



SIBAYA PRECINCT 4; ECOLOGICAL ASSESSMENT

Draft Report

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SIBAYA PRECINCT 4 ECOLOGICAL ASSESSMENT DRAFT REPORT

SPECIALIST REPORT DETAILS

This report has been prepared as per the requirements of Section 32 of Government Notice No. R. 543 dated 18 June 2010 (Environmental Impact Assessment Regulations) under sections 24(5), 24M and 44 of the National Environmental Management Act, 1998 (Act 107 of 1998).

I, **Richard Kinvig**, declare that this report has been prepared independently of any influence or prejudice as may be specified by the Department of Agriculture and Environmental Affairs (DAEA).

Signed: Date: November 2012

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Document Title:	Sibaya Precinct 4; Draft Ecological Assessment Report
Author:	Dr. R. Kinvig & Mr. S. Burton
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Checked by:	Ryan Edwards
Approved:	Ryan Edwards
Signature:	
For:	Tongaat Hulett Developments
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1. INTRODUCTION

SiVEST Environmental Division was requested to provide a quotation to undertake an ecological assessment of the proposed **Sibaya 4 Precinct** by **Tongaat Hulett Developments**. A proposal was duly submitted and SiVEST were appointed to undertake the Scope of Works in accordance with the Terms of Reference provided by Nonhlanhla Khoza from THD.

2. TERMS OF REFERENCE

Below are the terms of reference which were provided to us by Tongaat Hulett Developments.

- Establish the current ecological status of the areas which are currently under indigenous vegetation.
- Provision of a list of faunal species present.
- Provision of a list of plant species present.
- Provision of general recommendations with respect to the impacts of the proposed development on the "natural" corridors proposed.

3. METHODOLOGY OF ASSESSMENT

The following methodology is to be utilised for the ecological assessment. The approach is a relatively simple three tiered approach.

1st Tier: Desktop Analysis

1. A preliminary assessment of Precinct 4 will be carried out using primarily desktop analysis of aerial photography, as per the ToR.
2. Potential priority areas will be identified from the photography and their approximate boundaries indicated on a map using ArcGIS 10. Criteria such as vegetation change, slope and topography will be used during the mapping phase. The precautionary principle will be applied to the mapping and the priority areas indicated will err on the side of caution in their demarcation.

2nd Tier: Intensive Sampling for Risk Assessment and Site Specific EMPr Generation

1. The priority areas that cannot be avoided will then be accurately and intensively sampled and assessed in terms of their species assemblage and ecological functioning.
2. Consultation with *Ezemvelo* KZN Wildlife with regards to the Draft Ecological Assessment Report Submission and comments and responses in respect of their concerns.

3rd Tier: Final Report

The Final Report will comprise a comprehensive species list, ecological assessment of the proposed Open Spaces, vegetation and habitat mapping and recommendations. These recommendations will potentially be incorporated into the Environmental Management Programme (EMPr) submitted as part of the Environmental Impact Assessment Process compiled by the relevant Environmental Impact Assessment Practitioner (EAP).

4. DESKTOP ANALYSIS

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 records what may occur on the site and the sites 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 the landscape level and are thus coarse. In addition, the factors which are often utilized 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 will highlight areas of conservation significance and biodiversity richness as well as provide information regarding the *status quo* and what will be required in terms of management to ensure improvement in the *status quo* and ensure the long term viability and sustainability of the proposed development nodes.

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, as well as the pertinent results for each are included below under the various titled sub-sections.

4.1 Ezemvelo KZN wildlife C-Plan & SEA Database

The C-Plan is a systematic conservation-planning package that runs with the GIS software ArcGIS, 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 (**Lombard et al. 2003**).

Biodiversity features can be land classes or species, and targets are set in area units either for land classes, or as numbers of occurrences of species for species locality data sets (**Lombard et al. 2003**). 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.

4.1.1 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 1 by 1 km grid cells called 'planning units'.

Each cell has associated with it an 'Irreplaceability Value', which is a reflection of the cells' 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.

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 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)."

4.1.2 C-Plan Biodiversity Features / Species within Project Area

In terms of the desktop analysis undertaken, a very small portion of the southern-eastern corner of the site within the property boundary are classified as **1**, i.e. **Totally Irreplaceable**. The rest of the site has been excluded as a result of change in land use. The Minset analysis mirrors the C-Plan data with the irreplaceable area being deemed a **Mandatory Reserve**.

There are potentially four features present on site which are considered to be of environmental significance and conservation importance. The four features are as follows:

- Vegetation Type – North Coast Grassland
- Vegetation Type – KwaZulu-Natal Dune Forest
- Fauna – *Doratogonus cristulatus* (Millipede)
- Flora – *Kniphofia pauciflora* (Dainty Poker)

4.1.3 KZN Wildlife Strategic Environmental Assessment (SEA)

In terms of the SEA 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 Table below identifies which groups are significant.

Table 1. SEA Data taken from Ezemvelo KZN Wildlife

YES	NO
Avi-faunal	Vegetation - Wetlands
Vegetation - Grasslands	Aquatic Fauna
Frogs	Mammals
Invertebrates	Vegetation - Forests
Reptiles	
Medicinal Plants	
Protected Plants	

4.2 Bio Resource Units

In terms of Camp, 1998, the only Bio Resource Unit for the site is Ya14. The general characteristics are as follows:

Bioresource Group	1 - Moist Coastal Forest, Thorn and Palm Veld
BRG Subgroup	1.3
Vegetation pattern	Bushed Grassland, Bushland Thicket
Indicator Species	<i>Acacia karroo</i> , <i>Acacia mearnsii</i> , <i>Acacia nilotica</i> , <i>Acacia robusta</i> , <i>Acacia sieberiana</i> , <i>Albizia adianthifolia</i> , <i>Aristida junciformis</i> , <i>Combretum spp.</i> , <i>Digitaria eriantha</i> , <i>Hyphaene natalensis</i> , <i>Lantana camara</i> , <i>Panicum maximum</i> , <i>Phoenix reclinata</i> , <i>Pteridium aquilinum</i> , <i>Sclerocarya birrea</i> , <i>Strelitzia nicolai</i> , <i>Syzygium cordatum</i>

The rainfall average is 973 mm of rainfall. The mean temperature is 20.5 °C and the climate rating is C1, which has a none to slight limitation on crop growing. There is no frost hazard and the erosion rating for the site is 3.9, which translates to a very high risk of erosion.

There are no wetlands or perennial rivers identified on site. 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.

4.3 Environmental Potential Atlas (ENPAT)

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.

The ENPAT data provides the following information about the site:

4.3.1 Soils and Geology

The geology of the site is comprised of Arenite. Arenite is extremely sensitive to disturbance and development. The soils on the site are dominated by Red-yellow apedal, freely drained soils; red, dystrophic and/or mesotrophic.

4.4 Mucina and Rutherford's Vegetation Assessment

The KwaZulu-Natal (KZN) province is rich in natural diversity. In terms of vegetation the site falls within the Indian Ocean Coastal Belt (Bio-region or biome), within the Pondoland / Maputaland vegetation complex. These floristic assemblages are extremely species rich and exhibit high levels of endemism.

In terms of the vegetation on site, the general classification is made at a very coarse scale, i.e. low resolution. The predicted vegetation type which occurs on site is CB 3 KwaZulu-Natal Coastal Belt zone. The KwaZulu-Natal Coastal Belt is distributed in a long, and in places broad, coastal strip along the KwaZulu-Natal coast, from near Mtunzini in the north, via Durban to Margate and just short of Port Edward in the south. Altitude ranges from about 20–450 m. It is considered endangered, with a conservation target of 25%. Only very small parts are statutorily conserved in Ngoye, Mbumbazi and Vernon Crookes Nature Reserves. About 50% has been transformed for cultivation, by urban sprawl and for road-building. Aliens include *Chromolaena odorata*, *Lantana camara*, *Melia azedarach* and *Solanum mauritianum*. Erosion is low and moderate.

A list of plant species that potentially occur in this classification and their medicinal, traditional and cultural significance are included at **Appendix 2**.

5. ECOLOGICAL STATUS QUO

A site visit was undertaken on the 14th of February 2012, by **Dr. Richard Kinvig** and **Mr. Stephen Burton**. In terms of the site the following may be reported on;

- Approximately 99% of the site is under intensive sugarcane cultivation;
- Five pockets of indigenous vegetation remain;
- The individual pockets are extremely small and isolated and therefore are unable to function with any ecological integrity.

5.1. Wetland / Drainage Line

A small fragment of channelled valley wetland was identified in the southern portions of the site between the N2 and Sibaya Drive (**Plate 1**). This wetland fragment is the remains of a once larger system that has now been filled-in by the construction of the N2. The wetland has been transformed by cane cultivation and the discharge of storm water down the wetland from the N2. The wetland has been culverted and passes under Sibaya Drive, with significant gabion head wall structures (**Plate 2**) in place to prevent erosion and undercutting. This area is diagrammatically represented in **Map B** attached at **Appendix 1**.

In terms of the vegetation found within this area, it appears as if a large proportion of the vegetation was planted for aesthetics as well as for the potential stabilisation of the drainage channel. The dominant tree species in the lower reaches is *Raphia australis* (Raphia Palm). In the upper reaches of the drainage line in close proximity to the N2 there appears to be a more composite mix of tree species. Further, there was a notable stratification of tall trees, with a relatively poorly established under storey. These under storey species all grow well in conditions of lower light intensities. The majority of the species encountered are species which produce masses of fruit, which are extremely palatable to birds and which play a role in vectoring these species into new areas. The most common under storey species which can become a significantly large tree was *Apodytes dimidiata*. Other species included *Ficus sur* and *Bridelia micrantha*. In close proximity and within the SANRAL Road Reserve the vegetation is dominated by *Schinus terebinthifolius* which is entering the Tongaat Hulett land along the drainage line and because of the various bird vectors.

The canopy of tall trees is dominated by *Ficus burkei* and *Syzygium cordatum*. In the under storey small individuals of *Trichilia emetica* and *Albizia adianthifolia* were present. In areas where the canopy was not closed and the drainage line was exposed to high levels of light, *Ludwigia octovalvis* dominated. A full species list is attached at **Appendix 2** for your ease of reference.

5.2. Bush Clump 1

This area comprises a total of four large trees, three are *Ficus burkei* species and the other is an *Albizia adianthifolia*. This area is diagrammatically represented in **Map B** attached at **Appendix 1**. These trees are positioned on a relatively steep slope, which has a road cut above it. Due to the steepness of slope the area hasn't been cultivated and it would be postulated that these trees were either planted or have simply germinated from deposited seed and developed into a bush clump.

In terms of this area, there is no under storey development and it appears as if the soil surface is regularly cleared as part of general farm maintenance. In a drainage line approximately 120 metres to the north, a single small *Albizia adianthifolia* has established itself and is surrounded by alien invasive species. The most prominent are *Ricinus communis*, *Chromolaena odorata* and *Lantana camara*. A single dead *Ficus* sp. still exists and was being utilised as a perching area by a Steppe Buzzard.

5.3. Bush Clump 2

Given the position of this bush clump and the large alien Cypress Tree we would postulate that this area was artificially created. It appears as if historically this may have been an old homestead site. The reasons for this are the presence of a number of exotic trees commonly associated with homesteads which have been established along the coast. The alien invasive vegetation has recently been cut and sprayed in terms of regular farm maintenance. The most common alien was *Lantana*

camara. One point of concern is that the spraying appears to have been undertaken poorly, as non target species, most notably *Scadoxus puniceus* have been sprayed. The reason may possibly be that this species may have been misidentified as *Canna indica*. The most dominant tree in this particular area is *Bridelia micrantha*, with the other large trees being *Morus alba*, *Cestrum laevigatum* and introduced *Cupressus* species. This area is diagrammatically represented in **Map B** attached at **Appendix 1**.

5.4. Open Space area around old Dam and Dam Wall

The dam area is highly degraded, with many species of alien growing on the wall, especially at the toe of the embankment. This area is diagrammatically represented in **Map B** attached at **Appendix 1**. The most common alien species is *Melia azedarach* and to a lesser extent *Ricinus communis*. In terms of indigenous vegetation, it appears as if the area has been planted with indigenous trees. The reasoning is that the most common species present is *Erythrina lysistemon*. All the individuals of said species are comparable in size and we would therefore postulate that they were planted at the same time. Three other indigenous species were also recorded as singletons. The species were; *Searsia chirindensis*, *Ficus sur* and *Bridelia micrantha*. All of these species are commonly bird vectored species due to the high seed set and palatability of the fruit produced.

5.5. Road Cutting

This patch of indigenous vegetation is the most established area of vegetation on the site. This area is diagrammatically represented in **Map B** attached at **Appendix 1**. In addition, in terms of the plant species identified within this patch, the majority of the vegetation is woody in nature. Some very large *Ficus sur*, *Albizia adianthifolia*, *Clerodendrum glabrum*, *Ekebergia capensis* and *Apodytes dimidiata* exist on the steep cut embankment. Other indigenous species also occur within this area, however, they appear to have been recruited only in the recent past. The species are; *Trichilia dregeana*, *Deinbollia oblongifolia* and *Bridelia micrantha*. Some herbaceous species were encountered growing in and amongst the under storey which is currently dominated by alien invasive species as well as many pioneer and ruderal indigenous species. *Scadoxus puniceus* a common species occurring within woody vegetation along the coast and around Durban was quite prevalent. The most common alien invasive species were *Ricinus communis*, *Lantana camara*, *Melia azedarach*, *Chromolaena odorata* and *Gomphrena celosioides* (on the periphery of the woody vegetation only). One alien species of significant concern which was encountered was *Anredera cordifolia* an extremely vigorous and aggressive species which impacts on indigenous vegetation as well as sugarcane production. A full list of species identified within the road cutting is included at **Appendix 2**.

5.6. Fauna

The fauna across the study site is extremely limited due to the extensive monoculture of sugarcane and the obvious lack of indigenous vegetation. The small areas of natural vegetation described above are the only real areas available to faunal species using the site for foraging and breeding. During the site visit it was noted that the majority of faunal species recorded were either in the indigenous patches identified above, or were moving between them. A number of bird species were recorded feeding in the small bush clumps and drainage lines, while a few species were actively hunting for prey within the cultivated fields. As noted above, the largest species seen was a Steppe Buzzard (*Buteo vulpinus*), and a Yellow-billed Kite (*Milvus parasitus*), both of which are common residents along the coastal plateau. Mammals appear to be very rare on the site, but this is not surprising considering the human activity levels both on the site, and directly adjacent to the site.

Evidence of mammalian species on the site was minimal, but did include the diggings of the Southern African Porcupine (*Hystrix africaeaustralis*), and the spoor of a single Bushbuck (*Tragelaphus scriptus*). Both of these signs were noted in Bush Clump 2, which indicates that these animals are moving freely across the site, as this vegetation node is centrally situated within the study area, but does not offer sufficient cover for either of these species to be resident in the immediate area of the node.

In addition, a single female Vervet Monkey (*Cercopithecus pygerythrus*) and her baby were noted in the Wetland / Drainage Line vegetation node, and were probably making use of the vegetation as a refuge while feeding on sugarcane and any available fruit species within the SANRAL road reserve vegetation. The active hunting patterns of the two above-mentioned larger bird species indicates that

the study site probably plays host to a reasonable population of prey species (e.g. rodents and insects), but the Yellow-billed Kite could also be making use of the roads adjacent to the study area to scavenge prey hit by cars.

There appears to be a general lack of amphibian species across the site, but this can be directly attributed to the historic conversion of wetland systems to sugarcane fields that is a common feature of the coastal sugarcane growing region, thus reducing the available habitat for these species.

The C-Plan data indicates that a millipede species (*Doratogonus cristulatus*) may occur on the site. This species is considered of least concern due to the maintenance of populations within suburban gardens, and there is no real evidence of declining populations or a diminishing habitat range.

6. LEGISLATION

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

6.1.1. Protected trees

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'.

In essence the NFA prohibits the destruction of indigenous trees in any natural forest without a licence.

6.2. 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.

6.3. 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.

Permit / License 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 will require a 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.

6.4. Protected Species

Two species of protected plant were encountered on the site.

The first species in question is *Scadoxus puniceus*. This species is protected by a blanket protection order that has been placed over all species belonging to the Amaryllidaceae Family. Even though this species is afforded protection it is not at risk in terms of its overall population survival. In order to mitigate the potential loss of these individuals should the development get Authorisation and proceed It is suggested that these species be relocated to areas which will not be impacted upon by development. These species are easily relocated due to their bulbous growth form. In addition, these species transplant extremely well and will therefore not be at risk.

The other species which is afforded protection under **Schedule 5** is *Raphia australis* (Kosi Palm) (**Plate 4 & 5**). It must be noted that these species do not naturally occur in this specific location, with the most southerly natural occurrence being Mtunzini. The Kosi Palm often reaches a height of 16 m. They are usually solitary, monoecious (separate male and female flowers on the same tree) and monocarpic (flowers once and dies). This is a significant factor as the species usually flower between the ages of 20 to 40 years. The flowering trigger has not been isolated as yet. Numerous (3 of 6) of the planted *Raphia australis* individuals have flowered and are in the process of senescing. Two other individuals had large quantities of fruit and therefore those will also senesce within the near future. In essence, in two to three years time only one individual will remain, unless recruitment occurs, which is extremely unlikely as the Palm Nut Vulture is the main dispersal vector, and does not occur in the Sibaya Precinct. The result is these fine Palm specimens will fall out of the system and the drainage line will be colonised over a relatively long period of time by species which occur within the direct vicinity.

In addition, two species of bird have been historically recorded in the area that are considered endangered, and one bird species that is considered critically endangered (South African Bird Atlas species list for the 1: 50 000 grid square is attached as **Appendix 4**). A number of other bird species are also considered vulnerable or near-threatened, but the majority of these species are associated with the estuarine systems further north and south of the study site.

The first endangered bird species is the Black-browed Albatross (*Thalassarche melanophris*), which is of little concern to this study area, as it only found frequenting the deeper waters off the coastline, and only makes use of the inner coastal waters during storm events. This species is unlikely to actually occur on the site, and will not be directly impacted on by the proposed development.

The second endangered bird species is the Spotted Ground-Thrush (*Zoothera guttata*), which is again of little concern on the study site as its primary habitat is forest under-storey. Since the site contains no vegetation areas that could actually be defined as forest, this species is unlikely to extremely unlikely to occur on the site. This species may occasionally pass through the site while moving from forest patches that do occur both to the North and South of the site.

The critically endangered Eurasian Bittern (*Botaurus stellaris*) occurs within the quarter degree grid square covering the study site, but is of little concern to this study as it is found exclusively in reed beds, sedges and flooded grassland. None of this species preferred habitats occurs on the study site and it is expected to be present only in the wetlands and floodplains associated with the Ohlanga and Mloti River systems to the South and North of the study area.

7. ALIEN INVASIVE SPECIES AND THEIR CONTROL

Currently, limited alien vegetation occurs on the site due to the highly intensive sugarcane operations that are taking place. The only areas where alien vegetation was noted was growing within the remnant natural vegetation patches. Having said this, these patches are small and relatively well managed with evidence of regular and ongoing spraying and clearing of alien species. The single biggest obstacle to management of these areas is that the surrounding land parcels also have alien species growing on them and these areas are acting as a source for recruitment into these

populations which would be referred to as sink populations. As mentioned earlier, of concern was the presence of *Anredera cotinifolia* which is a rampant weed and can spread quickly if not managed correctly. However, due to the limited distribution and low abundance it appears that ongoing management will maintain the population to isolated pockets. The other species of concern is the elevated presence of *Schinus terebinthifolius*, particularly in the area around the wetland / drainage line. The management on the Tongaat Hulett Property is good; however, the efforts are being undone by the significant population occurring within the SANRAL servitude. It is recommended that SANRAL are contacted and requested to clear their servitude or permission given to Tongaat Hulett to manage this population.

8. ECOLOGICAL FUNCTIONALITY AND INTEGRITY

In terms of the *status quo* of Sibaya Precinct 4, the ecological functionality and integrity is of an extremely low value. This is evidenced by the lack of terrestrial and wetland indigenous vegetation onsite. In terms of functionality, the temporary and seasonal valley bottom wetlands onsite have been completely transformed by cane cultivation and by in-filling for cane haulage roads. The lack of artificial drainage channels indicates that the valley bottom wetland areas are generally well drained and of a temporary to seasonal nature.

The wetland areas are of a much more temporary and seasonal nature due to the substrate (Berea Red Sands) on which they occur, which has facilitated their transformation to cultivation (**Pers. Comm. Cowden, 2012**). Restoring the ecological functionality to this site would be an exceedingly difficult and economically unviable proposition, especially since the gains of rehabilitation would be low.

In terms of connectivity, this site is bounded on all sides by intensive agriculture and on the southerly boundary is the Sibaya Casino Complex. There are no existing linkages or Open Spaces that may be expanded upon to create ecological corridors. The requirement for such is therefore questionable, and it would be our position that in order to prevent further Urban Creep this site is ideally situated for high density development. It is the author's opinion that historically, this site would have been of limited ecological value and would have been a very homogenous ecosystem, dominated by grasslands, with temporary and seasonal wetlands in the valley bottoms bisecting these grasslands.

Woody vegetation would probably not have been a significant component of the system and this is evidenced by the limited distribution thereof across the site. We support this statement with the fact that even on other intensively farmed areas, where woody vegetation existed it was maintained, because the removal and transformation of these areas would have been difficult, both in establishment and maintaining cultivation thereafter.

Table 2. Current areas under natural vegetation and as a proportion of the entire site

NATURALLY VEGETATED ZONES	AREA (HA)	PROPORTION OF SITE (%)
Wetland / Drainage Line	0.326	0.26
Bush clump 1	0.125	0.10
Bush clump 2	0.109	0.09
Open Space area around old Dam and Dam Wall	0.374	0.30
Road Cutting	0.492	0.39
TOTAL AREA	1.426	1.14
TOTAL SITE EXTENT	125	

In general, the fauna of the site is extremely limited and the majority of the species recorded are using the site in a transitory way, or are generalists that can take advantage of the marginal habitat that a sugarcane monoculture creates.

9. PROPOSED DEVELOPMENT FRAMEWORK

Given the current nature and intensity of farming activities taking place on the site, we would be in support of the relatively high development density proposed for the site as per the attached Urban Design Layout (**Appendix 1G**). Within the proposed layout for the development of the site, numerous opportunities exist to provide a softening to the Urban Environment through the clever utilisation of vegetation, along the roadways and verges. The provision of park areas speak more to the social environment than too the ecological one, but having said this, the utilisation of the correct vegetation and the resourceful use of different suites of plant and tree species will see these park areas, ostensibly for human use, provide limited ecological value. The provision of Open Spaces, along the periphery of the Urban Core will provide limited ecological linkages, which may in turn support limited movement opportunities through the site for faunal species. However, due to their size, positioning and limited connectivity to other Open Space Areas off-site, these linkages will simply function at the movement level and not at a more involved and functional level.

In the greater context of the landscape, there are no existing ecological linkages which have been maintained or are potentially able to be established without considerable expense and alteration to the proposed development framework. We would also question the value as to creating these linkages as the site is disjunct from the surrounding landscape as four major roadways isolate the site. Given the lack of existing vegetation and the limited ecological value, we would propose that this site be sacrificed in its entirety with existing ecological opportunities (Forest 31, etc) be maintained, managed and interventions undertaken to ensure their persistence and value add to the overall Greater Sibaya Precinct. The concentration of effort and economic expenditure on these existing areas will mitigate the loss of a very low ecologically functioning area that is currently proposed to receive development.

10. PLANT SPECIES SUITABLE FOR LANDSCAPING “URBAN” ZONES

In terms of plant species which would naturally occur within the area and would be considered suitable to create an interface between development and existing indigenous Open Space Areas, have been presented in **Table 3** below. The suitability of the species that have been selected are based on a number of criteria.

The following criteria are of significance when selecting plant and particularly tree species, which are to be incorporated into the human aspect of any development, i.e. the verges, centralised planting in parks and open spaces.

- The trees should be tidy, i.e. not deciduous;
- Not produce significant amount of fruits;
- Fruits should not be large and very appealing to faunal and avifaunal species;
- Their root systems should be non-aggressive, i.e. species within the genus *Ficus* would not be suitable species;
- Species should grow rapidly and provide shade, and;
- Endemic to the surrounding area, i.e. should occur naturally within approximately 1 km of the sea within the eThekweni Municipal Area.

Table 3. Plant Species suitable for “Urban Planting”

Trees (suitable for planting on verges and not too untidy)
<i>Allophylus africanus</i>
<i>Allophylus dregeanus</i>
<i>Allophylus natalensis</i>
<i>Anastrabe integerrima</i>
<i>Apodytes dimidiata</i>
<i>Baphia racemosa</i>
<i>Burchellia bubalina</i>
<i>Calodendron capense</i>
<i>Chionanthus foveolatus</i> subsp. <i>foveolatus</i>
<i>Commiphora harveyi</i>
<i>Commiphora woodii</i>
<i>Cryptocarya woodii</i>
<i>Cussonia spicata</i>
<i>Ekebergia capensis</i>
Shrubs / Small trees for under-storey planting
<i>Acokanthera oblongifolia</i>
<i>Dovyalis rhamnoides</i>
<i>Ochna natalitia</i>
<i>Pavetta lanceolata</i>
<i>Pavetta revoluta</i>
<i>Psychotria capensis</i>
<i>Rothmannia globosa</i>
<i>Searsia nebulosa</i>
<i>Carissa bispinosa</i>
<i>Carissa macrocarpa</i>
Grass Species
<i>Themeda triandra</i>
<i>Melinis nerviglumis</i>
<i>Alloteropsis semialata</i>
<i>Bothriochloa insculpta</i>
<i>Aristida junciformis</i>
<i>Imperata cylindrica</i>
<i>Monocymbium cerasiiforme</i>
<i>Brachiaria serrata</i>
<i>Tristachya leucothrix</i>

11. CONCLUSIONS

The current vegetation and ecological status of the proposed development site is extremely low. Two protected plant species occur on the site, one species (*Raphia australis*) has been planted and falls outside of its natural distribution. Further the existing individuals are all close to the end of their life span and therefore do not hold any significant value. The second species (*Scadoxus puniceus*) naturally occurs in this location and all individuals should be removed and utilised in the landscaping of the development should it be approved. We would support the development of this site, and would suggest that the provision of linkages over and above the Open Spaces which separate the N3 Freeway from the site would be of no or limited value, due to the site and its surrounding landscape context.

It is with this in mind that we would support development from a biodiversity maintenance and ecological perspective only, and support the notion that the site is highly able to accept such change, without a resultant degradation of biodiversity or ecological functioning.

12. REFERENCES

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Appendix 1


MAPPING FOR THE SITE



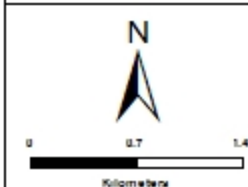
SIBAYA NODE 4 ECOLOGICAL ASSESSMENT

LOCALITY MAP
1: 50 000

Legend

 Sibaya Node 4 Boundary

SOURCE: Chief Directorate of Survey & Mapping



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 ENVIRONMENTAL DIVISION
 VCC STATE, NORTHVIEW BUILDING
 170 PETER BROWN DRIVE
 WENTZHOE, PIETRIEMARITZBURG
 3201
 Phone: +27 33 347 600
 Fax: +27 33 347 602
 e-mail: info@sivest.co.za

Project No	Map Ref No	Prepared By	Date
11306	11306/01	SLB	10/02/2012



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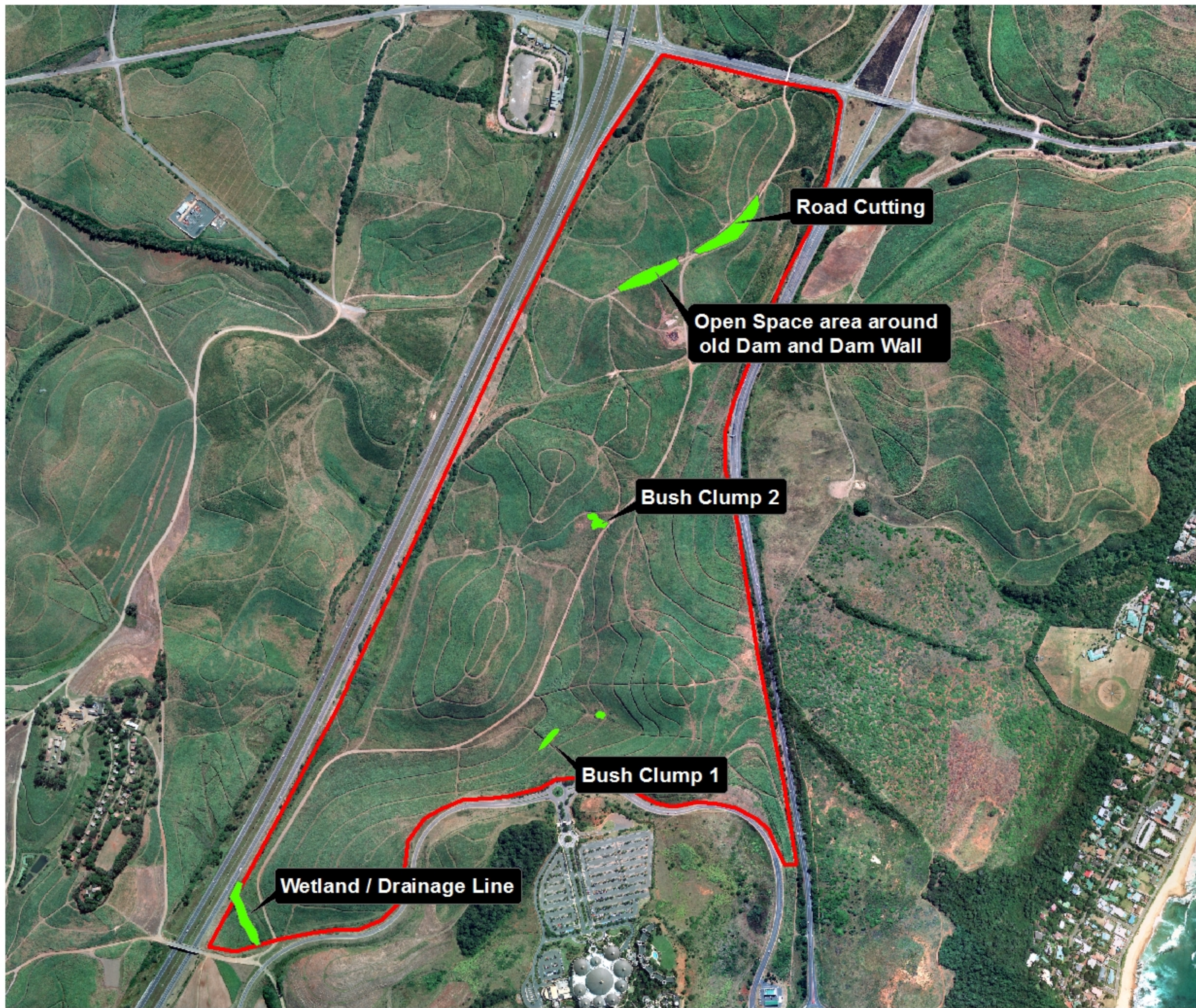
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**SIBAYA NODE 4
ECOLOGICAL ASSESSMENT**




AERIAL VIEW

Legend

-  Sibaya Node 4 Boundary
-  Indigenous Vegetation Units




SOURCE: Chief Directorate of Survey & Mapping

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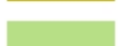
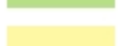
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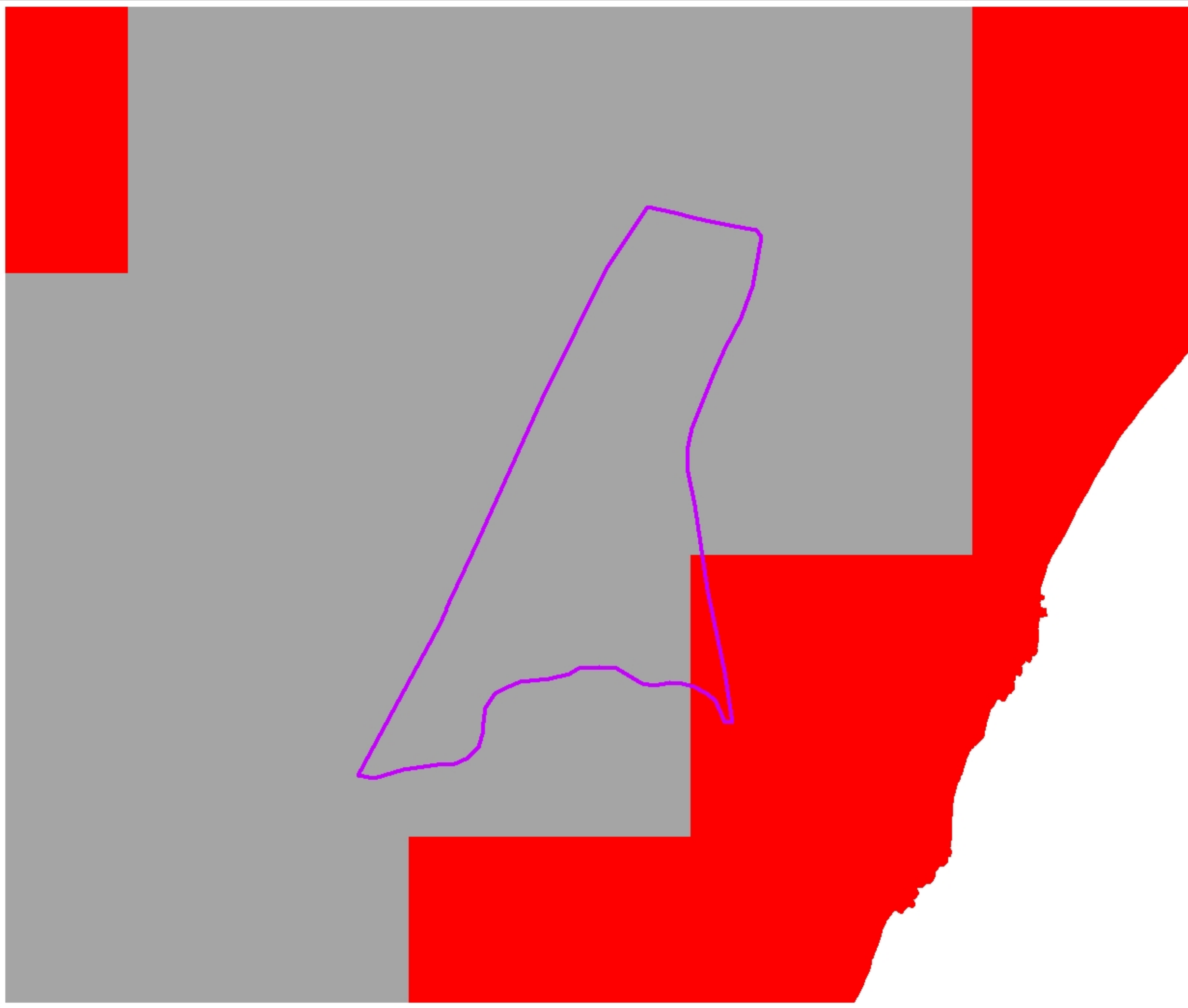
C-PLAN

Legend

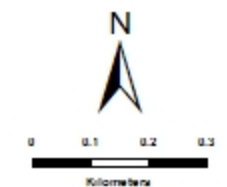
 Sibaya Node 4 Boundary

C-Plan Irreplaceability

-  Initial Excluded
-  1 (Totally Irreplaceable)
-  >0.8 - <1
-  >0.6 - 0.8
-  >0.4 - 0.6
-  >0.2 - 0.4
-  >0 - 0.2



SOURCE: Chief Directorate of Survey & Mapping




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 VCC STATE, NORTHVIEW BUILDING
 170 PETER BROWN DRIVE
 WINTROSE, PIETERMARITZBURG
 3201
 Phone: +27 33 347 1600
 Fax: +27 33 347 1762
 Email: info@sivest.co.za

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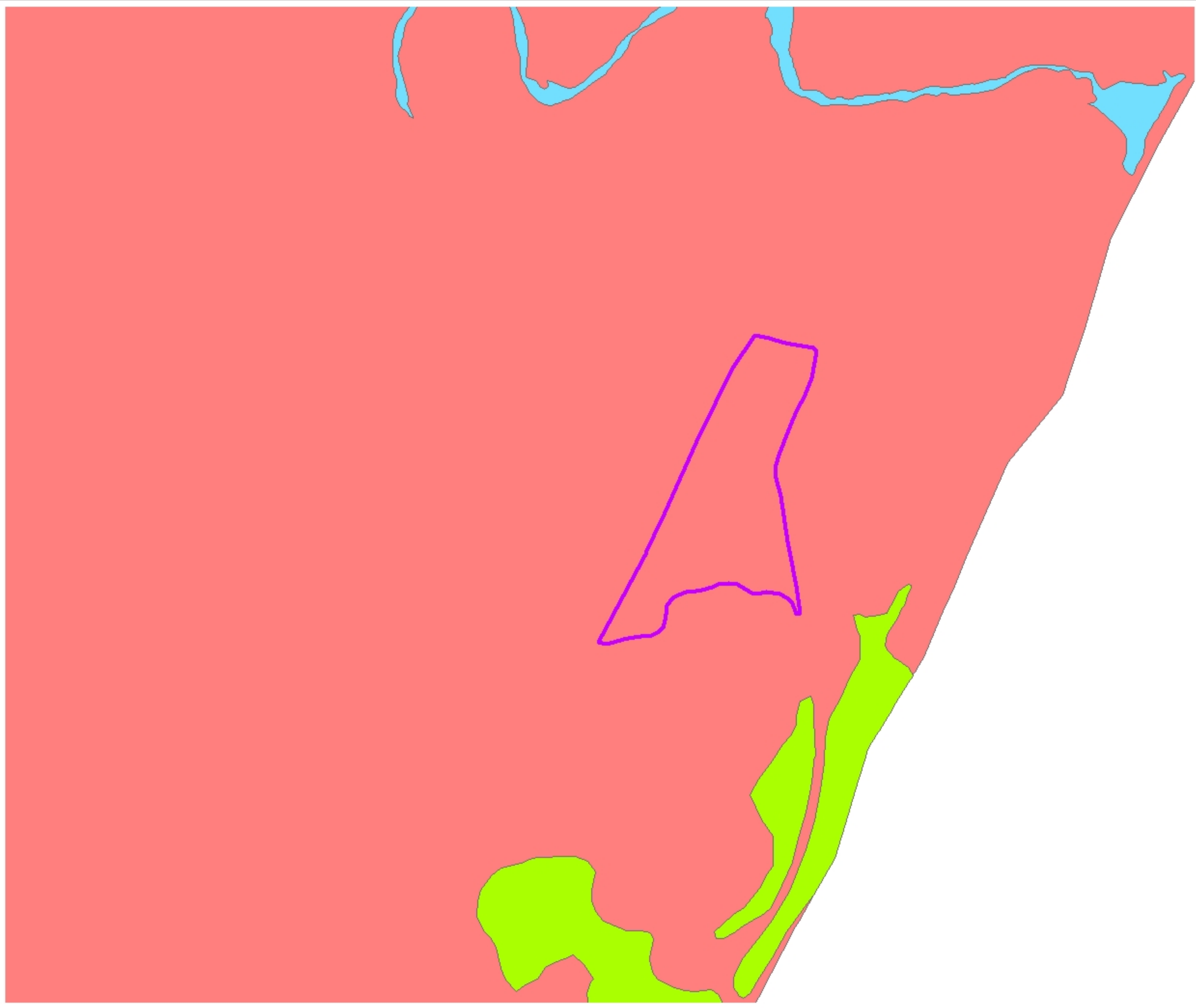


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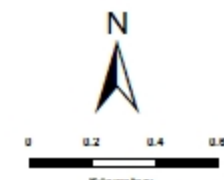
MUCINA & RUTHERFORD VEGETATION TYPES

Legend

-  Sibaya Node 4 Boundary
-  KwaZulu-Natal Coastal Belt
-  Northern Coastal Forest
-  Subtropical Coastal Lagoon



SOURCE: Chief Directorate of Survey & Mapping



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ENVIRONMENTAL DIVISION
VCC STATE, NORTHVIEW BUILDING
170 PETER BROWN DRIVE
MONTROSE, Pietermaritzburg
3201

Phone: +27 33 347 1600
Fax: +27 33 347 1762
Email: info@sivest.co.za

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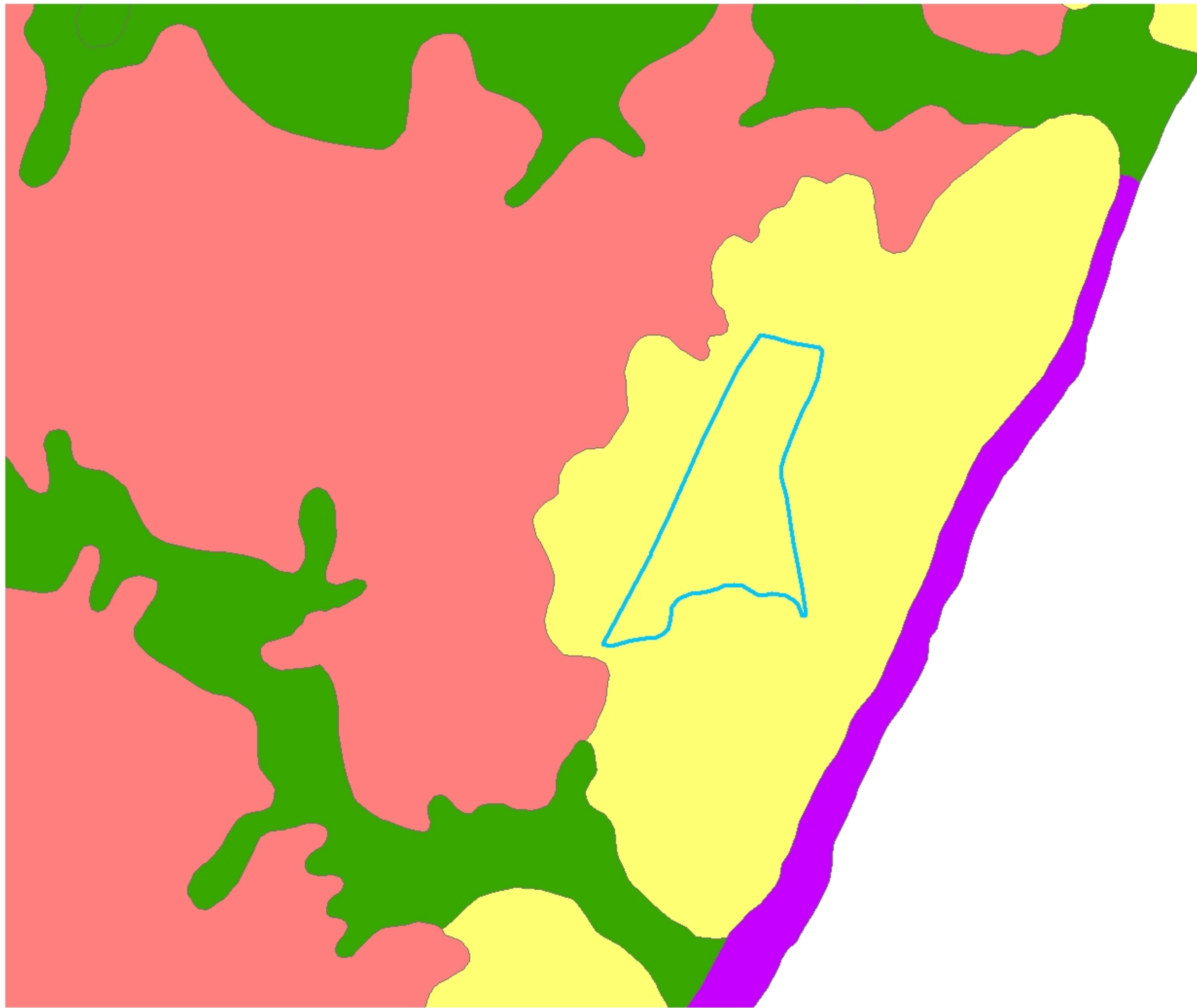


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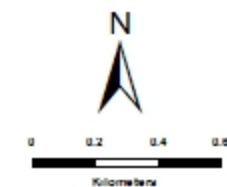
SOILS

Legend

-  Sibaya Node 4 Boundary
-  Grey Regic Sands
-  Vertic, Melanic and Red Structured Horizon Soils
-  Red-Yellow Apedal Freely Drained Soils
-  Glenrosa and/or Mispah Forms



SOURCE: Chief Directorate of Survey & Mapping




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 ENVIRONMENTAL DIVISION
 VCC STATE, NORTHVIEW BUILDING
 170 PETER BROWN DRIVE
 WINTROSSE, PIETERMARITZBURG
 3201
 Phone: +27 33 347 1600
 Fax: +27 33 347 1762
 Email: info@sivest.co.za

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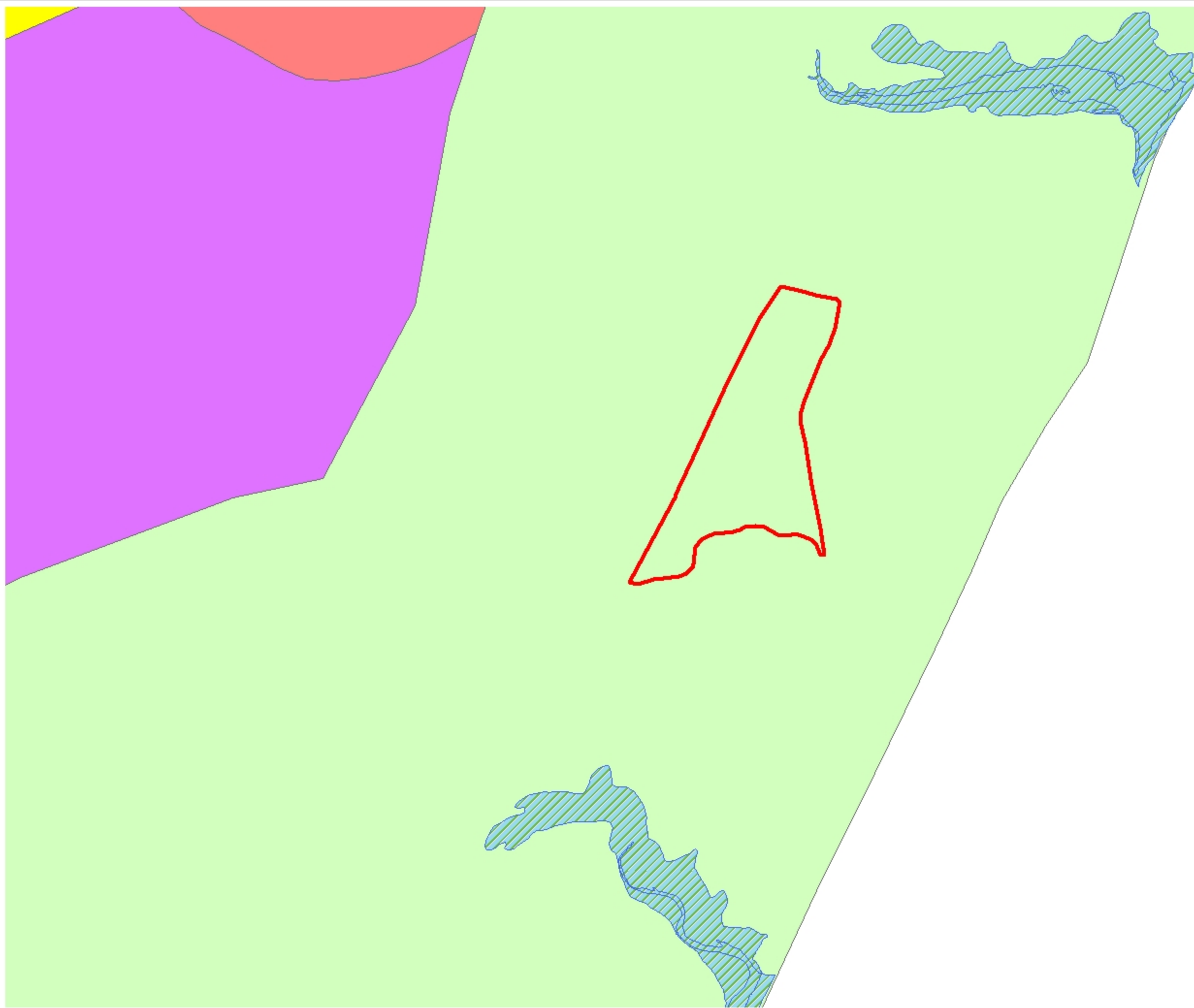


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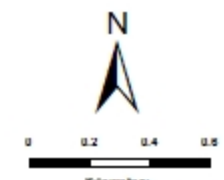
GEOLOGY & WETLANDS

Legend

-  Sibaya Node 4 Boundary
-  Arenite
-  Gneiss
-  Shale
-  Tillite
-  Wetlands



SOURCE: Chief Directorate of Survey & Mapping

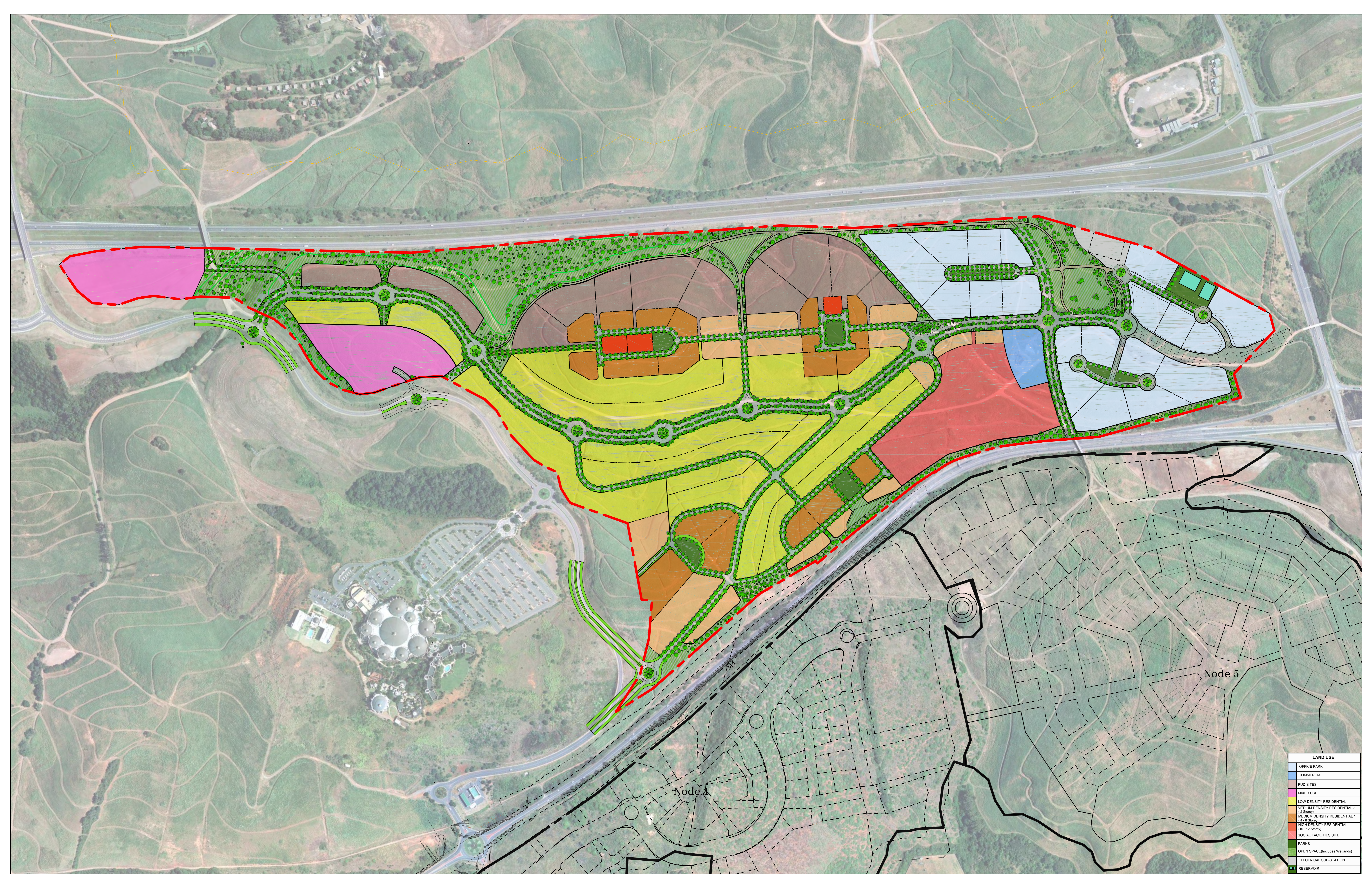


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 WINTROSSE, PIETERMARITZBURG
 3201
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 Fax: +27 33 347 1762
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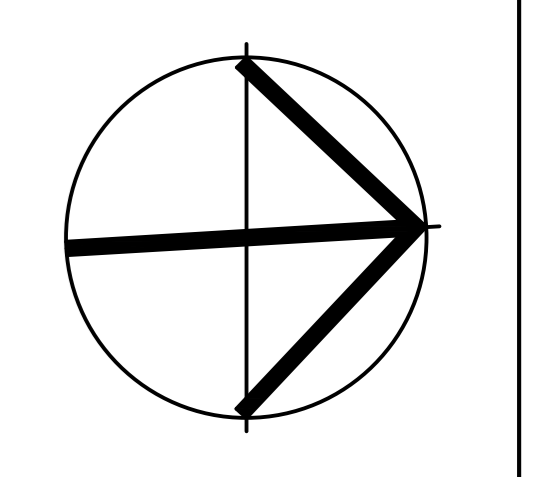
SIBAYA NODE 4 : URBAN DESIGN LAYOUT

FOR:

BY:

DATE: 19/09/2012
 DESIGNED:
 CHECKED:
 SCALE: 1 : 2500
 APPROVED:
 DRAWING NUMBER:
 UDL - SIB - N4 - 19092012- REV 004

LAND USE	
	OFFICE PARK
	COMMERCIAL
	PUD SITES
	MIXED USE
	LOW DENSITY RESIDENTIAL (2 Storey)
	MEDIUM DENSITY RESIDENTIAL 2 (4 - 8 Storey)
	MEDIUM DENSITY RESIDENTIAL 1 (4 - 8 Storey)
	HIGH DENSITY RESIDENTIAL (10 - 12 Storey)
	SOCIAL FACILITIES SITE
	PARKS
	OPEN SPACE (includes Wetlands)
	ELECTRICAL SUB-STATION
	RESERVOIR





Appendix 2

VEGETATION SPECIES RECORDED ON SITE

Species	Growth Form	Status
Wetland / Drainage Line		
<i>Ficus burkei</i>	Tree	Indigenous
<i>Albizia adianthifolia</i>	Tree	Indigenous
<i>Ricinus communis</i>	Woody shrub	Alien Cat 1
<i>Lantana camara</i>	Woody shrub	Alien Cat 1
<i>Solanum mauritianum</i>	Tree	Alien Cat 1
<i>Apodytes dimidiata</i>	Tree	Indigenous
<i>Cyperus albostrigatus</i>	Sedge	Indigenous
<i>Acacia kraussiana</i>	Creeper	Indigenous
<i>Uvaria caffra</i>	Scandent Tree	Indigenous
<i>Capparis fascicularis</i> var. <i>zeyheri</i>	Creeper	Indigenous
<i>Schinus terebinthifolius</i>	Tree	Alien Cat 1
<i>Strelitzia nicolai</i>	Tree	Indigenous
<i>Setaria megaphylla</i>	Graminoid	Indigenous
<i>Ageratum conyzoides</i>	Herb	Alien Cat 1
<i>Canna indica</i>	Herb	Alien Cat 1
<i>Rhynchosia caribaea</i>	Creeping Herb	Indigenous
<i>Commelina erecta</i>	Creeping Herb	Indigenous
<i>Sorghum bicolor</i>	Graminoid	Naturalised Alien
<i>Chrysanthemoides monilifera</i>	Woody shrub	Indigenous
<i>Phragmites australis</i>	Graminoid	Indigenous
<i>Typha capensis</i>	Graminoid	Indigenous
<i>Asystasia gangetica</i>	Creeper	Indigenous
<i>Syzygium cordatum</i>	Tree	Indigenous
<i>Ficus sur</i>	Tree	Indigenous
<i>Melia azedarach</i>	Tree	Alien Cat 2
<i>Paspalum dilatatum</i>	Graminoid	Naturalised Alien
<i>Bridelia micrantha</i>	Tree	Indigenous
<i>Desmodium incanum</i>	Herb	Indigenous
<i>Cestrum laevigatum</i>	Tree	Alien Cat 1
<i>Cestrum aurantiacum</i>	Tree	Alien Cat 1
<i>Cyphostemma cirrhosum</i>	Creeper	Indigenous
<i>Ludwigia octovalvis</i>	Shrub	Indigenous
<i>Passiflora</i> cf. <i>edulis</i>	Creeper	Alien Cat 1
<i>Rubus cuneifolius</i>	Woody shrub	Alien Cat 2
<i>Imperata cylindrica</i>	Graminoid	Indigenous
<i>Syngonium podophyllum</i>	Creeper	Alien N/A
<i>Ipomoea indica</i>	Creeper	Alien Cat 2
<i>Ipomoea cairica</i>	Creeper	Indigenous
<i>Cardiospermum grandiflorum</i>	Creeper	Alien Cat 1
<i>Physalis viscosa</i>	Herb	Alien N/A
<i>Panicum natalense</i>	Graminoid	Naturalised Alien
<i>Striga asiatica</i>	Parasitic Herb	Possibly Introduced
<i>Delairea odorata</i>	Creeper	Indigenous
<i>Euphorbia thyrsoflora</i>	Woody shrub	Alien Cat 1
<i>Trichilia dregeana</i>	Tree	Indigenous
<i>Raphia australis</i>	Tree	Indigenous (Protected)
Bush Clump 1		
<i>Ficus burkei</i>	Tree	Indigenous
<i>Albizia adianthifolia</i>	Tree	Indigenous
<i>Ricinus communis</i>	Woody shrub	Alien Cat 1

<i>Lantana camara</i>	Woody shrub	Alien Cat 1
<i>Solanum mauritianum</i>	Tree	Alien Cat 1
Bush Clump 2		
<i>Bridelia micrantha</i>	Tree	Indigenous
<i>Cupressus Tree</i>	Tree	Alien N/A
<i>Commelina erecta</i>	Creeper	Indigenous
<i>Commelina benagahlensis</i>	Creeper	Indigenous
<i>Asparagus falcatus</i>	Woody Creeper	Indigenous
<i>Morus alba</i>	Tree	Alien Cat 2
<i>Deinbollia oblongifolia</i>	Tree	Indigenous
<i>Cyperus albostriatus</i>	Sedge	Indigenous
<i>Cyphostemma cirrhosum</i>	Creeper	Indigenous
<i>Delairea odorata</i>	Creeper	Indigenous
<i>Canna indica</i>	Herb	Alien Cat 1
<i>Draceana aletriformis</i>	Tree	Indigenous
<i>Scadoxus puniceus</i>	Geophyte	Indigenous (Protected)
<i>Cestrum laevigatum</i>	Tree	Alien Cat 1
<i>Berkheya bipinnifida</i>	Herb	Indigenous Pioneer
<i>Richardia brasiliensis</i>	Creeping Herb	Alien N/A
<i>Lantana camara</i>	Woody shrub	Alien Cat 1
<i>Pavetta revoluta</i>	Tree	Indigenous
<i>Maytenus cf. peduncularis</i>	Tree	Indigenous
<i>Embelia ruminata</i>	Scandent Tree / Creeper	Indigenous
Open Space Dam		
<i>Erythrina lysistemon</i>	Tree	Indigenous
<i>Melia azedarach</i>	Tree	Alien Cat 2
<i>Bridelia micrantha</i>	Tree	Indigenous
<i>Ficus sur</i>	Tree	Indigenous
<i>Searsia chirindensis</i>	Tree	Indigenous
Road Cutting		
<i>Apodytes dimidiata</i>	Tree	Indigenous
<i>Bridelia micrantha</i>	Tree	Indigenous
<i>Scadoxus puniceus</i>	Geophyte	Indigenous (Protected)
<i>Schinus terebinthifolius</i>	Tree	Indigenous
<i>Senecio chrysocoma</i>	Herb	Indigenous
<i>Albizia adianthifolia</i>	Tree	Indigenous
<i>Gomphocarpus physocarpus</i>	Herb	Indigenous
<i>Psidium guajava</i>	Tree	Alien Cat 2
<i>Melia azedarach</i>	Tree	Alien Cat 2
<i>Ekebergia capensis</i>	Tree	Indigenous
<i>Clerodendrum glabrum</i>	Tree	Indigenous
<i>Ricinus communis</i>	Woody shrub	Alien Cat 1
<i>Deinbollia oblongifolia</i>	Tree	Indigenous
<i>Erythrina lysistemon</i>	Tree	Indigenous
<i>Trichillia dregeana</i>	Tree	Indigenous
<i>Ficus sur</i>	Tree	Indigenous
<i>Conyza sp.</i>	Herb	Alien N/A
<i>Setaria megaphylla</i>	Graminoid	Indigenous



Appendix 3

**MUCINA & RUTHERFORD CB 3 PREDICTED
SPECIES LIST**

KwaZulu-Natal Coastal Belt

Important Taxa			
Graminoids			
<i>Aristida junciformis</i> subsp. <i>galpinii</i>			Poor grazing potential, colonises disturbed soils
<i>Digitaria eriantha</i>			Palatable, indicates good veld condition, stolon varieties utilised for soil stabilisation, endure heavy grazing
<i>Panicum maximum</i>			Valuable grazing grass in its area of distribution, occurs in abundance in well managed grasslands, cultivated pasture
<i>Themeda triandra</i>			Most important grazing grass in SA, good indicator of a healthy grassland
<i>Alloteropsis semialata</i> subsp. <i>eckloniana</i>			Unpalatable
<i>Cymbopogon caesius</i>			Often used for thatching, and to line grain baskets to keep rodents away. Contains an essential oil
<i>Cymbopogon nardus</i>			Poor grazing, strong aromatic smell, contains essential oil, if dominant in veld cattle known to die from hunger
<i>Eragrostis curvula</i>			Cultivated pasture grass, good soil stabilising properties
<i>Eulalia villosa</i>			Indicates undisturbed veld
<i>Hyparrhenia filipendula</i>			Palatable early in season, good thatching grass
<i>Melinis repens</i> subsp. <i>repens</i>			Pioneer species, plays important soil stabilising role,
Herbs			
<i>Berkheya speciosa</i> subsp. <i>speciosa</i>			Treat stomach ailments, bilharzia, sore eyes
<i>Cyanotis speciosa</i>			Treat infertility, grazed by cattle
<i>Senecio glaberrimus</i>			N/A
<i>Alepidea longifolia</i>			Young leaves used as spinach (<i>Ikhokhwane</i>)
<i>Centella glabrata</i>			Used as a charm against hail
<i>Cephalaria oblongifolia</i>			N/A
<i>Chamaecrista mimosoides</i>			N/A
<i>Conostomium natalense</i>			Used traditionally as love charms
<i>Crotalaria lanceolata</i>			Used as green fodder & as a love charm
<i>Dissotis canescens</i>			Used traditionally to treat dysentery & hangovers
<i>Eriosema squarrosum</i>			N/A
<i>Gerbera ambigua</i>			Used to treat tapeworm and coughs
<i>Hebenstretia comosa</i>			<i>H. dura</i> used to make perfumed ointment
<i>Helichrysum cymosum</i> subsp. <i>cymosum</i>			<i>Impepho</i>
<i>Helichrysum pallidum</i>			Same complex as <i>H. nudifolium</i> , used as a tea, treats chest complaints, fevers, wounds, burnt to invoke goodwill from ancestors
<i>Hibiscus pedunculatus</i>			Bark used as twine in hut building & to treat urinary infections
<i>Hybanthus capensis</i>			N/A
<i>Indigofera hilaris</i>			Certain spp. used to alleviate pain from stings, snakebites
<i>Pentanisia prunelloides</i> subsp. <i>latifolia</i>			Treat range of ailments, from stomach pains to haemorrhoids

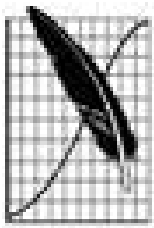
KwaZulu-Natal Coastal Belt			
<i>Senecio albanensis</i>			N/A
<i>Senecio bupleuroides</i>			Treat chest and heart complaints, used during difficult births
<i>Senecio coronatus</i>			Poultices, purification purgatives, for enemas in infants and stomach ache
<i>Senecio rhyncholaenus</i>			N/A
<i>Sisyranthus imberbis</i>			N/A
<i>Stachys aethiopica</i>			Used to cure feverish delirium
<i>Stachys nigricans</i>			Used as a tonic and love charm
<i>Vernonia galpinii</i>			N/A
<i>Vernonia oligocephala</i>			Used to treat diabetes , traditionally treats malaise, poor appetite, digestive ailments
Geophytic Herbs			
<i>Bulbine asphodeloides</i>			Leaves treat cracked lips, skin complaints, burns, to stop bleeding & as an antidote for livestock after ingesting poison
<i>Disa polygonoides</i>		Protected	Tuber infusions used to treat voice loss after illness
<i>Hypoxis filiformis</i>			<i>H. argentea</i> similar sp. used to treat cracked teats on cows, and root stock eaten
<i>Ledebouria floribunda</i>			Used in traditional medicine
<i>Pachycarpus asperifolius</i>			Used to treat hysteria, stomach complaints, headaches and a charm against evil
<i>Schizocarpus nervosus (Scilla nervosa)</i>		Protected	Treats rheumatic fever and dysentery
<i>Tritonia disticha</i>			Treat stomach complaints in babies
Low Shrubs			
<i>Clutia pulchella</i>			N/A
<i>Gnidia kraussiana</i>			Roots used medicinally, ear ache, boils, coughs, insanity, foetal growth, fish poisons
<i>Phyllanthus glaucophyllus</i>			<i>P. myrtaceus</i> fruit is edible
<i>Tephrosia polystachya</i>			N/A
Woody Climbers			
<i>Abrus laevigatus</i>			N/A
<i>Asparagus racemosus</i>			N/A
<i>Smilax anceps</i>			Treats numerous ailments
Small Trees and Tall Shrubs			
<i>Bridelia micrantha</i>			Fruit sometimes eaten, roots, bark treat sterility, gastric respiratory and eye complaints, wood used for fences & furniture
<i>Phoenix reclinata</i>			Fruit, brooms, weaving, house construction, fish bomas, wine making
<i>Syzygium cordatum</i>			Makes a good wine, used medicinally for respiratory, stomach illness, dyes from bark, wood for construction
<i>Acacia natalitia</i>			Coffee substitute, gum treats oral thrush, Firewood, Used in pharmaceuticals, rope
<i>Albizia adianthifolia</i>			Wood used for construction, fuel, bark for medicinal purposes, leaves used as a sponge for washing
<i>Antidesma venosum</i>			Tasty fruit, wood for construction, fuel, bark, leaves & roots to treat stomach complaints

KwaZulu-Natal Coastal Belt			
Biogeographically Important Taxa			
Graminoids			
<i>Cyperus natalensis</i>	Coastal Belt Element		
<i>Eragrostis lappula</i>	Southern Dist ⁿ Limit		Poor grazing, plays significant role in stabilising drainage lines
Herbs			
<i>Helichrysum longifolium</i>	Coastal Belt Element		N/A
<i>Selago tarachodes</i>	Coastal Belt Element		N/A
<i>Senecio dregeanus</i>	Coastal Belt Element		Used to treat chest colds & madness
<i>Sphenostylis angustifolia</i>	Southern Dist ⁿ Limit		Good fodder, used to cleanse blood & stomach
Geophytic Herbs			
<i>Kniphofia gracilis</i>	Coastal Belt Element	Protected	N/A
<i>Kniphofia littoralis</i>	Coastal Belt Element	Protected	N/A
<i>Kniphofia rooperi</i>	Coastal Belt Element	Protected	Used to treat chest complaints & good luck charm by children
<i>Pachystigma venosum</i>	Southern Dist ⁿ Limit		Edible fruit
<i>Zeuxine africana</i> (orchid)	Southern Dist ⁿ Limit	Protected Cites II	
Low Shrubs			
<i>Helichrysum kraussii</i>	Southern Dist ⁿ Limit		N/A
<i>Agathisanthemum bojeri</i>	Southern Dist ⁿ Limit		N/A
<i>Desmodium dregeanum</i>	Coastal Belt Element		N/A
Megaherb			
<i>Strelitzia nicolai</i>	Coastal Belt Element		Seeds ground into flour, make fritters
Geoxylic suffrutices			
<i>Ancylobothrys petersiana</i>	Southern Dist ⁿ Limit		Fruit eaten
<i>Eugenia albanensis</i>	Coastal Belt Element	Protected	Fruit eaten, used to treat diarrhoea
<i>Salacia kraussii</i>	Southern Dist ⁿ Limit		Fruits are eaten and roots used as an aphrodisiac (<i>Bangalala</i>)
Small Trees and Tall Shrubs			
<i>Anastrabe integerrima</i>	Coastal Belt Element		Wood termite resistant, used for spoons
<i>Acacia nilotica</i> subsp. <i>kraussiana</i>	Southern Dist ⁿ Limit		Dyes and Tanning
Endemic Taxa			
<i>Vernonia africana</i>	Extinct		N/A
Geophytic Herbs			
<i>Kniphofia pauciflora</i>	Extinct in wild	Protected	N/A used in horticulture
Low Shrubs			
<i>Barleria natalensis</i>	Extinct		N/A



Appendix 4

**PREDICTED BIRD SPECIES LIST FOR THE
SITE**



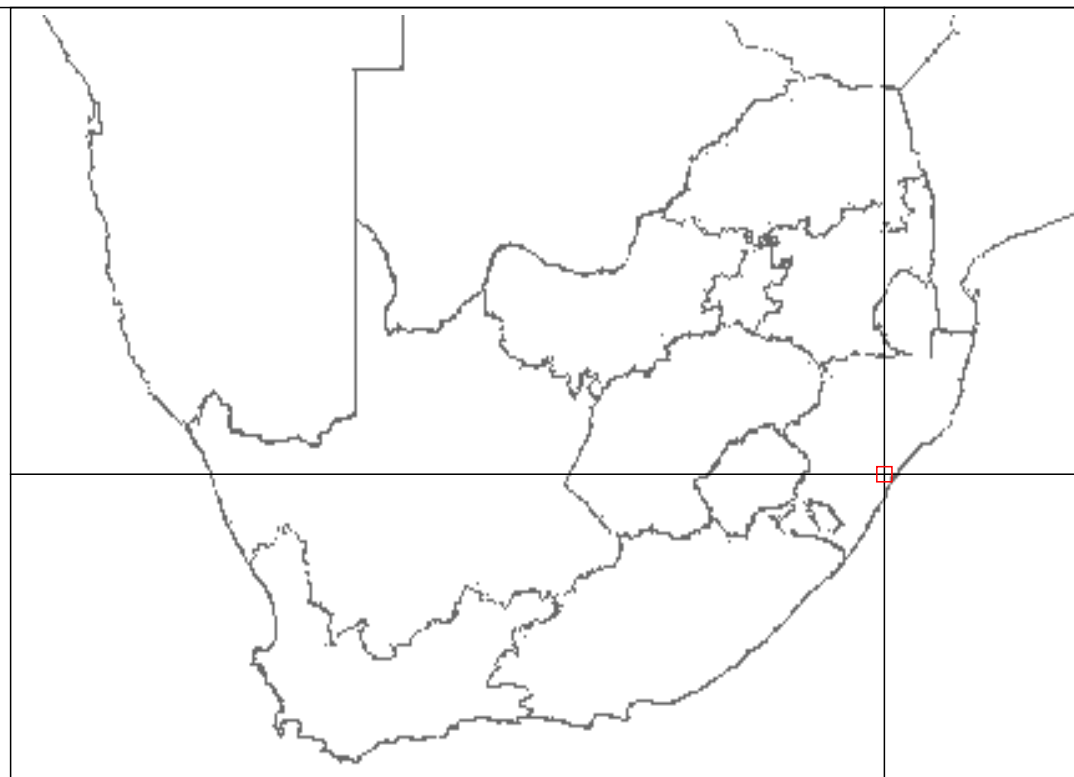
Southern African Bird Atlas Project

Occurrence:

n indicates the total number of cards on which the species was recorded. We also give this as a percentage (%) of the total cards for the site. The monthly breakdown shows the number of times the species was reported, as a percentage of the total cards for the month (ie: reporting rate).

Breeding:

n represents the number of cards on which confirmed breeding activity was reported. The monthly breakdown is the number of times the species was recorded breeding.



Site summary for:

Site Name: VERULAM (2931CA)

Province: KwaZulu-Natal





Appendix 5

PLATES FROM THE SITE VISIT

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Plate 1. *Raphia australis* growing in the wetland Drainage line in close proximity to the N2



Plate 2. Headwall protection in the Drainage Line, with *R. australis* and *Schinus terebinthifolius*.



Plate 3. *Clerodendrum glabrum* in flower



Plate 4. *Raphia australis* in fruit



Plate 5. Close up view of *R. australis* fruit



Plate 6. *Ficus sur* growing in the road cutting



Plate 7. *Ekebergia capensis* growing in the road cutting



Plate 8. *Embelia ruminata* growing in Bush clump 2.