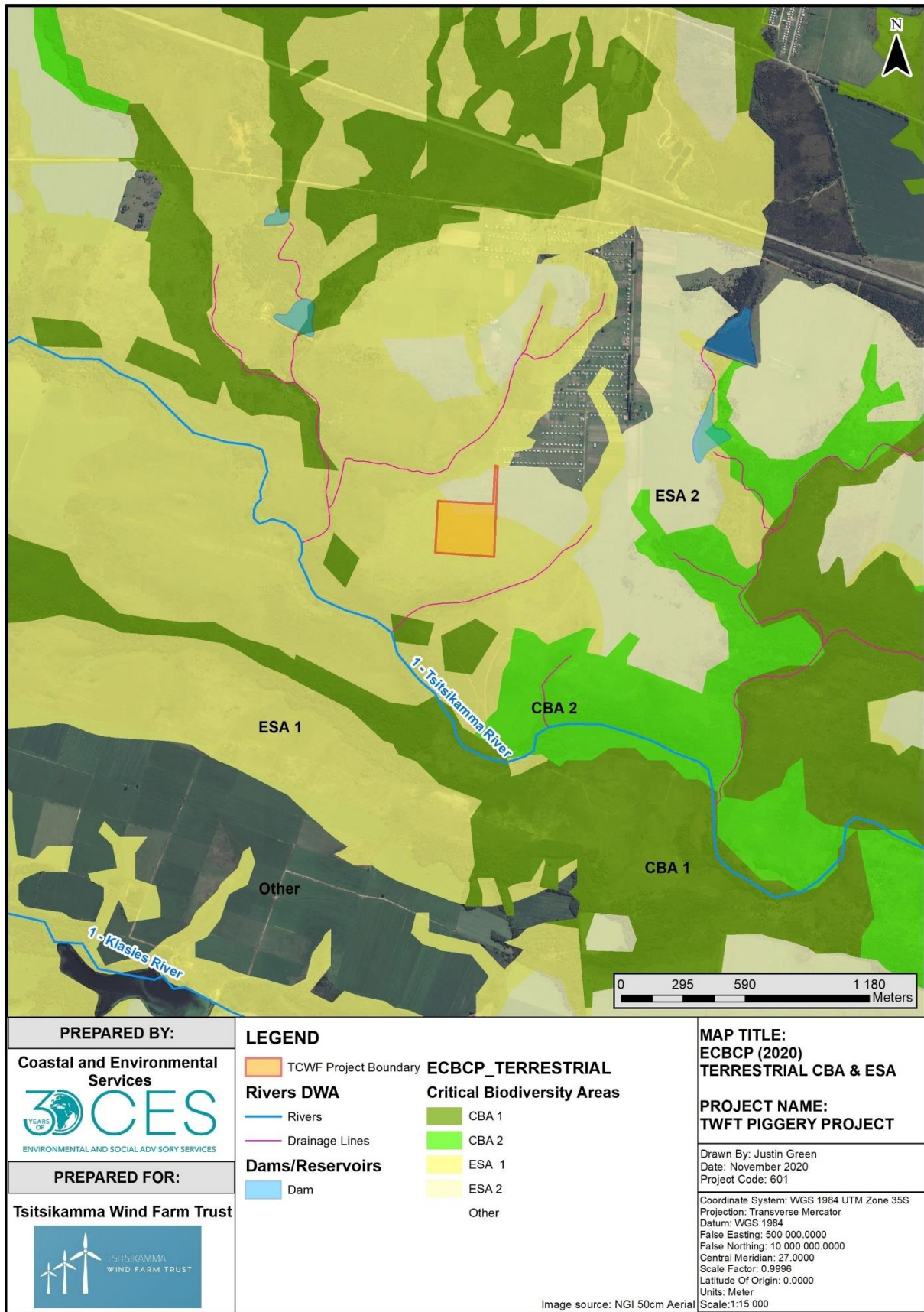


Figure 5.8: ECBCP (2019) Terrestrial Critical Biodiversity Areas (CBAs) located within the project area.

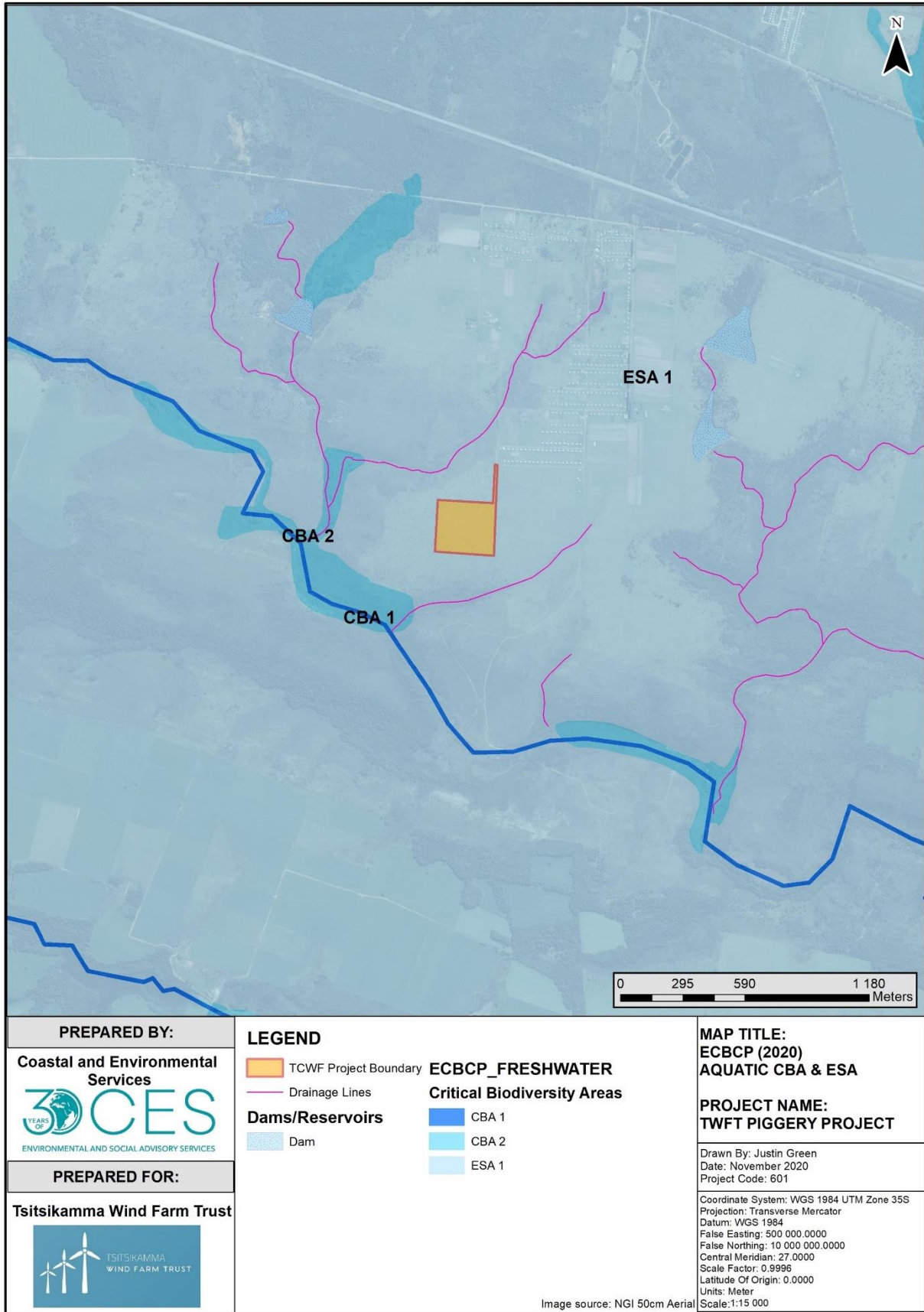


Figure 5.9: ECBCP (2019) Aquatic Critical Biodiversity Areas (CBAs) located within the project area.



### 5.6.2 Local - Garden Route Biodiversity Sector Plan (BSP) (2010)

The Garden Route Biodiversity Sector Plan (BSP) (2010) is the most fine-scale bioregional conservation plan available for the Koukamma Municipality area.

In terms of the Garden Route BSP, 2010, vegetation of the greatest portion of the development footprint is classified as Tsitsikamma Mountain/Mesic Proteoid Fynbos; watercourses in the Clarkson area are classified as Tsitsikamma Perennial Streams. The National Equivalent Ecosystem Status assigned to: Tsitsikamma Mountain/Mesic Proteoid Fynbos is Least Threatened; Tsitsikamma Perennial Stream is Critically Endangered (Holness *et al.*, 2010).

**Tsitsikamma Mountain/Mesic Proteoid Fynbos** is 'closely related to Tsitsikamma Plateau Proteoid Fynbos, but it differs in its position in the landscape. The Tsitsikamma Perennial Stream habitat unit is characterised by water that is dark, fresh and acidic. Much of the upper water catchment is located in inland valleys. Vegetation is dominated by *Protea mundii* and *Laurophyllus capensis*. A rare plant present in this habitat unit is *Gladiolus sempervirens* (Vlok *et al.*, 2008).

In terms of the Garden Route BSP, the development footprint area is classified as an Ecological Support Area (ESA).

The desired management objectives for ESA's are to maintain ecological processes (Vromans *et al.*, 2010). Watercourses present in the development footprint area are all classified as Ecological Support Areas (ESA's) (Figure 5.11). The management objective for ESA's is to maintain ecological processes (Vromans *et al.*, 2010).



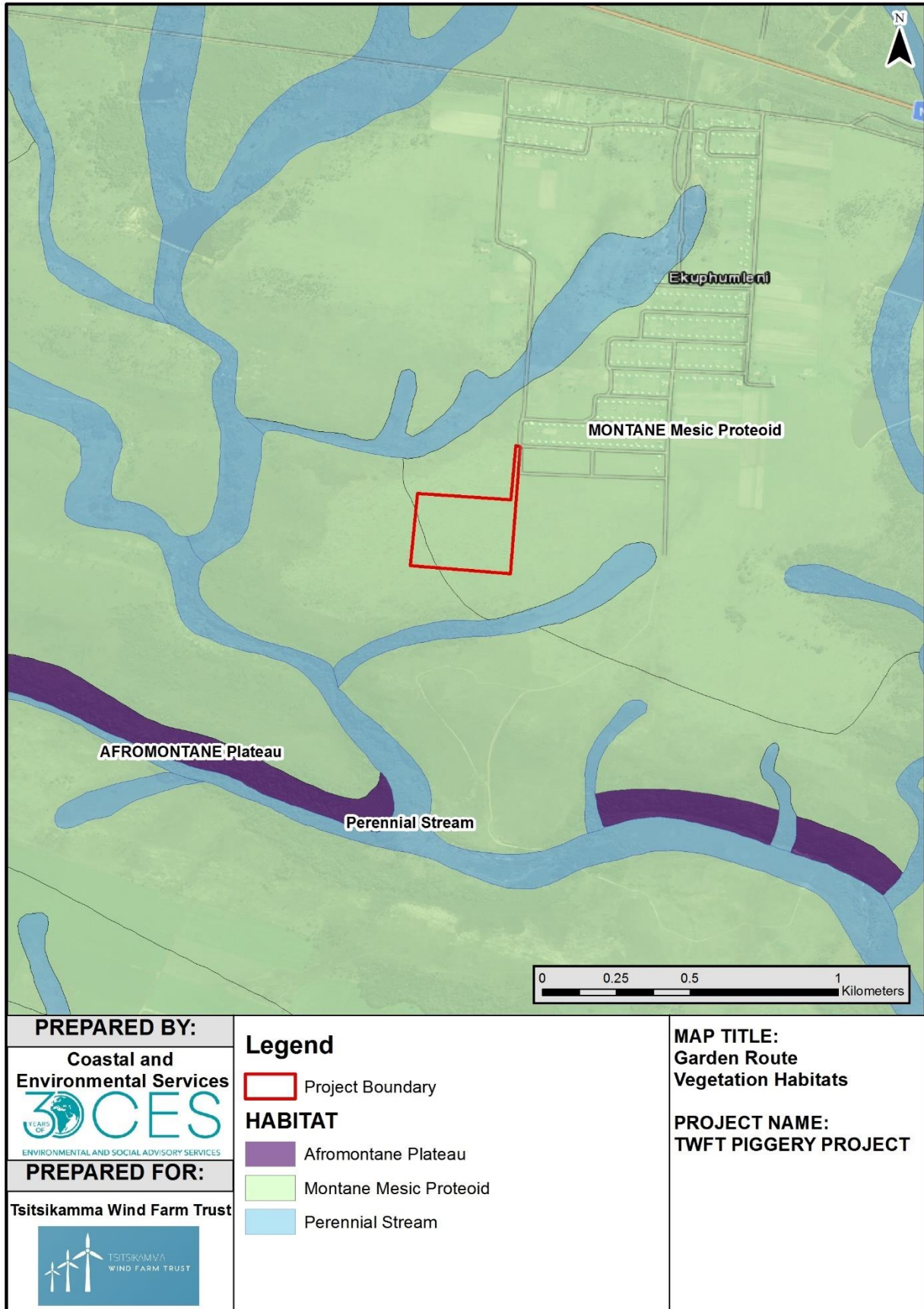


Figure 5.10: Garden Route BSP (2010) vegetation map.

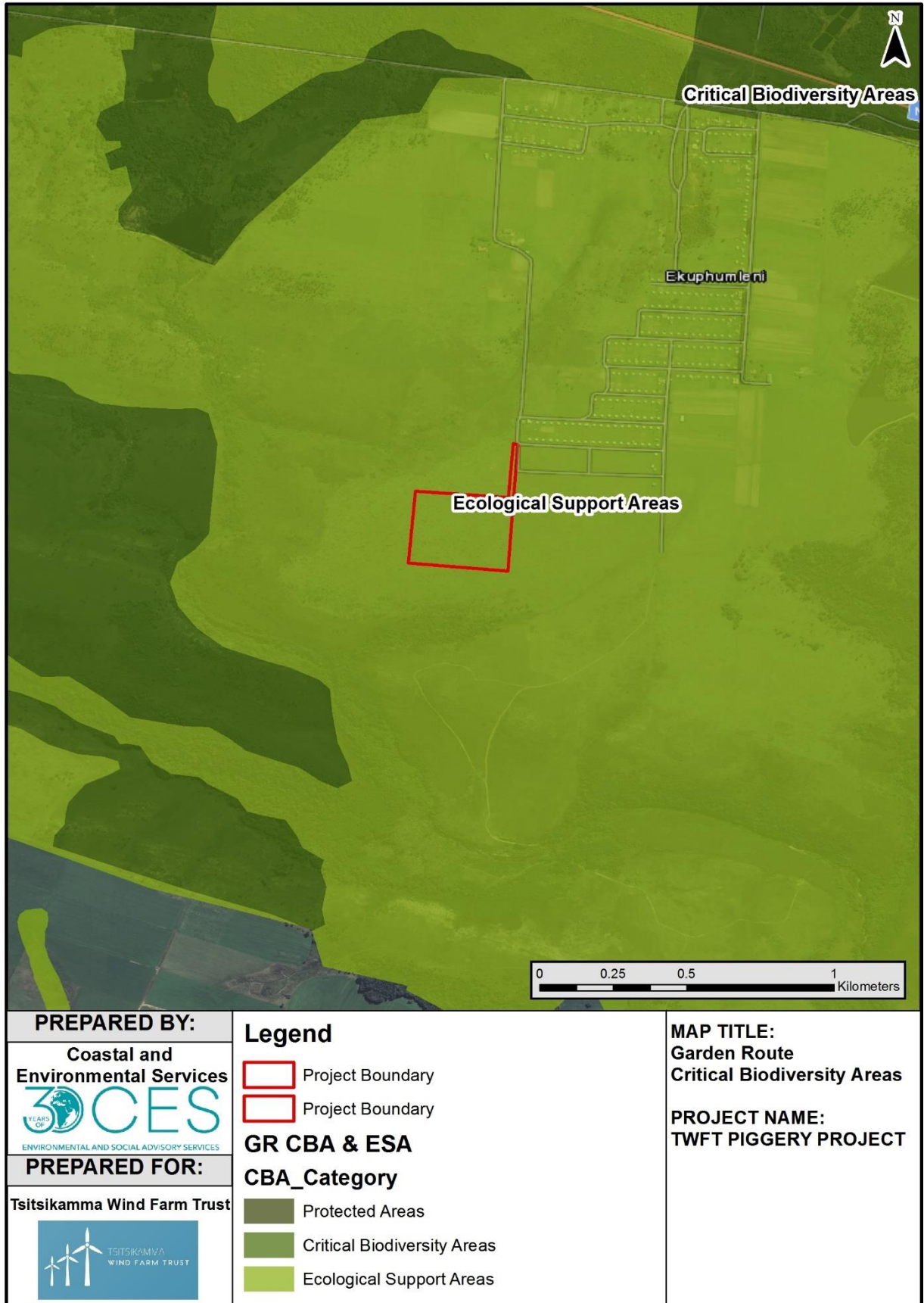


Figure 5.11: Garden Route BSP (2010) CBA map.





### 5.6.3 Threatened Ecosystems

The National Environmental Management: Biodiversity Act, (Act No. 10 OF 2004) (NEM:BA) provides a National List of Ecosystems that are threatened and in need of protection – GN 1002 of 2011. According to the NEMBA List of threatened ecosystems, Eastern Coastal Shale Band Vegetation has been listed as a VULNERABLE ecosystem. However, in terms of the NBA (2018) Terrestrial Ecosystem Threat Status Assessment, this ecosystem has been upgraded to ENDANGERED (Figure 5.12).

The access road (which is an existing track) traverses Eastern Coastal Shale Band Vegetation. The remainder and majority of the site is located within Tsitsikamma Sandstone Fynbos, an ecosystem classified as LEAST CONCERN (NBA, 2018).

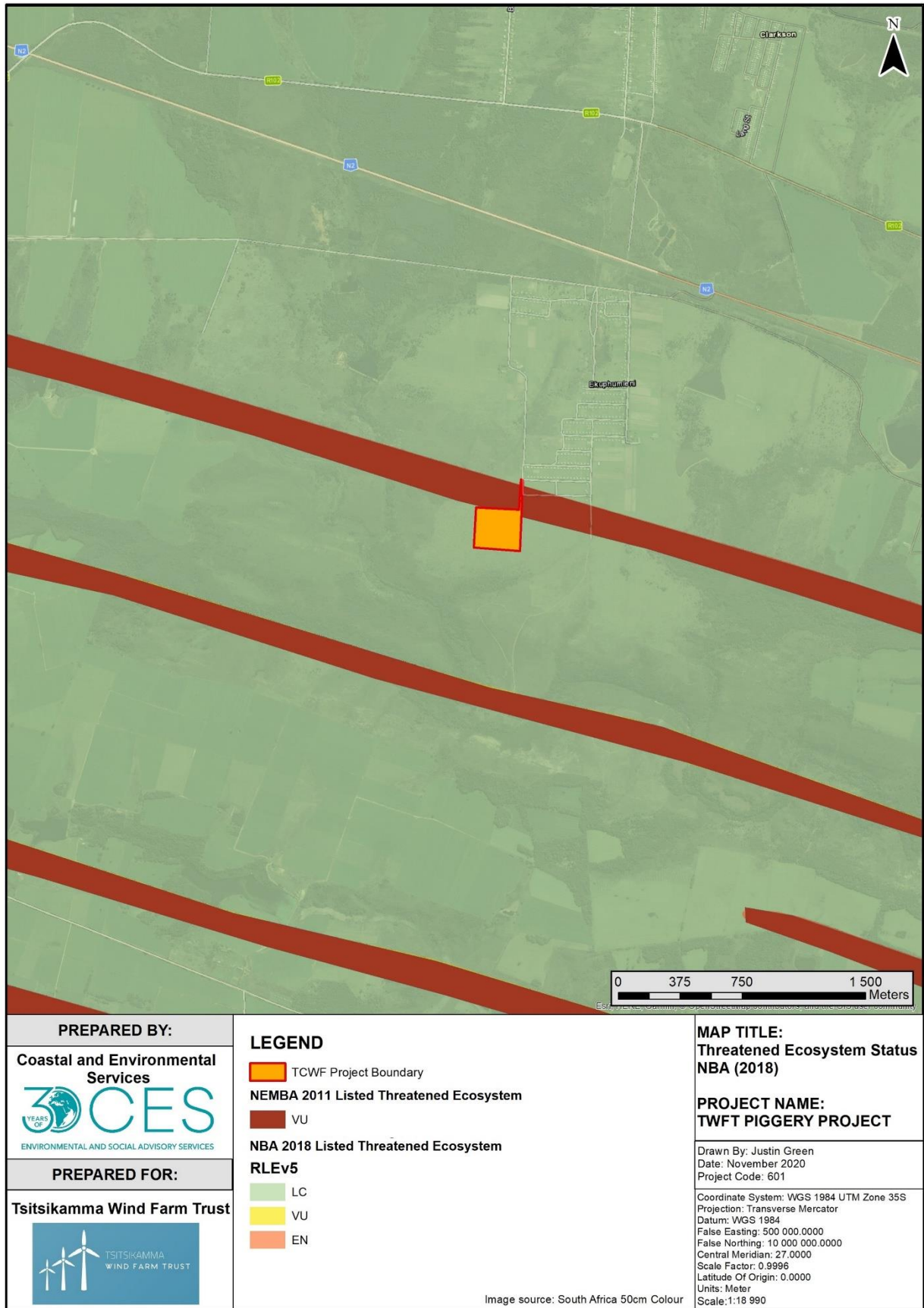


Figure 5.12: NEMBA (2011) List of threatened Ecosystems relative to the project area.



#### 5.6.4 Protected areas

The National Protected Areas Expansion Strategy (NPAES, 2008) was developed to “achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change.” The NPAES originated as Government recognised the importance of protected areas in maintaining biodiversity and critical ecological process. The NPAES sets targets for expanding South Africa’s protected area network, placing emphasis on those ecosystems that are least protected.

The site is not located within an NPAES Focus Area, formal or informal protected area. The nearest NPAES Focus Area (Garden Route NPAES Focus Area) is located approximately 12.5 km north-west of the study site. The site is not located within a formal or informal protected area (Figure 5.13). The site is located 3.2 km from the Garden Route National Park, 6.2 km from the Kareedouw Nature Reserve, and 11.8 km from the Formosa Nature Reserve.

There are no Important Bird Areas (IBAs) located within the project area. The nearest IBA (Tsitsikamma-Plettenberg Bay IBA) is located approximately 13.2 km south west of the site.



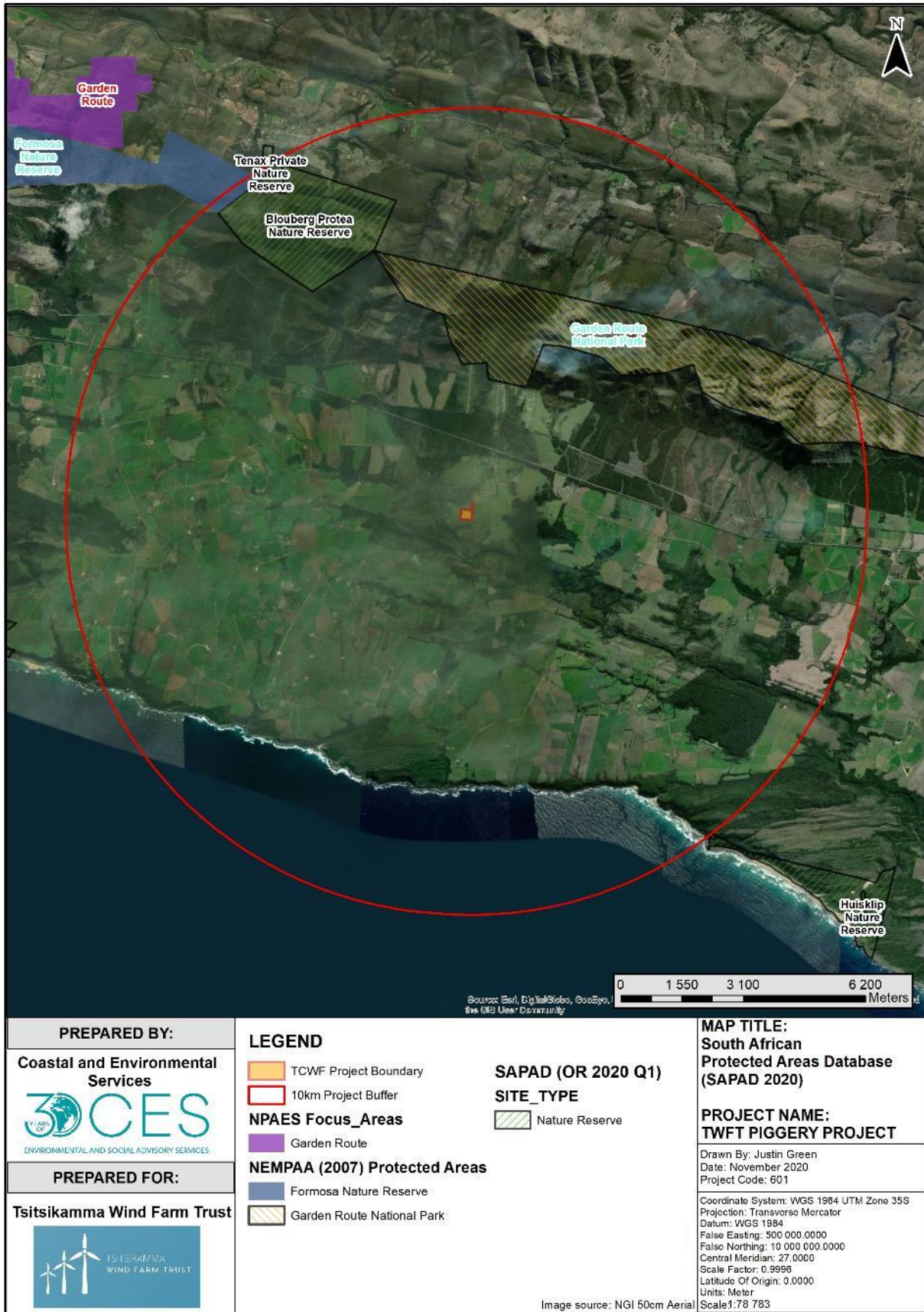


Figure 5.13: NPAES Focus Areas and Protected Areas.





## 5.7 FAUNA

According to the Screening Report generated for the proposed site, the animal species sensitivity of the majority of the site is classified as MEDIUM. The animal species contributing towards the sensitivity classification are listed in Table 5.4 below.

**Table 5.4: Sensitivity features contributing to the Animal Species Sensitivity of the Site.**

Sensitivity	Species	Common Name	SANBI Red List	IUCN	PNCO	NEM:BA
Medium	<i>Aneuryphymus montanus</i>	Yellow-winged Agile Grasshopper	-	Vulnerable	-	-
Medium	<i>Chlorotalpa duthieae</i>	Duthie's Golden Mole	VU	VU	-	-
Medium	<i>Tetradactylus fitzsimonsi</i>	FitzSimons's Long-Tailed Seps	VU	LC	-	-

### 5.7.1 Birds

According to Taylor and Peacock (2018), the Fynbos Biome is an important habitat type in terms of avian species richness, with approximately 257 species occurring, of which 29 are classified as threatened. The Fynbos Biome hosts approximately six of South Africa's 18 endemic bird species.

According to Avibase (Clements version, 2019), approximately 426 bird species are likely to occur within the project area, of which 19 are classified as globally threatened and twenty-one (21) of which are Endemic. Nine (9) are classified as EN, nine (9) are classified as Vulnerable, and eighteen (18) bird species are classified as NT. Please refer to Appendix B for a list of all the bird species likely to occur within the project area. Due to the presence of domestic dogs, the utilisation of the site for livestock grazing, and the activity of the nearby community, it is unlikely that this site is utilised as a breeding or foraging grounds by these species.

### 5.7.2 Mammals

According to IUCN, approximately 114 mammal species have a distribution that includes that project area, of which one (1) is classified as CR, four (4) are classified as EN, five (5) are classified as VU and nine (9) are classified as NT. Consultation of the ADU historical records for QDS 3424AB confirmed that six (6) mammal species have been recorded within 30 km<sup>2</sup> of the project area, of which *Philantomba monticola* (Blue Duiker) and *Panthera pardus* (Leopard) are classified as Vulnerable (Table 5.5).

Blue Duiker are small herbivorous mammals with a distribution range across central, western and southern Africa. In South Africa, this species is restricted to the coastal provinces, from Umfolozi River System in Kwazulu-Natal to George in the Western Cape. Their habitat includes a wide range of coastal forested and wooded habitats, which provides refuge from predators. Blue Duiker are exclusively browsers and feed on leaves, fruit, berries, flowers, fresh forest litter, tubers and roots. They do not require freshwater as their water needs are met through the food they consume (SANBI, 2019). This species is very shy, however it is possible that this species occurs within the study area, especially in the woody vegetation on the slopes down towards the water courses.



Leopard, although widespread in South Africa, are secretive animals and under severe threat due to hunting, snaring, and demand for their skins. This species has been assigned a threat status as Vulnerable due to the 10% population decline recorded over the last three generations (18 to 27 years). The habitat of Leopard is wide and includes woodland, grassland, savannah, mountain habitats, coastal scrub, shrubland, and semi-desert, although densely wooded and rocky areas appear to be the preferred choice. Unfortunately, the habitat available for this species is becoming increasingly scarce with recent habitat suitability models indicating that only around 20% of South Africa constitutes suitable habitat (Swanepoel *et al.*, 2016). Although it is possible that this species could occur in the project area, it is unlikely that its breeding or feeding grounds will be significantly affected by the proposed development.

**Table 5.5: Mammal species likely to occur within the project area.**

FAMILY	SPECIES	COMMON NAME	RED LIST CATEGORY	LAST RECORDED
Bovidae	<i>Oreotragus oreotragus</i>	Klipspringer	Least Concern (2016)	2014-04-12
Bovidae	<i>Philantomba monticola</i>	Blue Duiker	Vulnerable (2016)	2014-04-14
Bovidae	<i>Sylvicapra grimmia</i>	Bush Duiker	Least Concern (2016)	2016-09-24
Cercopithecidae	<i>Chlorocebus pygerythrus</i>	Vervet Monkey	Least Concern (2016)	2017-09-02
Felidae	<i>Panthera pardus</i>	Leopard	Vulnerable (2016)	
Soricidae	<i>Crocidura flavescens</i>	Greater Red Musk Shrew	Least Concern (2016)	1986-11-10

### 5.7.3 Amphibians and Reptiles

Amphibians and reptiles are well represented in sub-Saharan Africa. However, distribution patterns in southern Africa are uneven both in terms of species distribution and in population numbers (du Preez and Carruthers, 2009). Climate, centres of origin and range restrictions are the three main factors that determine species distribution. The eastern coast of South Africa has the highest amphibian diversity and endemism while reptile diversity is generally highest in the north eastern extremes of South Africa and declines to the south and west (Alexander and Marais, 2010).

#### Reptiles

The Eastern Cape is home to 133 which include 21 snakes, 27 lizards and eight chelonians (tortoises and turtles). The majority of these are found in Mesic Succulent Thicket and riverine habitats. According to IUCN, approximately 39 reptile species have a distribution which includes the project area. Consultation of the ADU historical records for QDS 3424AB indicates that 12 species have been confirmed to occur within at least 30 km<sup>2</sup> of the project area, all of which are classified as Least Concern (Table 5.6).

**Table 5.6: Reptile species recorded within 30 km<sup>2</sup> of the study site.**

FAMILY	SCIENTIFIC NAME	COMMON NAME	RED LIST CATEGORY	LAST RECORDED
Agamidae	<i>Agama atra</i>	Southern Rock Agama	Least Concern (SARCA 2014)	2004-04-14
Chamaeleonidae	<i>Bradypodion taeniabronchum</i>	Dwarf Chameleon sp. 2		2004-04-13



Colubridae	<i>Crotaphopeltis hotamboeia</i>	Red-lipped Snake	Least Concern (SARCA 2014)	2012-09-28
Colubridae	<i>Philothamnus occidentalis</i>	Western Natal Green Snake	Least Concern (SARCA 2014)	2016-01-16
Cordylidae	<i>Cordylus cordylus</i>	Cape Girdled Lizard	Least Concern (SARCA 2014)	1995-02-10
Cordylidae	<i>Pseudocordylus microlepidotus microlepidotus</i>	Cape Crag Lizard	Least Concern (SARCA 2014)	2019-04-07
Gekkonidae	<i>Afrogecko porphyreus</i>	Marbled Leaf-toed Gecko	Least Concern (SARCA 2014)	1998-01-02
Lacertidae	<i>Tropidosaura gularis</i>	Cape Mountain Lizard	Least Concern (SARCA 2014)	2016-04-10
Lamprophiidae	<i>Duberria lutrix lutrix</i>	South African Slug-eater	Least Concern (SARCA 2014)	2013-04-09
Lamprophiidae	<i>Lycodonomorphus inornatus</i>	Olive House Snake	Least Concern (SARCA 2014)	1987-02-26
Pelomedusidae	<i>Pelomedusa galeata</i>	South African Marsh Terrapin	Not evaluated	1995-02-12
Scincidae	<i>Trachylepis homalocephala</i>	Red-sided Skink	Least Concern (SARCA 2014)	1995-02-10

## Amphibians

Amphibians are important in wetland systems, particularly where fish are excluded or are of minor importance. In these habitats' frogs are dominant predators of invertebrates. Frog abundance and diversity is a poignant reflection of the general health and well-being of aquatic ecosystems. According to IUCN, 18 amphibian species have a distribution which includes the project area, all of which are classified as Least Concern. Consultation of the ADU historical records for QDS 3424AB confirms that seven (7) species of amphibian are likely to occur within the project area, all of which are considered **Least Concern** (Table 5.7).

**Table 5.7: Amphibian species recorded within 30 km<sup>2</sup> of the study site.**

Family	Scientific name	Common name	Red list category	Last recorded
Bufonidae	<i>Sclerophrys capensis</i>	Raucous Toad	Least Concern	2019-04-07
Heleophrynidae	<i>Heleophryne regis</i>	Southern Ghost Frog	Least Concern	
Hyperoliidae	<i>Hyperolius marmoratus</i>	Painted Reed Frog	Least Concern (IUCN ver 3.1, 2013)	1999-11-27
Pyxicephalidae	<i>Amietia fuscigula</i>	Cape River Frog	Least Concern (2017)	1998-11-27
Pyxicephalidae	<i>Cacosternum nanum</i>	Bronze Caco	Least Concern (2013)	1998-12-15
Pyxicephalidae	<i>Strongylopus fasciatus</i>	Striped Stream Frog	Least Concern	
Pyxicephalidae	<i>Strongylopus grayii</i>	Clicking Stream Frog	Least Concern	2016-04-10



## 6. SITE INVESTIGATION

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### 6.1 GENERAL SITE CHARACTERISTICS

The study site is located on the south western edge of the Gauva Juice farming community. Based on analysis of Google Earth imagery and the desktop analysis of the current land-use of the site, it is evident that the fynbos vegetation of the site had been degraded. The site visit conducted on the 15<sup>th</sup> of September 2020 confirmed that the fynbos vegetation of the site has revegetated to a secondary grass-dominated vegetation which is heavily grazed by livestock. The site contains low species diversity and scattered unpalatable shrubs such as *Stoebe plumosa*. Scattered aliens of the species *Pinus pinaster* were observed on site. No animal species, except for the cattle, sheep and free roaming domestic dogs were observed on site. It is likely that the presence of the domestic dogs prohibit the habitation of other wildlife within the area.





Plate 6.1: Vegetation of the study site.



Plate 6.2: Cattle grazing on site.

## 6.2 VEGETATION SURVEY

The vegetation observed within the project site is dominated by grass species interspersed with small fynbos shrubs such as *Stoebe plumosa*. Approximately 15 plant species will be affected by the proposed TWFT Piggery, all of which are classified as Least Concern in terms of Red



List of South African Plants. No SCC were recorded during the site visit. A list of the plant species observed on site is included in Table 6.1 below. An additional list of plant species that could occur within the project area is included in Appendix A.



Table 6.1: Plant species observed on site.



PHOTO	FAMILY	SPECIES	COMMON NAME	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA
	OXALIDACEAE	<i>Oxalis purpurea</i>	Bobbejaansuring	Least Concern	-	-	-
	ASTERACEAE	<i>Stoebe plumosa</i>	Slangbos	Least Concern	-	-	-







PHOTO	FAMILY	SPECIES	COMMON NAME	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA
	ASTERACEAE	<i>Helichrysum cymosum</i>	Yellow-tipped Straw-flower	Least Concern	-	-	-
	ASTERACEAE	<i>Helichrysum sp.</i>	-	Uncertain	-	-	-







PHOTO	FAMILY	SPECIES	COMMON NAME	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA
	ASTERACEAE	<i>Metalasia aurea</i>	Geelblombos	Least Concern	-	-	-
	ASTERACEAE	<i>Helichrysum sp.</i>	-	Uncertain	-	-	-





PHOTO	FAMILY	SPECIES	COMMON NAME	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA
	APIACEAE	<i>Centella didymocarpa</i>	-	Least Concern	-	-	-
	ASTERACEAE	<i>Senecio burchellii</i>	Geelgifbos	Least Concern	-	-	-





PHOTO	FAMILY	SPECIES	COMMON NAME	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA
		Unidentified sp.					
	ASTERACEAE	<i>Chrysocoma ciliata</i>	Bitterbos	Least Concern	-	-	-





PHOTO	FAMILY	SPECIES	COMMON NAME	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA
	DENNSTAEDTIACEAE	<i>Pteridium aquilinum</i>	Brackenfern	Least Concern	-	-	-
	Scrophulariaceae	<i>Selago corymbosa</i>	Bitterblombos	Least Concern	-	-	-





PHOTO	FAMILY	SPECIES	COMMON NAME	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA
	PLANTAGINACEAE	cf <i>Plantago lanceolata</i>	Ribwort Plantain	Least Concern	-	-	-
	Asteraceae	<i>Arctotheca prostrata</i>	Sterile Capeweed	Least Concern	-	-	-





PHOTO	FAMILY	SPECIES	COMMON NAME	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA
	ASTERACEAE	<i>Helichrysum sp.</i>	-	Uncertain	-	-	-
<b>ALIEN PLANT SPECIES</b>							
	Rosaceae	cf <i>Rubus fruticosus</i>	European blackberry	CARA Category 2  NEMBA: Not listed if for human consumption	-	-	-



PHOTO	FAMILY	SPECIES	COMMON NAME	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA
	FABACEAE	<i>Trifolium repens</i>	White Dutch Clover	Naturalized exotic	-	-	-



PHOTO	FAMILY	SPECIES	COMMON NAME	SA RED DATA LIST	PNCO	PROTECTED TREES	NEMBA
	Pinaceae	<i>Pinus pinaster</i>	Maritime Pine or Cluster Pine	CARA Category 2  NEMBA Category 1b	-	-	-





## 7. SENSITIVITY ASSESSMENT

### 7.1 CONSERVATION AND SPATIAL PLANNING TOOLS

In order to identify any potential site sensitivities or ecologically important areas during the early stages of a development, the conservation planning tools available for a particular area should be consulted. This could potentially assist with the fine-tuning of plans and infrastructure layouts.

The following relevant conservation planning tools were consulted for this assessment:

- SANBI NBA (2018) Terrestrial Ecosystem Threat Status;
- NEMBA Listed Threatened Ecosystems;
- NPAES Focus Areas;
- SAPAD (2019) Protected Areas;
- ECBCP Critical Biodiversity Areas (Terrestrial and Aquatic) (2019);
- Garden Route Biodiversity Sector Plan (BSP) (2010); and
- Nature and Environmental Conservation Ordinance No. 19 of 1974.

The conservation status of the Tsitsikamma Sandstone Fynbos is classified as Least Concern, while the Eastern Coastal Shale Band Vegetation of the site is classified as Endangered (Skowno *et al.*, 2019). However, it should be noted that:

- The only portion of the project site that traverses Eastern Coastal Shale Band Vegetation is the access road to the site, which is already a dirt track;
- Tsitsikamma Sandstone the vegetation of the site has been severely degraded due to historical cultivation and heavy grazing by livestock, and consequently represents a secondary grassland with scattered fynbos shrubs.

According to Garden Route BSP (2010) the study site occurs within an ESA (Section 5.7.2). This was supported by the ECBCP (2019), which classifies the area in which the study site occurs as a terrestrial and aquatic ESA 1 (see Section 5.7.1). A small section of the northern portion of the study site occurs within a NEMBA (2011) Listed Threatened Ecosystem (Eastern Coastal Shale Band Vegetation). The study site does not occur within a NPAES Focus Area or a protected area.

### 7.2 SENSITIVITY ALLOCATION

The proposed site has been mapped in terms of the ecological sensitivity (Figure 7.1). The sensitivity ratings and reasons therefore have been provided below. The recommended mitigation measures that need to be implemented in order to minimise the ecological impacts of the development are described in Chapter 8.

Areas of **high sensitivity** include:

- Process areas such as rivers, wetlands and streams that are important for ecosystem functioning, including surface and ground water as well as animal and plant dispersal;
- Areas that have a high species richness;
- Areas that are not significantly impacted, transformed or degraded by current land use; and



- Areas that contain the majority of species of special concern found in the area and may contain high numbers of globally important species or comprise part of a globally important vegetation type.

Areas of **moderate sensitivity** include:

- Areas that still provide a valuable contribution to biodiversity and ecosystem functioning despite being degraded;
- Degraded areas that still have a relatively high species richness; and
- Degraded areas that still contain species of special concern.

Areas of **low sensitivity** include:

- Areas that are highly impacted by current land use and provide little value to the ecosystem; and
- Highly degraded areas that are unlikely to harbour any species of special concern.

### **Low Sensitivity**

Due to the degraded nature of the study site, the low species diversity, current land use and impacts, and the altered ecological functioning of the site, the entire site for the proposed TWFT Piggery has been allocated LOW sensitivity.

### **High Sensitivity**

The surrounding drainage lines and wetlands, as well as the surrounding 100 m drainage buffers, have been delineated and classified as HIGH and MODERATE sensitivity, respectively. The purpose for this, is to highlight the importance of the surrounding aquatic habitats. Impacts and mitigation measures related to these areas are covered in the Aquatic Impact Assessment undertaken as part of the BA Process for the proposed TWFT Piggery. Areas of high sensitivity must be considered no-go areas.

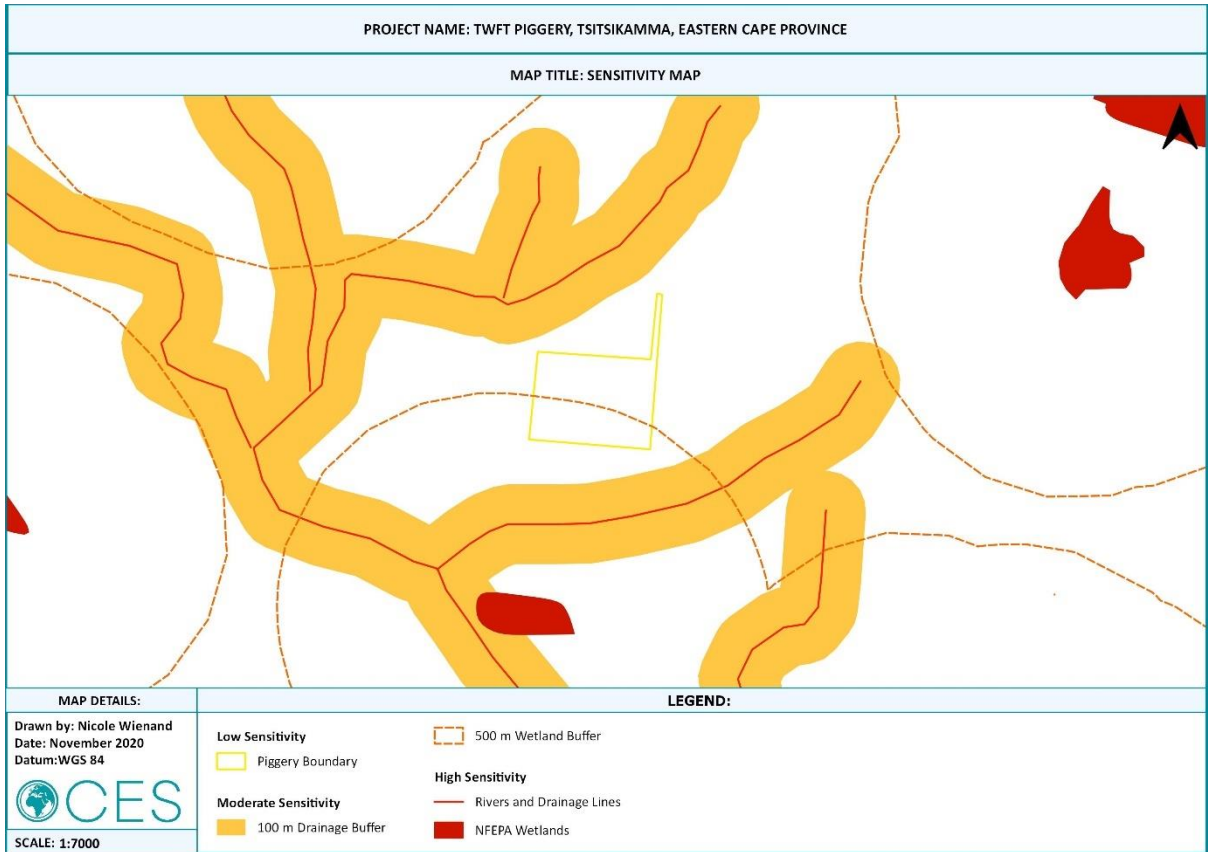


Figure 7.1: Sensitivity Map of the proposed site for the TWFT Piggery.



## 8. IMPACT IDENTIFICATION AND ASSESSMENT

The study that has been undertaken provides the necessary information in order to assess the impacts of the proposed TWFT Piggery on the ecology of the area at the appropriate spatial and temporal scales. The impacts identified and described in Section 8.1 below have been assessed in terms of the criteria described in Appendix C of this report.

### 8.1 IMPACT ASSESSMENT

#### Impact 1: Legal and Policy Compliance

##### Cause and Comment

*Preferred Alternative:* Failure to obtain and adhere to the necessary permits and/or authorisations, as well as failure to adhere to existing policies and legal obligations relating to the ecological environment, could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in a lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.

*No-Go Alternative:* The no-go alternative will not result in any conflict with local, provincial, and/or national policies, legislation, etc.

##### Mitigation Measures

- All necessary permitting and authorisations must be obtained prior to the commencement of any construction activities;
- A suitably qualified Environmental Control Officer (ECO) must be appointed prior to the commencement of the construction phase;
- Ensure that all relevant legislation and policy is consulted and further ensure that the project is compliant with such legislation and policy; and
- Planning for the construction and operation of the proposed development should consider available best practice guidelines.

##### Significance Assessment

IMPACT 1: LEGAL AND POLICY COMPLIANCE										
IMPACT	NATURE	DURATION	EXTENT	SEVERITY	LIKELIHOOD	SIGNIFICANCE BEFORE MITIGATION	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE AFTER MITIGATION





<b>All Alternatives</b>	Direct & Indirect	Long-Term	Regional/ National	Severe	Possible	<b>HIGH (-)</b>	Reversible	Resource will be lost	Achievable	<b>LOW (-)</b>
<b>No-Go Alternative</b>	<i>Not Applicable</i>									

**CONSTRUCTION PHASE**

**Impact 2: Impacts on the Terrestrial Habitat of Strategic Water Source Areas**

Cause and Comment

*Preferred Alternative:* During the construction phase, the clearance of vegetation and associated construction activities will directly impact the terrestrial habitat of Strategic Water Source Areas which could result in increased run-off, possible erosion and the loss of topsoil. However, it should be noted that the footprint of this site is small (only 7.2 ha) and located more than 100 m from surrounding drainage lines and/or rivers. Therefore, modification of the land is unlikely to significantly impact on the water quality entering the nearby rivers or drainage lines. Additionally, this impact may be mitigated. Provided that the mitigation measures are implemented, it is likely this impact will be of low significance.

*No-Go Alternative:* The no-go alternative will not impact the terrestrial habitat nor strategic water source areas.

Mitigation Measures

- An Erosion Management Plan/Method Statement should be compiled and implemented during the Construction Phase;
- Vegetation clearance must be kept to a minimum and retained where possible to avoid soil erosion;
- Disturbed areas that do not form part of the piggery must be rehabilitated as soon as possible after construction; and
- The areas surrounding the site should be monitored regularly for signs of erosion. Remedial action must be taken at the first signs of erosion.

Significance Assessment

<b>IMPACT 2: IMPACTS ON THE TERRESTRIAL HABITAT OF STRATEGIC WATER SOURCE AREAS</b>										
<b>IMPACT</b>	<b>NATURE</b>	<b>DURATION</b>	<b>EXTENT</b>	<b>SEVERITY</b>	<b>LIKELIHOOD</b>	<b>SIGNIFICANCE BEFORE MITIGATION</b>	<b>REVERSIBILITY</b>	<b>IRREPLACEABLE LOSS</b>	<b>MITIGATION POTENTIAL</b>	<b>SIGNIFICANCE AFTER MITIGATION</b>
<b>All Alternatives</b>	Direct	Long-Term	Study-Area	Moderate	May Occur	<b>MODERATE (-)</b>	Reversible	Resource will be lost	Achievable	<b>LOW (-)</b>



<b>No-Go Alternative</b>	<i>Not Applicable</i>
--------------------------	-----------------------

**Impact 3: Loss of Indigenous Vegetation (Tsitsikamma Sandstone Fynbos and Eastern Coastal Shale Band Vegetation)**

Cause and Comment

*Preferred Alternative:* Vegetation clearance for the construction of the proposed TWFT Piggery will result in the direct loss of approximately 7.2 ha of vegetation. However, it should be noted that the Tsitsikamma Sandstone Fynbos and Coastal Shale Band Vegetation of the study site has been severely degraded and constitutes a secondary grassland interspersed with small fynbos shrubs. As such, the significance of this impact has been classified as low.

*No-Go Alternative:* The no-go alternative will not require vegetation clearance.

Mitigation Measures

- The clearance of vegetation at any given time should be kept to a minimum and vegetation clearance must be strictly limited to the development footprint;
- Employees must be prohibited from making fires and harvesting plants;
- Any alien vegetation which establishes during the construction phase should be removed from site and disposed of at a registered waste disposal site. Continuous monitoring for seedlings should take place throughout the construction phase;
- Only indigenous species should be used for rehabilitation purposes if required);
- As far as practically possible, existing access roads should be utilised.

Significance Assessment

IMPACT 3: LOSS OF INDIGENOUS VEGETATION (TSITSIKAMMA SANDSTONE FYNBOS & EASTERN COASTAL SHALE BAND VEGETATION)										
IMPACT	NATURE	DURATION	EXTENT	SEVERITY	LIKELIHOOD	SIGNIFICANCE BEFORE MITIGATION	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE AFTER MITIGATION
<b>All Alternatives</b>	Direct & Cumulative	Permanent	Study-Area	Sight	Definite	<b>LOW (-)</b>	Irreversible	Resource will be lost	Achievable	<b>LOW (-)</b>
<b>No-Go Alternative</b>	<i>Not Applicable</i>									



### Impact 4: Loss of Biodiversity

Cause and Comment

*Preferred Alternative:* During the construction phase, the loss of indigenous vegetation due to clearance coincides with the loss of faunal habitats and plant species, and consequently overall biodiversity within the affected ecosystem. This could negatively affect ecological processes and functioning within the area, thereby influencing the provision of valuable ecosystems services. Due to the degraded and secondary nature of the site, the site is unlikely to support the level of biodiversity of pristine areas. In addition, very few (15) plant species were observed. This impact has been classified as low significance.

*No-Go Alternative:* The no-go alternative will not require vegetation clearance and will not result in the direct loss of biodiversity.

Mitigation Measures

- The clearance of vegetation at any given time should be kept to a minimum and vegetation clearance must be strictly limited to the development footprint;
- Employees must be prohibited from making fires and harvesting plants;
- Only indigenous species should be used for rehabilitation purposes (if required) which must re-vegetate exposed soil; and
- As far as practically possible, existing roads should be utilised.

Significance Assessment

IMPACT 4: LOSS OF BIODIVERSITY										
IMPACT	NATURE	DURATION	EXTENT	SEVERITY	LIKELIHOOD	SIGNIFICANCE BEFORE MITIGATION	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE AFTER MITIGATION
All Alternatives	Direct & Cumulative	Permanent	Study Area	Slight	Definite	LOW (-)	Irreversible	Resource will be lost	Achievable	LOW (-)
No-Go Alternative	<i>Not Applicable</i>									

### Impact 5: Establishment of Alien Plant Species

Cause and Comment



*Preferred Alternative:* The removal of existing natural vegetation creates ‘open’ habitats which favours the establishment of undesirable vegetation in areas that are typically very difficult to eradicate which could pose a threat to surrounding ecosystems.

*No-Go Alternative:* The no-go alternative has the risk of alien plant species establishment in the absence of the proposed TWFT Piggery.

Mitigation Measures

- An Alien Vegetation Management Plan must be developed and implemented to prevent the establishment and spread of undesirable alien plant species during all phases of development; and
- Any alien vegetation which establishes during the construction phase should be removed from site and disposed of at a registered waste disposal site. Continuous monitoring for seedlings should take place throughout the construction phase.

Significance Assessment

IMPACT 5: ESTABLISHMENT OF ALIEN PLANT SPECIES										
IMPACT	NATURE	DURATION	EXTENT	SEVERITY	LIKELIHOOD	SIGNIFICANCE BEFORE MITIGATION	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE AFTER MITIGATION
All Alternatives	Direct & Indirect	Long-Term	Localised	Moderate	Probable	<b>MODERATE (-)</b>	Reversible	Resource will be lost	Achievable	<b>LOW (-)</b>
No-Go Alternative	Existing	Long-Term	Localised	Moderate	Definite	<b>MODERATE (-)</b>	N/A	N/A	N/A	<b>N/A</b>

**Impact 6: Wildlife Mortalities**

Cause and Comment

*Preferred Alternative:* During the construction phase, vegetation clearance, vehicles, crew and materials may increase animal fatalities through opportunistic hunting, collisions, accidents or baiting and trapping.

*No-Go Alternative:* The no-go alternative is not likely to result in an increase in wildlife mortalities.

Mitigation Measures

- Vehicle speed must be limited to 40km/hr to reduce faunal collision mortality;
- All staff on site must receive training with regards to the proper management and response should animals be encountered;
- Search and clear the area of all faunal species prior to the commencement of construction;





- No hunting, baiting or trapping shall be allowed within the affected property or surrounding property by construction staff.
- All staff and trust members should receive training with regards to the proper management and response should animals be encountered on site.

Significance Assessment

IMPACT 6: WILDLIFE MORTALITIES										
IMPACT	NATURE	DURATION	EXTENT	SEVERITY	LIKELIHOOD	SIGNIFICANCE BEFORE MITIGATION	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE AFTER MITIGATION
All Alternatives	Direct & Indirect	Permanent	Localised	Moderate	May Occur	<b>MODERATE (-)</b>	Irreversible	Resource will be lost	Achievable	<b>LOW (-)</b>
No-Go Alternative	<i>Not Applicable</i>									

**Impact 7: Inadequate Rehabilitation and Maintenance of Disturbed Areas**

Cause and Comment

*Preferred Alternative:* During the construction phase, failure to implement rehabilitation measures could lead to the erosion of- and permanent loss of valuable soil, the unnecessary loss of indigenous vegetation and the establishment of alien invasive vegetation.

*No-Go Alternative:* The no-go alternative will not result in disturbed areas, which require rehabilitation.

Mitigation Measures

- All temporary disturbed areas that do not form part of development, must be rehabilitated using only indigenous vegetation; and
- All impacted areas must be restored as per the EMP requirements.

Significance Assessment

IMPACT 7: INADEQUATE REHABILITATION AND MAINTENANCE OF DISTURB AREAS										
IMPACT	NATURE	DURATION	EXTENT	SEVERITY	LIKELIHOOD	SIGNIFICANCE BEFORE MITIGATION	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE AFTER MITIGATION



<b>All Alternatives</b>	Direct	Permanent	Localised	Moderate	Definite	<b>MODERATE (-)</b>	Irreversible	Resource will be partially lost	Achievable	<b>LOW (-)</b>
<b>No-Go Alternative</b>	<i>Not Applicable</i>									

**OPERATIONAL PHASE**

**Impact 8: Establishment of Alien Plant Species**

Cause and Comment

*Preferred Alternative:* During the operational phase, failure to remove and manage alien vegetation during construction could result in the permanent establishment of alien vegetation in the study area. The poor rehabilitation of disturbed areas could lead to the permanent degradation of ecosystems as well as allow invasion by alien plant species.

*No-Go Alternative:* The no-go alternative has the risk of alien plant species establishment in the absence of the TWFT Piggery.

Mitigation Measures

- The Alien Vegetation Management Plan must be implemented to prevent the establishment and the spread of undesirable alien plant species during the Operational Phase; and
- Monitoring of the establishment of alien seedlings should continue throughout the operational phase. Any alien plant seedlings should be removed and disposed of at a registered landfill.

Significance Assessment:

<b>IMPACT 8: ESTABLISHMENT OF ALIEN PLANT SPECIES</b>										
<b>IMPACT</b>	<b>NATURE</b>	<b>DURATION</b>	<b>EXTENT</b>	<b>SEVERITY</b>	<b>LIKELIHOOD</b>	<b>SIGNIFICANCE BEFORE MITIGATION</b>	<b>REVERSIBILITY</b>	<b>IRREPLACEABLE LOSS</b>	<b>MITIGATION POTENTIAL</b>	<b>SIGNIFICANCE AFTER MITIGATION</b>
<b>All Alternatives</b>	Direct & Indirect	Long-Term	Localized	Moderate	May Occur	<b>MODERATE (-)</b>	Reversible	Resource will not be lost	Achievable	<b>LOW (-)</b>
<b>No-Go Alternative</b>	Existing	Long-Term	Localised	Moderate	Definite	<b>MODERATE (-)</b>	N/A	N/A	N/A	<b>N/A</b>



## 8.2 CUMULATIVE IMPACTS

Cumulative impacts are defined as those “*that result from the incremental impact, on areas or resources used or directly impacted by the project, from other existing, planned or reasonably defined developments at the time the risks and impact identification process is conducted.*”

To assess the cumulative impacts that the piggery will have on the terrestrial ecology of the site, it is necessary to assess this at a broader level by looking at other developments in the area.

The cumulative impacts associated with the project will include the following:

- Loss of vegetation communities at a regional scale will be exacerbated;
- The spread of invasive alien plant species could be exacerbated;
- Habitat fragmentation and disruption of ecosystem function and process could be exacerbated.

The cumulative impact associated with the construction and operation of the piggery, is likely to be of low significance due to the reduced biodiversity associated with historical cultivation and heavy grazing. However, to limit the impact, it is important that an Alien Invasive Management Plan is implemented, and that existing roads are used where feasible.



## 9. IMPACT STATEMENT, RECOMMENDATIONS AND CONCLUSION

### 9.1 CONCLUSIONS AND RECOMMENDATIONS

This study assessed the ecological impacts associated with the proposed TWFT Piggery. Analysis of the project description and layout plan of the proposed development indicates that a total of 7.2 ha of vegetation will be cleared. Based on the desktop assessment for the proposed Piggery, the site is located within two (2) vegetation types: Tsitsikamma Sandstone Fynbos (classified as Least Concern) and Eastern Coastal Shale Band Vegetation (classified as Endangered) (SA VEGMAP, 2018; Skowno *et al.*, 2019)). However, the site visit confirmed that the vegetation of the study site has been severely degraded due to historical cultivation and subsequent grazing by livestock, and consequently resembles a secondary grassland interspersed with unpalatable, small fynbos shrubs. Scattered aliens of the species *Pinus pinaster* was observed on site. No faunal species, other than cattle, sheep and free roaming dogs, were observed on site.

Although the site is degraded, the loss of this site does signify the loss of terrestrial habitat which is important for ensuring connectivity between CBAs, strengthening climate change resilience and proper functioning of ecosystem infrastructure for the delivery of ecosystem services.

Eight (8) impacts associated with the development of a piggery were identified. The majority of the impacts were identified for the construction phase and were classified as moderate negative with only one of High significance identified for the Planning and Design Phase.

All identified impacts will be reduced to a low negative significance if the mitigation measures proposed in this report are implemented and adhered to. The impacts associated with the proposed TWFT Piggery are not deemed insurmountable provided the recommendations and mitigation measures identified in this report are implemented.

**Table 9.1: Summary of all eight (8) impacts identified for the proposed TWFT Piggery.**

IMPACT	PRIOR TO MITIGATION	POST-MITIGATION	NO-GO ALTERNATIVE
<b>PLANNING AND DESIGN PHASE</b>			
Impact 1: Legal and Policy Compliance	HIGH (-)	LOW (-)	N/A
<b>CONSTRUCTION PHASE</b>			
Impact 2: Impacts on the Terrestrial Habitat of Strategic Water Source Areas	MODERATE (-)	LOW (-)	N/A
Impact 3: Loss of Indigenous Vegetation (Tsitsikamma Sandstone Fynbos and Eastern Coastal Shale Band Vegetation)	LOW (-)	LOW (-)	N/A
Impact 4: Loss of Biodiversity	LOW (-)	LOW (-)	MODERATE (-)





Impact 5: Establishment of Alien Plant Species	<b>MODERATE (-)</b>	<b>LOW (-)</b>	<b>MODERATE (-)</b>
Impact 6: Wildlife Mortalities	<b>MODERATE (-)</b>	<b>LOW (-)</b>	<b>N/A</b>
Impact 7: Inadequate Rehabilitation and Maintenance of Disturbed Areas	<b>MODERATE (-)</b>	<b>LOW (-)</b>	
<b>OPERATIONAL PHASE</b>			
Impact 8: Establishment of Alien Plant Species	<b>MODERATE (-)</b>	<b>LOW (-)</b>	<b>N/A</b>

### 9.1.1 Existing Impacts

A baseline analysis of the present condition of the study site indicated that the site has been historically cultivated and degraded by heavy grazing of livestock. Consequently, the vegetation now represents a secondary grassland interspersed with small unpalatable fynbos shrubs and characterised by low biodiversity and a low diversity of life forms. As such the following existing impacts have been identified:

- Loss of indigenous vegetation;
- Loss of biodiversity;
- Establishment of alien plant species; and
- Loss of faunal habitat.

### 9.1.3 No-go Areas

No 'no-go' areas have been identified within the boundaries of the proposed site. However, surrounding wetlands and drainage lines have been identified as highly sensitive and potential runoff from the piggery should be monitored to ensure that these areas are not impacted by the proposed development. Moreover, the mitigation measures specified in the Aquatic Impact Assessment must be implemented and adhered to.

Although no 'no-go' areas have been identified within the boundaries of the proposed site, it is important that vegetation clearance is strictly limited to that which is necessary for the construction of the proposed piggery.

## 9.2 CONDITIONS OF AUTHORISATION

The following recommendations must be included in the Final EMPr and as well as the conditions of the Environmental Authorisation (EA), if granted:

- All necessary permitting and authorisations must be obtained prior to the commencement of any construction activities;
- A suitably qualified ECO must be appointed prior to the commencement of the construction phase;
- An Erosion Management Plan must be developed prior to the commencement of construction activities in order to mitigate the unnecessary loss of topsoil and runoff; and
- A simple Alien Vegetation Management plan/method statement should be compiled (for implementation during the phases that follow the Planning and Design Phase).



### 9.2.1 Mitigation Measures

All mitigation measures identified for the impacts associated with the proposed development must be implemented during the relevant phases of the proposed TWFT Piggery (please refer to Section 8.1 above for the recommended mitigation measures associated with each impact).

## 9.3 ECOLOGICAL STATEMENT AND OPINION OF THE SPECIALIST

The ecological impacts of all aspects of the proposed TWFT Piggery were assessed and considered to be ecologically acceptable, provided the mitigation measures outlined in this report are implemented. The majority of the impacts were identified for the construction phase of the proposed development and were rated as moderately negative. Therefore, the implementation of the recommended mitigation measures and monitoring, especially during construction, is critical to ensure a development that is environmentally sound.

The majority of the site was allocated LOW sensitivity, while surrounding drainage lines and rivers were allocated HIGH sensitivity. The implementation of the appropriate mitigation measures, including those specified in the Aquatic Impact Assessment, are of critical importance for maintaining the integrity of the environment and in order to ensure a development which is environmentally appropriate.

The development footprint of the proposed TWFT Piggery must be demarcated to prevent any encroachment of construction or operational activities into surrounding natural areas and vegetation clearance must be kept to the minimum footprint required for the establishment and construction of thereof. Minor location deviations from the proposed works is deemed acceptable but the footprint may not be made larger.

The proposed TWFT Piggery is NOT considered to be Fatally Flawed.

The no-go option refers to the proposed TWFT Piggery not being constructed. This option will have a moderately positive outcome for the indigenous vegetation and surrounding natural environment relative to the proposed development, but the existing disturbed areas will remain, and the benefits associated with the proposed piggery will be lost.



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## APPENDIX A – LIST OF POSSIBLE PLANT SPECIES

The following list of plant species may occur within the project area of the proposed Piggery (source: <http://posa.sanbi.org/sanbi/Explore>).

FAMILY	SPECIES	IUCN	ECOLOGY
Asteraceae	<i>Zyrphelis sp.</i>		
Ericaceae	<i>Erica hispidula</i>	LC	Indigenous; Endemic
Lobeliaceae	<i>Monopsis unidentata</i>	LC	Indigenous; Endemic
Ericaceae	<i>Erica inconstans</i>	VU	Indigenous; Endemic
Campanulaceae	<i>Wahlenbergia sp.</i>		
Asteraceae	<i>Schistostephium umbellatum</i>	LC	Indigenous; Endemic
Asteraceae	<i>Oedera laevis</i>	DD	Indigenous; Endemic
Santalaceae	<i>Thesium turczaninowii</i>		Indigenous; Endemic
Celastraceae	<i>Pterocelastrus tricuspidatus</i>	LC	Indigenous; Endemic
Asteraceae	<i>Gerbera piloselloides</i>	LC	Indigenous
Asteraceae	<i>Pteronia teretifolia</i>	LC	Indigenous; Endemic
Asteraceae	<i>Helichrysum aureum</i>	NE	Indigenous; Endemic
Ericaceae	<i>Erica glandulosa</i>	VU	Indigenous; Endemic
Cyperaceae	<i>Tetraria robusta</i>	LC	Indigenous; Endemic
Asteraceae	<i>Helichrysum felinum</i>	LC	Indigenous; Endemic
Apocynaceae	<i>Gonioma kamassi</i>	LC	Indigenous
Asteraceae	<i>Osteospermum pterigoideum</i>	EN	Indigenous; Endemic
Fabaceae	<i>Otholobium heterosepalum</i>	LC	Indigenous; Endemic
Fabaceae	<i>Psoralea oreophila</i>	LC	Indigenous; Endemic
Asteraceae	<i>Senecio thunbergii</i>	DD	Indigenous; Endemic
Lobeliaceae	<i>Lobelia erinus</i>	LC	Indigenous
Ericaceae	<i>Erica humansdorpensis</i>	CR	Indigenous; Endemic
Asteraceae	<i>Felicia westae</i>	EN	Indigenous; Endemic
Fabaceae	<i>Indigofera hispida</i>	VU	Indigenous; Endemic





## APPENDIX B – LIST OF BIRD SPECIES

The following lists of bird species may occur within the project area for the proposed TWFT Piggery.

<b>STRUTHIONIFORMES: Struthionidae</b>		
Common Ostrich	<i>Struthio camelus</i>	
<b>ANSERIFORMES: Anatidae</b>		
White-faced Whistling-Duck	<i>Dendrocygna viduata</i>	
Fulvous Whistling-Duck	<i>Dendrocygna bicolor</i>	Rare/Accidental
White-backed Duck	<i>Thalassornis leuconotus</i>	
Knob-billed Duck	<i>Sarkidiornis melanotos</i>	Rare/Accidental
Egyptian Goose	<i>Alopochen aegyptiaca</i>	
South African Shelduck	<i>Tadorna cana</i>	
Spur-winged Goose	<i>Plectropterus gambensis</i>	
Hottentot Teal	<i>Spatula hottentota</i>	
Cape Shoveler	<i>Spatula smithii</i>	
African Black Duck	<i>Anas sparsa</i>	
Yellow-billed Duck	<i>Anas undulata</i>	
Cape Teal	<i>Anas capensis</i>	
Red-billed Duck	<i>Anas erythrorhyncha</i>	
Southern Pochard	<i>Netta erythrophthalma</i>	
Maccoa Duck	<i>Oxyura maccoa</i>	Vulnerable
<b>GALLIFORMES: Numididae</b>		
Helmeted Guineafowl	<i>Numida meleagris</i>	
<b>GALLIFORMES: Phasianidae</b>		
Common Quail	<i>Coturnix coturnix</i>	
Cape Francolin	<i>Pternistis capensis</i>	Endemic (country/region)
Red-necked Francolin	<i>Pternistis afer</i>	
Red-winged Francolin	<i>Scleroptila levaillantii</i>	
Gray-winged Francolin	<i>Scleroptila afra</i>	Endemic (country/region)
<b>PHOENICOPTERIFORMES: Phoenicopteridae</b>		
Greater Flamingo	<i>Phoenicopterus roseus</i>	
Lesser Flamingo	<i>Phoeniconaias minor</i>	Near-threatened
<b>PODICIPEDIFORMES: Podicipedidae</b>		
Little Grebe	<i>Tachybaptus ruficollis</i>	
Great Crested Grebe	<i>Podiceps cristatus</i>	



Eared Grebe	<i>Podiceps nigricollis</i>	
<b>COLUMBIFORMES: Columbidae</b>		
Speckled Pigeon	<i>Columba guinea</i>	
Rameron Pigeon	<i>Columba arquatrix</i>	
Lemon Dove	<i>Columba larvata</i>	
Red-eyed Dove	<i>Streptopelia semitorquata</i>	
Ring-necked Dove	<i>Streptopelia capicola</i>	
Laughing Dove	<i>Streptopelia senegalensis</i>	
Emerald-spotted Wood-Dove	<i>Turtur chalcospilos</i>	
Tambourine Dove	<i>Turtur tympanistria</i>	
Namaqua Dove	<i>Oena capensis</i>	
African Green-Pigeon	<i>Treron calvus</i>	
<b>OTIDIFORMES: Otididae</b>		
Ludwig's Bustard	<i>Neotis ludwigii</i>	Endangered
Denham's Bustard	<i>Neotis denhami</i>	Near-threatened
White-bellied Bustard	<i>Eupodotis senegalensis</i>	
Black Bustard	<i>Eupodotis afra</i>	Endemic (country/region) Vulnerable
<b>MUSOPHAGIFORMES: Musophagidae</b>		
Knysna Turaco	<i>Tauraco corythaix</i>	
Purple-crested Turaco	<i>Tauraco porphyreolophus</i>	Rare/Accidental
<b>CUCULIFORMES: Cuculidae</b>		
White-browed Coucal	<i>Centropus superciliosus</i>	
Pied Cuckoo	<i>Clamator jacobinus</i>	
Dideric Cuckoo	<i>Chrysococcyx caprius</i>	
Klaas's Cuckoo	<i>Chrysococcyx klaas</i>	
African Emerald Cuckoo	<i>Chrysococcyx cupreus</i>	
Black Cuckoo	<i>Cuculus clamosus</i>	
Red-chested Cuckoo	<i>Cuculus solitarius</i>	
Common Cuckoo	<i>Cuculus canorus</i>	
<b>CAPRIMULGIFORMES: Caprimulgidae</b>		
Eurasian Nightjar	<i>Caprimulgus europaeus</i>	
Rufous-cheeked Nightjar	<i>Caprimulgus rufigena</i>	
Fiery-necked Nightjar	<i>Caprimulgus pectoralis</i>	
<b>CAPRIMULGIFORMES: Apodidae</b>		
Alpine Swift	<i>Apus melba</i>	



Common Swift	<i>Apus apus</i>	
African Swift	<i>Apus barbatus</i>	
Little Swift	<i>Apus affinis</i>	
Horus Swift	<i>Apus horus</i>	
White-rumped Swift	<i>Apus caffer</i>	
African Palm-Swift	<i>Cypsiurus parvus</i>	
<b>GRUIFORMES: Sarothruridae</b>		
Buff-spotted Flufftail	<i>Sarothrura elegans</i>	
Red-chested Flufftail	<i>Sarothrura rufa</i>	
Striped Flufftail	<i>Sarothrura affinis</i>	
<b>GRUIFORMES: Rallidae</b>		
African Rail	<i>Rallus caerulescens</i>	
Spotted Crake	<i>Porzana porzana</i>	Rare/Accidental
Eurasian Moorhen	<i>Gallinula chloropus</i>	
Red-knobbed Coot	<i>Fulica cristata</i>	
African Swamphen	<i>Porphyrio madagascariensis</i>	
Black Crake	<i>Zapornia flavirostra</i>	
Baillon's Crake	<i>Zapornia pusilla</i>	Rare/Accidental
<b>GRUIFORMES: Heliornithidae</b>		
African Finfoot	<i>Podica senegalensis</i>	
<b>GRUIFORMES: Gruidae</b>		
Gray Crowned-Crane	<i>Balearica regulorum</i>	Endangered
Blue Crane	<i>Anthropoides paradiseus</i>	Vulnerable
<b>CHARADRIIFORMES: Burhinidae</b>		
Water Thick-knee	<i>Burhinus vermiculatus</i>	
Spotted Thick-knee	<i>Burhinus capensis</i>	
<b>CHARADRIIFORMES: Recurvirostridae</b>		
Black-winged Stilt	<i>Himantopus himantopus</i>	
Pied Avocet	<i>Recurvirostra avosetta</i>	
<b>CHARADRIIFORMES: Haematopodidae</b>		
Eurasian Oystercatcher	<i>Haematopus ostralegus</i>	Rare/Accidental Near-threatened
African Oystercatcher	<i>Haematopus moquini</i>	



<b>CHARADRIIFORMES: Charadriidae</b>		
Black-bellied Plover	<i>Pluvialis squatarola</i>	
American Golden-Plover	<i>Pluvialis dominica</i>	Rare/Accidental
Blacksmith Lapwing	<i>Vanellus armatus</i>	
Black-winged Lapwing	<i>Vanellus melanopterus</i>	
Crowned Lapwing	<i>Vanellus coronatus</i>	
Lesser Sand-Plover	<i>Charadrius mongolus</i>	Rare/Accidental
Greater Sand-Plover	<i>Charadrius leschenaultii</i>	Rare/Accidental
Kittlitz's Plover	<i>Charadrius pecuarius</i>	
Common Ringed Plover	<i>Charadrius hiaticula</i>	
Three-banded Plover	<i>Charadrius tricollaris</i>	
White-fronted Plover	<i>Charadrius marginatus</i>	
Chestnut-banded Plover	<i>Charadrius pallidus</i>	Near-threatened
<b>CHARADRIIFORMES: Rostratulidae</b>		
Greater Painted-Snipe	<i>Rostratula benghalensis</i>	
<b>CHARADRIIFORMES: Jacanidae</b>		
African Jacana	<i>Actophilornis africanus</i>	
<b>CHARADRIIFORMES: Scolopacidae</b>		
Whimbrel	<i>Numenius phaeopus</i>	
Eurasian Curlew	<i>Numenius arquata</i>	Near-threatened
Bar-tailed Godwit	<i>Limosa lapponica</i>	Near-threatened
Hudsonian Godwit	<i>Limosa haemastica</i>	Rare/Accidental
Ruddy Turnstone	<i>Arenaria interpres</i>	
Red Knot	<i>Calidris canutus</i>	Near-threatened
Ruff	<i>Calidris pugnax</i>	
Curlew Sandpiper	<i>Calidris ferruginea</i>	Near-threatened
Sanderling	<i>Calidris alba</i>	
Little Stint	<i>Calidris minuta</i>	
African Snipe	<i>Gallinago nigripennis</i>	
Terek Sandpiper	<i>Xenus cinereus</i>	
Common Sandpiper	<i>Actitis hypoleucos</i>	
Green Sandpiper	<i>Tringa ochropus</i>	Rare/Accidental
Common Greenshank	<i>Tringa nebularia</i>	
Marsh Sandpiper	<i>Tringa stagnatilis</i>	
Wood Sandpiper	<i>Tringa glareola</i>	
<b>CHARADRIIFORMES: Turnicidae</b>		
Hottentot Buttonquail	<i>Turnix hottentottus</i>	Endemic (country/region) Endangered





<b>CHARADRIIFORMES: Glareolidae</b>		
Temminck's Courser	<i>Cursorius temminckii</i>	Rare/Accidental
Double-banded Courser	<i>Smutsornis africanus</i>	
<b>CHARADRIIFORMES: Stercorariidae</b>		
Brown Skua	<i>Stercorarius antarcticus</i>	
Pomarine Jaeger	<i>Stercorarius pomarinus</i>	Rare/Accidental
Parasitic Jaeger	<i>Stercorarius parasiticus</i>	
<b>CHARADRIIFORMES: Laridae</b>		
Gray-hooded Gull	<i>Chroicocephalus cirrocephalus</i>	
Hartlaub's Gull	<i>Chroicocephalus hartlaubii</i>	Rare/Accidental
Franklin's Gull	<i>Leucophaeus pipixcan</i>	Rare/Accidental
Kelp Gull	<i>Larus dominicanus</i>	
Lesser Noddy	<i>Anous tenuirostris</i>	Rare/Accidental
Little Tern	<i>Sternula albifrons</i>	
Damara Tern	<i>Sternula balaenarum</i>	Vulnerable
Caspian Tern	<i>Hydroprogne caspia</i>	
White-winged Tern	<i>Chlidonias leucopterus</i>	
Whiskered Tern	<i>Chlidonias hybrida</i>	
Roseate Tern	<i>Sterna dougallii</i>	
Common Tern	<i>Sterna hirundo</i>	
Arctic Tern	<i>Sterna paradisaea</i>	
Great Crested Tern	<i>Thalasseus bergii</i>	
Sandwich Tern	<i>Thalasseus sandvicensis</i>	
Lesser Crested Tern	<i>Thalasseus bengalensis</i>	Rare/Accidental
<b>SPHENISCIFORMES: Spheniscidae</b>		
African Penguin	<i>Spheniscus demersus</i>	Endangered
<b>PROCELLARIIFORMES: Diomedeidae</b>		
Yellow-nosed Albatross	<i>Thalassarche chlororhynchos</i>	
White-capped Albatross	<i>Thalassarche cauta</i>	
Black-browed Albatross	<i>Thalassarche melanophris</i>	
Sooty Albatross	<i>Phoebetria fusca</i>	Endangered
Wandering Albatross	<i>Diomedea exulans</i>	
<b>PROCELLARIIFORMES: Oceanitidae</b>		
Wilson's Storm-Petrel	<i>Oceanites oceanicus</i>	



<b>PROCELLARIIFORMES: Hydrobatidae</b>		
Leach's Storm-Petrel	<i>Oceanodroma leucorhoa</i>	Vulnerable
<b>PROCELLARIIFORMES: Procellariidae</b>		
Southern Giant-Petrel	<i>Macronectes giganteus</i>	
Northern Giant-Petrel	<i>Macronectes halli</i>	
Southern Fulmar	<i>Fulmarus glacialisoides</i>	
Cape Petrel	<i>Daption capense</i>	
Kerguelen Petrel	<i>Aphrodroma brevirostris</i>	
Great-winged Petrel	<i>Pterodroma macroptera</i>	
Soft-plumaged Petrel	<i>Pterodroma mollis</i>	
Blue Petrel	<i>Halobaena caerulea</i>	
Antarctic Prion	<i>Pachyptila desolata</i>	
White-chinned Petrel	<i>Procellaria aequinoctialis</i>	Vulnerable
Cory's Shearwater	<i>Calonectris diomedea</i>	
Flesh-footed Shearwater	<i>Ardenna carneipes</i>	Near-threatened
Great Shearwater	<i>Ardenna gravis</i>	
Sooty Shearwater	<i>Ardenna grisea</i>	Near-threatened
Subantarctic Shearwater	<i>Puffinus elegans</i>	
Tropical Shearwater	<i>Puffinus bailloni</i>	
<b>CICONIIFORMES: Ciconiidae</b>		
Black Stork	<i>Ciconia nigra</i>	
White Stork	<i>Ciconia ciconia</i>	
Yellow-billed Stork	<i>Mycteria ibis</i>	Rare/Accidental
<b>SULIFORMES: Sulidae</b>		
Cape Gannet	<i>Morus capensis</i>	Endangered
<b>SULIFORMES: Anhingidae</b>		
African Darter	<i>Anhinga rufa</i>	
<b>SULIFORMES: Phalacrocoracidae</b>		
Long-tailed Cormorant	<i>Microcarbo africanus</i>	
Great Cormorant	<i>Phalacrocorax carbo</i>	
Cape Cormorant	<i>Phalacrocorax capensis</i>	Endemic (country/region) Endangered
<b>PELECANIFORMES: Scopidae</b>		
Hamerkop	<i>Scopus umbretta</i>	



<b>PELECANIFORMES: Ardeidae</b>		
Little Bittern	<i>Ixobrychus minutus</i>	
Gray Heron	<i>Ardea cinerea</i>	
Black-headed Heron	<i>Ardea melanocephala</i>	
Goliath Heron	<i>Ardea goliath</i>	
Purple Heron	<i>Ardea purpurea</i>	
Great Egret	<i>Ardea alba</i>	
Intermediate Egret	<i>Ardea intermedia</i>	
Little Egret	<i>Egretta garzetta</i>	
Black Heron	<i>Egretta ardesiaca</i>	
Cattle Egret	<i>Bubulcus ibis</i>	
Squacco Heron	<i>Ardeola ralloides</i>	
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	
White-backed Night-Heron	<i>Gorsachius leuconotus</i>	
<b>PELECANIFORMES: Threskiornithidae</b>		
Glossy Ibis	<i>Plegadis falcinellus</i>	
African Sacred Ibis	<i>Threskiornis aethiopicus</i>	
Hadada Ibis	<i>Bostrychia hagedash</i>	
African Spoonbill	<i>Platalea alba</i>	
<b>ACCIPITRIFORMES: Sagittariidae</b>		
Secretarybird	<i>Sagittarius serpentarius</i>	Vulnerable
<b>ACCIPITRIFORMES: Pandionidae</b>		
Osprey	<i>Pandion haliaetus</i>	
<b>ACCIPITRIFORMES: Accipitridae</b>		
Black-winged Kite	<i>Elanus caeruleus</i>	
African Harrier-Hawk	<i>Polyboroides typus</i>	
Bearded Vulture	<i>Gypaetus barbatus</i>	Near-threatened
European Honey-buzzard	<i>Pernis apivorus</i>	Rare/Accidental
African Cuckoo-Hawk	<i>Aviceda cuculoides</i>	
Cape Griffon	<i>Gyps coprotheres</i>	Endangered
Black-chested Snake-Eagle	<i>Circaetus pectoralis</i>	
Crowned Eagle	<i>Stephanoaetus coronatus</i>	Near-threatened
Martial Eagle	<i>Polemaetus bellicosus</i>	Vulnerable
Long-crested Eagle	<i>Lophaetus occipitalis</i>	
Booted Eagle	<i>Hieraaetus pennatus</i>	Rare/Accidental
Verreaux's Eagle	<i>Aquila verreauxii</i>	



Pale Chanting-Goshawk	<i>Melierax canorus</i>	
Gabar Goshawk	<i>Micronisus gabar</i>	
African Marsh-Harrier	<i>Circus ranivorus</i>	
Black Harrier	<i>Circus maurus</i>	Endangered
Pallid Harrier	<i>Circus macrourus</i>	Near-threatened
Montagu's Harrier	<i>Circus pygargus</i>	Rare/Accidental
African Goshawk	<i>Accipiter tachiro</i>	
Little Sparrowhawk	<i>Accipiter minullus</i>	
Black Goshawk	<i>Accipiter melanoleucus</i>	
Black Kite	<i>Milvus migrans</i>	Rare/Accidental
African Fish-Eagle	<i>Haliaeetus vocifer</i>	
Common Buzzard	<i>Buteo buteo</i>	
Forest Buzzard	<i>Buteo trizonatus</i>	Endemic (country/region) Near-threatened
Jackal Buzzard	<i>Buteo rufofuscus</i>	
<b>STRIGIFORMES: Tytonidae</b>		
Barn Owl	<i>Tyto alba</i>	
<b>STRIGIFORMES: Strigidae</b>		
African Scops-Owl	<i>Otus senegalensis</i>	
Cape Eagle-Owl	<i>Bubo capensis</i>	
Spotted Eagle-Owl	<i>Bubo africanus</i>	
African Barred Owlet	<i>Glaucidium capense</i>	
African Wood-Owl	<i>Strix woodfordii</i>	
Marsh Owl	<i>Asio capensis</i>	
<b>COLIIFORMES: Coliidae</b>		
Speckled Mousebird	<i>Colius striatus</i>	
White-backed Mousebird	<i>Colius colius</i>	
Red-faced Mousebird	<i>Urocolius indicus</i>	
<b>TROGONIFORMES: Trogonidae</b>		
Narina Trogon	<i>Apaloderma narina</i>	
<b>BUCEROTIFORMES: Upupidae</b>		
Eurasian Hoopoe	<i>Upupa epops</i>	
<b>BUCEROTIFORMES: Phoeniculidae</b>		
Green Woodhoopoe	<i>Phoeniculus purpureus</i>	
<b>BUCEROTIFORMES: Bucerotidae</b>		



Crowned Hornbill	<i>Lophoceros alboterminatus</i>	
Trumpeter Hornbill	<i>Bycanistes bucinator</i>	
<b>CORACIIFORMES: Alcedinidae</b>		
Half-collared Kingfisher	<i>Alcedo semitorquata</i>	
Malachite Kingfisher	<i>Corythornis cristatus</i>	
Brown-hooded Kingfisher	<i>Halcyon albiventris</i>	
Giant Kingfisher	<i>Megaceryle maxima</i>	
Pied Kingfisher	<i>Ceryle rudis</i>	
<b>CORACIIFORMES: Meropidae</b>		
White-fronted Bee-eater	<i>Merops bullockoides</i>	Rare/Accidental
European Bee-eater	<i>Merops apiaster</i>	
<b>CORACIIFORMES: Coraciidae</b>		
European Roller	<i>Coracias garrulus</i>	
<b>PICIFORMES: Lybiidae</b>		
Crested Barbet	<i>Trachyphonus vaillantii</i>	
Red-fronted Tinkerbird	<i>Pogoniulus pusillus</i>	
Pied Barbet	<i>Tricholaema leucomelas</i>	
Black-collared Barbet	<i>Lybius torquatus</i>	
<b>PICIFORMES: Indicatoridae</b>		
Wahlberg's Honeyguide	<i>Prodotiscus regulus</i>	
Lesser Honeyguide	<i>Indicator minor</i>	
Scaly-throated Honeyguide	<i>Indicator variegatus</i>	
Greater Honeyguide	<i>Indicator indicator</i>	
<b>PICIFORMES: Picidae</b>		
Rufous-necked Wryneck	<i>Jynx ruficollis</i>	
Cardinal Woodpecker	<i>Chloropicus fuscescens</i>	
Olive Woodpecker	<i>Chloropicus griseocephalus</i>	
Ground Woodpecker	<i>Geocolaptes olivaceus</i>	Endemic (country/region) Near-threatened
Knysna Woodpecker	<i>Campethera notata</i>	Endemic (country/region) Near-threatened
<b>FALCONIFORMES: Falconidae</b>		
Lesser Kestrel	<i>Falco naumanni</i>	
Rock Kestrel	<i>Falco rupicolus</i>	





Amur Falcon	<i>Falco amurensis</i>	
Eurasian Hobby	<i>Falco subbuteo</i>	
Lanner Falcon	<i>Falco biarmicus</i>	
Peregrine Falcon	<i>Falco peregrinus</i>	
<b>PASSERIFORMES: Campephagidae</b>		
Gray Cuckooshrike	<i>Coracina caesia</i>	
Black Cuckooshrike	<i>Campephaga flava</i>	
<b>PASSERIFORMES: Oriolidae</b>		
Eurasian Golden Oriole	<i>Oriolus oriolus</i>	
African Black-headed Oriole	<i>Oriolus larvatus</i>	
<b>PASSERIFORMES: Platysteiridae</b>		
Cape Batis	<i>Batis capensis</i>	
Chinspot Batis	<i>Batis molitor</i>	
Pirit Batis	<i>Batis pririt</i>	
<b>PASSERIFORMES: Malaconotidae</b>		
Black-backed Puffback	<i>Dryoscopus cubla</i>	
Black-crowned Tchagra	<i>Tchagra senegalus</i>	
Southern Tchagra	<i>Tchagra tchagra</i>	
Southern Boubou	<i>Laniarius ferrugineus</i>	
Bokmakierie	<i>Telophorus zeylonus</i>	
Sulphur-breasted Bushshrike	<i>Telophorus sulfureopectus</i>	
Olive Bushshrike	<i>Telophorus olivaceus</i>	
Gray-headed Bushshrike	<i>Malaconotus blanchoti</i>	
<b>PASSERIFORMES: Dicruridae</b>		
Fork-tailed Drongo	<i>Dicrurus adsimilis</i>	
<b>PASSERIFORMES: Monarchidae</b>		
African Crested-Flycatcher	<i>Trochocercus cyanomelas</i>	
African Paradise-Flycatcher	<i>Terpsiphone viridis</i>	
<b>PASSERIFORMES: Laniidae</b>		
Red-backed Shrike	<i>Lanius collurio</i>	
Southern Fiscal	<i>Lanius collaris</i>	
<b>PASSERIFORMES: Corvidae</b>		



Cape Crow	<i>Corvus capensis</i>	
Pied Crow	<i>Corvus albus</i>	
White-necked Raven	<i>Corvus albicollis</i>	
<b>PASSERIFORMES: Stenostiridae</b>		
Fairy Flycatcher	<i>Stenostira scita</i>	
<b>PASSERIFORMES: Paridae</b>		
Southern Black-Tit	<i>Melaniparus niger</i>	
Gray Tit	<i>Melaniparus afer</i>	
<b>PASSERIFORMES: Remizidae</b>		
Southern Penduline-Tit	<i>Anthoscopus minutus</i>	
<b>PASSERIFORMES: Alaudidae</b>		
Spike-heeled Lark	<i>Chersomanes albofasciata</i>	
Eastern Long-billed Lark	<i>Certhilauda semitorquata</i>	Endemic (country/region)
Gray-backed Sparrow-Lark	<i>Eremopterix verticalis</i>	
Cape Clapper Lark	<i>Mirafrapa apiata</i>	
Rufous-naped Lark	<i>Mirafrapa africana</i>	
Red-capped Lark	<i>Calandrella cinerea</i>	
Large-billed Lark	<i>Galerida magnirostris</i>	
<b>PASSERIFORMES: Macrosphenidae</b>		
Cape Crombec	<i>Sylvietta rufescens</i>	
Cape Grassbird	<i>Sphenoeacus afer</i>	
Victorin's Warbler	<i>Cryptillas victorini</i>	Endemic (country/region)
<b>PASSERIFORMES: Cisticolidae</b>		
Namaqua Warbler	<i>Phragmacia substriata</i>	
Green-backed Camaroptera	<i>Camaroptera brachyura</i>	
Bar-throated Apalis	<i>Apalis thoracica</i>	
Yellow-breasted Apalis	<i>Apalis flavida</i>	
Karoo Prinia	<i>Prinia maculosa</i>	
Drakensberg Prinia	<i>Prinia hypoxantha</i>	Endemic (country/region)
Rufous-eared Warbler	<i>Malcorus pectoralis</i>	
Rock-loving Cisticola	<i>Cisticola aberrans</i>	
Red-headed Cisticola	<i>Cisticola subruficapilla</i>	
Wailing Cisticola	<i>Cisticola lais</i>	
Rufous-winged Cisticola	<i>Cisticola galactotes</i>	
Levaillant's Cisticola	<i>Cisticola tinniens</i>	
Croaking Cisticola	<i>Cisticola natalensis</i>	



Piping Cisticola	<i>Cisticola fulvicapilla</i>	
Zitting Cisticola	<i>Cisticola juncidis</i>	
Desert Cisticola	<i>Cisticola aridulus</i>	
Cloud Cisticola	<i>Cisticola textrix</i>	
<b>PASSERIFORMES: Acrocephalidae</b>		
Marsh Warbler	<i>Acrocephalus palustris</i>	
African Reed Warbler	<i>Acrocephalus baeticatus</i>	
Lesser Swamp Warbler	<i>Acrocephalus gracilirostris</i>	
Great Reed Warbler	<i>Acrocephalus arundinaceus</i>	
<b>PASSERIFORMES: Locustellidae</b>		
Barratt's Warbler	<i>Bradypterus barratti</i>	
Knysna Warbler	<i>Bradypterus sylvaticus</i>	Endemic (country/region) Vulnerable
Little Rush-Warbler	<i>Bradypterus baboecala</i>	
<b>PASSERIFORMES: Hirundinidae</b>		
Plain Martin	<i>Riparia paludicola</i>	
Bank Swallow	<i>Riparia riparia</i>	
Banded Martin	<i>Riparia cincta</i>	
Rock Martin	<i>Ptyonoprogne fuligula</i>	
Barn Swallow	<i>Hirundo rustica</i>	
White-throated Swallow	<i>Hirundo albigularis</i>	
Pearl-breasted Swallow	<i>Hirundo dimidiata</i>	
Greater Striped Swallow	<i>Cecropis cucullata</i>	
Lesser Striped Swallow	<i>Cecropis abyssinica</i>	
South African Swallow	<i>Petrochelidon spilodera</i>	
Common House-Martin	<i>Delichon urbicum</i>	
Black Sawwing	<i>Psalidoprocne pristopectera</i>	
<b>PASSERIFORMES: Pycnonotidae</b>		
Sombre Greenbul	<i>Andropadus importunus</i>	
Terrestrial Brownbul	<i>Phyllastrephus terrestris</i>	
Yellow-streaked Greenbul	<i>Phyllastrephus flavostriatus</i>	
Common Bulbul	<i>Pycnonotus barbatus</i>	
Cape Bulbul	<i>Pycnonotus capensis</i>	Endemic (country/region)
<b>PASSERIFORMES: Phylloscopidae</b>		
Willow Warbler	<i>Phylloscopus trochilus</i>	



Yellow-throated Woodland-Warbler	<i>Phylloscopus ruficapilla</i>	
<b>PASSERIFORMES: Sylviidae</b>		
Bush Blackcap	<i>Sylvia nigricapillus</i>	Vulnerable
Layard's Warbler	<i>Sylvia layardi</i>	
Chestnut-vented Warbler	<i>Sylvia subcoerulea</i>	
<b>PASSERIFORMES: Zosteropidae</b>		
Orange River White-eye	<i>Zosterops pallidus</i>	
Cape White-eye	<i>Zosterops virens</i>	
<b>PASSERIFORMES: Buphagidae</b>		
Red-billed Oxpecker	<i>Buphagus erythrorhynchus</i>	Rare/Accidental
<b>PASSERIFORMES: Sturnidae</b>		
European Starling	<i>Sturnus vulgaris</i>	Introduced species
Wattled Starling	<i>Creatophora cinerea</i>	
Common Myna	<i>Acridotheres tristis</i>	Rare/Accidental
Pale-winged Starling	<i>Onychognathus nabouroup</i>	
Red-winged Starling	<i>Onychognathus morio</i>	
Black-bellied Starling	<i>Notopholia corusca</i>	
African Pied Starling	<i>Lamprotornis bicolor</i>	Endemic (country/region)
Cape Starling	<i>Lamprotornis nitens</i>	
<b>PASSERIFORMES: Turdidae</b>		
Olive Thrush	<i>Turdus olivaceus</i>	
Karoo Thrush	<i>Turdus smithi</i>	
<b>PASSERIFORMES: Muscicapidae</b>		
African Dusky Flycatcher	<i>Muscicapa adusta</i>	
Spotted Flycatcher	<i>Muscicapa striata</i>	
Fiscal Flycatcher	<i>Melaenornis silens</i>	
Karoo Scrub-Robin	<i>Cercotrichas coryphoeus</i>	
Brown Scrub-Robin	<i>Cercotrichas signata</i>	
Red-backed Scrub-Robin	<i>Cercotrichas leucophrys</i>	
Cape Robin-Chat	<i>Cossypha caffra</i>	
Chorister Robin-Chat	<i>Cossypha dichroa</i>	
White-starred Robin	<i>Pogonocichla stellata</i>	
Sentinel Rock-Thrush	<i>Monticola explorator</i>	Near-threatened
Cape Rock-Thrush	<i>Monticola rupestris</i>	Endemic (country/region)
African Stonechat	<i>Saxicola torquatus</i>	



Mocking Cliff-Chat	<i>Thamnolaea cinnamomeiventris</i>	
Southern Anteater-Chat	<i>Myrmecocichla formicivora</i>	
Arnot's Chat	<i>Myrmecocichla arnoti</i>	
Ruaha Chat	<i>Myrmecocichla collaris</i>	
Capped Wheatear	<i>Oenanthe pileata</i>	
Familiar Chat	<i>Oenanthe familiaris</i>	
<b>PASSERIFORMES: Promeropidae</b>		
Cape Sugarbird	<i>Promerops cafer</i>	Endemic (country/region)
<b>PASSERIFORMES: Nectariniidae</b>		
Collared Sunbird	<i>Hedypipna collaris</i>	
Orange-breasted Sunbird	<i>Anthobaphes violacea</i>	Endemic (country/region)
Mouse-colored Sunbird	<i>Cyanomitra veroxii</i>	
Amethyst Sunbird	<i>Chalcomitra amethystina</i>	
Scarlet-chested Sunbird	<i>Chalcomitra senegalensis</i>	
Malachite Sunbird	<i>Nectarinia famosa</i>	
Southern Double-collared Sunbird	<i>Cinnyris chalybeus</i>	
Greater Double-collared Sunbird	<i>Cinnyris afer</i>	
<b>PASSERIFORMES: Ploceidae</b>		
White-browed Sparrow-Weaver	<i>Plocepasser mahali</i>	
Spectacled Weaver	<i>Ploceus ocularis</i>	
Cape Weaver	<i>Ploceus capensis</i>	Endemic (country/region)
African Golden-Weaver	<i>Ploceus subaureus</i>	
Southern Masked-Weaver	<i>Ploceus velatus</i>	
Village Weaver	<i>Ploceus cucullatus</i>	
Forest Weaver	<i>Ploceus bicolor</i>	
Red-billed Quelea	<i>Quelea quelea</i>	
Southern Red Bishop	<i>Euplectes orix</i>	
Yellow Bishop	<i>Euplectes capensis</i>	
Fan-tailed Widowbird	<i>Euplectes axillaris</i>	
Long-tailed Widowbird	<i>Euplectes progne</i>	
Grosbeak Weaver	<i>Amblyospiza albifrons</i>	
<b>PASSERIFORMES: Estrildidae</b>		
Sweet Waxbill	<i>Coccyzygia melanotis</i>	
Common Waxbill	<i>Estrilda astrild</i>	
Red-billed Firefinch	<i>Lagonosticta senegala</i>	
African Firefinch	<i>Lagonosticta rubricata</i>	





Red-headed Finch	<i>Amadina erythrocephala</i>	
Quailfinch	<i>Ortygospiza atricollis</i>	
<b>PASSERIFORMES: Viduidae</b>		
Pin-tailed Whydah	<i>Vidua macroura</i>	
Variable Indigobird	<i>Vidua funerea</i>	
<b>PASSERIFORMES: Passeridae</b>		
House Sparrow	<i>Passer domesticus</i>	Introduced species
Cape Sparrow	<i>Passer melanurus</i>	
Southern Gray-headed Sparrow	<i>Passer diffusus</i>	
Yellow-throated Bush Sparrow	<i>Gymnoris superciliaris</i>	
<b>PASSERIFORMES: Motacillidae</b>		
Cape Wagtail	<i>Motacilla capensis</i>	
Mountain Wagtail	<i>Motacilla clara</i>	
Western Yellow Wagtail	<i>Motacilla flava</i>	
African Pied Wagtail	<i>Motacilla aguimp</i>	
African Pipit	<i>Anthus cinnamomeus</i>	
Long-billed Pipit	<i>Anthus similis</i>	
Plain-backed Pipit	<i>Anthus leucophrys</i>	
Buffy Pipit	<i>Anthus vaalensis</i>	
Orange-throated Longclaw	<i>Macronyx capensis</i>	
Yellow-throated Longclaw	<i>Macronyx croceus</i>	
<b>PASSERIFORMES: Fringillidae</b>		
Yellow-fronted Canary	<i>Crithagra mozambica</i>	
Forest Canary	<i>Crithagra scotops</i>	Endemic (country/region)
Black-throated Canary	<i>Crithagra atrogularis</i>	
Brimstone Canary	<i>Crithagra sulphurata</i>	
Yellow Canary	<i>Crithagra flaviventris</i>	
White-throated Canary	<i>Crithagra albogularis</i>	
Protea Canary	<i>Crithagra leucoptera</i>	Endemic (country/region) Near-threatened
Streaky-headed Seedeater	<i>Crithagra gularis</i>	
Cape Siskin	<i>Crithagra totta</i>	Endemic (country/region)
Cape Canary	<i>Serinus canicollis</i>	
Black-headed Canary	<i>Serinus alario</i>	
<b>PASSERIFORMES: Emberizidae</b>		
Golden-breasted Bunting	<i>Emberiza flaviventris</i>	



Cape Bunting	<i>Emberiza capensis</i>	
Lark-like Bunting	<i>Emberiza impetuani</i>	
Cinnamon-breasted Bunting	<i>Emberiza tahapisi</i>	



## APPENDIX C – IMPACT RATING METHODOLOGY

To ensure a balanced and objective approach to assessing the significance of potential impacts, a standardised rating scale was adopted which allows for the direct comparison of specialist studies. This rating scale has been developed in accordance with the requirements outlined in Appendix 1 of the EIA Regulations (2014 and subsequent 2017 amendments).

### **Impact significance pre-mitigation**

This rating scale adopts six key factors to determine the overall significance of the impact prior to mitigation:

1. **Nature of impact:** Defines whether the impact has a negative or positive effect on the receiving environment.
2. **Type of impact:** Defines whether the impact has a direct, indirect or cumulative effect on the environment.
3. **Duration:** defines the relationship of the impact to temporal scales. The temporal scale defines the significance of the impact at various time scales as an indication of the duration of the impact. This may extend from the short-term (less than 5 years, equivalent to the construction phase) to permanent. Generally, the longer the impact occurs the greater the significance of any given impact.
4. **Extent:** describes the relationship of the impact to spatial scales i.e. the physical extent of the impact. This may extend from the local area to an impact that crosses international boundaries. The wider the spatial scale the impact extends, the more significant the impact is considered to be.
5. **Probability:** refers to the likelihood (risk or chance) of the impact occurring. While many impacts generally do occur, there is considerable uncertainty in terms of others. The scale varies from unlikely to definite, with the overall impact significance increasing as the likelihood increases.
6. **Severity or benefits:** the severity/beneficial scale is used in order to scientifically evaluate how severe negative impacts would be, or how beneficial positive impacts would be on the receiving environment. The severity of an impact can be evaluated prior and post mitigation to demonstrate the seriousness of the impact if it is not mitigated, as well as the effectiveness of the mitigation measures. The word 'mitigation' does not only refer to 'compensation', but also includes concepts of containment and remedy. For beneficial impacts, optimization refers to any measure that can enhance the benefits. Mitigation or optimisation should be practical, technically feasible and economically viable.

For each impact, the duration, extent and probability are ranked and assigned a score. These scores are combined and used to determine the overall impact significance prior to mitigation. They must then be considered against the severity rating to determine the overall significance of an activity. This is because the severity of the impact is far more important than the other three criteria. The overall significance is either negative or positive (Criterion 1) and direct, indirect or cumulative (Criterion 2).

**Table D1: Evaluation Criteria.**

<b><i>Duration (Temporal Scale)</i></b>	
<i>Short term</i>	<i>Less than 5 years</i>
<i>Medium term</i>	<i>Between 5-20 years</i>



Long term	<i>Between 20 and 40 years (a generation) and from a human perspective also permanent</i>	
Permanent	<i>Over 40 years and resulting in a permanent and lasting change that will always be there</i>	
<b>Extent (Spatial Scale)</b>		
Localised	<i>At localised scale and a few hectares in extent</i>	
Study Area	<i>The proposed site and its immediate environs</i>	
Regional	<i>District and Provincial level</i>	
National	<i>Country</i>	
International	<i>Internationally</i>	
<b>Probability (Likelihood)</b>		
Unlikely	<i>The likelihood of these impacts occurring is slight</i>	
May Occur	<i>The likelihood of these impacts occurring is possible</i>	
Probable	<i>The likelihood of these impacts occurring is probable</i>	
Definite	<i>The likelihood is that this impact will definitely occur</i>	
<b>Severity Scale</b>	<b>Severity</b>	<b>Benefit</b>
Very Severe/ Beneficial	An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.
Severe/ Beneficial	Long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming, or some combination of these.	A long-term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
Moderately severe/Beneficial	Medium to long term impacts on the affected system(s) or party (ies), which could be mitigated.	A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
Slight	Medium- or short-term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.
No effect/don't or can't know	The system(s) or party(ies) is not affected by the proposed development.	In certain cases, it may not be possible to determine the severity of an impact.

*\* In certain cases, it may not be possible to determine the severity of an impact thus it may be determined: Don't know/Can't know.*

**Table D2: Description of Overall Significance Rating**

<b>Significance Rate</b>	<b>Description</b>
<b>Don't Know</b>	<i>In certain cases, it may not be possible to determine the significance of an impact. For example, the primary or secondary impacts on the social or natural environment given the available information.</i>
<b>NO SIGNIFICANCE</b>	<i>There are no primary or secondary effects at all that are important to scientists or the public.</i>



<b>LOW NEGATIVE</b>	<b>LOW POSITIVE</b>	<i>Impacts of low significance are typically acceptable impacts for which mitigation is desirable but not essential. The impact by itself is insufficient, even in combination with other low impacts, to prevent the development being approved. These impacts will result in negative medium to short term effects on the natural environment or on social systems.</i>
<b>MODERATE NEGATIVE</b>	<b>MODERATE POSITIVE</b>	<i>Impacts of moderate significance are impacts that require mitigation. The impact is insufficient by itself to prevent the implementation of the project but in conjunction with other impacts may prevent its implementation. These impacts will usually result in a negative medium to long-term effect on the natural environment or on social systems.</i>
<b>HIGH NEGATIVE</b>	<b>HIGH POSITIVE</b>	<i>Impacts that are rated as being high are serious impacts and may prevent the implementation of the project if no mitigation measures are implemented, or the impact is very difficult to mitigate. These impacts would be considered by society as constituting a major and usually long-term change to the environment or social systems and result in severe effects.</i>
<b>VERY HIGH NEGATIVE</b>	<b>VERY HIGH POSITIVE</b>	<i>Impacts that are rated as very high are very serious impact which may be sufficient by itself to prevent the implementation of the project. The impact may result in permanent change. Very often these impacts are unmitigable and usually result in very severe effects or very beneficial effects.</i>

**Impact significance post-mitigation**

Once mitigation measures are proposed, the following three factors are then considered to determine the overall significance of the impact after mitigation.

1. **Reversibility Scale:** This scale defines the degree to which an environment can be returned to its original/partially original state.
2. **Irreplaceable loss Scale:** This scale defines the degree of loss which an impact may cause.
3. **Mitigation potential Scale:** This scale defines the degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

**Table D3: Post-mitigation Evaluation Criteria**

<b>Reversibility</b>	
<i>Reversible</i>	<i>The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.</i>
<i>Irreversible</i>	<i>The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.</i>
<b>Irreplaceable loss</b>	
<i>Resource will not be lost</i>	<i>The resource will not be lost/destroyed provided mitigation measures are implemented.</i>
<i>Resource will be partly lost</i>	<i>The resource will be partially destroyed even though mitigation measures are implemented.</i>
<i>Resource will be lost</i>	<i>The resource will be lost despite the implementation of mitigation measures.</i>
<b>Mitigation potential</b>	
<i>Easily achievable</i>	<i>The impact can be easily, effectively and cost effectively mitigated/reversed.</i>





<i>Achievable</i>	<i>The impact can be effectively mitigated/reversed without much difficulty or cost.</i>
<i>Difficult</i>	<i>The impact could be mitigated/reversed but there will be some difficulty in ensuring effectiveness and/or implementation, and significant costs.</i>
<i>Very Difficult</i>	<i>The impact could be mitigated/reversed but it would be very difficult to ensure effectiveness, technically very challenging and financially very costly.</i>

The following assumptions and limitations are inherent in the rating methodology:

- **Value Judgements:** Although this scale attempts to provide a balance and rigor to assessing the significance of impacts, the evaluation relies heavily on the values of the person making the judgment.
- **Cumulative Impacts:** These affect the significance ranking of an impact because it considers the impact in terms of both on-site and off-site sources. This is particularly problematic in terms of impacts beyond the scope of the proposed development. For this reason, it is important to consider impacts in terms of their cumulative nature.
- **Seasonality:** Certain impacts will vary in significance based on seasonal change. Thus, it is difficult to provide a static assessment. Seasonality will need to be implicit in the temporal scale, with management measures being imposed accordingly (e.g. dust suppression measures being implemented during the dry season).



**APPENDIX D – CURRICULUM VITAE OF THE PROJECT TEAM**