

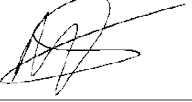



Nanza Consulting

**VEGETATION ASSESSMENT FOR
SHAYAMOYA HOUSING PROJECT, GREATER
KOKSTAD MUNICIPALITY**

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DETAILS OF SPECIALIST CONSULTANT

Date:	January 2021
Document Title:	Vegetation Assessment for Shayamoya Housing Project, Greater Kokstad Municipality
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VEGETATION ASSESSMENT FOR SHAYAMOYA HOUSING PROJECT, GREATER KOKSTAD MUNICIPALITY DRAFT REPORT

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EXECUTIVE SUMMARY

SiVEST SA (Pty) Ltd has been appointed by Nanza Consulting, to undertake the Vegetation Assessment for Phase 3 of the Shayamoya Housing Project application in line with the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998). The site falls within the Greater Kokstad Municipality, on the border of Kokstad town.

The site visit was undertaken by the Mark Summers on the 8th November 2019. The following assumptions, limitations, uncertainties are listed regarding the vegetation assessment of the site:

- The study was undertaken in early Summer however there had not been good rains, thus many species had not flowered and some bulbs were not visible above ground;
- Heavy overgrazing reduces species diversity, and the site exhibited signs of heavy overgrazing;
- 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; and
- Furthermore, any graminoid assemblage will be difficult to assess definitively as the majority of the standing sward and inflorescences are no longer available to aid in identification.

A small portion of site falls within CBA Irreplaceable and according to Mucina and Rutherford 2006 is classified as East Griqualand Grassland (Gs 12) which is a Vulnerable vegetation type. Upon undertaking the groundtruthing exercise it was found that the site is heavily transformed from natural and impacted by illegal dumping, human waste, overgrazing and informal housing.

A total of 23 plant species were recorded during the field survey, of which 3 were alien. Three (3) plant species which are protected by Provincial Legislation were noted within the development site. The plant species that fall under the protection of the KwaZulu-Natal Nature Conservation Management Act are listed below.

Provincially Protected Species:

- *Aloe maculata* All.
- *Hypoxis argentea* Harv. ex Baker var. *argentea*
- *Ledebouria ovalifolia* (Schrad.) Jessop

Although the vegetation type is **vulnerable**, the area is transformed from 'natural' and exhibits a low conservation value. Should any development take place the following is recommended but not limited to:

- ✓ Permits for the removal and relocation of plants and animals must be in place before any construction can commence;
- ✓ Translocation plan should inform the relocation of protected plants;
- ✓ A search and rescue operation, undertaken by a suitably qualified person, must be undertaken before construction commences;
- ✓ An Alien Invasive Control Programme must be implemented.
- ✓ Erosion control measures must be implemented;
- ✓ Construction must occur in a phased approach;
- ✓ Rehabilitation must occur once construction is complete in the relevant area

COMPLIANCE WITH APPENDIX 6 OF THE EIA REGULATIONS AND AMENDMENTS

Requirements of Appendix 6 – GN326 EIA Regulations of April 2017	Section of specialist report addressing requirement
1) A specialist report prepared in terms of these Regulations must contain— a. details of— i. the specialist who prepared the report; ii. the expertise of that specialist to compile a specialist report including a curriculum vitae;	See Page (i) and Appendix 2
b. a declaration that the specialist is independent in a form as may be specified by the competent authority;	See Specialist Declaration (page viii and ix)
c. an indication of the scope of, and the purpose for which, the report was prepared;	“Terms of Reference” on page x
A. an indication of the quality and age of base data used for the specialist report;	Section 5
B. a description of existing impacts on the site, cumulative impacts of the proposed development and levels of acceptable change;	Sections 9
d. the duration, date and season of the site investigation and the relevance of the season to the outcome of the assessment;	Sections 3, and 6
e. a description of the methodology adopted in preparing the report or carrying out the specialised process inclusive of equipment and modelling used;	Section 4, 5 and 6
f. details of an assessment of the specific identified sensitivity of the site related to the proposed activity or activities and its associated structures and infrastructure, inclusive of a site plan identifying site alternatives;	Section 6 and 8
g. an identification of any areas to be avoided, including buffers;	Section 10 and 11
h. a map superimposing the activity including the associated structures and infrastructure on the environmental sensitivities of the site including areas to be avoided, including buffers;	No sensitivities identified
i. a description of any assumptions made and any uncertainties or gaps in knowledge;	Page ix
j. a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives on the environment or activities;	Section 5, 6, 7, 8, 9
k. any mitigation measures for inclusion in the EMPr;	Sections 9, 10 and 11
l. any conditions for inclusion in the environmental authorisation;	Section 10 and 11
m. any monitoring requirements for inclusion in the EMPr or environmental authorisation;	Section 9, 10 and 11
n. a reasoned opinion— i) as to whether the proposed activity, activities or portions thereof should be authorised; A. regarding the acceptability of the proposed activity or activities; and ii) if the opinion is that the proposed activity, activities or portions thereof should be authorised, any avoidance, management and mitigation measures that should be included in the EMPr, and where applicable, the closure plan;	Section 10 and 11
o. a description of any consultation process that was undertaken during the course of preparing the specialist report;	Consultation will be undertaken by the EAP.
p. a summary and copies of any comments received during any consultation process and where applicable all responses thereto; and	Consultation will be undertaken by the EAP
q. any other information requested by the competent authority.	N/A

Requirements of Appendix 6 – GN326 EIA Regulations of April 2017	Section of specialist report addressing requirement
2) Where a government notice gazetted by the Minister provides for any protocol or minimum information requirement to be applied to a specialist report, the requirements as indicated in such notice will apply.	N/A

SPECIALISTS DECLARATION

I, Mark Summers as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- act as the independent specialist in this application;
- 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;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- declare that there are no circumstances that may compromise my objectivity in performing such work;
- 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;
- will comply with the Act, Regulations and all other applicable legislation;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- have no vested interest in the proposed activity proceeding;
- 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;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of specialist:



Name of specialist:

Mark Summers

Date:

15th February 2021

SPECIALISTS DECLARATION

I, Stephen Burton as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- act as the independent specialist in this application;
- 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;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2014 and any specific environmental management Act;
- declare that there are no circumstances that may compromise my objectivity in performing such work;
- 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;
- will comply with the Act, Regulations and all other applicable legislation;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- have no vested interest in the proposed activity proceeding;
- 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;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of specialist;



Name of specialist:

Stephen Burton

Date:

15th February 2021.

TERMS OF REFERENCE

The study was to adhere to the following:

- Adherence to the content requirements for specialist reports in accordance with Appendix 6 of the EIA Regulations 2014, as amended.
- 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:

- Describe the terrestrial vegetation features of the project area, with focus on features that are potentially impacted by the proposed project;
- Identify any species of conservation concern or protected species on site;
- Identify and assess the potential impacts of the project on the terrestrial environment and provide mitigation measures to include in the environmental management plan; and
- The assessment should be based on existing information, national and provincial databases, SANBI mapping, professional experience and field work conducted.

ASSUMPTIONS AND LIMITATIONS

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

- The study was undertaken in early Summer however there had not been good rains, thus many species had not flowered and some bulbs were not visible above ground;
- Heavy overgrazing reduces species diversity, and the site exhibited signs of heavy overgrazing;
- 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; and
- Furthermore, any graminoid assemblage will be difficult to assess definitively as the majority of the standing sward and inflorescences are no longer available to aid in identification.

ACRONYMS

AIS	Alien and Invasive species
BA	Basic Assessment
CBA	Critical Biodiversity Area
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DEFF	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
SANBI	South African National Biodiversity Institute
SCC	Species of conservation concern
ToPS	Threatened and Protected Species
ToR	Terms of Reference

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 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.

Definitions	
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.
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.
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.

Definitions	
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.

1. INTRODUCTION

SiVEST SA (Pty) Ltd has been appointed by Nanza Consulting, to undertake the Vegetation Assessment for Phase 3 of the Shayamoya Housing Project application in line with the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998). The site falls within the Greater Kokstad Municipality, on the border of Kokstad town.

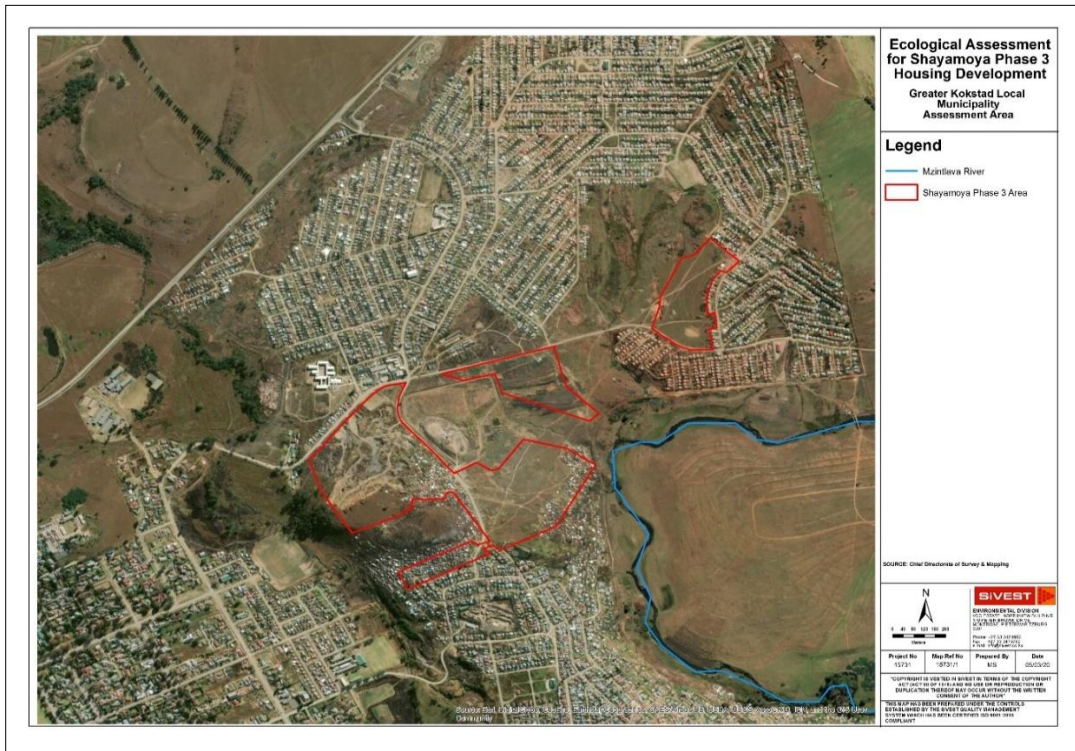


Figure 1: Aerial Map of the site

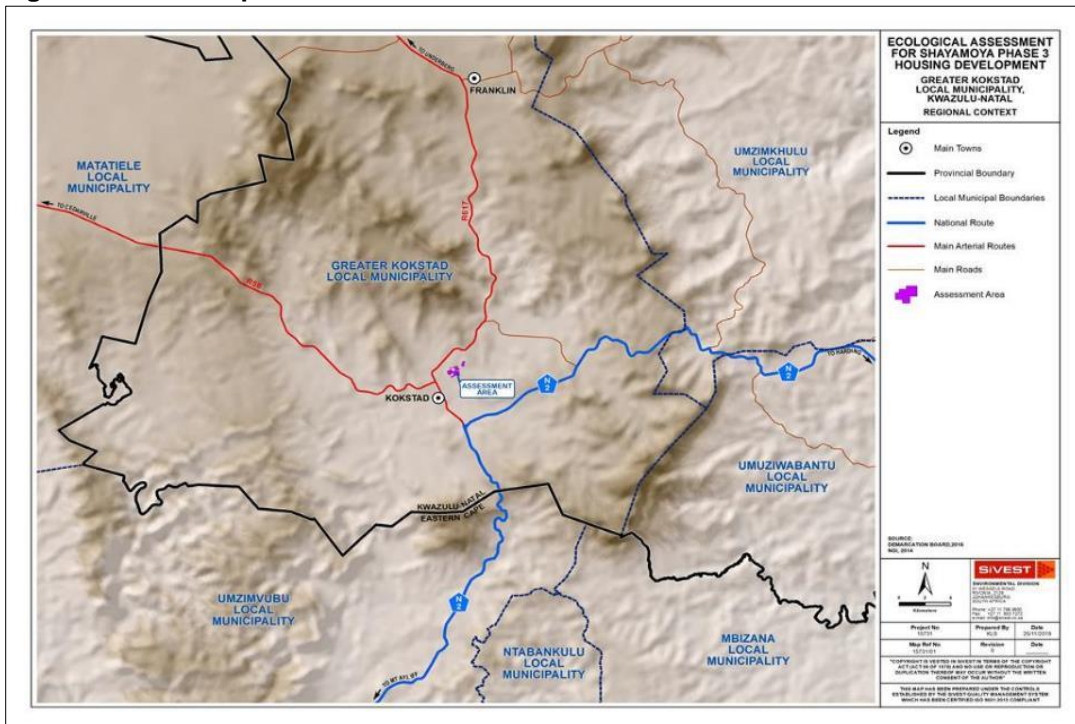


Figure 2: Locality Map of the site

2. PROJECT BACKGROUND

SiVEST SA (PTY) LTD, Environmental Division is undertaking a Basic Assessment (BA) on behalf of Nanza Consulting for the Greater Kokstad Municipality, for Phase 3 of the Shayamoya Housing Development in the Greater Kokstad Municipality, KwaZulu-Natal.

The development proposes low income housing to assist in the growing demand for formal housing within Kokstad. The development is broken down into six sites, comprising of residential units, planned unit developments (PUD), open space, a religious centre and a clinic. A breakdown of each site is as follows:

- Site 1:
 - 96 residential units
 - 56 PUD units
- Site 2:
 - 67 residential units
 - 124 PUD units
- Site 3:
 - 143 residential units
 - 224 PUD units
- Site 4:
 - 55 residential units
 - 0 PUD units
- Site 5:
 - 199 residential units
 - 288 PUD units
- Site 6:
 - 0 residential units
 - 168 PUD units

The total number of units is 1423 over 297 469m².

3. SITE VISIT

The site visit was undertaken by the ecologist Mark Summers on the 8th November 2019. However it must be noted that little rainfall had fallen before the site visit, and the short sward height and overgrazed nature of site limited the species seen at the site visit.

4. REGULATIONS GOVERNING THIS REPORT & LEGISLATION

Further to the Terms of Reference, the following protocol is extracted from the National Environmental Management Act, Act 108 of 1998 (NEMA) as amended in 2014. The relevant Section is included below for your ease of reference:

Specialist reports and reports on specialised processes

- 1) *An applicant or the EAP managing an application may appoint a person who is independent to carry out a specialist study or specialised process.*
- 2) *The Person referred to in sub-regulation (1) must comply with the requirements of Regulation 17.*
- 3) *A specialist report or a report on a specialised process prepared in terms of these Regulations must contain –*
 - a) *details of –*
 - i. *the person who prepared the report; and*
 - ii. *the expertise of that person to carry out the specialist study or specialised process;*

- b) a declaration that the person is independent in a form as may be specified by the competent authority;
- c) an indication of the scope of, and the purpose for which, the report was prepared;
- d) a description of the methodology adopted in preparing the report or carrying out the specialised process;
- e) a description of any assumptions made and any uncertainties or gaps in knowledge;
- f) a description of the findings and potential implications of such findings on the impact of the proposed activity, including identified alternatives, on the environment;
- g) recommendations in respect of any mitigation measures that should be considered by the applicant and the competent authority;
- h) a description of any consultation process that was undertaken during the course of carrying out the study;
- i) a summary and copies of any comments that were received during any consultation process; and
- j) any other information requested by the competent authority.

In addition, there are various Sections of the legislation that would be applicable to the proposed development and / or the land as it currently is.

4.1. National Environmental Management Act, Act No. 107 of 1998 (NEMA)

The following protocol is extracted from the National Environmental Management Act, Act 107 of 1998 (NEMA). (See Regulation 385 Section 33 — Specialist reports and reports on specialized processes under the Act). In addition there are various Sections of the legislation that would be applicable to the proposed development and / or the land as it currently is

NEMA requires, *inter alia*, that:

- “Development must be socially, environmentally, and economically sustainable”;
- “Disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied.”
- “A risk-averse and cautious approach is applied, which takes into account the limits of current knowledge about the consequences of decisions and actions”;

NEMA also states that;

“The environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people’s common heritage.”

4.2. National Forests Act (Act No. 84 of 1998)

According to this act, the Minister may declare a tree, group of trees, woodland or a species of trees as protected. The prohibitions provide that;

“No person may cut, damage, disturb, destroy or remove any protected tree, or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.”

Any disturbance, removal, pruning or transplanting of this species would require a licence from the administrators of the National Forests Act, who are an extension of the Department of Agriculture, Forestry and Fisheries (DAFF) based in Pietermaritzburg.

The National Forests Act of 1998 (as amended) provides the strongest and most comprehensive legislation and mandate for the protection of all natural forests in South Africa. The principles of the Act in Section 3 state clearly that *“...natural forests may not be destroyed save in exceptional circumstances where, in the opinion of the Minister, a proposed new land use is preferable in terms of its economic, social or environmental benefits”*. This prescribes that no development affecting forests may be allowed unless *“exceptional circumstances”* can be proven. Section 7 of the Act prohibits the cutting, disturbance, destruction or removal of any indigenous living or dead tree in a forest without a licence, while Section 15 places a similar prohibition on protected tree species listed under the Act, some of which are also forest species.

4.3. National Environmental Management: Biodiversity Act (Act No. 10 of 2004)

In terms of the Biodiversity Act, the developer has a responsibility for:

- *The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations).*
- *Promote the application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all development within the area are in line with ecological sustainable development and protection of biodiversity.*
- *Limit further loss of biodiversity and conserve endangered ecosystems.*

4.4. Conservation of Agricultural Resources (Act No. 43 of 1983) as amended in 2001

Declared Weeds and Invaders in South Africa are categorised according to one of the following categories:

- **Category 1** *plants: are prohibited and must be controlled.*
- **Category 2** *plants: (commercially used plants) may be grown in demarcated areas providing that there is a permit and that steps are taken to prevent their spread.*
- **Category 3** *plants: (ornamentally used plants) may no longer be planted; existing plants may remain, as long as all reasonable steps are taken to prevent the spreading thereof, except within the flood line of watercourses and wetlands.*

4.5. 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 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.

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 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 are included below:

5.1. *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.

5.1.1. 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 require 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 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).

5.1.2. 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 (Error! Reference source not found.).

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 1. 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

5.1.3. 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 Infrastructure¹ (EI).

5.1.4. Landscape Corridors

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

5.1.5. 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.

¹ 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.

5.2. *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 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.

5.3. *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.

5.4. *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 Swaziland. 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.

5.5. *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.

5.6. *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.

FEPAs 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). FEPAs 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. FEPAs 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. FEPAs 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. Wetland FEPAs that are currently in a condition lower than A or B should be rehabilitated to the best attainable ecological condition.

6. RESULTS OF THE DESKTOP ASSESSMENT

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

The desktop analysis indicated that the majority of 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. However, the southern portion of site (site 3) indicates the presence of CBA Irreplaceable, with a Minset score of 1. It must be noted, this area is already transformed into informal housing. The CBA maps indicate that the area is natural and transformed land and not CBA.

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 2. SEA Data taken from Ezemvelo KZN Wildlife

YES	NO
East Griqualand Grassland (Gs 12)	Forests
Eastern Temperate Wetlands	Medicinal Plants
Invertebrates	Mammals
Avifauna	Frogs
Reptiles	
Grassland	

Table 3. C-Plan Data taken from Ezemvelo KZN Wildlife

Species name	Type
East Griqualand Grassland	Vegetation Type
<i>Encephalartos friderica-guilielmi</i>	Plant
<i>Balearica regulorum</i>	Bird
<i>Centrobolus tricolor</i>	Millipede
<i>Leptopelis xenodactylus</i>	Amphibian

Although a small portion of site is shown to be CBA: Irreplaceable, this area is already transformed and can no longer be classified as CBA: Irreplaceable as, as can be seen in (Figure 3).



Figure 3: CBA Map

6.2. Bio Resource Units (BRU)

The Bioresource unit for the site is as follows:

UVc11a - Kokstad

Bioresource Group 9: "Dry Highland Sourveld".
BRG Subgroup 9.8

Vegetation pattern: The vegetation consists entirely of grassland.

Indicator Species: *Leucosidea sericea* (Ouhout).

The rainfall average is 778 mm per annum. The mean temperature is 15.1 °C and the climate rating is C4, Moderately restricted growing season due to low temperatures and severe frost. The erosion rating for the site is 4.6, which translates to a high risk of erosion.

There are 3 perennial rivers. The names of these rivers include Droewigrivier and the Mzintlava 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.



Figure 4: BRU Map

6.3. Environmental Potential Atlas

The entire landscape has a low sensitivity to disturbance, and can accept development well.

The ENPAT data provides the following information about for the site:

The geology of the site is comprised mainly dolerite and mudstone.



The ENPAT data provides the following information about the geology for the site: The soils consist of Glenrosa and/or Mispah forms, lime is rare or absent in entire landscape. There is also Plinthic catena: undifferentiated, upland duplex and/or marginalitic soils common.

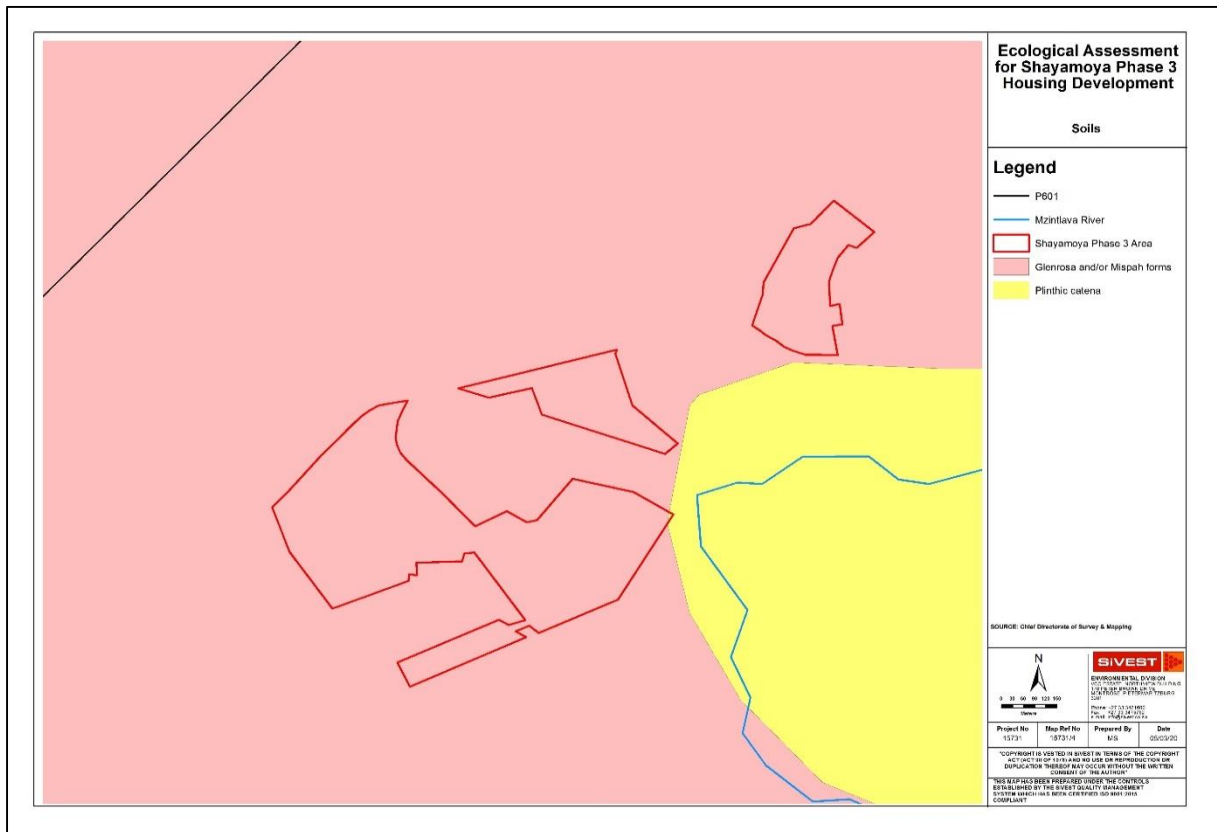


Figure 5: Soils and Geology Map

6.4. *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 East Griqualand Grassland (Gs 12) which is Vulnerable. In this case the KZN Wildlife Vegetation Type is the same.

Distribution:

KwaZulu-Natal and Eastern Cape Provinces: Major portion of this unit covers most of the East Griqualand (with Kokstad and Matatiele as centres). Altitude 920 – 1 740m.

Conservation:

Vulnerable. Target 23%. Only 0.2% is statutorily conserved in the Malekgonyane (Ongeluksnek) Wildlife Reserve and Mount Currie Nature Reserve. Over one quarter of the area has already been transformed for cultivation (maize), plantations and by urban sprawl. *Acacia dealbata* and *A. mearnsii* are invading these grasslands in some places. Erosion is low (31%), very low (30%) and moderate (30%).

Indicative Plant Species:

Graminoides: *Alloteropsis semialata* subsp. *eckloniana*, *Aristida congesta*, *A. junciformis* subsp. *galpinii*, *Brachiaria serrata*, *Digitaria tricholaenoides*, *Elionurus muticus*, *Eragrostis chloromelas*, *E. plana*, *E. racemosa*, *Harpochloa flax*, *Heteropogon contortus*, *Hyparrhenia hirta*, *Melinis nerviglumis*, *Microchloa caffra*, *Paspalum dilatatum*, *Sporobolus africanus*, *Themeda triandra*, *Tristachya leucothrix*, *Abildgaardia ovata*, *Andropogon appendiculatus*, *Cynodon incompletes*, *Cyperus obtusiflorus* var. *obtusiflorus*, *Digitaria ternata*, *Eragrostis capensis*, *Eulalia villosa*, *Hemarthria altissima*, *Setaria nigrirostris*, *Trachypogon spicatus*.

Herbs: *Acanthospermum austral*, *Centella asiatica*, *Conyza podocephala*, *Haplocarpha scaposa*, *Helichrysum herbaceum*, *H. nudifolium* var. *pilosellum*, *Hermannia depressa*, *Hibiscus aethiopicus* var. *ovatus*, *Ipomoea crassipes*, *Kohautia amatymbica*, *Lessertia harveyana*, *Pentanisia prunelloides* subsp. *latifolia*, *Rhynchosia effuse*, *Senecio retrorsus*, *Stachys aethiopica*, *Tolpis capensis*, *Vernonia natalensis*.

Herbaceous Climber: *Rhynchosia totta*.

Geophytic Herbs: *Cheilanthes deltoidea*, *C. hirta*, *Haemanthus humilis* subsp. *hirsutus*, *Ledebouria sandersonii*, *Rhodohypoxis baurii* var. *baurii*, *Watsonia pillansii*, *Zantedeschia albomaculata* subsp. *albomaculata*.

Low shrubs: *Anthospermum rigidum* subsp. *pumilum*, *Chaetacanthus setiger*, *Erica caffrorum* var. *caffrorum*, *Felicia filifolia* subsp. *filifolia*, *F. muricata*, *Helichrysum dregeanum*, *Rubus rigidus*.

Succulent Shrub: *Euphorbia clavarioides* var. *clavarioides*.

Biogeographically important Taxon (Sub-Escarpment Grassland endemic) Small Tree: *Encephalartos friderici-guilielmi*.

Endemic Taxa:

Herbs: *Alepidea duplidens*, *Berkheya griquana*, *Wahlenbergia dentate*, *W. ingrate*

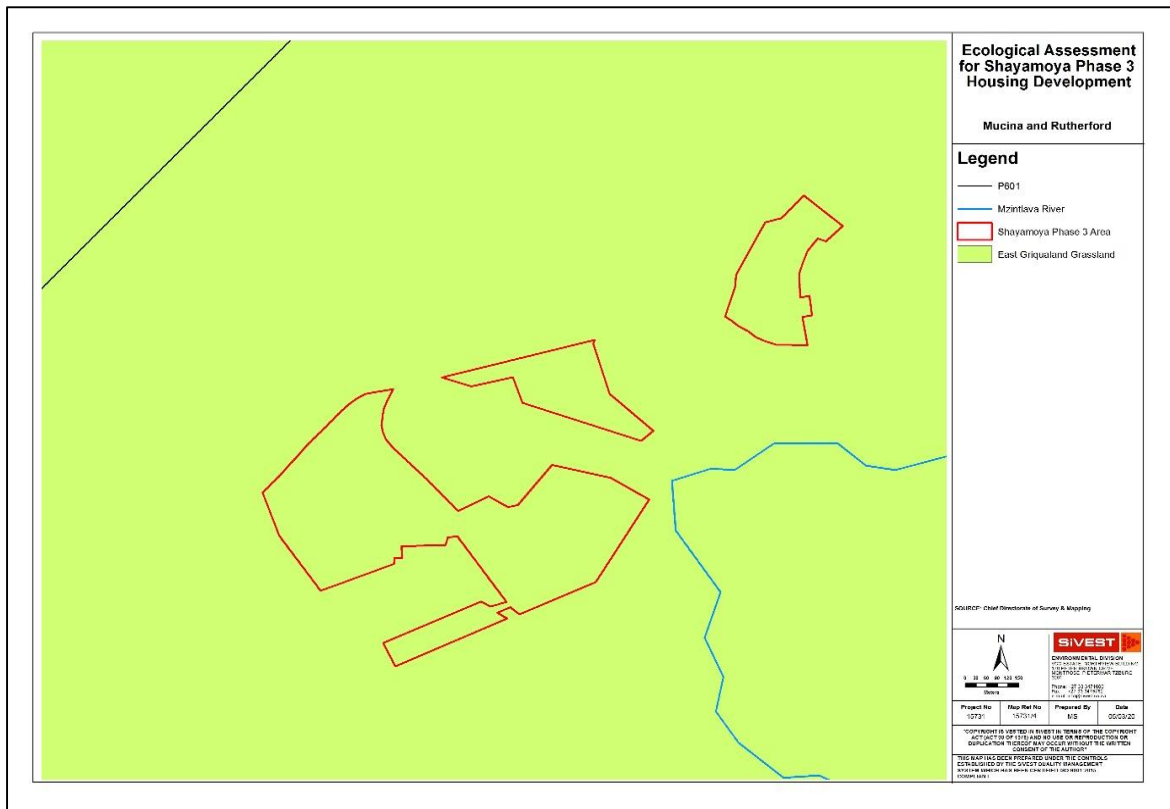


Figure 6: Vegetation Map

6.5. National Freshwater Ecosystem Priority Areas (NFEPA)

There are no FEPA wetlands within the development site. The Mzintlava River is classified as a NFEPA River.

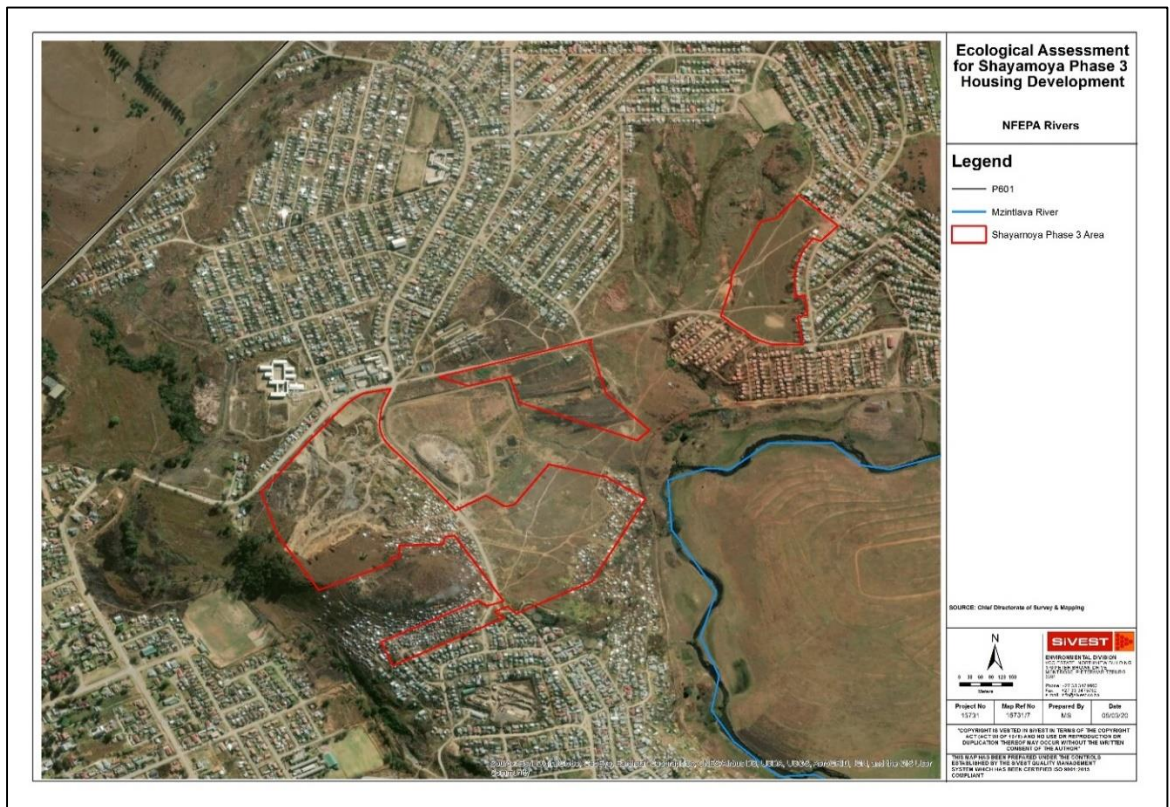


Figure 7: NFEPA Rivers map

7. VEGETATION DESCRIPTION

The study site is located within the Harry Gwala District Municipality, Greater Kokstad Local Municipality, on the fringe of Kokstad Town. The greater area is surrounded by croplands and livestock farming, while the study site is surrounded by informal and low cost housing on the fringe of Kokstad town. The Mount Currie Nature Reserve occurs within 4km of the study site.

The site is surrounded by formal and informal housing. Livestock from the surrounding communities has led to heavy overgrazing and low biomass with the soil layer exposed during the site assessment. The north eastern area is bisected by a wetland which runs in a southerly direction. Dumping, nappies and human waste litters large portions of site (**Plate 1**).

According to Mucina and Rutherford 2006, the site is classified as East Griqualand Grassland (Gs 12) which is a vulnerable vegetation type. Upon undertaking the groundtruthing exercise it was found that the site is transformed and overgrazed, with plant diversity being uniform across the entire site. The site description (site 1 to site 6) is as per the final layout in **Appendix 4**.



Plate 1: Litter and human waste, with Shayamoya Dump Site in the background.

7.1. Site 1.

Site 1 is bordered by a wetland in the west and formalised housing in the east. Numerous footpaths and a borrow pit exist in the site camp (**Plate 2**).



Plate 2: View across site 1, including a borrow pit and numerous footpaths.

No trees were present. The sward height on the vegetation was very low (<20cm), comprising of graminoid species such as Red grass (*Themeda triandra*), Ngongoni grass (*Aristida junciformis*), Giant Spear grass (*Trachypogon spicatus*) and Curly leaf grass (*Eragrostis chloromelas*). Forb species include Everlasting species (*Helichrysum confertifolium* and *Helichrysum pilosellum*), Gifbossie (*Gnidia caffra*) and *Rhynchosia adenodes*.

7.2. Site 2

Site 2 is bordered by communal farming to the south and a school to the north. The fields appear to have been ploughed in the past, while foundations of farm buildings are still in existence. Communal farming is still being practiced (**Plate 3**). The area surrounding the communal farming field consists of overgrazed veld, with a low species richness.



Plate 3: Communal farming around site 2.

Species present within site 2 were dominated by graminoids such as Wire grass (*Elionurus muticus*), Red grass, Ngongoni Grass and Nile grass (*Acroceras macrum* – present in the communal fields). Forb species present include Orange poppy (*Papaver aculeatum*), *Helichrysum pilosellum*, Leafy-flowered Ipomoea (*Ipomoea crassipes*) and Gifbossie.



Plate 4: Orange poppy (*Papaver aculeatum*) left and Leafy-flowered Ipomoea (*Ipomoea crassipes*) right.

7.3. Site 3.

Site 3 is bordered by informal and formal housing, except for a wetland in the north. The site is traversed by footpaths and roads leading to different parts of the surrounding community. The western portion of the site is bordered by the road leading into Bhongweni and the Shayamoya Dump Site, with a north facing slope with reservoirs to the south of site. The north facing slope is the only place of the entire sample area that has plant species that differ from the remainder of the site. Rocks and stones are present on the north facing slope. It must be noted, this site has a high level of dumping and human waste around the site.



Plate 3: North facing slope with reservoirs in background (left), and a view toward Site 2 from Site 3 (right).

Graminoid species such as Red grass, Curly leaf grass (*Eragrostis chloromelas*), Footpath love grass (*Eragrostis pseudosclerantha*), Caterpillar grass (*Harpochloa falx*), and Giant spear grass are present within the north facing slopes. Forb species comprise of *Salvia repens*, Wild Scabiosa (*Scabiosa columbaria*), *Stachys* spp. and *Berkheya* spp. A bulb species, *Ledebouria ovatifolia*, and an Aloe species, Common soap Aloe (*Aloe maculata*) was present within the north facing slope (both species protected under Natal Conservation Ordinance of 1974). Alien invasive stinging nettle (*Urtica dioica*) was also present in low densities around site 3.



Plate 4: *Ledebouria ovatifolia* left and Common soap Aloe (*Aloe maculata*) right.

7.4. Site 4.

Site 4 was completely transformed into informal housing, very little vegetation other than shrubs within garden patches and forbs were present.



Plate 5: Transformed state of Site 4.

7.5. Site 5.

Site 5 was characterised by a large borrow pit dominating approximately half of the site, with houses present within the borrow pit. The southern half of site 5 was in the process of being pegged out either by potential construction projects or by informal dwellers, however the recent establishment of corrugated iron stands suggests informal housing. Additionally a Shembe Church was present on the southern boundary. The southern portion of site was predominantly east facing with rocky areas and few trees. It must be noted, illegal dumping and human waste was present around the site.



Plate 6: Shembe Church on the southern boundary (left) and housing within the borrow pit (right).

Eucalyptus trees (*Eucalyptus saligna*) were present on the southern site boundary on the southern facing slope. Additional graminoid species occurring at Site 5 consisted of Purple finger grass (*Digitaria tricholaenoides*), Ratstail dropseed (*Sporobolus africanus*) and Broad-leaved Bluestem (*Diheteropogon amplexans*). Forb species included Dolls powderpuff (*Cyanotis speciosa*), *Tephrosia* spp., *Chlorophytum cooperi*, Small yellow star-flower (*Hypoxis argentea*, protected) and *Senecio polyanthemoides*. Protected *Aloe maculata* and *Ledebouria ovatifolia* were also present around rocks in the southern portion of site 5.



Plate 7: *Cyanotis speciosa* (left) and *Chlorophytum cooperi* right.



Plate 8: *Hypoxis argentea*.

7.6. Site 6.

Site 6 has been heavily disturbed through illegal dumping, borrow pits, human waste and establishment of informal housing, resulting in very little vegetation present.



Plate 9: Land use around site 6.

The extremely disturbed nature of site 6 resulted in very few species present. Graminoid species included Curly leaf grass (*E. chloromelas*) and Broad-leaved turpentine grass (*Cymbopogon caesius*), with Khaki bush present (*Tagetes minuta*).

8. 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 / 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 4 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 5** below.

8.1. 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. 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 4. Biodiversity maintenance services score sheet (Template and Description)

Biodiversity Noteworthiness	Scores				
	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 5. 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 23 plant species were recorded during the field survey, of which 3 were alien. Three (3) plant species which are protected by Provincial Legislation were noted within the development site. The plant species that fall under the protection of the KwaZulu-Natal Nature Conservation Management Act are listed below.

Provincially Protected Species:

- *Aloe maculata* All.
- *Hypoxis argentea* Harv. ex Baker var. *argentea*
- *Ledebouria ovalifolia* (Schrad.) Jessop

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 6. Biodiversity noteworthiness for Site 1.

Biodiversity Noteworthiness	Scores				
	0	1	2	3	4
Diversity	✓				
Rarity	✓				
Conservation Status			✓		
Red Data Species	✓				
Uniqueness / Special features	✓				
OVERALL VALUE	Total Score/number of categories is 2 / 5= 0.4				

Table 7. Biodiversity noteworthiness for Site 2.

Biodiversity Noteworthiness	Scores				
	0	1	2	3	4
Diversity	✓				
Rarity	✓				
Conservation Status			✓		
Red Data Species	✓				
Uniqueness / Special features	✓				
OVERALL VALUE	Total Score/number of categories is 2 / 5= 0.4				

Table 8. Biodiversity noteworthiness for Site 3.

Biodiversity Noteworthiness	Scores				
	0	1	2	3	4
Diversity	✓				
Rarity	✓				
Conservation Status			✓		
Red Data Species					✓
Uniqueness / Special features	✓				
OVERALL VALUE	Total Score/number of categories is 6 / 5= 1.2				

Table 9. Biodiversity noteworthiness for Site 4.

Biodiversity Noteworthiness	Scores				
	0	1	2	3	4
Diversity	✓				
Rarity	✓				
Conservation Status			✓		
Red Data Species	✓				
Uniqueness / Special features	✓				
OVERALL VALUE	Total Score/number of categories is 2 / 5= 0.4				

Table 10. Biodiversity noteworthiness for Site 5.

Biodiversity Noteworthiness	Scores				
	0	1	2	3	4
Diversity	✓				
Rarity	✓				
Conservation Status			✓		
Red Data Species					✓
Uniqueness / Special features	✓				
OVERALL VALUE	Total Score/number of categories is 8 / 5= 1.2				

Table 11. Biodiversity noteworthiness for Site 6.

Biodiversity Noteworthiness	Scores				
	0	1	2	3	4
Diversity	✓				
Rarity	✓				
Conservation Status			✓		
Red Data Species	✓				
Uniqueness / Special features	✓				
OVERALL VALUE	Total Score/number of categories is 2 / 5= 0.4				

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 12. Future Integrity and viability for Site 1.

Integrity & Future Viability	Scores				
	0	1	2	3	4
Buffer	✓				
Connectivity		✓			
Alteration	✓				
Invasive/pioneers		✓			
Size			✓		
OVERALL VALUE	Total Score/number of categories is 4 / 5= 0.8				

Table 13. Future Integrity and viability for Site 2.

Integrity & Future Viability	Scores				
	0	1	2	3	4
Buffer	✓				
Connectivity		✓			
Alteration	✓				
Invasive/pioneers		✓			
Size			✓		
OVERALL VALUE	Total Score/number of categories is 12 / 5= 0.8				

Table 14. Future Integrity and viability for Site 3.

Integrity & Future Viability	Scores				
	0	1	2	3	4
Buffer		✓			
Connectivity			✓		
Alteration		✓			
Invasive/pioneers		✓			
Size				✓	
OVERALL VALUE	Total Score/number of categories is 4 / 5= 1.6				

Table 15. Future Integrity and viability for Site 4.

Integrity & Future Viability	Scores				
	0	1	2	3	4
Buffer	✓				
Connectivity	✓				
Alteration	✓				
Invasive/pioneers	✓				
Size		✓			
OVERALL VALUE	Total Score/number of categories is 8 / 5= 0.2				

Table 16. Future Integrity and viability for Site 5.

Integrity & Future Viability	Scores				
	0	1	2	3	4
Buffer	✓				
Connectivity		✓			
Alteration	✓				
Invasive/pioneers	✓				
Size			✓		
OVERALL VALUE	Total Score/number of categories is 3 / 5= 0.6				

Table 17. Future Integrity and viability for Site 6.

Integrity & Future Viability	Scores				
	0	1	2	3	4
Buffer	✓				
Connectivity		✓			
Alteration	✓				
Invasive/pioneers	✓				
Size			✓		
OVERALL VALUE	Total Score/number of categories is 3 / 5= 0.6				

- The average score for Site 1 is **0.6** indicating that the site is functioning at a low level.
- The average score for Site 2 is **0.6** indicating that the site is functioning at a low level.
- The average score for Site 3 is **1.4** indicating that the site is functioning at a moderately low level.
- The average score for Site 4 is **0.3** indicating that the site is functioning at a low level.
- The average score for Site 5 is **0.9** indicating that the site is functioning at a moderately low level.
- The average score for Site 6 is **0.5** indicating that the site is functioning at a low level.

9. IMPACT ASSESSMENT

Housing developments have the potential to cause negative impacts on vegetation species and communities due to large scale hard transformation of the area. The area is highly transformed and impacted upon, therefore all sites have been assessed as one. If mitigation measures for the activity are correctly implemented and the rehabilitation is successful, minimal loss to species of conservation concern will be seen (**See Appendix 3 for EIA Methodology**).

The potential impacts of the proposed development mainly related to loss of habitat for the Red Data species as well as general species which are utilizing the site.

9.1. Environmental Impact Assessment

Please note that a No-Go option would be the status quo.

Potential impacts during the construction phase

- Loss of habitat for flora

The clearing of land reduces available habitat for floral species. This results in a local scale loss in ecosystem functionality and biodiversity and potentially reduces available habitat for red data species. Mitigation measures can reduce inevitable environmental damage to a state where long term losses are negated.

Table 18: Potential for loss of habitat for flora in the construction phase.

IMPACT TABLE FORMAT		
Environmental Parameter	Biodiversity	
Issue/Impact/Environmental Effect/Nature	Loss of habitat for Flora of common and protected or red data species.	
Extent	The impact will only affect this site	
Probability	Impact will certainly occur (greater than a 75% chance of occurrence)	
Reversibility	The impact is partly reversible but more intense mitigation measures are required	
Irreplaceable loss of resources	The impact will result in marginal loss of resources	
Duration	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).	
Cumulative effect	The impact would result in minor cumulative effects	
Intensity/magnitude	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.	
Significance Rating	The anticipated impact will have negligible negative effects and will require little to no mitigation.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	4	1
Reversibility	2	2
Irreplaceable loss	2	2
Duration	4	4
Cumulative effect	3	2
Intensity/magnitude	1	1
Significance rating	-17 (low negative)	-10 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ Footprint of the activity needs to be strictly adhered to. ▪ A site specific Environmental Management Programme needs to be developed for the construction and operation phases. ▪ An Environmental Control Officer (ECO) needs to be appointed for the duration of construction. ▪ A search and rescue operation needs to be conducted by a suitably qualified ecologist to collect species of special concern. ▪ Permits for plants collection/removal need to be obtained prior to search and rescue operations. ▪ Strictly no removal of any floral species without valid permits in place. ▪ Vegetation clearance in the construction phase is to be removed in a phased approach, as and when it becomes necessary as vegetation harbours fauna. ▪ Sensitive areas need to be demarcated clearly before construction commences. 	

- Transformation of habitat for flora

Hard transformation will result in a reduction in flora for the area. Additionally, transformation of the habitat may lead to an increased alien and invasive plant establishment and erosion potential through both wind and water erosion. Mitigation measures may decrease the severity of the impact, if the mitigation measures are adhered to.

Table 19: Loss of habitat for biodiversity in the construction phase.

IMPACT TABLE FORMAT		
Environmental Parameter	Biodiversity	
Issue/Impact/Environmental Effect/Nature	Loss of habitat for Flora of common and protected or red data species.	
Extent	The impact will only affect this site	
Probability	Impact will certainly occur (greater than a 75% chance of occurrence)	
Reversibility	The impact is partly reversible but more intense mitigation measures are required	
Irreplaceable loss of resources	The impact will result in marginal loss of resources	
Duration	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).	
Cumulative effect	The impact would result in minor cumulative effects	
Intensity/magnitude	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.	
Significance Rating	The anticipated impact will have negligible negative effects and will require little to no mitigation.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	2	1
Reversibility	2	2
Irreplaceable loss	2	2
Duration	4	4
Cumulative effect	3	2
Intensity/magnitude	1	1
Significance rating	-14 (low negative)	-10 (low negative)
Mitigation measures	<ul style="list-style-type: none"> Servitude widths need to be a strictly adhered to. Where possible, indigenous vegetation needs to 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. 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. Alien and invasive plants should be hand pulled prior to seeding occurring, and disposed of as per the alien invasive control programme. Soil stockpiles need to be grassed with an indigenous mix or covered with shade cloth to prevent soil loss through wind and water erosion. 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 occasion. An environmental education programme should be conducted within the beneficiary community to educate and inform the beneficiaries of the value and correct use of vegetation and conservation areas. A mix of indigenous grass species such as the standard "NPA" mix should be used for rehabilitation. 	

- Erosion related impacts for the construction phase

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. This removes habitat for fauna occurring in the area. This will effect ecosystem functionality and will have cost implications as the construction site is unlikely to rehabilitate naturally. If the mitigation measures are implemented correctly, erosion related impacts may be largely negated.

Table 20: Erosion related impacts in the construction phase

IMPACT TABLE FORMAT		
Environmental Parameter	Biodiversity	
Issue/Impact/Environmental Effect/Nature	Erosion	
Extent	The impact will only affect this site	
Probability	The impact will likely occur (between a 50% to a 75% chance of occurrence)	
Reversibility	The impact is partly reversible but more intense mitigation measures are required	
Irreplaceable loss of resources	The impact will result in marginal loss of resources	
Duration	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).	
Cumulative effect	The impact would result in minor cumulative effects	
Intensity/magnitude	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)	
Significance Rating	The anticipated impact will have negligible negative effects and will require little to no mitigation.	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	1	1
Probability	3	2
Reversibility	2	2
Irreplaceable loss	2	2
Duration	2	1
Cumulative effect	3	2
Intensity/magnitude	2	1
Significance rating	- 26 (low negative)	-11 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ An approved Stormwater Management Plan should be implemented before construction occurs. ▪ Where possible, indigenous vegetation needs to be retained. ▪ Vegetation should be cleared only when construction occurs in that section of the development. ▪ Soil stockpiles need to be grassed with an indigenous mix or covered with shade cloth to prevent soil loss through wind and water erosion. ▪ Rehabilitation should take place as soon as construction is complete. ▪ In areas of higher 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. 	

Potential impacts during the Operation phase

- Erosion related impacts for operation phase

Erosion potential is increased in areas where vegetation has been removed. Hard transformation may increase water velocity in steeper areas and will 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.

Table 21: Erosion related impacts in the operation phase

IMPACT TABLE FORMAT		
Environmental Parameter	Biodiversity	
Issue/Impact/Environmental Effect/Nature	Erosion	
Extent	The impact will affect the local area or district	
Probability	The impact will likely occur (between a 50% to a 75% chance of occurrence)	
Reversibility	The impact is partly reversible but more intense mitigation measures are required	
Irreplaceable loss of resources	The impact will result in significant loss of resources	
Duration	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).	
Cumulative effect	The impact would result in minor cumulative effects	
Intensity/magnitude	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).	
Significance Rating	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).	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1

IMPACT TABLE FORMAT		
Probability	3	2
Reversibility	2	2
Irreplaceable loss	3	2
Duration	2	1
Cumulative effect	3	2
Intensity/magnitude	2	1
Significance rating	-30 (medium negative)	-11 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ An approved Stormwater Management Plan should be implemented before construction occurs and should be maintained through operation phase. ▪ Where possible, indigenous vegetation and rescued plants needs to be returned as soon as construction ceases. ▪ Soil stockpiles need to be grassed with an indigenous mix and rehabilitated to prevent soil loss through wind and water erosion before operation phase begins. ▪ Rehabilitation should take place as soon as construction is complete. ▪ Operation phase should only begin once the ECO has deemed rehabilitation successful and mitigation measures have been implemented. ▪ Six monthly checks of the area should take place for the emergence of erosion gulley's, and if gulley's emerge, will need to be rehabilitated immediately. 	

- Biodiversity loss and alien invasive plant establishment due to operation phase
Biodiversity is unlikely to rehabilitate due to loss of habitat. This can be partly mitigated if rehabilitation is successful. Additionally, biodiversity may be further lost due to the establishment of alien and invasive plants

Table 22: Loss of habitat for biodiversity in the operation phase.

IMPACT TABLE FORMAT		
Environmental Parameter	Biodiversity	
Issue/Impact/Environmental Effect/Nature	Loss of biodiversity	
Extent	The impact will affect the local area or district	
Probability	The impact will likely occur (between a 50% to a 75% chance of occurrence)	
Reversibility	The impact is partly reversible but more intense mitigation measures are required	
Irreplaceable loss of resources	The impact will result in significant loss of resources	
Duration	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).	
Cumulative effect	The impact would result in minor cumulative effects	
Intensity/magnitude	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).	
Significance Rating	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).	
	Pre-mitigation impact rating	Post mitigation impact rating
Extent	2	1
Probability	3	2
Reversibility	2	2
Irreplaceable loss	3	2
Duration	2	1
Cumulative effect	3	2
Intensity/magnitude	2	1
Significance rating	-28 (Low negative)	-11 (low negative)
Mitigation measures	<ul style="list-style-type: none"> ▪ 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. ▪ Monitoring and control of alien and invasive species as per an alien invasive control programme. 	

10. 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 bulbs, may not have emerged due to the time of the year. However, it is the Specialist'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.

The specialist does not have any objections to the proposed development due to the transformed nature of site.

When development does take place and indigenous plants and provincially protected species will need to be removed or relocated, permits for their removal will need to be obtained from Ezemvelo KZN Wildlife and DAFF (*Aloe maculata*, *Hypoxis argentea* var. *argentea* and *Ledebouria ovalifolia*). Their removal should occur during their dormant growth period months and with due care informed by a Translocation Plan, preferably compiled 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 important for plant survival for underground organs (roots) 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 a very limited impact on the environment.

No variations in the layout are required in order to avoid sensitive vegetation.

Should mitigation measures be implemented, the Ecologist has no objection to the proposed development being granted Environmental Authorization.

11. RECOMMENDATIONS

Although the vegetation type is **vulnerable** (as mentioned in the desktop assessment in **Section 6** above), the overall area is transformed from natural and exhibits a low conservation value.

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

- ✓ Permits for the removal and relocation of plants and animals must be in place before any construction can commence;
- ✓ Translocation plan should inform the relocation of protected plants;
- ✓ A search and rescue operation, undertaken by a suitably qualified person, must be undertaken before construction commences;
- ✓ Should budget be available, the developer should consider planting fruit trees or plants which assist in providing the community with extra food;
- ✓ An environmental education programme should be conducted within the beneficiary community to educate and inform the beneficiaries of the value and correct use of vegetation and conservation areas.
- ✓ An Alien Invasive Control Programme must be implemented;
- ✓ Erosion control measures must be implemented;
- ✓ Construction must occur in a phased approach;
- ✓ Rehabilitation must occur once construction is complete in the relevant area

A biodiversity offset plan is not recommended due to the transformed nature of site; however, a search and rescue plan should be implemented prior to construction commencing. This search and rescue should focus on the removing all sensitive, endemic and protected species. This should be conducted by a suitable professional.

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Appendix 1 Species list

Scientific Name	Common Name	Origin	Growth Form
<i>Berkheya onopordifolia</i> (DC.) O.Hoffm. ex Burtt Davy var. <i>onopordifolia</i>		Indigenous	Herb
<i>Bidens pilosa</i> L.	Black jack	Alien	Herb
<i>Ceratotheca triloba</i> (Bernh.) Hook.f.	Wild foxglove	Indigenous	Herb
<i>Cyanotis speciosa</i> (L.f.) Hassk.	Doll's Powderpuff	Indigenous	Herb
<i>Digitaria tricholaenoides</i> Stapf	Purple Finger Grass	Indigenous	Grass
<i>Elionurus muticus</i> (Spreng.) Kunth	Lemon Grass	Indigenous	Grass
<i>Eragrostis chloromelas</i> Steud.	Blue Love Grass	Indigenous	Grass
<i>Eragrostis pseudoscleranth</i> Chiov.		Indigenous	Grass
<i>Harpochloa falx</i> (L.f.) Kuntze	Caterpillar Grass	Indigenous	Grass
<i>Helichrysum confertifolium</i> Klatt		Indigenous	Herb
<i>Helichrysum nudifolium</i> (L.) Less. var. <i>pilosellum</i> (L.f.) Beentje		Indigenous	Herb
<i>Helichrysum</i> Spp.		Indigenous	Herb
<i>Hypochaeris radicata</i> L.	Hairy Wild Lettuce	Alien	Herb
<i>Hypoxis argentea</i> Harv. ex Baker var. <i>argentea</i>	Star-flower	Indigenous	Herb
<i>Ipomoea crassipes</i> Hook. var. <i>crassipes</i>	Wildewinde	Indigenous	Herb
<i>Lasiosiphon caffer</i> Meisn.	Gifbossie	Indigenous	Herb
<i>Ledebouria ovatifolia</i>	Common Squill	Indigenous	Bulb
<i>Papaver aculeatum</i> Thunb.	Californian Poppy	Alien	Herb
<i>Polygala</i> Spp.			
<i>Rhynchosia adenodes</i> Eckl. & Zeyh.		Indigenous	Herb
<i>Salvia</i> Spp.			
<i>Scabiosa columbaria</i> L.	Rice Flower	Indigenous	Herb
<i>Senecio polyanthemoides</i> Sch.Bip.		Indigenous	Herb
<i>Sporobolus africanus</i> (Poir.) Robyns & Tourn.	Ratstail Dropseed	Indigenous	Grass
<i>Sporobolus pyramidalis</i> P.Beauv.	Cat's Tail Dropseed	Indigenous	Grass
<i>Stachys</i> Spp.		Indigenous	Herb
<i>Tagetes minuta</i> L.	Khakibos	Alien	Herb
<i>Tephrosia</i> Spp.		Indigenous	Herb
<i>Themeda triandra</i> Forssk.	Red grass	Indigenous	Grass
<i>Trachypogon spicatus</i> (L.f.) Kuntze	Giant Spear Grass	Indigenous	Grass
<i>Urtica dioica</i> L.	Common Stinging Nettle	Alien	Herb
<i>Argemone ochroleuca</i> Sweet subsp. <i>ochroleuca</i>	Mexican Poppy	Alien	Herb

Scientific Name	Common Name	Origin	Growth Form
<i>Chlorophytum cooperi (Baker) Nordal</i>		Indigenous	Herb
<i>Aloe maculata All.</i>	Common Soap Aloe	Indigenous	Succulent
<i>Aeollanthus parvifolius Benth.</i>		Indigenous	Herb



Appendix 2 CV

Name Stephen Burton
Profession Environmental Scientist
Name of Firm SiVEST SA (Pty) Ltd
Present Appointment Environmental Scientist:
Environmental Division
Years with Firm 12 Years
Date of Birth 12 January 1979
ID Number 7901125138083
Nationality South African



Education

- Matric Exemption (Natal Education Department)
- Maritzburg College, PMB, KZN (1991 – 1996)

Professional Qualifications

- B.Sc. (Zoology 2002), University of Natal PMB, KZN
- B.Sc. Honours (Zoology 2003), University of Natal PMB, KZN
- M.Sc. (Zoology 2006), University of KwaZulu-Natal PMB, KZN
- Pr.Sci.Nat. Registration No. 117474

Membership to Professional Societies

**INTERNATIONAL ASSOCIATION FOR IMPACT ASSESSMENT
SOUTH AFRICA (IAIASA)**

**SOUTH AFRICAN COUNCIL FOR NATURAL SCIENTIFIC
PROFESSIONS (SACNASP) PR. SCI. NAT. REG NO. 117474**

Employment Record

April 2008 – present SiVEST SA (Pty) Ltd: Environmental Division - Environmental Scientist
May 2007 – March 2008 UDIDI Project Development Company: Environmental Planner

Language Proficiency

LANGUAGE	SPEAK	READ	WRITE
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English	Fluent	Fluent	Fluent
Afrikaans	Good	Good	Good

Years of Experience: 13 Years

Fields of Specialisation

- Environmental Science
- Zoology (specifically Ornithology and Mammology)
- Entomology and Wetland Ecology.

Skills

- Evaluation of Biodiversity
- Management Recommendations
- Scoping Reports and Environmental Impact Assessments
- Bird Identification
- Grass Identification
- Tree Identification
- Mammal Identification
- Wetland Ecology
- Wetland Delineation
- Wetland Functionality Assessments
- Wetland Rehabilitation Plans
- GIS Package Skills, particularly ESRI products
- Statistical Package Skills, particularly STATISTICA, PDAP and R-Statistics.

Overview

Stephen has completed a Bachelor of Science Degree with a Zoology Major (University of Natal, PMB), as well as a Bachelor of Science (Honours) in Zoology (University of Natal, PMB). Stephen has also completed a Master of Science Degree in Zoology (University of KwaZulu-Natal, PMB). This post-graduate degree was fieldwork and lab based and provided practical experience in conceptualising, planning, modelling and executing of a project.

Stephen has been involved in consulting since May 2007, which included scoping reports, environmental management plans, integrated management plans, rezoning applications, development facilitation act applications, basic assessment reports, environmental impact reports and strategic environmental assessments. He has been involved in a number of faunal assessments for developments ranging from power lines and water pipelines, to housing developments and light industrial developments. In addition, Stephen has undertaken a number of wetland assessments, and wetland rehabilitation plans, for developments ranging from pipelines through housing and industrial developments.

Projects Experience

April 2008 – present

POWERLINE/ROADS PROJECTS

- D1562 Road Upgrade
- Franklin Overhead Power Line

- Eskom Grassridge Melkhout Power Line Rebuild
- Bulwer-Lamington Power Line
- Lukhanyeni and Maduna Access Roads, Umzimkhulu, Basic Assessment Class Application
- D1131 and D1137 Roads in Msunduzi
- Harvard-Soutdrift Power Line (Solar Reserve South Africa)
- Lengau Sub-Station & Switching Yard (Solar Reserve South Africa)
- Eskom Corinth-Mzongwana
- Eskom Ndwedwe to Appelsbosch
- Eskom Empangeni-Mandeni / Fairbreeze
- Spoornet Coal Link Upgrade
- Eskom Eros to Port Edward 132kV distribution lines
- Eskom Royal Substation
- Eskom Corinth-Lamington

DEVELOPMENT PROJECTS

- Shemula Water Treatment Works Expansion
- Mooi River Industrial Park Development, EIA
- MiddelFontein Housing Development, Kokstad, EIA
- Thanda Integrated Management Plan Development
- Ladysmith Extension 15 Development EIA
- Ladysmith Shopping Mall EIA
- Ladysmith Pedestrian Bridges BA
- Peacetown Taxi Rank BA
- Crookes Brothers EMF – Analysis Report

WATER PROJECTS

- Swayimane Community Water Supply Scheme
- Mooi-Mgeni Water Transfer System – Phase 2 (Trans-Caledon Tunnel Authority)
- Middeldrift Phase 2 Community Water Supply Scheme
- Shemula Water Treatment Works Expansion and Rising Main
- Richmond Pipeline, Umgeni Water
- Invutshane Dam, Umgeni Water
- Shemula Water Treatment Works Expansion
- Bulwer Dam EIA
- Hazelmere Pipeline, Umgeni Water
- Sundumbilli Community Water Supply Scheme
- Bulwer Farm Community Water Supply Scheme
- Umhlumayo Phase 4 (Fitty Park) Water Supply Scheme
- Raisethorpe Canal

ENVIRONMENTAL AUDITING / ENVIRONMENTAL CONTROL OFFICER (ECO)

- Greytown TVET College
- Mooi-Mgeni Water Transfer System – Phase 2 (Trans-Caledon Tunnel Authority)
- Zimbali Golf Course Estate Development
- Middeldrift Phase 2 Community Water Supply Scheme
- Shemula Water Treatment Works Expansion and Rising Main
- Zwelethu - Port Edward Power Line

- Richmond Pipeline, Umgeni Water
- Imvutshane Dam, Umgeni Water
- Hazelmere Pipeline, Umgeni Water
- Mpumulanga Town Centre Precinct, Shopping Centre Development
- Lukhanyeni and Maduna Access Roads, Umzimkhulu Environmental Auditing
- Rainbow Farms Broiler Houses (B17/B18)
- Ludeke-Zwelethu Power Lines, Port Edward
- Sundumbilli Community Water Supply Scheme
- Eros to Kokstad Power Line
- Roads in the Msunduzi Municipality
- Raisethorpe Canal
- Eskom Empangeni-Mandeni / Fairbreeze(Obanjani) Power Line
- Eskom Mandeni-Dlangezwa Power Line
- Brewitt Park Housing Development, Escourt

GIS INPUT MAPPING

- Arcelor-Mittal Newcastle Vegetation Assessment – Mapping & Desktop Assessment
- Normandien Farms – Mapping & Desktop Assessment
- Zimbali Lakes and Golf Course Estate - Mapping
- Cornubia Industrial Development Zone - Mapping
- Mshwathi Pipeline - Mapping
- Porritt Access Road Dispute, Snowdon Farm Trust - Mapping
- SNA Roads - Mapping & Desktop Assessment
- Ballito Flats - Mapping & Desktop Assessment
- DOW Veterinary Quarantine - Mapping & Desktop Assessment
- Farm Isonti - Mapping
- Hawaan CT - Mapping
- Izinga Phase 3 EIA - Mapping
- Ellingham Estate - Mapping
- Motala Housing - Mapping
- Ndundula Road - Mapping & Desktop Assessment
- Okhahlamba Landfill and Cemetery Project - Mapping & Desktop Assessment
- SNA Roads - Mapping & Desktop Assessment
- Woodridge Estate - Mapping

WETLAND ASSESSMENTS AND REHABILITATION PLANS

- Hendrina Wind Energy Farm Wetland Assessment
- Umgeni Water Waste Water Treatment Works Offset study
- Leeuwberg Wind Energy Farm Wetland Assessment
- Signal Hill Housing Wetland Assessment
- Umsobomvu Solar Energy Wetland Assessment
- Shayamoya Housing Wetland Assessment
- Rockdale Wetland Assessment
- Tooverberg Wind Energy Farm
- Sibaya Node 5 Development
- Transnet Wetland Functionality and Biodiversity Assessment for Port of Richards Bay
- Cornubia Rem 68 Development
- Dube Tradeport State of the Environment Report

- Eshowe SSA1 Bulk Water Supply Scheme
- Umgeni Water Waste Water Treatment Plant Offsets
- Osizweni Industrial Development
- Bishopstowe Strategic Environmental Assessment
- Ezaheni D Housing Development
- Izinga Phase 3 Residential Development Amendment
- Dannhauser Bulk Water Supply
- Transnet Richards Bay Port Wetland Assessment
- Raisethorpe Canal Phase 2
- Mimosadale Bulk Water Supply
- Greater Edendale EMF
- Shemula Phases 2-6 Pipeline
- Sumitomo New Rubber Plant
- Riverside Cemetery Development
- DTP Support Zone 2 Development
- Wosiyane/Swayimane Pipeline
- IRPTN Corridor 4 Development
- Sibaya Development
- Cornubia North Development
- Tinley Manor North Development
- Izinga Phase 3 Development
- Nonoti-Zinkwazi Development
- Zimbali Estate Properties
- Mthandeni Irrigation Scheme
- Strode Property Development
- Ethekwini Integrated Rapid Public Transport Network Corridor 9
- D1562 Road Upgrade
- Cornubia Phase 2 Development
- Compensation Flats Development
- Zimbali Estate Development
- Mandeni Cemetery
- Fairmont Hotel
- Tinley Manor South Development
- Maidstone Mill Development
- Mnambithi Substation and Powerline
- Nquthu Town Erf 16 & 17 Development
- Goswell Platform Development - Cato Ridge
- Driefontein Pipeline Route - Ladysmith
- Blaaubosch Housing Development - Newcastle
- Madadeni Housing Development - Newcastle
- Hyde Park Country Estate
- Newcastle Municipality New Cemetery Sites

FAUNAL ASSESSMENTS

- Umlaas Gate Faunal Assessment
- Ntunjambili Bulk Water Supply Scheme
- In-depth specialist studies (including faunal) for Port of Richards Bay
- Kassier Road North Mixed Use Development
- Transnet Richards Bay Port Faunal Assessment

- Greater Edendale EMF
- Shemula Phase 2-6 Pipeline
- Milky Way Shopping Centre Development
- Dudley Pringle Development
- Lindokuhle Housing Development
- Shongweni Bulk Water Pipeline
- Ethekewini Integrated Rapid Public Transport Network Corridor 1
- Ethekewini Integrated Rapid Public Transport Network Corridor 3
- Ethekewini Integrated Rapid Public Transport Network Corridor 9
- Newcastle Municipality New Cemetery Sites
- Shongweni Mixed-Use Development
- Nonoti Beach Tourism Development
- Proposed Shoprite & Checkers Distribution Centre Development, Marianhill
- Proposed Cornubia Development, Umhlanga
- Lower Tugela Bulk Water Supply Scheme Extension
- Proposed Redcliffe Housing Development in Ethekewini Municipality

AVI- FAUNAL ASSESSMENTS

- Proposed High Voltage Powerline to Cygnus Substation, Empangeni
- Proposed High Voltage Powerline between Corinth and Lamington Substations, Underberg
- Proposed High Voltage Powerline between Corinth and Mzongwana Substations

M06/20

CURRICULUM VITAE



Mark Summers

Name	Mark Summers
Profession	Environmental Scientist
Name of Firm	SiVEST SA (Pty) Ltd
Present Appointment	Environmental Consultant
Years with Firm	2 years 10 months
Date of Birth	15 December 1990, Pietermaritzburg, South Africa
Nationality	South African
I.D. No.	9012155010081

Education

- National Senior Certificate, Maritzburg College, 2004-2008

Professional Qualifications

- B.Sc. (Ecological Sciences), University of KwaZulu-Natal PMB, KZN (2013)
- B.Sc. Honours (Zoology), University of KwaZulu-Natal PMB, KZN (2014)
- M.Sc. (Ecological Sciences), University of KwaZulu-Natal PMB, KZN (2016)

Membership to Professional Societies

- South African Council for Natural Scientific Professions (SACNASP) Can.Sci.Nat. Reg No. 120309 (2019)
- International Association for Impact Assessment South Africa (IAIAAsa)

Employment Record

Jan 2018 – date	SiVEST SA (Pty) Ltd: Trainee Environmental Consultant
Oct 2016 – Dec 2017	JG Afrika (Pty) Ltd: Environmental Consultant
Feb 2016 – Jun 2016	SAEON: Plant community data entry and GIS analyst
Jan 2011	Ezemvelo KZN Wildlife: GIS Groundtruthing in Northern KZN

Years of Working Experience: 5

Countries of Work Experience

- South Africa

Fields of Specialisation

- Basic Assessments
- Environmental Compliance Monitoring
- Water Use Licence Applications
- Faunal Identification
- Avifaunal Identification
- Grass Identification
- Tree Identification
- GIS analysis (QGIS and ARCGIS)
- Statistical Analysis (SPSS, STATISTICA)

Overview

Mark has completed a Bachelor of Science Degree in Ecological Science (UKZN, PMB), a Bachelor of Science (Honours) Degree in Zoology (UKZN, PMB) and a Master of Science Degree (PMB) in Ecological Sciences with a focus on Population and Nesting Ecology of Nile crocodiles in Pongolapoort Dam. Additionally, Mark has been involved in plant community data capture and GIS analysis in the Drakensburg region of KwaZulu-Natal. He has attended the SASS 5 Aquatic Biomonitoring Course held by Groundtruth. Mark has been involved in Consulting since October 2016, with a focus on Environmental Compliance and Basic Assessments in the Eastern Cape Province and KwaZulu-Natal. He has conducted assessments in the Biodiversity sector, with hopes of specialising in this field.

Projects Experience (by Sector)

ENVIRONMENTAL AUDITING / ENVIRONMENTAL CONTROL OFFICER

- Nongoma TVET Campus ECO : Aveng Grinaker c/o MSW Consulting (*Current*)

- Kwagqikazai TVET Campus ECO : Fikile Construction c/o MSW Consulting (*Current*)
- Msinga TVET Campus ECO : Base Major Construction c/o MSW Consulting (*Current*)
- Greytown TVET Campus ECO : Motheo Construction c/o MSW Consulting (*Current*)
- Driefontein Water Pipeline ECO: WRK Consulting (*Current*)
- Trustfeeds Waste Water Treatment Works ECO: Umgeni Water (*Current*)
- Construction of the Kokstad Stadium Sports Complex ECO: Greater Kokstad Municipality (*Current*)
- Middelrift SSA 5 – 3 Water Supply Scheme ECO: King Cetshwayo District Municipality c/o SiVEST Civil Engineering (*Current*)
- Middelrift SSA 5 (Emergency Line) Water Supply Scheme ECO: King Cetshwayo District Municipality c/o SiVEST Civil Engineering (*Current*)
- Sumitomo Rubber Rehabilitation Close Out Report: Sumitomo Rubber (*Completed October 2018*)
- Fitty Park Community Water Supply Scheme ECO: Uthukela District Municipality c/o SiVEST Civil Engineering (*Completed August 2018*)
- Dannhauser Bulk Water Supply Scheme: SiVEST Consulting Engineers (*Current*)

BASIC ASSESSMENTS / ENVIRONMENTAL IMPACT ASSESSMENTS

- Dannhauser Bulk Water Supply Scheme: SiVEST Consulting Engineers (*Completed June 2019*)
- Chansbury Poultry Houses Basic Assessment: Chansbury Farming Trust (*Completed January 2020*)
- Gluckstaadt Water Supply Scheme Basic Assessment: Zululand District Municipality c/o SiVEST Civil Engineering (*Current*)

WATER USE LICENCE APPLICATIONS

- Menlyn Main WULA: Growthpoint Properties (*Current*)
- 50 Wierda Road WULA: Growthpoint Properties (*Current*)
- 151 on 5th WULA: Growthpoint Properties (*Current*)
- Riviera Office Park WULA: Growthpoint Properties (*Current*)
- 8 Rivonia Road WULA: Growthpoint Properties (*Current*)
- Dannhauser Bulk Water Supply Scheme, Amajuba District Municipality (*Current*)
- Growthpoint Properties Borehole Registration WULA: Growthpoint Properties (*May 2019*)
- Gluckstaadt Water Supply Scheme WULA: Zululand District Municipality c/o SiVEST Civil Engineering (*Current*)
- Manyoni WULA Audit: Manyoni Private Game Reserve (*Completed January 2020*)
- Zuka Properties WULA: Mun-Ya-Wana Conservancy (*Current*)

ECOLOGICAL ASSESSMENTS

- Ntunjambili Biodiversity Studies: Black Cubans Consulting (*Completed October 2018*)
- Middleburg Biodiversity Studies: Steve Tshwete Local Municipality (*Completed July 2018*)
- N3 New England Road Upgrade Faunal Study: KSEMS Environmental Consulting (*Completed October 2019*)
- Umlaas Gate Development Faunal Study: EcoPulse Consulting (*Completed January 2019*)
- Richards Bay Port Biodiversity Assessment: Transnet National Ports Authority (*Completed July 2018*)
- Underberg Dairy S24G Faunal Assessment: Underberg Dairy (Pty) Ltd (*Completed October 2019*)
- Babanango Faunal Species List: Nature Stamp (*Completed November 2019*).
- Gluckstaadt Water Supply Scheme Faunal Assessment: Zululand District Municipality c/o SiVEST Civil Engineering (*Current*)
- Shayamoya Housing Development Vegetation Assessment: Greater Kokstad Municipality (*Completed February 2020*)

VISUAL ASSESSMENTS

- Pofadder Wind Energy Farm Visual Impact Assessment: Arcus Consulting Services SA (*Completed November 2018*)
- Rondekop Wind Energy Farm Visual Impact Assessment: G7 Energies (*Completed October 2018*)
- Gromis Kommas Wind Energy Farm Visual Impact Assessment: CSIR (*Completed February 2020*)

OTHER APPLICATIONS/ASSESSMENTS

- Glen Arum Farm 24G Application: Glen Arum Farm (Pty) Ltd (*Current*)
- Phinda Nature Reserve Maintenance Management Plan: Mun-Ya-Wana Conservancy (*Current*)
- Bishopstowe Strategic Environmental Assessment: Msunduzi Municipality (*Completed September 2018*)
- DTP State of Environment Report: Dube TradePort Corporation (*Completed May 2018*)
- Maphumulo Weir Amendment: Umgeni Water (*Current*)
- Cape Floral Kingdom EMF Status Quo: Department of Environmental Affairs (*Current*)

Other Experience

- Reconstruction of the Sand River Bridge, St Francis Bay: BVi Consulting Engineers.
- Driftsands Expansion of the Waste Water Treatment works: Bosch Holdings.
- Proposed Upgrade of the Grassridge – Sunnyside – Melkhout 132kV Powerline, Eastern Cape Province: ESKOM SOC Ltd.
- Construction of the Tombo – Mafini 132kV Powerline, Port St Johns: ESKOM SOC Ltd.
- GIS and data input of plant community data in the Drakensberg region of KwaZulu-Natal: South African Environmental Observation Network (SAEON)
- Groundtruthing of Roads and Assets in EKZN Wildlife protected areas: Ezemvelo KZN Wildlife



Appendix 3 Impact Methodology

INTRODUCTION

The EIA Methodology assists in evaluating the overall effect of a proposed activity on the environment. The determination of the effect of an environmental impact on an environmental parameter is determined through a systematic analysis of the various components of the impact. This is undertaken using information that is available to the environmental practitioner through the process of the environmental impact assessment. The impact evaluation of predicted impacts is undertaken through an assessment of the significance of the impacts.

IMPACT SIGNIFICANCE

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 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.

The table in Annexure 1 must be used for reporting on the significance of impacts and must be added to the impact assessment section of the report.

Impact Rating System

The assessment of impacts takes into account the nature, scale and duration of effects on the environment whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact must also be assessed according to the project stages, namely:

- Planning
- Construction
- Operation
- Decommissioning

The proposal for mitigation or optimisation of an impact must be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance must be included.

RATING SYSTEM USED TO DETERMINE SIGNIFICANCE OF IMPACTS

In order to classify the potential impacts of a development, a rating system has been developed. The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the mitigation of an impact. Impacts must then be consolidated into one rating. In assessing the significance of each issue, the following criteria (including an allocated point system/score) has been used:

Nature

Provide a brief description of the impact of an environmental parameter being assessed in the context of the project. This criterion must include a brief written statement of the environmental aspect being impacted upon by a particular action or activity.

Geographical Extent

Defined as the area over which the impact will be expressed spatially.

Score	Extent	Description
1	Site	The impact will only affect this site
2	Local/district	The impact will affect the local area or district
3	Province/region	The impact will affect the entire province or region
4	International and National	The impact will affect the entire country

Probability

Probability describes the likelihood of the impact actually occurring.

Score	Probability	Description
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 a 75% chance of occurrence)
4	Definite	Impact will certainly occur (greater than a 75% chance of occurrence)

Reversibility

Provide a description on the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.

Score	Probability	Description
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

Irreplaceability

Provide a description on the degree to which resources will be irreplaceably lost as a result of a proposed activity.

Score	Irreplaceability	Description
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 resource	The impact will result in significant loss of resources
4	Complete loss of resource	The impact is result in a complete loss of all resources.

Duration

Provide a description on the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.

Score	Duration	Description
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).

Cumulative Effect

This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.

Score	Cumulative Effect	Description
1	Negligible cumulative impact	The impact would result in negligible to no cumulative effects
2	Low cumulative impact	The impact would result in insignificant cumulative effects
3	Medium cumulative impact	The impact would result in minor cumulative effects
4	High cumulative impact	The impact would result in significant cumulative effects

Intensity/Magnitude

The magnitude or intensity describes the severity of an impact

Score	Cumulative Effect	Description
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.

DETERMINING SIGNIFICANCE

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:

(Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity.

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

Below is a table outlining the impact significance ratings and a description of the anticipated impacts:

Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.
29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	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".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.



Appendix 4 Site layout plan