



Botanical and Wetland Impact Assessment

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January 2019

PROPOSED INFRASTRUCTURE DEVELOPMENT IN THE KWELERA NATIONAL BOTANICAL GARDEN

Title: Proposed Infrastructure Development in the SANBI Kwelela National Botanical Garden: Botanical and Wetland Impact Assessment

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Contents of the specialist report

The contents of this specialist report complies to the legislated requirements as described in Appendix 6 of the National Environmental Management Act (No 107 of 1998; NEMA) Regulations of 2014 (as amended) (GN R. 326 of 2017).

Appendix 6

Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
 - (a) details of—
 - (i) the specialist who prepared the report; and
 - (ii) the expertise of that specialist to compile a specialist report including a curriculum vitae;
 - (b) a declaration that the specialist is independent in a form as may be specified by the competent authority;
 - (c) an indication of the scope of, and the purpose for which, the report was prepared;
 - (cA) an indication of the quality and age of base data used for the specialist report;
 - (cB) a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;
 - (d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;
 - (e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;
 - (f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
 - (g) an identification of any areas to be avoided, including buffers;
 - (h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;
 - (i) a description of any assumptions made and any uncertainties or gaps in knowledge;
 - (j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities;
 - (k) any mitigation measures for inclusion in the EMPr;
 - (l) any conditions for inclusion in the environmental authorisation;
 - (m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
 - (n) a reasoned opinion—
 - (i) whether the proposed activity, activities or portions thereof should be authorised;
 - (iA) regarding the acceptability of the proposed activity or activities; and
 - (ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;
 - (o) a description of any consultation process that was undertaken during the course of preparing the specialist report;
 - (p) a summary and copies of any comments received during any consultation process and where

applicable all responses thereto; and

(q) any other information requested by the competent authority.

(2) Where a government notice by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.

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1. Project Team

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 - (p) a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and
 - (q) any other information requested by the competent authority.

1.1. Details and Expertise of the Specialists

Ms Jaclyn Smith

(Junior Botanical Specialist and Report Writer)

Jaclyn is an environmental consultant. She holds a BSc with majors in Environmental Science and Geology from Rhodes University, as well as a BSc (Hons) in Geology from Nelson Mandela Metropolitan University. Jaclyn's honours dissertation looked at the sediment disturbance depth over two beaches in the Port Elizabeth. Jaclyn's interest lies in the botanical and aquatic sector. She has assisted with and undertaken a number of vegetation assessments and aquatic and wetland assessments.

Wetland Training: Rhodes University, Tools for Wetland Assessment (certified competent).

Ms Caitlin Smith Pr.Sci.Nat.

(Wetland Specialist and Report Writer)

Senior Environmental Consultant. Caitlin holds a BSc degree with majors in Geology and Geography and a BSc Honours Degree (with distinction) in Geology both obtained from Nelson Mandela Metropolitan University. Caitlin is a qualified geologist and has managed and been involved in various Environmental Impact Assessments. Her interest lies in the water sector, specifically in wetland related studies. She has completed various Aquatic and Wetland assessments for road and infrastructure projects. She is currently studying her MSc degree in Hydrology at Rhodes University focusing on the groundwater and surface water interactions of the Krom River wetlands.

Wetland Training: Rhodes University, Tools for Wetland Assessment (certified competent).

Mr Roy de Kock Pr.Sci.Nat

(Plant identification and field work)

Roy is a Principal Consultant holding a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela Metropolitan University in Port Elizabeth. His MSc thesis focused on Rehabilitation Ecology using an open-cast mine as a case study. He has been working for CES since 2010, and is based at the East London branch where he focuses on Vegetation, Biodiversity, Ecological and Agricultural Assessments, Geological and Geotechnical analysis, Environmental Management Plans, mining applications and various environmental impact studies. Roy has worked on numerous projects in South Africa and Africa at large. Roy is registered with the South African Council for Natural Scientific Professional (SACNASP).

Dr Alan Carter Pr.Sci.Nat

(Report Reviewer)

SACNASP Registration Number: 400332/04

Alan is the executive of the CES East London Office. He holds a PhD in Marine Biology and is a Certified Public Accountant, with extensive training and experience in both financial accounting and environmental science disciplines with international accounting firms in South Africa and the USA. He has 25 years' experience in environmental management and has specialist skills in sanitation, coastal environments and industrial waste. Dr Carter is registered as a Professional Natural Scientist under the South African Council for Natural Scientific Professions (SACNASP). He is also registered as an EAP with the Environmental Assessment Practitioners of South Africa (EAPSA) interim EAP certification body.

Expertise:

Relevant projects CES have worked on include:

Name of project	Description of responsibility	Date completed
Earth Free (Pty) Ltd Biodiversity study for a housing development in Kei Road, Eastern Cape	Biodiversity study for a housing development extension	October 2017
City of Johannesburg Biodiversity Assessment and Conservation management Plans for 4 Nature Reserves	Vegetation and Ridgeline Biodiversity Study	January - April 2017
Terreco Butterworth Bypass Alternatives EIA (EC)	Botanical and Biodiversity Assessment	Oct 2016
Terreco Idutywa Bypass Alternatives EIA (EC)	Botanical and Biodiversity Assessment	Oct 2016
SANRAL N2 between Tetyana & Sitebe Komkulu EIA (EC)	Ecological Impact Assessment	June 2015
Laman Mining renewal of Mining License (EC)	Botanical Impact Assessment	February 2015

Name of project	Description of responsibility	Date completed
ACSA East London Airport Vegetation Study (EC)	Botanical & Biodiversity Impact Assessment	February 2014
SANRAL R61 Baziya to Mthatha EIA (EC)	Ecological Impact Assessment	November 2014
SANRAL Rehabilitation of the N9, Middelburg (EC)	Ecological Impact Assessment	June 2013
Amatola Water Pipeline from Sandile WTW to Burnshill and British Ridge Reservoirs	Vegetation Impact Assessment	October 2017
Kennersley Park Retirement Village Expansion	Vegetation Impact Assessment	February 2018
DAFF Qolora Aquaculture Development Zone	Wetland Impact Assessment	November 2016
Villa Rosa Development Development Phase 1	Aquatic Impact Assessment	December 2017
Earth Free Kei Road Housing Development	Aquatic and Wetland Assessment	November 2017
Amalinda Downs Development	Aquatic and Wetland Assessment	June 2018

Declaration:

Role on Study Team	Declaration of independence
Report Writing and Mapping	I, Jaelyn Smith , declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.
Report Writing	I, Caitlin Smith , declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.
Report Review	I, Alan Carter , declare that I am an independent consultant and have no business, financial, personal or other interest in the proposed development, application or appeal in respect of which I was appointed other than fair remuneration for work performed in connection with the activity, application or appeal. There are no circumstances that compromise the objectivity of my performing such work.

2. Introduction

2.1. Project description

South African National Biodiversity Institute (SANBI), in partnership with Eastern Cape Parks and Tourism Agency, are proposing the development of infrastructure within the Kwelera National Botanical Garden (KwNBG). The KwNBG is comprised of a 160ha portion of the Kwelera Nature Reserve and an adjacent 10ha portion of land. The Kwelera Nature Reserve has been gazetted¹ as a national botanical garden under the National Environmental Management: Biodiversity Act and will form the ‘natural’ portion of the garden. The 10ha portion of land has been gazetted² as part of the National Botanical Garden and will form the “landscaped” portion of the garden. The site is located within Kwelera within the Buffalo City Metropolitan Municipality (BCMM) within the Eastern Cape.

The infrastructure developments at the 160ha natural portion of the KwNBG will involve the following:

- Upgrading of the gravel ring road;
- Refurbish existing braai stands along the coast;
- Replacement of post and rail pole fence sections of the ring road;
- Introduce benches at the current braai area spots;
- Upgrade the KwNBG fence in strategic areas where it borders adjacent farms and Kwelera village;
- Include a traffic control boom or bollards towards the back of the gravel road to reduce traffic flow around the KwNBG;
- Upgrading two existing beach access routes at Sunrise-on-Sea;
- Demolish the old ski boat clubhouse and replace with a new ablution facility (covering a greater footprint) equipped with a ramped walkway and a whale/dolphin-viewing platform above;
- Establish a fire break along the north eastern boundary of the Kwelera village; and
- Introduce a hiking trail through the forest and grassland.

The infrastructure development on the 10ha landscaped portion of the Kwelera National Botanical Garden will entail the following:

- Entrance gate and visitor centre;
- Administration centre;
- Community/education centre;
- Coffee shop/restaurant;
- Garden nursery and workshop;
- Staff accommodation
- Seed bank facility;
- Library;

¹ GN R. 578 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) Declaration of the Kwelera National Botanical Garden

² GN R. 705 National Environmental Management: Biodiversity Act, 2004 (Act No 10, of 2004) Declaration Notice of the extension of Kwelera National Botanical Garden.

- Herbarium;
- Public parking; and
- Landscaped garden with associated plants and infrastructure.

CES were appointed to conduct a Botanical Impact Assessment and Wetland assessment as input into the Basic Assessment process.

2.2. Project location

The project site is located on Farm 1505 and Farm 782 in the BCMM in the Eastern Cape (Figure 2.1.).



Figure 2.1: Location of the proposed development.

2.3. Alternatives

Two layout alternatives were considered during this assessment and these relate largely to the proposed infrastructure developments within the 160ha natural portion of the KwNBG.

The **preferred layout alternative 1** (Figure 2.2) involves the upgrading of existing infrastructure within the natural portion of the KwNBG (difference in infrastructure shown in italics):

- Upgrading of the gravel ring road;
- *Refurbish existing braai stands along the coast;*
- Replacement of post & rail pole fence sections of the ring road;
- *Introduce benches at the current braai area spots;*
- Upgrade the KwNBG fence in strategic areas where it borders adjacent farms (including the ClearVu boundary fence around the 10ha landscaped portion of the KwNBG) and Kwelera village. The ClearVu boundary fence will follow the existing fenceline around the 10ha landscaped portion of the KwNBG and it will be adjacent to the existing vegetated fenceline along the DR02731 where possible;
- Include traffic control boom or bollards towards the back of the gravel road to reduce traffic flow around the reserve;
- Upgrading two existing beach access routes at Sunrise-on-Sea;
- Demolish the old ski boat clubhouse and replace with a new ablution facility (covering a greater footprint) equipped with a ramped walkway and a whale/dolphin-viewing platform above;
- Establish a fire break along the north eastern boundary of the Kwelera village; and
- Introduce a hiking trail through the forest and grassland.

The preferred layout alternative was designed following the public participation process.

The **alternative layout 2** (Figure 2.3) involves the upgrading of existing and development of new infrastructure in the natural portion of the KwNBG (difference in infrastructure highlighted in italics):

- Upgrading of the gravel ring road;
- *Demolish existing braai stands along the coast;*
- *Construct new centralised braai area;*
- *Establish new picnic spots;*
- *Construct new viewing platform along the point of the KwNBG;*
- *Construct new trail to Magoza peak;*
- Replacement of post & rail pole fence sections of the ring road;
- Upgrade the KwNBG fence in strategic areas where it borders adjacent farms (including the ClearVu boundary fence around the 10ha landscaped portion of the KwNBG) and Kwelera village. The ClearVu boundary fence will follow the existing fenceline around the 10ha landscaped portion of the KwNBG and it will be adjacent to the existing vegetated fenceline along the DR02731 where possible;
- Include traffic control boom or bollards towards the back of the gravel road to reduce traffic flow around the reserve;
- Upgrading two existing beach access routes at Sunrise-on-Sea;

- Demolish the old ski boat clubhouse and replace with a new ablution facility (covering a greater footprint) equipped with a ramped walkway and a whale/dolphin-viewing platform above;
- Establish a fire break along the north eastern boundary of the Kwelera village; and
- Introduce a hiking trail through the forest and grassland.



Figure 2.3: Alternative layout 2 of the proposed KwNBG.

2.4. Objectives and Terms of Reference

Taking into account the purpose of the specialist study, the following activities are to be undertaken:

- Describe the study area in terms of land cover and terrestrial habitat. This will include a full desktop analysis on the flora;
- Review relevant legislation, policies, guidelines and standards;
- Provide a general description of the status of the surface water resources of the area according to published literature;
- Conduct a site survey to determine the actual ecological state of the study area and identify any species of conservation concern;
- Identify the presence of wetlands and riparian habitats within the general project area;
- Delineate wetlands and the riparian habitat in areas affected by the development;
- This aspect of the report will specifically include the identification of the below in terms of fauna and flora -
 - Areas of high biodiversity;
 - The presence of species of conservation concern, including sensitive, endemic and protected species;
 - The presence of areas sensitive to invasion by alien species; and
 - The presence of conservation areas and sensitive habitats where disturbance should be avoided or minimised.
- Produce a sensitivity map that illustrates areas with significant developmental constraints;
- Describe the likely scope, scale and significance of direct and indirect positive and negative impacts and any cumulative resulting from the proposed development both on 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 can be adopted to reduce negative impacts for each phase of the project, where required;
- Identify any need for future permitting;
- Describe the implications of the No-Go option;
- Identify any fatal flaws associated with the project; and
- Describe any assumptions made and any uncertainties or gaps in knowledge.

2.5. Approach

The study site and surrounding areas were assessed using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation and surface water classifications and biodiversity programmes and plans. This included the consideration of:

- The South African Vegetation Map (Mucina and Rutherford, 2012);
- Department of Agriculture, Fisheries and Forestry (DAFF) - Indigenous forest maps;
- National Freshwater Ecosystem Priority Areas (NFEPA) - Water bodies and wetlands;
- National Environmental Management Biodiversity Act (NEMBA) - Biodiversity Regulations; and
- Plants of Southern Africa (POSA) – Quarter degree square level.

A single site visit was conducted on the 24 November 2017. The site visit was used to conduct floral surveys and to identify potential impacts of the Proposed Infrastructure Developments in the SANBI KwnBG on the surrounding natural environment and to inform the significance of the potential impacts identified.

2.6. Assumptions and limitations

This report is based on currently available information and, as a result, is limited to the information provided. In addition, data analysed in this report was generated based on a single site survey of plant species conducted in November 2017.

2.7. Public consultation

No consultation requirements were identified during the drafting of this specialist report. Any comments received on this report will be included in the EIA report.

3. Assessment methodology

Appendix 6

Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
 - (e) a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;

The aim of this assessment is to identify areas of ecological and aquatic importance and to evaluate these in terms of their conservation importance. In order to do so, the ecological and aquatic sensitivity of the area is assessed as well as an identification of potential plant Species of Conservation Concern (SCC) that may occur in habitats present in the area. The SANBI Guidelines for a botanical assessment (Driver *et al*; 2009) is followed to assess the botanical features. Aspects that would increase biodiversity impact significance include:

- Presence of plant SCC;
- Vegetation types of conservation concern;
- Presence of threatened ecosystems;
- Areas of high biodiversity; and
- The presence of process areas:
 - Ecological corridors; and
 - Complex topographical features (especially steep and rocky slopes that provide niche habitats for plants).

It is not the aim of this study to produce a complete list of all plant species occurring in the region, but rather to examine a representative sample. It is, however, important to note that areas of high sensitivity as well as SCC have been identified as far as possible, either from records from the site or a review of their habitat requirements, and whether or not these habitats occur within the site.

3.1. Species of conservation concern

Plant SCC in terms of the project area are defined as:

1. Plant species listed in the revised South African Red Data Books (Driver *et al* 2009);
2. Plants listed in the Cape Nature and Environmental Conservation Ordinance (No. 19 of 1974; NECO/PNCO);
3. Plant species listed in the NEMBA Threatened or Protected Species List (G.NR. 256 of 2015); and
4. Species included in other international lists (e.g., 2010 International Union for Conservation of Nature (IUCN) Red List of Threatened Plants).

Definitions:

The SANBI Red List system contains nine categories, with the main purpose of classifying species from lowest (Least Concern) to highest (Critically Endangered) risk of extinction (see Figure 3.1). Species that are

at high risk of extinction are placed in one of three categories: Vulnerable (VU), Endangered (EN) or Critically Endangered (CR). If a species is classified into one of these three categories, it is a SCC.

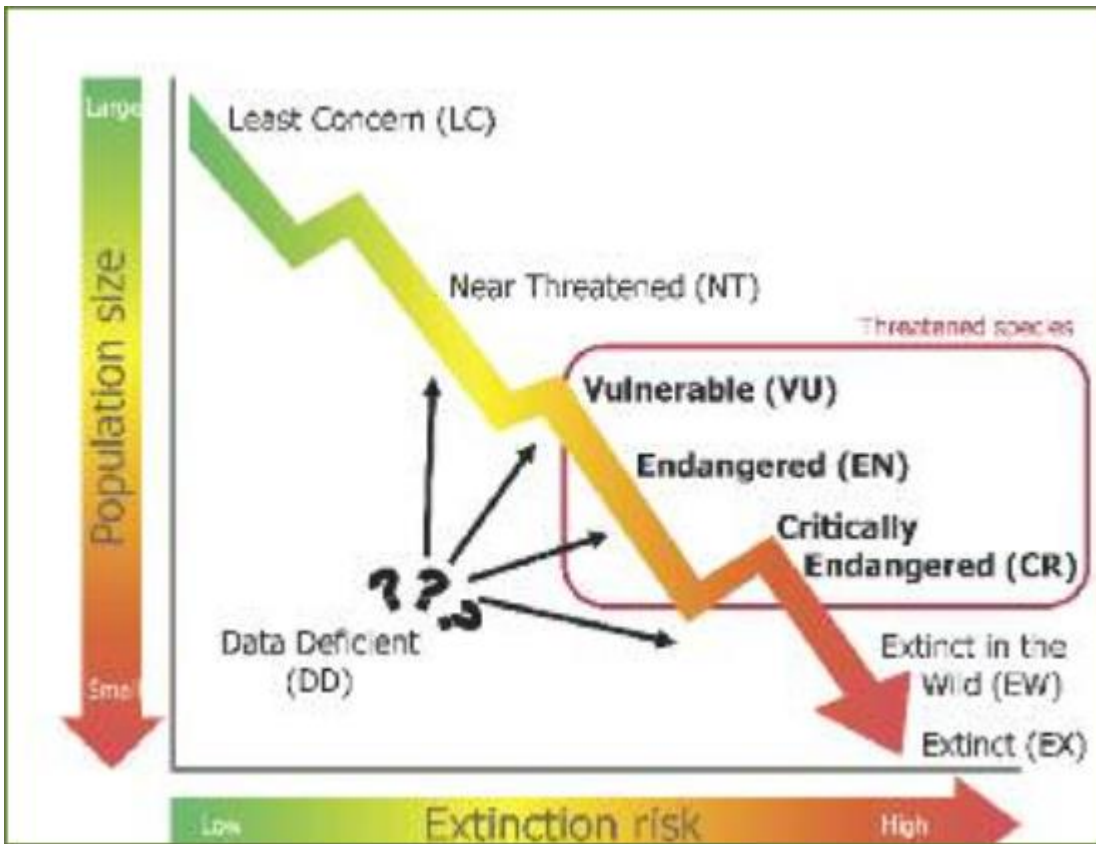


Figure 3.1: The SANBI Red List system categorizes species according to their risk of extinction (Source: SA Red Data Guidelines).

A species’ classification is guided by five criteria relating to different biological factors that indicate danger of extinction (Table 3.2). A species should always be evaluated against all five criteria, but available data only need to meet the requirements for at least one criterion in order to classify a species as threatened. A species is always classified in the highest category of threat for which it meets the quantitative thresholds of at least one criterion.

The following management guidelines for threatened species are provided in Table 3.1 below (Source: SANBI Red Data Guidelines):

Table 3.1: Guidelines for the management of the various vegetation categories

Status	Criterion*	Guidelines for Recommendation
^a Please notify the Threatened Species Programme immediately and provide details of the location, size and threats to the subpopulation. The fact that a subpopulation of the species was found at a site zoned for development means that its Red List status has to be reviewed and is likely to be upgraded.		
* Refer to Table 2.2 for criteria descriptions		
^a Critically Endangered	E	No further loss of natural habitat should be permitted as the species is on the brink of extinction, and all other known subpopulations have been lost. The subpopulation in question is likely to be newly discovered and the only remaining subpopulation of this species.
Critically	A,B,C,D	No further loss of natural habitat should be permitted as the species is on the

Status	Criterion*	Guidelines for Recommendation
Endangered		verge of extinction.
Endangered	B,C,D	No further loss of habitat should be permitted as the species is likely to go extinct in the near future if current pressures continue. All remaining subpopulations have to be conserved if this species is to survive in the long term.
Endangered	A	If the species has a restricted range (< 2 000 km ²), recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the National Environmental Management: Protected Areas Act (Act 57 of 2003), and provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
^a Vulnerable	D	This species either constitutes less than 1 000 individuals or is known from a very restricted range. No further loss of habitat should be permitted as the species' status will immediately become either Critically Endangered or Endangered, should habitat be lost.
Vulnerable	B,C	The species is approaching extinction but there are still a number of subpopulations in existence. Recommend no further loss of habitat as this will increase the extinction risk of the species.
Vulnerable	A	If the species has a restricted range, < 2 000 km ² , recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered under certain circumstances, such as the implementation of an offset whereby another viable, known subpopulation is formally conserved in terms of the Protected Areas Act, and provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
^a Data Deficient	D	This species is very poorly known, with insufficient information on its habitat, population status or distribution to assess it. However, it is highly likely to be threatened. If a Data Deficient species will be affected by a proposed activity, the subpopulation should be well surveyed and the data sent to the Threatened Species Programme. The species will be reassessed and the new status of the species, with a recommendation, will be provided within a short timeframe.
Data Deficient		There is uncertainty regarding the taxonomic status of this species, but it is likely to be threatened. Contact the taxonomist working on this group to resolve its taxonomic status; the species will then be reassessed by the Threatened Species Programme.
^a Near Threatened	D	Currently known from fewer than 10 locations, therefore preferably recommend no loss of habitat. Should loss of this species' habitat be considered, then an offset that includes conserving another viable subpopulation (in terms of the Protected Areas Act) should be implemented, provided that the subpopulation to be destroyed does not occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.

Status	Criterion*	Guidelines for Recommendation
Near Threatened	B,C	The species is approaching thresholds for listing as threatened but there are still a number of subpopulations in existence and therefore there is need to minimise loss of habitat. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant spatial biodiversity plan or (iii) on a site associated with additional ecological sensitivities.
Near Threatened	A	If the species has a restricted range, < 2 000 km ² , then recommend no further loss of habitat. If range size is larger, the species is possibly long-lived but widespread, and limited habitat loss may be considered. Conservation of subpopulations is essential if they occur (i) within a threatened ecosystem or (ii) within an area required for biodiversity conservation in terms of a relevant biodiversity conservation plan or (iii) on a site associated with additional ecological sensitivities.
^a Critically Rare		This is a highly range-restricted species, known from a single site, and therefore no loss of habitat should be permitted as it may lead to extinction of the species. The Threatened Species Programme is not aware of any current threats to this species and should be notified without delay.
^a Rare		The species is likely to have a restricted range, or be highly habitat specific, or have small numbers of individuals, all of which makes it vulnerable to extinction should it lose habitat. Recommend no loss of habitat. The Threatened Species Programme is not aware of any current threats to this species and should be notified without delay.
Declining		The species is declining but the population has not yet reached a threshold of concern; limited loss of habitat may be permitted. Should the species is known to be used for traditional medicine and if individuals will not be conserved <i>in situ</i> , plants should be rescued and used as mother stock for medicinal plant cultivation programmes.

Table 3.2: The biological indicators of extinction risk as contained in each of the five SANBI criteria.

Criterion	Biological indicator	Risk factor	Quantitative thresholds		
			CR	EN	VU
A	Large and rapid reduction in population size relative to the life history of the species	Proportion by which population is reduced	>80%	>50%	>30%
B	Small geographic range and decline, population fluctuation or fragmentation	Extent of occurrence (EOO)	<100 km ²	<5 000 km ²	<20 000 km ²
		Area of occupancy (AOO)	<10 km ²	<500 km ²	<2 000 km ²
C	Small population size and decline	Population size	<250	<2 500	<10 000
		Number of mature individuals in largest subpopulation	<50	<250	<1 000
		Proportion of population in largest subpopulation	>90%	>95%	100%
D	Critically small population size or very restricted distribution	Population size	<50	<250	<1 000
		Area of occupancy (AOO)			<20 km ²
		Number of locations			Five or fewer
E	Quantitative analysis of extinction risk	Probability of extinction over a specified time period	50%	20%	10%

3.2. Sampling protocol

The entire KwNGB study area was inspected to evaluate vegetation composition and to provide more detailed information on the plant communities present. The site inspection took into account the amount of time available for the study and limitations such as the seasonality of the vegetation.

Vegetation communities were described according to the dominant species recorded from each type. These were mapped and assigned a sensitivity score.

3.3. Vegetation mapping

Mucina and Rutherford (2012) developed the National Vegetation map as part of a SANBI funded project: *“It was compiled in order to provide floristically based vegetation units of South Africa, Lesotho and Swaziland at a greater level of detail than had been available before.”* The SANBI Vegmap was developed using a wealth of data from several contributors and has allowed for the best national vegetation map to date, the last being that of A Cocks developed over 50 years ago. This SANBI Vegetation map project has two main aims:

- To determine the variation in and between units of southern African vegetation based on the analysis and synthesis of data from vegetation studies throughout the region; and
- To compile a vegetation map. The aim of the map was to accurately reflect the distribution and variation on the vegetation and indicate the relationship of the vegetation with the environment. For this reason the collective expertise of vegetation scientists from universities and state departments were harnessed to make this project as comprehensive as possible.

The SANBI Vegmap describes each vegetation type in detail, along with the most important species including endemic species and those that are biogeographically important. This is the most comprehensive data for vegetation types in South Africa. In this study the SANBI Vegmap is used to for comparison with actual on site conditions of vegetation observed.

3.4. Tools available to define wetlands

The following tools were used to define wetlands.

3.4.1. National Freshwater Ecosystem Priority Areas (NFEPAs)

The NFEPAs programme provides strategic spatial priorities for conserving South Africa’s freshwater ecosystems and supports sustainable use of water resources. These priority areas are called Freshwater Ecosystem Priority Areas, or FEPAs. The system comprises a hierarchical classification process of defining a wetland based on the principles of the hydro-geomorphic (HGM) approach at higher levels, with structural features being included at the finer levels (SANBI, 2009).

Wetland ecosystem types were used by NFEPAs for representing natural examples of the diversity of wetland ecosystem types across South Africa. Wetlands of the same ecosystem type are expected to share similar functionality and ecological characteristics. The biodiversity target for freshwater ecosystems in South Africa is 20%, which means that we should keep at least 20% of each wetland ecosystem type in a natural or near-natural condition. This serves to conserve many common species and communities, and the habitats in which they evolve. Information used to classify wetlands as FEPAs included:

- Ramsar status;
- Known threatened frog and waterbird occurrences; and
- Expert knowledge on biodiversity importance.

For the purposes of this study Version 4 of the National Wetland Classification System (NWCS) was used as baseline information, as per SANBI's BGIS interactive tool.

The NWCS uses hydrological and geomorphological traits to distinguish the direct factors that influence wetland function. This is presented as a 6 tiered structure with four spatially nested primary levels that are applied in a hierarchical manner between different wetland types on the basis of these direct factors (SANBI, 2009).

- Level 1: Distinguishes between marine, estuarine and inland ecosystems based on the degree of connectivity the systems have with the ocean;
- Level 2: Categorises the regional wetland setting using a combination of biophysical attributes at the landscape level;
- Level 3: Assesses the topographical position of inland wetlands; and
- Level 4: Concerns the hydrogeomorphic (HGM) units as defined as follows:
 - *Landform* - considering the shape and localised setting of the wetland;
 - *Hydrological characteristics* - nature of water movement into, through and out of the wetland; and
 - *Hydrodynamics* - the direction and strength of flow through the wetland.

The HGM unit is considered the focal point for NWCS as the upper levels mean to classify the broad biogeographical context for grouping functional wetland units at the HGM level, whilst the lower levels provide more descriptive detail.

As wetlands are formed under the influence of geology, hydrology and topography it is necessary to note these features when delineating a wetland.

- **Geology:** Geology influences the formation of a wetland by geological obstructions such as erosion resistant rock or impervious material close to the surface forcing groundwater to move close to or onto the soil surface;
- **Hydrology:** The water transfer mechanisms such as source, movement and exit are important features of a wetland; and
- **Topography:** The topography of the landscape influences the likelihood of whether a wetland will form. For instance, under the right conditions wetlands may form in floodplains, valley bottoms, hillslopes, depressions and coastal flats.

A range of 'hydro-geomorphic' types can be defined by considering the above features. Six HGM units are defined for South African inland wetlands (SANBI, 2009):

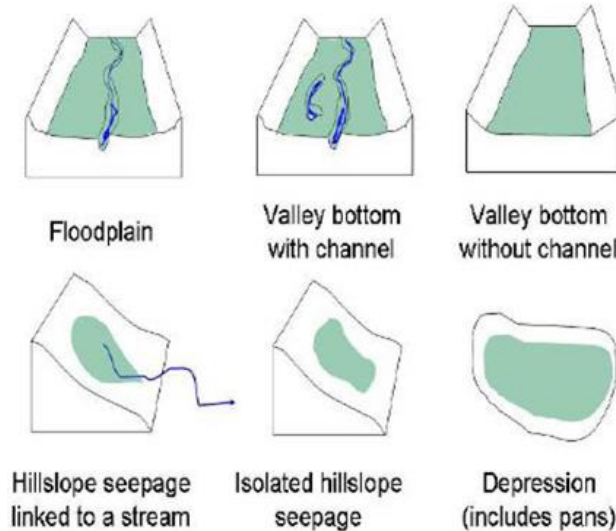


Figure 3.2: The HGM types for South African Inland wetlands (SANBI, 2009).

Important rivers are also classified according to the NFEPA rivers maps. These rivers are considered Freshwater Ecosystem Priority Areas (FEPAs). FEPAs are strategic spatial priorities for conserving freshwater ecosystems and supporting sustainable use of water resources. FEPAs are an essential part of an equitable and sustainable water resource strategy meaning that they need to stay in a good condition to manage and conserve freshwater ecosystems, and to protect water resources for human use. This means that the areas should be supported by good planning, decision-making and management to ensure that human use does not impact on the aquatic ecosystem.

3.5. Tools available for wetland delineation

3.5.1. DWAF (2005) wetland delineation

The DWAF (2005) guidelines for “a practical field procedure for delineation of wetlands and riparian areas” are recommended in Gazette No. 19182, Notice No. 1091 of the National Water Act, 1998. This guideline explains the field indicators and methods for determining whether an area is a wetland or a riparian area, and how to find its boundaries. Although the primary driver of a wetland is water, due to its dynamic nature water is not a very useful parameter for identifying the outer boundary of a wetland. What is needed is a method of identifying the indirect indicators of prolonged saturation by water. This includes wetland plants (hydrophytes) and wetland (hydromorphic) soils. Their presence or absence implies the frequency and duration of saturation and is a satisfactory indicator to classify the area as a wetland (DWAF, 2005).

In wetland delineation there are three zones which are distinguished according to a changing frequency of saturation. These are the permanent, seasonal and temporary zone. The primary objective of wetland delineation is usually to define the outer edge of the temporary zone as it marks the boundary between the wetland and the adjacent terrestrial zone. There are four important indicators that are used to define the boundaries of a wetland. The most important one is the soil wetness indicator with terrain unit, soil form and vegetation acting as confirmation. The point where wetland indicators are not present is regarded as the edge of the wetland.

The permanently wet zone is characterised by dark grey, clay soil, caused by a lack of oxygen required for the oxidation of minerals such as iron in the soil. The seasonally wet zone is characterised by grey soils with

lots of orange and black mottles. It is generally recommended that there should be a 100m buffer zone between the edge of the delineated temporary zone and any development. Important indicators of each zone are as follows:

- **Wetland vegetation**

In order to tolerate the anaerobic conditions of seasonal or permanent flooding, hydrophytes (water loving plants) have evolved a number of adaptations. Their presence can therefore indicate a moist soil habitat and thus provide a potential boundary of a wetland's seasonally flooded or permanent flooded zones (Macfarlane et al., 2007).

- *The temporary zone of a wetland will show mainly grasses, some woody species and some sedges.*
- *The seasonal zone will begin to show more hydrophytic (or water loving) sedges with tall grasses (over 1m).*
- *The permanent zone will be noticeable by emergent reeds and sedges, bulrushes or floating and submerged plants. Woody species will have adaptations for permanent wetness such as prop roots (Mangroves).*

- **Wetland soils**

Low oxygen levels result in a reduced rate of organic matter decomposition within the soil, where sulphur tends to exist in its reduced form, hydrogen sulphide (H₂S), noticeable by its tell-tale rotten-egg smell. These conditions also serve as a catalyst for the metals in the soil to become soluble and begin leaching (DWAF, 2005). The metals produce rich colours of yellow, orange and reds.

- *The temporary or seasonal zone of a wetland, where there is more seasonal flooding, produces mottling of colours, as the metals are still in the process of precipitating. These mottles occur within a grey matrix where the metals have already leached.*
- *The permanent zone of a wetland, where there is more permanent flooding of the soil, produces leaching of metals, with soils remaining a grey ("gleyed") colour.*
- *It is recommended by DWAF (2005) that soils be sampled on the surface (0-10cm) and between 40 and 50cm.*

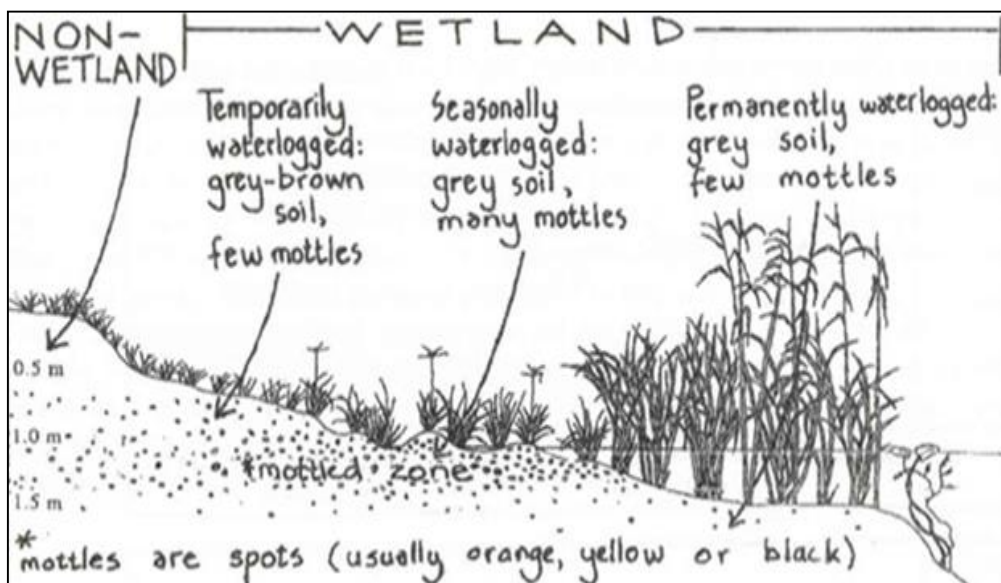


Figure 3.3: A cross-section through a wetland, indicating how the soil wetness and vegetation indicators change as one moves along a gradient of decreasing wetness, from the middle to the edge of the wetland (DWAF, 2005).

3.6. Botanical and Wetland Sensitivity assessment

The sensitivity assessment approach entails identifying zones of high, moderate and low sensitivity according to a system developed by CES and used in numerous botanical studies. It must be noted that the sensitivity zonings in this study are based solely on botanical and aquatic characteristics and social and economic factors have not been taken into consideration. The sensitivity analysis described here is based on 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 and biodiversity patterns (hotspots) and biodiversity process areas (ecological infrastructure and corridors (Table 3.3).

Although very simple, this method of analysis provides a good, yet conservative and precautionary assessment of the ecological sensitivity and was applied to determine the botanical and wetland sensitivity.

Table 3.3: Criteria used for the analysis of the sensitivity of the area.

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	Topography	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	Vegetation - Extent or habitat type in the region	Extensive	Restricted to a particular region / zone	Restricted to a specific locality / site
3	Conservation status 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	Species of special concern - 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	Habitat fragmentation 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
6	Biodiversity contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High species diversity, complex plant and animal communities
7	Visual quality of the site or landscape from other vantage	Site is hidden or barely visible from any vantage points with the	Site is visible from some or a few vantage points but is not obtrusive or very conspicuous	Site is visible from many or all angles or vantage points

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
	points	exception in some cases from the sea		
8	Erosion potential 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
9	Rehabilitation potential 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
10	Disturbance 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
11	Ecological function 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
12	Ecological services (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

A botanical and wetland sensitivity map was also developed with the aid of satellite imagery so that the sensitive regions and vegetation types could be plotted (see Chapter 6). The following was also taken into account:

3.6.1. Biodiversity Regulation

National:

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. The site does not fall within any threatened ecosystems.

Provincial:

The current Eastern Cape Biodiversity Conservation Plan (ECBCP, 2007) is a first attempt at detailed, low-level conservation mapping for land-use planning purposes. The aim of ECBCP 2007 is to map critical biodiversity areas through a systematic conservation planning process. This includes the mapping of priority

aquatic features, land-use pressures, critical biodiversity areas and develops guidelines for land and resource-use planning and decision-making.

ECBCP is in the process of being updated (ECBCP 2017) and this updated version will be used for this assessment.

The main outputs of the ECBCP are “critical biodiversity areas” or CBA’s, which are associated with the following management recommendations:

- **CBA 1** = Maintain in a natural state
- **CBA 2** = Maintain in a near-natural state
- **ESA 1** = Maintain in a functional state
- **ESA 2** = Maintain in a near functional state

The remainder of the areas are mapped as Biodiversity Land Management Classes (BLMC’s) with the following management recommendations:

- **BLMC 3** = Functional Landscapes
- **BLMC 4** = Towns & Settlements
 - = Woodlots & Plantations
 - = Cultivated Land

ECBCP 2017 maps CBA’s based on extensive biological data and input from key stakeholders. Although ECBCP 2017 is mapped at a finer scale than ECBCP2007, it is imperative that the status of the environment, for any proposed development MUST first be verified through a site assessment before the management recommendations associated with the ECBCP are considered. It is also important to note that the ECBCP2017 is currently undergoing public review and once adopted by the Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT), will be used as a systematic biodiversity conservation plan for the Province.

3.7. Impact assessment

3.7.1. Impact rating methodology

To ensure a direct comparison between various specialist studies, a standard rating scale has been defined and will be used to assess and quantify the identified impacts. This is necessary since impacts have a number of parameters that need to be assessed. Five factors need to be considered when assessing the significance of impacts, namely:

- 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.
- Relationship of the impact to **spatial scales** - the spatial scale defines the physical extent of the impact.

- The **severity of the impact** - 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 a particular affected system (for ecological impacts) or a particular affected party.
- The severity of impacts can be evaluated with and without mitigation in order to demonstrate how serious the impact is when nothing is done about it. The word ‘mitigation’ means not just ‘compensation’, but also the ideas of containment and remedy. For beneficial impacts, optimization means anything that can enhance the benefits. However, mitigation or optimization must be practical, technically feasible and economically viable.
- The **likelihood** of the impact occurring - the likelihood of impacts taking place as a result of project actions differs between potential impacts. There is no doubt that some impacts would occur (e.g. loss of vegetation), but other impacts are not as likely to occur (e.g. vehicle accident), and may or may not result from the proposed development. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- Each criterion is ranked with scores assigned as presented in Table 3.4 to determine the overall significance of an activity. The criterion is then considered in two categories, viz. effect of the activity and the likelihood of the impact. The total scores recorded for the effect and likelihood are then read off the matrix presented in Table 3.5, to determine the overall significance of the impact. The overall significance is either negative or positive.
- The **significance** scale is an attempt to evaluate the importance of a particular impact. This evaluation needs to be undertaken in the relevant context, as an impact can either be ecological or social, or both. The evaluation of the significance of an impact relies heavily on the values of the person making the judgment. For this reason, impacts of a social nature need to reflect the values of the affected society.

Cumulative Impacts:

Cumulative impacts affect the significance ranking of an impact because the impact is taken in consideration of both onsite and offsite sources. For example, pollution making its way into a river from a development may be within acceptable national standards. Activities in the surrounding area may also create pollution which does not exceed these standards. However, if both onsite and offsite activities take place simultaneously, the total pollution level may exceed the standards. For this reason it is important to consider impacts in terms of their cumulative nature.

Seasonality:

Although seasonality is not considered in the ranking of the significance, it may influence the evaluation during various times of the year. As seasonality will only influence certain impacts, it will only be considered for these, with management measures being imposed accordingly (i.e. dust suppression measures being implemented during the dry season).

Table 3.4. Significance Rating Table.

Temporal Scale (The duration of the impact)	
Short term	Less than 5 years (many construction phase impacts are of a short duration).
Medium term	Between 5 and 20 years.

Long term	Between 20 and 40 years (from a human perspective almost permanent).
Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
Spatial Scale (The area in which any impact will have an affect)	
Individual	Impacts affect an individual.
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
Project Level	Impacts affect the entire project area.
Surrounding Areas	Impacts that affect the area surrounding the development
Municipal	Impacts affect either the Local Municipality, or any towns within them.
Regional	Impacts affect the wider district municipality or the province as a whole.
National	Impacts affect the entire country.
International/Global	Impacts affect other countries or have a global influence.
Will definitely occur	Impacts will definitely occur.
Degree of Confidence or Certainty (The confidence with which one has predicted the significance of an impact)	
Definite	More than 90% sure of a particular fact. Should have substantial supportive data.
Probable	Over 70% sure of a particular fact, or of the likelihood of that impact occurring.
Possible	Only over 40% sure of a particular fact, or of the likelihood of an impact occurring.
Unsure	Less than 40% sure of a particular fact, or of the likelihood of an impact occurring.

Table 3.5. Impact Severity Rating.

Overall Significance (The combination of all the above criteria as an overall significance)	
VERY HIGH NEGATIVE	VERY BENEFICIAL
<p>These impacts would be considered by society as constituting a major and usually permanent change to the (natural and/or social) environment, and usually result in severe or very severe effects, or beneficial or very beneficial effects.</p> <p>Example: The loss of a species would be viewed by informed society as being of VERY HIGH significance.</p> <p>Example: The establishment of a large amount of infrastructure in a rural area, which previously had very few services, would be regarded by the affected parties as resulting in benefits with VERY HIGH</p>	

significance.	
HIGH NEGATIVE	BENEFICIAL
<p>These impacts will usually result in long term effects on the social and/or natural environment. Impacts rated as HIGH will need to be considered by society as constituting an important and usually long term change to the (natural and/or social) environment. Society would probably view these impacts in a serious light.</p> <p>Example: The loss of a diverse vegetation type, which is fairly common elsewhere, would have a significance rating of HIGH over the long term, as the area could be rehabilitated.</p> <p>Example: The change to soil conditions will impact the natural system, and the impact on affected parties (such as people growing crops in the soil) would be HIGH.</p>	
MODERATE NEGATIVE	SOME BENEFITS
<p>These impacts will usually result in medium to long term effects on the social and/or natural environment. Impacts rated as MODERATE will need to be considered by society as constituting a fairly important and usually medium term change to the (natural and/or social) environment. These impacts are real but not substantial.</p> <p>Example: The loss of a sparse, open vegetation type of low diversity may be regarded as MODERATELY significant.</p>	
LOW NEGATIVE	FEW BENEFITS
<p>These impacts will usually result in medium to short term effects on the social and/or natural environment. Impacts rated as LOW will need to be considered by the public and/or the specialist as constituting a fairly unimportant and usually short term change to the (natural and/or social) environment. These impacts are not substantial and are likely to have little real effect.</p> <p>Example: The temporary changes in the water table of a wetland habitat, as these systems are adapted to fluctuating water levels.</p> <p>Example: The increased earning potential of people employed as a result of a development would only result in benefits of LOW significance to people who live some distance away.</p>	
NO SIGNIFICANCE	
<p>There are no primary or secondary effects at all that are important to scientists or the public.</p> <p>Example: A change to the geology of a particular formation may be regarded as severe from a geological perspective, but is of NO significance in the overall context.</p>	
DON'T KNOW	
<p>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.</p> <p>Example: The effect of a particular development on people's psychological perspective of the environment.</p>	

4. Relevant legislation

The proposed infrastructure developments will be subject to the requirements of various items of South African legislation. These are described below.

Table 4.1. Environmental legislation considered in the preparation of this study for the proposed Infrastructure Developments in the SANBI KwNBG.

Title of Environmental legislation, policy or guideline	Implications for the Proposed Infrastructure Developments in the SANBI KwNBG
Constitution Act (No. 108 of 1996)	<ul style="list-style-type: none"> - Obligation to ensure that the proposed development will not result in pollution and ecological degradation; and - Obligation to ensure that the proposed development is ecologically sustainable, while demonstrating economic and social development.
National Environmental Management Act (NEMA) (No. 107 of 1998)	<ul style="list-style-type: none"> - The developer must apply the NEMA principles, the fair decision-making and conflict management procedures that are provided for in NEMA; and - The developer must apply the principles of Integrated Environmental Management and consider, investigate and assess the potential impact of existing and planned activities on the environment, socio-economic conditions and the cultural heritage.
National Environment Management: Biodiversity Act (NEMBA) (No. 10 of 2004)	<ul style="list-style-type: none"> - The proposed development must conserve endangered ecosystems and protect and promote biodiversity; - Must assess the impacts of the proposed development on endangered ecosystems; - No protected species may be removed or damaged without a permit; and - The proposed site must be cleared of alien vegetation using appropriate means.
Nature and Environmental Conservation Ordinance (NECO) (No 19 of 1974)	<ul style="list-style-type: none"> - All species of animals listed as schedule 1 endangered wild animals or schedule 2 protected wild animals and plants listed as either schedule 3 endangered flora or schedule 4 protected flora must be identified on site. - All species identified must be removed/relocated for site after the issuing of a permit by the provincial Department of Economic Development Environmental Affairs and Tourism (DEDEAT).
National Environmental Management: Protected Areas Act (No. 57 of 2003)	<ul style="list-style-type: none"> - The objective 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; and - In terms of Section 50 (1)(a)(ii) of this Act, the management authority may "Carry out or allow an activity in the reserve aimed at raising revenue". However, Section 50 (2) states that such activity may not negatively affect the survival of any species in, or significantly disrupt the integrity of the ecological system of the nature reserve. Furthermore, in terms Section 51 (a), the Minister or MEC is responsible for the

Title of Environmental legislation, policy or guideline	Implications for the Proposed Infrastructure Developments in the SANBI KwNBG
	regulations or restrictions of the development and other activities in a protected environment, <i>“which may be inappropriate for the area, given the purpose for which the area was declared”</i> .
National Water Act (No. 36 of 1998)	– This Act provides details of measures intended to ensure the comprehensive protection of all water resources, including the water reserve and water quality. This proposed development will likely trigger the need for a water-use license according to Sections 21 (c) and (i) of the Act.
National Forest Act (84 of 1998)	– Requires that a permit be obtained should any forests of protected trees be removed during the construction phase of the project.

5. Description of the biophysical environment

As mentioned earlier, the study sites and surrounding areas were described using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation and surface water classifications and biodiversity programmes and plans. This was followed by a site visit on 24 November 2017 in order to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species associated with the proposed project activities (see Chapter 5).

5.1. Background and Literature review

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:

- SANBI vegetation (Mucina & Rutherford, 2012);
- Eastern Cape Biodiversity Management Plan (ECBCP; 2017);
- The National Freshwater Ecosystem Priority Areas (NFEPA);
- National Protected Areas Act (NO. 57 of 2003; NEMPAA);
- National Protected Areas Expansion Strategy (NPAES);
- Review of the SANBI Red Data List (Plants);
- Convention on International Trade in Endangered Species (CITES);
- International Union for Conservation of Nature (IUCN);
- Provincial Nature Conservation Ordinance (PNCO);
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Threatened or Protected Species;
- National Biodiversity Management: Biodiversity Act (NEMBA) List of Alien Invasive Vegetation;
- National Biodiversity Management: Biodiversity Act (NEMBA) National List of Ecosystems that are Threatened and in need of protection; and
- Department of Agriculture, Forestry and Fisheries (DAFF) List of Protected Trees (National Forestry Act, No 84 of 1998; NFA).

5.2. Climate

The proposed site is in Kwelera in the Eastern Cape Province of South Africa. Kwelera has a temperate and generally warm climate. The temperature averages 18.4 °C and the average annual rainfall is 713mm. February is the warmest month of the year with an average temperature of 22 °C and July is the coldest month with an average temperature of 15 °C, as indicated in Figure 5.1. The area receives significant rainfall. Precipitation is the lowest during the winter months, with a June average of 27mm, and it is the highest during spring, averaging 80mm in October.

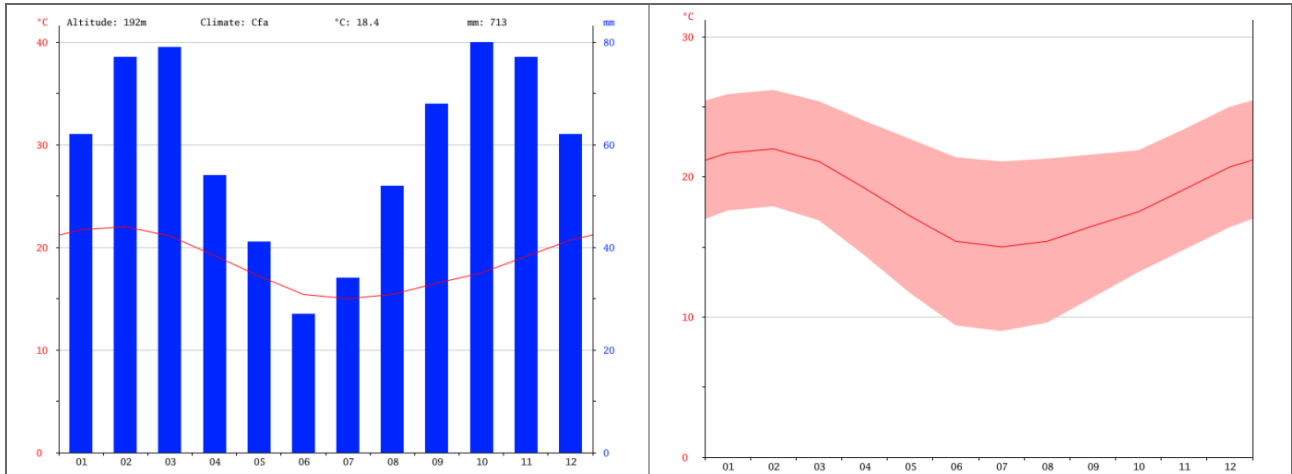


Figure 5.1: Kwelela average annual rainfall and temperature (<https://en.climate-data.org/location/27114/>)

5.3. Topography

The topography within the 10ha portion of land is relatively flat and slopes towards the south west. The topography of the remainder surrounding 160 ha portion of land consists of small gently sloping hills and small dunes (Figure 5.2).

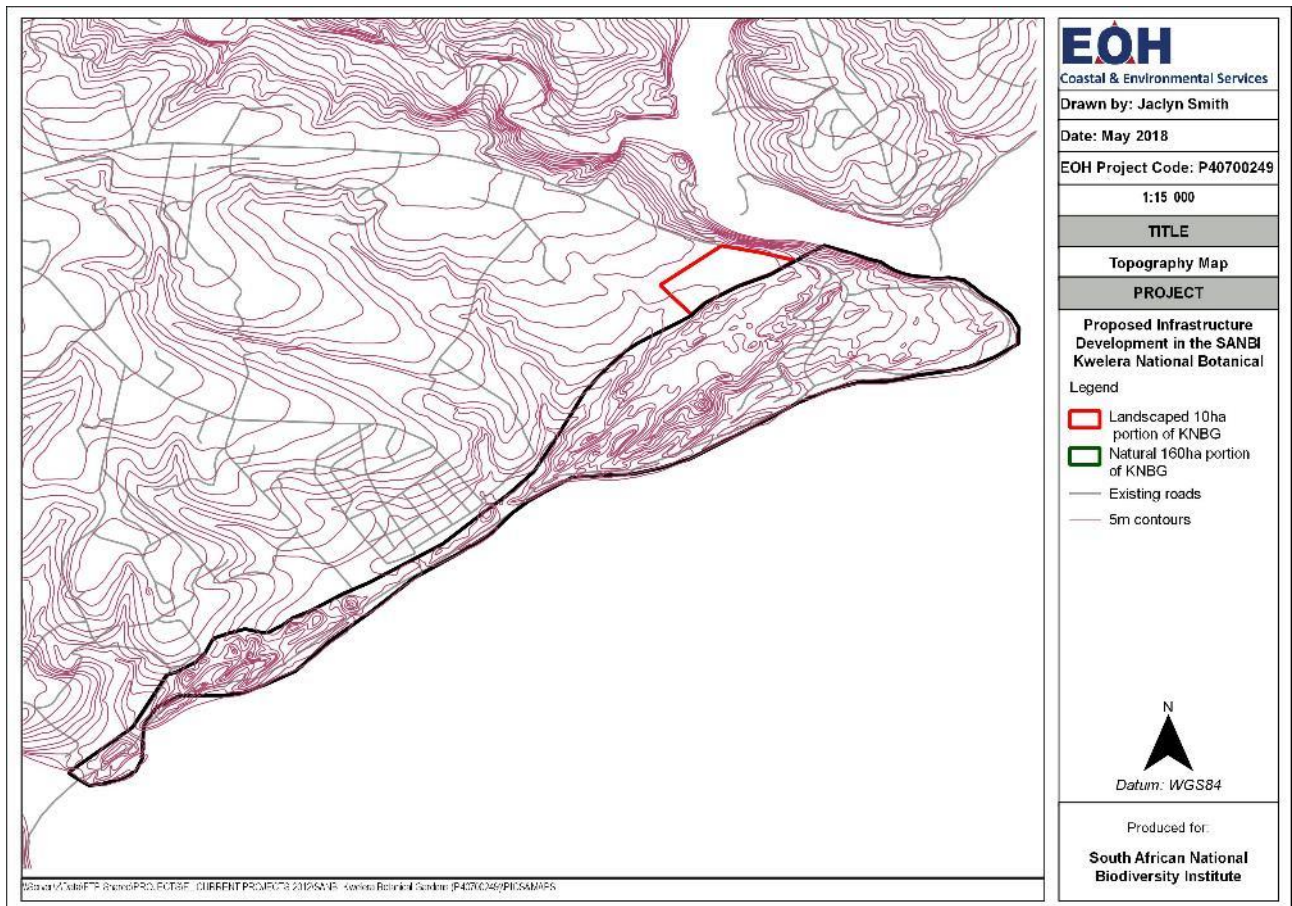


Figure 5.2: Topography of the site.

5.4. Geology and Soils

The proposed site is underlain by the mudstones of the Beaufort group of the Karoo Supergroup and Quaternary alluvial sands (Figure 5.3).

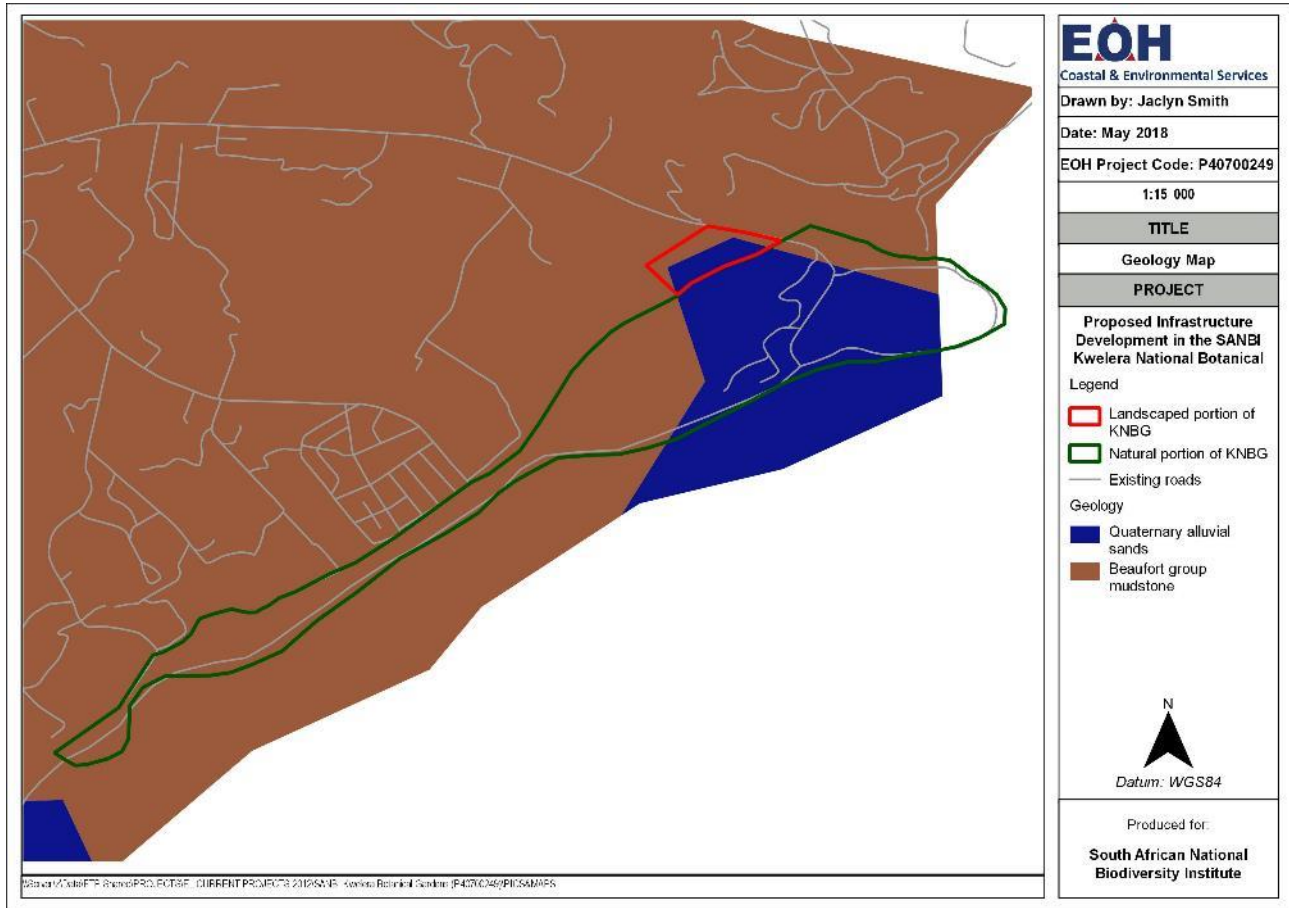


Figure 5.3: General geology of the site.

5.5. Hydrology

5.5.1. Quaternary Catchment and water management area

The study area is located within Quaternary Catchment R30B (Primary Catchment R) and Water Management Area 7 (Mzimvubu to Tsitsikamma) (Figure below 5.4).

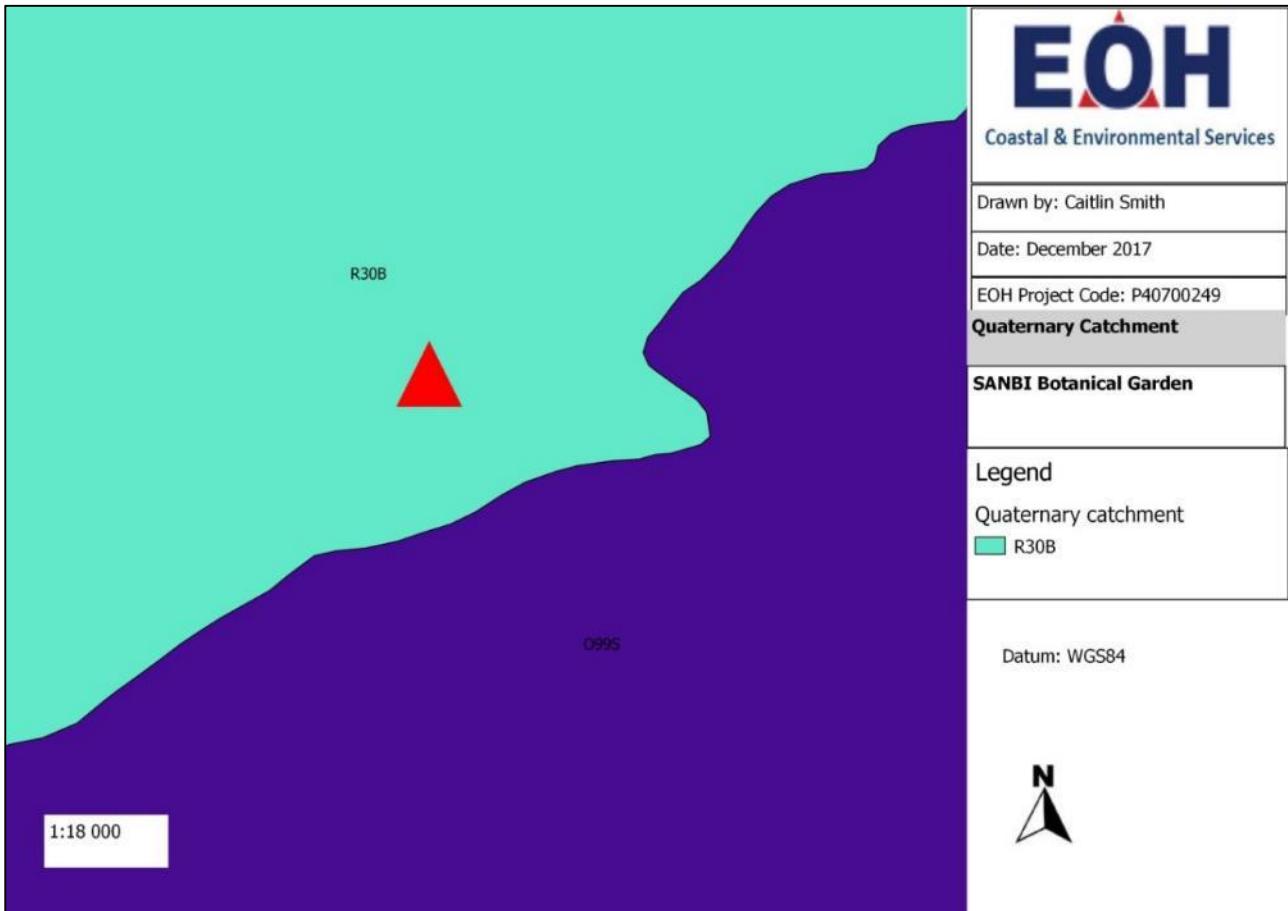


Figure 5.4: Quaternary Catchment Locality Map.

5.5.2. Wetlands

Wetlands in South Africa have been mapped on a broad-scale by various stakeholders and have been included in the National Freshwater Ecosystem Priority Assessment (NFEPA, 2011-2014). Due to the broad-scale nature of the NFEPA map it is not spatially accurate and therefore some error is expected. The location of NFEPA wetlands was derived from the National Land Cover 2000 (Van Den Berg et al., 2008) and inland water features from the Department of Land Affairs' Chief Directorate: Surveys and Mapping (DLA-CDSM). All wetlands are classified as either 'natural' or 'artificial' water bodies.

The NFEPA wetland map identifies important or sensitive wetlands and wetland clusters. A wetland cluster is a group of wetlands all within 1 km of each other and which are surrounded by relatively natural vegetation. Figure 5.5 indicates the NFEPA wetlands listed within 500 m of the study area. The NFEPA wetlands located within 500 m of the proposed infrastructure includes a stock dam and the Kwelela Estuarine Functional Zone.

Five additional wetlands were delineated on Farm 1505 (the 10ha landscaped portion of the KwNBG). According to the wetland classification provided by Ollis et al. (2013) these wetlands are depressions. These wetlands have also been described by MacKenzie (2012) who conducted an assessment of these wetlands in 2012. According to MacKenzie (2012) there is also a large population of the painted reed frogs (*Hyperolius marmoratus verrucosus*) present within two of the wetlands.

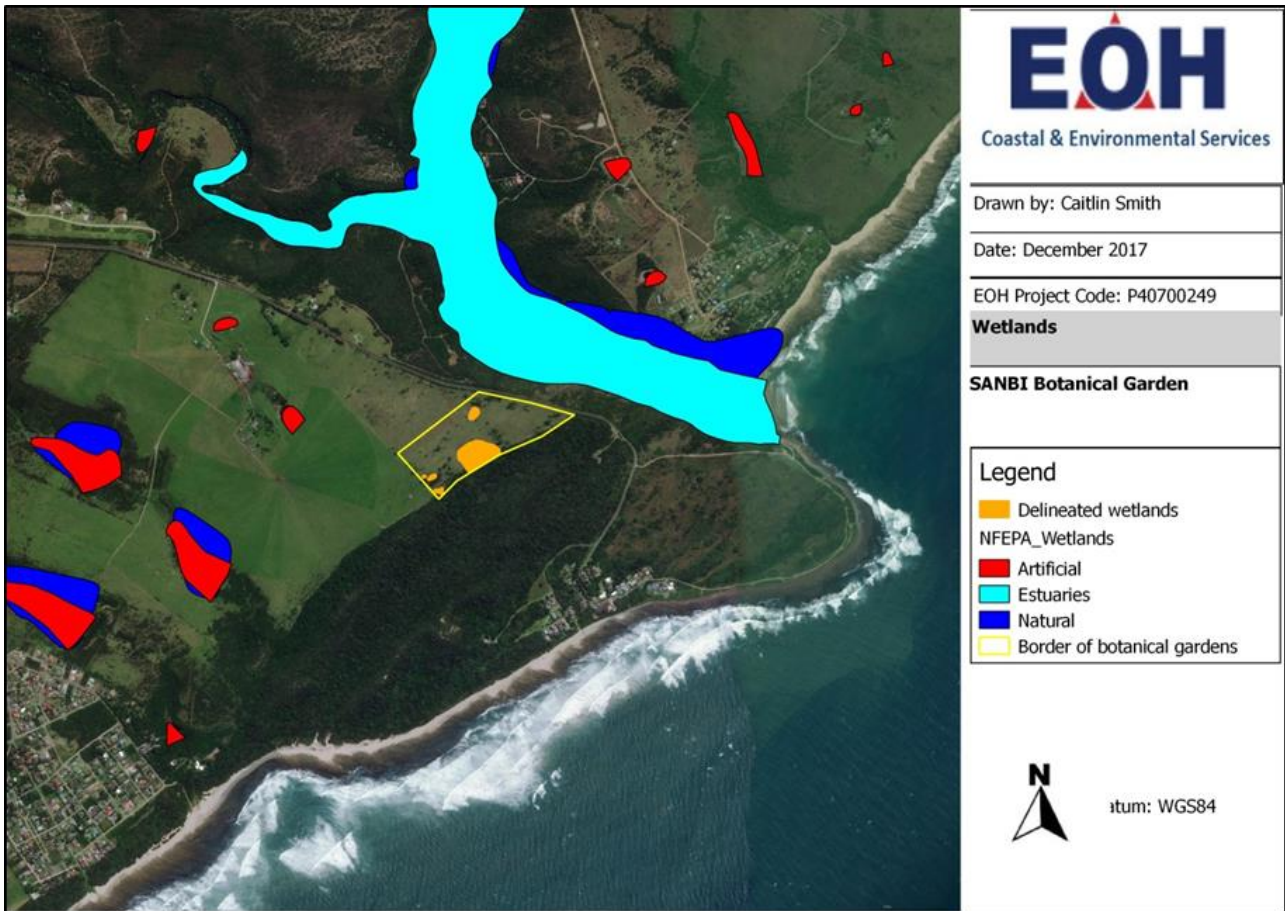


Figure 5.5: Wetlands located in the study area.

5.6. Vegetation and floristics

5.6.1. SANBI classification (Mucina and Rutherford, 2012)

According to the SANBI Map (Mucina and Rutherford; 2012) the 10 ha landscaped portion of the KwNBG falls mostly within the Albany Coastal Belt of the Albany Thicket Biome, the 160 ha natural portion of the KwNBG falls mostly within the Southern Coastal Forest of the Forest Biome and a small portion in the Albany Dune Strandveld (Figure 5.6).

typically composed of very dense shrubby thicket with mostly sclerophyllous shrubs and several woody and herbaceous vines with a sparse grassy understorey. SANBI considers this vegetation as **LEAST THREATENED** with a conservation target of 20%. Approximately 25% of this vegetation type is conserved in nature reserves and private conservation areas. Approximately 8% of this vegetation has been transformed for cultivation and urban development. Other threats to this vegetation include the invasion of large stretches of coastal thicket by Alien Australian acacias, *Lagurus ovatus* and *Lolium* species.

5.6.2. Forest classification (NFA)

According to SANBI the proposed study area falls within the Eastern Cape Dune Forest of the Southern Coastal Group of the Forest biome (Figure 5.7). The Eastern Cape Dune Forest is characterised as a dense-canopy forest found along coastal dune cordons along the Eastern Cape coast. The highest density of these forests occurs along the Kei River Mouth to Mcantzi River Mouth with small pockets occurring as far north as Nxaxo in the Transkei Wild Coast and as far south as Woody Cape. These forests are generally dominated by *Mimusops caffra*, *Sideroxylon inerme* and *Dovyalis rotundifolia*. According to Dereck Berliner (2005) the Eastern Cape Dune Forest has a conservation target of 48% and is considered to be **NEAR THREATENED**. According to CSIR (2003) this dune forest occurs largely on state-owned land which is relatively well-conserved and managed by relevant nature conservation authorities with patches of this forest falling within a number of nature reserves. This forest type is also home to a number of forest dependent and endemic bird, mammal, frog and reptile species. This forest type faces a number of threats including coastal recreational development, coastal dune mining, accidental fires and encroachment of alien invasive woody plant species.

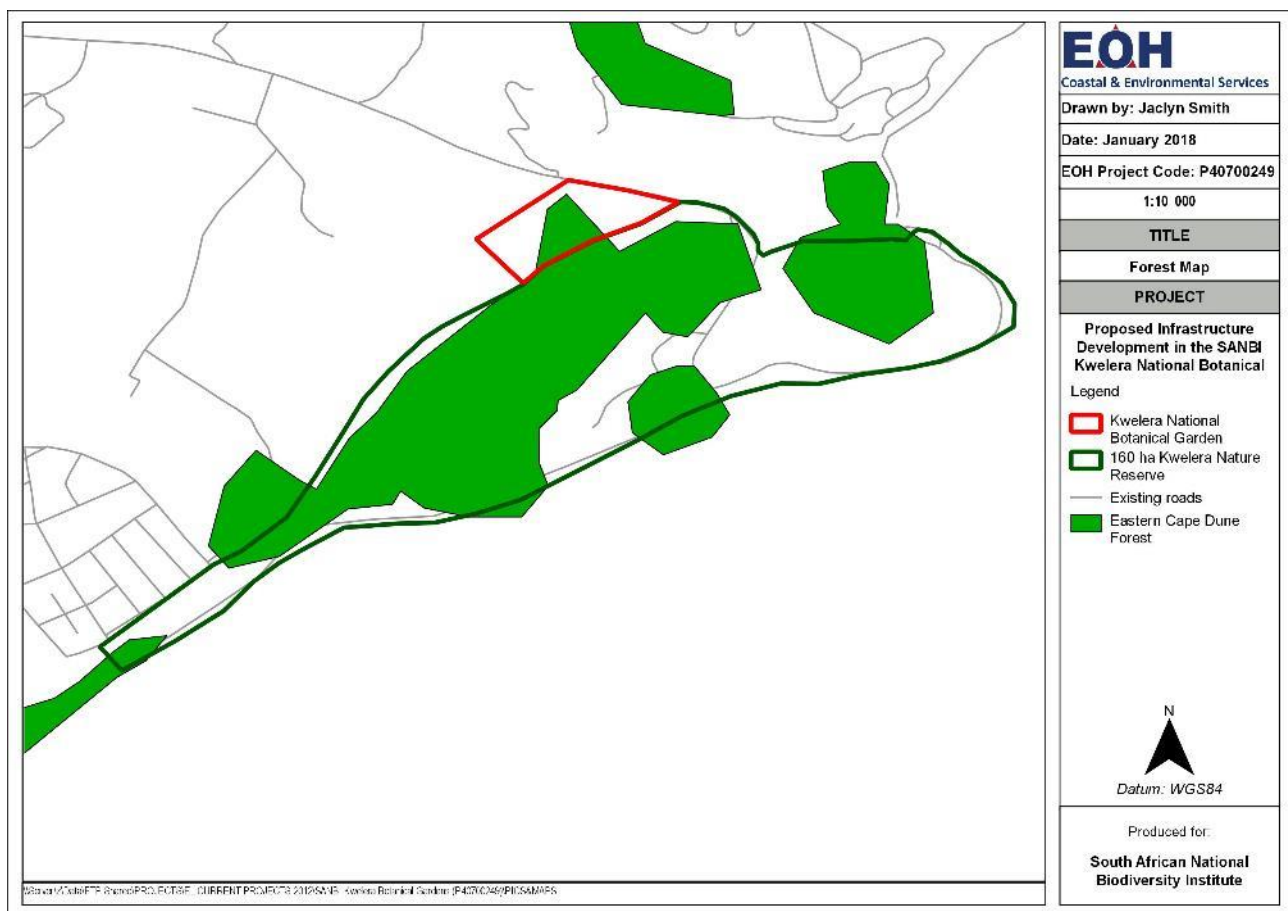


Figure 5.7: Map showing the forest patches within the study area.

5.7. 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 components of the national policy and legislative framework for biodiversity include:

- The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997);
- 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 Strategy and Action Plan (NBSAP) (2015);
- The National Spatial Biodiversity Assessment (2004, currently being reviewed and updated) (NSBA);
- The National Biodiversity Framework (2008) (NBF);
- The National Protected Area Expansion Strategy (2008) (NPAES); and
- Important Bird Areas (2015) (IBA).

In addition to national legislation, some of South Africa's nine provinces have their own provincial biodiversity legislation, as nature conservation is a concurrent function of national and provincial government in terms of the Constitution (Act 108 of 1996). ECBCP covers the entire Eastern Cape Province.

5.7.1. Eastern Cape Biodiversity Conservation Plan (ECBCP)

According to ECBCP (2007) the entire study area falls within a Terrestrial Critical Biodiversity Area (CBA) Category 2 area which recommends that the land should be maintained in a near-natural state. Site observations showed that the 10ha portion of land where the new KwnBG infrastructure will be located is transformed and previously used for agricultural purposes. The 160ha portion of land is mostly conserved as the Kwelela Coastal Nature Reserve while some areas have been transformed to the small villages, Kwelela and Sunrise-on-sea. The study area does not fall within any Aquatic Critical Biodiversity Area.

The management requirements for CBA's 1 and 2 are as follows (taken from the ECBCP 2007 Handbook):

CBA area	Management requirements
CBA 1	These areas are considered as natural landscapes and biodiversity must be maintained in an as natural state as possible so that there is no future biodiversity loss.
CBA 2	These areas are considered as near-natural landscapes and biodiversity must be managed in a near natural state with minimal loss of ecosystem integrity. No transformation of natural habitat should be permitted.

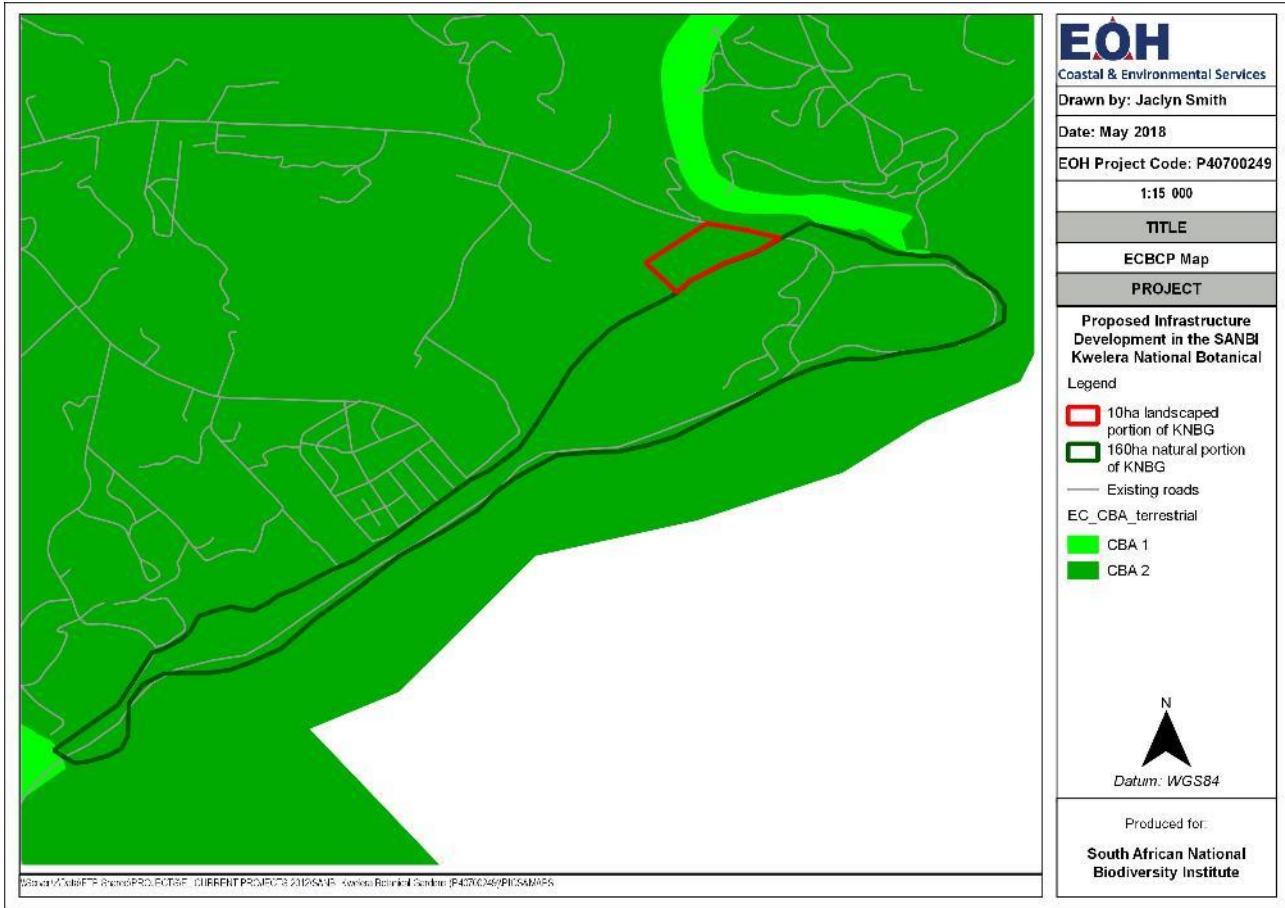


Figure 5.8: ECBCP (2007) conservation biodiversity classes for the study area.

5.7.2. Protected areas

Various areas that are protected by legislation are located within or surrounding the study area (Figure 5.9). Protected areas in the vicinity include:

Name of protected area	Distance from site
East London Coast Nature Reserve	Within the site and 3.4km from the 10ha and 160 ha portion of land
Gonubie Mouth Bird Sanctuary	4.3km from 10ha portion of land; 3.5km from 160 ha portion of land
Nahoon Point to Gonubie Point Marine Protected Area	4.8 km from 10 ha portion of land; 2.8km from the 160 ha portion of land
Quenera Local Authority Nature Reserve	12.1km from 10ha portion of land; 10.3km from the 160 ha portion of land

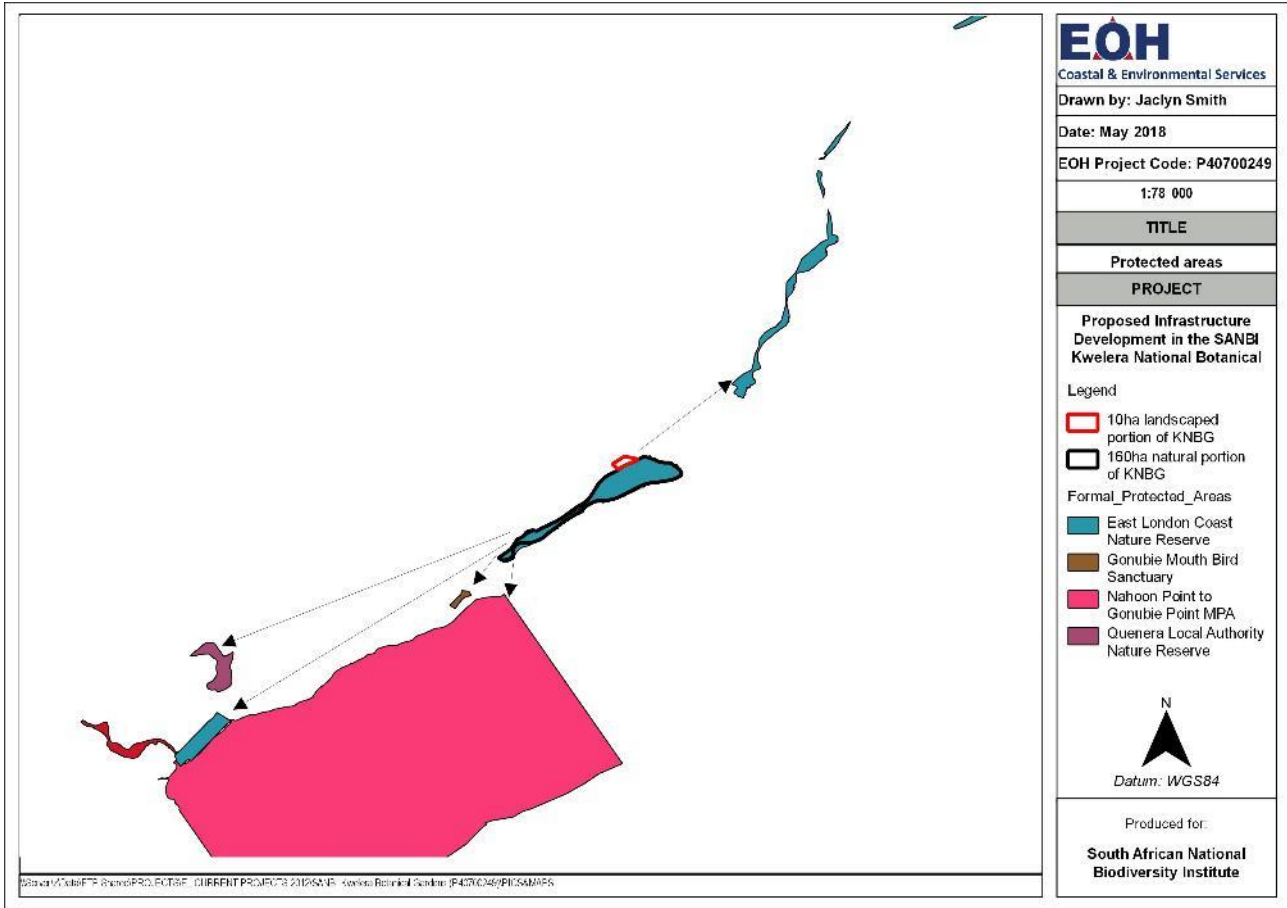


Figure 5.9: Illustrating the distances of various protected areas to study area.

The project site falls within a protected area, the East London Coast Nature Reserve.

5.7.3. Threatened Ecosystems

The National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA) has released a national list of ecosystems that are threatened and in need of protection (GN. 1002 of 2011). The study area is NOT located in any threatened ecosystem as classified by NEMBA.

6. Site investigation

A site investigation was conducted on 24 November 2017 in order to:

- Verify desktop findings;
- Assess the actual ecological state;
- Assess the current land-use;
- Identify potential sensitive ecosystems; and
- Identify plant species communities associated with the proposed project activities.

The site visit also served to inform potential impacts of the proposed project and how significantly it would impact on the surrounding ecological and wetland environment.

6.1. Wetland Survey

The wetland survey identified 5 wetlands as shown in the figure and photo sequence below:



Figure 6.1: Delineated wetlands on the 10ha landscaped portion of the KwNBG.



Wetland 1 with artificial modifications present.



Wetland 2 which is a large wetland dominated by *Eleocharis limosa*.



Wetland 3. This wetland has been artificially modified.



Wetland 4 with some artificial modifications



Wetland 5 with some artificial modifications.

6.2. Vegetation survey

Six vegetation communities were identified within the study area (Table 6.1).

Table 6.1: Vegetation communities found within the study area.

Community #	Name of vegetation community
1	Grassland with bush clumps
2	Wetland Vegetation
3	Dune forest
4	Strandveld/Grassland
5	Transformed forest/thicket
6	Transformed landscape

Below is a map showing the extent of each vegetation community on site:

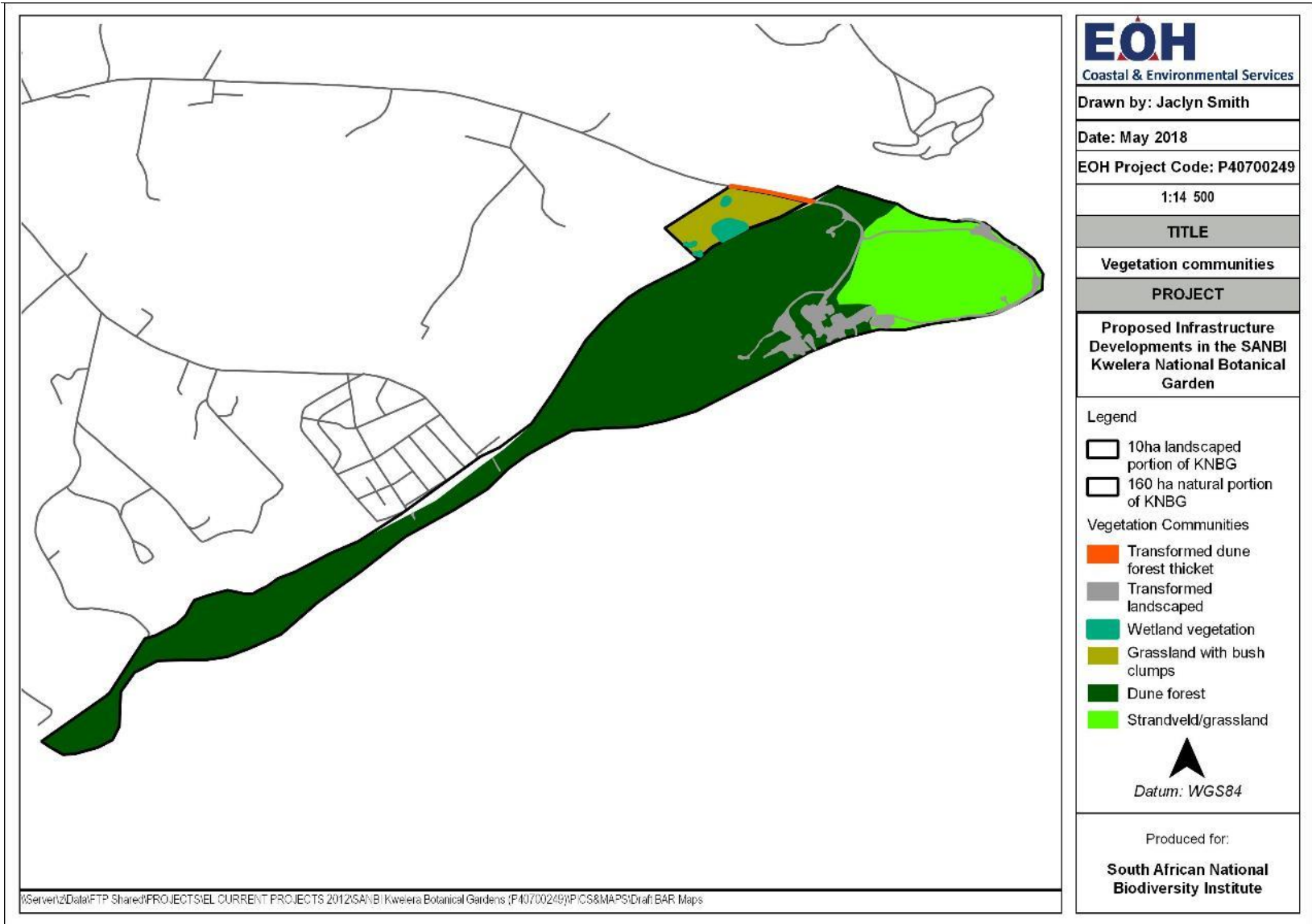


Figure 6.2: Vegetation community map of the proposed KwnBG area.

6.3. Description of vegetation communities

A description of each of the vegetation communities identified within study area is given below:

6.3.1. Grassland with bush clumps

This vegetation community occurs on the 10ha portion of land and is dominated by grasses with dispersed clumps of *Vachellia natalitia* trees. This site was previously used for agricultural purposes and is transformed as a result. This vegetation community covers approximately 5% of the entire project site and most of the 10ha portion of land.

Below is a photo sequence of the Grassland with bush clumps:





6.3.2. Wetland Vegetation

Wetland vegetation occurs within the wetlands found on the 10ha landscaped portion of the KwNGB and comprises approximately 1% of the total KwNGB site and a small portion of the 10ha portion. The wetland vegetation is comprised mostly of *Eleocharis limosa* and some alien invasive plant species including *Lantana camara* and *Datura stramonium*. *Paspalum distichum* was also found within the wetland vegetation.

Below is a photo sequence of the wetland vegetation:





6.3.3. Dune Forest

Forest occurs within the 160ha natural portion of the KwNBG and comprises approximately 70% of the entire project site. A very small portion of the forest overlaps along the south eastern border between the forest and the grassland on the 10ha portion of land. This vegetation community is dominated by *Sideroxylon inerme*, *Mimusops caffra* and *Dovyalis rotundifolia*.

Below is photo sequence of the dune forest:





6.3.4. Strandveld/Grassland

This vegetation community consists of interspersed grassland and strandveld and mostly occurs within the 160ha natural portion of the KwNGB and comprises approximately 18% of the entire project site.

Below is a photo sequence of the strandveld/grassland:



6.3.5. Transformed forest/thicket

This vegetation community occurs on the north eastern border of the 10ha landscaped portion of the KwNGB and comprises approximately 1% of the entire project area. This vegetation consists of some forest species and other indigenous plants. This vegetation has been transformed as it falls within the road reserve and is growing within the fence line bordering the 10ha portion of land of the KwNGB.

Below is a photo sequence of the transformed forest/thicket:



6.3.6. Transformed landscape

This vegetation community occurs within the 160 ha portion of land and covers approximately 5% of the entire project site. It comprises mostly roads, existing buildings, infrastructure, walkways, parking areas, residential areas and the vegetation which falls within these areas. This vegetation community is largely clear of woody vegetation and highly transformed with the exception of the residential areas which do comprise planted and naturally occurring indigenous vegetation.

Below is a photo sequence of the transformed landscape vegetation community:



6.4. Plant species observed

According to POSA (2017), SANBI and CSIR (2003), a number of plant species could be located within and surrounding the study area (Appendix 1). Of these species, 27 are listed as potential SCC (Table 6.2). These species are all Schedule 2 & 3 species on the Provincial Nature Conservation Ordinance Act 19 of 1974, species protected by NEMBA or protected tree species under the National Forest Act, 1998 (Act No. 84 of 1998). The implication is that these species will require a permit for removal or transplant prior to construction. This should be done through a Search and Rescue exercise prior to commencement of clearing.

Table 6.2: List of potential plant SCC that may be found onsite.

Family	Species	Threat status
AMARYLLIDACEAE	<i>Crinum macowanii</i> Baker	Red data list: Declining PNCO Protected
AMARYLLIDACEAE	<i>Crinum moorei</i> Hook.f.	Red data list: Vulnerable NEMBA Protected PNCO Protected
AMARYLLIDACEAE	<i>Cyrtanthus breviflorus</i> Harv.	PNCO Protected
APOCYNACEAE	<i>Asclepias monticola</i> N.E.Br.	Red data list: Critically Rare
APOCYNACEAE	<i>Pachycarpus grandiflorus</i> (L.f.) E.Mey. subsp. <i>grandiflorus</i>	PNCO Protected
ARACEAE	<i>Zantedeschia pentlandii</i> (R.Whyte ex W.Watson) Wittm.	Red data list: Vulnerable NEMBA Protected
CELASTRACEAE	<i>Elaeodendron croceum</i> (Thunb.) DC.	Red data list: Declining
CRASSULACEAE	<i>Crassula perfoliata</i> L. var. <i>minor</i> (Haw.) G.D.Rowley	PNCO Protected
DIOSCOREACEAE	<i>Dioscorea mundii</i>	Red data list: Near Threatened B1ab
ERICACEAE	<i>Erica glumiflora</i> Klotzsch ex Benth.	Red data list: Vulnerable PNCO Protected
IRIDACEAE	<i>Aristea anceps</i> Eckl. ex Klatt	PNCO Protected
IRIDACEAE	<i>Chasmanthe aethiopica</i> (L.) N.E.Br.	PNCO Protected
IRIDACEAE	<i>Dierama igneum</i> Klatt	PNCO Protected
ORCHIDACEAE	<i>Disa cornuta</i> (L.) Sw.	NEMBA Protected PNCO Protected
ORCHIDACEAE	<i>Eulophia macowanii</i> Rolfe	NEMBA Protected PNCO Protected
ORCHIDACEAE	<i>Habenaria epipactidea</i> Rchb.f.	NEMBA Protected PNCO Protected
ORCHIDACEAE	<i>Satyrium sphaerocarpaceum</i> Lindl.	NEMBA Protected PNCO Protected
ORCHIDACEAE	<i>Tridactyle tridentata</i> (Harv.) Schltr.	NEMBA Protected PNCO Protected
PITTOSPORACEAE	<i>Pittosporum viridiflorum</i> Sims	NFA Protected
PODOCARPACEAE	<i>Podocarpus falcatus</i>	NFA Protected
PODOCARPACEAE	<i>Podocarpus latifolius</i>	NFA Protected
PROTEACEAE	<i>Protea simplex</i> E.Phillips	NEMBA Protected PNCO Protected
SAPOTACEAE	<i>Mimusops caffra</i>	NFA Protected

Family	Species	Threat status
SAPOTACEAE	<i>Sideroxylon inerme</i>	NFA Protected
STANGERIACEAE	<i>Stangeria eriopus (Kunze) Baill.</i>	Red data list: Vulnerable PNCO Endangered NEMBA Endangered
ZAMIACEAE	<i>Encephalartos altensteinii Lehm.</i>	Red data list: Vulnerable PNCO Endangered NEMBA Endangered
ZAMIACEAE	<i>Encephalartos caffer (Thunb.) Lehm.</i>	Red data list: Near Threatened PNCO Endangered

6.5. Alien invasive species observed

Alien invasive plant species were identified within the project site. These plants are classified according to the Conservation of Agricultural Resources Act (Act No. 43 of 1983 or CARA) and the National Environmental Management: Biodiversity Act (Act No. 10 of 2004). Below is a list of alien and invasive plant species observed on site and species which may occur:

Table 6.3: List of all alien and invasive plant species that may occur on site.

Plant name	Common name	Category
<i>Achyranthes aspera</i> L. var. <i>sicula</i> L.	Chaff flower	CARA Category 1
<i>Azolla filiculoides</i>	Red water fern	CARA Category 1 NEMBA Category 1b
<i>Opuntia ficus-indica</i>	Sweet prickly pear	CARA Category 1 NEMBA Category 1b
<i>Sesbania punicea</i>	Sesbania	CARA Category 1 NEMBA Category 1b
<i>Arundo donax</i> L.	Giant reed	CARA Category 1 NEMBA Category 1b
<i>Pennisetum clandestinum</i> Hochst. ex Chiov.	Kikuyu grass	NEMBA Category 1b
<i>Cestrum laevigatum</i> Schlttdl.	Inkberry	CARA Category 1 NEMBA Category 1b
<i>Datura stramonium</i>	Jimsonweed	CARA Category 1 NEMBA Category 1b
<i>Solanum elaeagnifolium</i>	Silver-leaved nightshade	CARA Category 1 NEMBA Category 1b
<i>Lantana camara</i> L.	Lantana	CARA Category 1 NEMBA Category 1b
<i>Agave sisalana</i>	Sisal	CARA Category 2 NEMBA Category 2
<i>Acacia saligna</i> (Labill.) H.L.Wendl.	Port Jacksons willow	CARA Category 2 NEMBA Category 1b
<i>Psidium guajava</i> L.	Common guava	CARA Category 2

		NEMBA Category 3
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The following are control measures for alien invasive species categorised in CARA and NEMBA:

6.5.1. NEMBA Categories:

Category 1b invasive species

Plants classified as Category 1b alien invasive species are prohibited from:

- Being imported into the Republic;
- growing or in any other way propagating any specimen;
- conveying, moving or otherwise translocating any specimen;
- spreading or allowing the spread of any specimen; and
- releasing any specimen

Category 2 invasive species

Plants classified as Category 2 alien invasive species require a permit for:

- Being imported into the Republic;
- growing or in any other way propagating any specimen;
- conveying, moving or otherwise translocating any specimen;
- spreading or allowing the spread of any specimen; and
- releasing any specimen.

Category 3 invasive species

Plants classified as Category 3 alien invasive species are prohibited from:

- Being imported into the Republic;
- growing or in any other way propagating any specimen;
- conveying, moving or otherwise translocating any specimen;
- spreading or allowing the spread of any specimen; and
- releasing any specimen.

6.5.2. CARA Categories

Category 1: Declared weeds

These are prohibited plants, which must be controlled or eradicated where possible (except in biocontrol reserves, which are areas designated for the breeding of biocontrol agents).

Category 2: Declared invader plants

These species are allowed only in demarcated areas (by permit) under controlled conditions and in biocontrol reserves. All plants occurring outside the demarcated areas are treated as category 1 plants, which are prohibited.

Category 3: Declared invader plants

No further planting of such species are allowed, nor trade in propagative material. Existing plants may remain, but must be prevented from spreading. Plants may not remain within the floodline of watercourses or wetlands or as directed by the executive officer.

7. Botanical and Wetland sensitivity assessment

Appendix 6

Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
 - (f) details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;
 - (g) an identification of any areas to be avoided, including buffers;
 - (h) a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;

7.1. Conservation and spatial planning tools

Several conservation planning tools are available for the study area. These tools allow for the potential identification of any sensitive and important areas from a botanical and aquatic perspective at the early stage of a development and allow for the fine-tuning of plans and infrastructure layouts.

The following tools were identified and are discussed below:

- NEMBA Threatened Ecosystems;
- SANBI Vegetation threat status;
- Forest classification;
- Identified vegetation communities;
- Delineated wetlands;
- Protected Areas; and
- ECBCP CBA map.

These tools together with the field survey have been used to assess the sensitivity of the study area. Sensitivity of the study area is shown on a sensitivity map (Figure 7.1).

7.1.1. NEMBA Threatened Ecosystems

NEMBA provides a list of threatened terrestrial ecosystems. This was established as little attention has historically been paid to the protection of ecosystems outside of protected areas. The purpose of listing threatened ecosystems is primarily to reduce the rate of ecosystem and species extinction. This includes preventing further degradation and loss of structure, function and composition of threatened ecosystems.

No threatened ecosystem as listed by the NEMBA List of Threatened Ecosystems occurs within or near by the study area.

7.1.2. SANBI Vegetation

Albany Coastal Belt

This vegetation type occurring within the 10ha portion of land (Figure 5.6), is found on gently to moderately undulating landscapes and dissected hilltop slopes close to the coast (within 15-30km of the coastline). It is dominated by short grasslands punctuated by scattered bush clumps or solidary *Vachellia natalitia* (previously called *Acacia natalitia*) trees. SANBI considers this vegetation type as **LEAST CONCERNED** with a conservation target of 19%. Only 1% is formally conserved in 20 local-authority and provincial nature reserves as well as the Greater Addo Elephant National Park and other private conservation areas. Approximately 12% of the Albany Coastal Belt has over recent years been transformed as a result of urbanisation, cultivation and plantation forestry. Erosion is generally very low to moderate.

Southern Coastal Forest

This vegetation type occurring within the 160 ha portion of land and a very small portion of the 10 ha portion of land is found along coastal plains between Alexandria and Van Staden's River canyon and on coastal dunes in the Eastern Cape. It also occurs at low altitudes within deeply incised river valleys surrounded by tropical succulent thicket. It is dominated by *Celtis Africana*, *Sideroxylon inerme*, *Mimusops caffra* and *Dovyalis rotundifolia*. The eastern regions of the distribution area are dominated by well-developed low trees and trees including *Brachylaena discolor*, *Strychnos decussate*, *Euclea natalensis* and *Dracaena aletiformis*. SANBI considers this vegetation type as **LEAST THREATENED** with a conservation target of 40%. More than half of these forests are under statutory conservation especially the frontal dune cordons along the Eastern Cape Coast which fall on state-owned land. Approximately 6% of this forest has been transformed by urbanisation and cultivation. Other serious threats that these forests face include accidental fires, coastal developments and heavy mineral mining from coastal dunes.

Albany Dune Strandveld

This vegetation type occurring within a very small portion of the 160 ha portion of land. This vegetation type occurs on seaward slopes of rocky headlands and coastal dune cordons and is typically composed of very dense shrubby thicket with mostly sclerophyllous shrubs and several woody and herbaceous vines with a sparse grassy understorey. SANBI considers this vegetation as **LEAST THREATENED** with a conservation target of 20%. Approximately 25% of this vegetation type is conserved in nature reserves and private conservation areas. Approximately 8% of this vegetation has been transformed for cultivation and urban development. Other threats to this vegetation include the invasion of large stretches of coastal thicket by Alien Australian acacias, *Lagurus ovatus* and *Lolium* species.

7.1.3. Forest classification

The proposed study area falls within the Eastern Cape Dune Forest of the Southern Coastal Group of the Forest biome (Figure 5.7). The Eastern Cape Dune Forest is characterised as a dense-canopy forest found along coastal dune cordons along the Eastern Cape coast. The highest density of these forests occurs along the Kei River Mouth to Mcantzi River Mouth with small pockets occurring as far north as Nxaxo in the Transkei Wild Coast and as far south as Woody Cape. These forests are generally dominated by *Mimusops caffra*, *Sideroxylon inerme* and *Dovyalis rotundifolia*. According to Dereck Berliner (2005) the Eastern Cape Dune Forest has a conservation target of 48% and is considered to be **NEAR THREATENED**.

7.1.4. Identified vegetation communities

Five vegetation communities were identified within the project site. These vegetation communities are as follows:

- Grassland with bush clumps;

- Wetland vegetation;
- Dune forest;
- Strandveld/Grassland;
- Transformed forest/thicket; and
- Transformed landscape.

7.1.5. Protected areas

The 160ha natural portion of the project site falls within and is surrounded by the protected East London Coast Nature Reserve.

7.1.6. ECBCP CBA Map

The study area falls within a Terrestrial Critical Biodiversity Area Category 2 area which entails that the land should be maintained in a near-natural state. Site observations showed that the 10ha portion of land where the new KwNBG infrastructure will be located is transformed and previously used for agricultural purposes. The 160ha portion of land is mostly conserved as the Kwelera Coastal Nature Reserve while some areas have been transformed to two small villages, Kwelera and Sunrise-on-sea.

7.2. Sensitivity allocation

A botanical and wetland sensitivity map was developed based on the allocations made in Table 7.1 below, for the entire study area. The allocations were based on both the desktop biophysical description of the site as well as observations made during the site visit.

Table 7.1. Criteria used for the analysis of the sensitivity of the study area.

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	Topography	Level or even	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	Vegetation - Extent or habitat type in the region	Extensive throughout the region	Restricted to a particular region / zone	Restricted to a specific locality / site
3	Conservation status 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	Species of conservation concern - Presence and number	None, although occasional regional endemics	No Species of Conservation Concern, some indeterminate or rare endemics	One or more Species of Conservation Concern, or more than 2 endemics or rare species

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
5	Habitat fragmentation 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
6	Biodiversity contribution	Low diversity or species richness	Moderate diversity, and moderately high species richness	High species diversity, complex plant and animal communities
7	Visual quality of the site or landscape from other vantage points	Site is hidden or barely visible from any vantage points with the exception in some cases from the sea	Site is visible from some or a few vantage points but is not obtrusive or very conspicuous	Site is visible from many or all angles or vantage points
8	Erosion potential 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
9	Rehabilitation potential 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
10	Disturbance 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
11	Ecological function	Habitat widely represented in the landscape not specifically harbouring any unique habitat features...etc.	Intermediate role in ecological function	Key habitat involved in ecological processes (ecological corridors and network areas or key niche habitats)

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
12	Ecological Services	Little to no ecological services	Some ecological services.	Various ecological services. Areas should be conserved.

Site sensitivity was determined based on the following criteria as classified in Table 7.2 above:

Table 7.2: List of criteria contributing to the sensitivity map

Vegetation community	Sensitivity mapping rule	Sensitivity allocation
Grassland with bush clumps	Topography is low and even; Extensive areas of this habitat found elsewhere; The land is degraded and disturbed; Relatively easy to rehabilitate; Does not represent any unique habitat features; Low biodiversity; and No plant SCC.	Low sensitivity
Transformed landscape	Heavily transformed; Offers little ecosystem services and function; Site is relatively easy to rehabilitate given its accessibility; and Habitat is largely fragmented.	Low sensitivity
Strandveld/ Grassland	Undulating topography; Moderate conservation value and biodiversity contribution; Some degree of disturbance and transformation to the site; Involved in ecological processes and provides some ecosystem services; Some possibility of erosion; and Presence of plant SCC.	Moderate sensitivity
Transformed forest/thicket	Predominantly natural vegetation; Some human disturbance and degradation; Presence of some alien invasive species; Presence of plant SCC; and Species which are conserved.	Moderate sensitivity
Wetland vegetation	Natural vegetation with some scattered aliens; High conservation value; High biodiversity contribution; Key habitat involved in ecological process; and Provides ecological services	High sensitivity
Dune forest	Complex and steep dune slopes; Mostly natural vegetation; High conservation value; High biodiversity contribution; High visual quality; Little disturbance; Presence of plant SCC; Provides ecological processes; and Provides ecosystem services	High sensitivity

The sensitivity map (Figure 7.1) has been divided into various areas of different sensitivity. Site sensitivity was determined based on an analysis of the abovementioned criteria.

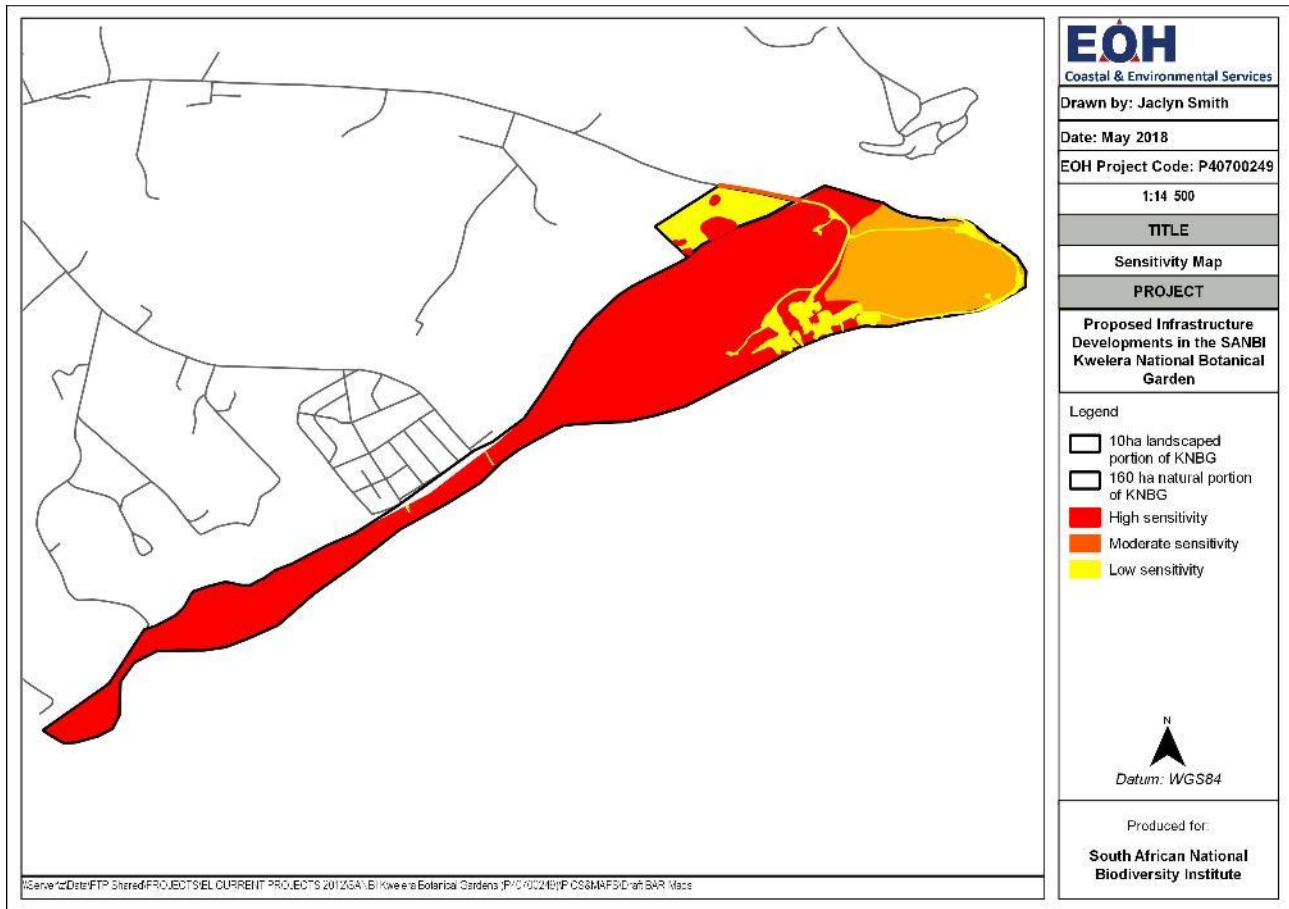


Figure 7.1: Sensitivity map for the site.

High sensitivity:

High sensitivity was allocated to:

- Areas of complex or uneven steep slopes;
- Areas with mostly natural vegetation;
- High conservation value and biodiversity contribution are considered highly sensitive;
- Areas that are likely to contain plant SCC;
- Areas with low disturbance or degradation;
- Unique habitats that are involved in ecological processes and provide ecological services;
- The dune forest which is considered to be highly sensitive as they occur on steep dune slopes in some areas, most of the vegetation is natural and undisturbed with the presence of plant SCC; and
- Wetlands are important habitats that provide important ecosystem services and were therefore classified as high sensitivity. Any activity within the wetlands will require prior authorisation from the Department of Water and Sanitation.

All high sensitivity will require a prior Search and Rescue exercise and application for the relevant permits from DAFF and DEDEAT.

Moderate sensitivity:

Moderate sensitivity was allocated to:

- Areas of undulating topography with fairly steep slopes;
- Vegetation restricted to a particular region/zone which have a moderate conservation value, moderate diversity and species richness;
- Areas that may potentially have plant SCC;
- Areas with some degree of disturbance;
- Areas that provide an intermediate role in ecological function and some ecological services; and
- The strandveld/grassland and transformed forest/thicket vegetation communities which were identified as moderate sensitivity given their moderate diversity and species richness and the possible presence of plant SCC.

A Search & Rescue (S&R) exercise must be conducted prior to commencement of activities in these areas and the relevant vegetation permits must also be applied for. Where possible, avoidance of habitat loss and vegetation clearance should be limited as possible with preference for more disturbed areas first.

Low sensitivity:

Low sensitivity was allocated to:

- Areas considered as severely disturbed or transformed by human activities.
- Areas which have low diversity and species richness; and
- The presence of plant SCC may still occur in these areas given the close proximity to the surrounding dune forest (high sensitivity area) and strandveld/grassland vegetation (moderate sensitivity area) communities. These areas are considered to be suitable for development with the recommended mitigation measures.

8. Manner in which the environment may be affected

<p>Appendix 6 Specialist Reports</p> <p>1. (1) A specialist report prepared in terms of these Regulations must contain—</p> <ul style="list-style-type: none"> (j) a description of the findings and potential implications of such findings on the impact of the proposed activity or activities; (k) any mitigation measures for inclusion in the EMPr;
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8.1. Issues identified

Table 8.1 below list all the issues identified during the assessment of the proposed Infrastructure Development in the SANBI KwnBG:

Table 8.1. Issues identified during all phases of the proposed Infrastructure Development in the SANBI KwnBG.

MIND MAP: Biodiversity Impacts for the proposed Infrastructure Development in the SANBI KwnBG				
THEMES	CATEGORIES/ISSUE	PLANNING & DESIGN PHASE	CONSTRUCTION PHASE	OPERATIONAL PHASE
Legislative Environment	Legal and policy compliance	X		
Ecological Environment	Loss of natural vegetation	X	X	
	Loss of plant SCC	X	X	X
	Control of alien species	X	X	X
	Dune stability	X	X	X
	Rehabilitation of disturbed areas		X	X
Wetland Environment	Scheduling of construction	X		
	Stormwater management	X	X	X
	Invasion of alien species	X	X	
	Placement and design of infrastructure around wetlands	X		
	Material stockpiling		X	
	Water quality		X	
	Destruction of wetland habitat		X	

Botanical and wetland impacts that were identified during the Planning and Design, Construction and Operational Phases of the proposed Infrastructure Development in the SANBI KwnBG and are described below. These issues are applicable for all proposed development alternatives.

Table 8.2. Issues identified during all phases of the proposed Infrastructure Development in the SANBI KwnBG.

Categories/Issue	Applicability to each phase		
	Planning and Design	Construction	Operation
Legal and policy compliance	<p>YES</p> <p>Non-compliance with the laws and policies of South Africa as they pertain to the ecological environment could lead to damage of the ecological and wetland environment, unnecessary delays in construction activities, and potentially criminal cases, based on the severity of the non-compliance, being brought against the proponent and his/her contractors.</p>	N/A	N/A
Loss of natural vegetation	<p>YES</p> <p>Inappropriate design of the project infrastructure will lead to the unnecessary loss of natural vegetation and habitat for other taxonomic groups.</p>	<p>YES</p> <p>Clearing of natural vegetation outside the approved development footprint will lead to the unnecessary loss of natural vegetation and habitat for other taxonomic groups.</p>	N/A
Loss of plant SCC	<p>YES</p> <p>Inappropriate design of the project infrastructure will lead to the unnecessary loss of SCC.</p>	<p>YES</p> <p>Clearing of natural vegetation may result in the destruction of identified and unidentified SCC.</p>	N/A
Control of alien species	<p>YES</p> <p>Failure to plan for the removal and management of alien vegetation could result in the invasion of alien vegetation throughout the site during the construction</p>	<p>YES</p> <p>Removal of natural vegetation creates 'open' habitats that will favour the establishment of undesirable alien plant species in areas that are</p>	<p>YES</p> <p>Loss of natural vegetation will increase the potential invasion by alien plant species. This coupled with the lack of an</p>

Categories/Issue	Applicability to each phase		
	Planning and Design	Construction	Operation
	and operation phase.	typically very difficult to eradicate and may pose a threat to neighbouring natural ecosystems.	effective alien vegetation management plan may result in large scale alien plant invasion.
Dune stability	<p>YES</p> <p>During the planning and design phase inappropriate layout and design of infrastructure and walkways may lead to dune instability and erosion.</p>	<p>YES</p> <p>During the construction phase, inappropriate and uncontrolled clearing of vegetation could result in dune instability and erosion.</p>	<p>YES</p> <p>During the operation phase failure to maintain infrastructure and walkways within the dune environment may lead to erosion and dune instability.</p>
Rehabilitation of disturbed areas	N/A	<p>YES</p> <p>Poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.</p>	<p>YES</p> <p>Continuous rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.</p>
Scheduling of construction	<p>YES</p> <p>Inappropriate construction scheduling</p>	N/A	N/A
Stormwater management	<p>YES</p> <p>Inappropriate stormwater design</p>	<p>YES</p> <p>Inappropriate routing of stormwater</p>	<p>YES</p> <p>Failure to monitor and maintain the stormwater management system</p>
Invasion of alien species	<p>YES</p> <p>Failure to plan for the removal and management of alien vegetation</p>	<p>YES</p> <p>Failure to implement an Alien Management Plan</p>	N/A

Categories/Issue	Applicability to each phase		
	Planning and Design	Construction	Operation
Placement and design of infrastructure around wetlands	YES Inappropriate design and placement of infrastructure	N/A	N/A
Material stockpiling	N/A	YES Stockpiling of construction materials within 50 m of wetlands	N/A
Water quality	N/A	YES Accidental chemical spills	N/A
Destruction of wetland habitat	N/A	YES Unplanned and unnecessary encroachment of construction activities into wetland areas	N/A

8.2. Impact assessment

The impacts identified in Section 8.2 are assessed in terms of the criteria described in Section 3.7 and are summarised in Tables 8.3- 8.6 below. Various mitigation measures have been provided for impacts identified during the planning and design, construction and operation phases and the no-go alternative.

Table 8.3. Assessment of impacts during the Planning & Design Phase

ISSUE	ALTERNATIVES	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
PLANNING & DESIGN PHASE										
<i>Legislative Environment</i>										
Legal and policy compliance	All	During the planning and design phase non-compliance with the laws and policies of South Africa as they pertain to the ecological environment could lead to damage of the ecological environment, unnecessary delays in construction activities, and potentially criminal cases, based on the severity of the non-compliance, being brought against the proponent and his/her contractors.	Direct, Cumulative	Project level	Short-term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All legal matters pertaining to permitting must be completed prior to any construction activity. The relevant permits must be obtained from the competent authority in order to remove any protected plant species and SCC. 	LOW NEGATIVE
	All	During the planning and design phase non-compliance with the legal requirements and policies of South Africa as they pertain to the wetland environment could lead to damage to wetlands, unnecessary delays in construction activities, and potentially criminal cases, based on the severity of the non-compliance, being brought against the proponent and his/her contractors.	Direct	Project level	Short term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All necessary Water Use Authorisations must be obtained for any of the following activities: <ul style="list-style-type: none"> Construction within 500 m of a wetland Construction within a watercourse An Environmental Control Officer (ECO) must be appointed for the duration of the construction phase. 	LOW NEGATIVE
<i>Ecological environment</i>										
Loss of natural vegetation	All + preferred layout alternative 1	During the planning and design phase the inappropriate design and layout of the project infrastructure will lead to the unnecessary loss of natural vegetation.	Direct, indirect, cumulative	Localised	Permanent	Definite	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> The layout of the project infrastructure must avoid the unnecessary removal of natural vegetation. The layout must avoid and minimise the footprint of any infrastructure within the sensitive wetland vegetation and dune forest. Design of the walkways within the highly sensitive forest areas must be done in such a way that existing paths or open areas are utilised and any vegetation clearing that may be required should, where possible, only involve the trimming or cutting of the vegetation rather than complete removal of any tree or plant. 	LOW NEGATIVE
	Alternative layout 2	During the planning and design phase, the design and layout of the project	Direct, indirect,	Localised	Permanent	Definite	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> The layout of the project infrastructure must avoid the 	MODERATE NEGATIVE

ISSUE	ALTERNATIVES	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
		infrastructure will lead to the unnecessary loss of natural vegetation.	cumulative						unnecessary removal of natural vegetation.	
Loss of plant SCC	All	During the planning and design phase the inappropriate design and layout of the project infrastructure will lead to the unnecessary loss of plant SCC.	Direct	Localised	Permanent	Probable	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> All affected plant SCC must be relocated to outside the construction footprint prior to commencement of activities. The relevant permits must be obtained from the competent authority in order to remove any SCC. 	LOW NEGATIVE
Invasion of alien plant species	All	During the planning and design phase the failure to plan for the removal and management of alien vegetation could result in the invasion of alien vegetation during the construction and operation phase.	Indirect	Project Level	Medium-term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> SANBI's Alien Vegetation Management Plan must be implemented to reduce the establishment and spread of undesirable alien plant species. 	LOW NEGATIVE
Dune stability	All + preferred layout alternative	During the planning and design phase inappropriate layout and design of infrastructure and walkways may lead to dune instability and erosion.	Indirect	Project level	Medium-term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> All infrastructure and walkways should be designed on flat areas or gentle slopes as far as possible. SANBI's Maintenance Management Plan for all infrastructure and walkways must be implemented. The appropriate materials must be used for the walkways Woodchip and crushed sandstone may be appropriate for light traffic while board and chain access ways may be more appropriate for heavier traffic. 	LOW NEGATIVE
	Alternative layout 2	During the planning and design phase, the design of alternative layout 2 will lead to a larger development footprint within the dune environment which may result in a greater risk of dune instability and erosion as a result of inappropriate layout of infrastructure and uncontrolled or unnecessary clearance of indigenous vegetation.	Indirect	Project level	Medium-term	Possible	Severe	HIGH NEGATIVE		MODERATE NEGATIVE
<i>Wetland Environment</i>										
Scheduling of construction	All	During the planning and design phase inappropriate construction scheduling could lead to short-term (and potentially long-term) impacts on the wetland environment such as excessive sediment mobilization, etc.	INDIRECT	Study area	Medium term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Wherever possible, construction activities should be undertaken during the driest part of the year to minimize sedimentation of the wetlands. 	LOW NEGATIVE
Stormwater management	All	During the planning and design phase the inappropriate design of stormwater structures may result in increased levels of erosion, sedimentation and pollution of the wetlands.	DIRECT	Study area	Long-term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> Appropriate stormwater structures must be designed to minimise erosion and sedimentation of the wetlands. 	MODERATE NEGATIVE
Control of alien species	All	During the planning and design phase, failure to plan for the removal and management of alien vegetation could result	INDIRECT	Study area	Long-term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> SANBI's Alien Vegetation Management Plan must be implemented to reduce the 	LOW NEGATIVE

ISSUE	ALTERNATIVES	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
		in the wetland areas being invaded by alien vegetation during the construction and operation phase. This would have an adverse impact on the wetland health.							establishment and spread of undesirable alien plant species. • This must be implemented and monitored by an ECO during the construction phase.	
Placement and design of infrastructure around wetlands	All	During the planning and design phase, inappropriate design and placement of infrastructure in relation to the wetlands could result in adverse impacts on the wetland habitat.	DIRECT	Localised	Long-term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> The design of infrastructure must take into account the location of the wetlands and not encroach into wetland areas. As far as possible no infrastructure be placed within 5 – 10 m of a wetland. The Applicant must apply for a WULA with DWS prior to any infrastructure being placed within the wetlands or within 500m of the wetlands. 	LOW NEGATIVE

Table 8.4. Assessment of impacts during the Construction Phase

ISSUE	ALTERNATIVES	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
CONSTRUCTION PHASE										
<i>Ecological environment</i>										
Loss of natural Vegetation	All	During the construction phase the uncontrolled clearing of natural vegetation outside the approved development footprint will lead to the unnecessary loss of natural vegetation.	Direct, Indirect, Cumulative	Localised	Medium-term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> The construction footprint must be surveyed and demarcated prior to construction commencing. No construction activities must be allowed outside the demarcated footprint. Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken. 	LOW NEGATIVE
	All	Incorrect handling of topsoil will result in limited or no vegetation regrowth during rehabilitation	Direct, Cumulative	Localised	Long-term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Topsoil must be separated from the subsoil during stockpiling. The first 150-200mm of soil is generally classified as topsoil. This must be removed and stockpiled separately to the remaining subsoil. Landscape the impacted areas with 150-200mm of topsoil on top of subsoil during rehabilitation. Topsoil must not be stockpiled higher than 2m or for longer than 1 	LOW NEGATIVE

ISSUE	ALTERNATIVES	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Loss of plant SCC	All	During the construction phase the clearing of natural vegetation may lead to the destruction of habitats and identified and unidentified plant SCC.	Direct, Indirect, Cumulative	Study Site	Permanent	Probable	Moderately severe	MODERATE NEGATIVE	<p>year.</p> <ul style="list-style-type: none"> All areas that will be impacted must be surveyed by a suitably qualified botanist/ecologist prior to topsoil removal in order to locate and rescue any SCC within the area and relocate them. Refer to list of plant SCC in Table 5.7. Search and rescue must be undertaken by a professional and qualified botanist. The contractor's staff must not poach or trap wild animals. The contractor's staff must not be allowed to harvest any natural vegetation. Stealing of animals is a criminal offence and is forbidden. To avoid injury of any animal and breeding habitats, sites to be cleared need to be inspected and transferable animals moved from the site to a new and benign location. Care must be taken when projects occur around breeding areas to avoid any negative impacts. Nests must also be carefully moved if found on demarcated project sites. Activities must also take into consideration the breeding periods of surrounding bird species, limiting construction/maintenance work during that time period and also reducing any negative impacts which may be caused on surrounding species. 	LOW NEGATIVE
Control of Alien Species	All	During the construction phase the removal of natural vegetation creates 'open' habitats that will favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring natural ecosystems.	Indirect	Study Site	Long-term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> SANBI's Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species. Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc. 	LOW NEGATIVE

ISSUE	ALTERNATIVES	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
Dune stability	All	During the construction phase, inappropriate and uncontrolled clearing of vegetation could result in dune instability and erosion.	Indirect	Study Site	Long-term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All vegetation clearance must be kept to the project footprint. 	LOW NEGATIVE
Rehabilitation of Disturbed Areas	All	During the construction phase poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Direct, Indirect, Cumulative	Localised	Long-term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction as phases have been completed. Restoration must be conducted as per a Rehabilitation Management Plan. Only topsoil from the development site, which has been appropriately stored, must be used for rehabilitation. 	LOW NEGATIVE
Wetland Environment										
Material stockpiling	All	During the construction phase, stockpiling of construction materials within 50 m of wetlands could result in erosion and mobilisation of the materials into the nearby wetlands, resulting in sedimentation and a decrease in water quality and wetland habitat.	Direct, Indirect, Cumulative	Study area	Medium-term	Possible	Moderately negative	MODERATE NEGATIVE	<ul style="list-style-type: none"> No construction material must be stored within 50 m of the wetlands. Stockpiles within 100 m of wetlands must be monitored for erosion and mobilisation of materials towards wetlands. If this is noted by an ECO, suitable cut-off drains or berms must be placed between the stockpile area and the wetlands. 	LOW NEGATIVE
Water quality	All	During the construction phase, accidental chemical spills or other spills (sewage, concrete, etc.) in the vicinity of wetlands will result in water pollution, adversely affecting the wetland ecosystem.	Direct, cumulative	Localised	Short-term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> No machinery should be parked overnight within 50 m of a wetland. All stationary machinery must be equipped with a drip tray to retain any oil leaks. Chemicals used for construction must be stored safely on bunded surfaces in the construction site camp and not within 50 m of a wetland. Emergency plans must be in place in case of spillages. No ablution facilities should be located within 50 m of a wetland. Chemical toilets must be regularly 	LOW NEGATIVE

ISSUE	ALTERNATIVES	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
									<p>maintained/ serviced to prevent ground or surface water pollution.</p> <ul style="list-style-type: none"> • Concrete mixing must not take place within 50 m of a wetland. • All concrete mixing must occur on impermeable surfaces. 	
Stormwater management	All	During the construction phase the inappropriate routing of stormwater will lead to sedimentation of wetlands, adversely affecting the wetland's ecosystem.	Direct	Study area	Long-term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> • An Erosion and Sediment Management Plan must be developed to minimize the ingress of sediment-laden stormwater into the wetlands. • Stormwater must be managed in such a manner that excess stormwater runoff does not enter the wetlands. 	LOW NEGATIVE
Control of alien species	All	During the construction phase, failure to implement an Alien Management Plan and monitor alien vegetation could lead to infestation in wetland areas.	Indirect	Study area	Long-term	Probable	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> • An Alien Management Plan must be implemented. • Alien plants must be eradicated from the impacted area. • The project area must be monitored for any new growth of invasive plants until completion of construction. • Short-term monitoring must be conducted for a period of 12 months after construction has been completed. 	LOW NEGATIVE
Destruction of wetland habitat	All	During the construction phase the unplanned and unnecessary encroachment of construction activities or construction vehicles into wetland areas could result in destruction of wetland habitat.	Direct	Localised	Long-term	Definite	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> • No construction activities or construction vehicles must encroach into wetland areas. • The wetland areas must be demarcated prior to the commencement of any construction activity. • Wetland areas must be considered 'NO-GO' areas; no vehicles shall be allowed to drive through rivers, streams and wetlands. 'NO-GO' areas must be shown on a site map of at least A1 size posted in the site office, and be demarcated by danger tape and/or fencing on site. To avoid damage to the 'NO-GO' areas, the site map should also include: <ul style="list-style-type: none"> - areas where construction, 	LOW NEGATIVE

ISSUE	ALTERNATIVES	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
									maintenance, or demolition work may be carried out; <ul style="list-style-type: none"> - areas where any material or waste may be stored; and - allowed access routes, parking and turning areas for construction or construction related vehicles. 	

Table 8.5. Assessment of impacts during the Operational Phase

ISSUE	ALTERNATIVES	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
OPERATIONAL PHASE										
<i>Ecological environment</i>										
Loss of plant SCC	All	During the operational phase, the uncontrolled clearing or unnecessary loss of natural vegetation during routine maintenance of the KwNGB and infrastructure may lead to the loss of unidentified plant SCC.	Direct, Indirect	Study site	Long-term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> • Vegetation clearing must only take place in the approved project footprint and areas that have been surveyed for potential plant SCC. 	LOW NEGATIVE
Invasion of Alien Species	All	During the operational phase the loss of natural vegetation will increase the potential invasion by alien plant species. This, coupled with the lack of implementation of an alien vegetation management plan may result in large scale alien plant invasion.	Direct, Indirect, Cumulative	Study Site	Long-Term	Possible	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> • SANBI's Alien Vegetation Management Plan must be implemented during the operational phase to reduce the establishment and spread of undesirable alien plant species. • Alien plants must be removed through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations. 	LOW NEGATIVE
Dune stability	All	During the operation phase failure to maintain infrastructure and walkways within the dune environment may lead to erosion and dune instability.	Direct	Study site	Long-term	Possible	Severe	HIGH NEGATIVE	<ul style="list-style-type: none"> • SANBI's Maintenance Management Plan must be implemented and must ensure regular monitoring of infrastructure for any sign of erosion and procedures to take to stop the erosion. • Appropriate signage must be erected at the start of any walkways within the dune environment/natural forest indicating that no public must stray from the designated walkway as this may impact on the 	LOW NEGATIVE

ISSUE	ALTERNATIVES	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
									surrounding dune environment.	
Rehabilitation of disturbed areas	All	During the operational phase, continuous rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Direct, Indirect, Cumulative	Study Site	Long-Term	Possible	Moderately Severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> All cleared areas must be continuously rehabilitated with indigenous vegetation post-construction. 	LOW NEGATIVE
<i>Wetland Environment</i>										
Stormwater	All	During the Operation Phase, failure to monitor and maintain the stormwater management system could result in erosion and sedimentation of wetlands.	Indirect, Cumulative	Localised	Medium-term	Possible	Moderately severe	MODERATE NEGATIVE	<ul style="list-style-type: none"> Stormwater management structures must be monitored and maintained throughout the operation phase. 	LOW NEGATIVE

Table 8.6: Assessment of the No-go alternative.

ISSUE	DESCRIPTION OF IMPACT	NATURE OF IMPACT	SPATIAL SCALE (EXTENT)	TEMPORAL SCALE (DURATION)	CERTAINTY SCALE (LIKELIHOOD)	SEVERITY / BENEFICIAL SCALE	SIGNIFICANCE PRE-MITIGATION	MITIGATION MEASURES	SIGNIFICANCE POST-MITIGATION
No-Go	Should the proposed KwnBG not be developed then the 10ha portion of land will remain transformed agricultural land with undisturbed wetlands and the 160ha portion will remain the Kwelela Nature Reserve.	Direct	N/A	N/A	N/A	N/A	Some benefits	<ul style="list-style-type: none"> None required 	Some benefits

9. Impact Statement, Recommendation and Conclusion

Appendix 6 Specialist Reports	
1. (1) A specialist report prepared in terms of these Regulations must contain—	
	(l) any conditions for inclusion in the environmental authorisation;
	(m) any monitoring requirements for inclusion in the EMPr or environmental authorisation;
	(n) a reasoned opinion—
	(i) whether the proposed activity, activities or portions thereof should be authorised;
	(iA) regarding the acceptability of the proposed activity or activities; and
	(ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;

9.1. Conclusions

The following table summarises the change in impacts from the pre- to post- mitigation for the proposed KwNBG.

Table 9.1: Assessment of pre- and post- mitigation impact significance.

Phase	Alternatives	PRE-MITIGATION			POST-MITIGATION		
		LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
Planning and Design	All + Preferred layout alternative 1	0	5	5	9	1	0
	Alternative layout 2		2	0	0	2	0
Construction	All	0	10	1	11	0	0
Operational	All	0	3	1	4	0	0
TOTAL		0	20	7	24	3	0

It can be clearly seen that through the application of the correct mitigations measures the overall significance of impacts can be reduced from mainly moderate and high significance to overall low significance.

9.1.1. Alternatives

Two layout options for the KwNBG have been proposed. These were assessed in terms of their planning and design impacts on the environment and the outcomes of the assessment are summarised in Table 9.2.

Table 9.2: Alternatives assessment.

Alternative	Issue	Pre-mitigation	Post-mitigation	Specialist preference
Preferred layout alternative 1	During the planning and design phase the inappropriate design and layout of the project infrastructure will lead to the unnecessary loss of natural vegetation.	Moderate negative	Low negative	1
	During the planning and design phase inappropriate layout and design of infrastructure and walkways may lead to dune instability and erosion.	High negative	Low negative	
Alternative layout 2	During the planning and design phase, the design and layout of the project infrastructure will lead to the unnecessary loss of natural vegetation.	Moderate negative	Moderate negative	2
	During the planning and design phase, the design of alternative layout 2 will lead to a larger development footprint within the dune environment which may result in a greater risk of dune instability and erosion as a result of inappropriate layout of infrastructure and uncontrolled or unnecessary clearance of indigenous vegetation.	High negative	Moderate negative	

9.1.2. Cumulative impact

A cumulative impact means “the past, current and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities”.

A major cumulative impact which the development of the KwNGB may bring about is an increase in and attraction of developments associated with the increase of tourism and general public in the area. Other cumulative impacts include impacts that already occur in the area and the construction and operation of the KwNGB would increase those impacts. Such impacts include vegetation clearance associated with any new development.

9.2. Recommendations

The following recommendations must be included into the final EMP:

- A qualified, independent ECO must be appointed prior to commencement of any activity on site;
- All mitigation measures indicated in this report must be included into the EMP;

- A Water Use Licence Application (WULA) is required for any construction activity within the extent of a watercourse (i.e. riparian and instream habitat or within 100 m of the watercourse) or the 1:100 year floodline; or within 500 m of a wetland in terms of the following triggers from the National Water Act (No. 36 of 1998):
 - Sec 21 (c) - impeding or diverting the flow of water in a watercourse; and
 - Sec 21 (i) - altering the bed, banks, course or characteristics of a watercourse.
 It is recommended that a WULA is applied for all infrastructure affecting wetland wetlands.
- The following Management Plans must be developed prior to clearing and implemented during construction and operations of the proposed development. These management plans must be incorporated into the EMP:
 - Storm Water & Contingency Management Plan;
 - Erosion Action Plan;
 - Road verge vegetation maintenance plan;
 - Rehabilitation Management Plan;
 - Alien Vegetation Management Plan; and
 - Maintenance Management Plan.

9.2.1. Mitigation measures

All the mitigation measures provided below are to be implemented during the planning and design, construction and operational phases of the proposed KwnBG.

During planning and design phase:

For all + preferred layout alternative 1:

- All legal matters pertaining to permitting must be completed prior to any construction activity.
- The relevant permits must be obtained from the competent authority in order to remove any protected plant species and any SCC.
- All necessary Water Use Licences must be in order for any of the following activities:
 - Construction within 500 m of a wetland
 - Construction within a watercourse
- An Environmental Control Officer (ECO) must be appointed for the duration of the construction phase.
- The layout of the project infrastructure must avoid the unnecessary removal of natural vegetation.
- The layout must avoid and minimise the footprint of any infrastructure within the sensitive wetland vegetation and dune forest.
- Design of the walkways within the highly sensitive forest areas must be done in such a way that existing paths or open areas are utilised and any vegetation clearing that may be required should, where possible, only involve the trimming or cutting of the vegetation rather than complete removal of any tree or plant.
- Walkways and other infrastructure must be designed to avoid the plant SCC as far as possible.
- All affected plant SCC must be relocated to outside the construction footprint prior to commencement of activities.
- An Alien Vegetation Management Plan must be developed to reduce the establishment and spread of undesirable alien plant species.
- All infrastructure and walkways should be designed on flat areas or gentle slopes as far as possible.
- SANBI's Maintenance Management Plan must be implemented for all infrastructure and walkways.

- The appropriate materials must be used for the walkways
- Woodchip and crushed sandstone may be appropriate for light traffic while board and chain access ways may be more appropriate for heavier traffic.
- Wherever possible, construction activities should be undertaken during the driest part of the year to minimize sedimentation of the wetlands.
- Appropriate stormwater structures must be designed to minimise erosion and sedimentation of the wetlands.
- The design of infrastructure must take into account the location of the wetlands and not encroach into wetland areas.
- As far as possible no infrastructure be placed within 5 – 10 m of a wetland.
- The Applicant must apply for a WULA with DWS prior to any infrastructure being placed within the wetlands or within 500m of the wetlands.

For Alternative layout 2

- The layout of the project infrastructure must avoid the unnecessary removal of natural vegetation.
- All infrastructure and walkways should be designed on flat areas or gentle slopes as far as possible.
- SANBI's Maintenance Management Plan must be implemented for all infrastructure and walkways.
- The appropriate materials must be used for the walkways
- Woodchip and crushed sandstone may be appropriate for light traffic while board and chain access ways may be more appropriate for heavier traffic.

During the construction phase:

For all alternatives:

- The construction footprint must be surveyed and demarcated prior to construction commencing.
- No construction activities must be allowed outside the demarcated footprint.
- Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken.
- Topsoil must be separated from the subsoil during stockpiling.
- The first 150-200mm of soil is generally classified as topsoil. This must be removed and stockpiled separately to the remaining subsoil.
- Landscape the impacted areas with 150-200mm of topsoil on top of subsoil during rehabilitation.
- Topsoil must not be stockpiled higher than 2m or for longer than 1 year.
- All areas that will be impacted must be surveyed by a suitably qualified botanist/ecologist prior to topsoil removal in order to locate and rescue any SCC within the area and relocate them. Refer to list of plant SCC in Table 6.7.
- Search and rescue must be undertaken by a professional and qualified botanist.
- The contractor's staff must not poach or trap wild animals. Stealing of animals is a criminal offence and is forbidden.
- To avoid injury of any animal and breeding habitats, sites to be cleared need to be inspected and transferable animals moved from the site to a new and benign location. Care must be taken when projects occur around breeding areas to avoid any negative impacts. Nests must also be carefully moved if found on demarcated project sites.

- Activities must also take into consideration the breeding periods of surrounding bird species, limiting construction/maintenance work during that time period and also reducing any negative impacts which may be caused on surrounding species.
- The contractor's staff must not be allowed to harvest any natural vegetation.
- SANBI's Alien Vegetation Management Plan must be implemented during the construction phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed from the site through appropriate methods such as hand pulling, application of chemicals, cutting, etc.
- All vegetation clearance must be kept to the project footprint.
- All temporarily impacted areas must be rehabilitated with indigenous vegetation as soon as construction in the particular area or phase of work is complete, i.e. rehabilitation is on-going throughout construction as phases have been completed. Restoration must be conducted as per a Rehabilitation Management Plan.
- Only topsoil from the development site, which has been appropriately stored, must be used for rehabilitation.
- No construction material must be stored within 50 m of the wetlands.
- Stockpiles within 100 m of wetlands must be monitored for erosion and mobilisation of materials towards wetlands. If this is noted by an ECO, suitable cut-off drains or berms must be placed between the stockpile area and the wetlands.
- No machinery should be parked overnight within 50 m of a wetland.
- All stationary machinery must be equipped with a drip tray to retain any oil leaks.
- Chemicals used for construction must be stored safely on bunded surfaces in the construction site camp and not within 50 m of a wetland.
- Emergency plans must be in place in case of spillages.
- No ablution facilities should be located within 50 m of a wetland.
- Chemical toilets must be regularly maintained/ serviced to prevent ground or surface water pollution.
- Concrete mixing must not take place within 50 m of a wetland.
- All concrete mixing must occur on impermeable surfaces.
- An Erosion and Sediment Management Plan must be developed to minimize the ingress of sediment-laden stormwater into the wetlands.
- Stormwater must be managed in such a manner that excess stormwater runoff does not enter the wetlands.
- During the construction phase an Alien Management Plan must be implemented.
- Alien plants must be eradicated from the impacted area.
- The project area must be monitored for any new growth of invasive plants until completion of construction.
- Short-term monitoring must be conducted for a period of 12 months after construction has been completed.
- No construction activities or construction vehicles must encroach into wetland areas.
- The wetland areas must be demarcated prior to the commencement of any construction activity.
- Wetland areas must be considered 'NO-GO' areas; no vehicles shall be allowed to drive through rivers, streams and wetlands. 'NO-GO' areas must be shown on a site map of at least A1 size posted in the site office, and be demarcated by danger tape and/or fencing on site. To avoid damage to the 'NO-GO' areas, the site map should also include:

- areas where construction, maintenance, or demolition work may be carried out;
- areas where any material or waste may be stored; and
- allowed access routes, parking and turning areas for construction or construction related vehicles.

During operational phase:

For all alternatives:

- Vegetation clearing must only take place in the approved project footprint and areas that have been surveyed for potential plant SCC.
- An Alien Vegetation Management Plan must be implemented during the operational phase to reduce the establishment and spread of undesirable alien plant species.
- Alien plants must be removed through appropriate methods such as hand pulling, application of chemicals, cutting, etc. as in accordance to the NEMBA: Alien Invasive Species Regulations.
- SANBI must implement a Maintenance Management Plan which ensures regular monitoring of infrastructure for any sign of erosion and procedures to take to stop the erosion.
- Appropriate signage must be erected at the start of any walkways within the dune environment/natural forest indicating that no public must stray from the designated walkway as this may impact on the surrounding dune environment.
- All cleared areas must be continuously rehabilitated with indigenous vegetation post-construction.
- Stormwater management structures must be monitored and maintained throughout the operation phase.

9.3. Environmental Statement and Opinion of the Specialist

The botanical and aquatic impacts of all aspects for the proposed KwnBG were assessed and considered to be acceptable, provided that the mitigation measures provided in this report are implemented. All impacts are rated as MODERATE to HIGH pre-mitigation, therefore implementation of recommended mitigation measures coupled with comprehensive rehabilitation and monitoring in terms of re-vegetation and restoration is an important element of the mitigation strategy. Implementing the recommended mitigations measures will reduce most impacts to LOW.

The proposed development is **NOT considered to be Fatally Flawed**.

The alternative layout 2 is considered to be more impactful when compared to preferred layout alternative 1 in terms of vegetation clearance and dune erosion potential. It is the opinion of the specialist to consider the preferred layout alternative 1 as it will have a lower impact on the natural environment.

The **No-Go option** refers to the proposed KwnBG not being constructed. This option will therefore have no negative impact on the local vegetation and wetlands if it is not constructed.

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1. Appendix A – List of plant species

List of plant species that may potentially occur on site:

(Source: Plants of Southern Africa; POA; Grid 3228CC (<http://posa.sanbi.org>) on November 27, 2017, 08:58 am)

Family	Species	Threat status
ACANTHACEAE	<i>Hypoestes aristata</i>	LC
ACANTHACEAE	<i>Isoglossa eckloniana</i> (Nees) Lindau	LC
ACANTHACEAE	<i>isoglossa woodii</i>	LC
ACANTHACEAE	<i>Thunbergia atriplicifolia</i> E.Mey. ex Nees	LC
ACANTHACEAE	<i>Thunbergia capensis</i> Retz.	LC
AIZOACEAE	<i>Aizoon rigidum</i> L.f.	LC
AIZOACEAE	<i>Carpobrotus species</i>	LC
AMARANTHACEAE	<i>Achyranthes aspera</i> L. var. <i>sicula</i> L.	Not Evaluated/CARA
AMARYLLIDACEAE	<i>Crinum macowanii</i> Baker	Declining/PNCO Protected
AMARYLLIDACEAE	<i>Crinum moorei</i> Hook.f.	VU/NEMBA Protected/PNCO Protected
AMARYLLIDACEAE	<i>Cyrtanthus breviflorus</i> Harv.	LC/PNCO Protected
ANACARDIACEAE	<i>Harpephyllum caffrum</i>	LC
ANACARDIACEAE	<i>Protorhus longifolia</i>	LC
ANACARDIACEAE	<i>Searsia crenata</i> (Thunb.) Moffett	LC
ANACARDIACEAE	<i>Searsia glauca</i> (Thunb.) Moffett	LC
ANACARDIACEAE	<i>Searsia gueinzii</i> (Sond.) F.A.Barkley	LC
ANACARDIACEAE	<i>Searsia lucida</i> (L.) F.A.Barkley forma <i>lucida</i>	Not Evaluated
ANACARDIACEAE	<i>Searsia natalensis</i>	LC
ANACARDIACEAE	<i>Searsia nebulosa</i> (Schönland) Moffett forma <i>nebulosa</i>	Not Evaluated
ANACARDIACEAE	<i>Searsia pallens</i> (Eckl. & Zeyh.) Moffett	LC
APIACEAE	<i>Afrosциadium platycarpum</i> (Sond.) P.J.D.Winter	LC
APIACEAE	<i>Annesorhiza macrocarpa</i> Eckl. & Zeyh.	LC
APIACEAE	<i>Apium prostratum</i> Vent.	Not Evaluated
APIACEAE	<i>Centella asiatica</i>	LC
APOCYNACEAE	<i>Acokanthera oblongifolia</i>	LC
APOCYNACEAE	<i>Asclepias crispa</i> P.J.Bergius var. <i>pseudocrispa</i> N.E.Br.	LC
APOCYNACEAE	<i>Asclepias monticola</i> N.E.Br.	Critically Rare
APOCYNACEAE	<i>Carissa bispinosa</i>	LC
APOCYNACEAE	<i>Cynanchum natalitium</i> Schltr.	LC
APOCYNACEAE	<i>Gomphocarpus fruticosus</i>	LC
APOCYNACEAE	<i>Gomphocarpus physocarpus</i>	LC
APOCYNACEAE	<i>Orbea verrucosa</i> (Masson) L.C.Leach	LC
APOCYNACEAE	<i>Pachycarpus grandiflorus</i> (L.f.) E.Mey.	LCP/NCO Protected

Family	Species	Threat status
	subsp. <i>grandiflorus</i>	
ARACEAE	<i>Zantedeschia pentlandii</i> (R. Whyte ex W. Watson) Wittm.	VU/NEMBA Protected
ARALIACEAE	<i>Cussonia spicata</i>	LC
ARECACEAE	<i>Phoenix reclinata</i>	LC
ARECACEAE	<i>Agave sisalana</i>	Not evaluated
ASPARAGACEAE	<i>Asparagus aethiopicus</i> L.	LC
ASPARAGACEAE	<i>Asparagus africanus</i>	LC
ASPARAGACEAE	<i>Asparagus densiflorus</i> (Kunth) Jessop	LC
ASPARAGACEAE	<i>Asparagus divaricatus</i> (Oberm.) Fellingham & N.L.Mey.	LC
ASPARAGACEAE	<i>Behnia reticulata</i>	LC
ASPHODELACEAE	<i>Aloe arborescens</i>	LC
ASPHODELACEAE	<i>Aloe ciliaris</i>	LC
ASPHODELACEAE	<i>Gasteria excelsa</i> Baker	LC
ASPHODELACEAE	<i>Haworthia cymbiformis</i> (Haw.) Duval var. <i>setulifera</i> (Poelln.) M.B.Bayer	DDT
ASPHODELACEAE	<i>Kniphofia rooperi</i> (T.Moore) Lem.	LC
ASTERACEAE	<i>Arctotis arctotooides</i> (L.f.) O.Hoffm.	LC
ASTERACEAE	<i>Brachylaena discolor</i> DC.	LC
ASTERACEAE	<i>Brachylaena ilicifolia</i>	LC
ASTERACEAE	<i>Chrysanthemoides monilifera</i> (L.) Norl. subsp. <i>rotundata</i> (DC.) Norl.	LC
ASTERACEAE	<i>Cirsium vulgare</i>	Not evaluated
ASTERACEAE	<i>Conyza obscura</i> DC.	LC
ASTERACEAE	<i>Conyza scabrida</i> DC.	LC
ASTERACEAE	<i>Conyza ulmifolia</i> (Burm.f.) Kuntze	LC
ASTERACEAE	<i>Helichrysum appendiculatum</i> (L.f.) Less.	LC
ASTERACEAE	<i>Helichrysum aureum</i> (Houtt.) Merr. var. <i>aureum</i>	LC
ASTERACEAE	<i>Helichrysum cephaloideum</i> DC.	LC
ASTERACEAE	<i>Helichrysum cymosum</i> (L.) D.Don subsp. <i>cymosum</i>	LC
ASTERACEAE	<i>Helichrysum herbaceum</i> (Andrews) Sweet	LC
ASTERACEAE	<i>Helichrysum longifolium</i> DC.	LC
ASTERACEAE	<i>Helichrysum nudifolium</i> (L.) Less. var. <i>nudifolium</i>	LC
ASTERACEAE	<i>Helichrysum odoratissimum</i> (L.) Sweet var. <i>odoratissimum</i>	Not Evaluated
ASTERACEAE	<i>Helichrysum spiralepis</i> Hilliard & B.L.Burt	LC
ASTERACEAE	<i>Helichrysum subglomeratum</i> Less.	LC
ASTERACEAE	<i>Helichrysum teretifolium</i> (L.) D.Don	LC
ASTERACEAE	<i>Melanthera scandens</i> (Schumach. & Thonn.) Roberty subsp. <i>dregei</i> (DC.) Wild	Not Evaluated
ASTERACEAE	<i>Nidorella auriculata</i> DC.	LC

Family	Species	Threat status
ASTERACEAE	<i>Othonna carnos</i> Less. var. <i>discoidea</i> Oliv.	LC
ASTERACEAE	<i>Senecio burchellii</i>	LC
ASTERACEAE	<i>Senecio carnosus</i> Thunb.	LC
ASTERACEAE	<i>Senecio cathcartensis</i> O.Hoffm.	LC
ASTERACEAE	<i>Senecio elegans</i> L.	LC
ASTERACEAE	<i>Senecio purpureus</i> L.	LC
ASTERACEAE	<i>Senecio skirrhodon</i> DC.	LC
ASTERACEAE	<i>Senecio speciosus</i> Willd.	LC
ASTERACEAE	<i>Sonchus dregeanus</i>	LC
ASTERACEAE	<i>Tarhonanthus camphoratus</i>	LC
ASTERACEAE	<i>Tarhonanthus littoralis</i> P.P.J.Herman	LC
ASTERACEAE	<i>Vellereophyton vellereum</i> (R.A.Dyer) Hilliard	LC
AVICENNIACEAE	<i>Avicennia marina</i> (Forssk.) Vierh.	LC
AZOLLACEAE	<i>Azolla filiculoides</i>	CARA Cat 1
BORAGINACEAE	<i>Cordia caffra</i>	LC
BRASSICACEAE	<i>Capparis sepiaria</i>	
BRASSICACEAE	<i>Heliophila subulata</i> Burch. ex DC.	LC
BRASSICACEAE	<i>Maerua caffra</i>	
BRYACEAE	<i>Bryum capillare</i> Hedw.	
BUDDLEJACEAE	<i>Nuxia congesta</i>	LC
BURSERACEAE	<i>Commiphora harveyi</i> (Engl.) Engl.	LC
BUXACEAE	<i>Buxus macowanii</i> Oliv.	LC
CACTACEAE	<i>Opuntia ficus-indica</i>	Not evaluated
CAMPANULACEAE	<i>Wahlenbergia grandiflora</i> Brehmer	LC
CAMPANULACEAE	<i>Wahlenbergia undulata</i> (L.f.) A.DC.	LC
CELASTRACEAE	<i>Elaeodendron croceum</i> (Thunb.) DC.	Declining
CELASTRACEAE	<i>Elaeodendron zeyheri</i> Spreng. ex Turcz.	LC
CELASTRACEAE	<i>Gymnosporia buxifolia</i>	LC
CELASTRACEAE	<i>Gymnosporia grandifolia</i> (Davison) M.Jordaan	LC
CELASTRACEAE	<i>Lauridia tetragona</i> (L.f.) R.H.Archer	LC
CELASTRACEAE	<i>Maytenus procumbens</i> (L.f.) Loes.	LC
CELASTRACEAE	<i>Mystroxyton aethiopicum</i> (Thunb.) Loes. subsp. <i>aethiopicum</i>	LC
CELASTRACEAE	<i>Pterocelastrus tricuspidatus</i>	LC
CELTIDACEAE	<i>Celtis africana</i>	LC
CHENOPODIACEAE	<i>Sarcocornia decumbens</i> (Toelken) A.J.Scott	LC
COMMELINACEAE	<i>Commelina africana</i> L. var. <i>africana</i>	LC
COMMELINACEAE	<i>Commelina benghalensis</i> L.	LC
COMMELINACEAE	<i>Commelina diffusa</i> Burm.f. subsp. <i>diffusa</i>	LC
COMMELINACEAE	<i>Floscopa glomerata</i>	LC
CONVOLVULACEAE	<i>Falkia repens</i> Thunb.	LC

Family	Species	Threat status
CONVOLVULACEAE	<i>Ipomoea cairica</i> (L.) Sweet var. <i>cairica</i>	LC
CRASSULACEAE	<i>Crassula perfoliata</i> L. var. <i>minor</i> (Haw.) G.D.Rowley	LC/PNCO Protected
CUCURBITACEAE	<i>Kedrostis nana</i> (Lam.) Cogn. var. <i>zeyheri</i> (Schrad.) A.Meeuse	LC
CYPERACEAE	<i>Carex clavata</i>	LC
CYPERACEAE	<i>Cyperus austro-africanus</i> C.Archer & Goetgh.	LC
CYPERACEAE	<i>Cyperus brevis</i> Boeckeler	LC
CYPERACEAE	<i>Cyperus congestus</i>	LC
CYPERACEAE	<i>Cyperus cyperoides</i> (L.) Kuntze subsp. <i>cyperoides</i>	LC
CYPERACEAE	<i>Cyperus cyperoides</i> (L.) Kuntze subsp. <i>pseudoflavus</i> (Kük.) Lye	LC
CYPERACEAE	<i>Cyperus distans</i> L.f.	LC
CYPERACEAE	<i>Cyperus dives</i>	LC
CYPERACEAE	<i>Cyperus dubius</i> Rottb. var. <i>dubius</i>	
CYPERACEAE	<i>Cyperis fastigiatus</i>	LC
CYPERACEAE	<i>Cyperus indecorus</i> Kunth var. <i>inflatus</i> (C.B.Clarke) Kük.	LC
CYPERACEAE	<i>Cyperus laevigatus</i> L.	LC
CYPERACEAE	<i>Cyperus longus</i>	LC
CYPERACEAE	<i>Cyperus marginatus</i>	LC
CYPERACEAE	<i>Cyperus pseudovestitus</i> (C.B.Clarke) Kük.	LC
CYPERACEAE	<i>Cyperus solidus</i> Kunth	LC
CYPERACEAE	<i>Cyperus tenax</i> Boeckeler	LC
CYPERACEAE	<i>Eleocharis limosa</i>	LC
CYPERACEAE	<i>Ficinia gracilis</i> Schrad.	LC
CYPERACEAE	<i>Ficinia lateralis</i> (Vahl) Kunth	LC
CYPERACEAE	<i>Ficinia repens</i> (Nees) Kunth	LC
CYPERACEAE	<i>Fimbristylis cymosa</i> R.Br.	
CYPERACEAE	<i>Fimbristylis ferruginea</i> (L.) Vahl	LC
CYPERACEAE	<i>Kyllinga alata</i>	LC
CYPERACEAE	<i>Pycneus mundii</i>	LC
CYPERACEAE	<i>Pycneus polystachyos</i> (Rottb.) P.Beauv. var. <i>polystachyos</i>	LC
DIOSCOREACEAE	<i>Dioscorea mundii</i>	Near Threatened B1ab
DRACAENACEAE	<i>Dracaena alettrisformis</i>	LC
DRACAENACEAE	<i>Sansevieria hyacinthoides</i>	LC
EBENACEAE	<i>Diospyros natalensis</i> (Harv.) Brenan subsp. <i>natalensis</i>	LC
EBENACEAE	<i>Diospyros simii</i> (Kuntze) De Winter	LC
EBENACEAE	<i>Euclea natalensis</i> A.DC. subsp. <i>obovata</i> F.White	LC
EBENACEAE	<i>Euclea racemosa</i> Murray subsp.	LC

Family	Species	Threat status
	<i>macrophylla</i> (E.Mey. ex A.DC.) F.White	
ERICACEAE	<i>Erica glumiflora</i> Klotzsch ex Benth.	VU/PNCO Protected
EUPHORBIACEAE	<i>Croton sylvaticus</i> Hochst.	LC
EUPHORBIACEAE	<i>Euphorbia striata</i> Thunb. var. <i>striata</i>	LC
EUPHORBIACEAE	<i>Tragia glabrata</i> (Müll.Arg.) Pax & K.Hoffm. var. <i>glabrata</i>	LC
FABACEAE	<i>Acacia caffra</i> (Thunb.) Willd.	LC
FABACEAE	<i>Acacia robusta</i> Burch. subsp. <i>robusta</i>	LC
FABACEAE	<i>Acacia saligna</i> (Labill.) H.L. Wendl.	Not Evaluated/NEMBA ELIEN/CARA
FABACEAE	<i>Calpurnia glabrata</i> Brummitt	LC
FABACEAE	<i>Desmodium incanum</i> DC.	Not Evaluated
FABACEAE	<i>Eriosema salignum</i> E.Mey.	LC
FABACEAE	<i>Erythrina caffra</i>	LC/
FABACEAE	<i>Galactia tenuiflora</i> (Willd.) Wight & Arn. var. <i>villosa</i> (Wight & Arn.) Benth.	LC
FABACEAE	<i>Indigofera candicans</i> Aiton	LC
FABACEAE	<i>Lablab purpureus</i> (L.) Sweet subsp. <i>purpureus</i>	Not Evaluated
FABACEAE	<i>Macrotyloma axillare</i> (E.Mey.) Verdc. var. <i>axillare</i>	LC
FABACEAE	<i>Psoralea ensifolia</i> (Houtt.) Merr.	LC
FABACEAE	<i>Rhynchosia caribaea</i> (Jacq.) DC.	LC
FABACEAE	<i>Schotia latifolia</i> Jacq.	LC
FABACEAE	<i>Sesbania punicea</i>	CARA Cat 1
FABACEAE	<i>Tephrosia kraussiana</i> Meisn.	LC
	<i>Vahellia natalitia</i>	
FABACEAE	<i>Vachellia karroo</i>	LC
FABACEAE	<i>Vigna unguiculata</i> (L.) Walp. subsp. <i>protracta</i> (E.Mey.) B.J.Pienaar	LC
FABACEAE	<i>Zornia capensis</i> Pers. subsp. <i>capensis</i>	LC
GERANIACEAE	<i>Geranium flanaganii</i> R.Knuth	LC
GERANIACEAE	<i>Monsonia emarginata</i> (L.f.) L'Hér.	LC
GOODENIACEAE	<i>Scaevola plumieri</i> (L.) Vahl	LC
HYACINTHACEAE	<i>Dipcadi viride</i> (L.) Moench	LC
HYACINTHACEAE	<i>Drimia elata</i> Jacq.	DDT
HYACINTHACEAE	<i>Drimia macrantha</i> (Baker) Baker	LC
HYACINTHACEAE	<i>Ledebouria cooperi</i> (Hook.f.) Jessop	LC
HYACINTHACEAE	<i>Ledebouria undulata</i> (Jacq.) Jessop	LC
HYPOXIDACEAE	<i>Hypoxis parvula</i> Baker var. <i>albiflora</i> B.L.Burt	LC
HYPOXIDACEAE	<i>Hypoxis sobolifera</i> Jacq. var. <i>sobolifera</i> (Jacq.) Nel	LC
IRIDACEAE	<i>Aristea anceps</i> Eckl. ex Klatt	LC/PNCO Protected
IRIDACEAE	<i>Chasmanthe aethiopica</i> (L.) N.E.Br.	LC/PNCO Protected

Family	Species	Threat status
IRIDACEAE	<i>Dierama igneum</i> Klatt	LC/PNCO Protected
JUNCACEAE	<i>Juncus kraussii</i> Hochst. subsp. <i>kraussii</i>	LC
JUNCACEAE	<i>Juncus lomatoophyllus</i> Spreng.	LC
JUNCAGINACEAE	<i>Triglochin bulbosa</i> L.	LC
LAMIACEAE	<i>Plectranthus hadiensis</i> (Forssk.) Schweinf. ex Spreng. var. <i>tomentosus</i> (Benth.) Codd	LC/CARA
LAMIACEAE	<i>Pycnostachys reticulata</i> (E.Mey.) Benth.	LC
LAMIACEAE	<i>Stachys aethiopica</i> L.	LC
LAMIACEAE	<i>Syncolostemon densiflorus</i> Benth.	LC
LEMNACEAE	<i>Lemna gibba</i>	LC
LENTIBULARIACEAE	<i>Utricularia stellaris</i>	
LOBELIACEAE	<i>Lobelia anceps</i> L.f.	LC
LOBELIACEAE	<i>Lobelia coronopifolia</i> L.	LC
LOBELIACEAE	<i>Lobelia flaccida</i> (C.Presl) A.DC. subsp. <i>flaccida</i>	LC
LOBELIACEAE	<i>Lobelia tomentosa</i> L.f.	LC
LOBELIACEAE	<i>Monopsis unidentata</i> (Dryand.) E.Wimm. subsp. <i>intermedia</i> Phillipson	LC
MALVACEAE	<i>Grewia occidentalis</i> L. var. <i>occidentalis</i>	LC
MALVACEAE	<i>Hibiscus tiliaceus</i> L. subsp. <i>tiliaceus</i>	LC
MALVACEAE	<i>Hibiscus trionum</i> L.	
MALVACEAE	<i>Hibiscus vitifolius</i> L. subsp. <i>vitifolius</i>	LC
MALVACEAE	<i>Melhania didyma</i> Eckl. & Zeyh.	LC
MELIACEAE	<i>Turraea oblacifolia</i>	LC
MELIANTHACEAE	<i>Bersama lucens</i> (Hochst.) Szyszyl.	LC
MESEMBRYANTHEACEAE	<i>Mesembryanthemum aitonis</i> Jacq.	LC
MORACEAE	<i>Ficus burkei</i>	LC
MORACEAE	<i>Ficus burtt-davyi</i>	LC
MYRTACEAE	<i>Eugenia capensis</i> (Eckl. & Zeyh.) Sond. subsp. <i>capensis</i>	LC
MYRTACEAE	<i>Psidium guajava</i> L.	Not Evaluated/NEMBA ELIEN/CARA
NYMPHAEACEAE	<i>Nymphaea nouchali</i>	LC
OCHNACEAE	<i>Ochna arborea</i>	LC
OLEACEAE	<i>Chionanthus foveolatus</i>	LC/
OLEACEAE	<i>Chionanthus peglerae</i>	LC/
OLEACEAE	<i>Olea capensis</i> subsp. <i>Macrocarpa</i>	LC
OLEACEAE	<i>Olea exasperata</i>	LC
ORCHIDACEAE	<i>Disa cornuta</i> (L.) Sw.	LC/NEMBA Protected/CITES #4:II/ PNCO Protected
ORCHIDACEAE	<i>Eulophia macowanii</i> Rolfe	LC/NEMBA Protected/PNCO Protected
ORCHIDACEAE	<i>Habenaria epipactidea</i> Rchb.f.	LC/NEMBA Protected?PNCO

Family	Species	Threat status
		Protected
ORCHIDACEAE	<i>Satyrium sphaerocarpum</i> Lindl.	LC/NEMBA Protected?PNCO Protected
ORCHIDACEAE	<i>Tridactyle tridentata</i> (Harv.) Schltr.	LC/NEMBA Protected/PNCO Protected
OXALIDACEAE	<i>Oxalis pes-caprae</i>	LC
PHYLLANTHACEAE	<i>Flueggea verrucosa</i> (Thunb.) G.L. Webster	LC
PHYLLANTHACEAE	<i>Phyllanthus heterophyllus</i>	LC
PHYLLANTHACEAE	<i>Phyllanthus maderaspatensis</i> L.	LC
PHYLLANTHACEAE	<i>Phyllanthus parvulus</i> Sond. var. <i>parvulus</i>	LC
PITTOSPORACEAE	<i>Pittosporum viridiflorum</i> Sims	LC/NFA Protected
POACEAE	<i>Agrostis lachnantha</i>	LC
POACEAE	<i>Andropogon eucomus</i> Nees	LC
POACEAE	<i>Aristida junciformis</i> Trin. & Rupr. subsp. <i>junciformis</i>	LC
POACEAE	<i>Arundo donax</i> L.	Not Evaluated/NEMBA ELIEN/CARA
POACEAE	<i>Brachiaria chusqueoides</i> (Hack.) Clayton	LC
POACEAE	<i>Brachiaria serrata</i> (Thunb.) Stapf	LC
POACEAE	<i>Chloris gayana</i> Kunth	LC
POACEAE	<i>Dactyloctenium australe</i> Steud.	LC
POACEAE	<i>Digitaria diagonalis</i> (Nees) Stapf var. <i>diagonalis</i>	LC
POACEAE	<i>Digitaria natalensis</i> Stent	LC
POACEAE	<i>Digitaria ternata</i> (A.Rich.) Stapf	LC
POACEAE	<i>Diheteropogon amplectens</i> (Nees) Clayton var. <i>amplectens</i>	LC
POACEAE	<i>Ehrharta calycina</i> Sm.	LC
POACEAE	<i>Ehrharta erecta</i>	LC
POACEAE	<i>Eragrostis curvula</i> (Schrad.) Nees	LC
POACEAE	<i>Eragrostis plana</i>	LC
POACEAE	<i>Hyparrhenia filipendula</i> (Hochst.) Stapf var. <i>filipendula</i>	LC
POACEAE	<i>Imperata cylindrica</i>	LC
POACEAE	<i>Leersia hexandra</i> Sw.	LC
POACEAE	<i>Leptochloa eleusine</i> (Nees) Cope & N.Snow	LC
POACEAE	<i>Leptochloa fusca</i> (L.) Kunth	LC
POACEAE	<i>Lolium perenne</i> L.	Not Evaluated
POACEAE	<i>Oplismenus hirtellus</i>	LC
POACEAE	<i>Panicum aequinerve</i> Nees	LC
POACEAE	<i>Panicum deustum</i>	LC
POACEAE	<i>Paspalum dilatatum</i> Poir.	Not Evaluated
POACEAE	<i>Paspalum distichum</i>	Not evaluated
POACEAE	<i>Paspalum scrobiculatum</i>	LC

Family	Species	Threat status
POACEAE	<i>Paspalum urvillei</i> Steud.	Not Evaluated
POACEAE	<i>Paspalum vaginatum</i> Sw.	LC
POACEAE	<i>Pennisetum clandestinum</i> Hochst. ex Chiov.	Not Evaluated/NEMBA ELIEN/CARA
POACEAE	<i>Polypogon strictus</i> Nees	LC
POACEAE	<i>Setaria sphacelata</i> (Schumach.) Stapf & C.E.Hubb. ex M.B.Moss var. <i>sericea</i> (Stapf) Clayton	LC
POACEAE	<i>Sporobolus africanus</i> (Poir.) Robyns & Tournay	LC
POACEAE	<i>Sporobolus virginicus</i> (L.) Kunth	LC
POACEAE	<i>Stenotaphrum secundatum</i> (Walter) Kuntze	LC
POACEAE	<i>Stipagrostis zeyheri</i> (Nees) De Winter subsp. <i>barbata</i> (Stapf) De Winter	LC
PODOCARPACEAE	<i>Podocarpus falcatus</i>	LC/NFA Protected
PODOCARPACEAE	<i>Podocarpus latifolius</i>	LC/NFA Protected
POLYGALACEAE	<i>Polygala myrtifolia</i> L. var. <i>myrtifolia</i>	LC
POLYGONACEAE	<i>Persicaria attenuata</i> (R.Br.) Soják subsp. <i>africana</i> K.L.Wilson	LC
POLYGONACEAE	<i>Persicaria lapathifolia</i>	NEMBA alien Cat 1b
POLYGONACEAE	<i>Rumex dregeanus</i> Meisn. subsp. <i>dregeanus</i>	LC
POLYPODIACEAE	<i>Pyrrosia africana</i> (Kunze) F.Ballard	LC
POTTIACEAE	<i>Trichostomum brachydontium</i> Bruch	
PROTEACEAE	<i>Protea simplex</i> E.Phillips	LC/NEMBA Protected/PNCO Protected
PTYCHOMITRIACEAE	<i>Ptychomitrium crispatum</i> (Hedw.) A.Jaeger	
RANUNCULACEAE	<i>Ranunculus multifidus</i>	LC
RESTIONACEAE	<i>Restio eleocharis</i> Mast.	LC
RHAMNACEAE	<i>Ziziphus mucronata</i> Willd. subsp. <i>mucronata</i>	LC
ROSACEAE	<i>Rubus rigidus</i> Sm.	LC
RUBIACEAE	<i>Psychotria capensis</i>	
RUBIACEAE	<i>Psydrax obovatum</i>	LC
RUPPIACEAE	<i>Ruppia maritima</i> L.	LC
RUSCACEAE	<i>Dracaena aletriformis</i>	LC
RUTACEAE	<i>Teclea natalensis</i>	LC
RUTACEAE	<i>Vepris lanceolata</i>	LC
RUTACEAE	<i>Zanthoxylum capense</i>	LC
SALICACEAE	<i>Dovyalis lucida</i>	LC
SALICACEAE	<i>Dovyalis rhamnoides</i>	LC
SALICACEAE	<i>Dovyalis rotundifolia</i>	LC
SALICACEAE	<i>Scolopia zeyheri</i>	LC
SANTALACEAE	<i>Rhoiacarpos capensis</i> (Harv.) A.DC.	LC

Family	Species	Threat status
SAPINDACEAE	<i>Allophylus natalensis</i> (Sond.) De Winter	LC
SAPINDACEAE	<i>Deinbollia oblongifolia</i> (E.Mey. ex Arn.) Radlk.	LC
SAPOTACEAE	<i>Mimusops caffra</i>	LC/NFA Protected
SAPOTACEAE	<i>Sideroxylon inerme</i>	LC/NFA Protected
SCROPHULARIACEAE	<i>Anastrabe integerrima</i> E.Mey. ex Benth.	LC
SCROPHULARIACEAE	<i>Chaenostoma roseoflavum</i> (Hiern) Kornhall	LC
SCROPHULARIACEAE	<i>Hebenstretia integrifolia</i> L.	LC
SCROPHULARIACEAE	<i>Nemesia denticulata</i> (Benth.) Grant ex Fourc.	LC
SCROPHULARIACEAE	<i>Selago cinerea</i> L.f.	LC
SCROPHULARIACEAE	<i>Veronica anagallisaquatica</i>	LC
SOLANACEAE	<i>Cestrum laevigatum</i> Schtdl.	Not Evaluated/NEMBA ELIEN/CARA
SOLANACEAE	<i>Datura stramonium</i>	Not evaluated
SOLANACEAE	<i>Solanum elaeagnifolium</i>	CARA Cat 1b
STANGERIACEAE	<i>Stangeria eriopus</i> (Kunze) Baill.	VU/PNCO Endangered/NEMBA Endangered
STRELITZIACEAE	<i>Strelitzia nicolai</i>	LC
STRYCHNACEAE	<i>Strychnos spinosa</i> Lam. subsp. <i>spinosa</i>	LC
THELYPTERIDACEAE	<i>Cyclosorus interruptus</i> (Willd.) H.Itô	LC
THYMELAEACEAE	<i>Gnidia anthylloides</i> (L.f.) Gilg	LC
TYPHACEAE	<i>Typha capensis</i> (Rohrb.) N.E.Br.	LC
UMLACEAE	<i>Chaetacme aristata</i>	LC
URTICACEAE	<i>Droguetia ambigua</i> Wedd.	LC
VERBENACEAE	<i>Lantana camara</i> L.	Not Evaluated/CARA
VIOLACEAE	<i>Hybanthus capensis</i> (Thunb.) Engl.	LC
VITACEAE	<i>Cyphostemma cirrhosum</i> (Thunb.) Desc. ex Wild & R.B.Drumm. subsp. <i>cirrhosum</i>	LC
VITACEAE	<i>Rhoicissus digitata</i> (L.f.) Gilg & M.Brandt	LC
VITACEAE	<i>Rhoicissus tomentosa</i>	LC
ZAMIACEAE	<i>Encephalartos altensteinii</i> Lehm.	VU/PNCO Endangered/NEMBA Endangered/CITES #4:I
ZAMIACEAE	<i>Encephalartos caffer</i> (Thunb.) Lehm.	NT/PNCO Endangered/CITES #4:I