KWAZULU-NATAL PROVINCE
ECONOMIC DEVELOPMENT, TOURISM AND ENVIRONMENTAL AFFAIRS
REPUBLIC OF SOUTH AFRICA

	(For official use only)
Provincial Reference Number:	
NEAS Reference Number:	KZN / EIA /
Waste Management Licence Number (if applicable):	
Date Received by Department:	

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

Submitted in terms of section 24(2) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) or for a waste management licence in terms of section 20(b) of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008).

KINDLY NOTE:

1. This form is current as of **May 2021**. It is the responsibility of the Applicant / Environmental Assessment Practitioner ("EAP") to ascertain whether subsequent versions of the form have been released by the Department.

PROJECT TITLE

Proposed Establishment of a Cemetery within the Dannhauser Local Municipality, KwaZulu-Natal

DISTRICT MUNICIPALITY

Amajuba District Municipality

1. SPECIALIST INFORMATION

Specialist name:	Alletson Ecologicals		
Contact person:	Dacre James Alletson		
Postal address:	PO Box 1129, Hilton		
Postal code:	3245	Cell:	083 7871584
Telephone:	033 3434972	Fax:	086 6108896
E-mail:	jakealletson7@gmail.com		

Professional affiliation(s) (if any)	SACNASP (Ecological Science. Reg. No. 125697) IAIASA Membership No. 035)

Project Consultant / EAP:	SiVEST SA (Pty) Ltd		
Contact person:	Luvanya Naidoo		
Postal address:	4 Pencarrow Crescent, Umhlanga Rocks		
Postal code:	4320	Cell:	
Telephone:	031 581 1500	Fax:	
E-mail:	luvanyan@sivest.co.za		

2. DECLARATION BY THE SPECIALIST

I, **D.J. Alletson** , declare that --

General declaration:

- I act as the independent specialist in this application;
- do not have and will not have any vested interest (either business, financial, personal or other) in the undertaking of the proposed activity, other than remuneration for work performed in terms of the Environmental Impact Assessment Regulations, 2014;
- 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 form are true and correct; and
- I am aware that a person is guilty of an offence in terms of Regulation 48 (1) of the EIA Regulations, 2014, if that person provides incorrect or misleading information. A person who is convicted of an offence in terms of sub-regulation 48(1) (a)-(e) is liable to the penalties as contemplated in section 49B(1) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Signature of the specialist:

Alletson Ecologicals

Name of company:

12 November 2021

Date:

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PROJECT TITLE

Proposed Establishment of a Cemetery within the Dannhauser Local Municipality, KwaZulu-Natal

DISTRICT MUNICIPALITY

Amajuba District Municipality

1. SPECIALIST INFORMATION

Specialist name:	Mark Summers		
Contact person:	Mark Summers		
Postal address:	PO Box 707, Msunduzi		
Postal code:	3231	Cell:	082 336 4268
Telephone:		Fax:	
E-mail:	marks@sivest.co.za		

Professional affiliation(s) (if any)	SACNASP: 120309

Project Consultant / EAP:	SiVEST SA (Pty) Ltd		
Contact person:	Luvanya Naidoo		
Postal address:	4 Pencarrow Crescent, Umhlanga Rocks		
Postal code:	4320	Cell:	
Telephone:	031 581 1500	Fax:	
E-mail:	luvanyan@sivest.co.za		

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I, **Mark Summers** are that --

General declaration:

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Signature of the specialist:

SiVEST SA (Pty) Ltd

Name of company:

15/11/2021

Date:

_____

DANNHAUSER LOCAL MUNICIPALITY

TERRESTRIAL ECOLOGICAL ASSESSMENT FOR THE PROPOSED DANNHAUSER CEMETERY, WITHIN DANNHAUSER LOCAL MUNICIPALITY, KWAZULU-NATAL PROVINCE

Issue Date: May 2021
Revision No.: 1
Project No.: 16482

DETAILS OF SPECIALIST CONSULTANT

Date:	June 2021
Document Title:	Terrestrial Ecological Assessment for the Proposed Construction and Upgrade of the Greater Mnqumeni Water Supply Scheme in Harry Gwala District Municipality, Kwazulu-Natal Province
Author:	**Mark Summers (Cand.Sci.Nat; Reg No. 120309)** B.Sc. Honours Zoological Science M.Sc. Ecological Science
Signature:	
Version Number:	#1
Checked by:	**Jake Alletson Pr.Sci.Nat (Reg No. 125697)** B.Sc. Honours Zoological Science
Signature:	
Approved:	**Michelle Nevette** (reviewed by John Richardson)
Signature:	
For:	GIBB (Pty) Ltd

TERRESTRIAL ECOLOGICAL ASSESSMENT FOR THE PROPOSED DANNHAUSER CEMETERY, WITHIN DANNHAUSER LOCAL MUNICIPALITY, KWAZULU-NATAL PROVINCE
DRAFT REPORT

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ECONOMIC DEVELOPMENT, TOURISM AND ENVIRONMENTAL AFFAIRS
REPUBLIC OF SOUTH AFRICA

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Signature of the specialist:

SiVEST SA (Pty) Ltd

Name of company:

15/11/2021

Date:

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Signature of the specialist:

Alletson Ecologicals

Name of company:

12 November 2021

Date:

TERMS OF REFERENCE

The study was to adhere to the following:

- Adherance to the content requirements of Terrestrial Plant and Animal Species Protocols, as per Government Notice No. 1150 of 30 October 2020; and, Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity as per Government Notice No. 320 of 20 March 2020.
- Adherence to all appropriate best practice guidelines, relevant legislation and authority requirements.
- Provide a thorough overview of all applicable legislation, guidelines.
- Cumulative impact identification and assessment
- Identification of sensitive areas to be avoided.
- Assessment of the significance of the proposed development during the Pre-construction, Construction, Operation, Decommissioning Phases and Cumulative impacts. Potential impacts should be rated in terms of the direct, indirect and cumulative.
    - Direct impacts: are impacts that are caused directly by the activity and generally occur at the same time and at the place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally obvious and quantifiable.
    - Indirect impacts: of an activity are indirect or induced changes that may occur as a result of the activity. These types of impacts include all the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place as a result of the activity.
    - Cumulative impacts: are impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities. Cumulative impacts can occur from the collective impacts of individual minor actions over a period of time and can include both direct and indirect impacts.
- Comparative assessment of alternatives (if alternatives provided).
- Implications of specialist findings for the proposed development (e.g. permits, licenses etc.).
- Specify if any further assessment will be required.
- Include an Impact Statement, concluding whether project can be authorised or not.
- Recommend mitigation measures in order to minimise the impact of the proposed development.

Specific issues to be addressed are as follows:

- Review existing ecological information available;
- Determine the general ecological state of the proposed site, determine the occurrence of any red data and/or vulnerable species, or any sensitive species requiring special attention;
- Provide a detailed description of the baseline environment; and
- Provide mitigation measures to prevent and/or mitigate any environmental impacts that may occur due to the proposed project.

ASSUMPTIONS AND LIMITATIONS

The following assumptions, limitations, uncertainties are listed regarding the ecological assessment of the site:

- The study was undertaken in late summer and within the approved vegetation sampling periods, and good rains have meant that vegetation could still be identified by leaves and remnant flowers;
- No bulbs were identified, and it is likely due to late season sampling, however bulbs are likely to occur on both sites as the author has identified *Boophone disticha* and *Hypoxis hemerocallidea* in the general Dannhauser area;
- Rare and threatened plant species are, by their nature, usually very difficult to locate and can be easily missed.
- It must be assumed and accepted that many plant species, in particular geophytes and annuals, will be absent from the visible species assemblage;
- The assessment area was limited to the preferred Try Again Farm and the Durnacol Site;

- This study has only focused on the identification of faunal species that may occur on site, or were noted on site during fieldwork. Night time surveying was not undertaken due to budgetary constraints.
- Faunal assessments dealing with reptiles and birds are best undertaken during the warmer months of the year, as these species brumate or migrate during the winter months. Sampling occurred in late summer (March 2021). Some migratory bird species have left the area; therefore, a decreased species assemblage was expected. However, faunal activity is still dependent on weather conditions experienced on the day of sampling.
- Paucity in the data due to late season sampling is expected.

ACRONYMS

ADU	Animal Demographic Unit
AIS	Alien and Invasive species
BA	Basic Assessment
CBA	Critical Biodiversity Area
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DFFE	Department of Environment, Forestry and Fisheries
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EDTEA	Economic Development, Tourism and Environmental Affairs
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GIS	Geographical Information System
NEM:BA	National Environmental Management: Biodiversity Act
NEMA	National Environmental Management Act
PA	Protected Area
POC	Potential of Occurence
SABAP2	South African Bird Atlas Project 2
SANBI	South African National Biodiversity Institute
SCC	Species of conservation concern
ToPS	Threatened and Protected Species
ToR	Terms of Reference
TSCP	Terrestrial Systematic Conservation Plan

GLOSSARY

Definitions	
Alternative	Alternatives can refer to any of the following but are not limited to: alternative sites for development, alternative projects for a particular site, alternative site layouts, alternative designs, alternative processes and alternative materials.
Biodiversity	The diversity of genes, species and ecosystems, and the ecological and evolutionary processes that maintain that diversity.
Biodiversity offset	Conservation measures designed to remedy the residual negative impacts of development on biodiversity and ecological infrastructure, once the first three levels of the mitigation hierarchy have been explicitly considered (i.e. to avoid, minimize and rehabilitate / restore impacts). Offsets are the last resort form of mitigation, only to be implemented if nothing else can mitigate the impact.
Biodiversity priority areas	Features in the landscape that are important for conserving a representative sample of ecosystems and species, for maintaining ecological processes, or for the provision of ecosystem services. These are identified using a systematic spatial biodiversity planning process and include the following categories: Protected Areas, Critically Endangered and Endangered ecosystems, Critical

Definitions	
	Biodiversity Areas, Ecological Support Areas, and Focus Areas for land-based Protected Area expansion.
Category 1a Listed Invasive Species	Species listed by notice in terms of section 70(1)(a) of the act, as a species that must be combatted or eradicated. These species are contained in Notice 3 of the AIS list, which is referred to as the National List of Invasive Species. Landowners are obliged to take immediate steps to control Category 1a species.
Category 1b Listed Invasive Species	Species listed by notice in terms of section 70(1)(a) of the act, as species that must be controlled or 'contained'. These species are contained in Notice 3 of the AIS list, which is referred to as the National List of Invasive Species. However, where an Invasive Species Management Programme has been developed for a Category 1b species, then landowners are obliged to "control" the species in accordance with the requirements of that programme.
Category 2 Listed Invasive Species	Species which require a permit to carry out a restricted activity e.g. cultivation within an area specified in the Notice or an area specified in the permit, as the case may be. Category 2 includes plant species that have economic, recreational, aesthetic or other valued properties, notwithstanding their invasiveness. It is important to note that a Category 2 species that falls outside the demarcated area specified in the permit, becomes a Category 1b invasive species. Permit-holders must take all the necessary steps to prevent the escape and spread of the species.
Category 3 Listed Invasive Species	A species listed by notice in terms of section 70(1)(a) of the act, as species which are subject to exemptions in terms of section 71(3) and prohibitions in terms of section 71A of the act, as specified in the notice. Category 3 species are less-transforming invasive species which are regulated by activity. The principal focus with these species is to ensure that they are not introduced, sold or transported. However, Category 3 plant species are automatically Category 1b species within riparian and wetland areas.
CBA Maps	A map of Critical Biodiversity Areas and Ecological Support Areas based on a systematic biodiversity plan.
Connectivity	The spatial continuity of a habitat or land cover type across a landscape.
Corridor	A relatively narrow strip of a particular type that differs from the areas adjacent on both sides.
Critical Biodiversity Areas	Areas required to meet biodiversity targets of representivity and persistence for ecosystems, species and ecological processes, determined by a systematic conservation plan. They may be terrestrial or aquatic, and are mostly in a good ecological state. These areas need to be maintained in a natural or near-natural state, and a loss or degradation must be avoided. If these areas were to be modified, biodiversity targets could not be met.
Cumulative impact	Past, current and reasonably foreseeable future impacts of an activity, considered together with the impact of the proposed activity, that in itself may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities.
Ecological condition	An assessment of the extent to which the composition, structure and function of an area or biodiversity feature has been modified from a reference condition of natural.
Ecological infrastructure	Naturally functioning ecosystems that generate or deliver valuable ecosystem services, e.g. mountain catchment areas, wetlands, and soils.
Ecological process	The functions and processes that operate to maintain and generate biodiversity.
Ecological Support Areas	An area that must be maintained in at least fair ecological condition in order to support the ecological functioning of a CBA or protected area, or to generate or deliver ecosystem services, or to meet remaining biodiversity targets for ecosystem types or species when it is not possible or necessary to meet them in natural or near natural areas. It is one of five broad categories on a CBA map, and a subset of biodiversity priority areas.
Ecosystem resilience	The ability of an ecosystem to maintain its functions (biological, chemical, and physical) in the face of disturbance or to recover from external pressures.

Definitions	
Ecosystem threshold	The tipping point where ongoing disturbance or change results in an irreversible change in its composition, structure and functioning. Surpassing ecosystem thresholds diminishes the quality and quantity of ecosystem services provided, rapidly reduces the ability of the ecosystem to sustain life, and results in less resilient ecosystems.
Ecosystem services	The benefits that people obtain from ecosystems, including provisioning services (such as food and water), regulating services (such as flood control), cultural services (such as recreational benefits), and supporting services (such as nutrient cycling, carbon storage) that maintain the conditions for life on Earth.
Edge	The portion of an ecosystem or cover type near its perimeter, and within which environmental conditions may differ from interior locations in the ecosystem.
Endemic	Restricted or exclusive to a particular geographic area and occurring nowhere else. Endemism refers to the occurrence of endemic species.
Exempted Alien Species	An alien species that is not regulated in terms of this statutory framework - as defined in Notice 2 of the AIS List.
Forbs	Herbaceous plants with soft leaves and non-woody stems.
Fragmentation	The breaking up of a habitat or cover type into smaller, disconnected parcels, often associated with, but not equivalent to, habitat loss.
Geophyte	Perennial plants having underground organs, such as bulbs, corms or tubers.
Hotspot	An area characterised by high levels of biodiversity and endemism, and that faces significant threats to that biodiversity.
Habitat	The area of an environment occupied by a species or group of species, due to the particular set of environmental conditions that prevail there.
Habitat loss	Conversion of natural habitat in an ecosystem to a land use or land cover class that results in irreversible change to the composition, structure and functional characteristics of the ecosystem concerned.
Prohibited Alien Species	An alien species listed by notice by the Minister, in respect of which a permit may not be issued as contemplated in section 67(1) of the act. These species are contained in Notice 4 of the Alien Invasive Species List, which is referred to as the List of Prohibited Alien Species.
Mitigate	The implementation of practical measures to reduce adverse impacts or enhance beneficial impacts of an action.
"No-Go" option	The “no-go” development alternative option assumes the site remains in its current state, i.e. there is no construction of a WEF and associated infrastructure in the proposed project area.
Patch	A surface area that differs from its surroundings in nature or appearance.
Red List	A publication that provides information on the conservation and threat status of species, based on scientific conservation assessments.
Rehabilitation	Less than full restoration of an ecosystem to its pre-disturbance condition.
Restoration	To return a site to an approximation of its condition before alteration.
Riparian	The land adjacent to a river or stream that is, at least periodically, influenced by flooding.
Runoff	Non-channelized surface water flow.
Succulent	Plants that have some parts that are more than normally thickened and fleshy, usually to retain water in arid climates or soil conditions.
Species of special / conservation concern	Species that have particular ecological, economic or cultural significance, including but not limited to threatened species.
Systematic biodiversity conservation planning	Scientific methodology for determining areas of biodiversity importance involving: mapping biodiversity features (such as ecosystems, species, spatial components of ecological processes); mapping a range of information related to these biodiversity features and their condition (such as patterns of land and resource use, existing protected areas); setting quantitative targets for biodiversity features, analysing the information using GIS; and developing maps that show spatial biodiversity priorities. Systematic biodiversity planning is often called ‘systematic conservation planning’ in the scientific literature.

Definitions	
Threatened ecosystems	An ecosystem that has been classified as Critically Endangered, Endangered or Vulnerable, based on analysis of ecosystem threat status. A threatened ecosystem has lost, or is losing, vital aspects of its structure, composition or function. The Biodiversity Act makes provision for the Minister or Environmental Affairs, or a provincial MEC of Environmental Affairs, to publish a list of threatened ecosystems.
Threatened species	A species that has been classified as Critically Endangered, Endangered or Vulnerable, based on a conservation assessment using a standard set of criteria developed by the IUCN for determining the likelihood of a species becoming extinct. A threatened species faces a high risk of extinction in the near future.

COMPLIANCE WITH SPECIES SPECIFIC PROTOCOLS AS PER GN. 1150 OF 30 OCTOBER 2020 AND GOVERNMENT NOTICE NO. 320 OF 20 MARCH 2020

Requirements of Animal and Plant Species Protocol – GN. 1150 30 October 2020 for Very High or High Site Sensitivity	**Section of specialist report addressing requirement**
This report must include as a minimum the following information:	
Contact details and relevant experience as well as the SACNASP registration number of the specialist preparing the assessment including a curriculum vitae;	**Appendix 7**
A signed statement of independence by the specialist;	**See Specialist Declaration on page vii and viii**
A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	**See Section 3: Site Visit and Sampling Methodology**
A description of the methodology used to undertake the site sensitivity verification, impact assessment and site inspection, including equipment and modelling used where relevant;	**Section 3, Section 4 and Section 5**
A description of the mean density of observations/number of sample sites per unit area and the site inspection observations;	**Section 6 and Section 7**
A description of the assumptions made and any uncertainties or gaps in knowledge or data;	**See Assumptions and Limitations**
Details of all SCC found or suspected to occur on site, ensuring sensitive species are appropriately reported;	**Section 6 and Section 7**
The online database name, hyperlink and record accession numbers for disseminated evidence of SCC found within the study area;	**Section 6**
The location of areas not suitable for development and to be avoided during construction where relevant;	**Section 8**
A discussion on the cumulative impacts;	**Section 8**
Impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	**Section 8**
A reasoned opinion, based on the findings of the specialist assessment, regarding the acceptability or not of the development and if the development should receive approval or not, related to the specific theme being considered, and any conditions to which the opinion is subjected if relevant; and	**Section 8.9 and Section 9**
A motivation must be provided if there were any development footprints identified as per paragraph above that were identified as having “low” or “medium” terrestrial animal species sensitivity and were not considered appropriate.	**Section 1**

COMPLIANCE WITH GOVERNMENT NOTICE NO. 320 OF 20 MARCH 2020

Requirements of Terrestrial Biodiversity Assessments as per Government Notice No. 320 of 20 March 2020	Section of specialist report addressing requirement
This report must include as a minimum the following information:	
contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae; a signed statement of independence by the specialist;	**Appendix 7**
a description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	**Appendix 8**
a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	**See Section 3: Site Visit and Sampling Methodology**
a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	**See Assumptions and Limitations**
a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	**Section 8.7 and 9**
additional environmental impacts expected from the proposed development;	**Section 8.7**
any direct, indirect and cumulative impacts of the proposed development;	**Section 8**
the degree to which impacts and risks can be mitigated;	**Section 8**
the degree to which the impacts and risks can be reversed;	**Section 8**
the degree to which the impacts and risks can cause loss of irreplaceable resources;	**Section 8**
proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	**Section 8**
a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	**N/A**
a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	**Section 8.9, Section 9 and Section 10**
any conditions to which this statement is subjected.	**Section 9 and Section 10**

1. INTRODUCTION

SiVEST SA (Pty) Ltd, has been appointed by Dannhauser Local Municipality to undertake a Terrestrial Biodiversity Assessment Report as part of a Basic Assessment report for a new cemetery site within Dannhauser Municipality. Two sites within the Dannhauser Local Municipality were identified as possible cemetery sites, one being to the east of Dannhauser Town called Try Again Farm, and the second site just outside of Durnacol Town.

The DFFE screening tool has identified the Try Again Farm to have a Very High Terrestrial Biodiversity. Please note, a site inspection showed site sensitivity to be medium, therefore a full Terrestrial Impact Assessment was undertaken as species of conservation concern were identified on site and an area of Try Again Farm was identified as CBA: Optimal. Additionally, as per section 4.6 of the Plant / Animal Species Protocols of Government Notice No. 1150 of 30 October 2020, "Where SCC are found on site or have been confirmed to be likely present, a Terrestrial Plant / Animal Species Specialist Assessment must be submitted in accordance with the requirements specified for "very high" and "high" sensitivity in this protocol."

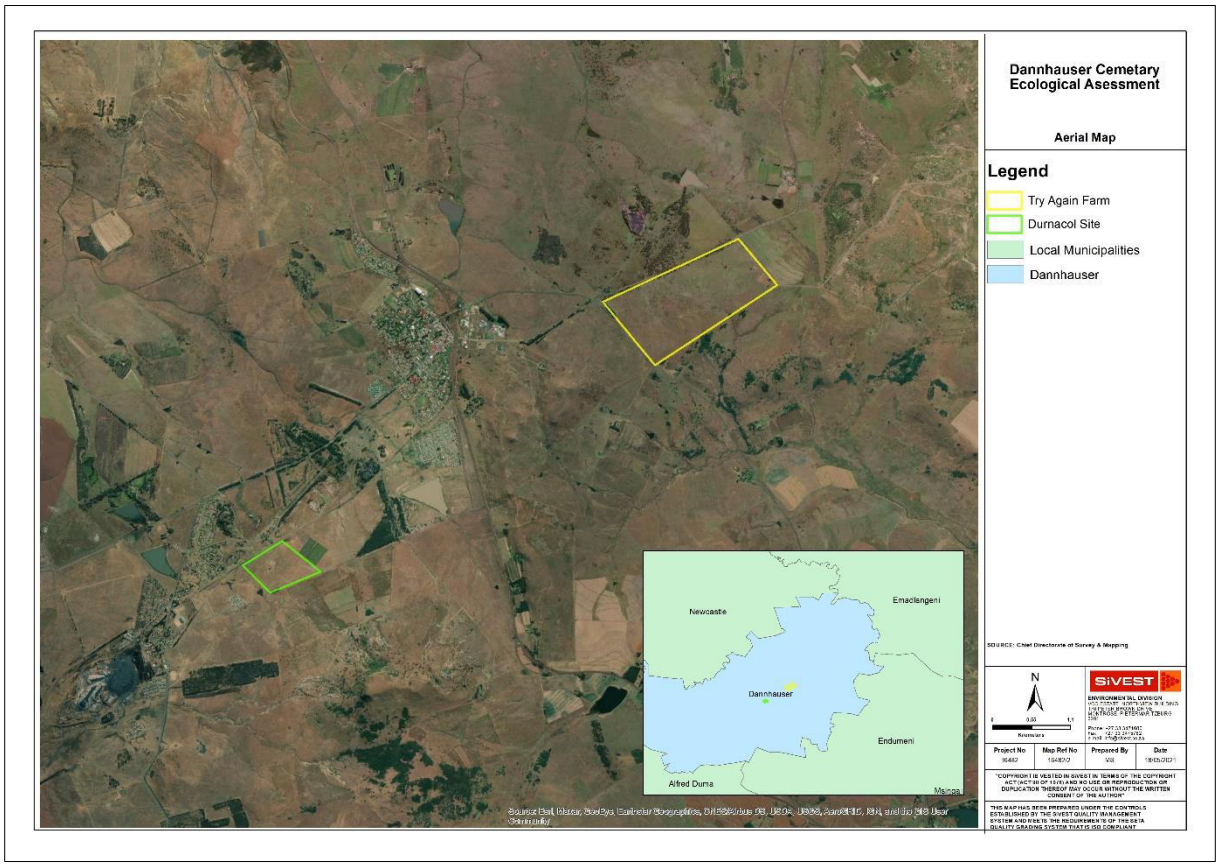

Figure 1: Site overview.

2. PROJECT BACKGROUND

The Dannhauser cemetery is currently nearing full capacity and the local Municipality have identified an urgent need for the establishment of a 10 – 15 hectare cemetery site to service local communities. Two site alternatives have been identified by the Municipality for further investigation to determine their suitability for the proposed land use, the preferred site is owned by the municipality and is commonly known as the "Try Again Farm". The alternative site is commonly known as "Durnacol Massgrave" site is owned by EXXARO Mining who have indicated to the Municipality that they can make the land available to the Municipality if deemed suitable for cemetery establishment.

Dannhauser town is the main node within the LM and is currently surrounded by the largest coal producing mines in KZN. The study area is located in a midway point along a main railway line that provides linkage between Durban and Johannesburg. It is located approximately 8 km off the N11.

In this regard, two cemetery alternatives have been presented to SiVEST, to assess for a Basic Assessment Report. As such, this Terrestrial Ecological Report has assessed various aspects of the terrestrial ecology and provided recommendations.

3. SITE VISIT AND SAMPLING METHODOLOGY

The site visit was undertaken on the 23rd March 2021 by Mark Summers. The weather conditions were warm (approximately 30°C) and calm. The study was undertaken in late summer and still falls within the preferred sampling period, however good rains have meant that vegetation could still be identified by leaves and remnant flowers.

3.1. Vegetation Sampling

A random vegetation sampling technique and "hotspot1" assessment technique was utilised, which focused the sampling effort on areas with natural vegetation or where the vegetation was dominated by indigenous species (i.e. not comprising a large proportion of alien invasive plant species). Individual plant species observed during the assessment were recorded to give an indication of species diversity and the overall species assemblage.

The sampling procedure proposed for this study is satisfactory for providing a general overview and rapid assessment of the plant diversity and assemblages that occur on site. This methodology allows sufficient information to be gathered to make the necessary inferences as to the ecological state of the receiving environment and to assess the possible impacts that may be imparted as a result of the proposed activities.

3.2. Faunal Sampling

The following methodology was used when sampling.

- Taxa specific lists were compiled with the use of databases such as the Animal Demographic Unit (ADU) Virtual Museum. These lists were compared with species seen on site visits.
- All site data was collated for the general area with a focus on the various alternatives presented, which gave an overall site assessment;
- Verification of fauna on site was done per taxa with a focus on movement, foraging, nesting and sites.
- Point count bird surveys, with a clear view of the surrounding vegetation, and walk through surveys were conducted in all of the habitat types around proposed development. Birds were identified visually or by their vocalisation.
- Active searches for reptiles and amphibians were conducted within habitats likely to harbour or be important for species.

The sampling procedure proposed for this study is satisfactory for providing a general overview and rapid assessment of the faunal diversity and assemblages that occur on site. This methodology allows sufficient information to be gathered to make the necessary inferences as to the ecological state of the receiving environment and to assess the possible impacts that may be imparted as a result of the proposed activities as well as the provision for rehabilitation recommendations and landscape management plans.

4. REGULATIONS GOVERNING THIS REPORT & LEGISLATION

[1] **Hotspot in this context refers to areas in the landscape, such as rocky outcrops and wetlands that supply refugia to plant species that would otherwise not exist in said landscape due to disturbance**.

The following legislation was consulted:

- National Environmental Management Act, Act No. 107 of 1998 (NEMA);
- National Forests Act (Act No. 84 of 1998);
- Terrestrial Plant and Animal Species Protols, Government Notice No. 1150 of 30 October 2020;
- Procedures for the Aassessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24 (5)(a) and (h) and 44 of the National Enviromental Management Act (Act No. 107 of 1998, as amended);
- Environment Conservation Act No. 73 of 1989, Amendment Notice No. R1183 of 1997;
- National Environmental Management: Biodiversity Act (Act No. 10 of 2004);
- Conservation of Agricultural Resources (Act No. 43 of 1983) as amended in 2001;
- International Union for Conservation of Nature (IUCN).

Permit / Licence requirements:

In terms of the National Forests Act, 1998 (Act No. 84 of 1998) and Government Notice 1339 of 6 August 1976 (promulgated under the Forest Act, 1984 (Act No. 122 of 1984) for protected tree species), the removal, relocation or pruning of any protected plants; or, 3 or more indigenous trees whose crowns are largely contiguous will require a Department of Agriculture, Fisheries and Forestry (DAFF) license.

Protected indigenous plants in general are controlled under the relevant provincial Ordinances or Acts dealing with nature conservation. In KZN the relevant statute is the 1974 Provincial Nature Conservation Ordinance. In terms of this Ordinance, a permit must be obtained from Ezemvelo KZN Wildlife to remove or destroy any plants listed in the Ordinance.

For a full list of legistation requirements, please contact the Specialist.

5. DESKTOP ASSESSMENT

One of the major advantages that technology has provided is the access to information. As a result of this and the ongoing pursuance of environmental knowledge, databases which can be interrogated to provide general information regarding the site have been developed.

This information in turn potentially predicts what may occur on the site and the site's value from a regional / provincial perspective in terms of conservation and biodiversity.

The caveat here is that the majority of these databases are created at a **landscape level**. In addition, the factors which are often utilised to determine many of the outputs are related to abiotic characteristics, such as rainfall, temperature, soil types, underlying geology, elevation and aspect.

The result, therefore, is the development of a database that provides a high level assessment of the area, which still requires **substantial ground-truthing** to illustrate the various components that comprise the landscape. The field survey may highlight areas of conservation significance and biodiversity richness as well as provide information regarding the *status quo;* and what consequences or concerns may be generated as a result of development.

A number of databases have been interrogated in the process of undertaking the Desktop Analysis. A summary of the methodology utilised for the generation of each of the databases has been tabulised below, with the description of the table available in **Appendix 8**.

Table 1: Databases Consulted in the Terrestrial Ecological Assessment

Database
Ezemvelo KZN Wildlife C-Plan & Sea Database
• Irreplaceability Analysis
• Critical Biodiversity Areas
• Ecological Support Areas
• Landscape Corridors

• Local Corridors
Bio Resource Units (BRU)
Environmental Potential Atlas
Mucina and Rutherford National Vegetation Types
KwaZulu – Natal Vegetation Types (KZN VT)
National Freshwater Ecosystem Priority Areas (NFEPA)
South African Bird Atlas Project 2
Animal Demographic Unit
• ReptileMAP
• FrogMAP
• MammalMAP
• LepiMAP

6. RESULTS OF THE DESKTOP ASSESSMENT

6.1. *Department of Forestry, Fisheries and Environment Screening Tool*

Try Again Farm:

Plant sensitivity was identified as medium by the Screening Tool, with four species of conservation concern being noted as potentially occurring on site. Animal sensitivity was noted as high on the screening tool, with no species of conservation concern identified on the site visit. These species are discussed in Section 7.2. Terrestrial biodiversity was noted to be Very High due to the presence of a CBA: Optimal area in the south west of Try Again Farm.

The following sensitivities were identified by the DFFE Online Screening Tool, and have been interrogated in the assessment below:

Table 2: Environmental sensitivity themes at Try Again Farm

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme	X			
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme			X	
Defence Theme				X
Paleontology Theme	X			
Plant Species Theme			X	
Terrestrial Biodiversity Theme	X			

Table 3: DFFE plant species potentially occurring on site.

Plant Feature	Red List Status
Sensitive species 1252	Vulnerable
Sensitive species 1003	Vulnerable
Sensitive species 998	Endangered
Polygala praticola	Vulnerable

Animal Feature	Red List Status
Sensitive species 9	Endangered
Geronticus calvus	Vulnerable
Neotis denhami	Vulnerable
Sagittarius serpentarius	Endangered
Clonia lalandei	Vulnerable
Ourebia ourebi ourebi	Endangered
Hydrictis maculicollis	Vulnerable

Durnacol Site:

Plant sensitivity was identified as medium by the Screening Tool, with four species of conservation concern being noted as potentially occurring on site. Animal sensitivity was noted as high on the screening tool, with no species of conservation concern identified on the site visit. These species are discussed in Section 7.2. Terrestrial biodiversity was noted to be Low.
The following sensitivities were identified by the DFFE Online Screening Tool, and have been interrogated in the assessment below:

Table 4: Environmental sensitivity themes at the Durnacol Site.

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme		X		
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Paleontology Theme		X		
Plant Species Theme			X	
Terrestrial Biodiversity Theme				X

Table 5: DFFE plant species potentially occurring on site.

Plant Feature	Red List Status
Sensitive species 1252	Vulnerable
Sensitive species 1003	Vulnerable
Sensitive species 998	Endangered
Polygala praticola	Vulnerable
Animal Feature	**Red List Status**
Sensitive species 9	Endangered
Geronticus calvus	Vulnerable
Neotis denhami	Vulnerable
Tyto capensis	Vulnerable

Sagittarius serpentarius	Endangered
Clonia lalandei	Vulnerable
Ourebia ourebi ourebi	Endangered
Hydrictis maculicollis	Vulnerable

6.2. *Desktop vegetation description*

6.2.1. C-Plan Biodiversity Features / Species within Project Area

The desktop analysis indicated that the site is classified as 0.05 (i.e. all biodiversity features recorded here are conserved to the target amount, and there is unlikely to be a biodiversity concern with the development of the site) and the Minset analysis mirrors the C-Plan data with the area being deemed as not requiring protection. The CBA maps indicate that Try Again Farm is classified as a Terrestrial Ecological Support Area, with the south western portion of the site classified as CBA: Optimal. The Durnacol site is classified as a Terrestrial Ecological Support Area (**Figure 2**).

In terms of the SEA and C-Plan data generated, through the physical characteristics that are present on site, a number of groups have been identified as potentially present on the site, and these groups are wholly significant in terms of conservation significance or parts thereof. The Tables below identify which groups are significant.

Table 6. SEA Data taken from Ezemvelo KZN Wildlife

YES	NO
Protected Landscapes	Protected Forests
Protected Grasslands	Important Vegetation Community
Wetlands	Frogs
Protected Ecosystems and Communities	Blue Swallow
Birds	Wattled Crane
Invertebrates	Mammals
Protected Species	Oribi
	Medicinal Plants
	Reptiles
	Plants

Table 7. TSCP Minset Data taken from Ezemvelo KZN Wildlife

Species name	Type
Glencoe Moist Grassland	Vegetation Type
Midland Floodplain Grassland	Temperate Alluvial Vegetation
Cochlitoma simplex	Mollusc

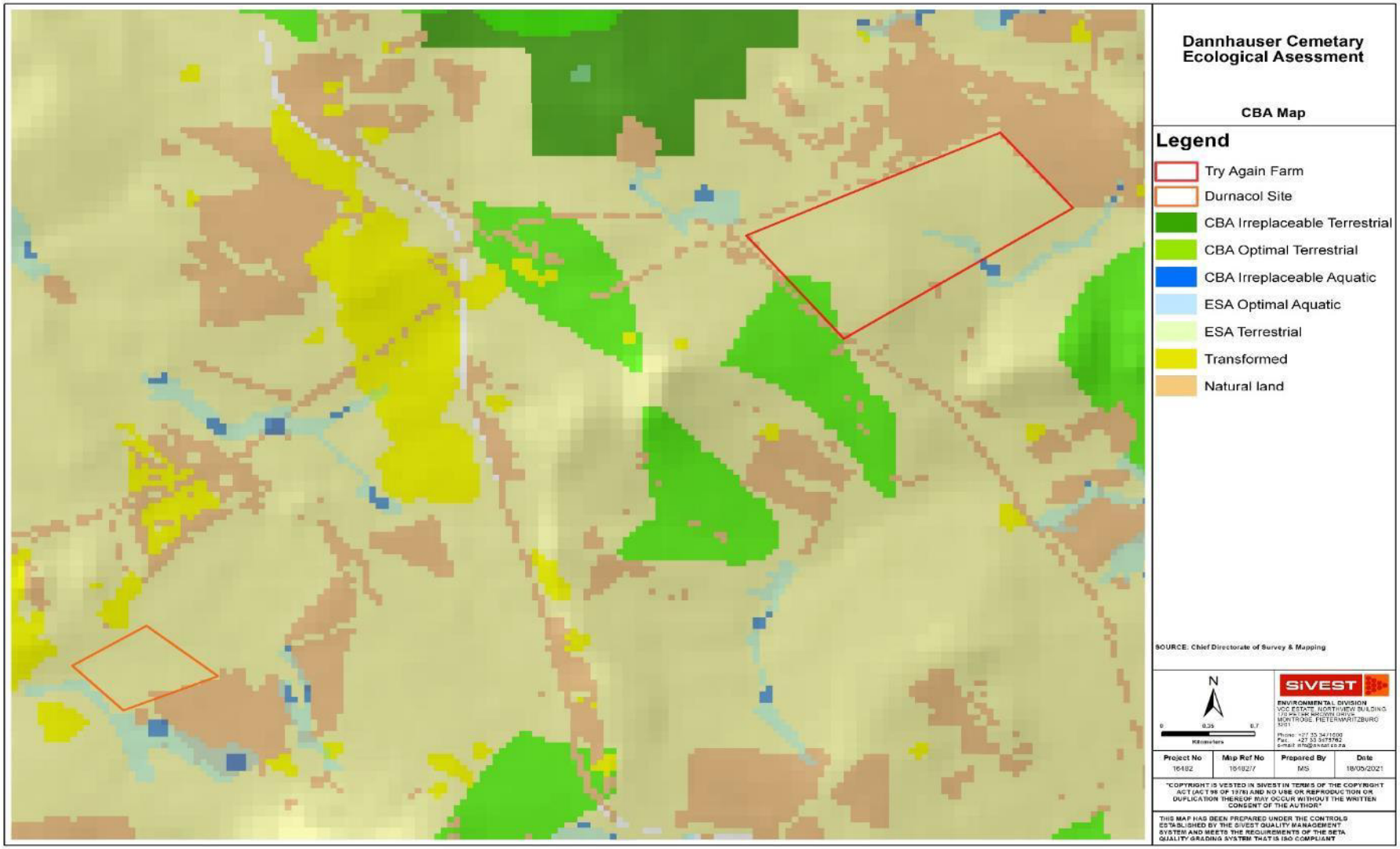

Figure 2: ***CBA Map***

6.2.2.Bio Resource Units (BRU)

The Bioresource unit for the site is as follows:

Vc2a – Dannhauser

Bioresource Group 12: "Moist Tall Grassveld".
BRG Subgroup 12c, 12d.

Vegetation pattern: The vegetation consists entirely of grassland.
Indicator Species: No indictaor species have been specified.

The rainfall average is 781 mm per annum. The mean temperature is 17.5^{0}C and the climate rating is C5, moderately restricted growing season due to low temperatures, frost and / or moisture stress. The erosion rating for the site is 4.1, which translates to a high of erosion.
There is one perennial river, the Mzinyashana River Please note there are a number of drainage lines, non-perennial streams and wetlands that are not captured at the coarse level at which this data has been defined.

6.2.3.Environmental Potential Atlas

The ENPAT data provides the following information about the geology for the site:
The geology of the site is comprised of mainly sandstone and shale of the Vryheid and Volksrust Formation, Ecca Group and dolerite. The other formation on the sites are mainly shale of the Volksrust Formation, Ecca Group with Dolerite.

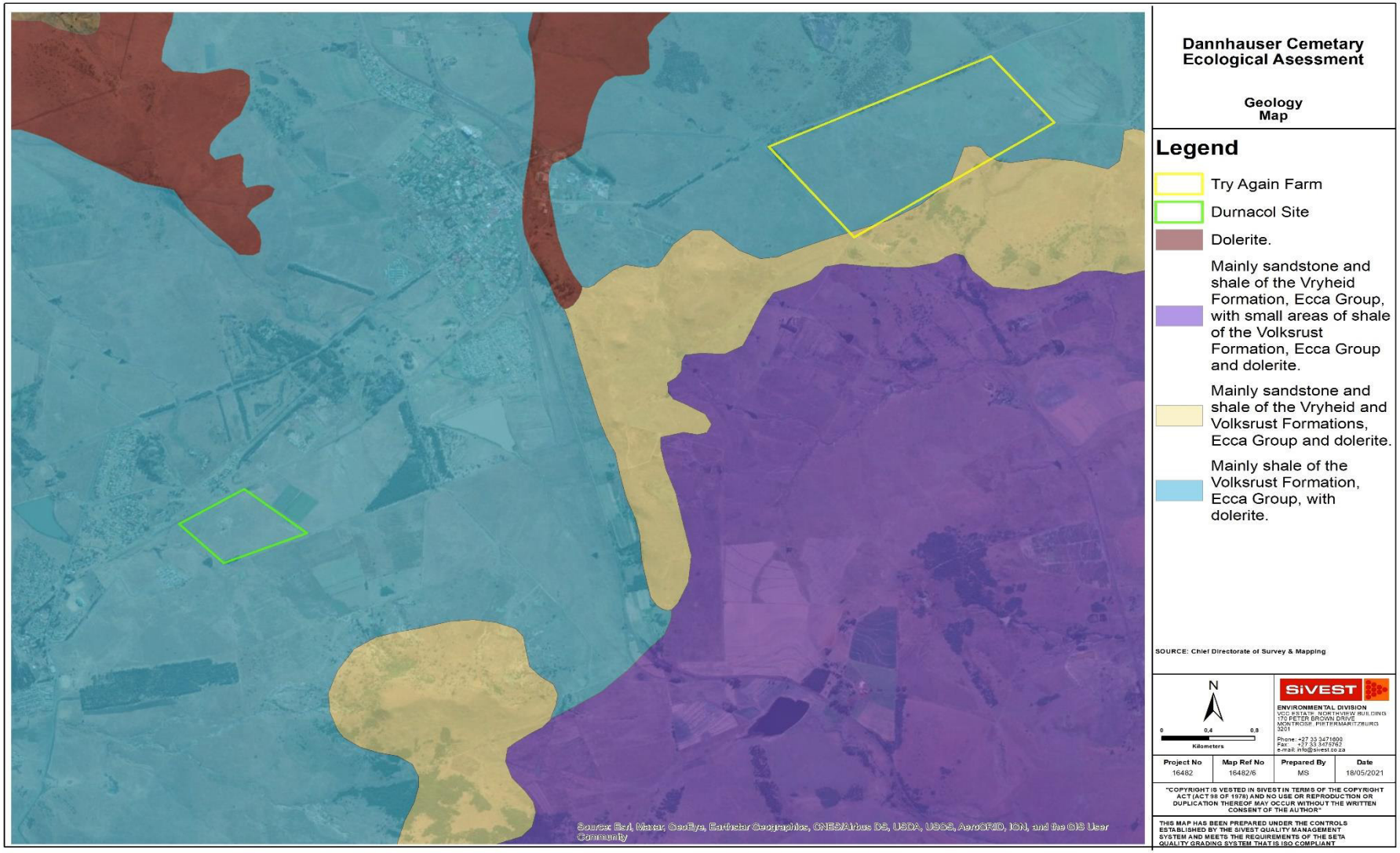

Figure 3: Geology Map

The ENPAT data provides the following information about the soils for the site:
Glenrosa and/or Mispah forms (other soils may occur), lime rare or absent in the entire landscape. Other soils present are Plinthic catena: undifferentiated upland duplex and / or margalitic soils are common.

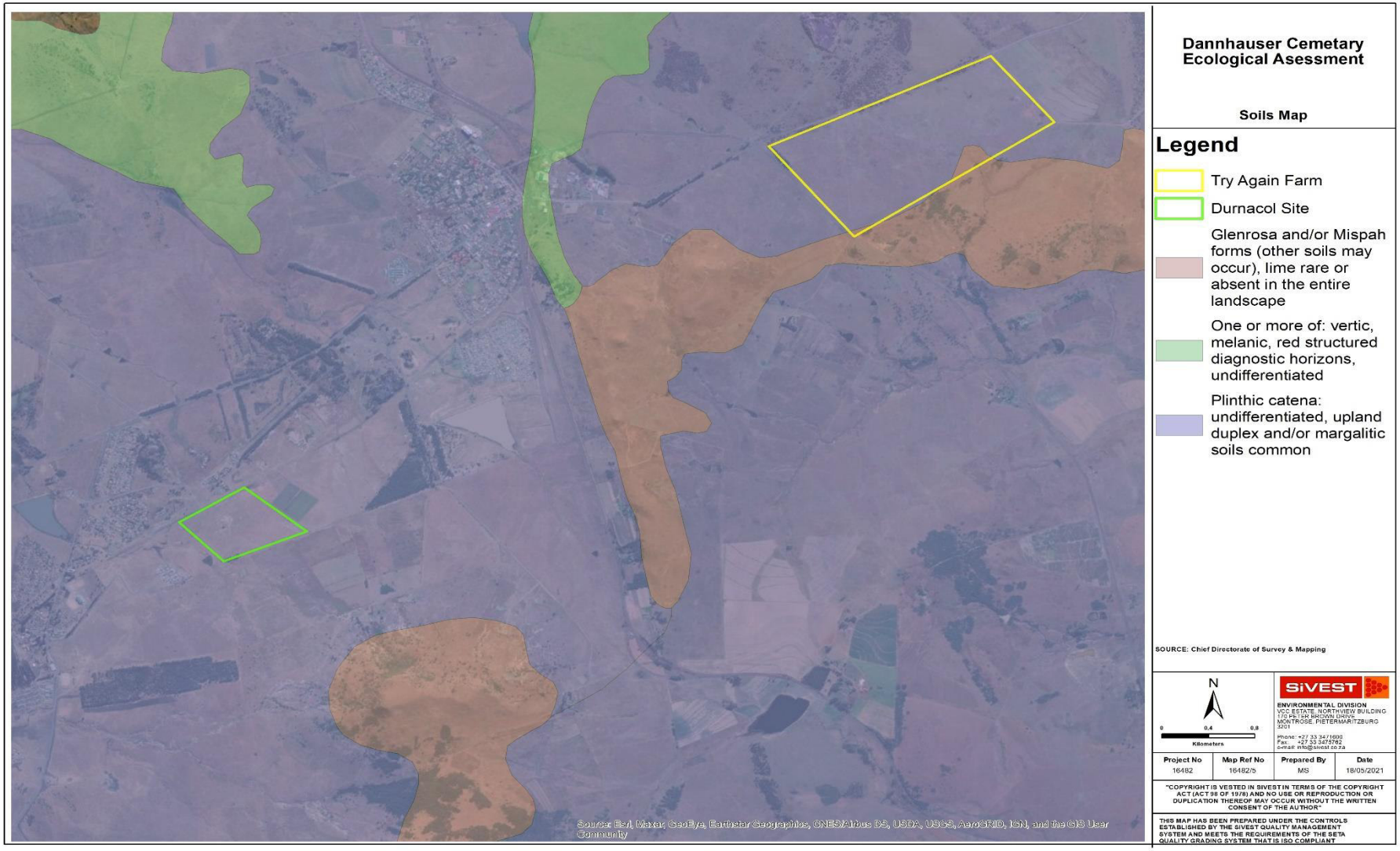

Figure 4: Soils Map

6.2.4.Mucina and Rutherford's Vegetation and KZN Vegetation Types

The classification of vegetation on site, is made at a very coarse scale, i.e. low resolution and falls within the Northern KZN Moist Grassland (Gs 4) which is Vunerable. In this case the KZN Wildlife Vegetation Type, and VegMap 2018 are the same.

Distribution

Kwazulu-Natal Province: Northern and northwestern regions of the province, where it forms a discontinuous rim around the upper Thukela Basin and is situated almost entirely within the catchment of the Thukela River. It lies between the drier Gs 6 KwaZulu- Natal Highland Thornveld and the moist upland vegetation of mainly Gs 3 Low Escarpment Moist Grassland to the north and Gs 10 Drakensberg Foothill Moist Grassland to the west. The most extensive areas are in the vicinity of Winterton, Bergville, Fort Mistake, Dannhauser, Dundee, north of Ladysmith and west of Newcastle. At higher altitudes this unit is usually surrounded by Gs 3 Low Escarpment Moist Grassland in the north and Gs 10 Drakensberg Foothill Moist Grassland in the west and south. At lower altitudes Gs 6 KwaZulu-Natal Highland Thornveld and SVs 2 Thukela Thornveld usually occur to the east. Altitude 1 040-1 440 m.

Vegetation & Landscape Features

Hilly and rolling landscapes supporting tall tussock grassland usually dominated by *Themeda triandra* and *Hyparrhenia hirta*. Open *Acacia sieberiana var. woodii* savannoid woodlands encroach up the valleys, usually on disturbed (strongly eroded) sites.

Important Taxa

Graminoids: *Alloteropsis semialata subsp. eckloniana (d), Aristida Congesta (d), Cynodon dactylon (d), Digitaria tricholaenoides (d), Elionurus muticus (d), Eragrostis patentissima (d), E. racemosa (d), Harpochloa falx (d), Hyparrhenia hirta (d), Themeda triandra (d), Tristachya leucothrix (d), Abildgaardia ovate, Andropogon appendiculatus, A eucomus, A schirensis, Aristida junciformis subsp. galpinii, Brachiaria serrata, Cymbopogon caesius, C. Pospischilii, Cynodon incompletes, Digitaria monodactyla, D. sanquinalis, Diheteropogon amplectens, D. filifolius, Eragrostis chloromelas, E. plana, E. planiculmis, E. sclerantha, Festuca scabra, Heteropogon contortus, Hyparrhenia dregeana, Melinis nerviglumis, Microchloa caffra, Panicum natalense, Paspalum scrobiculatum, Setaria nigrirostris, Sporobolus afrivanus*. Herbs: *Acanthospermum australe (d), Argyrolobium speciosum (d), Eriosema kraussianum (d), Geranium wakkerstroomianum (d), Pelargonium luridum (d), Acalypha peduncularis, Chamaecrista mimosoides, Dicoma anomala, Euryops transvaalensis subsp. setilobus, Helichrysum caespititum, H. rugulosum, Hermannia depressa, Ipomoea crassipes, Pearsonia grandifolia, Pentanisia prunelloides subsp. latifolia, Sebaea grandis, senecio inornatus, Thunbergia atriplicifolia, Zaluzianskya microsiphon*. Geophytic Herbs: *Chlorophytum haygarthii (d), Gladiolus aurantiacus (d), Asclepias aurea, Cyrtanthus tuckii var. transvaalensis, Gladiolus crassifoluis, Hypoxis colchicifolia, H. multiceps, Moraea brevistyla, Zantedeschia rehmannii.* Succulent Herbs: *Aloe ecklonis, Lopholaena segmentata*. Low shrubs: *Anthospermum rigidum subsp. pumilum, Erica oatesii, Hermannia geniculate*. Succulent Shrub: *Euphorbia pulvinata*

Biogeographically Important Taxa (both low Escarpment endemics) Succulent Herb: *Aloe modesta*. Low Shrub : *Bowkeria citrina*.

Conservation

Vulnerable. Target 24%. Only about 2% statutorily conserved in the uKhahlamba Drakensberg Park as well as in the Chelmsford, Spioenkop, Moor Park, Wagendrift, Ncandu Nature Reserves. More than a quarter has already been transformed either for cultivation, plantations and urban sprawl or by building of dams (Chelmsford, Driel, Kilburn, Mtoti, Wagendrift, Windsor and Woodstock). Alien *Acacia dealbata*, *Rubus, Eucalyptus* and *Populus* are invasive in places. Bush encroachment is common. Erosion very low (53%), Low (2%) and moderate (20%)

Figure 5: VegMap 2018 vegetation types.

6.2.5. National Freshwater Ecosystem Priority Areas (NFEPA) - SAIIAE

The wetland asscociated with Try Again Farm is a NFEPA Wetland classified as a seep slope wetland. No further wetlands are intersected at the proposal site.

Figure 6: NFEPA / SAIIAE Wetland Map

6.3. *Desktop faunal description*

Databases allow for the rapid assessment of species which are predicted to occur in an area. These databases are compiled using verified citizen science observations, as well as correlating species and their habitat requirements and assigning the result to a habitat type. This results in species predicted for an area. These databases are continually updated and verified by the Animal Demographic Unit at the Fitzpatrick Institude of African Ornithology, University of Cape Town. This may often result in a wide paucity in data as no previous observations have been made in an area, resulting in no predicted data for that species in that area. This means that verification of faunal data is essential in filling in gaps that may occur at desktop level. Desktop data for the area around Dannhauser site is seen as relatively inaccurate due to low reporting rates and full protocols achieved within the study area for the various Animal Demographic Unit and South African Bird Atlas Project databases.

6.3.1. Critically Biodiverse Areas

Critical Biodiversity Areas (CBAs) can be divided into two subcategories, namely *Irreplaceable* and *Optimal*. Each of these can in turn be subdivided into additional subcategories. The CBA categories are based on the optimised outputs derived using systematic conservation planning software, with the Planning Units (PU) identified representing the localities for which the conservation targets for one or more of the biodiversity features contained within can be achieved.

Please see Section 6.2.1 for a description of the CBA within the study site.

6.3.2. South African Bird Atlas Project 2

The South African Bird Atlas Project 2 (SABAP 2) Database was queried to determine which bird species have been recorded within the greater study area. Please note that the data represents a minimum presence ratio, which indicates species that have been recored in the area. This does not mean that other species do not occur in the pentad. Further to this, a good guidline to use for an accurate estimate of minimum presence ratio, is if more than 7-10 lists have been submitted for a pentad. Please note, between 7 to 10 lists were submitted for the pentad of the site (2800_3000) and (2800_3005), therefore the data is seen as a relatively accurate assessment of the avifauna present on site.

The complete list includes 140 species as listed in **Appendix 2**, with 27 species being confirmed on site (highlighted in **bold in Appendix 2**). Conservation status is given for Red Data Species on a Regional Basis as per the 2015 Eskom Red Data Book of Birds of South Africa (Taylor, 2015), where 6 potential Red Data species occur in the study area (**Table 8**). No Red Data species were identified during the assessment, with Denham's Bustard (Vulnerable) and Southern Bald Ibis (Vulnerable) being the only species predicted to occur on site. The Chelmsford Important Bird Area falls within 10km of the Durnacol site, as defined by BirdLife South Africa (2018).

Table 8: Red Data avifaunal species predicted to occur on site (LC = Least Concerned, NT = Near Threatened, VU = Vulnerable, EN = Endangered, FP = Full Protocol, FPn = Full Protocol number).

Scientific Name	Common Name	RD (Regional, Global)	fp	fpn	fp_last
Balearica regulorum	Grey Crowned Crane	EN, EN	29	2	2009/11/05
Monticola explorator	Sentinel Rock-thrush	LC, NT	14	1	2011/11/24
Anthropoides paradiseus	Blue Crane	NT, VU	14	1	2009/11/05
Eupodotis senegalensis	White-bellied Korhaan	VU, LC	14	1	2011/11/24
Neotis denhami	Denham's Bustard	VU, NT	14	1	2011/09/17
Geronticus calvus	Southern Bald Ibis	VU, VU	29	2	2017/08/03

6.3.3. ReptileMAP

The Animal Demographic Unit's (ADU) ReptileMAP predicts that 14 reptile species occur within the greater study area. These are listed in **Appendix 3**, with no species seen during the assessment, and no species of conservation concern potentially occur within the study area.

6.3.4. FrogMAP

The ADU's FrogMAP predicts that 15 species of amphibians occur within the greater study area. The full list of amphibians predicted to be within the study area can be found in Appendix 4. No species were seen during the assessment. One species of conservation concern is predicted to occur (**Table 9**).

Table 10: Red List Frog species predicted to occur within the study area.

Scientific name	Common name	Red list category	Number of records	Last recorded
Hemisus guttatus	Spotted Shovel-nosed Frog	Vulnerable	1	2000/12/11

6.3.5. MammalMAP

The ADU's MammalMAP predicts that 9 species of mammal occur within the study area (full list in **Appendix 5**). No mammal species was seen. Four mammal species of conservation concern are predicted to occur within the greater study area, (**Table 11**).

Table 11: Red List Mammal species predicted to occur within the study area.

Scientific name	Common name	Red list category	Number of records	Last recorded
Leptailurus serval	Serval	Near Threatened (2016)	2	
Otomys auratus	Southern African Vlei Rat (Grassland type)	Near Threatened (2016)	1	1988/10/28
Felis nigripes	Black-footed Cat	Vulnerable (2016)	1	
Mystromys albicaudatus	African White-tailed Rat	Vulnerable (2016)	1	1948/05/14

6.3.6. LepiMAP

According to the ADU's LepiMAP, 51 species of lepidoptera are predicted to occur within the greater study area (full list in **Appendix 6**). No species of conservation concern are predicted to occur on site.

7. RESULTS OF FIELD ASSESSMENT

7.1. *Vegetation Description*

7.1.1. General Site Description of the Vegetation Community

The study site is located within the Dannhauser Local Municipality, with the Try Again Farm occurring within 1.5km of the town of Dannhauser and the Durnacol Site occurring within 500m of the town of Durnacol.

Try Again Farm is currently leased to farmers for grazing by the Dannhauser Local Municipality. The Durnacol site is used for communal grazing, is in close proximity to a Mass Grave and has low to medium income villages in the vicinity of Durnacol. Free ranging livestock consisting of cattle and goats are unrestricted and roam over the general area around the Durnacol Site.

Alien and invasive species were identified running along the northern boundary of site alongside the road leading to Steildrift. Disturbance at the Try Again Site appears to be related to cattle farming, which at the current density of cattle, is not adversely affecting the vegetation on site.

Erosion channels were identified at the Durnacol Site which is associated with concerntrated surface water flow leading to a dam used for irrigation of livestock. Higher disturbance associated with the Durnacol Site appears to be related to mining activities or mass earthworks, which has resulted in a lower species diversity.

According to Mucina and Rutherford 2006, the area is classified as Northern KwaZulu-Natal Moist Grassland (Gs4) which is a Vulnerable vegetation type. Upon undertaking the groundtruthing exercise it was found that both sites comprise mostly of indigenous species, with a medium species diversity. Vegetation at Try Again Farm was representative (in part) of Gs4, with indicator species present. The Durnacol Site also had species representative of Gs4, however species diversity was lower due to the more disturbed nature of the Durnacol Site. Site photos of the general area within Try Again Farm and the Durnacol Site can be found in **Plate 1** and **Plate 2**.

A total of 42 plant species were recorded during the field survey, of which 4 were alien. Three plant species fall under the KwaZulu-Natal Nature Conservation Management Act were noted within the development footprint (*Boophone disticha, Hypoxis hemerocallidea* and *Kniphofia spp*).

Plate 1: View of vegetation representative of Try Again Farm.

Plate 2: General vegetation associated with the Durnacol Site. Please note berms and drainage ditches present from historical earthworks showing disturbance.

7.1.2. Try Again Farm

Vegetation associated with Try Again Farm comprised of mixed layers of grasses, forbs and herbs, up to 1m in height (please refer to **Plate 1** above). Vegetation diversity in this area was deemed to be medium based on the presence of indicator species and the presence of species of conservation concern. Alien and invasive Saligna Gum (*Eucalyptus grandis*) trees lined the road side portion of the P38. No other tree species were present within the study area.

The graminoid component is dominated by dense perennial grass species such as Buffalo Grass (*Aristida congesta* subsp. *congesta*), Ngongoni Grass (*Arastida junciformis*), Weeping Love Grass (*Eragrostis curvula*), Turpentine Grass (*Cymbopogon caesius*), Couch Grass (*Cynodon dactylon*), Thatch Grass (*Hyparrhenia hirta*), Red Grass (*Themeda triandra*), One-finger Grass (*Digitaria monodactyla*), Yellow Thatching Grass (*Hyparthelia dissoluta*) Rat's Tail Dropseed (*Sporobolus africanus*) and Cat's Tail Dropseed (*Sporobolus pyramidalis*). **Plate 3** below shows some graminoid species occurring on site. These majority of these species have a poor to average grazing value and are mostly Increaser 2 species, meaning that they increase in abundance with an increase in overgrazing. As a result, the grasses present show that the veld at Try Again Farm is in a sub-climax state, which include plants with a denser tuft than pioneer plants, which offer protection to the soil layer. The protection of the soil layer is visible in **Plate 1** above which shows the vegetative biomass protecting the soil surface.

Plate 3: From left to right, top to bottom – Thatching Grass, Yellow Thatching Grass, Rat's Tail Dropseed and Red Grass.

Herbs and bulbs associated with Try Again Farm included Common Yellow Commelina (*Commelina Africana*), Hairy Everlasting (*Helichrysum nudifolium var. pilosellum*), Marotole (*Helichrysum rugulosum*) and Silver Vernonia (Hilliardiella aristata) (**Plate 4**). Species protected under the Natal Nature Conservation Ordinance (1974) include Candelabra Flower (*Boophone disticha*), Yellow Star (*Hypoxis hemerocallidea*) and a species of Poker (*Kniphofia spp*, **Plate 5**).

Plate 4: Herbs seen from top left to bottom right include Common Yellow Commelina, Hairy Everlasting, Marotole and Silver Vernonia.

Plate 5: A protected species of *Kniphofia*.

Very few alien and invasive species were present at the Try Again Farm, other than the presence of Saligna Gum (*Eucalyptus grandis*) along the roads surrounding the site (**Plate 6**).

Plate 6: Saligna Gum trees present along the roads surrounding site.

7.1.3.Durnacol Site

Vegetation associated with the Durnacol Site was dominated by graminoid species, interspersed with forbs and herbs, up to 1m in height (**Plate 7**). Vegetation diversity in this area was deemed to be low based on the lack of species of conservation concern and the increase in diversity of alien and invasive species.

Plate 7: Graminiod species dominating the landscape growing up to 1m in height.

The Graminoid component mirrored that of Try Again Farm, however the grass component was dominated by Rat's Tail Dropseed more so that other graminoid species, which is an indicator that the Durnacol Site is overgrazed.

An increase in abundance of Purple Top (*Verbena bonariensis*) and *Berkheya* species were noted, further indicating that the Durnacol Site is moving into an overutilised state. Herb species present include *Tephrosia spp.* Astral Pachycarpus (*Pachycarpus concolor*) and Mohato (*Berkheya onopordifolia,* **Plate 8**).

Plate 8: Herbaceous layer included Tephrosia spp. Astral Pachycarpus and Mohato.

The component of alien and invasive species present at the Durnacol Site included Purple Top, Silverleaf Bitter Apple (*Solanum elaeagnifolium*) and Burweed (*Acanthospermum australe,*).

Plate 9: Alien plants included from top left to bottom, Purple Top, Silverleaf Bitter Apple and Burweed

7.2. *Species identified by the DFFE Screening Tool.*

No species highlighted in the DFFE Screening tool were identified on either site, therefore lowering the plant sensitivity to medium at the Try Again Farm and low at the Durnacol Site. It must be noted that bulbs may not have been identified due to the later sampling season.

7.3. *Vegetation Assessment*

Within the context of this vegetation assessment, conservation importance is broadly defined as the importance of the encountered vegetation communities as a whole, and the role these areas will fulfill in the preservation and maintenance of biodiversity in the local area. Biodiversity maintenance and importance are a function of the specific biodiversity attributes and noteworthiness of the vegetation communities in question and the biotic integrity and future viability of these features.

The biodiversity noteworthiness of the system is a function of the following:

- species richness/diversity;
- rarity of the system;
- conservation status of the system (endangered, least concern etc.);
- habitat (real or potential) for Red Data Species; and
- presence of unique and/or special features,

The integrity and future viability of the system is a function of the following:

- Extent of buffer around the system;
- Connectivity of system to other natural areas in the landscape;
- Level of alteration to indigenous vegetation communities within the system;
- Level of invasive and pioneer species encroachment system; and
- Presence of hazardous and/or obstructive boundaries to fauna.

The scores for each function of biodiversity maintenance were determined according to the scoring system shown in **Table 12** below. The scores were totaled and averaged to determine the biodiversity maintenance services score. Thereafter, the overall scores were rated according to the rating scale in **Table 13** below.

7.3.1. Biodiversity Assessment

In terms of assessing the impacts of a proposed development on the receiving environment, it is vital that the current state of the environment is assessed, and the level at which it contributes currently, is considered and recorded.

It is bearing this in mind that we have developed an assessment matrix which will assist in determining the current biodiversity and conservation value of the various vegetation types that were encountered during the field survey (SiVEST, 2013). In addition, we need to consider the biodiversity noteworthiness of the receiving environment (i.e. does the environment hold any rare species, protected species and unique landscape features) as well as the functional integrity and future sustainability of the vegetation types in the immediate vicinity of the development. The final condition score of each landscape is calculated adding the Biodiversity noteworthiness score with the Functional integrity and Sustainability score. It must be noted that the two scores are weighted 50:50% respectively.

Table 12. Biodiversity maintenance services score sheet (Template and Description)

	Scores				
Biodiversity Noteworthiness	**0**	**1**	**2**	**3**	**4**
Diversity	Low	Med-Low	Medium	Med-High	High
Rarity	Low	Med-Low	Medium	Med-High	High
Conservation Status	Least Concern	Near-Threatened	Vulnerable	Endangered	Critically Endangered
Red Data	No	-	-	-	Yes
Uniqueness / Special features	None	Med-Low	Medium	Med-High	High
Integrity & Future Viability	**0**	**1**	**2**	**3**	**4**
Buffer	Low	Med-Low	Medium	Med-High	High
Connectivity	Low	Med-Low	Medium	Med-High	High
Alteration	>50%	25-50%	5-25%	1-5%	<1%
Invasive/pioneers	>50%	25-50%	5-25%	1-5%	<1%
Size	<1 ha	1 – 2 ha	3 - 10 ha	10 – 15 ha	>15 ha

Table 13. Rating Scale for Biodiversity Maintenance services based on Assessment scores

Score:	**0-0.8**	**0.9-1.6**	**1.7-2.4**	**2.5-3.2**	**3.3-4.0**
Rating of the likely extent to which a service is being performed	Low	Moderately Low	Intermediate	Moderately High	High

A total of 42 plant species were recorded during the field survey, of which 4 were alien. Three plant species fall under the KwaZulu-Natal Nature Conservation Management Act were noted within the development footprint (*Boophone disticha, Hypoxis hemerocallidea* and *Kniphofia spp*).

Try Again Farm

Biodiversity noteworthiness

In terms of the vegetation classifications that were identified from the aerial photography and ground truthed on site, the following assessment was made in terms of the noteworthiness of the vegetation that would be immediately impacted upon by the proposed Development.

Table 14. Biodiversity noteworthiness of the proposed development.

	Scores				
Biodiversity Noteworthiness	**0**	**1**	**2**	**3**	**4**
Diversity			✓		
Rarity		✓			
Conservation Status			✓		
Red Data Species					✓
Uniqueness / Special features		✓			
OVERALL VALUE	Total Score/number of categories is 10 / 5= **2**				

Functional Integrity and Sustainability

The Functional Integrity and Sustainability speaks to the impact of the proposed activity on the receiving environment. It also speaks to the likelihood that it will be of significance, and whether there are significant mitigation and or amelioration measures that are required to be put in place to ensure that the impacts are manageable, and will not prove deleterious to the vegetation type as a whole.

Table 15. Future Integrity and viability of the proposed development.

	Scores				
Integrity & Future Viability	**0**	**1**	**2**	**3**	**4**
Buffer	✓				
Connectivity				✓	
Alteration				✓	
Invasive/pioneers				✓	
Size					✓
OVERALL VALUE	Total Score/number of categories is 13 / 5= **2.6**				

- The average score of the proposed development is **2,** which indicates that this area is functioning at an intermediate level.
- The average score of the proposed development is **2.6**, which indicates that integrity and future viability is at a moderately high level.

Durnacol Site

Biodiversity noteworthiness

In terms of the vegetation classifications that were identified from the aerial photography and ground truthed on site, the following assessment was made in terms of the noteworthiness of the vegetation that would be immediately impacted upon by the proposed Development.

Table 16. Biodiversity noteworthiness of the proposed development.

	Scores				
Biodiversity Noteworthiness	**0**	**1**	**2**	**3**	**4**
Diversity		✓			
Rarity		✓			
Conservation Status			✓		
Red Data Species	✓				
Uniqueness / Special features		✓			
OVERALL VALUE	Total Score/number of categories is 5 / 5= **1.0**				

Functional Integrity and Sustainability

The Functional Integrity and Sustainability speaks to the impact of the proposed activity on the receiving environment. It also speaks to the likelihood that it will be of significance, and whether there are significant mitigation and or amelioration measures that are required to be put in place to ensure that the impacts are manageable, and will not prove deleterious to the vegetation type as a whole.

Table 17. Future Integrity and viability of the proposed development.

	Scores				
Integrity & Future Viability	**0**	**1**	**2**	**3**	**4**
Buffer	✓				
Connectivity				✓	
Alteration			✓		
Invasive/pioneers				✓	
Size				✓	
OVERALL VALUE	Total Score/number of categories is 11 / 5= **2.2**				

- The average score of the proposed development is **1.0,** which indicates that this area is functioning at a moderately low level.
- The average score of the proposed development is **2.2,** which indicates that integrity and future viability is at an intermediate level.

7.4. *Faunal Description*

Please note, the faunal description for both the Try Again Farm and Durnacol site have been combined due to the promity of the two sites. The difference between the two sites in terms of faunal presence is that the Try Again Farm is less disturbed as the site does not fall between communal farming areas and suburbs associated with Durnacol. This means that the possible presence of species of conservation concern is higher at Try Again Farm.

7.4.1.Avifauna

A total of 28 bird species were seen during the sampling period. Species were difficult to see and photograph due to the grassy nature of site, meaning that species were only seen when flushed or when flying over. All species seen were in flight, however the majority of the species seen do not range over

large distances. This assumes that these birds were using the sample sites as a viable home range and movement corridor, which is understandable as both sites are connected to the wider grassland habitat areas, surrounded by low hillsides. Additionally, the suite of birds seen tend to inhabit the above mentioned vegetation types. The sampling period time of the year was likely a limiting factor in species richness as some migratory avifauna would be preparing for their annual migrations at the end of March. No species of conservation concern were identified during the assessment.

There is potential for Southern Bald Ibis (*Geronticus calvus*, Vulnerable), Denham's Bustard (*Neotis denhami,* Vulnerable) and White-bellied Korhaan (*Eupodotis senegalensis*, Vulnerable) to forage through the area, with grassland habitat interspersed with occasional trees present within the greater area. Sentinel Rock-thrush are not expected to occur on site due to their requirements of rocky areas in which they forage, breed and roost in not being present on either site. Grey Crowned Cranes (*Balearica regulorum*, Endangered) and Blue Cranes (*Anthropoides paradiseus*, Vulnerable) could potentially occur on both sites for foraging purposes. However, both of these species are dependent on wetlands and water bodies for roosting. It is therefore unlikely that the two crane species will be nesting or roosting at either of the sites although they may use these sites in a foraging capacity.

7.4.2.Herpetofauna

Herpetofauna include both reptiles and amphibians. No herpetofauna were identified during the assessment, however it is likely that species with a habitat preference to grasslands could occur on site. Species predicted to occur on site include Guttural Toad (*Sclerophrys gutturalis*), Raucous Toad (*Sclerophrys capensis*), Natal Sand Frog (*Tomopterna natalensis*) and Tandy's Sand Frog (*Tomopterna tandyi*).

Spotted Shovel-nosed Frog (*Hemisus guttatus*, Vulnerable) could potentially occur in close proximity to the wetland on the south western portion of Try Again Farm as this species nests in burrows in wet soils in close proximity to water bodies. Species predicted to occur within the study area according to FrogmapMAP can be found in **Appendix 4**.

No reptile species were seen during the assessment. Habitat for grassland reptile species is present, therefore common species such as Variable Skinks (*Trachylepis varius*), Rinkhals (*Hemachatus haemachatus*), Brown House Snakes (*Boaedon capensis*), Rhombic Night Adders (*Causus rhombeatus*) and Puff Adders (*Bitis arietans arietans*) are expected to occur on site. No species of conservation concern were noted in site. Species predicted to occur within the study area according to ReptileMAP can be found in **Appendix 3**.

7.4.3.Mammals

No mammal species were seen during the site assessment. Grassland habitat is available for species such as Black-backed Jackal (*Canis mesomelas*), Serval (*Leptailurus serval,* Near Threatened), Black-footed Cat (*Felis nigripes*, Vulnerable) Southern African Vlei Rat (*Otomys auratus*, Near Threatened) and African White-tailed Rat (*Mystromys albicaudatus*, Vulnerable). No further species of conservation concern are likely to occur on site. Species predicted to occur within the study area according to MammalMAP can be found in **Appendix 5**.

7.4.4.Butterflies

No species were seen on site and no species of conservation concern are predicted to occur on site. Species predicted to occur within the study area according to LepiMAP can be found in **Appendix 6**.

7.4.5.Other Species

TSCP Minset predicts that one mollusc species (*Cochlitoma simplex,* no further information). It must be noted that very little information is known on the above invertebrates, with their known distributions

limited to a few locations. It is however unlikely that these species occur on site due to their very isolated distributions.

7.4.6.DFFE Screening Tool

The DFFE Screening Tool predicts that the Secretarybird (*Sagittarius serpentarius*, Endangered) could potentially occur on site due to grassland areas being present at both sites. Lalande's Black-winged Clonia (*Clonia lalandei*, Vulnerable) could potentially occur on site as their habitat preference is grassland areas. Oribi (*Ourebia ourebi ourebi,* Endangered) may occur within the area due to the presence of grassland, however no occurrences are available on MammalMAP, therefore presence is unlikely. Spotted-necked Otter (*Hydrictis maculicollis,* Vulnerable) is predicted to occur on site, however this is unlikely due to no open water bodies present on both sites.

7.5. *Faunal Probability of Occurrence*

Fauna POC Assessment Summary

The potential occurrence of fauna of conservation significance for the study area were highlighted at a desktop level by investigating:

1) Biodiversity features for the study area highlighted in the Provincial Terrestrial Systematic Conservation Plan or CPLAN (EKZNW, 2010);
2) Species records found in the South African Bird Atlas Project 2 (SABAP2) database;
3) Available species records (ADU, 2020); and
4) Professional experience regarding rare/threatened amphibian species, reptiles and small mammals and their habitat requirements in KZN.

The findings of the desktop faunal potential of occurrence (POC) assessment have been summarised in terms of potential mammals, avifauna (birds), amphibians, reptiles and invertebrates of conservation concern (i.e. Red-Dated Listed Species: CR: Critically Endangered, EN: Endangered, VU: Vulnerable, NT: Near Threatened). Note that species of Least Concern (LC), endemic species and species with restricted ranges have been excluded from the assessment, with the focus being on Red-Data Listed (threatened) species.

Table 18: Faunal probability of occurrence.

Group	Scientific Name	Common Name	Threat Status (regional, global)	Habitat Requirements / Preferences (IUCN, 2017)	Requirements Met	POC
Avifauna	*Geronticus calvus*	Southern Bald Ibis	VU, VU	High rainfall (>700 mm p.a.), sour and alpine grasslands, characterised by an absence of trees and a short, dense grass sward. It also occurs in lightly wooded and relatively arid country. It has high nesting success on safe, undisturbed cliffs.	Yes - grasslands and cliffs present	Likely
	Neotis denhami	Denham's Bustard	VU, NT	Inhabits grasslands, grassy Acacia-studded dunes, fairly dense shrubland, light woodland, farmland, crops, dried marsh and arid scrub plains, high rainfall sour grassveld, planted pastures and cereal croplands in fynbos in South Africa	Yes - grassland present	Likely
	Monticola explorator	Sentinel Rock Thrush	LC, NT	Species occurs in high altitude grassland and heathland associated with stones, including rocky areas and felled areas containing exposed rocks	No - habitat type not representative	Unlikely
	Sagittarius serpentarius	Secretarybird	VU, VU	The species inhabits grasslands, ranging from open plains to lightly wooded savanna, but is also found in agricultural areas and sub-desert. It ranges from sea-level to 3,000 m	Yes - grassland present	Potentially likely
	Anthropoides paradiseus	Blue Crane	NT, VU	This species breeds in natural grass- and sedge-dominated habitats, preferring secluded grasslands at high elevations where the vegetation is thick and short. It inhabits short, dry, natural grasslands, as well as the Karoo and fynbos biomes	Yes - grassland present	Potentially likely to forage on both sites
	Balearica regulorum	Grey Crowned Crane	EN, EN	Wetlands such as marshes, pans and dams with tall emergent vegetation, riverbanks, open riverine woodland, shallowly flooded plains and temporary pools with adjacent grasslands, open savannas, croplands, pastures, fallow fields and irrigated areas	Yes - grassland present	Potentially likely to forage on both sites
Mammals	*Leptailurus serval*	Serval	Near Threatened (2016)	Associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions, typically occurring in dense vegetation in close proximity to water.	No - habitat not present	Unlikely
	Otomys auratus	Southern African Vlei Rat	Near Threatened (2016)	Associated with mesic grasslands and wetlands within alpine, montane and sub-montane regions, typically occurring in dense vegetation in close proximity to water	No - habitat not present	Unlikely
	Felis nigripes	Black-footed Cat	Vulnerable	All availale habitats in South Africa, including urban fringe areas surrounded by farmland and savanna. Dependant on Spring Hare burrows	Yes- habitat available	Unlikley due to no Spring Hares predicted to occur on site
	Mystromys albicaudatus	African White-tailed Rat	Vulnerable (2016)	They are often associated with calcrete soils within grasslands. They are never found on soft, sandy substrate, rocks, wetlands or river banks. Further records show that they can occur in disturbed areas (heavily grazed) and in sparse grasslands; for example, on shallow limestone substrate	No - calcrete soils absent	Unlikely
Invertebrates	*Cochlitoma simplex*	Thukela Agate Snail	No information	Potentially distributed on calcium rich soils	No information	No information
Amphibians	*Hemisus guttatus*	Spotted Shovel-nosed Frog	Vulnerable	Grassland and savanna. It breeds in seasonal pans, swampy areas, and in pools near rivers. It nests in burrows in wet soil close to temporary water	Grassland habitat present	Unlikely due to pans and wetlands occuring outside of the developable area

8. IMPACT ASSESSMENT

The nature of the activity is that it has the potential to cause negative environmental effects. However, if mitigation measures for the activity are correctly implemented and the rehabilitation is successful, minimal disturbance of environment will be seen (**See Appendix 8 for Methodology**).

The potential impacts of the proposed development mainly related to loss of terrestrial fauna and flora which are utilizing the site during operation. However, the loss of floral and faunal species of conservation concern is limited as species of conservation concern predicted to occur on site are mobile and are unlikely to be negatively affected by a graveyard. Additionally, a Vulnerable vegetation type is predicted to occur on site. However, if the disturbed Dunacol Site is chosen as the preferred site, the loss of the Vulnerable Northern KZN Moist Grassland will be minimal. Consequently, loss of terrestrial fauna and flora will be on a localised scale and can be largely mitigated against, provided mitigation measures are implemented.

8.1. *Planning and design phase impacts*

Identification and pegging out of environmental buffers associated with CBA: Optimal areas and wetland areas. These two areas, only found on the Try Again Farm site must be pegged out and avoided during the entire construction and operation phase of the cemetery site.

8.2. *Construction phase impacts*

8.2.1. Indigenous natural vegetation

Loss, degradation or fragmentation of vegetation through direct clearing.

8.2.2. Transformation of habitat for flora

Hard transformation of the access roads and built infrastructure will result in a marginal reduction in flora. Construction activities will result in the disturbance of the soil surface, and this often leads to the establishment of alien invasive plant species.

8.2.3. Erosion related impacts

Vegetation binds and protects the soil surface, and when removed, increases erosion potential. This may lead to water and wind removing vital topsoil and blocking up drains and eventually clogging roadside drains, drainage lines, wetlands, and watercourses through sedimentation.

8.2.4. Habitat transformation and fragmentation for fauna

Continued transformation of vegetation in the area could result in a marginal reduction in flora and fauna for the area.. Continued transformation of the land results in habitat fragmentation, where edge effects decrease suitable habitat for a wide range of fauna in the area. This leads to an overall indirect decline in faunal and floral diversity.

8.3. *Operational phase impacts*

8.3.1. Erosion related impacts for operation phase

Erosion potential is increased in areas where vegetation has been removed. Hard transformation associated with grave sites may increase water velocity in steeper areas and may result in a loss of topsoil and the erosion of drainage lines. This will aid in alien and invasive plant establishment and vegetation rehabilitation will be compromised as the loss of topsoil will delay rehabilitation efforts.

8.3.2. Biodiversity loss due to operation phase

Biodiversity loss during operation is expected to occur as digging and maintenance of grave sites will remove topsoil permanently and thereby reduce the available vegetation and habitat on site.

8.3.3. Vegetation

Establishment and spread of alien invasive plant species due to disturbance vectors around the gravesites.

8.4. *Decomission phase impacts*

Decomissioning phase impacts are anticipated to be the same as the construction and operation phase impacts, therefore mitigation measures for the construction and operation phase must be followed should decommissioning of the proposed construction.

8.5. *No-go alternative.*

Please note that a No-Go option would be the status quo. This is not supported by the Ecologist as the need to provide a suitable gravesight outweighs anticipated loss in biodiversity, in particular if the Durnacol Site is chosen as the preferred option.

8.6. *Overall impact rating*

The overall negative impact of the Try Again Farm site is expected to be a negative medium pior to mitigation measures being implemented (31.3) with a negative low post mitigation score of 18.8. The overall negative impact of the Durnacol Site is expected to be a negative medium prior to mitigation measures being implemented (26.9) with a negative medium post mitigation score of 14.25. A relatively limited area will be lost to development. This will result in the loss of some indigenous plants, but little anticipated impact on any floral or faunal species of conservation concern.

8.7. *Impacts identified for all phases and cemetery alternatives*

Table 19: Impact descriptions for the Try Again Farm Alternative

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Planning and Design Phase																				
Design must avoid sensitive areas	Loss of CBA: Optimal areas and wetland functionality.	2	3	2	3	3	3	39	-	Medium	Identification and fencing off of environmental buffers associated with CBA: Optimal areas and wetland areas. These two areas, only found on the Try Again Farm site must be fenced off with a 32m buffer and avoided during the entire construction and operation phase of the cemetery site.	2	2	1	2	1	3	24	-	Medium

Construction Phase																				
Indigenous natural vegetation	Loss, degradation or fragmentation of vegetation through direct clearing	2	3	2	3	3	3	39	-	Medium	▪ Footprint of the activity must be strictly adhered to. ▪ A site specific Environmental Management Programme must be developed for the construction and operation phases. ▪ An Environmental Control Officer (ECO) must be appointed for the duration of construction. ▪ Permits for plants collection/removal need to be obtained prior to search and rescue operations. ▪ Vegetation clearance in the construction phase is to be remove in a phased approach, as and when it becomes necessary as vegetation harbours fauna. ▪ Sensitive areas shouldbe demarcated clearly before construction commences. ▪ Areas outside of the construction zone are to be	2	2	1	2	1	3	24	-	Medium

											designated as "no-go areas."									
Transformation of habitat for flora	Hard transformation of the access road and built infrastructure will result in a marginal reduction in flora. Construction activities will result in the disturbance of the soil surface, and this often leads to the establishment of alien invasive plant species.	2	3	2	3	3	3	39	-	Medium	▪ Footprint must be a strictly adhered to. ▪ Where possible, indigenous vegetation mustbe retained. ▪ Clearance for construction should be done in a phased approach, and rehabilitation should be done as soon as work has ceased along the section of routing. ▪ Where possible, construction should occur in the dry season to prevent soil loss through stormwater. ▪ Where possible, manual clearance of the vegetation should be done so as to prevent the unnecessary movement of machinery in no-go areas. ▪ The contractor should implement an alien invasive control programme, particularly in areas where soil disturbance occurs. ▪ Soil stockpiles shouldbe grassed with an	2	2	1	2	1	3	24	-	Medium

											indigenous mix or covered with shadecloth to prevent soil loss through wind and water erosion. Grass species useful for rehabilitation include *Eragrostis curvula, Cynodon dactylon, Digitaria eriantha,* and *Aristida junciformis.* ▪ Strictly no trapping or hunting of fauna is allowed. ▪ All open excavations should be checked on a daily basis and any fauna that may be stranded will have to be caught and released by a qualified person. ▪ Rehabilitation should take place as soon as construction of the section of line is complete. ▪ Strictly no littering. The contractor should highlight this at daily toolbox talks and site clean-ups should occur on a daily basis. ▪ A mix of indigenous grass species, should									

											be used for rehabilitation.									
Erosion related impacts	Vegetation binds and protects the soil surface, and when removed, increases erosion potential. This may lead to water and wind removing vital topsoil and blocking up drains and eventually clogging roadsides and drainage lines.	1	3	2	2	2	2	20	-	Low	▪ An approved Stormwater Management Plan should be implemented before construction occurs. ▪ Where possible, indigenous vegetation must be retained. ▪ Vegetation should be cleared only when construction occurs in that section of the routing. ▪ Soil stockpiles should be grassed with an indigenous mix or covered with shadecloth to prevent soil loss through wind and water erosion. ▪ Rehabilitation should take place as soon as construction is complete. ▪ In areas of steeper gradient, access roads should have erosion berms to prevent soil loss.	1	2	1	2	1	2	14	-	Low

											▪ Construction activities should be limited to the winter months to prevent loss of soil to water runoff. ▪ Spraying of the soil surface should occur when working in dusty conditions.									
Habitat transformation and fragmentation for fauna	Continued transformation of vegetation in the area will result in a marginal reduction in flora and fauna for the area. Disturbance of the soil surface and a leads to the establishment of alien invasive plant species. Continued transformation of the land results in habitat fragmentation, where edge effects decrease suitable habitat for a wide range of fauna in the area. This leads to an overall indirect decline in faunal dversity.	2	3	2	3	3	3	39	-	Medium	▪ Construction footprint must be a strictly adhered to. ▪ Clearance of land and vegetation is not allowed, unless clearance occurs within the authorised project area. ▪ Areas outside of the construction zone must be demarcated as “no-go” areas. ▪ Where possible, indigenous vegetation must be retained. ▪ Manual clearance of alien and invasive vegetation should be done so as to prevent the unnecessary movement of machinery in no-go areas. ▪ An alien and invasive control programme should implemented, particularly in	2	2	1	2	1	3	24	-	Medium

											areas where soil disturbance has occured. ▪ Soil stockpiles should be returned to the excavations, with the subsoil being placed first, followed by the topsoil. ▪ Monthly ECO auditing should occur during rehabilitation of the site. Once rehabilitation is complete, one three month, and one six month follow up audit should be conducted to assess the state of rehabilitation.									
Terrestrial fauna	Displacement of individuals	2	3	2	3	3	3	39	-	Medium	▪ The ECO should do a site walk through prior to construction commencing, to identify breeding or nesting fauna. Should these species be identified, permits for the capture and relocation must be applied for and a search and rescue must take place by a qualified Ecologist / Zoologist	1	1	1	1	1	1	5	-	Low
Operational Phase																				

Erosion related impacts for operation phase	Erosion related to access roads within the cemetery and hard transformation of the actual gravesites may increase surfacewater flow.	2	2	2	2	3	2	22	-	Low	▪ An approved Stormwater Management Plan should be implemented before operation occurs. ▪ Where possible, indigenous vegetation must be returned. ▪ Soil stockpiles should be grassed with an indigenous mix and rehabilitated to prevent soil loss through wind and water erosion before operation phase begins. ▪ Berms are required in areas where water concentrates. ▪ A six monthly check of the area should take place for the emergence erosion gullies, and if gullies appear must be rehabilitated immediately.	2	2	1	2	3	2	20	-	Low
Biodiversity loss due to operation phase	Biodiversity is likely to be lost during the operation phase of the cemetery as regular grave sites will be dug. This can be partly mitigated if CBA: Optimal and	2	4	3	3	3	2	-	30	Medium	▪ A post construction monitoring programme to ensure that rehabilitation efforts are successful and that edge effects are reduced. ▪ Monthly monitoring of these sensitive areas should take	2	2	1	2	1	3	24	-	Medium

	wetland areas are avoided										place during the first year after construction to ensure that rehabilitation is successful. ▪ Six monthly checks of the area should take place for the emergence of invader species.									
Vegetation	Establishment and spread of alien invasive plant species due disturbance vectors	2	4	3	3	3	2	-	30	Medium	▪ Compile and implement Alien Invasive Management Plan. ▪ Rehabilitate disturbed areas.	1	2	2	2	3	1	10	-	Low
Decommissioning Phase																				
It is anticipated that decommissioning phase impacts will mirror the construction and operation phase impacts. As such, construction and operation phase impacts must be implemented should the Dannhauser Cemetery be decommissioned.																				

Table 20: Impact descriptions for the Durnacol Site Alternative

ENVIRONMENTAL PARAMETER	ISSUE / IMPACT / ENVIRONMENTAL EFFECT/ NATURE	ENVIRONMENTAL SIGNIFICANCE BEFORE MITIGATION									RECOMMENDED MITIGATION MEASURES	ENVIRONMENTAL SIGNIFICANCE AFTER MITIGATION								
		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S		E	P	R	L	D	I / M	TOTAL	STATUS (+ OR -)	S
Planning and Design Phase																				
No sensitive areas were identified at the Durnacol Site																				
Construction Phase																				
Indigenous natural vegetation	Loss, degradation or fragmentation of vegetation through direct clearing	2	3	2	1	3	2	22	-	Low	▪ Footprint of the activity must be strictly adhered to. ▪ A site specific Environmental Management Programme must be developed for the construction and operation phases. ▪ An Environmental Control Officer (ECO) must be appointed for the	2	2	1	1	2	2	16	-	Low

											duration of construction. ▪ Permits for plants collection/removal should be obtained prior to search and rescue operations. ▪ Vegetation clearance in the construction phase is to be remove in a phased approach, as and when it becomes necessary as vegetation harbours fauna. ▪ Sensitive areas should be demarcated clearly before construction commences. ▪ Areas outside of the construction zone are to be designated as "no-go areas."									
Transformation of habitat for flora	Hard transformation of the access road and built infrastructure will result in a marginal reduction in flora. Construction activities will result in the disturbance of the soil surface, and this often leads to the establishment of	1	3	2	2	3	3	33	-	Medium	▪ Footprint must be a strictly adhered to. ▪ Where possible, indigenous vegetation must be retained. ▪ Clearance for construction should be done in a phased approach, and rehabilitation should be done as soon as work has ceased along the section of routing.	2	2	1	1	2	2	16	-	Low

	alien invasive plant species.										▪ Where possible, construction should occur in the dry season to prevent soil loss through stormwater. ▪ Where possible, manual clearance of the vegetation should be done so as to prevent the unnecessary movement of machinery in no-go areas. ▪ The contractor should implement an alien invasive control programme, particularly in areas where soil disturbance occurs. ▪ Soil stockpiles should be grassed with an indigenous mix or covered with shadecloth to prevent soil loss through wind and water erosion. ▪ Strictly no trapping or hunting of fauna is allowed. ▪ All open excavations should be checked on a daily basis and any fauna that may be stranded will have to be caught and									

											released by a qualified person. ▪ Rehabilitation should take place as soon as construction of the section of line is complete. ▪ Strictly no littering. The contractor should highlight this at daily toolbox talks and site clean-ups should occur on a daily basis. ▪ A mix of indigenous grass species, should be used for rehabilitation.									
Erosion related impacts	Vegetation binds and protects the soil surface, and when removed, increases erosion potential. This may lead to water and wind removing vital topsoil and blocking up drains and eventually clogging roadsides and drainage lines.	1	3	2	2	2	2	20	-	Low	▪ An approved Stormwater Management Plan should be implemented before construction occurs. ▪ Where possible, indigenous vegetation must be retained. ▪ Vegetation should be cleared only when construction occurs in that section of the routing. ▪ Soil stockpiles should be grassed with an indigenous mix or covered with shadecloth to prevent soil loss through wind and water erosion.	1	2	1	2	1	2	14	-	Low

											▪ Rehabilitation should take place as soon as construction is complete. ▪ In areas of steeper gradient, access roads should have erosion berms to prevent soil loss. ▪ Construction activities should be limited to the winter months to prevent loss of soil to water runoff. ▪ Spraying of the soil surface should occur when working in dusty conditions.									
Habitat transformation and fragmentation for fauna	Continued transformation of vegetation in the area will result in a marginal reduction in flora and fauna for the area. Disturbance of the soil surface and a leads to the establishment of alien invasive plant species. Continued transformation of the land results in habitat fragmentation, where edge effects decrease suitable habitat for a wide range of fauna in the area. This	2	3	2	2	2	3	33	-	Medium	▪ Construction footprint must be a strictly adhered to. ▪ Clearance of land and vegetation is not allowed, unless clearance occurs within the authorised project area. ▪ Areas outside of the construction zone must be demarcated as “no-go” areas. ▪ Where possible, indigenous vegetation must be retained. ▪ Manual clearance of alien and invasive vegetation should be done so as to	2	2	1	2	1	2	16	-	Low

	leads to an overall indirect decline in faunal dversity.										prevent the unnecessary movement of machinery in no-go areas. ▪ An alien and invasive control programme should implemented, particularly in areas where soil disturbance has occured. ▪ Soil stockpiles should be returned to the excavations, with the subsoil being placed first, followed by the topsoil. ▪ Monthly ECO auditing should occur during rehabilitation of the site. Once rehabilitation is complete, one three month, and one six month follow up audit should be conducted to assess the state of rehabilitation.									
Terrestrial fauna	Displacement of individuals	2	3	2	2	2	3	33	-	Medium	▪ The ECO should do a site walk through prior to construction commencing, to identify breeding or nesting fauna. Should these species be identified, permits for the capture and relocation	1	1	1	1	1	1	6	-	Low

											must be applied for and a search and rescue must take place by a qualified Ecologist / Zoologist									
Operational Phase																				
Erosion related impacts for operation phase	Erosion related to access roads within the cemetery and hard transformation of the actual gravesites may increase surfacewater flow.	2	2	2	2	3	2	22	-	Low	▪ An approved Stormwater Management Plan should be implemented before operation occurs. ▪ Where possible, indigenous vegetation must be returned. ▪ Soil stockpiles should be grassed with an indigenous mix and rehabilitated to prevent soil loss through wind and water erosion before operation phase begins. ▪ Berms are required in areas where water concentrates. ▪ A Six month check of the area should take place for the emergence erosion gullies, and if gullies emerge, will need to be rehabilitated immediately.	2	2	1	2	3	2	20	-	Low

Biodiversity loss due to operation phase	Biodiversity is likely to be lost during the operation phase of the cemetery as regular grave sites will be dug.	2	3	3	2	3	2	-	26	Medium	▪ A post construction monitoring programme to ensure that rehabilitation efforts are successful and that edge effects are reduced. ▪ Monthly monitoring of these sensitive areas should take place during the first year after construction to ensure that rehabilitation is successful. ▪ Six monthly checks of the area should take place for the emergence of invader species.	2	2	1	2	1	2	16	-	Medium
Vegetation	Establishment and spread of alien invasive plant species due disturbance vectors	2	3	3	2	2	2	-	24	Low	▪ Compile and implement Alien Invasive Management Plan. ▪ Rehabilitate disturbed areas.	1	2	2	2	3	1	10	-	Low
Decommissioning Phase																				
It is anticipated that decommissioning phase impacts will mirror the construction and operation phase impacts. As such, construction and operation phase impacts must be																				

implemented should the Dannhauser Cemetery be decommissioned.																			

8.8. *Comparitive Assessment of Alternatives*

The respective alternatives being considered as part of the EIA process for the proposed development must be comparatively assessed as per the table provided by SiVEST.

Key

PREFERRED	The alternative will result in a low impact / reduce the impact / result in a positive impact
FAVOURABLE	The impact will be relatively insignificant
LEAST PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Table 21: Comparitive assessment between the Try Again Farm and Durnacol Site

Alternative	Preference	Reasons (incl. potential issues)
Try Again Farm	**LEAST PREFERRED**	As discussed in Section 7.1.1, the Try Again Farm site is shown to have a medium plant diversity with the vegetation type indicative of Northern KZN Moist Grassland which has been classified as Vulnerable. Protected plant species also occur on this site. There are also NFEPA wetlands on site which potentially house faunal species of conservation concern. Additionally, a portion of the Try Again Farm has been classified as CBA: Optimal. The potential biodiversity loss is greater for the Try Again Farm in comparison to the Durnacol Site. Lastly, the impact assessment has shown that the impact on biodiversity is expected to be a medium negative effect (31.3) for the Try Again Farm site in comparison to the negative medium effect (26.9) at the Durnacol Site.

Alternative	Preference	Reasons (incl. potential issues)
Durnacol Site	**PREFERRED**	Although some species of conservation concern may occur at the Durnacol Site, historical disturbance from mining operations and potential overgrazing from livestock in the area has resulted in a decreased plant diversity. Consequently, faunal diversity is also lower at the Durnacol Site. A lack of CBA areas and classified NFEPA wetlands (please refer to wetland report for actual delineations) also reduces the sensitivity of this site. Although negative effects associated with construction phase, but mostly related to operation phase will occur, the disturbance of this site would not severly impact on the biodiversity in the general area. It is for these reasons that the Durnacol Site is the preferred option.

8.9. *Impact Statement*

The proposed development will result in a medium loss to biodiversity at a site level, however this loss can be largely mitigated to a low level, provided the mitigation measures are implemented. Loss of biodiversity and potential species of conservation concern is possible due to the permanent transformation associated with a graveyard. Although a loss of biodiversity at a site level may occur, none of the loss is predicted to have a negative effect on the species of conservation concern population as the faunal species will move to adjacent areas and plant salvage, with permits for the relocation of protected species, must be undertaken before for construction and operation phases.

The preferred Durnacol graveyard site is supported by the Ecologist as this site has a lower level of biodiversity and lacks CBA: Optimal and NFEPA wetlands on site. No fatal flaws have been identified and the Ecologist supports the proposed development provided the mitigation measures are implemented.

9. CONCLUSIONS

It is important to mention that additional species may have been overlooked during the field survey because of the plant life history characteristics exhibited by certain plant species during this time of the season. Some species, especially the plants which have underground bulbs, may not have emerged due variations in their life strategies. However, it is the Ecologist's opinion that the vegetation that was recorded from the site assessment provides enough information in order for inferences and extrapolations as to the quality, and the likely impacts associated with a development of this nature, to be made.

When development does take place, and indigenous plants will have to be removed or relocated, permits for their removal must to be obtained from DAFF and Ezemvelo KZN Wildlife. The removal should occur during their dormant growth period months and with due care informed by a Translocation Plan, preferably complied by a qualified botanist or similarly qualified individual.

The plants should be relocated into areas with the same aspect, soil conditions and elevation to ensure that the relocations are successful. In addition, the plants should be placed into good-sized holes that are at least twice the size of underground organs. It is very important for survival for underground organs not to be damaged and for plants to be watered for a period of time. Bulbs, however, are able to withstand a relatively high level of disturbance, given their survival strategy of storing the required reserve resources in the bulb. These species will likely re- generate following their excavation and replacement. Any applicable approvals/permits/consents/licenses relating to the environment should be in place prior to any site clearing and development. Good housekeeping and management of the construction impacts will see no or very limited impact on the surrounding environment.

From a faunal perspective, the study area, including both graveyard sites, has a medium conservation value. This is based on the potential for the sites to harbour some species of conservation concern, which were not identified during the assessment, potentially as a result of the sampling time of year. Habitat for foraging is present in areas near the site, and so faunal species can move to adjacent areas during construction and operation. This is unlikely to affect the status of species of conservation concern. It is not aniticipated that the proposed construction and operation will have a long term negative effect on the fauna of the area. The fauna of the site is directly dependent on the vegetation of the site, and the careful management of the vegetation (and soil) should not result in a reduction of faunal species of conservation concern in the greater area.

The overall area is natural but diversity is medium at the Try Again Farm and therefore has a medium conservation value. Although species identified in the DFFE Screening Tool may be present on site (although only a few according to the POC table), the of operation of the graveyard potentially results in the loss in habitat for these species, especially if mitigation measures are not implemented. Further to this, species identified in the TSCP Minset dataset mirror those of the DFFE Screening Tool. The NFEPA

Wetlands and CBA: Optimal areas at Try Again Farm must be avoided with a minimum 32m wide buffer, with the Try Again Farm preferably being removed as a feasible option. It is for these reasons that the preferred site is the Durnacol Site as a lower conservation level and higher level of existing disturbance is apparent.

The ecologist has no objection to the development provided all mitigation measures are implemented, and that the Durnacol Site is chosen as the preferred location.

10. RECOMMENDATIONS

Should any development take place the following are recommended but not limited to:

- ✓ Permits for the removal and relocation of plants (DAFF and EKZNW) must be in place before any construction can commence;
- ✓ A translocation plan should inform the relocation of indigenous plants; including storing protected plants within an onsite plant storage area or for rehabilitation purposes. To be decided upon by the DAFF / EKZNW permit requirements.
- ✓ The appointed ECO should do a site walk through prior to construction commencing to search for breeding and nesting fauna. Should these be identified, a search and rescue operation by a suitably qualified person, must be undertaken before construction commences;
- ✓ Unused areas must be maintained in their natural state until such time as the area is required for graves. Once surrounding areas have been used for graves, these areas must be rehabilitated and maintained in a tidy state with the assistance of an Alien Invasive Control Programme;
- ✓ An Alien Invasive Control Programme must be implemented.
- ✓ Erosion control measures and a Stormwater Management Plan must be implemented;
- ✓ Construction and operation must occur in a phased approach;
- ✓ Care must be taken that veld fires are not started; and,
- ✓ No biodiversity offset plan is recommended.

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Appendix 1 Floral Species list

Scientific Name	Common Name	Origin	Growth Form	Status	Try Again Farm	Durnacol Site
Cirsium vulgare (Savi) Ten.	Canada Thistle	Alien	Herb	1b		X
Verbena bonariensis L.	Purple Top	Indigenous	Herb	1b	X	X
Solanum sisymbriifolium Lam.	Wild tomato	Alien	Shrub	1b		X
Eucalyptus grandis W. Hill ex Maiden	Rose gum	Alien	Tree	1b	X	
Boophone disticha (L.f.) Herb.	Candelabra Flower	Indigenous	Bulb	Protected EKZNW	X	X
Hypoxis hemerocallidea Fisch., C.A.Mey. & Avé-Lall.	Yellow Star	Indigenous	Bulb	Protected EKZNW	X	X
Kniphofia spp			Herb	Protected EKZNW	X	
Acanthospermum australe (Loefl.) Kuntze	Burweed	Alien	Creeping herb			X
Aristida congesta Roem. & Schult. subsp. congesta	Buffalo Grass	Indigenous	Grass		X	
Aristida junciformis Trin. & Rupr. subsp. junciformis	Gongoni Grass	Indigenous	Grass		X	X
Cymbopogon caesius (Hook. & Arn.) Stapf	Broad leaf turpentine grass	Indigenous	Grass		X	X
Cynodon dactylon (L.) Pers.	Bermuda grass	Indigenous	Grass			X
Digitaria monodactyla (Nees) Stapf	One-finger Grass	Indigenous	Grass		X	
Eragrostis curvula (Schrad.) Nees	African Love Grass	Indigenous	Grass		X	X
Eragrostis racemosa (Thunb.) Steud.	Narrow Heart Love Grass	Indigenous	Grass		X	
Hyparrhenia hirta (L.) Stapf	Thatch Grass	Indigenous	Grass		X	X
Hyperthelia dissoluta (Nees ex Steud.) Clayton	Yellowthatching Grass	Indigenous	Grass		X	
Melinis repens (Willd.) Zizka	Natal red top	Indigenous	Grass			X
Panicum maximum Jacq	Guinea grass	Indigenous	Grass		X	
Sporobolus africanus (Poir.) Robyns & Tournay	Rat's Tail Dropseed	Indigenous	Grass		X	X
Sporobolus pyramidalis P.Beauv.	Cat's Tail Dropseed	Indigenous	Grass		X	X
Themeda triandra Forssk.	Red Grass	Indigenous	Grass		X	
Berkheya onopordifolia (DC.) O.Hoffm. ex Burtt Davy var. onopordifolia	Mohato	Indigenous	Herb			X
Commelina africana L. var. africana	Common Yellow Commelina	Indigenous	Herb		X	
Gomphrena celosiodes Mart.	Batchelor's Button	Alien	Herb			X
Helichrysum aureonitens Sch.Bip.	Golden Everlasting	Indigenous	Herb		X	
Helichrysum nudifolium (L.) Less. var. pilosellum (L.f.) Beentje	Hairy everlasting	Indigenous	Herb		X	
Helichrysum rugulosum Less.	Marotole	Indigenous	Herb		X	X
Hermannia geniculata Eckl. & Zeyh.		Indigenous	Herb		X	

Scientific Name	Common Name	Origin	Growth Form	Status	Try Again Farm	Durnacol Site
Hilliardiella aristata (DC.) H.Rob.	Silver Vernonia	Indigenous	Herb		X	
Hypochaeris radicata L.	Spotted Cat's Ear	Alien	Herb			X
Nemesia denticulata (Benth.) Grant ex Fourc.	Leeubekkie	Indigenous	Herb		X	
Ocimum obovatum E.Mey. ex Benth. subsp. obovatum var. obovatum	cat's whiskers	Indigenous	Herb		X	X
Pachycarpus concolor E.Mey. subsp. concolor	Astral Pachycarpus	Indigenous	Herb		X	
Ranunculus multifidus Forssk.	Common Buttercup	Indigenous	Herb		X	X
Scabiosa columbaria L.	Wild Scabiosa	Indigenous	Herb			X
Taraxacum officinale Webb	Dandelion	Alien	Herb		X	X
Zornia capensis Pers. subsp. capensis	Caterpillar Bean	Indigenous	Herb		X	
Solanum elaeagnifolium Cav.	Silverleaf Bitter Apple	Alien	Shrub			X
Berkheya spp.					X	X
Tephrosia spp.					X	

Appendix 2 SABAP2 Species List
Bold species are species identified during the assessment

Common group	Scientific Name	Common Name	Red List Status (Regional; Global)	fp	fpn	fp last	Presence (marked with X)
Crane	*Balearica regulorum*	Grey Crowned Crane	EN, EN	29	2	2009/11/05	
Rock-thrush	*Monticola explorator*	Sentinel Rock-thrush	LC, NT	14	1	2011/11/24	
Crane	*Anthropoides paradiseus*	Blue Crane	NT, VU	14	1	2009/11/05	
Korhaan	*Eupodotis senegalensis*	White-bellied Korhaan	VU, LC	14	1	2011/11/24	
Bustard	*Neotis denhami*	Denham's Bustard	VU, NT	14	1	2011/09/17	
Ibis	*Geronticus calvus*	Southern Bald Ibis	VU, VU	29	2	2017/08/03	
Babbler	*Turdoides jardineii*	Arrow-marked Babbler	LC	14	1	2010/12/04	
Barbet	*Lybius torquatus*	Black-collared Barbet	LC	14	1	2017/08/03	
Barbet	*Trachyphonus vaillantii*	Crested Barbet	LC	43	3	2017/08/03	
Batis	*Batis molitor*	Chinspot Batis	LC	14	1	2009/11/05	
Bishop	*Euplectes orix*	Southern Red Bishop	LC	57	4	2017/08/03	
Bokmakierie	*Telophorus zeylonus*	Bokmakierie Bokmakierie	LC	14	1	2017/08/03	
Bulbul	*Pycnonotus tricolor*	Dark-capped Bulbul	LC	71	5	2017/08/03	**X**
Bunting	*Emberiza flaviventris*	Golden-breasted Bunting	LC	14	1	2011/11/24	
Buzzard	*Buteo buteo*	Steppe Buzzard	LC	14	1	2009/12/17	
Canary	*Crithagra atrogularis*	Black-throated Canary	LC	29	2	2009/12/17	
Canary	*Serinus canicollis*	Cape Canary	LC	14	1	2011/05/06	
Canary	*Crithagra mozambica*	Yellow-fronted Canary	LC	14	1	2009/12/17	**X**
Chat	*Myrmecocichla formicivora*	Anteating Chat	LC	29	2	2016/10/12	**X**
Chat	*Campicoloides bifasciata*	Buff-streaked Chat	LC	14	1	2011/11/24	
Chat	*Cercomela familiaris*	Familiar Chat	LC	14	1	2016/09/21	**X**
Cisticola	*Cisticola tinniens*	Levaillant's Cisticola	LC	57	4	2011/09/17	**X**
Cisticola	*Cisticola juncidis*	Zitting Cisticola	LC	29	2	2009/12/17	**X**
Cisticola	*Cisticola textrix*	Cloud Cisticola	LC	29	2	2011/11/24	
Cliff-swallow	*Petrochelidon spilodera*	South African Cliff-swallow	LC	57	4	2016/10/12	**X**
Coot	*Fulica cristata*	Red-knobbed Coot	LC	86	6	2017/08/03	
Cormorant	*Microcarbo africanus*	Reed Cormorant	LC	71	5	2017/08/03	
Cormorant	*Phalacrocorax lucidus*	White-breasted Cormorant	LC	29	2	2013/09/23	
Crow	*Corvus capensis*	Cape Crow	LC	29	2	2017/08/03	**X**

Common group	Scientific Name	Common Name	Red List Status (Regional; Global)	fp	fpn	fp last	Presence (marked with X)
Crow	*Corvus albus*	Pied Crow	LC	0	0	-	
Cuckoo	*Chrysococcyx caprius*	Diderick Cuckoo	LC	43	3	2010/12/04	
Cuckoo	*Cuculus solitarius*	Red-chested Cuckoo	LC	14	1	2010/12/04	
Darter	*Anhinga rufa*	African Darter	LC	57	4	2017/08/03	
Dove	*Streptopelia senegalensis*	Laughing Dove	LC	86	6	2017/08/03	**X**
Dove	*Streptopelia semitorquata*	Red-eyed Dove	LC	100	7	2017/08/03	**X**
Dove	*Columba livia*	Rock Dove	LC	43	3	2017/08/03	
Drongo	*Dicrurus adsimilis*	Fork-tailed Drongo	LC	86	6	2017/08/03	
Duck	*Dendrocygna viduata*	White-faced Duck	LC	57	4	2017/08/03	
Duck	*Anas undulata*	Yellow-billed Duck	LC	100	7	2017/08/03	
Duck	*Anas sparsa*	African Black Duck	LC	14	1	2008/05/28	
Eagle	*Hieraaetus wahlbergi*	Wahlberg's Eagle	LC	14	1	2009/12/17	
Eagle-owl	*Bubo africanus*	Spotted Eagle-owl	LC	14	1	2008/05/28	
Egret	*Bubulcus ibis*	Cattle Egret	LC	86	6	2017/08/03	**X**
Egret	*Ardea intermedia*	Yellow-billed Egret	LC	57	4	2016/10/12	
Egret	*Egretta garzetta*	Little Egret	LC	14	1	2011/11/24	
Falcon	*Falco amurensis*	Amur Falcon	LC	0	0	-	
Fiscal	*Lanius collaris*	Common (Southern) Fiscal	LC	100	7	2017/08/03	**X**
Fish-eagle	*Haliaeetus vocifer*	African Fish-eagle	LC	29	2	2017/08/03	
Flycatcher	*Sigelus silens*	Fiscal Flycatcher	LC	29	2	2017/08/03	
Flycatcher	*Muscicapa striata*	Spotted Flycatcher	LC	29	2	2010/12/04	
Goose	*Alopochen aegyptiaca*	Egyptian Goose	LC	100	7	2017/08/03	**X**
Goose	*Plectropterus gambensis*	Spur-winged Goose	LC	43	3	2011/09/17	
Grassbird	*Sphenoeacus afer*	Cape Grassbird	LC	14	1	2008/12/20	**X**
Grebe	*Tachybaptus ruficollis*	Little Grebe	LC	57	4	2017/08/03	
Guineafowl	*Numida meleagris*	Helmeted Guineafowl	LC	57	4	2011/09/17	
Hamerkop	*Scopus umbretta*	Hamerkop Hamerkop	LC	43	3	2008/12/20	
Heron	*Ardea melanocephala*	Black-headed Heron	LC	86	6	2017/08/03	**X**
Heron	*Ardea goliath*	Goliath Heron	LC	14	1	2016/10/12	

Common group	Scientific Name	Common Name	Red List Status (Regional; Global)	fp	fpn	fp last	Presence (marked with X)
Heron	*Ardea cinerea*	Grey Heron	LC	29	2	2011/05/06	
Heron	*Ardea purpurea*	Purple Heron	LC	43	3	2011/09/17	
Honeyguide	*Indicator indicator*	Greater Honeyguide	LC	14	1	2010/12/04	
Hoopoe	*Upupa africana*	African Hoopoe	LC	14	1	2017/08/03	
Ibis	*Threskiornis aethiopicus*	African Sacred Ibis	LC	71	5	2017/08/03	**X**
Ibis	*Bostrychia hagedash*	Hadeda Ibis	LC	100	7	2017/08/03	**X**
Ibis	*Plegadis falcinellus*	Glossy Ibis	LC	0	0	-	
Jacana	*Actophilornis africanus*	African Jacana	LC	14	1	2016/10/12	
Kestrel	*Falco rupicolus*	Rock Kestrel	LC	14	1	2009/11/07	
Kingfisher	*Alcedo cristata*	Malachite Kingfisher	LC	29	2	2011/09/17	
Kingfisher	*Ceryle rudis*	Pied Kingfisher	LC	14	1	2009/11/07	
Kite	*Elanus caeruleus*	Black-shouldered Kite	LC	57	4	2011/05/06	
Lapwing	*Vanellus armatus*	Blacksmith Lapwing	LC	86	6	2017/08/03	
Lapwing	*Vanellus coronatus*	Crowned Lapwing	LC	29	2	2017/08/03	
Lapwing	*Vanellus senegallus*	African Wattled Lapwing	LC	14	1	2011/11/24	
Lark	*Calandrella cinerea*	Red-capped Lark	LC	14	1	2011/09/17	
Lark	*Mirafra africana*	Rufous-naped Lark	LC	29	2	2009/12/17	**X**
Lark	*Certhilauda semitorquata*	Eastern Long-billed Lark	LC	14	1	2009/11/05	
Lark	*Chersomanes albofasciata*	Spike-heeled Lark	LC	14	1	2011/11/24	
Longclaw	*Macronyx capensis*	Cape Longclaw	LC	43	3	2011/09/17	**X**
Mannikin	*Lonchura cucullata*	Bronze Mannikin	LC	14	1	2016/09/21	
Martin	*Riparia cincta*	Banded Martin	LC	14	1	2009/12/17	
Martin	*Riparia paludicola*	Brown-throated Martin	LC	57	4	2011/05/06	
Masked-weaver	*Ploceus velatus*	Southern Masked-weaver	LC	100	7	2017/08/03	
Moorhen	*Gallinula chloropus*	Common Moorhen	LC	14	1	2008/05/28	
Mousebird	*Urocolius indicus*	Red-faced Mousebird	LC	14	1	2011/09/17	
Mousebird	*Colius striatus*	Speckled Mousebird	LC	86	6	2017/08/03	
Myna	*Acridotheres tristis*	Common Myna	LC	86	6	2017/08/03	
Neddicky	*Cisticola fulvicapilla*	Neddicky Neddicky	LC	29	2	2009/12/17	**X**

Common group	Scientific Name	Common Name	Red List Status (Regional; Global)	fp	fpn	fp last	Presence (marked with X)
Oriole	*Oriolus larvatus*	Black-headed Oriole	LC	57	4	2011/09/17	
Palm-swift	*Cypsiurus parvus*	African Palm-swift	LC	43	3	2010/12/04	
Paradise-flycatcher	*Terpsiphone viridis*	African Paradise-flycatcher	LC	14	1	2009/12/17	
Pigeon	*Columba guinea*	Speckled Pigeon	LC	86	6	2017/08/03	
Pipit	*Anthus cinnamomeus*	African Pipit	LC	57	4	2011/09/17	**X**
Pipit	*Anthus similis*	Nicholson's Pipit	LC	14	1	2009/12/17	
Plover	*Charadrius tricollaris*	Three-banded Plover	LC	29	2	2017/08/03	
Pochard	*Netta erythrophthalma*	Southern Pochard	LC	0	0	-	
Quelea	*Quelea quelea*	Red-billed Quelea	LC	71	5	2017/08/03	
Reed-warbler	*Acrocephalus baeticatus*	African Reed-warbler	LC	14	1	2016/10/12	
Reed-warbler	*Acrocephalus arundinaceus*	Great Reed-warbler	LC	14	1	2008/12/20	
Robin-chat	*Cossypha caffra*	Cape Robin-chat	LC	43	3	2017/08/03	
Sandpiper	*Actitis hypoleucos*	Common Sandpiper	LC	14	1	2013/09/23	
Scimitarbill	*Rhinopomastus cyanomelas*	Common Scimitarbill	LC	14	1	2011/11/24	
Seedeater	*Crithagra gularis*	Streaky-headed Seedeater	LC	14	1	2011/11/24	
Shelduck	*Tadorna cana*	South African Shelduck	LC	14	1	2011/05/06	
Shoveler	*Anas smithii*	Cape Shoveler	LC	14	1	2009/11/07	
Snake-eagle	*Circaetus pectoralis*	Black-chested Snake-eagle	LC	14	1	2011/11/24	
Sparrow	*Passer melanurus*	Cape Sparrow	LC	43	3	2017/08/03	
Sparrow	*Passer domesticus*	House Sparrow	LC	71	5	2017/08/03	
Sparrow	*Passer diffusus*	Southern Grey-headed Sparrow	LC	29	2	2010/12/04	
Spoonbill	*Platalea alba*	African Spoonbill	LC	71	5	2016/10/12	
Spurfowl	*Pternistis swainsonii*	Swainson's Spurfowl	LC	29	2	2010/12/04	
Starling	*Lamprotornis nitens*	Cape Glossy Starling	LC	71	5	2017/08/03	
Starling	*Lamprotornis bicolor*	Pied Starling	LC	57	4	2017/08/03	
Starling	*Onychognathus morio*	Red-winged Starling	LC	14	1	2017/08/03	
Stonechat	*Saxicola torquatus*	African Stonechat	LC	57	4	2017/08/03	**X**
Sunbird	*Cinnyris afer*	Greater Double-collared Sunbird	LC	14	1	2010/12/04	
Sunbird	*Chalcomitra amethystina*	Amethyst Sunbird	LC	71	5	2016/09/21	

Common group	Scientific Name	Common Name	Red List Status (Regional; Global)	fp	fpn	fp last	Presence (marked with X)
Swallow	*Hirundo rustica*	Barn Swallow	LC	43	3	2010/12/04	**X**
Swallow	*Cecropis cucullata*	Greater Striped Swallow	LC	57	4	2016/10/12	**X**
Swallow	*Hirundo albigularis*	White-throated Swallow	LC	43	3	2011/09/17	
Swamphen	*Porphyrio madagascariensis*	African Purple Swamphen	LC	29	2	2009/12/17	
Swift	*Apus barbatus*	African Black Swift	LC	0	0	-	
Swift	*Apus affinis*	Little Swift	LC	14	1	2009/11/07	
Swift	*Apus caffer*	White-rumped Swift	LC	14	1	2009/12/17	
Teal	*Anas erythrorhyncha*	Red-billed Teal	LC	29	2	2011/09/17	
Thick-knee	*Burhinus capensis*	Spotted Thick-knee	LC	14	1	2007/12/22	
Thrush	*Turdus smithi*	Karoo Thrush	LC	14	1	2009/11/05	
Turtle-dove	*Streptopelia capicola*	Cape Turtle-dove	LC	86	6	2017/08/03	**X**
Wagtail	*Motacilla capensis*	Cape Wagtail	LC	86	6	2017/08/03	**X**
Warbler	*Phylloscopus trochilus*	Willow Warbler	LC	14	1	2009/12/17	
Waxbill	*Estrilda astrild*	Common Waxbill	LC	43	3	2010/12/04	
Weaver	*Ploceus capensis*	Cape Weaver	LC	57	4	2011/09/17	
Weaver	*Ploceus cucullatus*	Village Weaver	LC	57	4	2016/09/21	
Wheatear	*Oenanthe monticola*	Mountain Wheatear	LC	14	1	2009/11/05	
White-eye	*Zosterops virens*	Cape White-eye	LC	14	1	2011/05/06	
Whydah	*Vidua macroura*	Pin-tailed Whydah	LC	71	5	2017/08/03	
Widowbird	*Euplectes axillaris*	Fan-tailed Widowbird	LC	57	4	2016/10/12	**X**
Widowbird	*Euplectes progne*	Long-tailed Widowbird	LC	86	6	2016/10/12	
Widowbird	*Euplectes ardens*	Red-collared Widowbird	LC	14	1	2013/09/23	
Wood-hoopoe	*Phoeniculus purpureus*	Green Wood-hoopoe	LC	43	3	2017/08/03	
Wryneck	*Jynx ruficollis*	Red-throated Wryneck	LC	43	3	2016/09/21	

Appendix 3 ReptileMAP Species List

Scientific name	Common name	Red list category	Number of records	Last recorded
Chamaeleo dilepis	Common Flap-neck Chameleon	Least Concern (SARCA 2014)	1	1900/06/15
Dasypeltis scabra	Rhombic Egg-eater	Least Concern (SARCA 2014)	2	1900/06/15
Hemachatus haemachatus	Rinkhals	Least Concern (SARCA 2014)	2	1900/06/15
Gerrhosaurus flavigularis	Yellow-throated Plated Lizard	Least Concern (SARCA 2014)	3	1900/06/15
Aparallactus capensis	Black-headed Centipede-eater	Least Concern (SARCA 2014)	1	1900/06/15
Boaedon capensis	Brown House Snake	Least Concern (SARCA 2014)	1	1900/06/15
Lamprophis aurora	Aurora House Snake	Least Concern (SARCA 2014)	1	1900/06/15
Lycodonomorphus laevissimus	Dusky-bellied Water Snake	Least Concern (SARCA 2014)	1	1900/06/15
Lycodonomorphus rufulus	Brown Water Snake	Least Concern (SARCA 2014)	2	1900/06/15
Psammophis brevirostris	Short-snouted Grass Snake	Least Concern (SARCA 2014)	1	1900/06/15
Psammophylax rhombeatus	Spotted Grass Snake	Least Concern (SARCA 2014)	2	1900/06/15
Pseudaspis cana	Mole Snake	Least Concern (SARCA 2014)	2	1900/06/15
Bitis arietans arietans	Puff Adder	Least Concern (SARCA 2014)	2	1900/06/15
Causus rhombeatus	Rhombic Night Adder	Least Concern (SARCA 2014)	3	2008/12/24

Appendix 4 FrogMAP Species List

Scientific name	Common name	Red list category	Number of records	Last recorded
Breviceps adspersus	Bushveld Rain Frog	Least Concern	2	1998/11/24
Schismaderma carens	Red Toad	Least Concern	5	2001/01/20
Sclerophrys capensis	Raucous Toad	Least Concern	5	2008/12/24
Sclerophrys gutturalis	Guttural Toad	Least Concern (IUCN, 2016)	11	2001/01/20
Hemisus guttatus	Spotted Shovel-nosed Frog	Vulnerable	1	2000/12/11
Hyperolius marmoratus	Painted Reed Frog	Least Concern (IUCN ver 3.1, 2013)	21	2010/11/26
Kassina senegalensis	Bubbling Kassina	Least Concern	8	2001/01/20
Xenopus laevis	Common Platanna	Least Concern	1	1960/08/30
Amietia delalandii	Delalande's River Frog	Least Concern (2017)	6	1998/03/22
Cacosternum boettgeri	Common Caco	Least Concern (2013)	6	2000/12/11
Cacosternum nanum	Bronze Caco	Least Concern (2013)	1	1998/04/10
Strongylopus fasciatus	Striped Stream Frog	Least Concern	3	1998/03/20
Tomopterna sp.			1	2007/12/25
Tomopterna cryptotis	Tremelo Sand Frog	Least Concern	4	1998/03/23
Tomopterna natalensis	Natal Sand Frog	Least Concern	8	2001/01/20
Tomopterna tandyi	Tandy's Sand Frog	Least Concern	1	1999/11/18

Appendix 5 MammalMAP Species List

Scientific name	Common name	Red list category	Number of records	Last recorded
Cryptomys hottentotus	Southern African Mole-rat	Least Concern (2016)	1	2000/03/07
Canis sp.	Jackals and Wolves		1	
Canis mesomelas	Black-backed Jackal	Least Concern (2016)	1	
Felis nigripes	Black-footed Cat	Vulnerable (2016)	1	
Felis silvestris	Wildcat	Least Concern (2016)	1	1978/07/17
Leptailurus serval	Serval	Near Threatened (2016)	2	
Proteles cristata	Aardwolf	Least Concern (2016)	2	
Aethomys ineptus	Tete Veld Aethomys	Least Concern (2016)	3	2000/03/07
Aethomys namaquensis	Namaqua Rock Mouse	Least Concern	1	1999/11/22
Gerbilliscus brantsii	Highveld Gerbil	Least Concern (2016)	3	1980/03/24
Gerbilliscus leucogaster	Bushveld Gerbil	Least Concern (2016)	1	2000/03/07
Grammomys dolichurus	Common Grammomys	Least Concern (2016)	1	1999/11/22
Lemniscomys rosalia	Single-Striped Lemniscomys	Least Concern (2016)	1	1989/08/06
Mastomys natalensis	Natal Mastomys	Least Concern (2016)	2	1999/11/22
Mus (Nannomys) minutoides	Southern African Pygmy Mouse	Least Concern	1	2000/03/07
Otomys angoniensis	Angoni Vlei Rat	Least Concern (2016)	4	2000/03/07
Otomys auratus	Southern African Vlei Rat (Grassland type)	Near Threatened (2016)	1	1988/10/28
Rattus rattus	Roof Rat	Least Concern	1	2000/03/07
Rhabdomys pumilio	Xeric Four-striped Grass Rat	Least Concern (2016)	1	2000/03/07
Mellivora capensis	Honey Badger	Least Concern (2016)	2	1997/10/01
Dendromus mesomelas	Brants's African Climbing Mouse	Least Concern (2016)	1	2000/03/07
Mystromys albicaudatus	African White-tailed Rat	Vulnerable (2016)	1	1948/05/14
Saccostomus campestris	Southern African Pouched Mouse	Least Concern (2016)	1	1999/11/22
Steatomys krebsii	Kreb's African Fat Mouse	Least Concern (2016)	1	2000/03/07
Crocidura flavescens	Greater Red Musk Shrew	Least Concern (2016)	2	2000/03/07
Crocidura silacea	Lesser Gray-brown Musk Shrew	Least Concern (2016)	1	2000/03/07
Myosorex varius	Forest Shrew	Least Concern (2016)	1	2000/03/07
Suncus infinitesimus	Least Dwarf Shrew	Least Concern (2016)	1	2000/03/07
Neoromicia capensis	Cape Serotine	Least Concern (2016)	1	

Appendix 6 LepiMAP Species List

Family	Scientific name	Common name	Red list category	Number of records	Last recorded
CRAMBIDAE	*Diasemia monostigma*		Not listed	2	2009/10/31
GEOMETRIDAE	*Mimoclystia pudicata quaggaria*		Not Threatened (NT) [not an IUCN category]	1	2009/10/31
GEOMETRIDAE	*Omphax bacoti*		Not Threatened (NT) [not an IUCN category]	1	2009/10/31
GEOMETRIDAE	*Petovia marginata*		Not Threatened (NT) [not an IUCN category]	1	2009/10/31
HESPERIIDAE	*Kedestes wallengrenii wallengrenii*	White-streaked ranger	Least Concern (SABCA 2013)	1	1880-06-15
HESPERIIDAE	*Parnara monasi*	Water watchman	Least Concern (SABCA 2013)	1	2014/04/02
LYCAENIDAE	*Actizera lucida*	Rayed blue	Least Concern (SABCA 2013)	1	2009/10/31
LYCAENIDAE	*Aloeides swanepoeli*	Grassveld russet	Least Concern (SABCA 2013)	1	2009/10/31
LYCAENIDAE	*Anthene amarah amarah*	Black-striped ciliate blue	Least Concern (SABCA 2013)	1	2009/11/01
LYCAENIDAE	*Anthene definita definita*	Steel-blue-ciliate blue	Least Concern (SABCA 2013)	1	2009/10/31
LYCAENIDAE	*Anthene minima minima*	Little ciliate blue	Least Concern (SABCA 2013)	1	1984/12/14
LYCAENIDAE	*Anthene otacilia otacilia*	Trimen's ciliate blue	Least Concern (SABCA 2013)	1	1894-01-28
LYCAENIDAE	*Axiocerses tjoane tjoane*	Eastern scarlet	Least Concern (SABCA 2013)	1	1984/12/14
LYCAENIDAE	*Azanus natalensis*	Natal babul blue	Least Concern (SABCA 2013)	4	1984/12/14
LYCAENIDAE	*Cupidopsis cissus cissus*	Meadow blue	Least Concern (SABCA 2013)	2	2009/11/01
LYCAENIDAE	*Eicochrysops messapus mahallakoaena*	Cupreous ash blue	Least Concern (SABCA 2013)	2	2009/10/31
LYCAENIDAE	*Euchrysops dolorosa*	Sabie smoky blue	Least Concern (SABCA 2013)	2	1880-05-15
LYCAENIDAE	*Lampides boeticus*	Pea blue	Least Concern (SABCA 2013)	2	2009/11/01
LYCAENIDAE	*Lepidochrysops ignota*	Zulu giant cupid	Least Concern (SABCA 2013)	1	2009/10/31
LYCAENIDAE	*Lepidochrysops patricia*	Patrician giant cupid	Least Concern (SABCA 2013)	1	2009/10/31
LYCAENIDAE	*Lepidochrysops plebeia plebeia*	Twin-spot giant cupid	Least Concern (SABCA 2013)	1	2009/10/31
LYCAENIDAE	*Leptotes pirithous pirithous*	Common zebra blue	Least Concern (SABCA 2013)	1	2009/10/31
LYCAENIDAE	*Lycaena clarki*	Eastern sorrel copper	Least Concern (SABCA 2013)	1	1880-06-15
LYCAENIDAE	*Myrina silenus ficedula*	Common fig tree blue	Least Concern (SABCA 2013)	1	2010/04/25
LYCAENIDAE	*Tarucus sybaris sybaris*	Dotted pierrot	Least Concern (SABCA 2013)	2	1894-01-25
LYCAENIDAE	*Uranothauma nubifer nubifer*	Black heart	Least Concern (SABCA 2013)	6	2009/11/01
LYCAENIDAE	*Zintha hintza hintza*	Hintza pierrot	Least Concern (SABCA 2013)	1	2009/11/01
LYCAENIDAE	*Zizeeria knysna knysna*	African grass blue	Least Concern (SABCA 2013)	2	2009/11/01
NOCTUIDAE	*Chrysodeixis chalcites*		Not listed	1	2015/05/06
NYMPHALIDAE	*Acraea horta*	Garden acraea	Least Concern (SABCA 2013)	1	2009/11/01

Family	Scientific name	Common name	Red list category	Number of records	Last recorded
NYMPHALIDAE	*Acraea neobule neobule*	Wandering donkey acraea	Least Concern (SABCA 2013)	1	2016/09/21
NYMPHALIDAE	*Byblia ilithyia*	Spotted joker	Least Concern (SABCA 2013)	1	2009/11/01
NYMPHALIDAE	*Catacroptera cloanthe cloanthe*	Pirate	Least Concern (SABCA 2013)	2	2009/11/01
NYMPHALIDAE	*Charaxes brutus natalensis*	White-barred charaxes	Least Concern (SABCA 2013)	1	2009/10/31
NYMPHALIDAE	*Danaus chrysippus orientis*	African plain tiger	Least Concern (SABCA 2013)	3	2016/09/21
NYMPHALIDAE	*Junonia hierta cebrene*	Yellow pansy	Least Concern (SABCA 2013)	2	2010/04/25
NYMPHALIDAE	*Precis archesia archesia*	Garden inspector	Least Concern (SABCA 2013)	3	2015/05/07
NYMPHALIDAE	*Precis octavia sesamus*	Southern gaudy commodore	Least Concern (SABCA 2013)	5	2016/09/20
NYMPHALIDAE	*Telchinia rahira rahira*	Marsh telchinia	Least Concern (SABCA 2013)	2	1980/11/11
NYMPHALIDAE	*Vanessa cardui*	Painted lady	Least Concern (SABCA 2013)	2	2010/04/25
NYMPHALIDAE	*Ypthima asterope asterope*	African three-ring	Least Concern (SABCA 2013)	2	1908/10/15
NYMPHALIDAE	*Ypthima impura paupera*	Impure three-ring	Least Concern (SABCA 2013)	2	1984/12/14
PAPILIONIDAE	*Papilio demodocus demodocus*	Citrus swallowtail	Least Concern (SABCA 2013)	3	2014/09/19
PAPILIONIDAE	*Papilio nireus lyaeus*	Narrow green-banded swallowtail	Least Concern (SABCA 2013)	1	2009/10/31
PIERIDAE	*Belenois aurota*	Pioneer caper white	Least Concern (SABCA 2013)	2	2010/11/26
PIERIDAE	*Colotis euippe omphale*	Southern round-winged orange tip	Least Concern (LC)	1	2009/10/31
PIERIDAE	*Eronia cleodora*	Vine-leaf vagrant	Least Concern (SABCA 2013)	1	1984/12/14
PIERIDAE	*Eurema brigitta brigitta*	Broad-bordered grass yellow	Least Concern (SABCA 2013)	5	2015/05/07
PIERIDAE	*Eurema desjardinsii regularis*	Angled grass yellow	Least Concern (SABCA 2013)	1	1984/12/14
PIERIDAE	*Eurema hecabe solifera*	Lowveld yellow	Least Concern (SABCA 2013)	1	2009/10/31

Appendix 7 CV's of specialists

Appendix 8
Desktop Assessment Methodology and Information

EZEMVELO KZN WILDLIFE C-PLAN & SEA DATABASE

The C-Plan is a systematic conservation-planning package that runs with the GIS software ArcGIS, and which analyses biodiversity features and landscape units. C-Plan is used to identify a national reserve system that will satisfy specified conservation targets for biodiversity features (*Ezemvelo KZN Wildlife*, 2010). Biodiversity features can be land classes or species, and targets that are set within area units either for land classes, or as numbers of occurrences of species for species locality data sets (*Ezemvelo KZN Wildlife*, 2010). These units or measurements are used as **surrogates** for un-sampled data. The C-Plan is an effective conservation tool when determining priority areas at a **regional level** and is being used in South Africa to identify areas of high conservation value. The SEA (Goodman, 2004) modelled the distribution of a selection of 255 red data and endemic species that have the potential to occur in the area.

Irreplaceability Analysis

The following is referenced from Goodman (2004): "The first product of the conservation planning analysis in C-Plan is an irreplaceability map of the planning area, in this case the province of KwaZulu-Natal. This map is divided into grid cells called 'Planning Units'.

Each planning unit has associated with it an 'Irreplaceability Value', which is a reflection of the planning units' importance with respect to the conservation of biodiversity. Irreplaceability reflects the planning unit's ability to meet set 'targets' for selected biodiversity 'features'. The irreplaceability value is scaled between 0 and 1.

Irreplaceability value – 0. Where a planning unit has an irreplaceability value of 0, all biodiversity features recorded here are conserved to the target amount, and there is unlikely to be a biodiversity concern with the development of the site. This of course will be subject to ground truthing to determine the biodiversity features at a finer scale.

Irreplaceability value – 1. These planning units are referred to as totally irreplaceable and the conservation of the features within them is critical to meet conservation targets. (EIA very definitely required and depending on the nature of the proposal authorisation is unlikely to be granted).

Irreplaceability value > 0 but < 1. Some of these planning units are still required to meet biodiversity conservation targets. If the value is high (e.g. 0.9) then most units are required (few options available for alternative choices). If the value is low, then many options are available for meeting the biodiversity targets. (EIA required and depending on the nature of the proposed development, permission could be granted)."

The irreplaceability units have been optimised further to create various subcategories called *Critical Biodiversity Areas* and *Ecological Support Areas* (*Ezemvelo* KZN Wildlife, 2014).

Critical Biodiversity Areas

The Critical Biodiversity Areas (CBAs) can be divided into two subcategories, namely *Irreplaceable* and *Optimal*. Each of these can in turn be subdivided into additional subcategories (**Table 22**).

The CBA categories are based on the optimised outputs derived using systematic conservation planning software, with the Planning Units (PU) identified representing the localities for which the conservation targets for one or more of the biodiversity features contained within can be achieved.

The distribution of the biodiversity features is not always applicable to the entire extent of the PU, but is more often than not confined to a specific niche habitat e.g. a forest or wetland reflected as a portion of the PU in question. In such cases, development could be considered within the PU if special mitigation measures are put in place to safeguard this feature(s) and if the nature of the development is commensurate with the conservation objectives. Obviously this is dependent on a site by site, case by case, basis.

Using C-Plan, these areas are identified through the MINSET analysis process and reflect the negotiable sites with an Irreplaceability score of less than 0.8. Within the C-Plan MINSET analysis this does not mean they are of a lower biodiversity value however, only that there are more alternate options available within which the features located within can be met. The determination of the spatial locality of these PU's is driven primarily by the Decision Support Layers.

Table 22. Summary of CBA Categories (from *Ezemvelo* KZN Wildlife, Biodiversity Spatial Planning Terms).

Category	C-Plan	MARXAN (statistical modelling package)	Expert Input/ Desktop	Biodiversity Sector and Regional Plans
CBA: Irreplaceable (SCA)	Irreplaceability = 1	No equivalent		CBA: Irreplaceable
CBA: High Irreplaceable (SCA)	Irreplaceability Score >= 0.8 and <1.0	Selection frequency value = 80% –100%		CBA: Irreplaceable
CBA: Irreplaceable Expert Input			Expert input	CBA: Irreplaceable
CBA: Irreplaceable Linkage			Desktop and expert input	CBA: Irreplaceable
CBA: Optimal (SCA)	Irreplaceability Score > 0 and < 0.8	"Best" solution from MARXAN runs less the identified CBA High Irreplaceability areas		CBA: Optimal
CBA: Optimal, High Degradation	Irreplaceability Score > 0 and < 0.8	"Best" solution from MARXAN runs less the identified CBA High Irreplaceability areas	Field Assessment	CBA: Optimal
CBA: Optimal Low Degradation	Irreplaceability Score > 0 and < 0.8	"Best" solution from MARXAN runs less the identified CBA High Irreplaceability areas	Field Assessment	CBA: Optimal
CBA: Optimal Expert Input			Expert input	CBA: Optimal

Ecological Support Areas

Ecological Support Areas (ESAs) are required to support and sustain the ecological functioning of Critical Biodiversity Areas (CBAs). For terrestrial and aquatic environments, these areas are functional but are not necessarily pristine natural areas. They are however, required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the CBAs, and contribute significantly to the maintenance of Ecological Infrastructure[2] (EI).

Landscape Corridors

A series of bio-geographic corridors were developed in KZN to facilitate evolutionary, ecological and climate change processes to create a linked landscape for the conservation of species in a fragmented landscape.

Local Corridors

Corridors were developed at a district scale to create fine scale links within the landscape that facilitate ecological processes and ensure persistence of critical biodiversity features.

BIO RESOURCE UNITS (BRU)

A Bioresource Unit is a demarcated area in which the environmental conditions such as soil, vegetation, climate and, to a lesser degree, terrain form, are sufficiently similar to permit uniform recommendations

[2] **A term referring to areas in the landscape which provide significant Ecosystem Services which contribute positively to the economy and human welfare. Examples include 'Flood mitigation' and 'Good Water Quality' (provided both by wetlands and well maintained water catchments). Ecological infrastructure is the stock of functioning ecosystems that provides a flow of essential system services to human communities – services such as the provision of fresh water, climate regulation and soil formation. Ecological infrastructure includes features such as healthy mountain catchments, rivers, wetlands, and nodes and corridors of natural grassland habitat which together form a network of interconnected structural elements within the landscape. If this ecological infrastructure is degraded or lost, the flow of ecosystem services will diminish and ecosystems will become vulnerable to shocks and disturbances, such as the impacts of climate change, unsustainable land use change and natural disasters like floods and droughts. It is important to note that when ecological infrastructure is degraded or fails, the direct monetary cost to society and government is often very high. Ecological infrastructure is, therefore, the nature-based equivalent of hard infrastructure, and is just as important for providing the vital services that underpin social development and economic activity.**

of land use and farm practices to be made, to assess the magnitude of crop yields that can be achieved, to provide a framework in which an adaptive research programme can be carried out, and to enable land users to make correct decisions (Camp, 1998).

The environmental factors defined in a BRU should give an indication of habitat suitability for both plant and animal species. On the other hand, knowing the habitat requirements of any particular species, it should be possible to map locations suitable for such species. There are 590 BRUs in KwaZulu-Natal.

Environmental Potential Atlas

The following is referenced from the Department of Environmental Affairs and Tourism (2007): The Environmental Potential Atlas (ENPAT) developed from a single map of Gauteng to a complete spatial data set of the entire South Africa.

ENPAT was updated in July 2001 and is used by the National Department of Environmental Affairs and Tourism and various provincial environmental management departments as a decision-making tool in the process of environmental impact assessments. ENPAT includes the decision-making parameters such as: high-risk development category indications and potential impacts are linked to the 1:250 000 spatial databases on national and provincial level.

The main purpose of ENPAT is to proactively indicate potential conflicts between development proposals and critical or sensitive environments. ENPAT can also be used for development planning since it indicates the environment's potential for development.

ENPAT consists of two distinct, parallel sets of information: natural or environmental characteristics, and social-economic factors. The environmental character maps depict geology, land types, soils, vegetation, and hydrology. The socio-economic factors consist of land cover, cadastral aspects and infrastructure, land use and culture.
These two sets of information are combined and assessed in terms of their potential or latent environmental sensitivity. Sensitivity is assigned based on the ability of a resource to absorb change or impact. A value of **0** indicates a **low sensitivity** - thus a high ability to accept change and a value of **1** indicates a **high sensitivity**, or a low ability to accept change. Areas of low sensitivity are thus available or suitable for development.

Mucina and Rutherford National Vegetation Types

Mucina and Rutherford (2006**)** present an up-to-date and comprehensive overview of the vegetation of South Africa and the two small neighbouring countries of Lesotho and eSwatini. This account is based on vegetation survey using appropriate tools of contemporary vegetation mapping and vegetation description. They aimed at drawing a new vegetation map that depicts the complexity and **macro-scale** ecology and reflects the level of knowledge of the vegetation of the region. This is an extensive account of the vegetation of a complex and biologically intriguing part of the world, offering not only insights into structure and dynamics of the vegetation cover, but containing a wealth of base-line data for further vegetation- ecological, biogeographical, and conservation-oriented studies. The map and the descriptive account of the vegetation of South Africa, Lesotho and Swaziland offers a powerful decision-making tool for conservationists, land and resource planners, and politicians as well as the interested public at large.

KwaZulu – Natal Vegetation Types (KZN VT)

The KZN VT was created to provide an accurate representation of the **historical extent** of the vegetation types present in KZN with the most current available information. A key issue of concern is our current lack of knowledge regarding the historical extents of both our wetland and forest biomes. Almost all vegetation mapping conducted currently only displays the current extent of the feature in question. As such, no true understanding as to rates of loss and or minimum required habitat areas required to ensure persistence can be accurately determined. This issue further influences our understanding of the grassland/savannah/bushland matrix within which these features reside. The KZN

VT map has undergone several changes since the publication of the Mucina and Rutherford (2006) national vegetation types.

Ezemvelo KZN Wildlife has, in association with various government departments, NGOs, Working Groups and Forums, municipalities and parastatals, refined the KZN VT to develop an accurate representation of the extent of the vegetation types present. As a result of the finer scale mapping and classification, KZN VT map has in some cases identified new vegetation types and or subtypes within the vegetation types identified at national level. These changes have been peer reviewed and adopted by the National Vegetation Committee, and have been incorporated into the revised South African Vegetation map.

National Freshwater Ecosystem Priority Areas (NFEPA)

NFEPA was a three-year partnership project between South African National Biodiversity Institute (SANBI), CSIR, Water Research Commission (WRC), Department of Environmental Affairs (DEA), Department of Water Affairs (DWA), Worldwide Fund for Nature (WWF), South African Institute of Aquatic Biodiversity (SAIAB) and South African National Parks (SANParks) (Van Deventer *et al.,* 2010). NFEPA map products provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. These strategic spatial priorities are known as Freshwater Ecosystem Priority Areas, or FEPAs.

FEPA maps and supporting information form part of a comprehensive approach to sustainable and equitable development of South Africa's scarce water resources. They provide a single, nationally consistent information source for incorporating freshwater ecosystem and biodiversity goals into (two) 2 planning and decision-making processes. For integrated water resource management, the maps provide guidance on how many rivers, wetlands and estuaries, and which ones, should remain in a natural or near-natural condition to support the water resource protection goals of the National Water Act (Act No. 36 of 1998; RSA, 1998a). FEPA maps are therefore directly applicable to the National Water Act, feeding into Catchment Management Strategies, classification of water resources, reserve determination, and the setting and monitoring of resource quality objectives. FEPA maps are also directly relevant to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004; RSA, 2004) (hereafter referred to as the Biodiversity Act), informing both the listing of threatened freshwater ecosystems and the process of bioregional planning provided for by this Act. FEPA maps support the implementation of the National Environmental Management: Protected Areas Act (Act No. 57 of 2003; RSA, 2003) (hereafter referred to as the Protected Areas Act) by informing the expansion of the protected area network. They also inform a variety of other policies and legislation that affect the management and conservation of freshwater ecosystems, including at the municipal level.
FEPAs are strategic spatial priorities for conserving freshwater ecosystems and supporting sustainable use of water resources. FEPAs were determined through a process of systematic biodiversity planning and were identified using a range of criteria for conserving ecosystems and associated biodiversity of rivers, wetlands and estuaries.

FEPAs are often tributaries and wetlands that support hard-working large rivers, and are an essential part of an equitable and sustainable water resource strategy. FEPAs need to stay in a good condition to manage and conserve freshwater ecosystems, and to protect water resources for human use. This does not mean that FEPAs need to be fenced off from human use, but rather that they should be supported by good planning, decision-making and management to ensure that human use does not impact on the condition of the ecosystem. The current and recommended condition for all river FEPAs is A or B ecological category (Nel et al, 2011). Wetland FEPAs that are currently in a condition lower than A or B should be rehabilitated to the best attainable ecological condition.

Appendix 8 Impact Methodology

ENVIRONMENTAL IMPACT ASSESSMENT (EIA) METHODOLOGY

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

The significance of Cumulative Impacts should also be rated (As per the Excel Spreadsheet Template).

Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 23: Rating of impacts criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		

1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula:

Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity.

The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.

Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.