



DRAFT ECOLOGICAL IMPACT ASSESSMENT

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SED DEVELOPMENT OF THE BAVIAANSKLOOF WORLD HERITAGE SITE INTERPRETIVE CENTRE

Title: Baviaanskloof World Heritage Site Interpretive Centre
Prepared for: Eastern Cape Parks and Tourism Agency (ECPTA)
Date: August 2019

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The contents of this specialist report complies with the legislated requirements as described in Appendix 6 of the National Environmental Management Act (NEMA) (No 107 of 1998), as amended.

THE PROJECT TEAM

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;

Details of the specialist

Ms Rebekah Anderson
(Assistant report writer)

Rebekah is an Environmental Consultant and holds a B.Sc in Environmental Sciences from Nelson Mandela University, majoring with Botany and Geography. Rebekah is currently completing her B.Sc honours in Environmental Management through UNISA. Her Honours Thesis aims to determine the sustainability of tourism activities within a Botanical Garden, particularly the Kwelera National Botanical Garden. Rebekah has worked on a number of Ecological Specialist studies during her time at EOH CES, namely; the SANRAL Road Upgrading of National Route N2 Section 5 between Lizmore and Heidelberg, the proposed development of the Waterval Citrus Farm and Great Kei Quarries desktop Ecological studies. Rebekah has also worked on an Aquatic study and a Soil and Agricultural assessment for the Heidelberg Road upgrade project.

Mr Roy de Kock M.Sc., Pri. Nat Sci.
(Report reviewer)

Roy is a Principal Consultant holding a BSc Honours in Geology and an MSc in Botany from the Nelson Mandela 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 Pri. Nat Sci.
(Quality Control)

Alan is the executive of the EOH 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 by the Environmental Assessment Practitioners of South Africa (EAPSA).

Declaration

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

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

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1. Introduction

1. (1) A specialist report prepared in terms of these Regulations must contain—
 - (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;
 - (d) the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;
 - (i) a description of any assumptions made and any uncertainties or gaps in knowledge;
 - (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.

1.1. Project description

Eastern Cape Parks and Tourism Agency (ECPTA) is proposing the development of the Baviaanskloof World Heritage Site (WHS) Interpretive Centre on Farm 202, near the western entrance of the Baviaanskloof, within the Eastern Cape Province. The process of the Ecological Impact Assessment will be conducted as per the National Environmental Management Act (NEMA) EIA Regulations, which came into effect from 8 December 2014 and were subsequently amended on 7 April 2017. The proposed development will trigger a **Basic Assessment process**, in accordance with regulations 19 as published in GN R 326 of NEMA.

The development of the Baviaanskloof WHS Interpretive Centre would entail the development of the following, at a minimum:

- An information centre, gallery, conference room, admin area, reception area and curios shop;
- Staff areas, kitchen, scullery, store room and female and male toilets;
- Walkways and decks made from hardwood;
- Water, electrical and sewer services; and
- Roads, parking bays and a guard house.

Two site alternatives are proposed for the Baviaanskloof WHS Interpretive Centre (Figure 1.1).

The proposed Interpretive Centre aims to introduce, educate and showcase the Baviaanskloof World Heritage Site's unique features, history, activities and attractions to visitors that enter from the western section.

1.2. Project location

ECPTA is proposing to develop the Baviaanskloof WHS Interpretive Centre approximately 40 km south-east of Willowmore, in the Eastern Cape Province (Figure 1.1). The study area is situated in the Dr Beyers Naude Local Municipality seated in the Sarah Baartman District Municipality. The two site alternatives are proposed for the Baviaanskloof WHS Interpretive Centre which are located approximately 800m from one another on Farm 202. The centre coordinates of the preferred site alternative 1 are 33°31'17.21"S and 23°39'37.16"E and site alternative 2 (Figure 1.1.).



Figure 1.1: Location of the Baviaanskloof WHS Interpretive Centre site alternatives.

1.3. Alternatives

- Two location alternatives have been considered for the proposed Baviaanskloof WHS Interpretive Centre.
- No activity alternatives have been considered and no layout alternatives have been assessed.
- The No-Go alternative was also assessed.

1.4. Objectives

The main objective of this report is to assess the terrestrial ecological environment as well as the potential impact that the proposed development of an IC may have on the terrestrial habitat.

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

- Describe the study area in terms of land cover and terrestrial habitat. This will include a full desktop analysis on the fauna and flora.
- Review relevant legislation, policies, guidelines and standards.
- Conduct a site survey to determine the actual ecological state of the study area and identify any species of conservation concern.
- 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 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. **[NB: It is not the purpose of the studies to comply with or apply for any permitting requirements at this stage.]**

1.5. Approach

The study site and surrounding areas were assessed using a two-phased approach. Firstly, a desktop and baseline assessment of the project area was conducted in terms of current vegetation classifications and biodiversity programmes and plans. For the terrestrial fauna and flora, the consideration of the following has been included:

- Council for Geoscience (2013) South African Geology;
- Soil and Terrain (SOTER) Database of South Africa (2008);
- The South African Vegetation Map (Mucina and Rutherford, 2012);
- National Protected Areas Expansion Strategy (NPAES);
- National Environmental Management: Biodiversity Act (NEMBA), 2004: List of Threatened Ecosystems (2011); and
- Eastern Cape Biodiversity Conservation Plan (ECPCP).

A site visit was conducted on 16 October 2018. The site visit was used to identify potential impacts of the proposed development of the IC on the surrounding environment and to inform the significance of the potential impacts identified.

1.6. Assumptions and limitations

This report is based on information that is currently available and, as a result, the following limitations and assumptions are implicit–

- The report is based on a project description taken from design specifications for the proposed Baviaanskloof WHS Interpretive Centre that have not yet been finalised, and which are likely to undergo a number of iterations and refinements before they can be regarded as definitive. A project description based on the final design will be provided in the EIA Phase.
- Descriptions of the natural and social environments are based on limited fieldwork and available literature. More information will be provided in the EIA phase based on the outcomes of the specialist studies.

1.7. Public consultation

The Public Participation Process (PPP) followed to date has been described in detail in the Draft BAR. Pre-assessment PPP was conducted in December 2018. Once the draft report is available for public review, a formal 30 day commenting and review period will be scheduled. In addition a public meeting will be held and all comments and issues received during this PPP will be included in the Final reports. All proof and correspondence to date is available in the DBAR. No comments have been received to

date that relates to the ecological environment. Any comments received on the Draft Ecological report will be included in the Final Ecological report.

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2. 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 importance and to evaluate these in terms of their conservation importance. In order to do so, the ecological sensitivity of the area is assessed as well as an identification of potential plant and animal Species of Conservation Concern (SCC) that may occur in habitats present in the area. To a large extent, the condition and sensitivity of the vegetation will also determine areas with high biodiversity. This study also aims at identifying areas of high sensitivity and those that may be subject to significant impacts from the project.

The approach to determining the vegetation sensitivity of the study area is described below. Zones of low, moderate and high sensitive areas were identified by the presence or lack of the following:

- Degree of disturbance and transformation
- Presence of plant and faunal species of conservation concern.
- Vegetation types (which also constitute faunal habitats) of conservation concern.
- Areas of high biodiversity.
- The presence of important process areas such as:
 - Ecological corridors
 - Topographical features (especially steep and rocky slopes that provide niche habitats for both plants and animals)

A Geographical Information System (GIS) map was then drawn up depicting the different zones of sensitivity using available aerial imagery and relating this to the information gathered from the field survey.

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.

2.1. Species of conservation concern

Data on the known distribution and conservation status for each potential plant SCC needs to be obtained in order to develop a list of SCC. These plant species are those that are subject to significant impacts from the proposed activity. In general these will be species that are already known to be threatened or at risk. Efforts to provide the conservation status ('red list' status) of individual species may provide additional valuable information on SCC (see <http://www.iucnredlist.org/>). SCC have been identified by means of a combination of applicable legislation, guidelines and conservation status lists. The following lists were utilised to cross reference conservation and protection statuses of various species:

- National Environmental Management: Biodiversity Act (No. 10 of 2004) - Chapter 4, Part 2;
- Endangered and Protected Flora in the 1974 Provincial Nature Conservation Ordinance (PNCO) – Schedule 3 and 4;
- 1976 List of Protected Trees (Government Gazette No. 9542 Schedule A) in the 1998 National Forest Act (NFA) as amended in November 2014; and

- SA Red Data List.

The South African Red Data List of plants use the internationally recognised IUCN Red List Categories and Criteria to measure a species risk of extinction (Table 3.1). Since the Red List of South African plants are used widely for conservation practices throughout South Africa, this list has been modified to identify species that are at low risk of extinction but of high conservation importance.

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

Definitions:

The South African (SA) Red List system contains nine categories, with the main purpose of classifying species from lowest (Least Concern) to highest (Critically Endangered) threat in terms of risk of extinction (see Figure 2.1). 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 considered as a SCC.

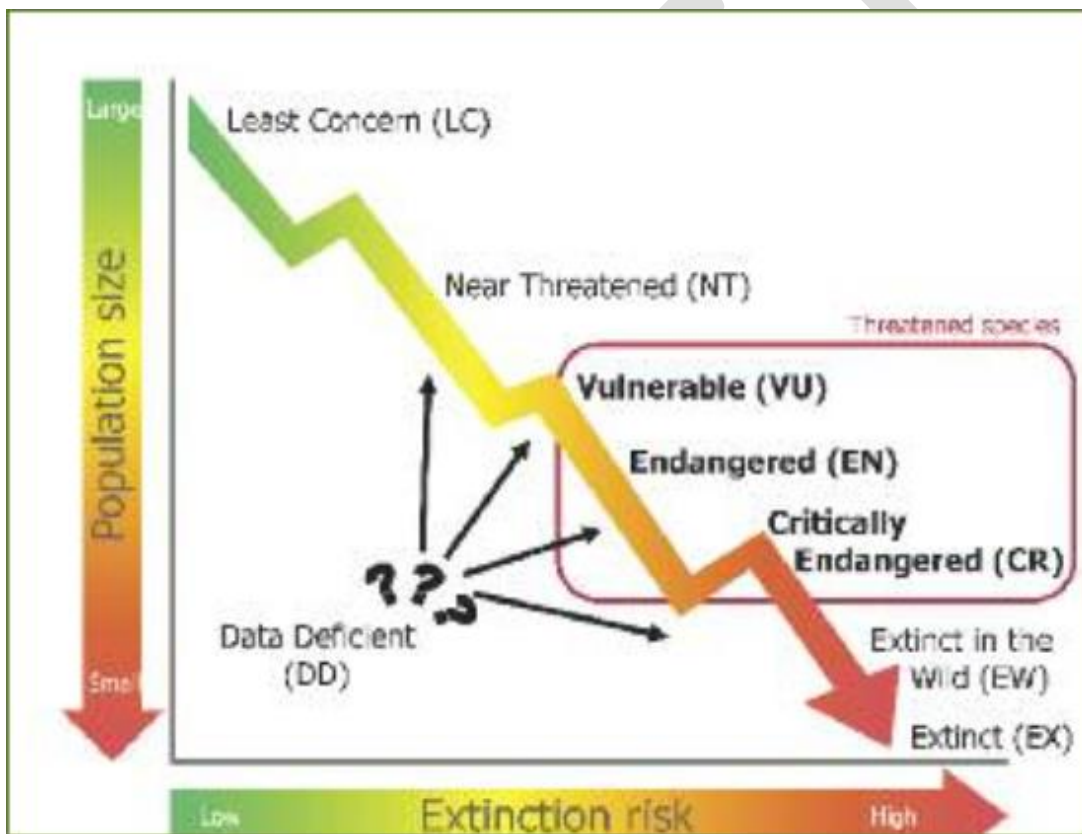


Figure 2.1: The SA Red List system categorizes species according to their risk of extinction (Source: SA Red Data Guidelines).

A species’ classification is guided by five criteria relating to different biological factors that indicate danger of extinction (Table 2.2). 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 2.1 below (Source: SA Red Data Guidelines):

Table 2.1: Guidelines for the management of the various categories

Status	Criterion*	Guidelines for Recommendation
<p>^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.</p>		
<p>* Refer to Table 2.2 for criteria descriptions</p>		
^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 Endangered	A,B,C,D	No further loss of natural habitat should be permitted as the species is on the 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.

Status	Criterion*	Guidelines for Recommendation
^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.
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 be 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 2.2: 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) Area of occupancy (AOO)	<100 km ² <10 km ²	<5 000 km ² <500 km ²	<20 000 km ² <2 000 km ²
C	Small population size and decline	Population size Number of mature individuals in largest subpopulation Proportion of population in largest subpopulation	<250 <50 >90%	<2 500 <250 >95%	<10 000 <1 000 100%
D	Critically small population size or very restricted distribution	Population size Area of occupancy (AOO) Number of locations	<50	<250	<1 000 <20 km ² Five or fewer
E	Quantitative analysis of extinction risk	Probability of extinction over a specified time period	50%	20%	10%

2.2. Sampling protocol

During the site survey a stratified random sampling approach was adopted, whereby initial assumptions were made about the diversity of vegetation from satellite imagery, existing vegetation maps and previous studies conducted in the area. Random sample points were then selected within each “desktop mapped vegetation type” and assessed. In this way the time available was used much more efficiently than in random sampling, but there is a risk of bias and the eventual results may simply ‘prove’ the assumptions. The aim of this visit was to characterise and describe each vegetation community within the study site as well as identifying areas of high sensitivity and species of conservation concern. Visible species within the study site were identified using plant identification books and various other literatures.

Vegetation types within the study area were assessed and surveyed and vegetation communities were then described according to the dominant species recorded from each type. These were mapped and assigned a sensitivity score.

2.3. Vegetation mapping

Mucina and Rutherford (2018) developed the National Vegetation map as part of a South African National Biodiversity Institute (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 map 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 Acocks (1953) developed over 50 years ago.

Mucina and Rutherford (2018) assert that the SANBI Vegetation map project has two main aims:

- to determine the variation in and 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 map and accompanying book 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.

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

2.4. 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 ecological studies. It must be noted that the sensitivity zonings in this study are based solely on ecological characteristics and social and economic factors have not been taken into consideration. The sensitivity analysis described here is based on 11 criteria which are considered to be of importance in determining ecosystem and landscape sensitivity. The method predominantly involves identifying sensitive vegetation or habitat types, topography and land transformation, biodiversity patterns (hotspots) and biodiversity process areas (ecological infrastructure and corridors) (Table 2.3).

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

Table 2.3: 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	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

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
8	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
9	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
10	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
11	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
12	Aquatic environments (Rivers, wetlands, drainage line etc)	Outside of the 32m watercourse buffer. Outside of the 500m wetland buffer	Within 32m of the watercourse. Within 500m of a natural wetland, but outside of 50m wetland buffer	Development within the watercourse.

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

2.4.1. Biodiversity Regulations

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. These areas are included in the sensitivity map.

Provincial:

ECBCP is a detailed, low-level conservation mapping tool for land-use planning purposes. The aim of ECBCP is to map critical biodiversity areas through a systematic conservation planning process. The current biodiversity plan includes the mapping of priority aquatic features, land-use pressures, and critical biodiversity areas and develops guidelines for land and resource-use planning and decision-making.

The main outputs of the ECBCP are “critical biodiversity areas” (CBAs), which are allocated the following management categories:

CBA 1 = Maintain in a natural state

CBA 2 = Maintain in a near-natural state

Land use outputs not classified as CBAs are called Biodiversity Land Management Classes (BLMCs) and are allocated the following management categories.

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

ECBCP maps the CBAs based on extensive biological data and input from key stakeholders. Although ECBCP is mapped at a finer scale than the National Spatial Biodiversity Assessment (Driver *et al.*, 2005) it is still, for the large part, inaccurate and coarse. Therefore it is imperative that the status of the environment, for any proposed development MUST first be verified before the management recommendations associated with the ECBCP are considered (Berliner and Desmet, 2007). It is also important to note that in absence of any other biodiversity plan, the ECBCP has been adopted by the Provincial Department of Economic Development, Environmental Affairs and Tourism (DEDEAT) as a strategic biodiversity plan for the Eastern Cape.

2.4.1. Protected areas

The National Environmental Management Protected Areas Act (Act No 57 of 2003; NEMPAA) was developed to provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. All protected areas within 15km of the study site were listed. Impacts were identified and mitigations proposed.

The goal of the National Protected Areas Expansion Strategy (NPAES) is to achieve cost-effective protected area expansion for ecological sustainability and increased resilience to climate change. It sets targets for protected area expansion, provides maps of the most important areas for protected area expansion, and makes recommendations on mechanisms for protected area expansion. The NPAES has classified protected areas into three categories: formally protected areas, informally protected areas and focus areas. Focus areas are large, intact and unfragmented areas suitable for the creation or expansion of large protected areas.

2.5. Impact assessment

2.5.1. Impact rating methodology

CES has developed an evaluation criteria of impacts in accordance with the requirements outlined in Appendix 2 of the EIA Regulations (2014, as amended). This scale takes into consideration the following variables:

- **Nature:** negative or positive impact on the environment.
- **Type:** direct, indirect and/or cumulative effect of impact on the environment.
- **Significance:** The criteria in Table 9.1 are used to determine the overall significance of an activity. The impact effect (which includes duration; extent; consequence and probability) and the reversibility/mitigation of the impact are then read off the significance matrix in order to determine the overall significance of the issue. The overall significance is either negative or positive and will be classified as low, moderate or high (Table 9.2).
- **Consequence:** the consequence scale is used in order to objectively evaluate how severe a number of negative impacts might be on the issue under consideration, or how beneficial a number of positive impacts might be on the issue under consideration.
- **Extent:** the spatial scale defines the physical extent of the impact.
- **Duration:** the temporal scale defines the significance of the impact at various time scales, as an indication of the duration of the impact.
- **Probability:** the likelihood of impacts taking place as a result of project actions arising from the various alternatives. 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 and alternatives. Although some impacts may have a severe effect, the likelihood of them occurring may affect their overall significance.
- **Reversibility:** The degree to which an environment can be returned to its original/partially original state.

- **Irreplaceable loss:** The degree of loss which an impact may cause.
- **Mitigation potential:** The degree of difficulty of reversing and/or mitigating the various impacts ranges from very difficult to easily achievable. The four categories used are listed and explained in Table 6.1 below. Both the practical feasibility of the measure, the potential cost and the potential effectiveness is taken into consideration when determining the appropriate degree of difficulty.

Table 2.4: Ranking of Evaluation Criteria

Nature	
Positive	Beneficial/positive impact.
Negative	Detrimental/negative impact.
Type	
Direct	Direct interaction of an activity with the environment.
Indirect	Impacts on the environment that are not a direct result of the project or activity.
Cumulative	Impacts which may result from a combination of impacts of this project and similar related projects.
Duration	
Short term	Less than 5 years.
Medium term	Between 5-20 years.
Long term	More than 20 years.
Permanent	Over 40 years or resulting in a permanent and lasting change that will always be there.
Extent	
Localised	Impacts affect a small area of a few hectares in extent. Often only a portion of the project area.
Study area	The proposed site and its immediate environments.
Municipal	Impacts affect the municipality, or any towns within the municipality.
Regional	Impacts affect the wider district municipality or the Eastern Cape Province as a whole.
National	Impacts affect the entire country.
International/Global	Impacts affect other countries or have a global influence.
Consequence	
Slight	Slight impacts or benefits on the affected system(s) or party(ies).
Moderate	Moderate impacts or benefits on the affected system(s) or party(ies).
Severe/ Beneficial	Severe impacts or benefits on the affected system(s) or party(ies).
Probability	
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.
Reversibility	
Reversible	The activity will lead to an impact that can be reversed provided appropriate mitigation measures are implemented.
Irreversible	The activity will lead to an impact that is permanent regardless of the implementation of mitigation measures.
Irreplaceable loss	
Resource will not be lost	The resource will not be lost/destroyed provided mitigation measures are implemented.
Resource will be partly lost	The resource will be partially destroyed even though mitigation measures are implemented.
Resource will be lost	The resource will be lost despite the implementation of mitigation measures.
Mitigation potential	

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

Table 2.5 Description of significance ratings

Significance Rating		Description
LOW NEGATIVE	LOW POSITIVE	The impacts on this issue are acceptable and mitigation, whilst desirable, is not essential. The impacts on the issue by themselves are insufficient, even in combination with other low impacts, to prevent the development being approved. Impacts on this particular issue will result in either positive or negative medium to short term effects on the social and/or natural environment.
MODERATE NEGATIVE	MODERATE POSITIVE	The impacts on this issue are important and require mitigation. The impacts on this issue are, by themselves, insufficient to prevent the implementation of the project, but could in conjunction with other issues with moderate impacts, prevent its implementation. Impacts on this particular issue will usually result in either a positive or negative medium to long-term effect on the social and/or natural environment.
HIGH NEGATIVE	HIGH POSITIVE	The impacts on this issue are serious, and if not mitigated, they may prevent the implementation of the project (if it is a negative impact). Impacts on this particular issue would be considered by society as constituting a major and usually a long-term change to the (natural and/or social) environment, and will result in severe effects or if positive, substantial beneficial effects.

3. Relevant legislation

Environmental legislation relevant to the proposed development is summarised in Table 3.1 below. Biodiversity Plans and Programmes are discussed in Chapter 5 where they are used to describe the desktop ecological conditions of the study area.

Table 3.1. Environmental legislation considered in the preparation of the Ecological Assessment for the proposed Baviaanskloof IC.

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
The Constitution (Act 108 of 1996)	<p>The Constitution of the Republic of South Africa is the supreme law of the land. As a result, all laws, including those pertaining to this Management Plan, must conform to the Constitution. The Bill of Rights - Chapter 2 of the Constitution, includes an environmental right (Section 24) according to which, everyone has the right:</p> <p><i>a) To an environment that is not harmful to their health or well-being; and</i></p> <p><i>b) To have the environment protected for the benefit of present and future generations, through reasonable legislative and other measures that:</i></p> <ol style="list-style-type: none"> <i>i. Prevent pollution and ecological degradation;</i> <i>ii. Promote conservation; and</i> <i>iii. Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development.</i> 	<ul style="list-style-type: none"> • Obligation to ensure that the proposed activity 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.
<p>National Environmental Management Act (NEMA) (Act 108 of 1998), and its subsequent amendments.</p> <p>NEMA Amended EIA Regulations (GNR. 326) (2017)</p>	<p>Relevant Sections of the Act: Section 2, 23, 24, 24-1, 28-33</p> <ul style="list-style-type: none"> • Application of the NEMA principles (e.g. need to avoid or minimise impacts, use of the precautionary principle, polluter pays principle, etc.) • Application of fair decision-making and conflict management procedures are provided for in NEMA. 	<ul style="list-style-type: none"> • An application for Environmental Authorisation (as triggered by the Amended EIA Regulations) has been submitted to the Competent Authority (i.e. DEA and DMR).

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<ul style="list-style-type: none"> Application of the principles of Integrated Environmental Management and the consideration, investigation and assessment of the potential impact of existing and planned activities on the environment; socio-economic conditions; and the cultural heritage. <p>NEMA introduces the duty of care concept, which is based on the policy of strict liability. This duty of care extends to the prevention, control and rehabilitation of significant pollution and environmental degradation. It also dictates a duty of care to address emergency incidents of pollution. A failure to perform this duty of care may lead to criminal prosecution, and may lead to the prosecution of managers or directors of companies for the conduct of the legal persons.</p> <p>In addition NEMA introduced a framework for environmental impact assessments, the Amended EIA Regulations (2017). The NEMA EIA Regulations aim to avoid detrimental environmental impacts through the regulation of specific activities that cannot commence without prior environmental authorisation. Authorisation either requires a Basic Assessment or a Full Scoping and Environmental Impact Assessment, depending on the type of activity. These assessments specify mitigation and management guidelines to minimise negative environmental impacts and optimise positive impacts.</p>	<ul style="list-style-type: none"> In terms of Section 28, every person who causes; has caused, or may cause significant pollution or degradation of the environment must take reasonable measures to prevent pollution or rectify the damage caused – The undertaking of a specialist study, in this case an Ecological study in order to identify potential impacts on the ecological environment and to recommend mitigation measures to minimise these impacts, complies with Section 28 of NEMA. This report complies with Appendix 6 of the Amended Environmental Impact Assessment Regulations (GNR. 326 of 2017) as regulated by the National Environmental Management Act (Act 107 of 1998 and amended in 2014; NEMA), which cover the requirements of the content of a Specialist Report. The developer must apply the NEMA principles, the fair decision-making and conflict management procedures that are provided for in NEMA.

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
		<ul style="list-style-type: none"> 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.
<p>National Environmental Management: Biodiversity Act (Act 10 of 2004), and its subsequent amendments.</p> <p>Alien Invasive Species Regulations, 2014.</p>	<p>The National Environmental Management: Biodiversity Act (NEMBA), No. 10 of 2004, aims to assist with the management and conservation of South Africa's biological diversity through the use of legislated planning tools. These planning tools include the declaration of bioregions and the associated bioregional plans as well as other mechanisms for managing and conserving biodiversity. The objectives of the Act include inter alia: To provide for:</p> <ul style="list-style-type: none"> The management and conservation of biological diversity within the Republic and of the components of such biological diversity; The use of indigenous biological resources in a suitable manner; The fair and equitable sharing of benefits arising from bio-prospecting of genetic material derived from indigenous biological resources; and To give effect to ratified international agreements relating to biodiversity which are binding on the Republic. To provide for co-operative governance in biodiversity management and conservation; and 	<ul style="list-style-type: none"> An invasive species management, control and eradication plan for land/activities under their control should be developed, as part of their environmental plans in accordance with section 11 of NEMA. Activities may not be carried out in threatened or protected ecosystems without first gaining authorisation for such activities. It should however be noted that no threatened or protected ecosystems as listed in NEMBA has been identified within the project area and thus this is not considered to be relevant to this project. No protected species may be removed or damaged without a permit;

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<ul style="list-style-type: none"> To provide for a South African National Biodiversity Institute to assist in achieving the objectives of the Act. <p>In addition to this, Sections 50-62 of the Act provide details relating to the protection of threatened or protected ecosystems and species, while Sections 63-77 of the Act provide details relating to alien and invasive species with the purpose of preventing their introduction and spread, managing, controlling and eradicating of alien and invasive species.</p> <p>The NEMBA Alien and Invasive Species List (Government Notice 599 of 2014) lists Alien and Invasive species that are regulated by the NEMBA Alien and Invasive Species Regulations (Government Notice 98 of 2014).</p>	<ul style="list-style-type: none"> A total of 2 plant species identified on site are classified as invasive species in the NEMBA alien and invasive species list.
<p>Conservation of Agricultural Resources Act, (Act 43 of 1983).</p>	<p>The Conservation of Agricultural Resources Act, No. 43 of 1983 aims to control over-utilisation of the natural agricultural resources to promote the conservation of soil, water sources and vegetation through the combat of weeds and invader plants. Regulations 15 and 16 under this Act, which relate problem plants were amended in March 2001.</p> <p>This is achieved by:</p> <ul style="list-style-type: none"> Production potential of land is maintained, Preventing and combating erosion, Preventing and combating weakening or destruction of the water sources, and Protecting vegetation and combating of weeds and invader plants. <p>The Act provides a list of declared weeds and invader plants as well as indicators of bush encroachment. In terms of weeds and invader plants:</p>	<ul style="list-style-type: none"> An invasive species monitoring, control and eradication plan for land/activities under their control should be developed as part of the construction environmental plans in accordance with CARA. 2 species identified within the project area has been classified as either Category 1 or Category 2 invaders.

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<ul style="list-style-type: none"> • A land user shall control any category 1 plants that occur on any land or inland water surface. • No person shall, except in or for purposes of a biological control reserve – <ul style="list-style-type: none"> ○ Establish, plant, maintain, multiply or propagate weeds and invader plants; ○ Import or sell propagating material of category weeds and invader plants; and ○ Acquire propagating material of weeds and invader plants <p>Combating of category 1 plants (Section 15A) according to CARA (Act No 43 of 1983)</p> <ol style="list-style-type: none"> 1) Category 1 plants may not occur on any land or inland water surface other than in biological control reserves. 2) A land user shall control any category 1 plants that occur on any land or inland water surface in contravention of the provisions of sub-regulation (1) by means of the methods prescribed in regulation 15E. 3) No person shall, except in or for purposes of a biological control reserve – <ol style="list-style-type: none"> a. Establish, plant, maintain, multiply or propagate category 1 plants; b. Import or sell propagating material of category 1 plants or any category 1 plants; c. Acquire propagating material of category 1 plants or any category 1 plants. 	

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<p>4) The executive officer may, on good cause shown in writing by the land user, grant written exemption from compliance with the requirements of sub-regulation (1) on such conditions as the executive officer may determine in each case.</p> <p>Combating of category 2 plants (Section 15B) according to CARA (Act No 43 of 1983)</p> <p>1) Category 2 plants may not occur on any land or inland water surface other than a demarcated area or a biological control reserve.</p> <p>(a) The executive officer may on application in writing demarcate an area as an area where category 2 plants may occur, be established and be maintained.</p> <p>(b) An area in respect of which a water use license for stream flow reduction activities has been issued in terms of section 36 of the National Water Act, 1998 (Act No. 36 of 1998) shall be deemed to be a demarcated area.</p> <p>2) The executive officer shall demarcate an area for the occurrence, establishment and maintenance of category 2 plants only if:</p> <p>(a) the category 2 plants in the area are cultivated under controlled circumstances; and</p> <p>(b) the land user concerned has been authorised to use water in terms of the National Water Act, 1998 (Act No. 36 of 1998); and</p>	

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<p>(c) the category 2 plants or products of category 2 plants in the area are demonstrated to primarily serve a commercial purpose, use as a woodlot, shelter belt, building material, animal fodder, soil stabilisation, medicinal or other beneficial function that the executive officer may approve; and</p> <p>(d) all reasonable steps are taken to curtail the spreading of propagating material of the category 2 plants outside the demarcated areas.</p> <p>3) When an area is demarcated for the occurrence, establishment and maintenance of category 2 plants the executive officer may impose such additional conditions as may reasonably be deemed necessary to keep the category 2 plants in the area in check.</p> <p>4) No person shall sell propagating material of category 2 plants or any category 2 plants to another person unless such other person is a land user of a demarcated area or of a biological control reserve.</p> <p>5) No person shall acquire propagating material of category 2 plants or any category 2 plants unless such material or such plants are intended for use in a demarcated area or in a biological control reserve.</p> <p>6) Propagating material of category 2 plants or category 2 plants shall only be imported or sold in accordance with the provisions of the Plant Improvement Act, 1976 (Act No. 53 of 1976), the Agricultural Pests Act, 1983 (Act No. 36 of 1983) and the environment conservation regulations.</p>	

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<p>7) A land user shall control any category 2 plants that occur on any land or inland water surface in contravention of the provisions of sub-regulation (1) by means of the methods prescribed in regulation 15E.</p> <p>8) Unless authorised thereto in terms of the National Water Act, 1998 (Act No. 36 of 1998), no land user shall allow category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland.</p> <p>The executive officer may, on good cause shown in writing by the land user, grant written exemption from compliance with one or more of the requirements of sub-regulations (1), (3), (5), (6), (8) and (9) on such conditions as the executive officer may determine in each case.</p> <p><i>It should be noted that the CARA regulations for the legal obligations regarding alien invasive plants in South Africa have been superseded by the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations which was promulgated on 1 October 2014. However, CARA has not been repealed and is still included as a reference point to use in terms of the management of AIS where certain species may not be included in the NEM:BA AIS list.</i></p>	
<p>National Forest Act (Act 84 of 1998) and its subsequent amendments.</p>	<p>The NFA provides the legal framework for the protection and sustainable use of South Africa’s indigenous forests. Any area that has vegetation which is characterised by a closed and contiguous canopy and under storey plant establishment is defined as a ‘forest’ and as a result falls under the authority of the Department of Agriculture, Forestry and Fisheries (DAFF): Forestry sector. A clause in Chapter 3, Part 1 covers:</p>	<ul style="list-style-type: none"> • No forest or trees that form part of a forest or forest association may be damaged or destroyed without a permit. • Development that comes within 50 metres of forest must be closely monitored during the construction phase.

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<p><u>Prohibition on destruction of trees in natural forests</u> Section 7 (1) No person may cut, disturb, damage or destroy any indigenous living tree in, or remove or receive any such tree from, a natural forest except in terms of (a) a licence issued under subsection (4) or section 23.</p> <p><u>Prohibition on destruction of protected trees</u> Section 15 (1) No person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree except under a licence or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated.</p> <p><u>Effect of setting aside protected areas</u> Section 10 (1) No person may cut, disturb, damage or destroy any forest produce in, or remove or receive any forest produce from, a protected area, except—</p> <ul style="list-style-type: none"> (a) in terms of the rules made for the proper management of the area in terms of section 11(2)(b); (b) in the course of the management of the protected area by the responsible organ of State or person; (c) in terms of a right of servitude; (d) in terms of the authority of a licence granted under section 7(4) or 23; (e) in terms of an exemption under section 7(1)(b) or 24(6); or 	<p>No forest patches were identified within the construction footprint.</p> <ul style="list-style-type: none"> • No protected tree species may be damaged or destroyed without a permit.

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<p>(f) in the case of a protected area on land outside a State forest, with the consent of the registered owner or by reason of another right which allows the person concerned to do so, subject to the prohibition in section 7(1).</p>	
<p>National Water Act (Act 36 of 1998)</p>	<p>The purpose of this Act (Section 2) is to ensure that the Nation’s water resources are protected, used, developed, conserved and controlled in ways that take into account, including:</p> <ul style="list-style-type: none"> (a) Promoting sustainable use of water (b) Protection of aquatic and associated ecosystems and their biological diversity (c) Reducing and preventing pollution and degradation of water resources <p><u>Protection of Water Resources (Sections 12-20)</u> Provides details of measures intended to ensure the comprehensive protection of all water resources, including the water reserve and water quality.</p> <p>With respect to the establishment of water quality objectives, objectives may relate to (Section 13):</p> <ul style="list-style-type: none"> • the presence and concentration of particular substances in the water • the characteristics and quality of the water resource and the in-stream and riparian habitat • the characteristics and distribution of aquatic biota • the regulation and prohibition of in-stream and land-based activities which may affect the quantity and quality of the water resources <p><u>Section 19 deals with Pollution Prevention (Part 4)</u></p>	<ul style="list-style-type: none"> • Appropriate measures must be taken to prevent the pollution of water courses and other water resources. • Riparian zones must be protected. • Construction within a River, within the Regulated area of a watercourse and within a wetland will require a GA under section 21 (c) & (i) issued by the Department of Water and Sanitation.

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<p>The person (including a municipality) who owns, controls occupies or uses the land in question, is responsible for taking reasonable measures to prevent pollution of water resources. If such measures are not taken, the catchment management agency concerned, may itself do whatever is necessary to prevent the pollution or remedy its effects and recover all reasonable costs from the persons responsible for the pollution.</p> <p>The ‘reasonable measures’ which have to be taken may include measures to:</p> <ul style="list-style-type: none"> • Cease, modify or control any act or process causing the pollution; • Comply with any prescribed waste standard or management practice; • Contain or prevent the movement of pollutants; • Eliminate any source of the pollution; • Remedy the effects of the pollution; and • Remedy the effect of any disturbance to the bed and banks of a watercourse. <p>With respect to pollution of rivers, the following definition is relevant when considering the potential impacts of development on water resources. Pollution may be deemed to occur when the following are affected:</p> <ul style="list-style-type: none"> • the quality, pattern, timing, water level and assurance of instream flow; • the water quality, including the physical, chemical and biological characteristics of the water; • the character and condition of the in-stream and riparian habitat; • the characteristics, condition and distribution of the aquatic biota. 	

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<p>The Act defines ‘instream habitat’ as including the physical structure of a watercourse and the associated vegetation in relation to the bed of the watercourse.</p> <p><u>Riparian Ecosystems</u> ‘Riparian habitat’ includes the physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species and physical structure distinct from those of adjacent land areas.</p> <p><u>Section 21 deals with the Use of Water</u> Section 21 (a-k) describes activities defined as a water use under the Act. These activities may only be undertaken subject to the application for, and issue of, a water use licence.</p>	
<p>National Environmental Management: Protected Areas Amendment Act (No. 31 of 2004)</p>	<p>The purpose of this Act is to provide for the protection and conservation of ecologically viable areas representative of South Africa’s biological diversity and its natural landscapes and seascapes. The objectives of this Act are-</p> <ul style="list-style-type: none"> • To provide, within the framework of national legislation, including the National Environmental Management Act, for the declaration and management of protected areas; • To provide for co-operative governance in the declaration and management of protected areas; • To effect a national system of protected areas in South Africa as part of a strategy to manage and conserve its biodiversity; • To provide for a representative network of protected areas on state land, private land and communal land; 	<ul style="list-style-type: none"> • The proposed activity is not situated within any National, Provincial or Local Protected areas. The closest National Reserve is the Great Fish River Nature Reserve situated approximately 2.5 km west to the closest point of the development boundary.

LEGISLATION/POLICY	DESCRIPTION	IMPLICATIONS FOR THE DEVELOPMENT OF THE PROPOSED BAVIAANSKLOOF WHS INTERPRETIVE CENTRE
	<ul style="list-style-type: none"> • To promote sustainable utilisation of protected areas for the benefit of people, in a manner that would preserve the ecological character of such areas; • To promote participation of local communities in the management of protected areas, where appropriate; and • To provide for the continued existence of South African National Parks. <p>In terms of Section 50 (1)(a)(ii) of this Act, the management authority of a national park, nature reserve and world heritage site may, despite any regulation or by-law referred to in section 49, but subject to the management plan of the park, reserve or site - <i>“carry out or allow an activity in the park, reserve or site aimed at raising revenue”</i>. However, Section 50 (2) states that such activity <i>“may not negatively affect the survival of any species in or significantly disrupt the integrity of the ecological systems of the national park, nature reserve or world heritage site”</i>. Furthermore, in terms Section 51 (a), the Minister or MEC is responsible for the 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>.</p>	

4. Description of the biophysical environment

The study area and surrounding areas were described using a two-phased approach. Firstly, a desktop assessment of the site was conducted in terms of current vegetation classifications, biodiversity programmes and plans. This was followed by a site visit 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).

4.1. 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 applicable documents/plans are included:

- SANBI National vegetation (Mucina & Rutherford, 2018);
- Council for Geoscience (2013) South African Geology;
- Soil and Terrain (SOTER) Database of South Africa (2008);
- Eastern Cape Biodiversity Conservation Plan (ECBCP);
- National Environmental Management: Biodiversity Act (NEMBA), 2004: List of Threatened Ecosystems (2011);
- Review of the SANBI Red Data List;
- 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 Alien Invasive Vegetation; and
- Department of Agriculture, Forestry and Fisheries (DAFF) List of Protected Trees (2014).

4.2. Climate

The prevailing climate in Willowmore is known as a local steppe climate. During the year, there is little rainfall in Willowmore. This location is classified as BSk by Köppen and Geiger. The average temperature in Willowmore is 15.9 °C. The average annual rainfall is 363 mm. The precipitation varies 31 mm between the driest month and the wettest month. The average temperatures vary during the year by 12.3 °C. With an average of 22.0 °C, January is the warmest month. In July, the average temperature is 9.7 °C. It is the lowest average temperature of the whole year.

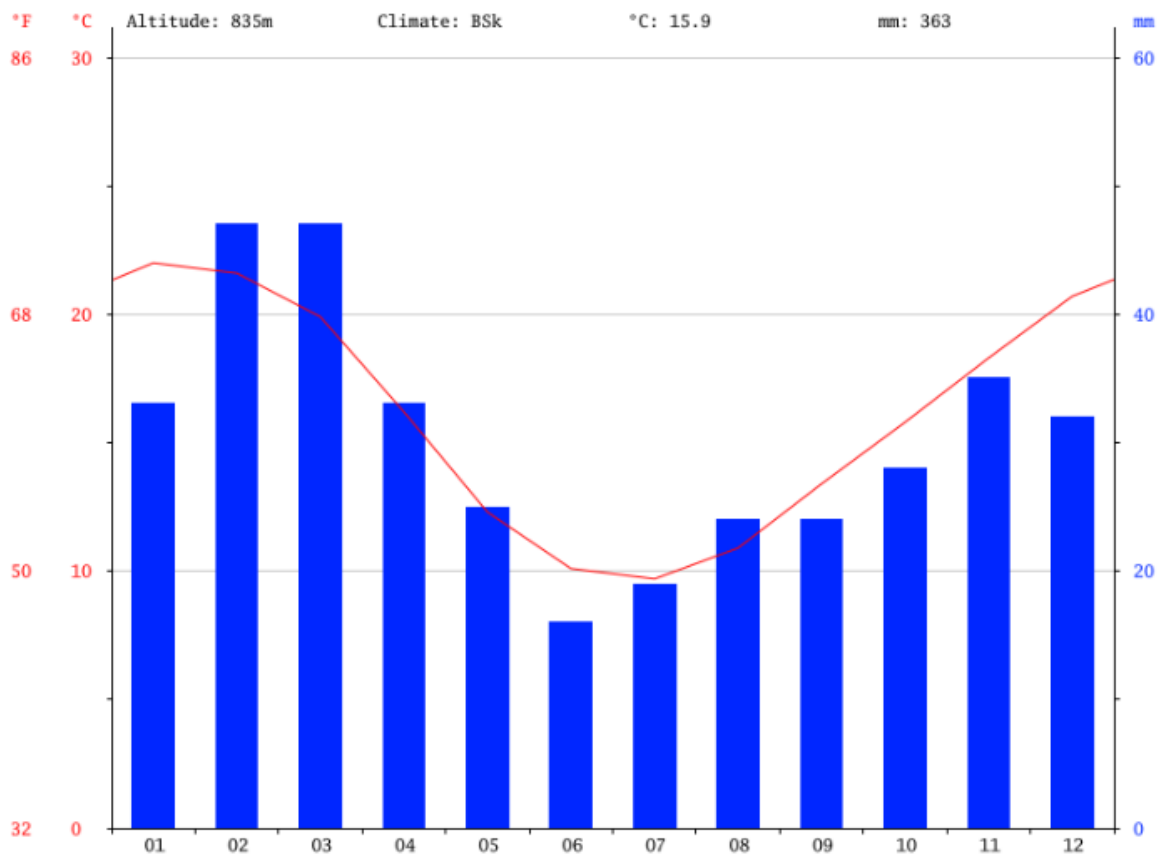


Figure 4.1 Climate data for the Baviaanskloof area (Source: Climate-data.org, <https://en.climate-data.org/africa/south-africa/eastern-cape/willowmore-11240/>).

4.3. Topography

The topography of the preferred site alternative 1 is gently sloping from north-west to south-east with altitudes ranging from 865 m.a.s.l. in the north-west to 847 m.a.s.l. in the south-east. Site alternative 2 is gently sloping from south to north with altitudes ranging from 865 m.a.s.l. to 858 m.a.s.l. respectively (Figure 4.2).

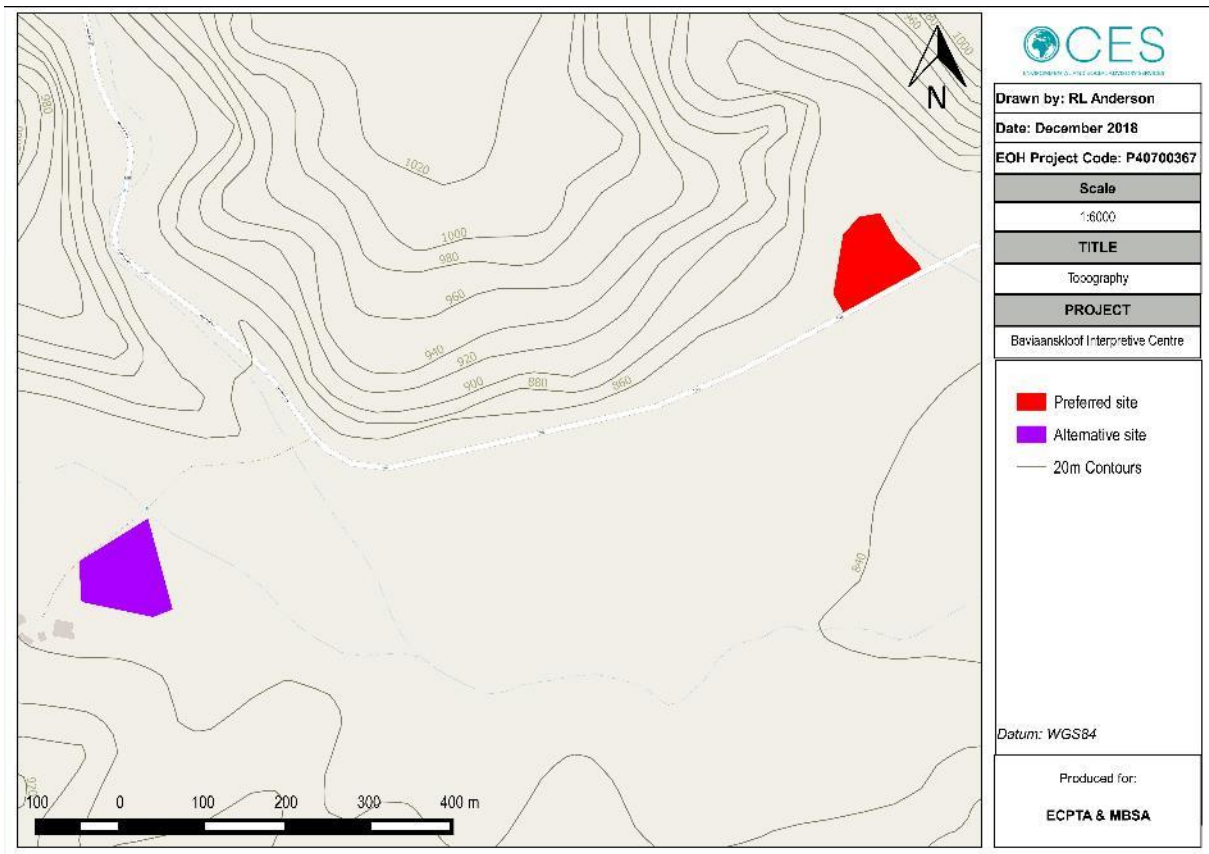


Figure 4.2 Topography of the Baviaanskloof WHS Interpretive Centre study site showing 20m contour intervals

4.4. Geology and Soils

Site alternative 1 is located within quartzitic sandstones of the Peninsula Formation (Table Mountain Group), with some of the site located on alluvium (alluvial valley deposits). Site alternative 2 is located within alluvium (alluvial valley deposits) (Figure 4.3).

The SOTER Soil Association Map (Figure 4.4) indicates that the soils of both site alternatives are classified as soils with minimal development, usually shallow on hard or weathering rock, with or without intermittent diverse soils.

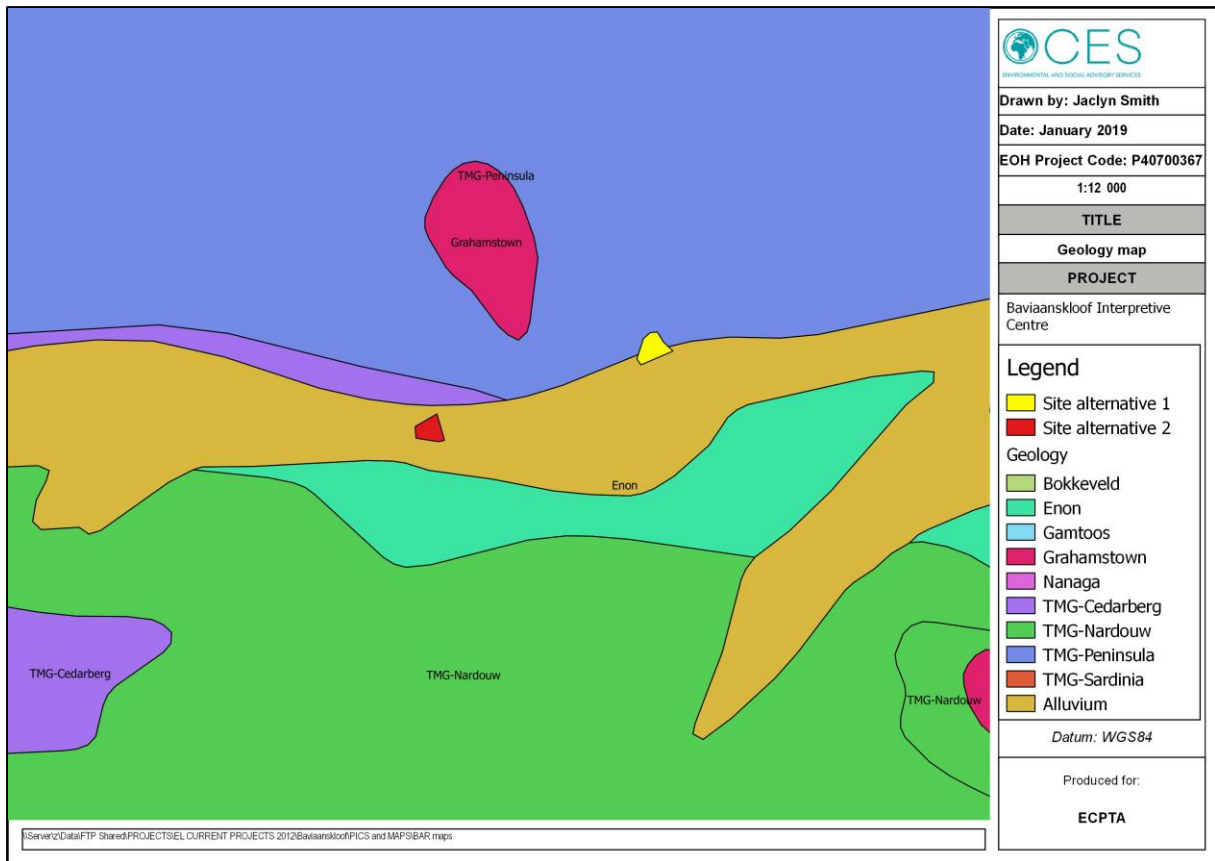


Figure 4.3: Geology map of the project site.

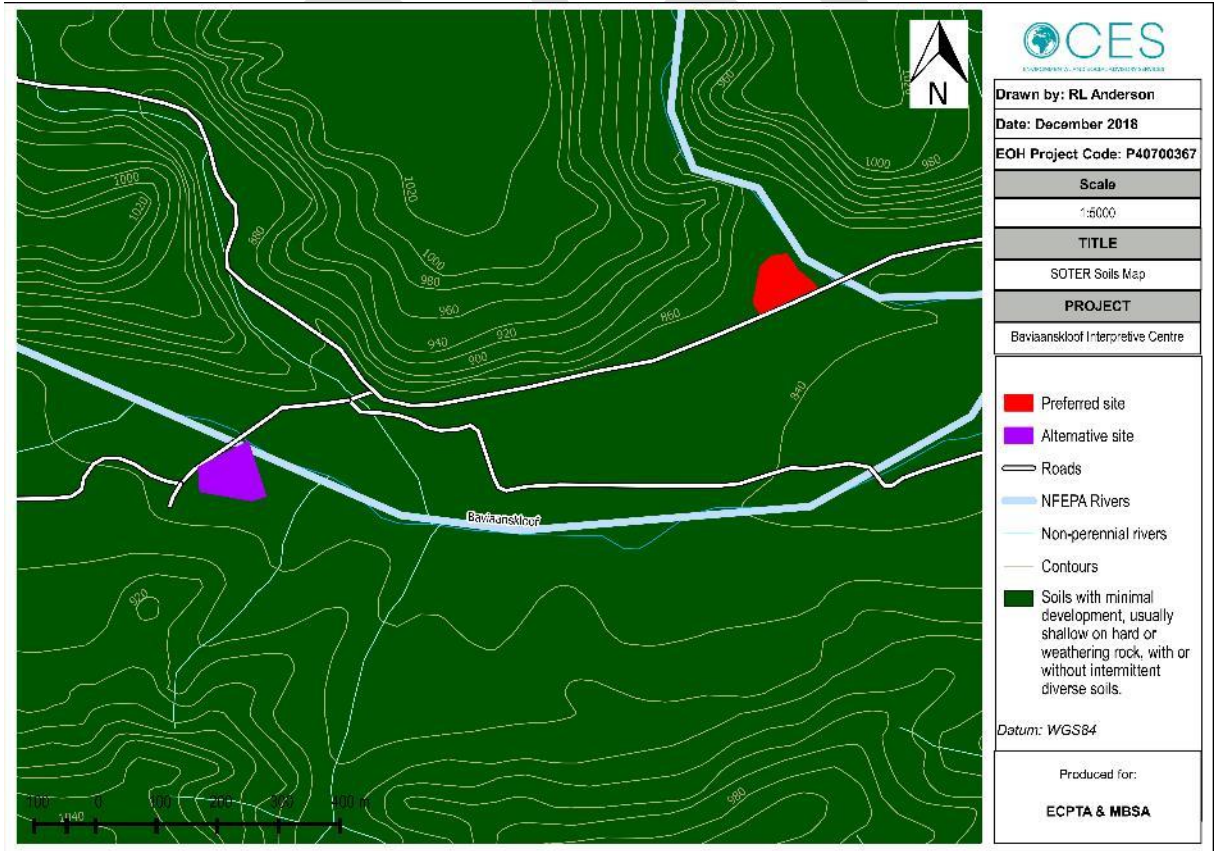


Figure 4.4: Generalised soils at Baviaanskloof WHS Interpretive Centre project site.

4.5. Rivers, Watercourses and Drainage Lines

Preferred Site Alternative 1

According to the National Freshwater Ecosystem Priority Areas (NFEPA) map a perennial tributary, the Saag Kuilen River, runs north-west to south-east of the site. NFEPA have classified this river as an **Upstream Management Area**. Upstream Management Areas are sub-quaternary catchments in which human activities need to be managed to prevent degradation of downstream river FEPA's and Fish Support Areas.

Site observations showed that the nearby perennial tributary has previously experienced flooding. There is a dry old earth dam and an apparent stone dam on site. There is also a water storage dam within 500 m of this site alternative.

Site Alternative 2

According to the NFEPA map the Baviaanskloof River runs north of the site. There are two non-perennial tributaries north-east and south-west of the site that ultimately run into the Baviaanskloof River. The Baviaanskloof River is also classified as an **Upstream Management Area**.

Site observations indicate there is an artificial water storage dam within 500m of the site.



Figure 4.5. Rivers and wetlands surrounding the project site.

4.6. Land cover

The proposed development site (site alternative 1) is characterised by natural shrubland and low fynbos vegetation, with abandoned farm infrastructure located approximately 1km westwards and previously cultivated land cover south of the site (Figure 4.6).

Site alternative 2 is located within cultivated land.

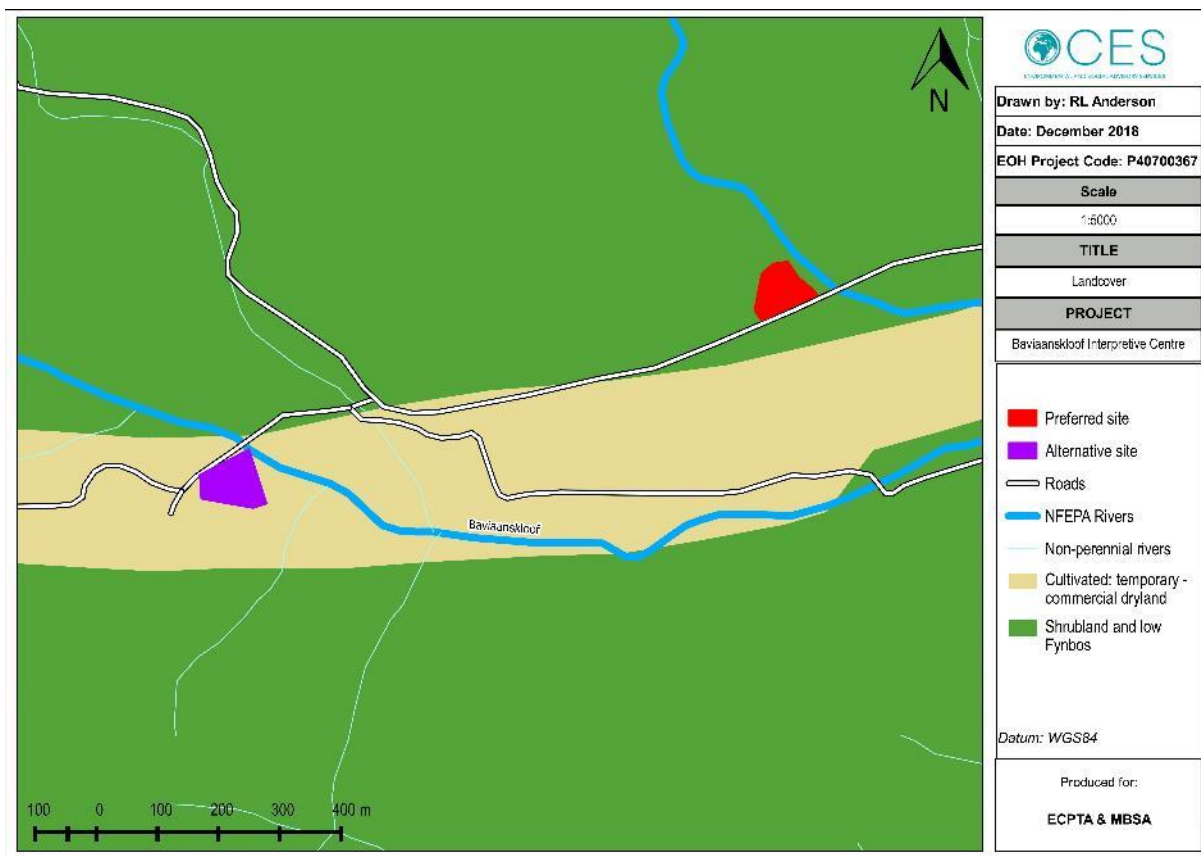


Figure 4.6 Land cover of the project site alternatives.

4.7. Vegetation and floristics

The project area falls within one of the major South African Biomes, the Albany Thicket Biome, also referred to as Subtropical Thicket or Subtropical Transitional Thicket, is described as a closed shrubland to low forest dominated by evergreen, sclerophyllous or succulent trees, shrubs and vines, where several of these species have stem spines. It is often dense, generally not divided into strata and has little herbaceous cover. Some thicket types are referred to as “transitional thicket” due to them having similar floristic components with many other phytochoria and occurring within almost all formal biomes (Low and Rebelo, 1996).

Doug-Euston Brown was commissioned to generate a 1:50 000 vegetation map for the Baviaanskloof Mega Reserve in 2006. Figure 4.7 illustrates the vegetation map of the Baviaanskloof core area and more specifically a zoomed in view of the general study area. This map informed the Ecological assessment with regards to the vegetation as well as its degradation status within and around the study site. The vegetation types, classified by Euston-Brown (2006), that fall around the proposed development site include Baviaanskloof Spekboom Thicket, Baviaanskloof Temperate Thicket and Nuewkloof Fynbos Woodland (Figure 4.8).

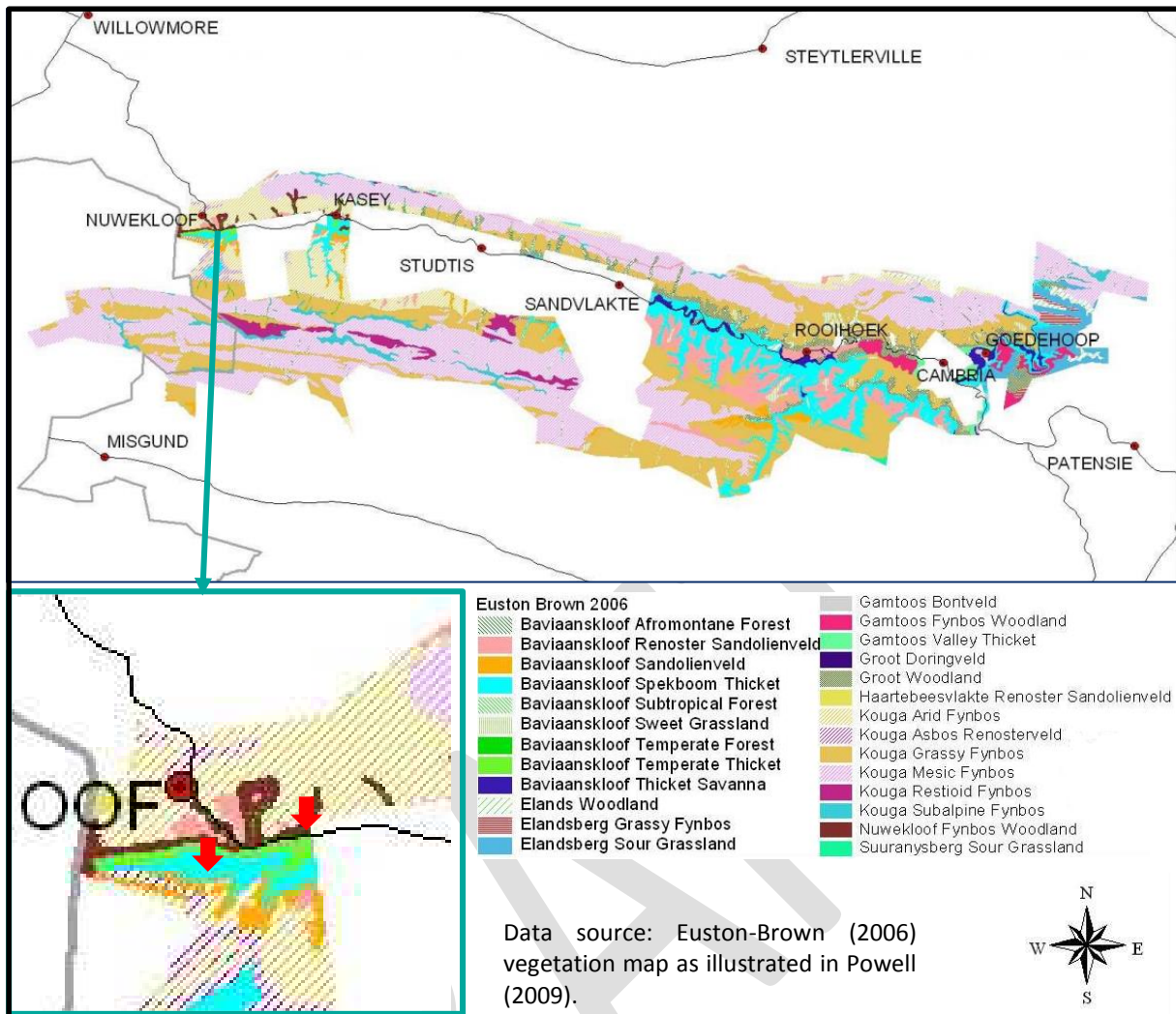


Figure 4.8 Euston-Brown vegetation types for the Baviaanskloof Mega Reserve (Source: Powell, 2009).

4.7.1. National Vegetation Map classification (Mucina and Rutherford, 2018)

The vegetation of the study area is described by the South African National Biodiversity Institute (SANBI) National Vegetation Map (Mucina and Rutherford, 2018) as **Albany Alluvial Vegetation (Aza 6)**, **Kouga Grassy Sandstone Fynbos (FFs28)** and **Baviaans Valley Thicket (AT19)** (Figure 4.7). Both the preferred alternative site 1 and alternative site 2 fall within the Albany Alluvial Vegetation type. To the north of the two sites lies the Kouga Grass Sandstone Fynbos and to the south the Baviaans Valley Thicket.

Albany Alluvial Vegetation

This vegetation type is found in the Eastern Cape Province between East London and Cape St Francis on wide floodplains of large rivers such as the Sundays, Zwartkops, Coega, Gamtoos, Great Fish and Baviaanskloof Rivers. This alluvial unit is embedded within the Albany Thicket Biome and is found at an altitude ranging from 20-1000 m. Two major types of vegetation patterns are observed in these zones, namely riverine thicket and Thornveld (*Acacia natalita*). The Thornveld is found mainly on inland floodplains, while the riverine thicket occurs on both inland and coastal floodplains. This vegetation type has been classified as **ENDANGERED**, with a conservation target of 31%. Only 6% is statutorily conserved in the Greater Addo Elephant National Park, Baviaanskloof Wilderness Area, Loerie Dam, Springs Swartkops Valley and Yellowwoods Nature Reserves and in the Double Drift Reserve complex. About 2% enjoys protection from private nature reserves. Greater than half of the vegetation area is

transformed for cultivation, urban development, road construction and plantations. Alien invaders include *Acacia saligna*, *Nerium oleander* and *Eucalyptus sp.*

Kouga Grassy Sandstone Fynbos

This vegetation is found in both the Eastern and Western Cape provinces, between Uniondale and Uitenhage within the Baviaanspoort Mountains at an altitude range of 220-1220 m, however mainly concentrated between 480-560 m. The vegetation is comprised of low shrubland with sparse emergent tall shrubs dominated by grasslands with erocoid shrubs. It is classified as **LEAST THREATENED** with a conservation target of 23%. About 20% is conserved in wilderness and conservation areas including the Baviaanskloof, Berg Plaatz, Groendal, Guerna, Kouga, Welbedacht State Forest and in the Mierhooplaat and Stinkhoutsberg Nature Reserves. About 2% enjoy protection in private reserves. Some 9% is transformed due to cultivation, too frequent burning and invasion by alien species such as *Pinus pinaster*, *Acacia Cyclops* and *A. mearnsii*.

Baviaans Valley Thicket

This vegetation type occurs in the Eastern Cape Province, on the lower slopes and ridges from Willowmore/Perdepoort in the west, to the Klein Winterhoek/Zuurberg Mountains (northwest of Kirkwood) in the east including some narrow northern edges of the Baviaanskloof and Groot Winterhoek Mountains, as well as the thicket of the central and upper Baviaanskloof and river valleys in the Kouga Mountains. The vegetation of the Baviaans Vallet Thicket is made up of low (2-3 m) succulent thicket, typically dense with a closed canopy and emergent trees (*Euphorbia grandidens*, *Euphorbia tetragona*, *Cussonia spicata*) occasional. *Portulacaria afra* is dominant on north-facing slopes amongst dense stands of small trees (*Boscia oleoides*, *Pappea capensis*, *Schotia afra*) and woody shrubs. Succulent shrubs are abundant, while the grass component is typically poorly developed. Found on moderate to steep slopes on the ridges of the mountain ranges. This vegetation type has a conservation target of 19% and enjoys protection in the Baviaanskloof nature reserve. Currently 1,2% is transformed due to cultivation, overgrazing, rural development and small stock grazing.

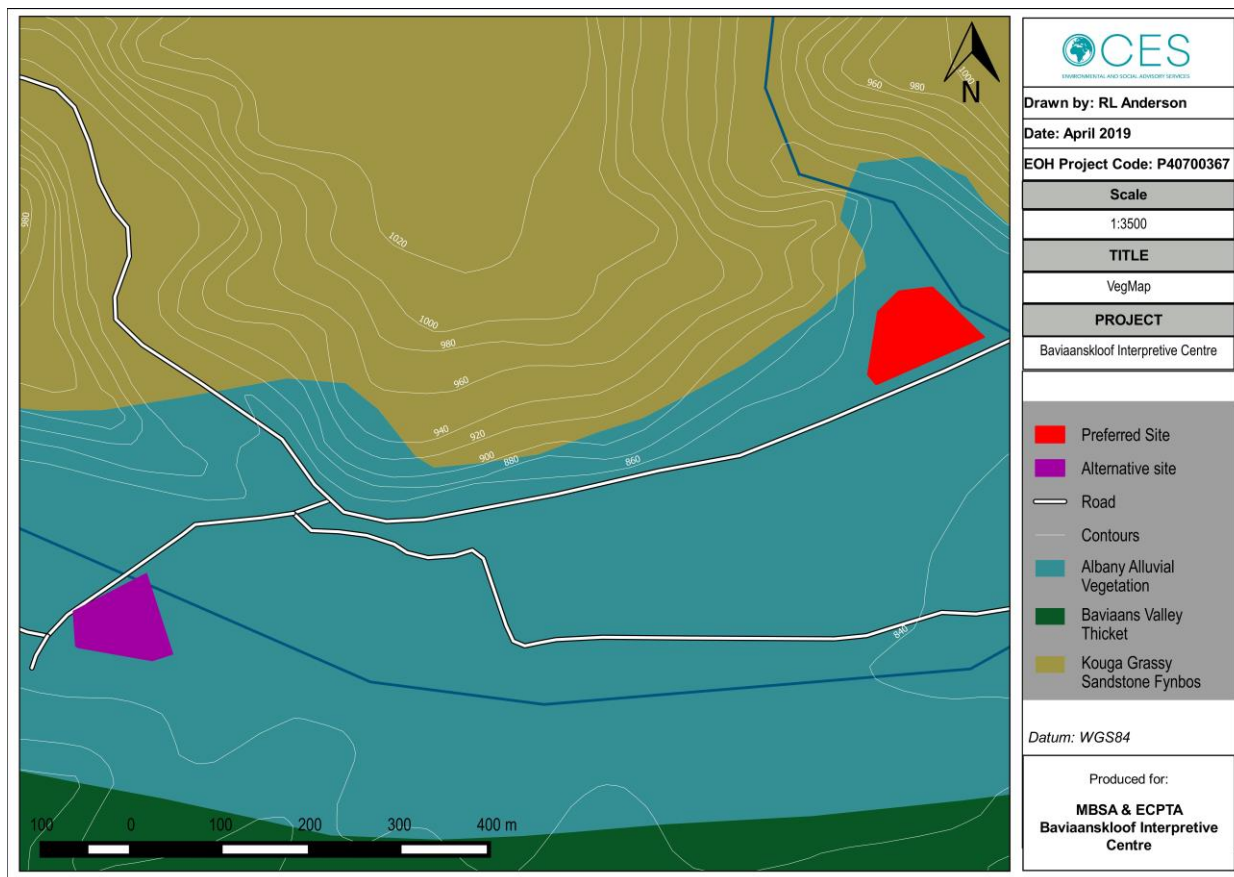


Figure 4.7: Vegetation of the Baviaanskloof WHS Interpretive Centre project sites (SANBI classification).

4.7.2. Regional Classification (STEP, 2006)

The Subtropical Thicket Ecosystem Planning (STEP, 2006) Project aimed to identify priority areas that would ensure the long-term conservation of the subtropical thicket biome and to ensure that the conservation of this biome was considered in the policies and practices of the private and public sector that are responsible for land-use planning and the management of natural resources in the region (Pierce *et al.* 2005). STEP looked specifically at the thicket biome and provided a finer scale map of the project area than the Mucina and Rutherford map.

STEP identifies **Baviaans Doringveld** as the vegetation type relevant to the study area (Figure 4.9). Thicket mosaic consist of species typical of Groot Valley Thicket mosaic with Name Karoo.

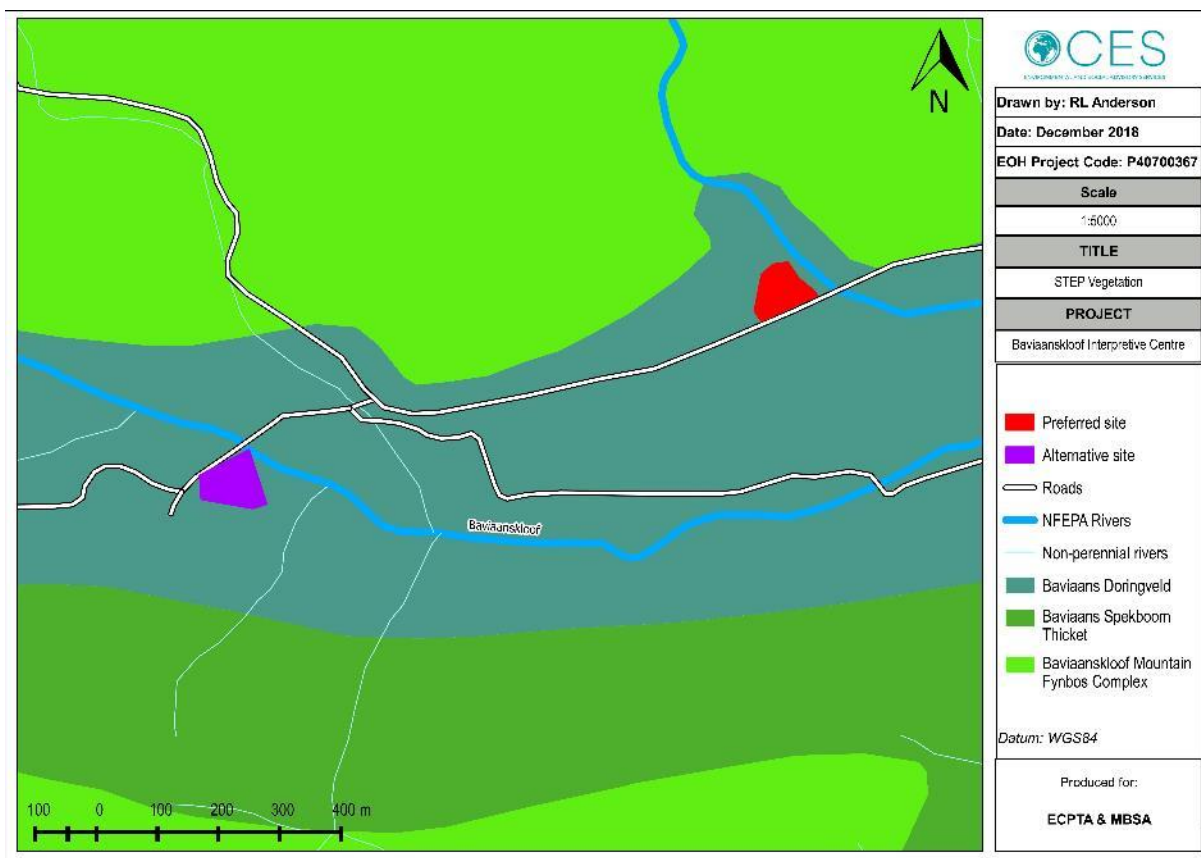


Figure 4.9: Vegetation of the Baviaanskloof WHS Interpretive Centre project site (STEP classification).

4.7.2 Forest classification (NFA)

No natural forest will be impacted by the proposed development of the Baviaanskloof WHS Interpretive Centre. The nearest Forest patch was found approximately 30km away from the proposed project site.

4.8. State of Biodiversity

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:

1. The White Paper on the Conservation and Sustainable Use of South Africa's Biological Diversity (1997)
2. The National Environmental Management: Biodiversity Act (Act 10 of 2004) (NEMBA)
3. NEMBA List of Ecosystems in need of Protection
4. NEMBA List of Threatened or Protected Species
5. NEMBA List of Alien Invasive Species
6. The National Environmental Management: Protected Areas Act (Act 57 of 2003) (NEMPAA)
7. The National Biodiversity Strategy and Action Plan (NBSAP) (2015)
8. The National Spatial Biodiversity Assessment (2004, currently being reviewed and updated) (NSBA)
9. The National Biodiversity Framework (2008) (NBF)
10. The National Protected Area Expansion Strategy (2008) (NPAES)
11. 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). The Eastern Cape Biodiversity Conservation Plan (ECBCP) covers the entire Eastern Cape Province.

4.8.1 Eastern Cape Biodiversity Conservation Plan (ECBCP)

According to the ECBCP spatial planning tool, both sites fall within an area categorised as a **terrestrial CBA 2** and an **aquatic CBA 1** (Figure 4.10.1 and 4.10.2). Aquatic CBA 1 areas are defined as ‘critically important river sub-catchments’ while terrestrial CBA 2 areas should be managed to maintain the environment in a near-natural state.

The management requirements for CBAs 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.

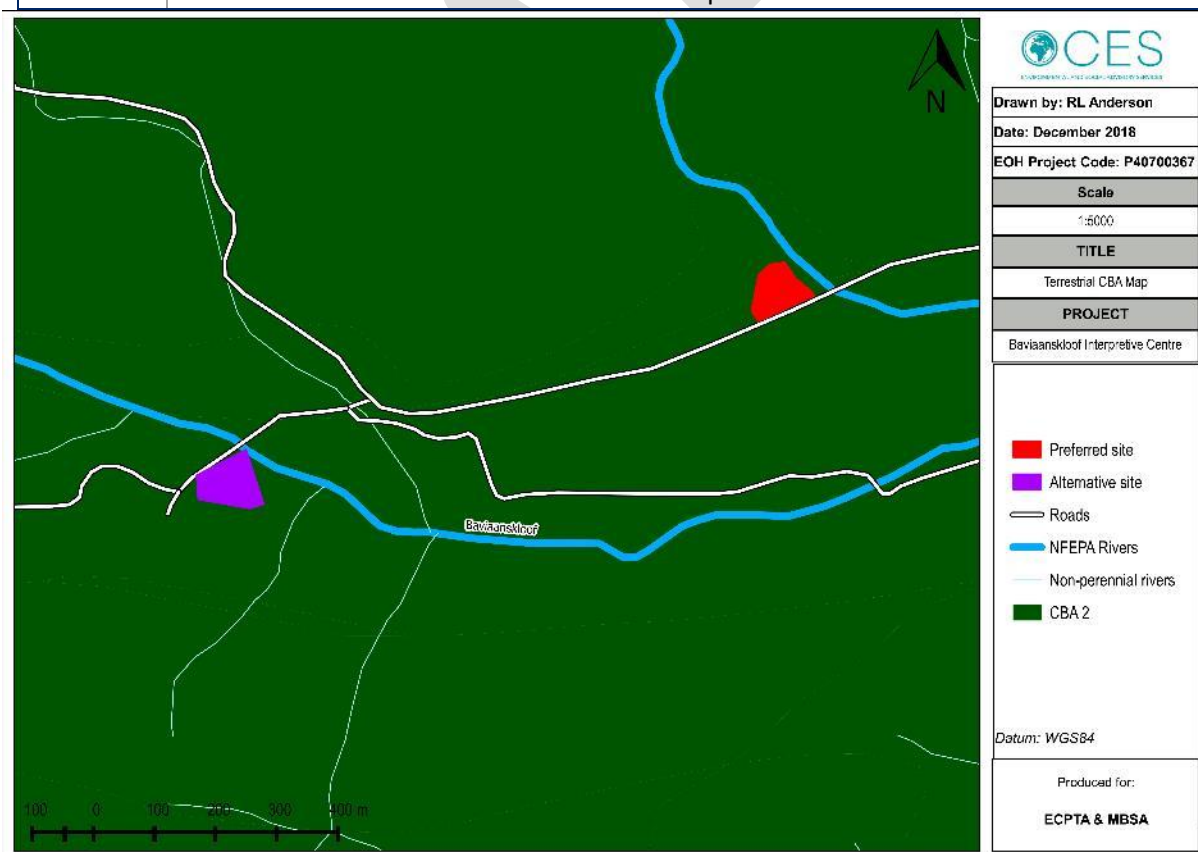


Figure 4.10.2: ECBCP (2007) Terrestrial conservation biodiversity classes for the Baviaanskloof WHS Interpretive Centre development site.

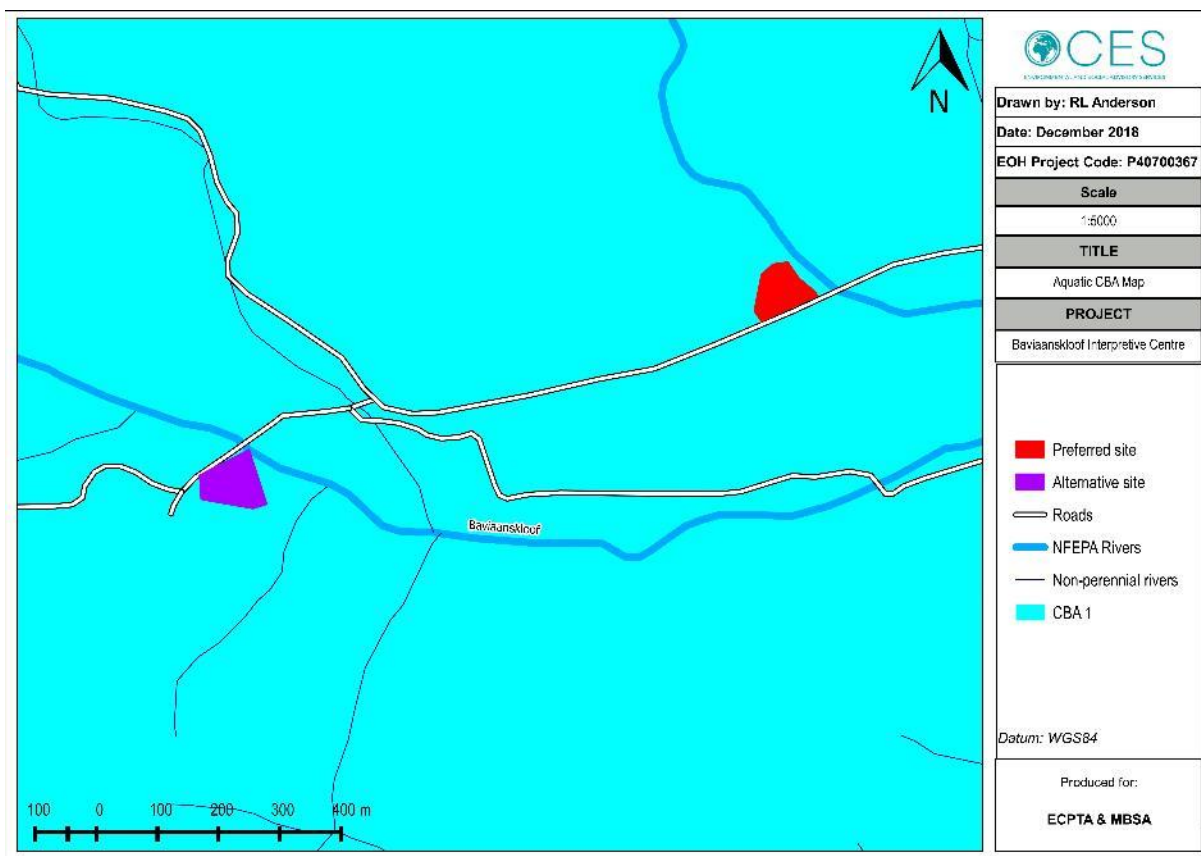


Figure 4.10.1: ECBCP (2007) Aquatic conservation biodiversity classes for the Baviaanskloof WHS Interpretive Centre development site.

4.8.2. Threatened Ecosystems

The National Biodiversity Assessment (Driver, et al., 2011) has released a national list of ecosystems that are threatened and in need of protection (GN. 1002 of 2011). The southern portion of preferred site alternative 1 and the entire portion of site alternative 2 are located within an **ENDANGERED** ecosystem: **Albany Alluvial Vegetation**. Endangered ecosystems are ecosystems that have undergone degradation of ecological structure, function or composition as a result of human intervention, although they are not critically endangered ecosystems.

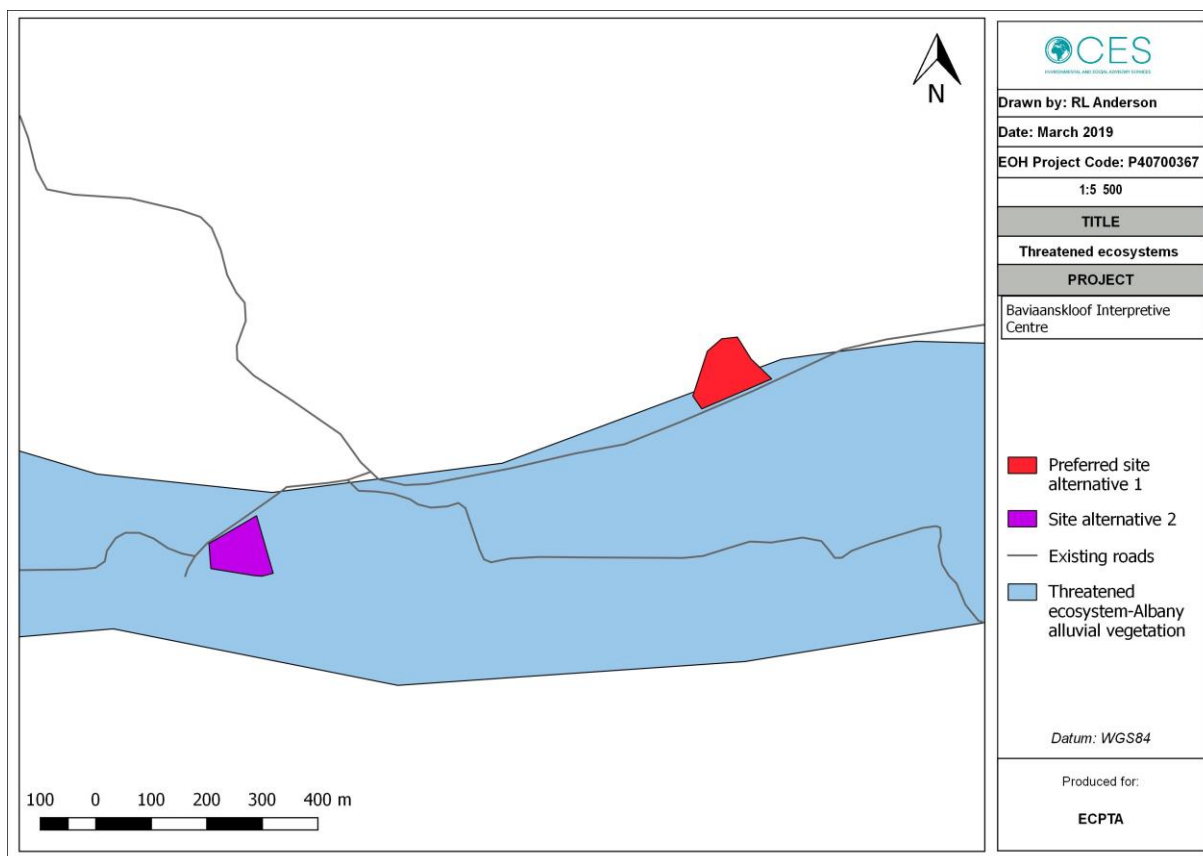


Figure 4.11. Threatened ecosystem extent for the Baviaanskloof WHS Interpretive Centre study area.

4.8.3. Protected Areas

The proposed development site falls within a priority area, the **Cape Floristic Region** priority area and one reserve, the **Baviaanskloof Mega-Reserve**. The Baviaanskloof Mega-Reserve comprises a number of protected areas, namely; two (2) protected areas (provincial reserves) neighbour the study area, the **Berg Plaatz Wilderness area** lies roughly 4 km northeast of the proposed sites and the **Kouga Wilderness Area** approximately 6 km southwest of the proposed sites. The **Baviaans-Addo NPAES Focus Area** lies both 2 km east and 2 km southwest of the proposed development sites.

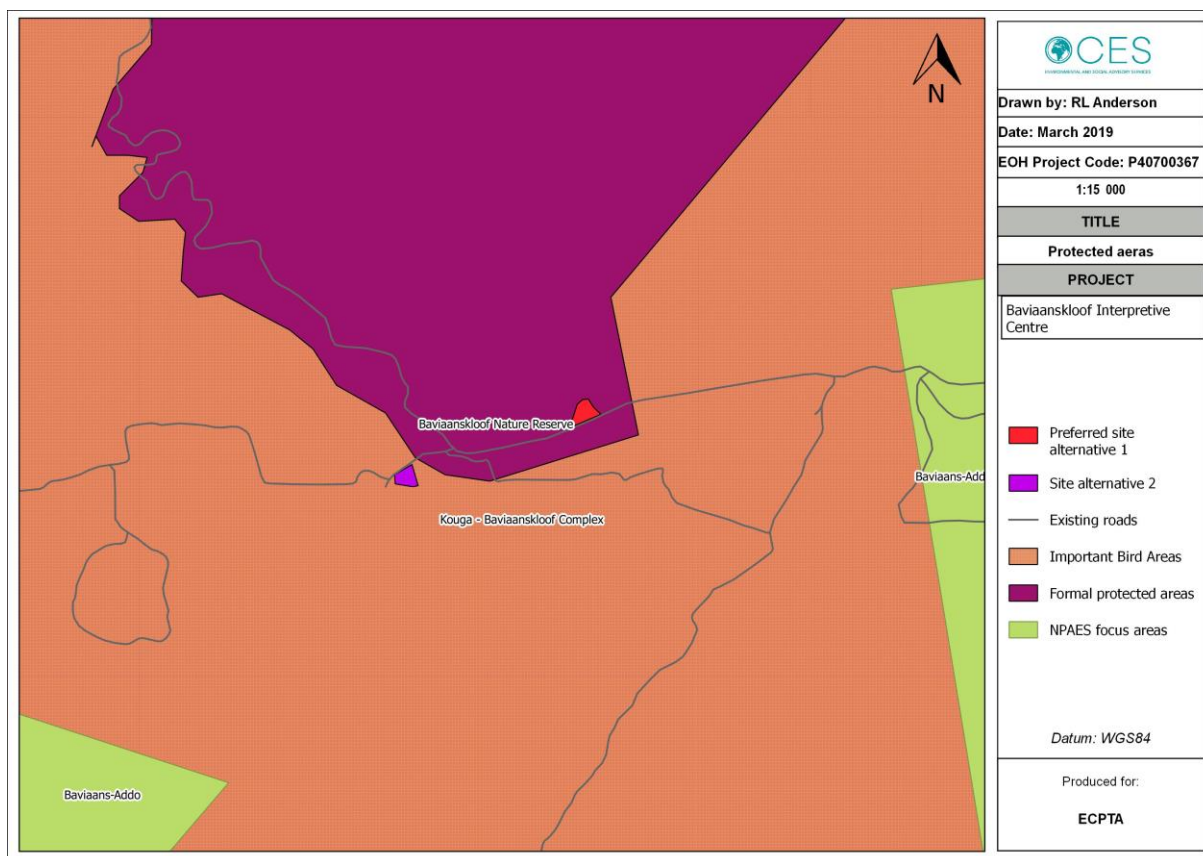


Figure 12. Protected areas within and surrounding the proposed development site

4.8.4. Floristics

The following list of potential plant SCC has been derived from current literature (POSA, 2018 and Mucina & Rutherford, 2018) for possible vegetation found in the area as well as the international IUCN Red Data list, the South African Red Data List, DAFF protected trees, the Provincial Nature Conservation Ordinance (PNCO), and CITES. A full list of the potential species found within the project region can be seen in Appendix 2. A detailed list of SCC found on site can be found in section 5.1.1 of this report.

Family	Species	IUCN Red Data List Threat status	PNCO
Aizoaceae	<i>Ruschia altigena</i>	Rare	
Asphodelaceae	<i>Bulbine cremnophila</i>	Rare	
	<i>Gasteria glauca</i>	Critically Rare	
Asteraceae	<i>Gasteria rawlinsonii</i>	Rare	
	<i>Amphiglossa callunoides</i>	Vulnerable	
	<i>Aster laevigatus</i>	Endangered	
	<i>Eriocephalus tenuipes</i>	Rare	
Crassulaceae	<i>Relhania decussata</i>	Rare	
Crassulaceae	<i>Crassula cremnophila</i>	Rare	
Cupressaceae	<i>Widdringtonia schwarzii</i>	Near Threatened	
Ericaceae	<i>Erica ingeana</i>	Rare	Schedule 4
	<i>Erica zwartbergensis</i>	Rare	Schedule 4

Family	Species	IUCN Red Data List Threat status	PNCO
Fabaceae	<i>Argyrolobium trifoliatum</i>	Endangered	
	<i>Aspalathus cliffortiifolia</i>	Critically Endangered	
	<i>Aspalathus fourcadei</i>	Rare	
	<i>otholobium carneum</i>	Rare	
Hyacinthaceae	<i>Moraea monticola</i>	Rare	
Iridaceae	<i>Aristea nana</i>	Rare	Schedule 4
	<i>Gladiolus uitenhagensis</i>	Vulnerable	Schedule 4
Poaceae	<i>Merxmuellera papposa</i>	Vulnerable	
Polygalaceae	<i>Paranomus esterhuyseniae</i>	Near Threatened	
Proteaceae	<i>Leucadendron sorocephalodes</i>	Near Threatened	Schedule 4
	<i>Phylica floccosa</i>	Rare	Schedule 4
	<i>Protea rupicola</i>	Endangered	Schedule 4
Restionaceae	<i>Restio vallis-simius</i>	Rare	
Rutaceae	<i>Agathosma ovalifolia</i>	Rare	
	<i>Agathosma spinosa</i>	Rare	
Scrophulariaceae	<i>Freylinia crispa</i>	Vulnerable	
	<i>Zaluzianskya mirabilis</i>	Rare	

4.9. Fauna

The proposed project area is situated largely within the 3323DA Quarter Degree Square (QDS) area. The Animal Demography Unit (ADU), Boshoff (2005), Apps (2000) and Branch (1994) were used to compile this section. Comprehensive species lists have been included in Appendix 1.

Boshoff (2005) asserts that the diversity of Fauna found within the Baviaanskloof area is due to two contributing factors, the degree of habitat complexity and the persistence of the region as a relatively stable refuge. Human activities however place severe pressure on the unique animal life through exploitation, habitat transformation and the introduction of alien invasive species. Recent times have seen the loss of many large mammal species due to such disturbances (Boshoff, 2005). Conservation of natural vegetation and habitats is therefore critical for the preservation of faunal communities. Vlok and Euston-Brown (2002) consider the Albany Alluvial vegetation as important temporary habitats and migration corridors for larger herbivores (elephants, rhinoceros, eland and kudu).

Cape grysbok *Raphicerus melanotis* also occurs within the IBA. Threatened mammals include leopard *Panthera pardus*, Cape mountain zebra *Equus zebra zebra*, black rhinoceros *Diceros bicornis bicornis*, Cape spiny mouse *Acomys subspinosus* and striped weasel *Poecilogale albinucha*.

4.9.1. Birds

The Baviaanskloof Nature Reserve is recognised as a Globally Important Bird Area because of the high overall diversity of birds (Boshoff, 2005). Boshoff (2005) asserts that a number of threatened species occur namely;

- **IUCN threatened** species include the blue crane *Anthropoides paradisea*, lesser kestrel *Falco naumanni*,
- **IUCN near-threatened** species include the black harrier *Circus maurus*, ground woodpecker *Geocolaptes olivaceus*, Cape rock-jumper *Chaetops frenatus*, Cape siskin *Chrithagra totta*, protea seedeater *Chrithagra leucopterus*,
- SA Red Data List **threatened** species include the African marsh-harrier *Circus ranivorus*, striped flufftail *Sarothrura affinis*, Denham's bustard *Neotis denhami*, and
- SA Red Data List **Near-threatened** species include the black stork *Ciconia nigra*, peregrine falcon *Falco peregrinus*, lanner falcon *Falco biarmicus*.

Boshoff (2005) further asserts that six of the Cape Floristic Region's endemic bird species occur. These include Victorin's warbler (*Cryptillas victorini*), Cape sugarbird (*Promerops cafer*), orange-breasted sunbird (*Anthobaphes violacea*), Cape rock-jumper (*Chaetops frenatus*), Cape siskin (*Chrithagra totta*), and protea seedeater (*Chrithagra leucopterus*). No fewer than 23 raptor (bird of prey) species occur in the mega-reserve area. This includes the Verreaux's (black) eagle (*Aquila verreauxii*).

According to SABAP 2 (2017), a total of 145 bird species may occur in the project region. Of these species, five (5) are on the IUCN Red Data list. Two birds were listed as vulnerable, two as near-threatened and one as endangered, these species are listed below. According to PNCO, all bird species found in the study area (Appendix 1) are listed as Protected wild animals except the Yellow bishop, Red-winged starling, Cape sparrow, Cape weaver, Cape bulbul and Common starling.

IUCN Red Data List Bird Species found within the study area.				
Common name	Species name	Threat status (IUCN)	PNCO	SA Red Data List
Korhaan, Southern Black	<i>Afrotis afra</i>	Vulnerable	Protected	
Crane, Blue	<i>Anthropoides paradiseus</i>	Vulnerable	Protected	Endangered
Rock-jumper, Cape	<i>Chaetops frenatus</i>	Near Threatened	Protected	
Woodpecker, Ground	<i>Geocolaptes olivaceus</i>	Near Threatened	Protected	
Bustard, Ludwig's	<i>Neotis ludwigii</i>	Endangered	Protected	Vulnerable

A complete list of birds that may occur in the project site is included in Appendix 1.

Important Bird Areas

The Important Bird and Biodiversity Areas (IBA) Programme is a BirdLife International Programme to conserve habitats that are important for birds. These areas are defined according to a strict set of guidelines and criteria based on the species that occur in the area. The Important Bird Areas of Southern Africa directory was first published 1998 and identified within South Africa 122 IBAs. In September 2015 a revised IBA Directory was published by BirdLife South Africa. All these IBAs were objectively determined using established and globally accepted criteria. An IBA is selected on the presence of the following bird species in a geographic area:

- Bird species of global or regional conservation concern;
- Assemblages of restricted-range bird species;
- Assemblages of biome-restricted bird species; and
- Concentrations of numbers of congregatory bird species.

Site Alternative 2 falls within an IBA, the Kouga – Baviaanskloof Complex which is partially protected. This complex supports a number of avian habitats and is home to approximately 300 bird species. Globally threatened species found within this IBA are the following:

- Hottentot Buttonquail, Blue Crane, Knysna Woodpecker, Ludwig’s Bustard, Denham’s Bustard, Crowned Eagle and Black Harrier.

Regionally threatened species found within this IBA include the following:

- African Marsh Harrier *Circus ranivorus*, Cape Rockjumper, Lanner Falcon *Falco biarmicus*, Black Stork *Ciconia nigra*, Karoo Korhaan and Verreauxs’ Eagle.

Restricted-range and biome-restricted species common in this IBA are the following:

- Cape Bulbul, Cape Spurfowl, Cape Sugarbird, Orange-breasted Sunbird and Cape Siskin.

Locally common species in the IBA include:

- Olive Bush-Shrike, Victorin’s Warbler, Cape Rockjumper, Grey Cuckooshrike *Coracina caesia*, Sweet Waxbill *Coccygia melanotis*, Forest Canary, Protea Seedeater and Black-headed Canary

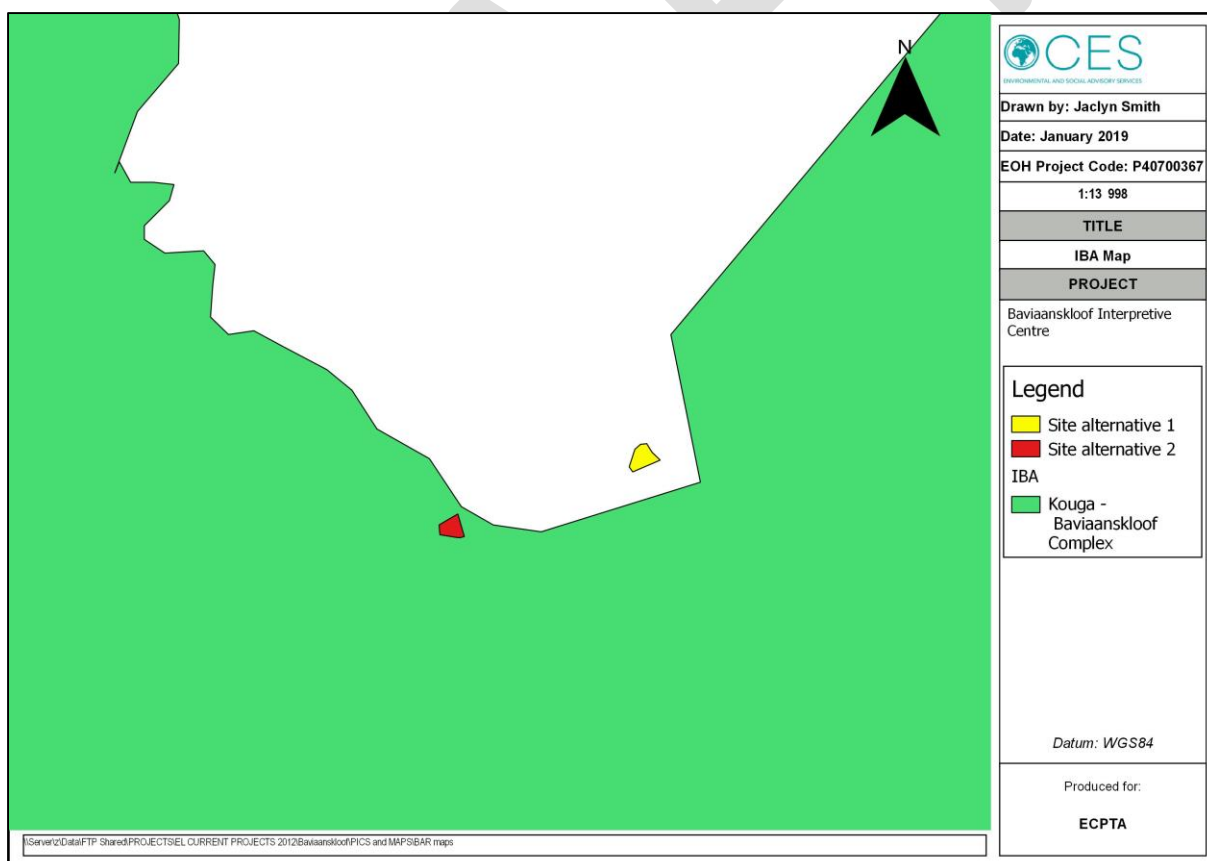


Figure 13. Important Bird Areas map.

4.9.2. Amphibians and Reptiles

Amphibians and certain reptiles are sensitive to habitat change and are therefore good indicators of land transformation. There are seven threatened and four endemic frog species in the Eastern Cape Province. One species, *Heleophryne hewitti*, is critically endangered and known from only four rivers in the Elandsberg range. The Province contains 19 threatened reptiles, of which 18 are endemic to Eastern Cape (Eastern Cape State of the Environment Report, 2004).

According to the IUCN Red List, seventy-six (76) Reptiles and twenty-one (21) possible Amphibians are found in the Eastern Cape. Of these, five (5) tortoise, twenty-two (22) snakes, Twelve (12) Geckos, eight (8) Skinks and twenty-seven (27) lizards species may occur within the proposed project area. A complete list of amphibians and reptiles that may occur in the project site is included in Appendix 1.

Reptile Fauna of the Baviaanskloof area:

Faunal diversity of the Baviaanskloof region parallels its plant diversity such that it comprises of; fifty six (57) reptile species, twenty three (24) of which are endemic to South Africa and three (3) endemic to the Baviaanskloof (Boshoff, 2005). Boshoff (2005) asserts that four (4) **tortoise** species occur within the area, with the most common species being the large leopard tortoise (*Geochelone pardalis*).

Many southern African endemic reptiles have been recorded in the complex, including the spectacular black thread snake *Leptotyphlops nigricans*, Sundevall's shovel-snout *Prosymna sundevallii*, cross-marked grass snake *Psammophis crucifer*, Cape cobra *Naja nivea*, many-spotted snake *Amplorhinus multimaculatus*, berg adder *Bitis atropos*, Cape legless skink *Acontias meleagris*, red-sided skink *Mabuya homalocephala*, spotted sand lizard *Pedioplanis lineocellata*, Cape mountain lizard *Tropidosaura gularis*, common mountain lizard *T. montana*, Cape girdled lizard *Cordylus cordylus*, southern rock agama *Agama atra*, ocellated thick-toed gecko *Pachydactylus geitje* and spotted thick-toed gecko *P. maculatus*.

Most of the global range of Hewitt's dwarf leaf-toed gecko *Goggia hewitti* is restricted to the Baviaanskloof Mountains. The rare yellow-bellied house snake *Lamprophis fuscus* has been recorded here, and an as-yet-undescribed species of dwarf chameleon *Bradypodion sp.* An additional undescribed species of gecko has been found within the Cockscomb area, the *Afroedura genus*.

Amphibia of the Baviaanskloof area:

According to SAFAP (2017), seven (7) species of amphibians possibly occurring were identified for the project area namely; *Afrana fuscigula*, *Bufo gariepensis*, *Bufo rangeri*, *Cacosternum boettgeri*, *Strongylopus grayii*, *Tomopterna delalandii* and *Xenopus laevis*.

Bird Life South Africa (2015) describes the amphibia population of the Baviaanskloof region such that, the highly localised southern ghost frog *Heleophryne regis* has been found in the Baviaanskloof region. The Endangered Hewitt's ghost frog *Heleophryne hewitti* is confirmed at Cockscomb and is likely to occur at several sites in the Baviaanskloof Mountains, pending genetic confirmation of the species. It is likely that the ghost frogs in the Baviaanskloof range may infact be a new species should they not be confirmed as *H. hewitti*.

See appendix 1 for a complete list of Reptiles and Amphibia that may be found within the study area.

4.9.4. Mammals

Boshoff (2005) states that the Baviaanskloof Mega-reserve provides habitats for a least 58 mammal species. The Baviaanskloof area is well-suited for larger herbivores due to the presence of grassy fynbos and subtropical thicket elements. The latter making possible the presence of the African elephant (*Loxodonta africana*) and the black rhinoceros (*Diceros bicornis*). Other medium to large herbivores that may occur within the baviaanskloof mega-reserve include the Cape mountain zebra (*Equus zebra zebra*), klipspringer (*Oreotragus oreotragus*) and bushbuck (*Tragelaphus scriptus*), and small species such as steenbok (*Raphicerus campestris*) and the tiny blue duiker (*Philantomba monticola*).

One of the main predators and conservation concerns within the Baviaanskloof Mega-reserve, is the leopard (*Panthera pardus*). All the other large carnivores (lion *Panthera leo*, cheetah *Acinonyx jubatus*, spotted hyaena *Crocuta crocuta*, brown hyaena *Hyaena brunnea*, and the African wild dog *Lycaon pictus*) have since become extinct in the area (Boshoff, 2005).

A complete list of potential mammal species was generated using *Smither's Mammals of Southern Africa: A Field Guide* (Apps, 2000) and can be found in Appendix 1.

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5. Site investigation

A site investigation was conducted between the May 2017 and March 2018 in order to:

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

The site visit also served to inform potential impacts of the proposed project and to inform the significance of these impacts on the surrounding ecological environment. Vegetation was assessed within the entire project boundary.

5.1. Vegetation survey

A site investigation was conducted during October 2018, in order to confirm the desktop findings, to assess the actual ecological state, current land-use, identify potential sensitive ecosystems and identify plant species 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 environment.

On site analysis of the proposed development area indicated that both sites had some degree of disturbance. The Site alternative 2 was most degraded of the two sites. Regardless, both sites hosted some vegetation diversity. Graves were present on site alternative 2 and some evidence of human influence (stone walls and possible grave site) was present on the preferred site alternative 1. Both sites were within close proximity to watercourse, however neither of the watercourses contained water. There was evidence of an artificial wetland within the preferred Site alternative 1. The development of the access roads for Site alternative 2 included two river crossings (which were currently dried up) and directly impacting on an existing artificial wetland.

Therefore, although desktop analysis indicated a the presence of the endangered Albany Alluvial Vegetation, close proximity to the Baviaans and Saagkullen Rivers and the presence of artificial wetlands within site alternative 1 and close to site alternative 2, it should be noted that upon site investigations, the natural vegetation was somewhat degraded and the watercourses (both rivers and the dam in Site alternative 1) had dried up.



Figure 5.1: Aerial image of the Baviaanskloof WHS Interpretive Centre project site alternatives (Source: Google Earth)





Riparian vegetation and the Saagkullen River (adjacent to site alternative 1) that will be slightly affected by the development as a result of an irrigation pipe transporting water from the river for irrigation of the crops.



Illustration of the potential artificial wetland found within the Preferred site alternative 1



Illustrations of rivers that will be affected by the construction of the access roads to Site alternative 2.





Picture of the artificial wetland in site alternative 2 that will be impacted by the development of the access roads.




Plate 5.1: Photographs showing vegetation within the proposed project boundary and the watercourses within/ in close proximity to each site.




5.1.1. Plant species observed

A total of 27 plants were identified during the site visit. These plants, along with their protection status, are illustrated in **Plate 5.2**. A full list of plants that may occur in the region can be found in Appendix 2. No NEMBA threatened plants were identified on site, however some CITES, NFA and PNCO protected species were identified.




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Family	Picture	Species Name	IUCN Red Data List	SANBI Red List	DAFF
AIZOACEAE		<i>Delosperma sp.</i>			
		<i>Drosanthemum floribundum</i>		SANBI Red list - Least concern	

<p>ANACARDIACEAE</p>		<p><i>Searsia sp.</i></p>		<p>SANBI Red list - Least Concern</p>	
		<p><i>Searsia undulata</i></p>		<p>SANBI Red list - Least Concern</p>	
<p>ANEMIIACEAE</p>		<p><i>Mohria caffrorum</i></p>		<p>SANBI Red list - Least Concern</p>	




ASTERACEAE		<i>Athanasia virgata</i>		SANBI Red list - Least Concern	
		<i>Chrysocoma ciliata</i>		SANBI Red list - Least Concern	
		<i>Elytropappus rhinocerotis</i>		SANBI Red list - Least Concern	



		<p><i>Felicia filifolia</i></p>		<p>SANBI Red list - Least Concern</p>	
		<p><i>Pteronia incana</i></p>		<p>SANBI Red list - Least Concern</p>	
		<p><i>Pteronia unguiculata</i></p>		<p>SANBI Red list - Least Concern</p>	

<p>CELASTRACEAE</p>		<p><i>Gymnosporia polyacantha</i></p>		<p>SANBI Red list - Least Concern</p>	
<p>CRASSULACEAE</p>		<p><i>Crassula tetragona</i></p>		<p>SANBI Red list - Least Concern</p>	
<p>FABACEAE</p>		<p><i>Sutherlandia frutescens</i> (Cancer-bush)</p>		<p>SANBI Red list - Least Concern (Not endemic)</p>	

<p>GERANIACEAE</p>		<p><i>Pelargonium graveolens</i></p>		<p>SANBI Red list - Least Concern</p>	
<p>MELIANTHACEAE</p>		<p><i>Melianthus comosus</i> (touch-me-not)</p>		<p>SANBI Red list - Least Concern (Not endemic)</p>	
<p>POACEAE</p>		<p><i>Eragrostis sp.</i></p>		<p>SANBI Red list - Least Concern</p>	

<p>PODOCARPACEAE</p>		<p><i>Podocarpus latifolius</i> (Yellowwood)</p>			<p>Protected in terms of National Forests Act (NFA), 1998 (Act No. 84 of 1998)</p>
<p>POLYGALACEAE</p>		<p><i>Polygala myrtifolia</i></p>		<p>SANBI Red list - Least Concern</p>	
<p>SANTALACEAE</p>		<p><i>Colpoon compressum</i></p>		<p>SANBI Red list - Least Concern</p>	

<p>SCROPHULARIACEAE</p>		<p><i>Buddleja salviifolia</i></p>		<p>SANBI Red list - Least Concern</p>	
<p>SOLANACEAE</p>		<p><i>Lycium oxycarpum</i></p>		<p>SANBI Red list - Least Concern</p>	
					

		<p>Possibly wild lavender</p>			
Threatened Plant Species identified on site					
<p>AIZOACEAE</p>		<p><i>Ruschia altigena</i></p>		<p>Rare</p>	



<p>ASTERACEAE</p>			<p><i>Amphiglossa callunoides</i></p>	<p>Vulnerable</p>	<p>Vulnerable</p>	
<p>Alien invasive plants identified on site</p>						
<p>PAPAVERACEAE</p>			<p><i>Argemone ochroleuca</i> subsp. <i>ochroleuca</i></p>	<p>Invasive</p> <ul style="list-style-type: none"> • CARA 2002 – Category 1 NEMBA – Category 1b 		

Plate 5.2 Plant species identified on site.



5.2. Faunal survey

Appendix 1 lists various faunal species (birds, amphibians, reptiles and mammals) that may potentially occur within the development site of the Baviaanskloof WHS Interpretive Centre.

The development site lies within the Baviaanskloof, an area characterised by high animal diversity and high endemism. The unique animal life has been placed under pressure due to human influences, habitat transformation and the introduction of alien invaders. Many of the large mammals occurring in the area have gone extinct as of recent years, however many smaller mammal species still exist in the region. All large carnivores, apart from the leopard, have become extinct in the area, therefore faunal diversity is still rich within the Baviaanskloof Mega – Reserve.

No fauna were however seen within the development site alternatives during the site investigation; but the presence of animals on site was confirmed by the evidence of animal faeces and burrows (Plate 5.2).





A number of burrows were identified on site. Such burrows represent the potential presence of Aardvark on site.

Plate 5.3. Fauna identified during the site visit

5.3. Aquatic environment

Desktop analysis indicates that the Baviaanskloof River flows through the region and adjacent to the preferred and alternative sites for development. No natural wetlands fall within 500 m of either site; however an artificial wetland was identified approximately 200 m northeast of the alternative site. Upon site investigation, it was evident that neither of the tributaries of the Baviaanskloof River (adjacent to both sites) were flowing (Plate 5.4).

Preferred Site Watercourses



North (left) and South (right) views of the dried out Baviaanskloof river tributary adjacent to the preferred development site.



Remnants of artificial dam.

Alternative Site Watercourses





River beds adjacent to the alternative site.



Bank stabilisation efforts



Artificial wetland 200m from site alternative 2.

Plate 5.4. Watercourses adjacent the preferred and alternative development site for the Baviaanskloof WHS Interpretive Centre.

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6. 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;

6.1. 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 an ecological perspective at the early stage of a development and allow for the fine-tuning of plans and infrastructure layouts.

The following tools were identified as relevant to the site and are summarised below:

- SANBI Vegetation threat status;
- NEMBA Protected Ecosystems; and
- Nature and Environmental Conservation Ordinance No. 19 of 1974

The conservation status of The Albany Alluvial and Kouga Grassy Sandstone Fynbos vegetation types that occur within the project site (Mucina and Rutherford, 2018) are considered as **Endangered** and **Least Threatened** respectively by SANBI. The site assessment however indicated some vegetation within the study site was previously disturbed for anthropogenic uses. A portion of the study area comprising of **Albany Alluvial Vegetation** was classified by **NEMBA** (National list of ecosystems that are threatened and in need of protection; 2014) in terms of the list of **threatened ecosystems**.

The area falls within Critical Biodiversity Areas – Terrestrial CBA 2 and an Aquatic CBA 1.

6.2. Sensitivity allocation

A sensitivity map was developed based on the methodology presented in Table 6.1, for the entire study area. The following sensitivity criteria were allocated for the proposed development of the Baviaanskloof WHS Interpretive Centre. The allocation of criteria was based on both the desktop biophysical description of the site as well as observations made during the site visit.

Table 6.1. Criteria used for the analysis of the sensitivity of the proposed new Heyserskand Loop.

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
1	Topography	Level or even <i>Site 1 and 2</i>	Undulating; fairly steep slopes	Complex and uneven with steep slopes
2	Vegetation - Extent or	Extensive throughout the region	Restricted to a particular region / zone <i>Site 1 and 2</i>	Restricted to a specific locality / site

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
	habitat type in the region			
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 <i>Site 1 and 2</i>
4	Species of conservation concern - Presence and number	None, although occasional regional endemics	No Species of Conservation Concern, some indeterminate or rare endemics <i>Site 2</i>	One or more Species of Conservation Concern, or more than 2 endemics or rare species <i>Site 1</i>
5	Habitat fragmentation leading to loss of viable populations	Extensive areas of preferred habitat present elsewhere in region not susceptible to fragmentation <i>Site 1 and 2</i>	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 diversity and species richness <i>Site 1 and 2</i>
7	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 <i>Site 1 and 2</i>	Large possibility of erosion, change to the site or destruction due to climatic or other factors
8	Rehabilitation potential of the area or region	Site is easily rehabilitated <i>Site 1 and 2</i>	There is some degree of difficulty in rehabilitation of the site	Site is difficult to rehabilitate due to the terrain, type of habitat or species required to reintroduce
9	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 <i>Site 1 and 2</i>	The site is hardly or very slightly impacted upon by human disturbance
10	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) <i>Site 1 and 2</i>

CRITERIA		LOW SENSITIVITY	MODERATE SENSITIVITY	HIGH SENSITIVITY
11	Ecological Services	Little to no ecological services	Some ecological services. <i>Site 1 and 2</i>	Various ecological services. Areas should be conserved.
12	Aquatic environment	Outside of the 32m watercourse buffer. Outside of the 500m wetland buffer	Within 32m of the watercourse. Within 500m of a natural wetland, but outside of 50m wetland buffer <i>Site 1</i>	Development within the watercourse. <i>Site 2</i>

Site sensitivity was determined based on the following criteria as classified in Table 6.1 above:

Table 6.2: List of criteria contributing to the sensitivity map

CRITERIA	Preferred Site (1)	Alternative Site (2)
Topography	Topography is low and even	Topography is low and even
Vegetation	Vegetation restricted to riparian zone (Albany Alluvial Vegetation)	Vegetation restricted to riparian zone (Albany Alluvial Vegetation)
Conservation status	Vegetation (Albany Alluvial Vegetation) has a high conservation status (target 31%), but currently not well conserved (only 8% conserved)	Vegetation (Albany Alluvial Vegetation) has a high conservation status (target 31%), but currently not well conserved (only 8% conserved)
Species of conservation concern	Two species of conservation concern was found on site, one Rare and one Vulnerable. Many endemics occurred on site.	No species of conservation concern were identified within the development footprint. Many endemics occurred within the proposed area.
Habitat fragmentation	Due to the extent of the habitat and size of the development footprint, the proposed development will not result in habitat fragmentation	Due to the extent of the habitat and size of the development footprint, the proposed development will not result in habitat fragmentation
Biodiversity	The area is rich in biodiversity	The area is rich in biodiversity
Erosion potential	The manifestation of episodic events and floods may lead to erosion	The manifestation of episodic events and floods may lead to erosion
Rehabilitation	Site is easily Rehabilitated	Site is easily Rehabilitated
Disturbance	Area has previously been disturbed by human influences	Area has previously been disturbed by human influences
Ecological function	Important ecological corridor (Albany Alluvial vegetation)	Important ecological corridor (Albany Alluvial vegetation)
Ecological Services	Due to the study area previously being disturbed and the small size of the proposed development, the degree of ecological services has been given a moderate sensitivity	Due to the study area previously being disturbed and the small size of the proposed development, the degree of ecological services has been given a moderate sensitivity

Rivers	Site falls within 32m of a watercourse, but development footprint is outside of the 1:100 year floodline and no development will take place within the watercourse.	Development footprint falls within a watercourse and as well as within the 1:100 year floodline.
Total Sensitivity	HIGH	HIGH

The following maps reflect ecological sensitivity identified within both the proposed sites for the development of the interpretive centre. It is evident that ecologically, both sites have equal sensitivity scores.

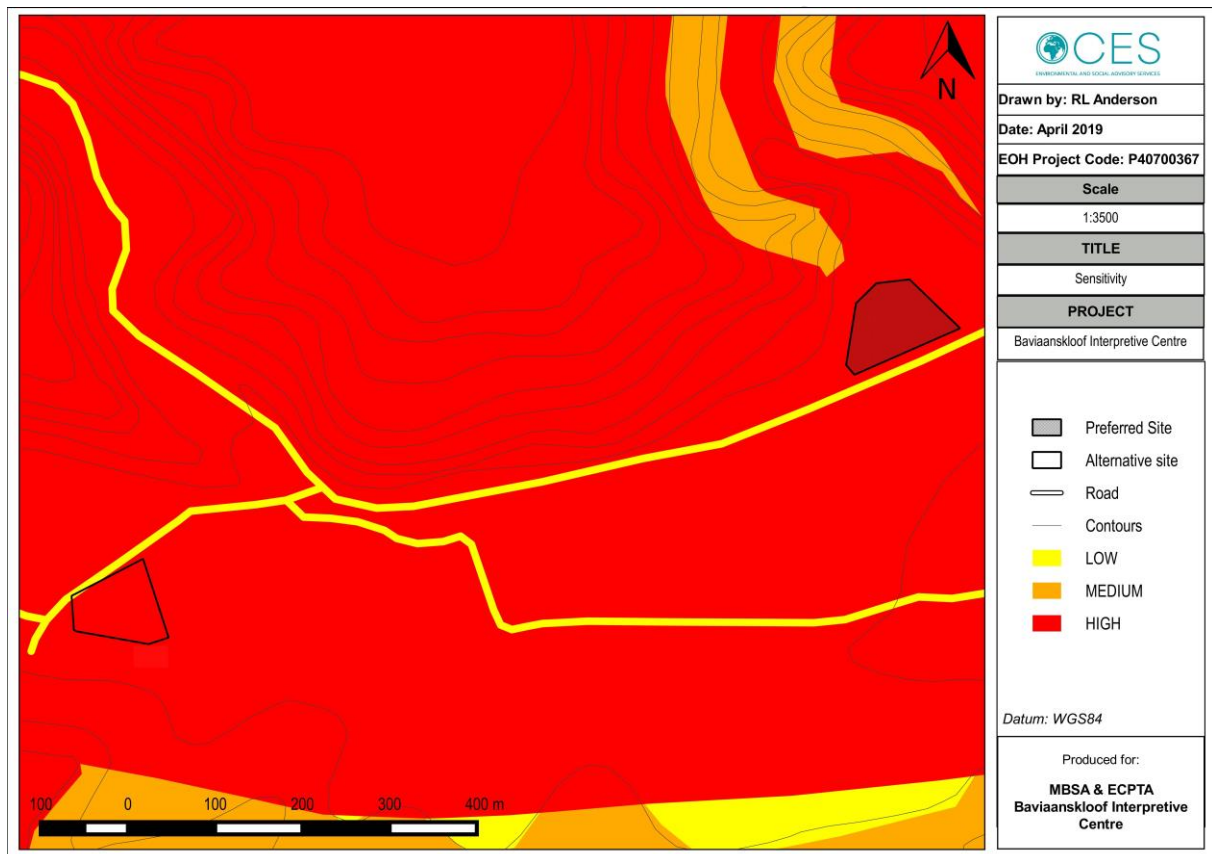


Figure 6.1: Sensitivity of the proposed development site for the Baviaanskloof WHS Interpretive Centre.

High sensitivity:

High sensitivity areas have been demarcated using the river line and the 1:100year floodline, as well as areas with extremely steep topography (Cliffs). Areas containing the ENDANGERED Albany Alluvial Vegetation have been demarcated as highly sensitive. Furthermore, areas which have one or more Species of Conservation Concern should be considered as highly sensitive areas. Areas that have high diversity and species richness were considered highly sensitive and as such are subject to strict mitigation measures. Loss of SCC is prohibited and further impacts must be kept to a bare minimum. In the event of SCC being impacted, permits must be obtained, a relevant search and rescue operation must take place and the necessary relocation/ mitigation measures agreed upon must be conducted.

Moderate sensitivity:

Moderate sensitivity was allocated to areas that fell within 32m of rivers and areas with moderately steep topography. Areas that evidently have some degree of previous disturbance have been

delineated as moderately sensitive. These areas can withstand a limited loss of, or disturbance to, natural vegetation. Mitigations measures and best practice as identified in this report shall apply to the activities within these zones, but do not prohibit development. Where possible, avoidance of habitat loss, hydrological feature impacts and vegetation clearance should be limited as far as possible, with preference for more disturbed regions first.

Low sensitivity:

In areas where the natural vegetation is extensive, such as the areas containing Kouga Grassy Sandstone Fynbos vegetation, falling on low and even slopes are classified as *LOW sensitivity* areas. These areas are suitable for development and will only require low-level mitigations. If SCC are found within the demarcated *LOW Sensitivity* areas, then they are considered highly sensitive and measures as explained above should be implemented.

6.3. Issues and impacts identified

Various issues have been identified as **HIGHLY sensitive** in the sensitivity assessment, which will impact the local ecology with the proposed development site of the Baviaanskloof WHS Interpretive Centre during all phases of development (including Planning and Design, Construction and Operational phases)

The following issues were identified during the sensitivity assessment:

Table 6.2: Issues identified during the sensitivity assessment of the proposed development site of the Baviaanskloof WHS Interpretive Centre.

ISSUES IDENTIFIED	DESCRIPTION OF IMPACTS
Loss of natural vegetation	<p>Construction activities and vehicle movement will remove vegetation within the project area, as well as, the permanent clearance of natural vegetation for the construction of the Interpretive Centre building and facilities will result in the permanent loss of natural vegetation comprising of many indigenous endemics and the threatened vegetation type, Albany Alluvial Vegetation.</p> <p>The development of the Baviaanskloof WHS Interpretive Centre will result in both temporary and permanent losses of Albany Alluvial vegetation, an ENDANGERED vegetation type. Furthermore the development site falls within the Baviaanskloof Mega-reserve, a biodiversity hotspot and area of conservation concern.</p>
Loss of Species of conservation concern	The permanent clearance of natural vegetation for the construction of the Interpretive Centre building and facilities may result in the permanent loss of plant SCC.
Loss of Biodiversity	The clearance of natural vegetation and the development of the Interpretive Centre and its associated facilities will result in an alteration of local habitats and subsequently a loss of plant and animal diversity in the direct development footprint area. The construction activities will further result in a disturbance to the natural habitats and may cause temporary migrations of animal species out of the development area.

Loss of Ecological function & Ecological Services	Vlok and Euston-Brown (2002) consider the Albany Alluvial vegetation as an important ecological corridor, the temporary and permanent loss of this vegetation due to construction activities and the development of the Interpretive Centre may result in the loss of habitats contributing to the functioning of the ecological corridor.
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Various mitigations are recommended (based on the various levels of sensitivity) to reduce the impacts of the proposed Baviaanskloof WHS Interpretive Centre development on the natural environment within the development area. These are discussed in more detail in Chapter 8.

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7. Alien invasive species

An “invasive species” is any species whose establishment and spread outside of its natural distribution range (i) threatens ecosystems, habitats or other species or has a demonstrable potential to threaten ecosystems, habitats or other species; and (ii) may result in economic or environmental harm or harm to human health. Invasive alien plant species are globally considered as one of the greatest threats to the environment, biodiversity, ecosystem integrity and the economy.

According to the Conservation of Agricultural Resources Act (No. 43 of 1983 - Regulation 15, 30 March 2001) (CARA), for agricultural land, and the National Environmental Management: Biodiversity Act (No. 10 of 2004) (NEMBA), for natural areas, invasive alien plant species should be controlled and eradicated with an emphasis on urgent action in biodiversity priority areas. NEMBA published a list of Alien and Invasive Species (No 599) in 2014 which regulates the management of alien and invasive plants in natural environments.

Alien and Invasive plant species were identified within the development footprint of the Baviaanskloof WHS Interpretive Centre.

Potential alien invaders identified in POSA for the development site include; *Hirschfeldia incana*, *Salvia coccinea*, and *Argemone ochroleuca subsp. ochroleuca*. As illustrated in Section 5 of this report, the study area is rich in indigenous vegetation however some alien plant species such as; one (1) alien plant species was found on site, *Argemone ochroleuca subsp. ochroleuca*.

7.1. Discussion

The alien and invasive plant identified within the development area was classified as a **Category 1b invasive as per Notice 1 of GN. 599 of 2014 of NEMBA** and **Category 1 invasive as per CARA 2002**.

7.1.1. 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

All Category 1b alien and invasive plant species must be controlled during all phases of development according to the recommendations outline in the Environmental Management Plan (EMP).

One (1) Category 1b species was identified on site; *Argemone ochroleuca subsp. ochroleuca*.

7.1.2. Conservation of Agricultural Resources Act 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).

One (1) category 1 plant was found on site; *Argemone ochroleuca subsp. ochroleuca*.

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.

7.2. Issues identified

The following issues were identified during the Alien and invasive Species assessment:

Table 7.2: Issues identified during the Alien and Invasive Species assessment of the proposed development of the Baviaanskloof WHS Interpretive Centre.

ISSUES IDENTIFIED	DESCRIPTION OF IMPACTS
Control of alien plant species	The lack of an effective alien vegetation management plan may exacerbate the problem of alien plant invasion.

Various alien invasive control measures are recommended in Chapter 8 to reduce the impact of alien invasive plant species within the proposed Baviaanskloof WHS Interpretive Centre development site.

8. Manner in which the environment may be affected

Appendix 6

Specialist Reports

1. (1) A specialist report prepared in terms of these Regulations must contain—
 - (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;

8.1. Issues identified

Table 8.1 below list all the issues identified during the assessment of the proposed development site of the proposed development of the Baviaanskloof WHS Interpretive Centre. All impacts assessed are applicable to both the preferred site and the Alternative site.

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Table 8.1: Technical scope of the impacts identified during all phases of the proposed development of the Baviaanskloof WHS Interpretive Centre.

THEME	POTENTIAL ISSUES	SOURCE OF ISSUE	POTENTIAL RECEPTORS	PHASE			ASSESSMENT ACTIONS
				PLANNING & DESIGN	CONSTRUCTION	OPERATIONAL	
Environmental Policy	Legal and Policy Compliance	Non-compliance	ECPTA	X	X	X	Obtaining Authorisation from relevant Competent Authorities
Bio-physical	Soils	Construction activities Inadequate erosion management/rehabilitation	Terrestrial and aquatic environment	X	X		Assessment of the geology and soils as part of the EclA
	Fluvial geomorphology and hydrology of watercourses	Earthworks and erosion	Surrounding water courses	X	X	X	Assessment of the aquatic environment as part of the EclA
	Stormwater and erosion management	Inadequate stormwater management	Surrounding soils and watercourses	X	X	X	Assessment of the erosion susceptibility and climate of the study area as part of the EclA
	Waste	Inappropriate planning, construction activities, operational effluent and sewage and general litter.	Surrounding areas	X	X	X	Assessment of the waste management for the construction and operational phases
Biological	Riparian Vegetation	Vegetation clearance	Albany alluvial vegetation		X		Assessment of the vegetation compositions of the study area as part of the EclA
	Natural vegetation	Vegetation clearance	Flora in study area	X	X		
		Habitat destruction	Faunal and flora in study area	X	X		
	Species of Conservation Concern (SCC)	Vegetation clearance	SCC in development footprint	X	X		Assessment of the fauna and flora species lists and identification of any potential SCC according to NEMBA, PNCO, CITES and Red Data List.
	Wildlife disturbances and mortalities	Construction activities and operations	Fauna within the development site and surrounds		X	X	Assessment of the faunal composition of the study area as part of the EclA
	Loss/ Fragmentation of habitats	Clearance of vegetation	Habitats within development footprint		X		Assessment of the ecosystems of the study area as part of the EclA
	Conservation and protection	Tourism information at the interpretive centre	Baviaanskloof Biodiversity			X	Assessment of conservation status
		Income generated from the centre	ECPTA and Baviaanskloof conservancy			X	
	Fire	Construction and Operational activities	Local fauna and flora		X	X	Assessment of fire risks.
Establishment of alien vegetation	Inappropriate planning for management/ rehabilitation of alien vegetation	Disturbed terrestrial and aquatic areas	X	X	X	Assessment of the vegetation compositions of the study area and	

THEME	POTENTIAL ISSUES	SOURCE OF ISSUE	POTENTIAL RECEPTORS	PHASE			ASSESSMENT ACTIONS
				PLANNING & DESIGN	CONSTRUCTION	OPERATIONAL	
		Vegetation clearance			X		identification of any potential alien invaders as part of the EclA.

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Ecological impacts that were identified during the Planning and Design, Construction and Operational Phases of the proposed development of the Baviaanskloof WHS Interpretive Centre are described below:

Table 8.2. Impacts identified during all phases of the proposed development of the Baviaanskloof WHS Interpretive Centre.

Categories/Issue	Project phase		
	Planning and Design	Construction	Operation
Legal and policy compliance	During the Planning and Design Phase, Failure to adhere to existing policies and legal obligations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	During the construction phase, failure to adhere to all permits, authorisations and regulations may lead to financial penalties and the EA being revoked.	N/A
Biophysical environment			
Soils	During the planning and design phase inappropriate demarcation of construction activities may result in the loss of topsoil and increase in soil erosion.	During construction, loss of topsoil from erosion during construction will alter the soil characteristics.	N/A
Fluvial geomorphology and hydrology of watercourses	During the planning and design phase incorrect design of the development footprint may result in scouring of the river bed or changes to the hydrology of the adjacent watercourse.	During the construction phase incorrect scheduling and demarcation of construction activities may result in scouring of the river bed or changes to the hydrology of the adjacent watercourse.	During the operational phase, the increase in the amount of hard surfaces (parking lots) may result in an increase in surface water runoff and subsequent soil erosion.
	During the Planning and Design Phase, failure to plan mitigation measures to prevent or minimise the degradation of the health and functioning of water courses due erosion and sedimentation of surrounding watercourse.	During the construction phase the chemicals from construction activities and construction vehicle spillages may contaminate the water course. The construction activities may result in the sedimentation of watercourses due to	N/A

Categories/Issue	Project phase		
	Planning and Design	Construction	Operation
		runoff and erosion of loose soils.	
Stormwater and erosion management	During the Planning and Design Phase Inadequate stormwater management designs could result in high erosion due to loss of vegetation and the slope and topography of the site as well as impacting surrounding water courses.	During the Construction Phase, Loss of soil due to soil erosion and soil compression during construction could lead to an increase in non-permeable surfaces and result in increased storm water runoff.	During the operational phase, the increase in the amount of hardened surfaces could lead to stormwater runoff resulting in soil erosion and sedimentation/ pollution of surrounding watercourses
		The construction phase will include two river crossings of the Baviaanskloof mainstream and one of its tributaries and therefore require the construction of two culverts which may influence the natural fluvial geomorphology of the Baviaanskloof river.	
	During the Planning and Design Phase, Inadequate erosion management plans will result in soil erosion.	During construction, the clearance of vegetation and construction activities may result in the erosion of top soils in the development site.	During the operational phase, the increase in the amount of hardened surfaces could lead to soil erosion and sedimentation/ pollution of surrounding watercourses.
	During the planning and design phase, the failure to plan for the rehabilitation of impacted areas may lead to erosion of disturbed areas and unnecessary loss of soil and sedimentation of watercourses.	During the construction phase, the poor rehabilitation of impacted areas may lead to erosion of disturbed areas and unnecessary loss of soil and sedimentation of watercourses.	N/A

Categories/Issue	Project phase		
	Planning and Design	Construction	Operation
Waste	Inadequate planning for the management of waste could lead to pollution in the study area and surrounding areas.	During the construction phase, pollution may result from construction spills (cement, paint, fuel) and litter from construction workers.	During the operational phase, general solid waste produced from operational activities may result in pollution of the development area.
			During the operational phase, sewage and effluent waste produced may spill into the surrounding environment and pollute the soils/ watercourses.
Biological environment			
Riparian Vegetation	N/A	During the construction phase the clearing of riparian vegetation for the construction of the interpretive centre may result in the unnecessary loss of riparian vegetation.	N/A
Natural vegetation	During the planning and design phase the inappropriate design of the project infrastructure and demarcation of project boundaries will lead to the unnecessary loss of natural vegetation and habitat supporting other taxonomic groups.	During the construction phase the clearing of natural vegetation outside the approved development footprint will lead to the unnecessary loss of natural vegetation and habitat for other taxonomic groups. The removal of existing natural vegetation creates 'open' habitats that will favour the establishment of undesirable species in areas that are typically very difficult to eradicate and may pose a threat to surrounding ecosystems.	N/A

Categories/Issue	Project phase		
	Planning and Design	Construction	Operation
Floral biodiversity	N/A	Due to the biodiversity rich nature of the Baviaanskloof reserve, the clearance of natural vegetation will result in a subsequent loss of floral biodiversity.	N/A
Faunal Biodiversity	N/A	Due to the biodiversity rich nature of the Baviaanskloof reserve, the clearance of natural vegetation will result in a subsequent loss of habitats and local loss of faunal biodiversity.	N/A
Species Conservation Concern	During the planning and design phase, the inadequate planning for search and rescue operations and permitting for the removal of any SCC may result in non-compliances being issued and the unintended loss of SCC.	During the construction phase, activities may permanently damage or remove plant and animal SCC present on site.	N/A
Wildlife disturbances and mortalities	N/A	During the construction phase, vehicles, crew and materials may result in disturbances of natural animal habitats and behaviour patterns, as well as, increase animal fatalities through opportunistic hunting, collisions, accidents or baiting and trapping.	During the operational phase, the increased presence of humans and increase in human activities may result in the disturbance of local habitats and natural behavioural patterns of wildlife in the area.
Loss/ fragmentation of habitats	N/A	During construction, the loss of vegetation coincides with the loss of faunal habitat, reducing breeding and rearing locales. Endangered or rare faunal populations may permanently	N/A

Categories/Issue	Project phase		
	Planning and Design	Construction	Operation
		disappear or diminish in size.	
Conservation	N/A	N/A	During the operational phase, the presence of an information centre will provide education to visitors and may encourage conservative behaviour whilst in the Baviaanskloof Reserve.
			During the operational phase, income generated from the Interpretive Centre may be used to fund the conservation of the Baviaanskloof biodiversity and natural resources.
Fire Risk	N/A	During the construction phase, construction activities, spills and cigarette butts from construction workers may result in fire in the development site causing unnecessary loss of local fauna and flora.	During the operational phase, activities such as cooking and incorrect disposal of cigarette butts will increase the risk of fire in the development area, which may cause the unnecessary loss of local fauna and flora.
Establishment of alien plant species	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 in sensitive areas during the construction and operational phases.	During the construction phase, the removal of natural vegetation creates open habitats that favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring ecosystems	During the operational phase, the influx of tourists from around the world could result in the introduction of alien plant species, the inadequate monitoring of alien invasive vegetation could result in such introductions resulting in permanent establishment of alien species.
	During the planning and design phase, the failure to plan for the rehabilitation of impacted areas may lead to the establishment of alien vegetation.	During the construction phase poor rehabilitation of disturbed areas may lead to the permanent degradation of	During the Operational phase, the poor rehabilitation of disturbed areas may lead to the permanent

Categories/Issue	Project phase		
	Planning and Design	Construction	Operation
		ecosystems as well as allow alien vegetation species to expand.	establishment of alien vegetation.

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8.2. Impact assessment

The impacts identified in Section 8.1 are assessed in terms of the criteria described in Section 2.5 and are summarised in Tables 8.3- 8.5 below.

Table 8.3. Assessment of the existing impacts identified for the development site

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
EXISTING IMPACTS														
Biophysical Environment														
Soil Erosion	All	A baseline analysis of the present condition of the study area indicated the presence of areas that are moderately susceptible to erosion as an existing impact on the development site.	Negative	Indirect	Moderately severe	Study area	Long-term	Certain	Reversible	Resource will not be lost	Achievable	MODERATE	<ul style="list-style-type: none"> An Erosion Management Plan must be developed to mitigate the unnecessary loss of soil and sedimentation of watercourses during all phases of the project. The Erosion Management Plan must be approved by the appointed ECO prior to implementation. 	LOW
Biological Environment														
Alien Invasive Species	All	A baseline analysis of the present condition of the study area indicated the presence of alien invasive plant species as an existing impact on the development site.	Negative	Indirect	Moderately severe	Study area	Long-term	Certain	Reversible	Resource will be partly lost	Achievable	MODERATE	<ul style="list-style-type: none"> An Alien Vegetation Management Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project. The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation. 	LOW

Table 8.4. Assessment of impacts during the Planning & Design Phase

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
PLANNING AND DESIGN PHASE														
Environmental Policy														
Legal and policy compliance	All	During the planning and design phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	Negative	Direct	Severe	National	Long-term	Possible	Reversible	Resource will be partly lost	Achievable	HIGH	<ul style="list-style-type: none"> All legal matters pertaining to permitting must be completed prior to any construction activity. A qualified and independent Environmental Control Officer (ECO) must be appointed prior to commencement of any activity on site to monitor all legal and policy compliance. All DAFF and DEDEAT plant permits must be in place prior to removal or disturbance of SCC. 	LOW
Biophysical Environment														

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
PLANNING AND DESIGN PHASE														
Soils	All	During the planning and design phase inappropriate demarcation of construction activities may result in the loss of topsoil and increase in soil erosion.	Negative	Indirect	Moderate	Localised	Short-term	Probable	Irreversible	Resource will be partly lost	Easily Achievable	LOW	<ul style="list-style-type: none"> An Erosion Management Plan must be developed to mitigate the unnecessary loss of soil and sedimentation of watercourses during all phases of the project. The Erosion Management Plan must be approved by the appointed ECO prior to implementation. 	LOW
Fluvial geomorphology and hydrology of watercourses	All	During the planning and design phase incorrect design of the development footprint may result in scouring of the river bed or changes to the hydrology of the adjacent watercourse.	Negative	Direct, indirect	Severe	Study area	Long-term	Possible	Reversible	Resource will be partly lost	Achievable	HIGH	<ul style="list-style-type: none"> The layout and design of the proposed interpretive centre must be designed in such a way as to minimise the impacts on surrounding watercourses. 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. Develop and implement a stormwater management plan to ensure the water runoff from the irrigation scheme does not erode/ pollute surrounding areas. 	LOW
Stormwater management	All	During the planning and design phase, inadequate planning for stormwater during the construction and operational phases within the site could result in erosion and contamination of the soil and surrounding watercourses if there is not appropriate stormwater management structures in place.	Negative	Direct, Cumulative	Severe	Study area	Long-term	Possible	Reversible	Resource will be partly lost	Easily Achievable	HIGH	<ul style="list-style-type: none"> A Stormwater Management Plan must be developed to control runoff and prevent erosion of the site and its surroundings. An Erosion Management Plan must be developed to mitigate the unnecessary loss of soil and sedimentation of watercourses during all phases of the project. The Erosion Management Plan must be approved by the appointed ECO. Regular monitoring of implementation of this plan for the rehabilitation of disturbed areas must be conducted. Appropriate stormwater structures alongside a stormwater management plan must be designed to minimise erosion of the surrounding environment and sedimentation of surrounding watercourses. Pervious surfaces must be used for the parking lot, roads and footpaths where possible to promote infiltration and reduce concentrated runoff. Impermeable bunded areas must be designed to store all oil tanks. These areas must be 110% the volume of the oil storage tanks within them and there must be an outlet valve with an oil trap for release of uncontaminated stormwater from the bunded areas. 	LOW
	All	During the planning and design phase, the failure to plan for the rehabilitation of impacted areas may lead to erosion of disturbed areas and unnecessary loss of soil and sedimentation of watercourses.	Negative	Indirect, Cumulative	Severe	Study area	Long-term	Probable	Reversible	Resource will be partly lost	Easily Achievable	HIGH	<ul style="list-style-type: none"> Appropriate stormwater structures alongside a stormwater management plan must be designed to minimise erosion of the surrounding environment and sedimentation of surrounding watercourses. Pervious surfaces must be used for the parking lot, roads and footpaths where possible to promote infiltration and reduce concentrated runoff. Impermeable bunded areas must be designed to store all oil tanks. These areas must be 110% the volume of the oil storage tanks within them and there must be an outlet valve with an oil trap for release of uncontaminated stormwater from the bunded areas. 	LOW
Waste management	All	During the planning and design phase, failure to plan for the storage, handling and disposal of general and hazardous waste during the construction and operation phase may lead to littering and pollution of the surrounding environment, unsanitary conditions and health risks.	Negative	Direct, Indirect	Moderate	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE	<ul style="list-style-type: none"> A proper waste management plan for handling onsite general and hazardous waste during the construction and operation phases must be developed and implemented. An appropriate area must be identified where waste can be stored before disposal. 	LOW
Biological Environment														
Natural vegetation	All	During the planning and design phase the inappropriate design of the project infrastructure and demarcation of project boundaries will lead to the unnecessary loss of natural vegetation and habitat supporting other taxonomic groups.	Negative	Direct, Indirect, Cumulative	Severe	Localised	Permanent	Probable	Irreversible	Resource will be lost	Achievable	HIGH	<ul style="list-style-type: none"> Permits must be obtained by the Competent Authority to remove any plant SCC and all affected plants must be relocated outside construction footprint. 	LOW

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
PLANNING AND DESIGN PHASE														
Species of Conservation Concern	All	Prior to construction, the inadequate planning for search and rescue operations and permitting for the removal of any SCC may result in non-compliances being issued and the unintended loss of SCC.	Negative	Direct, Cumulative	Moderate	Localised	Long-term	Possible	Irreversible	Resource will be partly lost	Achievable	HIGH	<ul style="list-style-type: none"> All necessary permits must be obtained for the removal of any identified SCC prior to the commencement of construction activities Planning for any search and rescue operations must be conducted prior to the commencement of construction activities. 	LOW
Control of alien 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 in sensitive areas during the construction and operational phases.	Negative	Indirect	Moderate	Study area	Long-term	Probable	Reversible	Resource will not be lost	Achievable	MODERATE	<ul style="list-style-type: none"> An Alien Vegetation Management Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project. The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation. Regular monitoring of the implementation of this plan for the rehabilitation of disturbed areas must be conducted by the appointed ECO. 	LOW
		During the planning and design phase, the failure to plan for the rehabilitation of impacted areas may lead to the establishment of alien vegetation.	Negative	Indirect	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Achievable	MODERATE		LOW

Table 8.5. Assessment of impacts during the Construction Phase

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
CONSTRUCTION PHASE														
Environmental Policy														
Legal and policy compliance	All	During the construction phase, failure to adhere to existing policies and legal obligations and obtain the necessary authorisations could lead to the project conflicting with local, provincial and national policies, legislation, etc. This could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment.	Negative	Direct	Severe	National	Long-term	Possible	Reversible	Resource will be partly lost	Achievable	HIGH	<ul style="list-style-type: none"> The Applicant must employ an independent Environmental Control Officer (ECO) for the duration of the construction phase to audit the contractors compliance with the specifications in the EA, EMPr and any other permits/authorisations. 	LOW
Biophysical Environment														

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
CONSTRUCTION PHASE														
Soils	All	During construction phase, the erosion from construction activities may result in the loss of soil from the development area and surrounds.	Negative	Direct	Moderate	Study area	Medium-term	Possible	Reversible	Resource will be partly lost	Achievable	MODERATE	<ul style="list-style-type: none"> Wind screening and stormwater control must be undertaken to prevent soil loss from the site. The contractor must develop and implement an Erosion Management Plan. All erosion control mechanisms must be regularly maintained. Natural vegetation must be retained where possible to avoid soil erosion. Construction must be phased in order to minimise the area of exposed soil at any one time. Disturbed areas of natural vegetation must be rehabilitated immediately to prevent further soil erosion. Fill and stabilise all erosion rills before they develop into larger gullies that advance from erosion and runoff due to construction activities 	LOW
Fluvial geomorphology and hydrology of watercourse	All	During the construction phase incorrect scheduling and demarcation of construction activities may result in scouring of the river bed or changes to the hydrology of the adjacent watercourse.	Negative	Direct, Indirect	Severe	Study area	Long-term	Possible	Reversible	Resource will be partly lost	Easily Achievable	MODERATE	<ul style="list-style-type: none"> Regular monitoring of construction activities must be conducted by the appointed ECO in order to ensure no construction activities are taking place outside of the demarcated footprint and within sensitive watercourses. 	LOW
		During the construction phase runoff and erosion of soils that have been loosened by construction activities may result in the sedimentation of watercourses.	Negative	Direct	Severe	Study area	Long-term	Possible	Reversible	Resource will be partly lost	Easily Achievable	MODERATE		LOW
	Site alternative 2	The construction phase will include two river crossings. Therefore the construction of river culverts within the rivers may alter the natural fluvial geomorphology of the watercourses.	Negative	Direct, Indirect, Cumulative	Severe	Study area	Permanent	Definite	Irreversible	Resource will be partly lost	Achievable	HIGH	<ul style="list-style-type: none"> Construction within the watercourses can be avoided through the use of the preferred site alternative 1. The relevant licences must be obtained from DWS prior to construction within the watercourse. 	LOW
Stormwater run-off	All	During the Construction Phase, soil compression may lead to an increase in non-permeable surfaces and result in increased storm water runoff.	Negative	Direct	Severe	Study area	Short-term	Probable	Reversible	Resource will be partly lost	Easily Achievable	MODERATE	<ul style="list-style-type: none"> Ensure that appropriate stormwater structures are designed prior to construction and implemented during construction. Ongoing soil loosening and re-vegetation efforts must be employed on compacted areas throughout the construction phase. 	LOW
		During construction, the clearance of vegetation and construction activities may result in the erosion of top soils within the development site and surrounds.	Negative	Direct, Indirect	Severe	Study area	Long-term	Possible	Reversible	Resource will be partly lost	Easily Achievable	MODERATE	<ul style="list-style-type: none"> Develop and implement an Erosion Action Plan that aims to monitor and respond to erosion events. Rehabilitate disturbed areas as soon as possible after construction; Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance; All cleared areas (not used for the development footprint) must be vegetated with indigenous natural vegetation. Natural vegetation (scrubs & trees) that was removed onsite on must be placed on cleared areas for soil stabilisation efforts. 	LOW
Stormwater management	All	During the construction phase, failure to implement effective stormwater management measures may result in increased surface soil erosion and contamination of stormwater and resulting surrounding watercourses.	Negative	Direct, Indirect	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE	<ul style="list-style-type: none"> The construction site must be managed in a manner that prevents pollution to downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants. Berms and swathes must be placed in areas that may be prone to erosion. Temporary cut-off drains and berms may be required to capture storm water and promote infiltration. 	LOW

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
CONSTRUCTION PHASE														
Waste management	All	During the construction phase, poor management of handling, disposal and storage of general and hazardous waste may lead to the pollution of the surrounding environment.	Negative	Direct, Indirect	Moderate	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE	<ul style="list-style-type: none"> A Waste Management Plan for handling onsite general and hazardous waste during the construction and operation phases must be developed and implemented. All general waste must be disposed of in bins/waste skips labelled "general waste". Sufficient waste bins must be provided throughout the construction site for collecting waste. All general waste collected on site must be disposed of at a licensed general waste disposal site. All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider. Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site. Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground. Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages. 	LOW
Biological Environment														
Riparian vegetation	Preferred site alternative 1	During the construction phase the clearing of riparian vegetation for the construction of the Baviaanskloof WHS Interpretive Centre may result in the unnecessary loss of riparian vegetation.	Negative	Direct	Moderate	Localised	Long-term	Possible	Reversible	Resource will not be lost	Achievable	MODERATE	<ul style="list-style-type: none"> Layout and design should take into account watercourses on and surrounding site whereby all infrastructure and buildings should be outside of the 1:100 year floodline and riparian zone. Clearance of riparian vegetation must be kept to an absolute minimum and only if entirely necessary must be conducted All riparian vegetation clearance activities must be monitored by the appointed ECO throughout the construction phase. 	LOW
	Site alternative 2	During the construction phase the clearing of riparian vegetation for the construction of the Baviaanskloof WHS Interpretive Centre and associated activities may result in the unnecessary loss of riparian vegetation.	Negative	Direct	Severe	Localised	Long-term	Possible	Reversible	Resource will not be lost	Difficult	HIGH		LOW
Natural vegetation	All	During the construction phase the clearing of natural vegetation outside the approved development footprint will lead to the unnecessary loss of natural vegetation including the loss of endangered Albany alluvial vegetation and habitat for other taxonomic groups.	Negative	Direct, indirect, cumulative	Severe	Study area	Permanent	Possible	Reversible	Resource will be partly lost	Achievable	MODERATE	<ul style="list-style-type: none"> The construction footprint must be surveyed and demarcated prior to construction commencing. No construction activities must occur outside the demarcated footprint. Construction activities must be preferred in areas where degraded natural vegetation is found. Intact Albany alluvial vegetation patches must be avoided and activities within this vegetation type must be kept to a minimum. Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken. Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation may be mulched and used as ground cover during rehabilitation. The contractor's staff must not harvest any natural vegetation. 	LOW

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
CONSTRUCTION PHASE														
Species of Conservation Concern (SCC)	All	During the construction phase, activities may permanently damage or remove plant and animal SCC present on site.	Negative	Direct	Severe	Localised	Permanent	Probable	Irreversible	Resource be partly lost	Achievable	HIGH	<ul style="list-style-type: none"> A search and rescue operation must be conducted by the relevant authority prior to commencement of construction activities. All SCC impacted by construction activities must be conserved and rescued. All rescued SCC must be transplanted to a suitable habitat or nursery for the duration of the construction phase; All rescued SCC must be replanted within the site where it was originally found or in close proximity during rehabilitation 	LOW
		During construction phase, the construction activities and presence of construction workers may lead to the permanent loss of unidentified animal SCC, especially around the river and drainage line crossings.	Negative	Direct	Severe	Localised	Permanent	Possible	Irreversible	Resource will be partly lost	Achievable	HIGH	<ul style="list-style-type: none"> The development area must be surveyed prior to topsoil removal in order to locate and capture any animal SCC and relocate them. The contractor's workers must not poach or trap wild animals. 	LOW
Wildlife mortalities	All	During the construction phase, vehicles, crew and materials may increase animal fatalities through opportunistic hunting, collisions, accidents or baiting and trapping.	Negative	Direct	Moderate	Localised	Permanent	Possible	Irreversible	Resource will be partly lost	Difficult	MODERATE	<ul style="list-style-type: none"> Train all staff on site regarding the proper management and response should animals be encountered. A specialist must be appointed to search and relocate animals in the construction region prior to work commencing, No hunting, baiting or trapping must be allowed. 	MODERATE
Loss/fragmentation of habitats	All	During construction, the loss of vegetation coincides with the loss of faunal habitat, reducing breeding and rearing locales. Endangered or rare faunal populations may permanently disappear or diminish in size.	Negative	Direct	Moderate	Study area	Long-term	Possible	Irreversible	Resource will be partly lost	Achievable	MODERATE	<ul style="list-style-type: none"> Vegetation clearance and aquatic habitats must be avoided as far as possible; Should avoidance be impractical, harm to the environment shall be minimised as far as possible. 	LOW
On-site fire risk	All	During the construction phase inadequate attention to fire safety awareness and fire safety equipment could result in uncontrolled fires, posing a threat to animals, vegetation and the surrounding landowners.	Negative	Direct	Severe	Study area	Long-term	Possible	Irreversible	Resource will be lost	Easily Achievable	HIGH	<p>In order to reduce the risk of fires:</p> <ul style="list-style-type: none"> All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances. Smoking must not be permitted near flammable substances. All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires. No open fires must be allowed on site. Fire extinguishers must be available onsite. 	LOW
Establishments of alien plant species	All	During the construction phase, the removal of natural vegetation creates open habitats that favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring ecosystems	Negative	Indirect	Severe	Study area	Long-term	Probable	Reversible	Resource will not be lost	Achievable	HIGH	<ul style="list-style-type: none"> The approved 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. as in accordance to the NEMBA: Alien Invasive Species Regulations. 	LOW
	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.	Negative	Direct, indirect, cumulative	Moderate	Localised	Long-term	Probable	Reversible	Resource may be partly lost	Achievable	MODERATE	<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. Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans. 	LOW

Table 8.6. Assessment of impacts during the Operational Phase

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
OPERATION PHASE														
Environmental Policy														
Legal and policy compliance	All	During the operation phase, failure to adhere to all permits, authorisations and regulations may lead to financial penalties and closure of the Baviaanskloof WHS Interpretive Centre.	Negative	Direct	Severe	National	Long-term	Possible	Reversible	Resource will be partly lost	Achievable	HIGH	<ul style="list-style-type: none"> The proponent must ensure that operation of the Baviaanskloof WHS Interpretive Centre is compliant with the relevant legislation and policy. These should include (but are not restricted to): NEMA, EA, WULA, plant removal permits and any other permits/authorisations. 	LOW
Biophysical Environment														
Fluvial geomorphology and hydrology of watercourses	All	During the operational phase, the increase in the amount of hard surfaces (parking lots) may result in an increase in surface water runoff and subsequent soil erosion.	Negative	Direct, Indirect	Moderate	Study area	Long-term	Probable	Irreversible	Resource will be partly lost	Easily Achievable	MODERATE	<ul style="list-style-type: none"> Stormwater management measures such as attenuation structures, channels, etc. must be properly maintained and monitored. If the stormwater management measures put in place are deemed insufficient, a qualified engineer must be approached to assist with additional storm water attenuation mechanisms and remediation. 	LOW
Stormwater management	All	During the operation phase, failure of the stormwater system and or lack of maintenance of the stormwater system may result in the erosion and or pollution of the surrounding environment should the stormwater be contaminated.	Negative	Direct, Indirect	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE		LOW
Waste management	All	During the operation phase, inappropriate handling, storage and disposal of general and hazardous waste may lead to pollution of soil, surface and/or groundwater as well as pose a health and safety risk to staff, the general public and surrounding landowners.	Negative	Direct	Moderate	Study area	Medium-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE	<ul style="list-style-type: none"> A waste management plan must be implemented to ensure appropriate handling, collection, processing and disposal of solid waste. (An adequate backup system for waste management should be in place in case of service delivery strikes). Reuse, recycling and separation-at-source of waste should be promoted. If any hazardous waste that is generated on site it must be stored in an impermeable container until such time as it can be disposed at a registered hazardous landfill site or be collected by the appropriate service provider (eg. Enviroserv). A "clean site policy" must be adopted by all employees. 	LOW
Biological environment														
Wildlife disturbances and mortalities	All	During the operational phase, the increased presence of humans and increase in human activities may result in the disturbance of local habitats and natural behavioural patterns of wildlife in the area.	Negative	Direct	Severe	Study area	Long-term	Possible	Reversible	Resource will not be lost	Difficult	MODERATE	<ul style="list-style-type: none"> Train all staff on site regarding the proper management and response should animals be encountered. No animals shall be hunted or killed. Rules for guests should be enforced that prohibit the feeding of animals and harvesting of plants. 	LOW
Conservation and protection	All	During the operation phase, the operation of the Baviaanskloof WHS Interpretive Centre may bring about an increase in awareness and protection of the biodiversity within the Baviaanskloof WHS Interpretive Centre.	Positive	Indirect	Moderate	Municipal to Regional	Long-term	Probable	Irreversible	Resource will not be lost	Achievable	MODERATE	<ul style="list-style-type: none"> No mitigation required. 	MODERATE

POTENTIAL ISSUES	ALTERNATIVES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
OPERATION PHASE														
On-site fire risk	All	During the operation phase there is the chance of fires which may harm staff and surrounding landowners/general public.	Negative	Direct	Severe	Study area	Long-term	Possible	Irreversible	Resource will be lost	Easily Achievable	HIGH	<ul style="list-style-type: none"> Fire extinguishers must be placed throughout the site. No smoking or open flame should be permitted on the site. An Emergency Response Plan must be in place and must be known by all employees. Fire breaks should be considered by ECPTA. 	LOW
Establishment of alien plant species	All	During the operational phase, the influx of tourists from around the world could result in the introduction of alien plant species, the inadequate monitoring of alien invasive vegetation could result in such introductions resulting in permanent establishment of alien species.	Negative	Direct, indirect	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Achievable	MODERATE	<ul style="list-style-type: none"> The approved Alien Vegetation Management Plan must be implemented 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. as in accordance to the NEMBA: Alien Invasive Species Regulations. 	LOW
		During the operational phase, the poor rehabilitation of disturbed areas may lead to the permanent establishment of alien vegetation.	Negative	Direct, indirect	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Achievable	MODERATE	LOW	

Table 8.7. Assessment of the No-Go alternative

POTENTIAL ISSUES	SOURCE OF ISSUE	NATURE	TYPE	CONSEQUENCE OF IMPACT	EXTENT OF IMPACT	DURATION OF IMPACT	PROBABILITY OF IMPACT	REVERSIBILITY	IRREPLACEABLE LOSS	MITIGATION POTENTIAL	SIGNIFICANCE WITHOUT MITIGATION	MITIGATION MEASURES	SIGNIFICANCE OF IMPACT WITH MITIGATION	
(SIGNIFICANCE WITHOUT MITIGATION)												(SIGNIFICANCE WITH MITIGATION)		
Biophysical environment														
No development of the IC	Should the project not proceed, the current land use will remain the same. In this instance the likelihood of loss of Threatened Albany Alluvial Vegetation and SCC is reduced.	Positive	Indirect, cumulative	Moderate	Study area	Long-term	Possible	Reversible	Resource will not be lost	Easily Achievable	MODERATE	<ul style="list-style-type: none"> No mitigation required. 	MODERATE	
	Should the project not proceed, there will be a loss of the generation of awareness and education on the conservation of the Baviaanskloof flora and fauna and therefore may lead to tourists failing to adhere to conservative practices in the reserve.	Negative	Indirect, cumulative	Low	Study area	Long-term	Possible	Reversible	Resource will not be lost	Difficult	LOW	<ul style="list-style-type: none"> Awareness and knowledge of the Baviaanskloof WHS can be increased through social media and other platforms. 	LOW	

9. Impact statement, recommendations 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. Impact statement

A total of 27 plant species dominated the proposed development area, two (2) of which were SSC and one (1) of which was an alien plant species. The proposed Baviaanskloof WHS Interpretive Centre study area is situated within two (2) vegetation types, the Kouga Grassy Sandstone Fynbos and Albany Alluvial vegetation types (Figure 5.10 and 5.11). The vegetation of the study area was found to represent the fynbos vegetation mostly; however some SCC plants were identified on site, namely *Ruschia altigena* and *Amphiglossa callunoides*. Much of the vegetation identified on site was indigenous and only one alien plant, *Argemone ochroleuca subsp. ochroleuca* (white flowered Mexican poppy), was identified during the site visit. There are however a number of alien invasives that occur in the region and a large amount of potential SCC present in the area, therefore caution must be practiced during search and rescue operations and alien vegetation must be effectively managed.

The topography of the preferred site is such that the proposed development footprint is mostly flat, with a steep ridge directly behind the development area. The site alternative 2 is mostly flat in the direct development footprint and surrounds, however the topography of the preferred site is favoured for its visual aesthetics. Should development take place in the preferred site it must be limited to the flat portions and a sufficient distance away from the ridge to avoid the danger of rockfalls.

Analysis of the boundary of the proposed study site indicated that given the worst case scenario, approximately 0.7 hectares (7000m²) of land will be transformed for the development. This transformation will include the clearance of natural vegetation. The southern portion of preferred site alternative 1 and the entire portion of site alternative 2 are located within an ENDANGERED ecosystem: Albany Alluvial Vegetation.

The proposed development site falls within a priority area, the Cape Floristic Region priority area and one reserve, the Baviaanskloof Mega-Reserve. Two (2) South African Protected areas (provincial reserves) neighbour the study area, namely the Berg Plaatz Wilderness area roughly 4 km northeast of the proposed sites and the Kouga Wilderness Area approximately 6 km southwest of the proposed sites. The Baviaans-Addo NPAES Focus Area lies both 2 km east and 2 km southwest of the proposed development sites. According to the ECBCP spatial planning tool, both sites fall within an area categorised as a **terrestrial CBA 2** and an **aquatic CBA 1** (Figure 4.9 and 4.10). Aquatic CBA 1 areas are defined as 'critically important river sub-catchments' while terrestrial CBA 2 areas should be managed to maintain the environment in a near-natural state.

The Baviaanskloof River flows adjacent the site and a buffer of 32m from this river has been allocated HIGH sensitivity while regions that fall within 50-100m of the river have been allocated as MODERATE sensitivity. Although the Baviaanskloof River was not flowing during the time of the site visit, and evidently has been dry for quite some time, there was evidence of previous flood events (large deposits of rocks) and therefore construction activities should be avoided in the high sensitive area and within the floodline of the Baviaanskloof River.

Should the site alternative 2 be the chosen location for the development, the development will include two river crossings and thus the construction of two culverts within the rivers. The preferred site alternative 1 will not involve any river crossings for the development. Construction within a River, within the Regulated area of a watercourse and within a wetland will require a GA under section 21 (c) & (i) issued by the Department of Water and Sanitation.

Alien and invasive plants occur in places but are not dominant. Alien species present on site and their category according to the NEMBA Alien and Invasive Species Regulations (published 1 August 2014) as well as CARA are presented in Section 7 above. It is advised that an Alien Vegetation Management Plan is generated and implemented during the construction phase (for clearing) and operation phase (for maintenance), throughout the life of the project, and that active management of alien species is carried out.

Few animal species were recorded during the site visit. These were mostly limited to birds, however much evidence of animal presence was found on site such as faeces and burrows. No animal SCC were observed.

9.1.1. Existing impacts

A baseline analysis of the present condition of the study area indicated the presence of alien invasive plant species and erosion prone areas as existing impacts on the development site.

9.1.2. Cumulative impact

The following cumulative impacts were identified as a result of the development of the proposed Baviaanskloof WHS Interpretive Centre:

Theme	Description of Impact	Cumulative impact
Legislation	Failure to adhere to existing policies and legal obligations could result in lack of institutional support for the project, overall project failure and undue disturbance to the natural environment. Furthermore, the failure to adhere to all permits, authorisations and regulations may lead to financial penalties and the EA being revoked.	Delays in the proposed development processes and operations resulting in loss of job opportunities and economic profitability.
Natural Vegetation	Inappropriate design of the project infrastructure and demarcation of project boundaries as well as the clearance of natural vegetation outside of the demarcated project boundary will lead to the unnecessary loss of natural vegetation and habitat supporting other taxonomic groups.	Unnecessary loss of natural vegetation resulting in the loss of habitat/ habitat corridors leading to the long-term alterations of animal movement patterns and potential permanent loss of SCC.

Species of Conservation Concern	The inadequate planning for search and rescue operations and permitting for the removal of any SCC may result in non-compliances being issued and the unintended loss of SCC.	Permanent loss of SCC. Delays in development/operational processes due to the non-compliances issued.
Alien Invasive Management	The removal of natural vegetation creates open habitats that favour the establishment of undesirable alien plant species in areas that are typically very difficult to eradicate and may pose a threat to neighbouring ecosystems. Together with poor rehabilitation of disturbed areas may lead to the permanent degradation of ecosystems as well as allow alien vegetation species to expand.	Establishment of alien invasive vegetation and permanent degradation of the ecosystems.
Soils and erosion management	The sandy soils of the study area indicate erosion prone soils, specifically after large rainfall events. The loss of vegetation due to the construction activities and erection of pavements and buildings may result in a greater amount of run off and an increase in erosion and subsequent loss of soils.	Erosion of soils and sedimentation of watercourses.

9.1.3. No-Go areas

The development site (including temporary impacted areas such as site camps and laydown areas) must be demarcated prior to commencement of construction and the site location approved by the appointed ECO. All areas outside the approved demarcation must be considered as NO-GO areas. All areas indicated to contain SCC must be considered NO-GO areas until necessary permits are obtained for their removal.

9.1.4. Alternatives

Two location alternatives, one layout alternative and one activity alternative were assessed. From an ecological viewpoint, the preferred alternative location is favoured due to its lesser degree of high sensitivity regions around the development footprint. The entire area of the Alternative site is demarcated as HIGH SENSITIVITY due to the presence of endangered Albany alluvial vegetation and close proximity to the Baviaanskloof River. The preferred alternative location has some degree of LOW and MODERATE SENSITIVITY areas in the development footprint (Figure 6.1). The construction of larger structures and facilities with a greater impact will be favoured in these regions.

9.2. Recommendation

The following recommendations must be included into the final EMPr:

- The project construction site must be demarcated prior to commencement of activities on site. All areas outside the demarcation will be considered as No-Go areas during construction.
- 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 EMPr
- 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 EMPr:
 - Storm Water & Contingency Management Plan;
 - Erosion Action Plan;
 - Rehabilitation Management Plan

- Alien Vegetation 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 development of the Baviaanskloof WHS Interpretive Centre.

EXISTING IMPACTS

Soil Erosion

- An Erosion Management Plan must be developed to mitigate the unnecessary loss of soil and sedimentation of watercourses during all phases of the project.
- The Erosion Management Plan must be approved by the appointed ECO prior to implementation.

Alien Invasive Species

- An Alien Vegetation Management Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project.
- The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation.

PLANNING AND DESIGN PHASE

Legal and policy compliance

- All legal matters pertaining to permitting must be completed prior to any construction activity.
- A qualified and independent Environmental Control Officer (ECO) must be appointed prior to commencement of any activity on site to monitor all legal and policy compliance.
- All DAFF and DEDEAT plant permits must be in place prior to removal or disturbance of SCC.

Soils

- An Erosion Management Plan must be developed to mitigate the unnecessary loss of soil and sedimentation of watercourses during all phases of the project.
- The Erosion Management Plan must be approved by the appointed ECO prior to implementation.

Fluvial geomorphology and hydrology of watercourses

- The layout and design of the proposed interpretive centre must be designed in such a way as to minimise the impacts on surrounding watercourses.
- All necessary Water Use Authorisations must be obtained for any of the following activities:
 - Construction within 500 m of a wetland
 - Construction within a watercourse.
- Develop and implement a stormwater management plan to ensure the water runoff from the irrigation scheme does not erode/ pollute surrounding areas.

Stormwater and erosion management

- A Stormwater Management Plan must be developed to control runoff and prevent erosion of the site and its surroundings.
- An Erosion Management Plan must be developed to mitigate the unnecessary loss of soil and sedimentation of watercourses during all phases of the project.
- The Erosion Management Plan must be approved by the appointed ECO.
- Regular monitoring of implementation of this plan for the rehabilitation of disturbed areas must be conducted.

- Appropriate stormwater structures alongside a stormwater management plan must be designed to minimise erosion of the surrounding environment and sedimentation of surrounding watercourses.
- Pervious surfaces must be used for the parking lot, roads and footpaths where possible to promote infiltration and reduce concentrated runoff.
- Impermeable bunded areas must be designed to store all oil tanks. These areas must be 110% the volume of the oil storage tanks within them and there must be an outlet valve with an oil trap for release of uncontaminated stormwater from the bunded areas.

Waste

- A proper waste management plan for handling onsite general and hazardous waste during the construction and operation phases must be developed and implemented.
- An appropriate area must be identified where waste can be stored before disposal.

Natural vegetation

- Permits must be obtained by the Competent Authority to remove any plant SCC and all affected plants must be relocated outside construction footprint.

Species of Conservation Concern

- All necessary permits must be obtained for the removal of any identified SCC prior to the commencement of construction activities
- Planning for any search and rescue operations must be conducted prior to the commencement of construction activities.

Control of alien species -

- An Alien Vegetation Management Plan must be developed to mitigate the establishment and spread of undesirable alien plant species during all phases of the project.
- The Alien Vegetation Management Plan must be approved by the appointed ECO prior to implementation.
- Regular monitoring of the implementation of this plan for the rehabilitation of disturbed areas must be conducted by the appointed ECO.

CONSTRUCTION PHASE

Legislation and policy compliance

- The Applicant must employ an independent Environmental Control Officer (ECO) for the duration of the construction phase to audit the contractors compliance with the specifications in the EA, EMPr and any other permits/authorisations.

Soils

- Wind screening and stormwater control must be undertaken to prevent soil loss from the site.
- The contractor must develop and implement an Erosion Management Plan.
- All erosion control mechanisms must be regularly maintained.
- Natural vegetation must be retained where possible to avoid soil erosion.
- Construction must be phased in order to minimise the area of exposed soil at any one time.
- Disturbed areas of natural vegetation must be rehabilitated immediately to prevent further soil erosion.
- Fill and stabilise all erosion rills before they develop into larger gullies that advance from erosion and runoff due to construction activities

Fluvial geomorphology and hydrology of watercourses

- Regular monitoring of construction activities must be conducted by the appointed ECO in order to ensure no construction activities are taking place outside of the demarcated footprint and within sensitive watercourses.
- Construction within the watercourses can be avoided through the use of the preferred site alternative 1.
- The relevant licences must be obtained from DWS prior to construction within the watercourse.

Stormwater and erosion management

- Ensure that appropriate stormwater structures are designed prior to construction and implemented during construction.
- Ongoing soil loosening and re-vegetation efforts must be employed on compacted areas throughout the construction phase.
- Develop and implement an Erosion Action Plan that aims to monitor and respond to erosion events.
- Rehabilitate disturbed areas as soon as possible after construction;
- Regular monitoring for erosion after construction to ensure that no erosion problems have developed as result of the disturbance;
- All cleared areas (not used for the development footprint) must be vegetated with indigenous natural vegetation.
- Natural vegetation (scrubs & trees) that was removed onsite on must be placed on cleared areas for soil stabilisation efforts.
- The construction site must be managed in a manner that prevents pollution to downstream watercourses or groundwater, due to suspended solids, silt or chemical pollutants.
- Berms and swathes must be placed in areas that may be prone to erosion.
- Temporary cut-off drains and berms may be required to capture storm water and promote infiltration.

Waste

- A Waste Management Plan for handling onsite general and hazardous waste during the construction and operation phases must be developed and implemented.
- All general waste must be disposed of in bins/waste skips labelled “general waste”.
- Sufficient waste bins must be provided throughout the construction site for collecting waste.
- All general waste collected on site must be disposed of at a licensed general waste disposal site.
- All hazardous waste generated on site must be placed in a temporary impermeable bunded containment area which must be disposed of at a hazardous landfill site or be collected by the appropriate service provider.
- Proof of receipt of hazardous waste by a licenced service provider must be maintained on the site.
- Adequate sanitary facilities must be provided for construction workers and they must be properly secured to the ground.
- Maintenance of the chemical toilets should be done on a regular basis to prevent any leakages.

Riparian vegetation

- Layout and design should take into account watercourses on and surrounding site whereby all infrastructure and buildings should be outside of the 1:100 year floodline and riparian zone.
- Clearance of riparian vegetation must be kept to an absolute minimum and only if entirely necessary must be conducted
- All riparian vegetation clearance activities must be monitored by the appointed ECO throughout the construction phase.

Natural vegetation

- The construction footprint must be surveyed and demarcated prior to construction commencing.
- No construction activities must occur outside the demarcated footprint.
- Construction activities must be preferred in areas where degraded natural vegetation is found.
- Intact Albany alluvial vegetation patches must be avoided and activities within this vegetation type must be kept to a minimum.
- Where vegetation has been cleared, site rehabilitation in terms of soil stabilisation and vegetation must be undertaken.
- Cleared vegetation must not be piled on top of natural vegetation but must be stockpiled temporarily on bare ground and removed to a registered landfill site. Alternatively, cleared vegetation may be mulched and used as ground cover during rehabilitation.
- The contractor's staff must not harvest any natural vegetation.

Species of Conservation Concern

- A search and rescue operation must be conducted by the relevant authority prior to commencement of construction activities.
- All SCC impacted by construction activities must be conserved and rescued.
- All rescued SCC must be transplanted to a suitable habitat or nursery for the duration of the construction phase;
- All rescued SCC must be replanted within the site where it was originally found or in close proximity during rehabilitation
- The development area must be surveyed prior to topsoil removal in order to locate and capture any animal SCC and relocate them.
- Provide training for construction workers on the contents of the EMPr.
- The contractor's workers must not poach or trap wild animals.

Wildlife mortalities

- All staff must be trained regarding the proper management and response should animals be encountered.
- A specialist must be appointed to search and relocate animals found within the study area prior to work commencing.
- No hunting, baiting or trapping of animals must be allowed.

Loss/fragmentation of habitats

- Vegetation clearance and aquatic habitats must be avoided as far as possible;
- Should avoidance be impractical, harm to the environment must be minimised as far as possible.

Fire

In order to reduce the risk of fires:

- All flammable substances must be stored in dry areas which do not pose an ignition risk to the said substances.
- Smoking must not be permitted near flammable substances.
- All cooking must be done in demarcated areas that are safe in terms of runaway or uncontrolled fires.
- No open fires must be allowed on site.
- Fire extinguishers must be available onsite.

Establishment of Alien Plant Species

- The approved 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. as in accordance to the NEMBA: Alien Invasive Species Regulations.
- 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.
- Restoration must be conducted as per the approved Erosion and Alien Vegetation Management Plans.

OPERATIONAL PHASE

Legal and Policy compliance

- The proponent must ensure that operation of the Baviaanskloof WHS Interpretive Centre is compliant with the relevant legislation and policy.
- These should include (but are not restricted to): NEMA, EA, WULA, plant removal permits and any other permits/authorisations.

Fluvial geomorphology and hydrology of watercourses and Stormwater management

- Stormwater management measures such as attenuation structures, channels, etc. must be properly maintained and monitored.
- If the stormwater management measures put in place are deemed insufficient, a qualified engineer must be approached to assist with additional storm water attenuation mechanisms and remediation.

Waste

- A waste management plan must be implemented to ensure appropriate handling, collection, processing and disposal of solid waste. (An adequate backup system for waste management should be in place in case of service delivery strikes).
- Reuse, recycling and separation-at-source of waste should be promoted.
- If any hazardous waste that is generated on site it must be stored in an impermeable container until such time as it can be disposed at a registered hazardous landfill site or be collected by the appropriate service provider (eg. Enviroserv).
- A “clean site policy” must be adopted by all employees.

Wildlife disturbances and mortalities

- Train all staff on site regarding the proper management and response should animals be encountered.
- No animals shall be hunted or killed.
- Rules for guests should be enforced that prohibit the feeding of animals and harvesting of plants.

Fire

- Fire extinguishers must be placed throughout the site.
- No smoking or open flame should be permitted on the site.
- An Emergency Response Plan must be in place and must be known by all employees.
- Fire breaks should be considered by ECPTA.

Establishment of Alien Plant Species

- The approved Alien Vegetation Management Plan must be implemented 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. as in accordance to the NEMBA: Alien Invasive Species Regulations.

NO-GO ALTERNATIVE

- Awareness and knowledge of the Baviaanskloof WHS can be increased through social media and other platforms.

9.3. Conclusion

Table 9.1 summarises the change in impacts from pre- to post- mitigation during development of the proposed Baviaanskloof WHS Interpretive Centre. The majority of the impacts were identified as moderate and high, and will be reduced to a low significance if the mitigation measures as proposed in this report are adhered to.

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

	PRE-MITIGATION			POST-MITIGATION		
	LOW	MODERATE	HIGH	LOW	MODERATE	HIGH
Existing impacts	0	2	0	2	0	0
Planning and Design	1	3	6	10	0	0
Construction	0	11	8	19	0	0
Operational	0	5, 1+	3	8	1+	0
No-Go	1	1+	0	1	1+	0
TOTAL	2	21, 2+	17	40	2+	0

9.3.1 Ecological Statement and Opinion of the Specialist

The ecological impacts of all aspects for the development of the Baviaanskloof WHS Interpretive Centre were assessed and considered to be ecologically acceptable, provided that mitigation measures outlined in this report are implemented. 55% of the impacts are rated as MODERATE NEGATIVE pre-mitigation (Table 9.1), and 40% as HIGH NEGATIVE, 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 overall impacts from MODERATE and HIGH to 95% LOW NEGATIVE and 6% MODERATE POSITIVE.

All regions demarcated as HIGH sensitivity in Section 6 of this report must be avoided as far as possible; specifically alterations to the river, wetlands and endangered Albany Alluvial vegetation must be avoided. The application of the appropriate mitigation measures provided in Section 8 for these sensitive areas and high negative impacts is of critical importance for the integrity of the environment to be sustained throughout the development and operations of the Baviaanskloof WHS Interpretive Centre. Specific mitigations are required for any plant SCC and/or communities identified onsite.

Minor location deviations from the proposed works are deemed acceptable provided that they are approved by the appointed ECO and the recommended mitigation measures contained in this report are implemented for such deviations.

It is the opinion of the Ecological Specialist that the proposed development is **NOT considered to be Ecologically Fatally Flawed**.

The **No-Go option** refers to the proposed Baviaanskloof WHS Interpretive Centre not being developed. This option will therefore have a moderately positive impact on the natural fauna and flora of the affected area, but will have a low negative impact on the tourism in the region.

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11. Appendix 1 – List of Animal species

The following lists of animal species (birds and reptiles) may occur within the proposed Baviaanskloof WHS Interpretive Centre development site.

Birds (Source: <http://sabap2.adu.org.za/> 09/05/2018):

Common name	Species name	Threat status (IUCN)	PNCO	SA Red Data List
Sparrowhawk, Rufous-chested	<i>Accipiter rufiventris</i>		Protected	
Korhaan, Southern Black	<i>Afrotis afra</i>	Vulnerable	Protected	
Goose, Egyptian	<i>Alopochen aegyptiacus</i>		Protected	
Duck, African Black	<i>Anas sparsa</i>		Protected	
Duck, Yellow-billed	<i>Anas undulata</i>		Protected	
Greenbul, Sombre	<i>Andropadus importunus</i>		Protected	
Sunbird, Orange-breasted	<i>Anthobaphes violacea</i>		Protected	
Penduline-tit, Cape	<i>Anthoscopus minutus</i>		Protected	
Crane, Blue	<i>Anthopoides paradiseus</i>	Vulnerable	Protected	Endangered
Pipit, African	<i>Anthus cinnamomeus</i>		Protected	
Pipit, Long-billed	<i>Anthus similis</i>		Protected	
Apalis, Bar-throated	<i>Apalis thoracica</i>		Protected	
Swift, Little	<i>Apus affinis</i>		Protected	
Swift, African Black	<i>Apus barbatus</i>		Protected	
Swift, White-rumped	<i>Apus caffer</i>		Protected	
Eagle, Booted	<i>Aquila pennatus</i>		Protected	
Eagle, Verreaux's	<i>Aquila verreauxii</i>		Protected	
Heron, Grey	<i>Ardea cinerea</i>		Protected	
Heron, Black-headed	<i>Ardea melanocephala</i>		Protected	
Batis, Cape	<i>Batis capensis</i>		Protected	
Ibis, Hageda	<i>Bostrychia hagedash</i>		Protected	
Eagle-owl, Spotted	<i>Bubo africanus</i>		Protected	
Thick-knee, Spotted	<i>Burhinus capensis</i>		Protected	
Buzzard, Jackal	<i>Buteo rufofuscus</i>		Protected	
Buzzard, Steppe	<i>Buteo vulpinus</i>		Protected	
Lark, Red-capped	<i>Calandrella cinerea</i>		Protected	
Nightjar, Fiery-necked	<i>Caprimulgus pectoralis</i>		Protected	
Coucal, Burchell's	<i>Centropus burchellii</i>		Protected	
Chat, Familiar	<i>Cercomela familiaris</i>		Protected	
Chat, Sickie-winged	<i>Cercomela sinuata</i>		Protected	
Scrub-robin, Karoo	<i>Cercotrichas coryphoeus</i>		Protected	
Rock-jumper, Cape	<i>Chaetops frenatus</i>	Near Threatened	Protected	
Sunbird, Amethyst	<i>Chalcomitra amethystina</i>		Protected	

Plover, Three-banded	<i>Charadrius tricollaris</i>		Protected	
Cuckoo, Diderick	<i>Chrysococcyx caprius</i>		Protected	
Sunbird, Greater Double-collared	<i>Cinnyris afer</i>		Protected	
Sunbird, Southern Double-collared	<i>Cinnyris chalybeus</i>		Protected	
Neddicky, Neddicky	<i>Cisticola fulvicapilla</i>		Protected	
Cisticola, Grey-backed	<i>Cisticola subruficapilla</i>		Protected	
Cisticola, Levaillant's	<i>Cisticola tinniens</i>		Protected	
Waxbill, Swee	<i>Coccygia melanotis</i>		Protected	
Mousebird, White-backed	<i>Colius colius</i>		Protected	
Mousebird, Speckled	<i>Colius striatus</i>		Protected	
Olive-pigeon, African	<i>Columba arquatrix</i>		Protected	
Pigeon, Speckled	<i>Columba guinea</i>		Protected	
Dove, Rock	<i>Columba livia</i>		Protected	
Raven, White-necked	<i>Corvus albicollis</i>		Protected	
Crow, Pied	<i>Corvus albus</i>		Protected	
Crow, Cape	<i>Corvus capensis</i>		Protected	
Robin-chat, Cape	<i>Cossypha caffra</i>		Protected	
Canary, White-throated	<i>Crithagra albogularis</i>		Protected	
Canary, Yellow	<i>Crithagra flaviventris</i>		Protected	
Seedeater, Streaky-headed	<i>Crithagra gularis</i>		Protected	
Seedeater, Protea	<i>Crithagra leucopterus</i>		Protected	
Canary, Brimstone	<i>Crithagra sulphuratus</i>		Protected	
Siskin, Cape	<i>Crithagra totta</i>		Protected	
Warbler, Victorin's	<i>Cryptillas victorini</i>		Protected	
Cuckoo, Red-chested	<i>Cuculus solitarius</i>		Protected	
House-martin, Common	<i>Delichon urbicum</i>		Protected	
Woodpecker, Cardinal	<i>Dendropicos fuscescens</i>		Protected	
Woodpecker, Olive	<i>Dendropicos griseocephalus</i>		Protected	
Drongo, Fork-tailed	<i>Dicrurus adsimilis</i>		Protected	
Puffback, Black-backed	<i>Dryoscopus cubla</i>		Protected	
Bunting, Cape	<i>Emberiza capensis</i>		Protected	
Bunting, Lark-like	<i>Emberiza impetuani</i>		Protected	
Bunting, Cinnamon-breasted	<i>Emberiza tahapisi</i>		Protected	
Waxbill, Common	<i>Estrilda astrild</i>		Protected	
Bishop, Yellow	<i>Euplectes capensis</i>			
Kestrel, Rock	<i>Falco rupicolus</i>		Protected	
Coot, Red-knobbed	<i>Fulica cristata</i>		Protected	
Lark, Large-billed	<i>Galerida magnirostris</i>		Protected	
Woodpecker, Ground	<i>Geocolaptes olivaceus</i>	Near Threatened	Protected	
Kingfisher, Brown-hooded	<i>Halcyon albiventris</i>		Protected	
Fish-eagle, African	<i>Haliaeetus vocifer</i>		Protected	

Swallow, Greater Striped	<i>Hirundo cucullata</i>		Protected	
Martin, Rock	<i>Hirundo fuligula</i>		Protected	
Swallow, Barn	<i>Hirundo rustica</i>		Protected	
Honeyguide, Lesser	<i>Indicator minor</i>		Protected	
Starling, Cape Glossy	<i>Lamprotornis nitens</i>		Protected	
Boubou, Southern	<i>Laniarius ferrugineus</i>		Protected	
Fiscal, Common (Southern)	<i>Lanius collaris</i>		Protected	
Warbler, Rufous-eared	<i>Malcorus pectoralis</i>		Protected	
Goshawk, Southern Pale Chanting	<i>Melierax canorus</i>		Protected	
Lark, Cape Clapper	<i>Mirafrapa apiata</i>		Protected	
Lark, Eastern Clapper	<i>Mirafrapa fasciolata</i>		Protected	
Rock-thrush, Cape	<i>Monticola rupestris</i>		Protected	
Wagtail, Cape	<i>Motacilla capensis</i>		Protected	
Flycatcher, African Dusky	<i>Muscicapa adusta</i>		Protected	
Sunbird, Malachite	<i>Nectarinia famosa</i>		Protected	
Bustard, Ludwig's	<i>Neotis ludwigii</i>	Endangered	Protected	Vulnerable
Guineafowl, Helmeted	<i>Numida meleagris</i>		Protected	
Dove, Namaqua	<i>Oena capensis</i>		Protected	
Wheatear, Mountain	<i>Oenanthe monticola</i>		Protected	
Starling, Red-winged	<i>Onychognathus morio</i>			
Starling, Pale-winged	<i>Onychognathus naboroupp</i>		Protected	
Oriole, Black-headed	<i>Oriolus larvatus</i>		Protected	
Tit-babbler, Layard's	<i>Parisoma layardi</i>		Protected	
Tit-babbler, Chestnut-vented	<i>Parisoma subcaeruleum</i>		Protected	
Sparrow, Southern Grey-headed	<i>Passer diffusus</i>		Protected	
Sparrow, House	<i>Passer domesticus</i>		Protected	
Sparrow, Cape	<i>Passer melanurus</i>			
Cormorant, Reed	<i>Phalacrocorax africanus</i>		Protected	
Cormorant, White-breasted	<i>Phalacrocorax carbo</i>		Protected	
Wood-hoopoe, Green	<i>Phoeniculus purpureus</i>		Protected	
Brownbul, Terrestrial	<i>Phyllastrephus terrestris</i>		Protected	
Goose, Spur-winged	<i>Plectropterus gambensis</i>		Protected	
Weaver, Cape	<i>Ploceus capensis</i>			
Masked-weaver, Southern	<i>Ploceus velatus</i>		Protected	
Tinkerbird, Red-fronted	<i>Pogoniulus pusillus</i>		Protected	
Harrier-Hawk, African	<i>Polyboroides typus</i>		Protected	
Prinia, Karoo	<i>Prinia maculosa</i>		Protected	
Sugarbird, Cape	<i>Promerops cafer</i>		Protected	
Saw-wing, Black (Southern race)	<i>Psaldoprocne holomelaena</i>		Protected	
Bulbul, Cape	<i>Pycnonotus capensis</i>			
Martin, Brown-throated	<i>Riparia paludicola</i>		Protected	

Stonechat, African	<i>Saxicola torquatus</i>		Protected	
Francolin, Grey-winged	<i>Scleroptila africanus</i>		Protected	
Hamerkop, Hamerkop	<i>Scopus umbretta</i>		Protected	
Canary, Black-headed	<i>Serinus alario</i>		Protected	
Canary, Cape	<i>Serinus canicollis</i>		Protected	
Flycatcher, Fiscal	<i>Sigelus silens</i>		Protected	
Grassbird, Cape	<i>Sphenoeacus afer</i>		Protected	
Starling, Pied	<i>Spreo bicolor</i>		Protected	
Flycatcher, Fairy	<i>Stenostira scita</i>		Protected	
Turtle-dove, Cape	<i>Streptopelia capicola</i>		Protected	
Dove, Red-eyed	<i>Streptopelia semitorquata</i>		Protected	
Dove, Laughing	<i>Streptopelia senegalensis</i>		Protected	
Ostrich, Common	<i>Struthio camelus</i>		Protected	
Starling, Common	<i>Sturnus vulgaris</i>			
Crombec, Long-billed	<i>Sylvietta rufescens</i>		Protected	
Swift, Alpine	<i>Tachymarptis melba</i>		Protected	
Shelduck, South African	<i>Tadorna cana</i>		Protected	
Turaco, Knysna	<i>Tauraco corythaix</i>		Protected	
Tchagra, Southern	<i>Tchagra tchagra</i>		Protected	
Bush-shrike, Olive	<i>Telophorus olivaceus</i>		Protected	
Bokmakierie, Bokmakierie	<i>Telophorus zeylonus</i>		Protected	
Paradise-flycatcher, African	<i>Terpsiphone viridis</i>		Protected	
Barbet, Acacia Pied	<i>Tricholaema leucomelas</i>		Protected	
Thrush, Olive	<i>Turdus olivaceus</i>		Protected	
Thrush, Karoo	<i>Turdus smithi</i>		Protected	
Hoopoe, African	<i>Upupa africana</i>		Protected	
Mousebird, Red-faced	<i>Urocolius indicus</i>		Protected	
Lapwing, Crowned	<i>Vanellus coronatus</i>		Protected	
Whydah, Pin-tailed	<i>Vidua macroura</i>		Protected	
White-eye, Cape	<i>Zosterops virens</i>		Protected	

Reptiles (Source: IUCN Red Data List):

Species name	Common name	Red Data List Status
Tortoises		
<i>Chersina angulata</i>	Angulate Tortoise	Least Concern
<i>Chersobius boulengeri</i>	Karoo Dwarf Tortoise	Near Threatened
<i>Homopus areolatus</i>	Parrot-beaked Dwarf Tortoise	Least Concern
<i>Homopus femoralis</i>	Greater Padloper	Least Concern
<i>Psammobates tentorius</i>	Tent Tortoise	Least Concern
Snakes		
<i>Afrotyphlops bibronii</i>	Bibron's Blind Snake	Least Concern
<i>Amblyodipsas concolor</i>	KwaZulu-Natal Purple-glossed Snake	Least Concern
<i>Amplorhinus multimaculatus</i>	Many-spotted Snake	Least Concern
<i>Bitis albanica</i>	Albany Adder	Critically Endangered

Species name	Common name	Red Data List Status
<i>Bitis atropos</i>	Berg Adder	Least Concern
<i>Bitis inornata</i>	Plain Mountain Adder	Endangered
<i>Bitis rubida</i>	Red Adder	Least Concern
<i>Dasypeltis inornata</i>	Southern Brown Egg-eater	Least Concern
<i>Duberria lutrix</i>	Common Slug Eater	Least Concern
<i>Hemachatus haemachatus</i>	Rinkhals	Least Concern
<i>Homoroselaps lacteus</i>	Spotted Harlequin Snake	Least Concern
<i>Lamprophis aurora</i>	Aurora Snake	Least Concern
<i>Lamprophis fiskii</i>	Fisk's Snake	Least Concern
<i>Lamprophis fuscus</i>	Yellow-bellied Snake	Least Concern
<i>Lamprophis guttatus</i>	Spotted Rock Snake	Least Concern
<i>Leptotyphlops nigricans</i>	Black Thread Snake	Least Concern
<i>Leptotyphlops sylvicolus</i>	Forest Thread Snake	Data Deficient
<i>Lycodonomorphus inornatus</i>	Olive Ground Snake	Least Concern
<i>Lycodonomorphus laevisissimus</i>	Dusky-bellied Water Snake	Least Concern
<i>Macrelaps microlepidotus</i>	Natal Black Snake	Near Threatened
<i>Prosymna sundevallii</i>	Sundevall's Shovel-snout	Least Concern
<i>Psammophis crucifer</i>	Montane Grass Snake	Least Concern
Lizards		
<i>Agama atra</i>	Southern Rock Agama	Least Concern
<i>Bradypodion caffer</i>	Pondo Dwarf Chameleon	Endangered
<i>Bradypodion damaranum</i>	Knysna Dwarf Chameleon	Least Concern
<i>Bradypodion kentanicum</i>	Kentani Grass Chameleon	Vulnerable
<i>Bradypodion melanocephalum</i>	Durban Dwarf Chameleon	Vulnerable
<i>Bradypodion taeniabronchum</i>	Elandsberg Dwarf Chameleon	Endangered
<i>Bradypodion ventrale</i>	Eastern Cape Dwarf Chameleon	Least Concern
<i>Chamaesaura aenea</i>	Coppery Grass Lizard	Near Threatened
<i>Cordylus cordylus</i>	Cape Girdled Lizard	Least Concern
<i>Gerrhosaurus typicus</i>	Karoo Plated Lizard	Least Concern
<i>Hemicordylus capensis</i>	Graceful Crag Lizard	Least Concern
<i>Karusasaurus polyzonus</i>	Karoo Girdled Lizard	Least Concern
<i>Ninurta coeruleopunctatus</i>	Blue-spotted Girdled Lizard	Least Concern
<i>Nucras lalandii</i>	Delalande's Sandveld Lizard	Least Concern
<i>Nucras livida</i>	Karoo Sandveld Lizard	Least Concern
<i>Nucras taeniolata</i>	Albany Sandveld Lizard	Near Threatened
<i>Pedioplanis burchelli</i>	Burchell's Sand Lizard	Least Concern
<i>Pedioplanis laticeps</i>	Karoo Sand Lizard	Least Concern
<i>Pseudocordylus melanotus</i>	Highveld Crag Lizard	Least Concern
<i>Pseudocordylus microlepidotus</i>	Cape Crag Lizard	Least Concern
<i>Tetradactylus fitzsimonsi</i>	FitzSimons' Long-tailed Seps	Vulnerable
<i>Tetradactylus seps</i>	Short-legged Seps	Least Concern
<i>Tetradactylus tetradactylus</i>	Cape Long-tailed Seps	Least Concern
<i>Tropidosaura cottrelli</i>	Cottrell's Mountain Lizard	Near Threatened
<i>Tropidosaura essexi</i>	Essex's Mountain Lizard	Least Concern
<i>Tropidosaura gularis</i>	Cape Mountain Lizard)	Least Concern

Species name	Common name	Red Data List Status
<i>Tropidosaura montana</i>	Common Mountain Lizard	Least Concern
Geckos		
<i>Afroedura amatolica</i>	Amatola Flat Gecko	Least Concern
<i>Afroedura halli</i>	Hall's Flat Gecko	Least Concern
<i>Afroedura karroica</i>	Karoo Flat Gecko	Least Concern
<i>Afroedura tembulica</i>	Tembu Flat Gecko	Least Concern
<i>Afrogecko porphyreus</i>	Marbled Leaf-toed Gecko	Least Concern
<i>Cryptactites peringueyi</i>	Salt Marsh Gecko	Critically Endangered
<i>Goggia essexi</i>	Essex's Pygmy Gecko	Least Concern
<i>Goggia hewitti</i>	Hewitt's Pygmy Gecko	Least Concern
<i>Pachydactylus geitje</i>	Ocellated Gecko	Least Concern
<i>Pachydactylus maculatus</i>	Spotted Gecko	Least Concern
<i>Pachydactylus mariquensis</i>	Common Banded Gecko	Least Concern
<i>Pachydactylus oculatus</i>	Golden Spotted Gecko	Least Concern
Skinks		
<i>Acontias gracilicauda</i>	Thin-tailed Legless Skink	Least Concern
<i>Acontias lineicauda</i>	Algoa Legless Skink	Least Concern
<i>Acontias meleagris</i>	Cape Legless Skink	Least Concern
<i>Acontias orientalis</i>	Eastern Cape Legless Skink	Least Concern
<i>Acontias poecilus</i>	Variable Legless Skink	Endangered
<i>Scelotes anguineus</i>	Algoa Dwarf Burrowing Skink	Least Concern
<i>Scelotes caffer</i>	Cape Dwarf Burrowing Skink	Least Concern
<i>Trachylepis homalocephala</i>	Red-sided Skink	Least Concern

Amphibians (Source: SAFAP, 2016 and IUCN Red Data List):

Species	Common name	Threat status
<i>Afrana fuscigula</i>	Cape river frog	Least Concern
<i>Afrixalus knysnae</i>	Knysna Leaf-folding Frog	Endangered
<i>Afrixalus spinifrons</i>	Natal Leaf-folding Frog	Least Concern
<i>Amietia delalandii</i>	Delalande's River Frog	Least Concern
<i>Amietia fuscigula</i>	Dark-throated River Frog	Least Concern
<i>Amietia poyntoni</i>	Poynton's River Frog	Least Concern
<i>Amietia vertebralis</i>	Maluti River Frog	Least Concern
<i>Anhydrophryne rattrayi</i>	Hogsback Chirping Frog	Vulnerable
<i>Breviceps bagginsi</i>	Bilbo's Rain Frog	Near threatened
<i>Bufo gariensis</i>	Karoo Toad	Least Concern
<i>Bufo rangeri</i>	Raucous Toad	Least Concern
<i>Cacosternum boettgeri</i>	Boettger's dainty frog	Least Concern
<i>Cacosternum thorini</i>	Hogsback Caco	Endangered
<i>Heleophryne hewitti</i>	Hewitt's Ghost Frog	Endangered
<i>Hyperolius horstockii</i>	Horstock's Reed Frog	Least Concern
<i>Hyperolius poweri</i>	Power's Reed Frog	Least Concern
<i>Natalobatrachus bonebergi</i>	Kloof Frog	Endangered
<i>Strongylopus grayii</i>	Gray's Stream Frog	Least Concern

Species	Common name	Threat status
<i>Tomopterna delalandii</i>	Delalande's sand frog	Least Concern
<i>Vandijkophrynus amatolicus</i>	Amathole Toad	Critically Endangered
<i>Xenopus laevis</i>	African clawed frog	Least Concern

Mammals (Source: Apps, 2000)

Mammal	Common name	Threat Status
Golden Moles, Shrews and Hedgehogs		
<i>Amblysomus hottentotus</i>	Hottentot Golden Mole	Least Concern
<i>Mysorex varius</i>	Forest Shrew	
<i>Macroscelides proboscideus</i>	Round-eared Elephant Shrew	Least Concern
Bats		
<i>Taphozous mauritanus</i>	Mauritian Tomb Bat	Least Concern
<i>Nycteris thebaica</i>	Egyptian Slit-faced Bat	Least Concern
<i>Rhinolophus clivosus</i>	Geoffroy's Horseshoe bat	Least Concern
<i>Rhinolophus capensis</i>	Cape Horseshoe Bat	Least Concern
<i>Eptesicus capensis</i>	Cape Serotine Bat	
<i>Tadarida aegyptiaca</i>	Egyptian Free-tailed Bat	Least Concern
<i>Miniopterus schreibersii</i>	Schreibers' Long-Fingered Bat	Near Threatened
<i>Myotis tricolor</i>	Temminck's Hairy Bat	Least Concern
Baboons & Monkeys		
<i>Papio cynocephalus ursinus</i>	Chacma Baboon	
Hares and Rabbits		
<i>Lepus saxatilis</i>	Scrub Hare	Least Concern
<i>Pronolagus rupestris</i>	Smith's Red Rock Rabbit	Least Concern
Rodents		
<i>Cryptomys hottentotus</i>	Common (African) Mole-rat	Least Concern
<i>Hystrix africaeustralis</i>	Cape Porcupine	Least Concern
<i>Gerbillurus paeba</i>	Hairy-footed Gerbils	Least Concern
<i>Desmodillus auricularis</i>	Short-tailed Gerbil	Least Concern
<i>Micaelamys namaquensis</i>	Namaqua Rock Mouse	Least Concern
<i>Rhabdomys pumilo</i>	Four-striped Grass Mouse	
<i>Mus minutoides</i>	Pygmy Mouse	Least Concern
<i>Mus domesticus</i>	House Mouse	Least Concern
<i>Saccostomus campestris</i>	Pouched Mouse	Least Concern
<i>Dendromus melanotis</i>	Grey Climbing Mouse	Least Concern
<i>Graphiurus ocellatus</i>	Spectacled Dormouse	Least Concern
<i>Graphiurus murinus</i>	Woodland Dormouse	
<i>Rattus rattus</i>	House Rat	Least Concern
<i>Otomys irroratus</i>	Vlei Rat	Least Concern
Foxes, Jackals & Wild Dog		
<i>Vulpes chama</i>	Cape Fox	Least Concern
<i>Otocyon megalotis</i>	Bat-eared Fox	Least Concern
<i>Canis mesomelas</i>	Black-backed Jackal	Least Concern
<i>Mellivora capensis</i>	Honey Badger	Least Concern

Mammal	Common name	Threat Status
<i>Ictonyx striatus</i>	Striped Polecat	Least Concern
Civets, Genets and Mongooses		
<i>Galerella pulverulenta</i>	Small Grey Mongoose	
<i>Suricata suricatta</i>	Meerkat	Least Concern
<i>Genetta genetta</i>	Small-spotted Genet	Least Concern
<i>Genetta tigrina</i>	South African Large-spotted Genet	Least Concern
<i>Cynictis penicillata</i>	Yellow Mongoose	Least Concern
Antbear		
<i>Orycteropus afer</i>	Aardvark	Least Concern
Dassies		
<i>Procavia capensis</i>	Rock Dassie	Least Concern
Medium- Large Mammals		
<i>Tragelaphus scriptus</i>	Bushbuck	Least Concern
<i>Raphicerus campestris</i>	Steenbok	Least Concern
<i>Raphicerus melanotis</i>	Cape Greysbok	Least Concern
<i>Slyvicapra grimmia</i>	Common Duiker	
<i>Alcelaphus buselaphus</i>	Red Hartebeest	Least Concern
<i>Antidorcas marsupialis</i>	Springbok	Least Concern
<i>Oreotragus oreotragus</i>	Klipspringer	Least Concern
<i>Pelea capreolus</i>	Grey Rhebok	Near Threatened
<i>Taurotragus oryx</i>	Eland	
Carnivores		
<i>Proteles cristatus</i>	Aardwolf	Least Concern
<i>Panthera pardus</i>	Leopard	Vulnerable
<i>Caracal caracal</i>	Caracal	Least Concern
<i>Felis silvestris lybica</i>	African Wild Cat	
<i>Felis nigripes</i>	Small spotted cat	Vulnerable

12. Appendix 2 – List of Plant species

Mucina & Rutherford (2012) list the taxa that are common to Great Fish Thicket and may be affected by the development.

List of potential species occurring within the proposed development site (Mucine & Rutherford, 2012)

Category	Species that fall within the study site
Small trees	<ul style="list-style-type: none"> - <i>Acacia caffra</i>; - <i>Acacia natalitia</i>; - <i>Protea nitida</i>; - <i>Rhus longispina</i>; - <i>Salix mucronata</i> subsp. <i>Mucronata</i>; and - <i>Schotia afra</i> var. <i>arfa</i>
Succulent trees	<ul style="list-style-type: none"> - <i>Aloe africana</i>;and - <i>Aloe ferox</i>
Tall shrubs	<ul style="list-style-type: none"> - <i>Aspalathus kougagensis</i>; - <i>Aspalathus nivea</i>; - <i>Azima tetracantha</i>; - <i>Cadaba aphylla</i>; - <i>Dodonaea viscosa</i> var. <i>angustifolia</i>; and - <i>Freylinia crispa</i>
Low shrubs	<ul style="list-style-type: none"> - <i>Agathosma mucronulata</i>; - <i>Agathosma pilifera</i>; - <i>Agathosma puberula</i>; - <i>Agathosma spinosa</i>; - <i>Amphiglossa callunoides</i>; - <i>Argyrolobium parviflorum</i>; - <i>Argyrolobium trifoliatum</i>; - <i>Aspalathus fourcadei</i>; - <i>Asparagus striatus</i>; - <i>Asparagus suaveolens</i>; - <i>Carissa haematocarpa</i>; - <i>Cliffortia drepanoides</i>;

	<ul style="list-style-type: none"> - <i>Clutia alaternoides</i>; - <i>Clutia polifolia</i>; - <i>Cullumia crisioides</i>; - <i>Diosma prama</i>; - <i>Diosma rourkei</i>; - <i>Disparago ericoides</i>; - <i>Erica demissa</i>; - <i>Erica pectinifolia</i>; - <i>Erica sparsa erica thamnoides</i>; - <i>Eriocephalus tenuipes</i>; - <i>Eryops euryopoides</i>; - <i>Euchaetis vallis-simiae</i>; - <i>Helichrysum teretifolium</i>; - <i>Leucadendron salignum</i>; - <i>Leucospermum cuneiforme</i>; - <i>Lycium cinereum</i>; - <i>Otholobium carneum</i>; - <i>Passerina obtusifolia</i>; - <i>Passerina pendula</i>; - <i>Pentzia incana</i>; - <i>Phyllica axillaris</i>; - <i>Phyllica lachneaeoides</i>; - <i>Polygala myrtifolia</i>; - <i>Protea foliosa</i>; - <i>Pteronia incana</i>; - <i>Stoebe plumoas</i>; - <i>Sutera cinerea</i>; - <i>Tephrosia capensis</i>; and - <i>Thesium junceum</i>
Succulent shrubs	<ul style="list-style-type: none"> - <i>Annesorhiza thunbergii</i>; - <i>Aster laevigatus</i>; - <i>Centella didymocarpa</i>; - <i>Cotyledon campanulata</i>; - <i>Glottiphyllum longum</i>; - <i>Lampranthus lavisii</i>; - <i>Malephora lutea</i>; - <i>Malephora uitenhagensis</i>; and - <i>Peucedanum dregeanum</i>
Herbs	<ul style="list-style-type: none"> - <i>Alepidea capensis</i>; - <i>Centella virgate</i>; - <i>Gazania krebsiana</i> subsp. <i>Krebsiana</i>; - <i>Helichrysum felinum</i>; - <i>Knowltonia capensis</i>; and - <i>Rorippa fluviatilis</i> var. <i>fluviatilis</i>
Geopyhtic Herbs	<ul style="list-style-type: none"> - <i>Bobartia orientalis</i> subsp. <i>Orientalis</i>; - <i>Cyrtanthus fammosus</i>; - <i>C. labiatus</i>; - <i>C. montanus</i>; - <i>Geissorhiza roseoalba</i>; - <i>Gladiolus uitenhagensis</i>; and - <i>Watsonia meriana</i>
Succulent Herbs	<ul style="list-style-type: none"> - <i>Gasteria glauca</i> ; - <i>Haworthia sordida</i> var. <i>sordida</i>; and

	<ul style="list-style-type: none"> - <i>Orbea pulchella</i>
Graminoids	<ul style="list-style-type: none"> - <i>Anthochortus crinalis</i>; - <i>Brachiaria serrata</i>; - <i>Cannomois scirpoides</i>; - <i>Cannomois virgate</i>; - <i>Cymbopogon marginatus</i>; - <i>Cynodon dactylon</i>; - <i>Digitaria eriantha</i>; - <i>Digitaria eriantha</i>; - <i>Diheteropogon filifolius</i>; - <i>Eragrostis curvula</i>; - <i>Eragrostis obtuse</i>; - <i>Heteropogon contortus</i>; - <i>Hypodiscus albo-aristatus</i>; - <i>Hypodiscus striatus</i>; - <i>Hypodiscus synchroolepsis</i>; - <i>Ischyrolepsis capensis</i>; - <i>Ischyrolepsis gaudichaudiana</i>; - <i>Mastersiella purpurea</i>; - <i>Melenis repens subsp. Repens</i>; - <i>Merxmuellera papposa</i>; - <i>Merxmuellera stricta</i>; - <i>Pentameris distichophylla</i>; - <i>Pentaschistis eriostoma</i>; - <i>Pentaschistis pallida</i>; - <i>Restio triticeus</i>; - <i>Restio vallis-simius</i>; - <i>Rhodocoma fruticosa</i>; - <i>Sporobolus nitens</i>; - <i>Tetraria capillacea</i>, - <i>T. cuspidate</i>; - <i>T. fourcadei</i>; - <i>T. involucrate</i>; - <i>Thamnocortus fruticosa</i>; - <i>Themeda triandra</i>; - <i>Trachypogon spicatus</i>; and - <i>Tristachya leucothrix</i>
Mega-graminoids	<ul style="list-style-type: none"> - <i>Cyperus papyrus</i>; and - <i>Phragmites australis</i>

The following list of plant species may occur within the proposed development site of the Baviaanskloof WHS Interpretive Centre (Source: <http://posa.sanbi.org/searchspp.php>; 16/05/2018):

Family	Species Name	Ecology	PNCO Status	SA RED DATA LIST
Achariaceae	<i>Ceratosicyos laevis</i>	Indigenous		Least Concern
Aizoaceae	<i>Drosanthemum lique</i>	Indigenous; Endemic		Least Concern
	<i>Ruschia vaginata</i>	Indigenous; Endemic		Least Concern
	<i>Galenia procumbens</i>	Indigenous; Endemic		Least Concern
	<i>Hereroa gracilis</i>	Indigenous; Endemic		Least Concern
	<i>Mesembryanthemum aitonis</i>	Indigenous; Endemic		Least Concern
	<i>Ruschia orientalis</i>	Indigenous; Endemic		Least Concern
	<i>Malephora thunbergii</i>	Indigenous; Endemic		Least Concern
	<i>Ruschia altigena</i>	Indigenous; Endemic		Rare
	<i>Delosperma peersii</i>	Indigenous; Endemic		Least Concern
	<i>Carpobrotus deliciosus</i>	Indigenous; Endemic		Least Concern
	<i>Delosperma esterhuyseniae</i>	Indigenous; Endemic		Least Concern
	<i>Ruschia spinosa</i>	Indigenous		Least Concern
	<i>Ruschia fourcadei</i>	Indigenous; Endemic		Least Concern
	<i>Delosperma sp.</i>			
	<i>Lampranthus affinis</i>	Indigenous; Endemic		Data Deficient - Taxonomically Problematic
	<i>Drosanthemum sp.</i>			
	<i>Machairophyllum bijliae</i>	Indigenous; Endemic		Least Concern
	<i>Ruschia parvifolia</i>	Indigenous; Endemic		Data Deficient - Taxonomically Problematic
	<i>Rhombophyllum dolabriforme</i>	Indigenous; Endemic		Least Concern
	<i>Ruschia sp.</i>			
Amaryllidaceae	<i>Cyrtanthus smithiae</i>	Indigenous; Endemic	Protected (Schedule 4)	Least Concern
Anacardiaceae	<i>Searsia pallens</i>	Indigenous		Least Concern
	<i>Searsia longispina</i>	Indigenous; Endemic		Least Concern

Apiaceae	<i>Heteromorpha arborescens</i>	Indigenous		Least Concern
	<i>Ezosciadium capense</i>	Indigenous; Endemic		Least Concern
Apocynaceae	<i>Secamone alpini</i>	Indigenous		Least Concern
	<i>Stapelia paniculata</i>	Indigenous		Least Concern
	<i>Carissa bispinosa</i>	Indigenous		Least Concern
	<i>Pachypodium succulentum</i>	Indigenous; Endemic	Protected (Schedule 4)	Least Concern
	<i>Gomphocarpus fruticosus subsp. fruticosus</i>	Indigenous		Least Concern
Araliaceae	<i>Cussonia paniculata subsp. paniculata</i>	Indigenous; Endemic		Least Concern
Asparagaceae	<i>Asparagus capensis var. capensis</i>	Indigenous		Least Concern
	<i>Asparagus multiflorus</i>	Indigenous; Endemic		Least Concern
	<i>Asparagus suaveolens</i>	Indigenous		Least Concern
Asphodelaceae	<i>Bulbine praemorsa</i>	Indigenous		Least Concern
	<i>Bulbine rupicola</i>	Indigenous; Endemic		Least Concern
	<i>Aloiampelos tenuior</i>	Indigenous; Endemic		Least Concern
	<i>Gasteria rawlinsonii</i>	Indigenous; Endemic		Rare
	<i>Bulbine cremnophila</i>	Indigenous; Endemic		Rare
	<i>Aloe perfoliata</i>	Indigenous; Endemic		Least Concern
	<i>Haworthia monticola var. monticola</i>	Indigenous; Endemic		Not Evaluated
	<i>Bulbine abyssinica</i>	Indigenous		Least Concern
Asteraceae	<i>Amellus strigosus subsp. strigosus</i>	Indigenous; Endemic		Least Concern
	<i>Felicia sp.</i>			
	<i>Hertia alata</i>	Indigenous; Endemic		Least Concern
	<i>Hertia sp.</i>			
	<i>Eriocephalus capitellatus</i>	Indigenous; Endemic		Least Concern
	<i>Amphiglossa callunoides</i>	Indigenous; Endemic		Vulnerable
	<i>Ifloga glomerata</i>	Indigenous		Least Concern
	<i>Senecio coronatus</i>	Indigenous		Least Concern
	<i>Felicia filifolia</i>	Indigenous		Least Concern

	<i>Athanasia virgata</i>	Indigenous; Endemic		Least Concern
	<i>Senecio sp.</i>			
	<i>Senecio angustifolius</i>	Indigenous		Least Concern
	<i>Oedera squarrosa</i>	Indigenous; Endemic		Least Concern
	<i>Athanasia pinnata</i>	Indigenous; Endemic		Least Concern
	<i>Senecio othonniflorus</i>	Indigenous		Least Concern
	<i>Athanasia vestita</i>	Indigenous; Endemic		Least Concern
	<i>Chrysocoma ciliata</i>	Indigenous		Least Concern
	<i>Dicerotheramnus rhinocerotis</i>	Indigenous; Endemic		Least Concern
	<i>Dolichotheix ericoides</i>	Indigenous; Endemic		Least Concern
	<i>Felicia douglasii</i>	Indigenous; Endemic		
	<i>Helichrysum rosum var. rosum</i>	Indigenous; Endemic		Least Concern
	<i>Metalasia pallida</i>	Indigenous; Endemic		Least Concern
	<i>Relhania decussata</i>	Indigenous; Endemic		Rare
Boraginaceae	<i>Lithospermum sp.</i>			
Brassicaceae	<i>Heliophila suavissima</i>	Indigenous		Least Concern
	<i>Hirschfeldia incana</i>	Not indigenous Naturalised		
Campanulaceae	<i>Wahlenbergia paniculata</i>	Indigenous		Least Concern
Capparaceae	<i>Boscia oleoides</i>	Indigenous; Endemic		Least Concern
Caryophyllaceae	<i>Pollichia campestris</i>	Indigenous		Least Concern
Celastraceae	<i>Putterlickia pyracantha</i>	Indigenous; Endemic		Least Concern
	<i>Pterocelastrus tricuspidatus</i>	Indigenous; Endemic		Least Concern
Crassulaceae	<i>Crassula multiflora subsp. multiflora</i>	Indigenous; Endemic		Least Concern
	<i>Crassula tecta</i>	Indigenous; Endemic		Least Concern
	<i>Cotyledon orbiculata var. orbiculata</i>	Indigenous		Least Concern
	<i>Crassula rupestris subsp. rupestris</i>	Indigenous; Endemic		Least Concern

	<i>Adromischus inamoenus</i>	Indigenous; Endemic		Least Concern
	<i>Crassula nudicaulis</i> var. <i>nudicaulis</i>	Indigenous; Endemic		Least Concern
	<i>Crassula biplanata</i>	Indigenous; Endemic		Least Concern
	<i>Crassula tetragona</i> subsp. <i>robusta</i>	Indigenous; Endemic		Least Concern
	<i>Cotyledon velutina</i>	Indigenous; Endemic		Least Concern
	<i>Crassula cremnophila</i>	Indigenous; Endemic		Rare
	<i>Crassula tetragona</i> subsp. <i>lignescens</i>	Indigenous; Endemic		Least Concern
	<i>Cotyledon woodii</i>	Indigenous; Endemic		Least Concern
	<i>Crassula subaphylla</i> var. <i>subaphylla</i>	Indigenous; Endemic		Least Concern
	<i>Crassula pellucida</i> subsp. <i>marginalis</i>	Indigenous; Endemic		Least Concern
	<i>Crassula rogersii</i>	Indigenous; Endemic		Least Concern
	<i>Adromischus sphenophyllus</i>	Indigenous; Endemic		Least Concern
	<i>Crassula capitella</i> subsp. <i>thyrsoiflora</i>	Indigenous; Endemic		Least Concern
	<i>Crassula perfoliata</i> var. <i>perfoliata</i>	Indigenous; Endemic	Protected (Schedule 4)	Least Concern
Cupressaceae	<i>Widdringtonia schwarzii</i>	Indigenous; Endemic		Near Threatened
	<i>Tetradlea sp.</i>			
Cyperaceae	<i>Cyperus uitenhagensis</i>	Indigenous		Least Concern
	<i>Ficinia ramosissima</i>	Indigenous; Endemic		Least Concern
	<i>Diospyros austro-africana</i> var. <i>austro-africana</i>	Indigenous; Endemic		Least Concern
Ebenaceae	<i>Diospyros scabrida</i> var. <i>cordata</i>	Indigenous; Endemic		Least Concern
	<i>Euclea undulata</i>	Indigenous		Least Concern
	<i>Diospyros lycioides</i> subsp. <i>lycioides</i>	Indigenous		Least Concern
	<i>Euclea daphnoides</i>	Indigenous		Least Concern
	<i>Erica pectinifolia</i> var. <i>pectinifolia</i>	Indigenous; Endemic		Least Concern
Ericaceae	<i>Erica melanthera</i>	Indigenous; Endemic		Least Concern
	<i>Erica calycina</i> var. <i>calycina</i>	Indigenous; Endemic	Protected (Schedule 4)	Least Concern
	<i>Erica zwartbergensis</i>	Indigenous; Endemic		Rare
	<i>Erica thamnoides</i>	Indigenous; Endemic		Least Concern

	<i>Erica pseudocalycina</i>	Indigenous; Endemic		Least Concern
	<i>Erica sparsa</i>	Indigenous		Least Concern
	<i>Erica newdigateae</i>	Indigenous; Endemic		Least Concern
	<i>Erica glomiflora</i> var. <i>glomiflora</i>	Indigenous; Endemic		Least Concern
	<i>Erica glandulosa</i> subsp. <i>glandulosa</i>	Indigenous; Endemic		Least Concern
	<i>Erica ingeana</i>	Indigenous; Endemic		Rare
	<i>Erica nemorosa</i>	Indigenous; Endemic		Least Concern
	<i>Erica strigilifolia</i> var. <i>rosea</i>	Indigenous; Endemic		Data Deficient - Taxonomically Problematic
	<i>Erica viridiflora</i> subsp. <i>primulina</i>	Indigenous; Endemic		Least Concern
	<i>Erica uberiflora</i>	Indigenous; Endemic		Least Concern
	<i>Erica umbelliflora</i>	Indigenous; Endemic		Least Concern
	Euphorbiaceae	<i>Clutia laxa</i>	Indigenous	
<i>Clutia affinis</i>		Indigenous		Least Concern
Fabaceae	<i>Aspalathus</i> sp.			
	<i>Aspalathus cinerascens</i>	Indigenous, Endemic		Least Concern
	<i>Aspalathus cliffortiifolia</i>	Indigenous, Endemic		Critically Endangered
	<i>Schotia latifolia</i>	Indigenous		Least Concern
	<i>Argyrolobium incanum</i>	Indigenous; Endemic		Least Concern
	<i>Amphithalea parvifolia</i>	Indigenous; Endemic		Least Concern
	<i>Aspalathus lactea</i> subsp. <i>lactea</i>	Indigenous; Endemic		Least Concern
	<i>Melolobium adenodes</i>	Indigenous		Least Concern
	<i>Pelargonium auritum</i> var. <i>carneum</i>	Indigenous		Least Concern
	<i>Pelargonium laevigatum</i> subsp. <i>laevigatum</i>	Indigenous; Endemic		Least Concern
	<i>Pelargonium scabrum</i>	Indigenous; Endemic		Least Concern
Geraniaceae	<i>Pelargonium sidoides</i>	Indigenous		Least Concern
	<i>Pelargonium tetragonum</i>	Indigenous; Endemic		Least Concern

	<i>Pelargonium quercifolium</i>	Indigenous; Endemic		Least Concern
	<i>Gunnera perpensa</i>	Indigenous		Least Concern
	<i>Drimia sclerophylla</i>	Indigenous; Endemic		Least Concern
	<i>Albuca macowanii</i>	Indigenous		Least Concern
Gunneraceae	<i>Ornithogalum anguinum</i>	Indigenous; Endemic		Least Concern
Hyacinthaceae	<i>Moraea monticola</i>	Indigenous; Endemic		Rare
	<i>Freesia verrucosa</i>	Indigenous; Endemic		Least Concern
	<i>Gladiolus mutabilis</i>	Indigenous; Endemic		Least Concern
Iridaceae	<i>Freesia corymbosa</i>	Indigenous; Endemic	Protected (Schedule 4)	Least Concern
	<i>Gladiolus stellatus</i>	Indigenous; Endemic		Least Concern
	<i>Aristea nana</i>	Indigenous; Endemic		Rare
	<i>Gladiolus floribundus</i>	Indigenous; Endemic		Least Concern
	<i>Teucrium africanum</i>	Indigenous; Endemic		Least Concern
	<i>Stachys aethiopica</i>	Indigenous		Least Concern
	<i>Salvia stenophylla</i>	Indigenous; Endemic		
Lamiaceae	<i>Salvia coccinea</i>	Not Indigenous; Naturalised		
	<i>Limeum aethiopicum var. aethiopicum</i>	Indigenous; Endemic		Not Evaluated
	<i>Hermannia coccocarpa</i>	Indigenous		Least Concern
	<i>Sparrmannia africana</i>	Indigenous; Endemic		Least Concern
Limeaceae	<i>Nymania capensis</i>	Indigenous		Least Concern
Malvaceae	<i>Olea europaea subsp. cuspidata</i>	Indigenous		Least Concern
	<i>Satyrium longicolle</i>	Indigenous; Endemic		Least Concern
Meliaceae	<i>Oxalis algoensis</i>	Indigenous; Endemic		Least Concern
Oleaceae	<i>Oxalis stellate var. stellata</i>	Indigenous; Endemic		
Orchidaceae	<i>Argemone ochroleuca subsp. ochroleuca</i>	not Indigenous; Naturalised; Invasive		
Oxalidaceae	<i>Harpochloa falx</i>	Indigenous		Least Concern
	<i>Themeda triandra</i>	Indigenous		Least Concern

Papaveraceae	<i>Brachiaria serrata</i>	Indigenous		Least Concern
Poaceae	<i>Pentameris sp.</i>			
	<i>Pentameris capensis</i>	Indigenous, Endemic		Least Concern
	<i>Eragrostis obtusa</i>	Indigenous		Least Concern
	<i>Stipa dregeana var. elongata</i>	Indigenous		Least Concern
	<i>Eragrostis capensis</i>	Indigenous		Least Concern
	<i>Hordeum capense</i>	Indigenous		Least Concern
	<i>Agrostis bergiana var. bergiana</i>	Indigenous		Least Concern
	<i>Eragrostis lehmanniana var. lehmanniana</i>	Indigenous		Least Concern
	<i>Polygala virgate var. virgate</i>	Indigenous		
	<i>Muraltia macrocarpa</i>	Indigenous		Least Concern
	<i>Polygala myrtifolia var. myrtifolia</i>	Indigenous		Least Concern
Polygalaceae	<i>Muraltia juniperifolia</i>	Indigenous; Endemic		Least Concern
	<i>Leucadendron album</i>	Indigenous; Endemic		Least Concern
	<i>Leucadendron eucalyptifolium</i>	Indigenous; Endemic		Least Concern
	<i>Paranomus esterhuyseniae</i>	Indigenous; Endemic		Near Threatened
Proteaceae	<i>Leucadendron rourkei</i>	Indigenous; Endemic	Protected (Schedule 4)	Least Concern
	<i>Protea rupicola</i>	Indigenous; Endemic		Endangered
	<i>Leucadendron sorocephalodes</i>	Indigenous; Endemic		Near Threatened
	<i>Leucadendron nobile</i>	Indigenous; Endemic		Least Concern
	<i>Protea subvestita</i>	Indigenous		Least Concern
	<i>Leucospermum royenifolium</i>	Indigenous; Endemic		Least Concern
	<i>Protea intonsa</i>	Indigenous; Endemic		Least Concern
	<i>Phylica tortuosa</i>	Indigenous; Endemic		Least Concern
	<i>Phylica floccosa</i>	Indigenous; Endemic		Rare
	<i>Cliffortia drepanoides</i>	Indigenous; Endemic		Least Concern
Rhamnaceae	<i>Cliffortia cervicornu</i>	Indigenous; Endemic		Least Concern
	<i>Eriospermum ciliatum</i>	Indigenous; Endemic		Least Concern

Rosaceae	<i>Agathosma affinis</i>	Indigenous; Endemic		Least Concern
	<i>Agathosma blaerioides</i>	Indigenous; Endemic		Least Concern
Ruscaceae	<i>Euchaetis vallis-simiae</i>	Indigenous; Endemic		Least Concern
Rutaceae	<i>Agathosma ovalifolia</i>	Indigenous; Endemic		Rare
	<i>Agathosma mucronulata</i>	Indigenous; Endemic		Least Concern
	<i>Empleurum uncapulare</i>	Indigenous; Endemic		Least Concern
	<i>Salix mucronata</i>	Indigenous		Least Concern
	<i>Thesium foliosum</i>	Indigenous; Endemic		Least Concern
	<i>Viscum hoolei</i>	Indigenous		Least Concern
Salicaceae	<i>Dodonaea viscosa var. angustifolia</i>	Indigenous		Least Concern
Santalaceae	<i>Selago sp.</i>			
	<i>Selago gracilis</i>	Indigenous; Endemic		Least Concern
Sapindaceae	<i>Buddleja salviifolia</i>	Indigenous		Least Concern
Scrophulariaceae	<i>Nemesia linearis</i>	Indigenous		Least Concern
	<i>Diascia patens</i>	Indigenous; Endemic		Least Concern
	<i>Zaluzianskya mirabilis</i>	Indigenous; Endemic		Rare
	<i>Selago myriophylla</i>	Indigenous; Endemic		Least Concern
	<i>Lasiosiphon anthylloides</i>	Indigenous; Endemic		Least Concern
	<i>Lachnaea eriocephala</i>	Indigenous; Endemic		Least Concern
	<i>Lachnaea glomerata</i>	Indigenous; Endemic		Least Concern

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