Ecological Assessment of Portion 1283 Cottonland, uMdloti, eThekweni.

Establishment of a residential dwelling

Compiled by: L Maingard BSc Hons (*Cand.Sci.Nat*)

Reviewed by: S C Bundy BSc MSc (Pr.Sci. Nat.)

SDP Ecological and Environmental Services cc

Compiled for Mr J Kellerman

April 2021

Ecological Assessment of Portion 1283 of Cottonland, uMdloti, eThekweni Municipality.

Contents

Compilation Date	April 2021
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Image	View of site from North Beach Rd

DECLARATION BY SPECIALISTS & RELEVANT BACKGOUND

NAME Luke Patrick Maingard BSc (Hons)

PROFESSION BSc (Hons) Candidate Ecologist / Environmental Assessment Practitioner

DATE OF BIRTH 15 September 1993

MEMBERSHIP OF PROFESSIONAL BODIES: South African Council of Natural Scientific Professionals– Candidate Ecologist (registration number 116639)

KEY COMPETENCIES AND EXPERIENCE

Luke Maingard has been employed as an ecologist at SDP Ecological and Environmental Services since April 2016 to this present date, carrying out a number of ecological investigations as well as undertaking a number of Basic Assessment and Water Use License Processes. Maingard has a core competency in the delineation and assessments wetland environments as well as a focus on terrestrial environments, particularly coastal habitats. Throughout the past three years of employment, Maingard has compiled a number of ecological impact reports as well as providing mitigatory measure and insight on enviro-legal compliance matters with regards to a number of developments throughout South Africa as well as Zambia.

SELECTED RELEVANT PROJECT EXPERIENCE

Ecological Assessment of the dune habitat at Erf 206, Tinley Manor, KwaZulu-Natal (2017)

Assessment of the botanical community present within the dune cordon as well as a review of the coastal vulnerability of the site through an evaluation of coastal erosion.

Ecological assessment of the Umzimvubu river system, Swartberg, KwaZulu-Natal (2019)

Delineation of the riparian area as well as the assessment of the ambient water quality though water samples analysis, Bio-SASS as well as an icthy faunal assessment.

Ecological and Wetland Assessment with regards to the Charlottedale Housing Project, Kwadukuza (2019)

Delineation and assessment of wetlands within the context of the Charlottedale township in conjunction with an EIA process.

Ecological and Wetland Assessment with regards to the Kwadabeka Housing Project, Inanda (2018)

Delineation and assessment of wetlands within the context of the Kwadabeka township in conjunction with an EIA process.

NAME Simon Colin Bundy. BSc. MSc Dip Proj Man

PROFESSION Ecologist / Environmental Assessment Practitioner

DATE OF BIRTH 7 September 1966

MEMBERSHIP OF PROFESSIONAL BODIES : South African Council of Natural Scientific Professionals No. 400093/06 – Professional Ecologist ; Southern African Association of Aquatic Scientists

KEY COMPETENCIES AND EXPERIENCE

Simon Bundy has been involved in environmental and development projects and programmes since 1991 at provincial, national and international level, with employment in the municipal, NGO and private sectors, providing a broad overview and understanding of the function of these sectors.From a technical specialist perspective, Bundy focusses on coastal ecological systems in the near shore environment and is competent in a large number of ecological and analytical methods including multivariate analysis and canonical analysis. Bundy is competent in wetland delineation and has formulated ecological coastal set back methodologies for EKZN Wildlife and for the Department of Economic Development Tourism and Environmental Affairs. Bundy acts as botanical and environmental specialist for Eskom Eastern Region. Based in South Africa, he has engaged in projects in the Seychelles, Mozambique, Mauritius and Tanzania as well as Rwanda, Lesotho and Zambia. Within South Africa , Bundy has been involved in a number of large scale mega power projects as well as the development of residential estates, infrastructure and linear developments in KwaZulu Natal, Eastern Cape and Western Cape. In such projects Bundy has provided both technical support, as well as the undertaking of rehabilitation programmes.

SELECTED RELEVANT PROJECT EXPERIENCE

Ecological investigations Tongaat and Illovo Desalination Plants : CSIR – (2013 - 2016)

Review of eco-physiological state of the coastal environments in and around the proposed Illovo and Tongaat desalination plants for associated EIA process.

Review and report on impact of the Fairbreeze Mine at Mtunzini on aquaculture operations at Mtunzini Aquaculture –Supporting document for legal argument presented on behalf of Mtunzini Aquaculture.(2017)

Specialist review and investigation of groundwater discharge and dune mobility at Siyaya, Mtunzini and its effect on the marine intake supplying the Mtunzini Fish Farm. Client : Mtunzini Fish Farm / Eversheds

Wetland delineation and ecological assessment for various project upgrades and expansion at Secunda SASOL, Mpumulanga (2015 – 2016)

Wetland and riparian delineation for various sites within the Secunda SASOL pipeline complex. Client = Enviro – Edge Consultants and SASOL (Ltd)

Ecological evaluation and monitoring: Plastic pellet (nurdles) clean-up MSC Susanna Marine Pollution Event : West of England Insurance, United Kingdom (2018 - 2019)

Location, evaluation and monitoring of plastic pellets within the coastal habitats between Durban and Richards Bay with Resolve Marine, AR Brink and Assocs and Drizit Environmental. Objective is to maintain a defendable but efficient level of pellet contamination across coastline.

Wetland delineation and risk assessment – Khanyane Agricultural Development, Mooi river for CSIR (2015 = 2018). Identification of extent of wetland environments and impact of proposed agricultural project on aquatic systems

Specialist Declaration

I, ...L P Maingard, as the appointed independent specialist, in terms of the 2014 EIA Regulations (as amended), hereby declare that I:

- I act as the independent specialist in this application;
- I 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 (as amended) and any specific environmental management Act;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I have no vested interest in the proposed activity proceeding;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- I 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;
- I 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
- I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Name of Specialist: L P Maingard

Signature of the specialist:

Date: March 2021

EXECUTIVE SUMMARY

Mr J Kellerman wishes to establish a residential dwelling at 78 North Beach Road, eThekwini Municipality. In part of the Basic Assessment process, SDP Ecological and Environmental Services have been appointed by Confluence Pty Ltd to undertake an ecological investigation of this property. Site reconnaissance was undertaken on the 9th of April 2021, whereby a broad survey of the habitat structure and nature of the affected site was undertaken. All data was subject to analysis using basic linear and comparative methods. Such information provided a preliminary understanding of the nature and structure of the habitat in question

Results infer a transformed or disturbed botanical structure at the lower section of the site whereas a more intact vegetation structure, typical of KZN Coastal Dune Forest, is evident within high elevations of the site. This disjunct arose as a consequence of anthropogenic activities, namely the access road way and encompassing dwellings. The impacts associated with this proposed development are considered high based on the nature and coastal location of this property. However, such impacts are mitigable through sound construction management, allowing for a moderate, localized impact on the receiving environment. The site supports moderate botanical species diversity with evident disturbance at points within the lower elevations of the site. Further to this, it could be argued that the subject site is somewhat ecologically isolated as a consequence of encompassing urban developments.

STATEMENT

Following an evaluation of the subject site, the establishment of the proposed development at Portion of 1283 Cottonland portion of land may be sanctioned from a biophysical perspective. However, any approval(s) should be contingent on strict compliance conditions, comprehensive mitigation measures as well as construction management protocols to avoid any untoward impacts on the receiving environment.

1. INTRODUCTION

Portion 1283 of Cottonland (78 North Beach Road) is a zoned "residential" site that falls within the northern extent of the Umdloti town planning scheme, Ethekwini Municipality (see Figure 1 below). This site lies within 100m of the shoreline of the Indian Ocean and lies between established residential dwellings on North Beach Road. The property in question and its neighbors comprise in part, of a large portion of land determined as Durban Metropolitan Open Space System (DMOSS), a designation identified for conservation worthy environments.

Mr J Kellerman has recently purchased this property and now wishes to develop this land and establish a residential dwelling. On account of the site lying within 100m of the high-water mark, the proposed development would require authorization in terms of the EIA regulations of NEMA (2014) and as such a basic assessment process must be undertaken. As part of the Basic Assessment process, SDP Ecological and Environmental Services have been appointed by the EAP, Confluence Pty Ltd to undertake an ecological investigation of this property to assess the nature of the site from an ecological perspective giving due consideration to the prevailing habitat in particular vegetation form and structure; as well coastal vulnerability, in order to determine the suitability of the proposed development from a biophysical perspective, as well as to identify any specific measures that should be applied in the layout and construction of the proposed residential development.

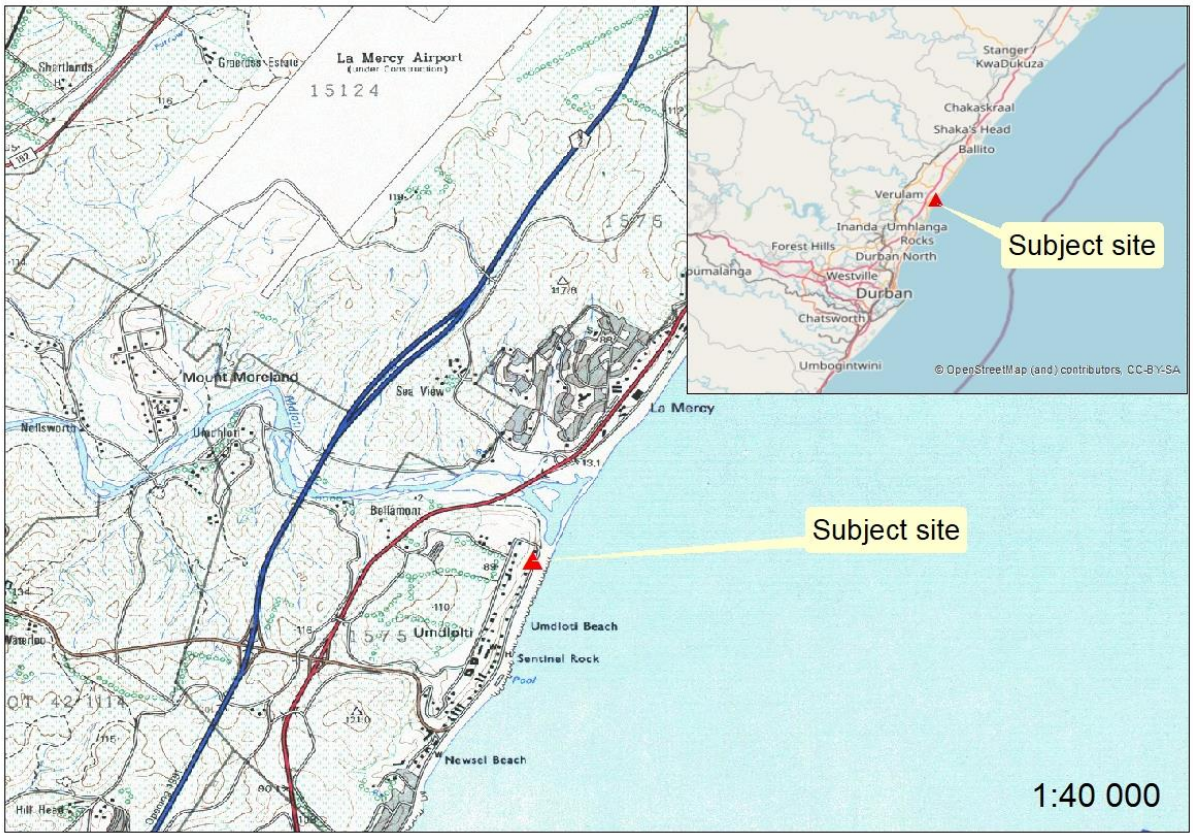

Figure 1. Regional map image detailing the location of 78 North Beach Road

2. ASSUMPTIONS AND LIMITATIONS

The objective of this assessment has been compiled to a level of detail that would satisfy the requirements for the environmental authorisation process under NEMA. Although detailed, this report must be considered as a rapid appraisal or "snap shot" of current ecological conditions encountered at the site. The findings represent those undertaken during the late summer period, with no comparative data for other seasons. The time frame given for the assessment was limited and where necessary, methods were adjusted to accommodate the delivery date of this report.

3. PROPOSED DEVELOPMENT STRUCTURE

Figure 2 below presents a sketch plan of the proposed residential dwelling. The structure is to incorporate three bed rooms, a living room and a pool facility spanning across 4 levels that will lie within the dune form. The design of the structure has in part been compiled to accommodate the prevailing landform and avoid intrusion into the DMOSS designated areas of the site. As embankment stability is a notable concern, piling will be undertaken, as per the recommendations stipulated within the geotechnical report compiled by Dreunn Maud and Company.

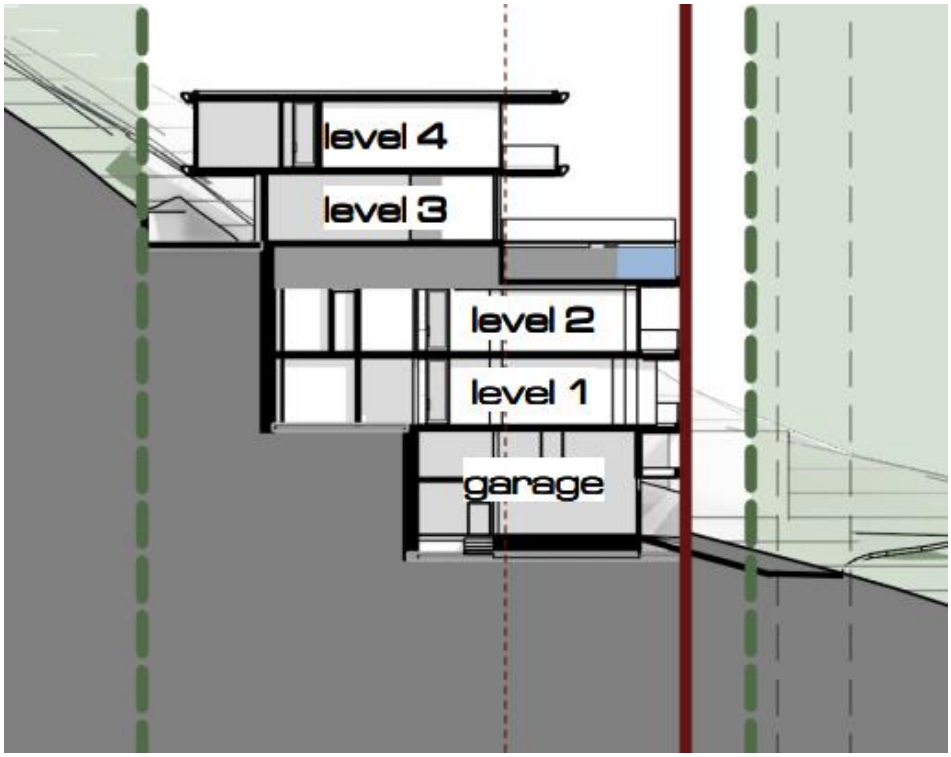

Figure 2. Proposed residential development planned for 78 North Beach Road.

4. APPLICABLE LEGISLATION

1. The National Environmental Management: Biodiversity Act (Act 10 of 2004)

This Act serves to control the disturbance of land and its utilisation within certain habitats, as well as the planting and control of certain exotic species. The proposed development, taking place in the identified Northern Coastal Forest, may not necessitate any particular application for a change in land use from an ecological perspective, however the effective disturbance and removal of species identified below, as well as possibly other species (i.e., TOPS species), will require specific permission from the applicable authorities. In addition, the planting and management of exotic plant species on site, if and where required, will be governed by the Alien and Invasive Species (AIS) regulations, which were gazetted in 2020. These regulations compel landowners to manage exotic weeds on land under their jurisdiction and control.

2. The National Forests Act (Act 84 of 1998)

The National Forest Act (Act 84 of 1998) governs the removal, disturbance, cutting or damage and destruction of identified "protected trees". The focus of this assessment has been to identify the position and nature of these specimens within the site. Where their removal is required, or where disturbance of the specimens will arise, a license must be obtained from the mandated authority, in this case the Department of Environment, Forestry and Fisheries, in terms of Section 15 of the Act. In this regard the legal definition of a "forest", is the presence of three or more trees with contiguous or interfacing canopy cover. While not a scientific definition, forest form has been identified on the subject site and such habitat is applicable. It is therefore likely that an application for the "clearing of a *natural forest*", as defined within the Act, will be applicable to the site in question.

3. Integrated Coastal Management Amendment Act (36 of 2014)

ICMA presents a number of principles that relate to sound coastal management practices. Principles applicable to the proposed development include the conservation of the coastal environment and maintenance of the natural attributes of coastal landscapes, as well as the implementation of an economically justifiable and ecologically sustainable development.

5. METHODOLOGY

This assessment was undertaken using the following methods and through performance of the tasks outlined below:

Desktop analysis:

In order to obtain an overview of the region in general, a desktop analysis of the site was undertaken using the following information that is applicable to uMdloti and the site in particular;

- Historical imagery sourced from Google Earth
- ARC GIS (Geographic Information Systems)
    - SANBI data (South African National Biodiversity Institute)
    - eThekweni GIS data sets
    - Surveyor General contour data.

Site evaluation and determination of habitat form and structure

Site reconnaissance was undertaken on the 9th of April 2021, whereby a broad survey of the habitat structure and nature of the affected site was undertaken.

In order to determine the nature and extent of various habitat associations across the site , linear transects were established at intervals across the property. The transect points were selected on account of differing elevation across the site and distance from the shoreline. Species were recorded within the transects using a presence/absence method of data collection. A total of 5 transects were evaluated (Figure 7). The dense nature of vegetation within the site prevented access to all portions of the site.

All data was subject to analysis using basic linear and comparative methods. Such information provided a preliminary understanding of the nature and structure of the habitat in question. In addition, all collated data was subject to evaluation using Two Way Indicator Species Analysis (TWINSPAN). TWINSPAN is a method of grouping species according to community structure. Principle Component Analysis (PCA) was used to support and confirm the results of the TWINSPAN. These two methods were interrogated in order to identify any change in habitat form and structure and from this, using visual and basic ecological knowledge, a determination of the extent and significance of habitat can be spatially provided. Other physical factors, such as “elevation” and “slope”, as well as surface soil structure were also analysed in order to assess the ecological integrity of the site.

6. REGIONAL ECOLOGICAL ASPECTS

The town of Umdloti lies primarily within the seaward portion of a Pleistocene dune cordon, that overtops a shale and sandstone geology (Porat 2008). The near-shore terrestrial environment is of more recent Holocene origin and is a thin veneer of sediments lying upon the prevailing geology.

Umdloti falls within the *Indian Ocean Coastal Belt* biome, a broad categorization that is indicative of sub-tropical coastal habitat and includes a wide variety of habitat forms. Figure 3, indicates the categorization of these habitats from a regional perspective. Notably, the SANBI data base identifies two distinct vegetation forms, *KwaZulu Natal Coastal Belt Grassland* and *Kwa Zulu Natal Northern Coastal Forest)*. The former is considered "critically endangered", while the latter is considered "vulnerable", from a conservation perspective.

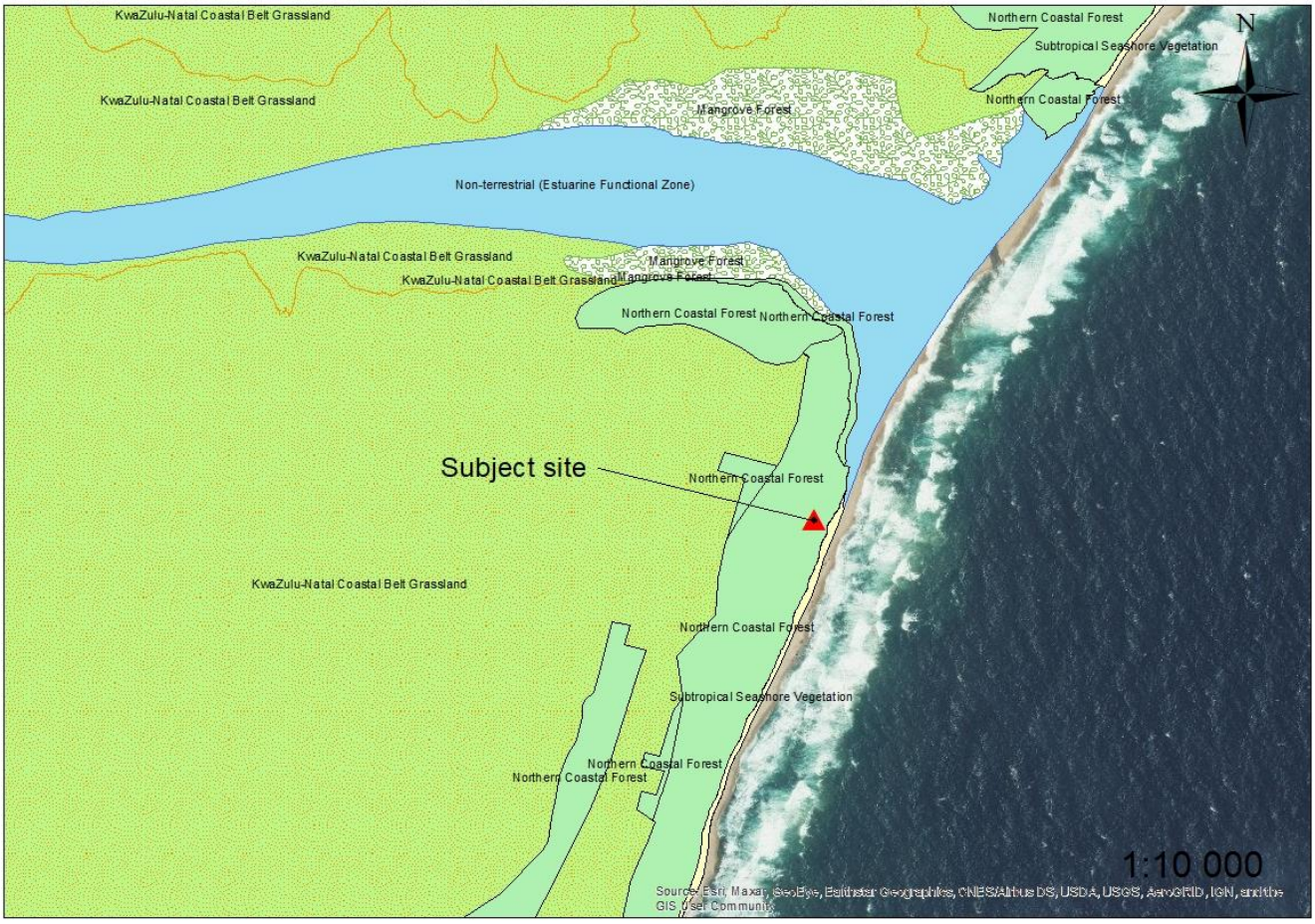

Figure 3. Prevailing vegetation relative to the subject site as identified by SANBI.

At a more definitive level of consideration, Umdloti comprises of up to four distinct habitat forms, based primarily on geology and geomorphology, as well as maritime factors. Most significant is a Pleistocene dune form, an over-steep clayey – sand formation which is most notable to the north of the town. This formation shows significant ecological variation from the prevailing ecology of the less elevated and more seaward areas. This area, despite rapid urbanization, still holds some botanical diversity, while the vegetative cover associated with the paleo dune is considered to be an important stabilizing factor (Garland 2002 pers comm). The balance of natural habitat located to the west of the town according to SANBI, has been transformed to accommodate cultivated lands associated with sugar cane and residential developments.

The overly steep Pleistocene dune form which has not been subject to transformation has been designated as DMOSS (Durban Metropolitan Open Space System), on account of the presence of sizable portions of dune forest, with regionally significant botanical constituents still evident, amid transformed properties. Most of the relic habitat forms within the area are associated with extremely steep properties that are limited in terms of their development opportunities. Figure 4 indicates the position of the subject site within the regional vegetation cover mapping imagery available from SANBI. Evidently, a portion of the site avoids infringing into DMOSS.

Figure 4. Image detailing the extent of DMOSS zonation relative to the site.

The requirements of Government Gazette 43110 "Protocol for the specialist assessment and minimum reporting content requirements", consideration of The Department of Environmental Affairs' screening tool (https://screening.environment.gov.za) is required. Whilst no complete biodiversity data appeared to be available, this tool indicates the subject site and region to be of a "medium" plant biodiversity sensitivity (Figure 5), while the same tool indicates the region to have a 'low' aquatic biodiversity.

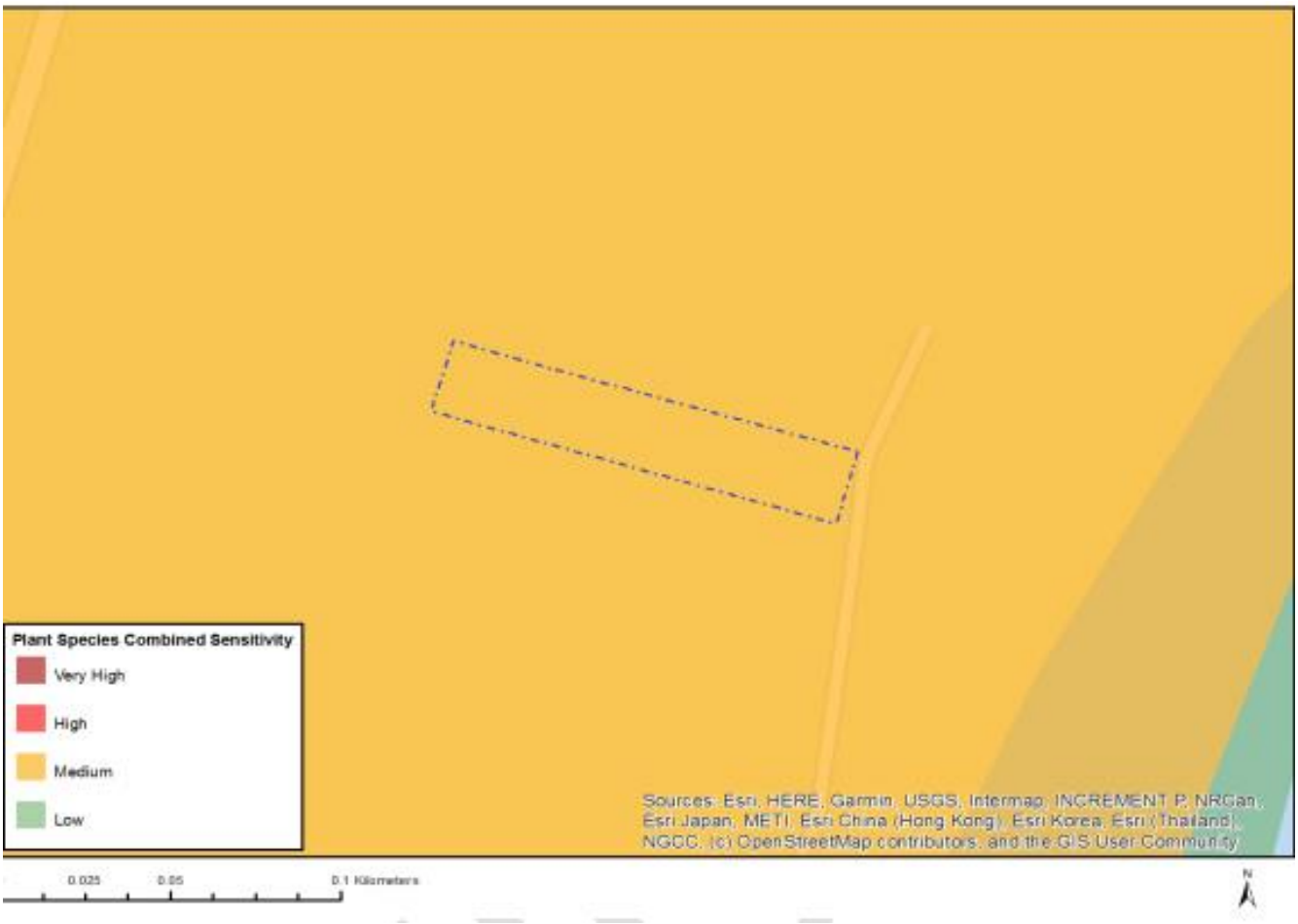

Figure 5. EDTEA screening tool suggests the site is associated with a 'medium' plant sensitivity.

6.1 Coastal vulnerability

Coastal vulnerability refers to the level of vulnerability that may arise on built structures in and around the coastal zone as a result of both sea level rise, storm forced erosion and tidal inundation or a combination of the above. The index suggests the site has a "moderate" vulnerability (Figure 6). Vulnerability is measured according to a number of parameters relating to the width, function and integrity of the coastline. Few sites are considered to be of "low" vulnerability in KwaZulu Natal in terms of this index. The moderate vulnerability bestowed upon the site is a function of the geological stability, aspect, a wide beach and a wide and stable dune form. Such attributes were confirmed during site reconnaissance.

With further reference to the 2007 marine storm event, with a return of 1: 35 years (Smith *et al*. 2007), it is evident that the site, like much of uMdloti was impacted by erosion at this point. Howsoever, most residential structures are positioned at elevation and well back from the shoreline. In addition, it is evident that stable dune forms are retreating and transgressive dunes within the region are becoming more prevalent. It can be inferred that the public amenity and access road along North Beach road do show moderate to high vulnerability to coastal erosion events, however the site is generally suitably protected from such events in the short to medium term.

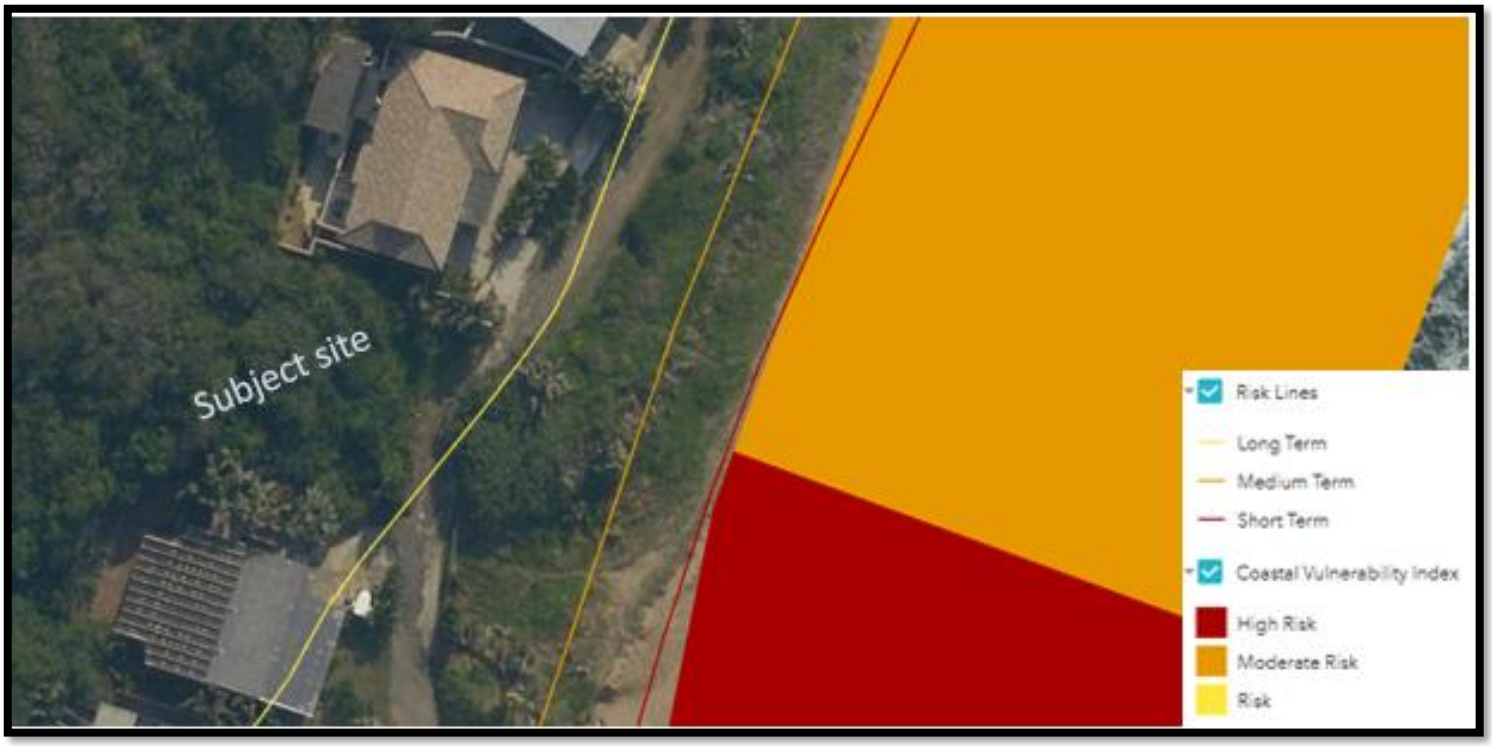

Figure 6. Map image detailing CVI and coastal risk lines relative to the subject site at 78 North Beach Road. (source: Coast KZN)

7. SITE SPECIFIC EVALUATION

The subject site at 78 North Beach Road rises steeply from the coastal terrace, located just off North Beach road. This road way has been established along the dune slack, effectively separating the fore dune from the more stable secondary dune to the lee (Figure 7). Landward of the access road, the subject site is characterized with typical Northern Coastal Forest vegetation along a steepening slope that exceeds 40° near the upper extent of the property as confirmed by the geotechnical report carried out by Drennan and Maud. The combination of friable, loamy windblown sands with poor nutrient availability proximal to the Indian Ocean gives rise to a sensitive, yet dynamic dune environment, susceptible to minor changes in slope and vegetation cover.

Reconnaissance confirmed that *B. discolor* and *Ficus burtt-davyi* dominate throughout much of the site, creating a dense, entangled thicket (Figure 10). Few large and significant woody species, such as *Mimusops caffra* and *Euclea natalensis* were identified, these being along the upper reaches of the site, affording an elevated canopy and allowing for the presence of typical dune forest undergrowth comprising of herb and shrub layers, such as *S puniceus*, *Asparagus spp* and *Sanseveria hyacinthoides* being evident. Despite disturbance generated by the road way and adjacent developments, the vegetation encountered on site largely appears to align with typical dune structure, comprising of dune thicket at lower elevations, whereas the rear dunes support larger woody specimens and forms 'dune forest' at higher elevations. However, exotic species such as *Chromolaena odorata*, *Pandanus utilis* and *Opuntia spp* were recorded along the fringes of the property, which are likely a result of general anthropogenic disturbance as well as horticultural endeavors.

7.1 Habitat form and structure

A list of the species encountered on site is provided as Annexure "A". A total of 28 species were recorded within the five transects established across the site, which in the present subject site can be considered moderately diverse. Such species included both woody and herbaceous species and as indicated above, showed exotic invasion limited to the lower reaches of the site. It is evident that *Chromolaena odorata* has been driven by general disturbance whereas the remainder of the exotic specimens such as *Pandanus utilis* and *Opuntia* are a result of horticulture practices.

Figure 7. Map image detailing the transect layout across the subject site representative of elevation and distance from the ocean.

Figure 8. Images of the access road dissecting the foredune with established dwellings lying adjacent to the undeveloped subject site. Note alien invasive species and horticultural specimens along the road – namely *C. Odorata* as well as *Pandanus utilis* and *Opuntia.*

Figure 9. Left – frontal dune vegetation along the seaward extent of the fore dune, which is excluded from the proposed construction plans. Right – image of the subject site captured from the beach, note neighboring dwelling.

Figure 10. Left – typical dense vegetation encountered centrally within the site. Right – image captured from the upper elevations of the site.

Figure 11 indicates species presence and relative abundance recorded within the transects across the subject site. From, Figure 11 it is evident that *B. discolor* and *Ficus burtt davy*i are the most common species encountered throughout the site. Notably, there is little in the way of alien invasive species across the broader composition of the property however the dominance of *F burtt davyii* and *B discolor* is indicative of some level of disturbance on the site

As per the method described above, data collected from the transects was evaluated using TWINSPAN and PCA, the results of these analyses are depicted in Figures 12, 13 and 14 below.

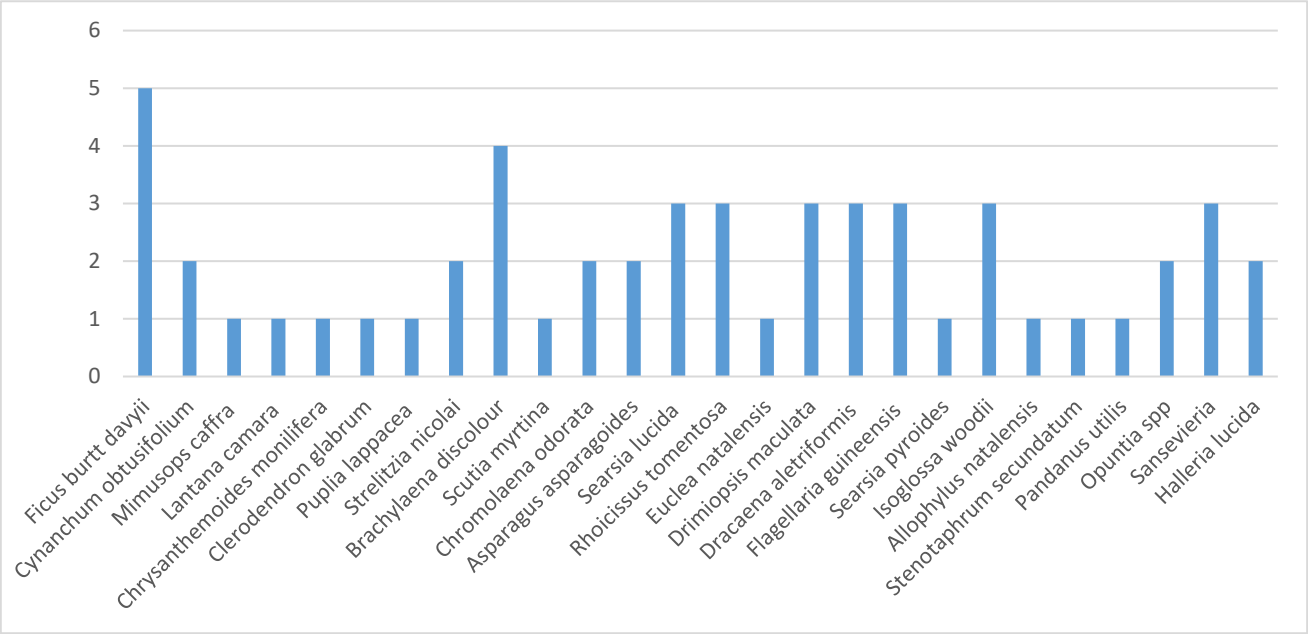

Figure 11. Graph indicating species relative abundance recorded within transects.

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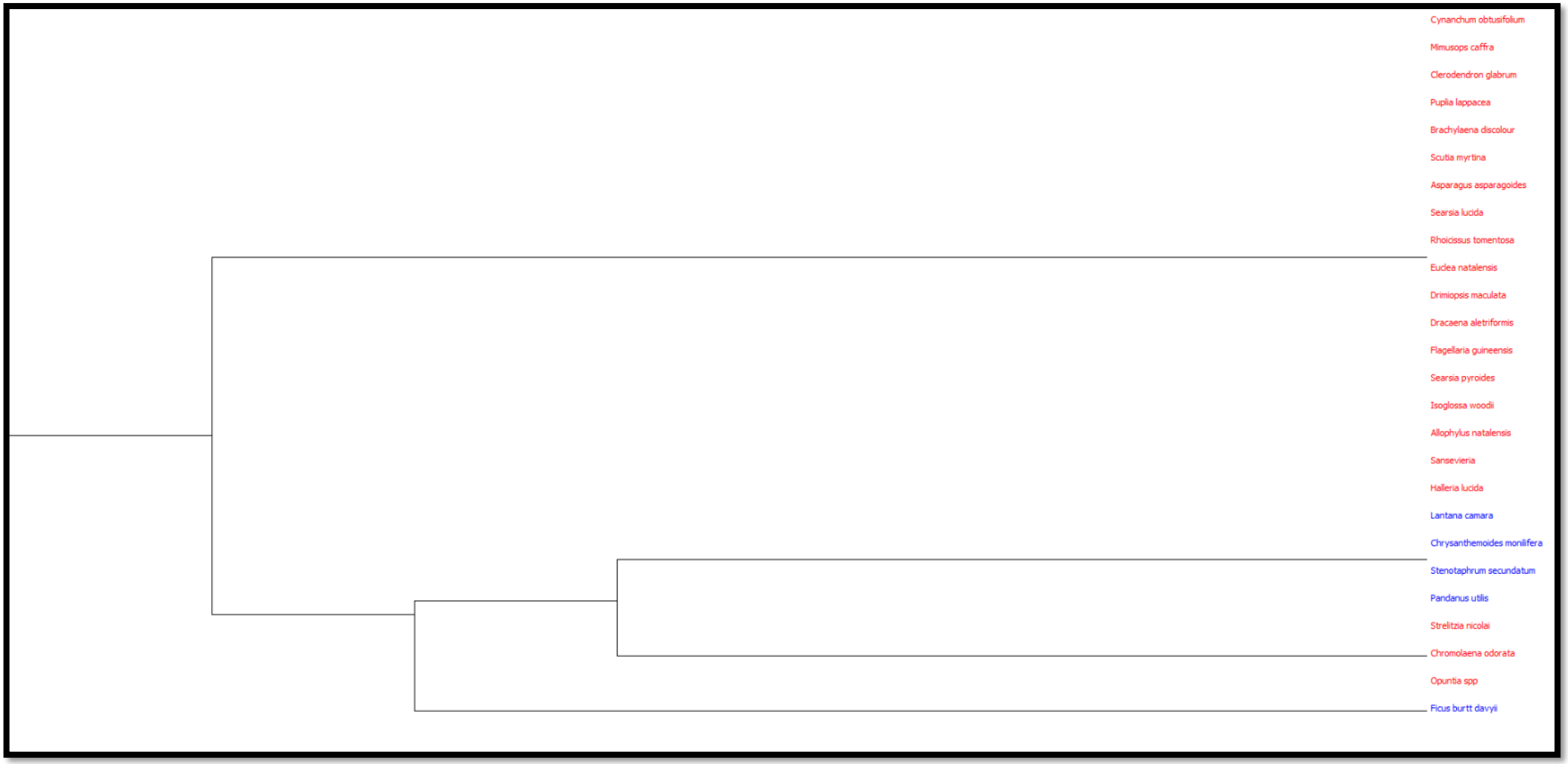

Figure 12. Graphic representation of results from TWINSPAN analysis identifying the correlation of sites with specific species composition.

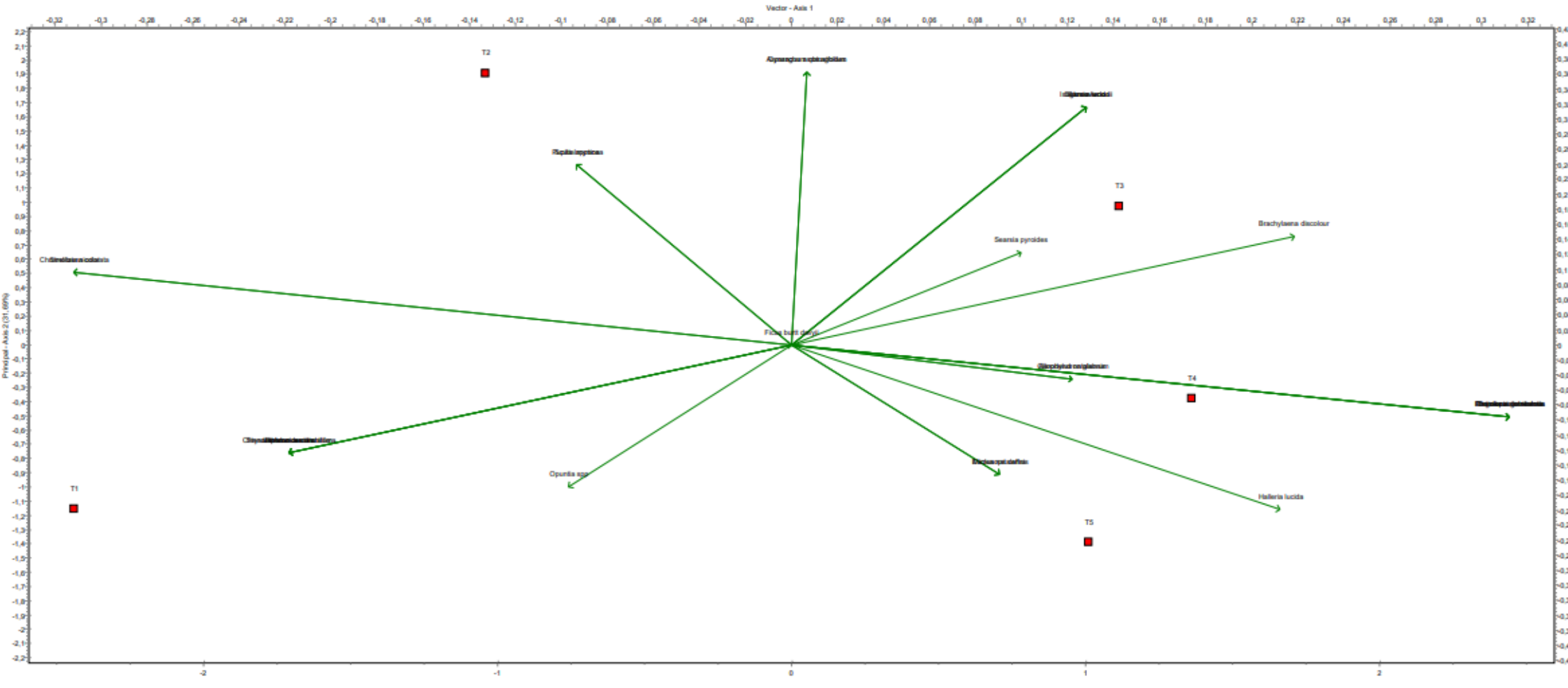

Figure 13. Results of the PCA showing species attributes vs sites. Note definitive differentiation between 'spread' of recorded specimens relative to the transect sample points.

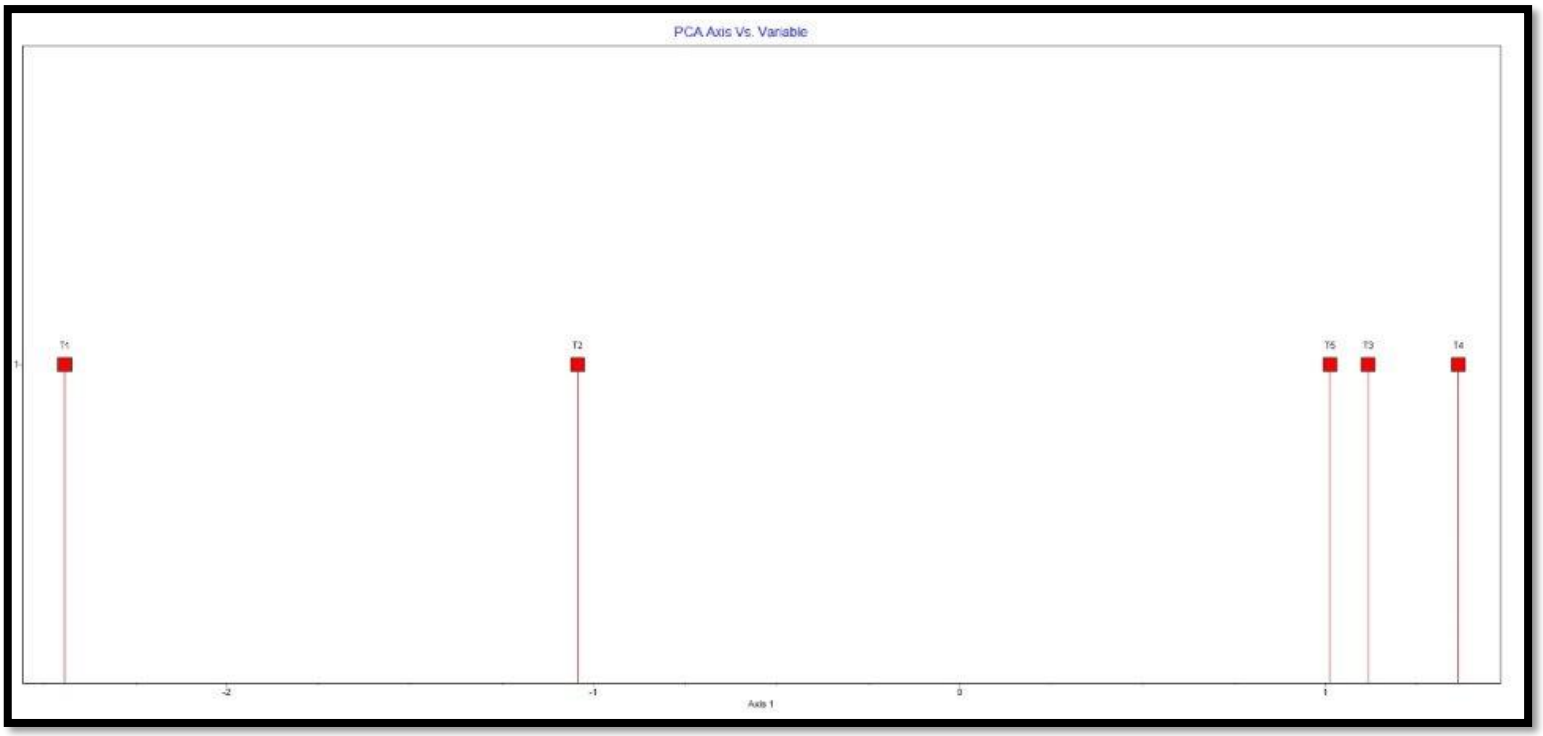

Figure 14. PCA axis. Note cluster of T3, T4 and T5 in relation to the distribution of T1 and T2

From the above the TWINSPAN analysis indicates that there are 4 broad associations within the site, with an almost mono-specific consocies of *F burtt davyii*, supporting the contention that this is the most prevalent species within the property. In addition, there appears to be some level of exotic associes, in particular associations of *Lantana camara* and *Chrysanthemoides monilifera*.

The PCA analysis a definitive distinction between transects 1 and 2 and the more elevated transects. This disjunct indicates the following:

1. That physical drivers and associated factors associated with Transects 1 and 2 differ significantly to those found at higher elevations across the site.

2. Interpretation of disturbance, as well as possibly slope, sediment form and proximity to the shoreline are accountable for such differentiation.

The presence of *F burtt davyii* and *B discolor*, as well as the AIP, *C odorata*, supports the contention that disturbance is a significant factor in the lower portions of the site Anthropogenic influences, primarily the establishment of the North Beach Road bordering the lower, eastern extent of the site, as well as the adjacent developments is responsible for much the disturbance as is the construction of properties on either side of the site. Notably, some species including *Pandus utilis*, are horticultural specimens while *Opuntia spp* are likely to be the product of dune stabilisation activities.

The analysis also indicated that botanical composition at higher elevations (Transect 3,4,5) are consistent with Northern Coastal Forest (Coastal Dune Forest form), showing a stratification comprising of species such as *M caffra* and *E natalensis* as well as the herbs and lianes *Drimiopsis maculata* and *Flagellaria guineensis*.

Using Figure 7 above it is clear that the present DMOSS delineation is "relevant" and "appropriate" to the site. Transect 3 indicates a point of compositional change in habitat form and as such is a good indicator of the extent of the proposed footprint for the building. Notably, this may extend a few metres either way, however the most significant factor associated with the construction of the site will be to avoid slip and surface movement in sands during the excavation of the lower elevations of the site.

7.2 Comment on fauna

Table 1 presents the faunal species list for the subject area, based on observation, spoor, spat and in some cases, anecdotal information. From Table 1, all relative species with exception of *Philantomba monticola* are listed as "Least Concern", in terms of the NEM Biodiversity Act have a high likelihood of occurrence in the locality.

In most cases, it is likely that animal specimens will leave the site as a consequence of disturbance at the commencement of construction. Howsoever, some species are likely to move freely into and out of the construction site. Where this becomes a problem or a risk to the animal, capture and relocation can be considered. Such measures are often not successful and require permitting by authorities. Trained personnel should be engaged where capture and relocation are required.

Table 1. List of Terrestrial Species identified within and around the subject site.

Scientific name	Common name	Red list category
Cryptomys hottentotus	Southern African Mole-rat	Least Concern (2016)
Cephalophus sp.	Forest Duikers	
Cephalophus natalensis	Red Duiker	Near Threatened (2016)
Philantomba monticola	Blue Duiker	Vulnerable (2016)
Sylvicapra grimmia	Bush Duiker	Least Concern (2016)
Tragelaphus angasii	Nyala	Least Concern (2016)
Tragelaphus scriptus	Bushbuck	Least Concern
Chlorocebus pygerythrus	Vervet Monkey	Least Concern (2016)
Chlorocebus pygerythrus pygerythrus	Vervet Monkey (subspecies pygerythrus)	Least Concern (2008)
Amblysomus hottentotus	Hottentot Golden Mole	Least Concern (2016)
Taphozous (Taphozous) mauritianus	Mauritian Tomb Bat	Least Concern
Atilax paludinosus	Marsh Mongoose	Least Concern (2016)
Herpestes sanguineus	Slender Mongoose	Least Concern (2016)
Ichneumia albicauda	White-tailed Mongoose	Least Concern (2016)
Mungos mungo	Banded Mongoose	Least Concern (2016)
Chaerephon pumilus	Little Free-tailed Bat	Least Concern (2016)
Aethomys ineptus	Tete Veld Aethomys	Least Concern (2016)
Dasymys incomtus	Common Dasymys	Near Threatened (2016)
Grammomys dolichurus	Common Grammomys	Least Concern (2016)
Lemniscomys rosalia	Single-Striped Lemniscomys	Least Concern (2016)
Mastomys natalensis	Natal Mastomys	Least Concern (2016)
Mus (Nannomys) minutoides	Southern African Pygmy Mouse	Least Concern
Otomys angoniensis	Angoni Vlei Rat	Least Concern (2016)
Rattus norvegicus	Brown Rat	Least Concern
Rattus rattus	Roof Rat	Least Concern
Dendromus mystacalis	Chestnut African Climbing Mouse	Least Concern (2016)
Nycteris thebaica	Egyptian Slit-faced Bat	Least Concern (2016)
Epomophorus sp.	Epauletted Fruit Bats	

Epomophorus wahlbergi	Wahlberg's Epauletted Fruit Bat	Least Concern (2016)
Crocidura cyanea	Reddish-gray Musk Shrew	Least Concern (2016)
Crocidura flavescens	Greater Red Musk Shrew	Least Concern (2016)
Crocidura hirta	Lesser Red Musk Shrew	Least Concern (2016)
Neoromicia nana	Banana Pipistrelle	Least Concern
Pipistrellus (Pipistrellus) hesperidus	Dusky Pipistrelle	Least Concern
Scotophilus dinganii	Yellow-bellied House Bat	Least Concern (2016)

8. IMPACT IDENTIFICATION AND EVALUATION

The establishment of the proposed residential dwelling will signficiantly transform the receiving environment, with possible concomitant indirect changes arising just beyond the development footprint. The majority of the identified potential impacts associated with this development are likely to emanate during the construction phase of the project.

It is evident that the surface soils associated with the site are generally friable and loose sands which are easily mobilised under disturbance. Changes in slope stability within the development footprint will result in the cascading of sands from higher elevations, resulting in disturbance of those habitats which lie within the DMOSS zone. The various impacts that are likely to arise from construction of the dwelling are discussed below.

Clearance of vegetation: The construction of the homestead on the development footprint will see significant clearance of both vegetation and further excavation of the dune face. While this is a given, slope stability on the elevated portions of the site is likely to be a matter of concern. Measures to avoid slip and further mobilization of sands on the slope are presented below. The maintenance of vegetation immediately leeward of the site is therefore of importance.

Change in edaphic form and structure. Excavation and removal of dune material will alter the sub surface form and structure of the dune.

Alteration of surface and sub surface hydrology: Increased surface hard panning as result of the development serves to reduce subsurface infiltration and increase the volume of surface water runoff on the development footprint. In addition, the subsurface hydrology of the site will change as the lower portions of the dune are altered to accommodate the structure.

Proliferation of exotic species. Construction activities, primarily vegetation clearance, typically provides an opportunity for the proliferation of exotic species within the disturbed area.

Alteration of habitat. The establishment of the proposed residential dwelling presents a cumulative impact through additional removal of prevailing vegetation forms within Umdloti. Changes in the more ecologically significant DMOSS area to the lee of the site will arise, with the ousting of species through nuisance factors such as electrical light pollution (ELP) and noise factors.

The impact assessment rating method utilized, below identifies 8 criteria for utilisation in the assessment of the level or degree of impact associated with the activity. These 8 criteria are:

1. **Intensity / severity** – the level of change or disturbance that arises from the activities envisaged. Intensity is determined to arise from "very low" (negligible change) to "high" (prominent change where dysfunctional states arise on the status quo).

2. **Extent/ spatial scale** – the area affected by the activity. This is determined to vary from "local" (impact is confined to the area where the activity is undertaken) to "international" (where the impact extends beyond geopolitical boundaries).

3. **Duration**. The timeframe over which the impact is experienced, varying from "short term" (>5 years) to permanent (where temporal scale will not ameliorate the impact).

4. **Probability**; The likelihood of the impact arising, which extends from "improbable" to "definite". This is a qualitative determination of probability.

5. **Confidence**: A measure of the level of surety that the impacts or the parameters identified, will occur. (low = <0.35; moderate = 0.35 – 0.75; high >0.75).

6. **Reversal**: An indication of the ability to reverse the impact or re-establish the status quo. (irreversible; partially reversible and fully reversible)

7. **Resource Loss:** The degree to which the impact may cause irreplaceable loss of resources (low, medium and high)

8. **Mitigation:** The level to which a negative impact can be ameliorated (none; very low; low; medium; high)

The consequence of the impacts that have been identified is determined by the "intensity, extent and duration" criteria identified above. These consequences are determined using criteria stated as *very high; high; medium; low* and *very low*. The significance of the impact is finally determined using a function of "consequence" and "probability". See annexure 'C' detailing the quantification of impacts.

Table 2. Impact table with regards to the establsihment and operation of the proposed development from an ecological perspective.

IMPACT	Intensity	Extent	Duration	Probability	Confidence	Reversibility	Resource Loss	Mitigation	Consequence	Significance
Clearance of vegetation	High	Local	Long term	Definite	High	Irreversible	High	Low	High	Moderate
Change in edaphic form and structures	Moderate	Local	Long term	Definite	High	Irreversible	Medium	Low	Low	Moderate
Alteration of hydrology	Moderate	Local	Long term	Definite	High	Reversible	Medium	High	Moderate	Low
Proliferation of exotic species	Moderate	Local	Short term	Moderate	Moderate	Reversible	Low	High	Low	Low
Alteration of habitat	Moderate	Local	Short term	Moderate	Moderate	Reversible	Medium	Moderate	Moderate	Low

8.1 Mitigation measures

Restricted clearance of vegetation.

In order to limit destabilization within this area it is recommended that excavation and clearance activities should be carried out exclusively within the extent of the property. If possible, a phased approach to the removal of vegetation would be advantageous. Unnecessary clearance and excavation outside the property is prohibited. The extent of DMOSS should be disclosed to contractors to avoid clearance and disturbance in these areas. To this end, it is proposed that a "sheet pile" or temporary walled structure be established along the defined edge, that serves to stabilize the higher elevations. Figure 14 below presents a conceptual image of measures to be undertaken.

Cordon of site

A distinct fence and cordon using shade cloth should established leeward of the working area to designate the development footprint from the DMOSS area (Figure 15).

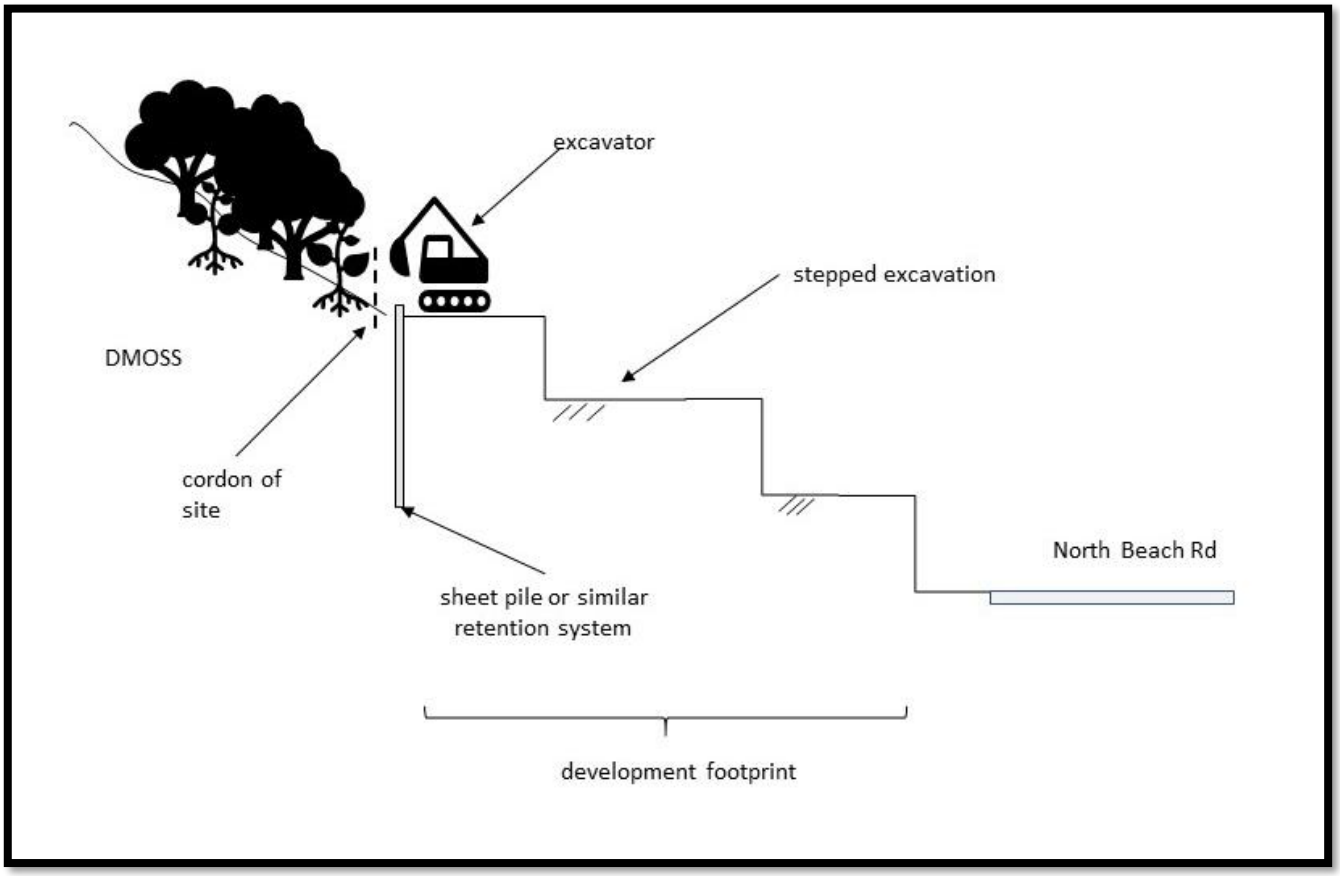

Figure 15. Stylistic diagram illustrating on site mitigation measures.

Select area of operations

During construction and at random periods during the construction of the dwelling, minor spills of materials, in particular hydro carbons or other liquids used in construction and operations may occur. Such materials, depending on their specific chemistry may pose an immediate and localized threat to the immediate environment. This may be mitigated through management and correct storage of materials within the site camp and operational and maintenance management of a high level.

Rehabilitation measures and additional remediation measures within and around DMOSS:

In consideration of the proximity of the designated DMOSS boundary the use of a 'soft' edifice is recommended where possible along the western extent of the dwelling. To this end, a geofabric cordon should be established along the boundary point to deter unrestricted access into the DMOSS as well as serve as a mitigation against 'creep' activities and disturbance during the construction period, as mentioned above and indicated by Figure 15. However, where disturbance of the interface between the development footprint and the DMOSS area arises rehabilitation interventions should be employed. Such interventions should include the sculpting and stabilization of using geofabrics and commercial seed should be employed where appropriate. Any emergence and spread of exotic species in this area are to be addressed through the implementation of a weed eradication program.

Exotic weed control:

The site is not significantly invaded by exotic vegetation however, species that are considered likely to be problematic in the site include:

Chromolaena odorata.
Lantana camara
Bambusa balcooa
Cardiospermum grandiflorum
Collocasia esculenta
Ipomoea purpurea
Lantana camara
Listea sebifera
Ricinis communis
Tecoma stans
Tithonia diversifolia

These species are generally to be treated with a foliar spray of either triclopyr or glyphosphate active ingredient. The small size of the site area allows for effective clearance of alien invasive plants by hand. During the initial clearance, identified plants must be cut as low as possible. The stumps should then be either treated with *Garlon*, or dug up and removed manually. This will limit regrowth of the undesirable species. Follow up clearance or spot sprays of new growth must be undertaken for the clearance to be effective. When spraying, the correct dosages must be applied. Working for Water offers a comprehensive table of herbicide applications for various declared weeds. Equipment required for mechanical removal includes the following:

- Bush knives/pangas (woody plants)
- Brush cutters (herbaceous plants)
- Spades
- Hazard tape
- *Garlon* (poison for stump application)
- *Springbok* (poison for leaf application of new growth)
- General safety equipment – goggles, gloves, safety boots, aprons.

For spraying, the following will be needed.

- Nap sack sprayer or handheld bottle and applicator spray
- Gloves
- Face mask
- Water for users to wash their hands and faces after applying herbicides.
- Water for dilution and measuring containers.
- Suitable herbicides

Spraying is best done when there is little wind and during dry periods. Wind disperses the spray onto non target plants while precipitation washes the herbicides from the leaf surface. Cut material must be handled and disposed of properly. Large branches and stems must be cut up into manageable sizes and piled. Leafy material must also be piled neatly. Piling the material neatly and tightly prevents coppicing of cut material. This material can either be removed from site wet, or allowed to dry for 2 to 5 days and then cleared (reduced volume and weight). Material removed from site must be disposed of at a suitable waste disposal site. Follow up maintenance is essential. Hand removal of new seedlings and growth can be done as well as spraying. Spraying is very affective for treating new growth. Follow up maintenance should be undertaken at least twice a year, first in the spring after the initial clearance and then again during the following year in autumn, followed by a second spring clearance later in the year.

Light exposure:

Levels 3 and 4 of the dwelling structure would require outdoor illumination along the western extent of the property during the night, however care should be taken to ensure minimal exposure of artificial light into the nearby dune forest. The use of flood lighting or any direct light sources shone into the forest should be prohibited. Furthermore, the use of 'yellow' lighting rather than white LED lighting should be implemented along the DMOSS boundary if outside illumination is required.

Storm water management:

Natural ground levels will alter and where compaction will arise, as a consequence of the construction of the dwelling and erosion and silt run off is likely to emanate from site. Such runoff has the potential to affect the beach and dune environment with negative ecological consequences. It follows that during the construction phase, measures to ensure the sound management of surface water runoff from platforms and areas under construction must be set in place.

Once constructed, significant runoff from rooftop and other hardpan surfaces will arise. To this end, the following measures should be set in place:

- Use of attenuators and spreaders should be undertaken to retain surface water on site and promote percolation of stormwater into the surrounding ground.
- Water harvesting is to be considered and implemented on site.
- Existing stormwater infrastructure should be utilized within North Beach Road.

Duty of care:

Although this development is viewed as a comparatively small-scale coastal development within Umdloti, the required construction procedures may possibly result in unfavourable environmental change if the identified impacts and externalities are not carefully managed. From an environmental perspective, it is crucial that the construction and operational phases of this development are done so in alignment with the applicable management regime, as encapsulated in the Environmental Authorisation and Environmental Management Plan (EMPR). From the above, it is recommended that an experienced contractor along with a knowledgeable Environmental Control Officer, with the necessary skills are appointed to undertake the task at hand.

9. CONCLUSION AND RECOMMENDATIONS

Given the nature of the site at 78 North Beach Rd as well as the proposed nature of the development, the following salient findings of this assessment can be summarised as;

- The vulnerability of the subject site with regards to wave inundation and coastal erosion has been categorized with a 'moderate' risk using the methods of Palmer *et al* (2011), contained within the municipal spatial planning tool (www.CoastKZN.co.za).

- Analysis of vegetation and habitat presents two distinct vegetation forms within the site. The lower elevation habitat form aligns with areas of high disturbance. The juncture between these two forms (Transect 3) broadly aligns with the designated DMOSS area and confirms this designation.

- The impacts associated with this proposed development are considered significant based on the nature and location of this property. This is particularly true for the DMOSS area located to the lee of the structure. However, such impacts can be mitigated using are sound construction management methods, allowing for a moderate, localized impact on the receiving environment.

Given the above, the establishment of the proposed development at Portion 1283 of Cottonland as detailed by Figure 2 may be sanctioned from a biophysical perspective, this being contingent upon the application of strict compliance conditions, comprehensive mitigation measures, as well as sound construction management protocols to avoid any untoward impacts on the receiving environment. The following legislation will apply should the commencement of the project be sanctioned.

1. Trees in a natural forest permit to cut/remove/disturb – National Forests Act

2. Protected tree permit to cut/remove/disturb *Mimusops caffra* at 29°39'17.95"S 31° 7'32.99"E and 29°39'17.72"S 31° 7'33.13"E – National Forests Act.

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Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity	***Section where this has been addressed in the Specialist Report***
The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects: *2.3.1. a description of the ecological drivers or processes of the system and how the proposed development will impact these;*	Section 6
2.3.2. ecological functioning and ecological processes (e.g., fire, migration, pollination, etc.) that operate within the preferred site;	Section 7
2.3.3. the ecological corridors that the proposed development would impede including migration and movement of flora and fauna;	NA – no ecological corridors affected.
2.3.4. the description of any significant terrestrial landscape features (including rare or important flora-faunal associations, presence of strategic water source areas (SWSAs) or freshwater ecosystem priority area (FEPA) sub catchments;	Section 6
2.3.5. a description of terrestrial biodiversity and ecosystems on the preferred site, including: *a) main vegetation types;* *b) threatened ecosystems, including listed ecosystems as well as locally important habitat types identified;* *c) ecological connectivity, habitat fragmentation, ecological processes and fine-scale habitats; and* *d) species, distribution, important habitats (e.g. feeding grounds, nesting sites, etc.) and movement patterns identified;*	Section 6 & 7
2.3.6. the assessment must identify any alternative development footprints within the preferred site which would be of a low" sensitivity as identified by the screening tool and verified through the site sensitivity verification; and	*NA*
2.3.7. the assessment must be based on the results of a site inspection undertaken on the preferred site and must identify:	*Section 4*

Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity	***Section where this has been addressed in the Specialist Report***
2.3.7.1.terrestrial critical biodiversity areas (CBAs), including: *a) the reasons why an area has been identified as a CBA;* *b) an indication of whether or not the proposed development is consistent with maintaining the CBA in a natural or near natural state or in achieving the goal of rehabilitation;* *c) the impact on species composition and structure of vegetation with an indication of the extent of clearing activities in proportion to the remaining extent of the ecosystem type(s);* *d) the impact on ecosystem threat status;* *e) the impact on explicit subtypes in the vegetation;* *f) the impact on overall species and ecosystem diversity of the site; and* *g) the impact on any changes to threat status of populations of species of conservation concern in the CBA;*	
2.3.7.2.terrestrial ecological support areas (ESAs), including: *a) the impact on the ecological processes that operate within or across the site;* *b) the extent the proposed development will impact on the functionality of the ESA; and* *c) loss of ecological connectivity (on site, and in relation to the broader landscape) due to the degradation and severing of ecological corridors or introducing barriers that impede migration and movement of flora and fauna;*	*Section 4*
2.3.7.3.protected areas as defined by the National Environmental Management: Protected Areas Act, 2004 including- *a) an opinion on whether the proposed development aligns with the objectives or purpose of the protected area and the zoning as per the protected area management plan;*	*The project area is not within or adjacent to a protected area (Section 4)*
2.3.7.4.priority areas for protected area expansion, including- *a) the way in which in which the proposed development will compromise or contribute to the expansion of the protected area network;*	*The site does not lie within an area identified for protected area expansion*

Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity	***Section where this has been addressed in the Specialist Report***
2.3.7.5.SWSAs including: *a) the impact(s) on the terrestrial habitat of a SWSA; and* *b) the impacts of the proposed development on the SWSA water quality and quantity (e.g. describing potential increased runoff leading to increased sediment load in water courses);*	*NA*
2.3.7.6.Indigenous forests, including: *a) impact on the ecological integrity of the forest; and* *b) percentage of natural or near natural indigenous forest area lost and a statement on the implications in relation to the remaining areas.*	*Section 3, 6,7 and 8*
3.1.The Terrestrial Biodiversity Specialist Assessment Report must contain, as a minimum, the following information:	
3.1.1. contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	*Page 3 & 4*
3.1.2. a signed statement of independence by the specialist;	*Page 5*
3.1.3. a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment;	*Section 2*
3.1.4. a description of the methodology used to undertake the site verification and impact assessment and site inspection, including equipment and modelling used, where relevant;	*Section 4*
3.1.5. a description of the assumptions made and any uncertainties or gaps in knowledge or data as well as a statement of the timing and intensity of site inspection observations;	*Section 2*
3.1.6. a location of the areas not suitable for development, which are to be avoided during construction and operation (where relevant);	*Section 5*
3.1.7. additional environmental impacts expected from the proposed development;	*Sections 8*
3.1.8. any direct, indirect and cumulative impacts of the proposed development;	*Section 8*
3.1.9. the degree to which impacts and risks can be mitigated;	*Section 8 – Table 1*
3.1.10. the degree to which the impacts and risks can be reversed;	*Section 8 – Table 1*

Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Biodiversity	***Section where this has been addressed in the Specialist Report***
3.1.11. the degree to which the impacts and risks can cause loss of irreplaceable resources;	*Section 8 – Table 1*
3.1.12. proposed impact management actions and impact management outcomes proposed by the specialist for inclusion in the Environmental Management Programme (EMPr);	*Sections 8 & 9*
3.1.13. a motivation must be provided if there were development footprints identified as per paragraph 2.3.6 above that were identified as having a "low" terrestrial biodiversity sensitivity and that were not considered appropriate;	*Section 8 & 9*
3.1.14. a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability, or not, of the proposed development, if it should receive approval or not; and	*Section 9*
3.1.15. any conditions to which this statement is subjected.	*Section 9*
3.2. The findings of the Terrestrial Biodiversity Specialist Assessment must be incorporated into the Basic Assessment Report or the Environmental Impact Assessment Report including the mitigation and monitoring measures as identified, which must be incorporated into the EMPr, where relevant.	*Sections 9*
3.2.1. A signed copy of the assessment must be appended to the Basic Assessment Report or Environmental Impact Assessment Report.	*Page 5*

Annexure B

List of species encountered on 78 North Beach Road uMdloti and surrounds:

Allophylus natalensis

Apodytes dimidiata

Asparagus plumosis

Asparagus asparagoides

Brachylaena discolor

Chromolaena odorata

Chrysanthemoides monilifera

Dracaena aletriformis

Drimiopsis maculata

Euclea racemosa

Eugenia capensis

Ficus burtt-davyi

Flagellaria guineensis

Isoglossa woodii

Mimusops caffra

Rhoicissus tomentosa

Sanseveria hyacinthoides

Scadoxus membranaceus

Sclerocroton integerrimum

Scutia myrtina

Searsia nebulosa

Secamone virosa

Senecio tamoides

Setaria megaphylla

Sideroxylon inerme

Smilax krausii

Strelitzia nicolaii

Appendix C: Impact Assessment Methodology

The following impact assessment was adopted, which includes:

- *the nature, significance and consequences of the impact and risk;*
- *the extent and duration of the impact and risk;*
- *the probability of the impact and risk occurring;*
- *the degree to which impacts and risks can be mitigated;*
- *the degree to which the impacts and risks can be reversed; and*
- *the degree to which the impacts and risks can cause loss of irreplaceable resources.*

As per the DEFFT Guideline 5: Assessment of Alternatives and Impacts, the following methodology is applied to the prediction and assessment of impacts and risks. Potential impacts and risks have been 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.*

The impact assessment methodology includes the following aspects:

- *Nature of impact/risk - The type of effect that a proposed activity will have on the environment.*

- *Status - Whether the impact/risk on the overall environment will be:*
    - *Positive - environment overall will benefit from the impact/risk;*
    - *Negative - environment overall will be adversely affected by the impact/risk; or*
    - *Neutral - environment overall not be affected.*

- *Spatial extent – The size of the area that will be affected by the impact/risk:*
    - *Site specific;*
    - *Local (<10 km from site);*
    - *Regional (<100 km of site);*
    - *National; or*
    - *International (e.g. Greenhouse Gas emissions or migrant birds).*

- *Duration – The timeframe during which the impact/risk will be experienced:*
    - *Very short term (instantaneous);*
    - *Short term (less than 1 year);*
    - *Medium term (1 to 10 years);*
    - *Long term (the impact will cease after the operational life of the activity (i.e. the impact or risk will occur for the project duration)); or*
    - *Permanent (mitigation will not occur in such a way or in such a time span that the impact can be considered transient (i.e. the impact will occur beyond the project decommissioning)).*

- *Consequence – The anticipated consequence of the risk/impact:*
    - *Extreme (extreme alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they permanently cease);*
    - *Severe (severe alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);*
    - *Substantial (substantial alteration of natural systems, patterns or processes, i.e. where environmental functions and processes are altered such that they temporarily or permanently cease);*
    - *Moderate (notable alteration of natural systems, patterns or processes, i.e. where the environment continues to function but in a modified manner); or*
    - *Slight (negligible alteration of natural systems, patterns or processes, i.e. where no natural systems/environmental functions, patterns, or processes are affected).*

- *Reversibility of the Impacts - the extent to which the impacts/risks are reversible assuming that the project has reached the end of its life cycle (decommissioning phase):*
    - *High reversibility of impacts (impact is highly reversible at end of project life i.e. this is the most favourable assessment for the environment);*
    - *Moderate reversibility of impacts;*
    - *Low reversibility of impacts; or*
    - *Impacts are non-reversible (impact is permanent, i.e. this is the least favourable assessment for the environment).*

- *Irreplaceability of Receiving Environment/Resource Loss caused by impacts/risks – the degree to which the impact causes irreplaceable loss of resources assuming that the project has reached the end of its life cycle (decommissioning phase):*
    - *High irreplaceability of resources (project will destroy unique resources that cannot be replaced, i.e. this is the least favourable assessment for the environment);*
    - *Moderate irreplaceability of resources;*
    - *Low irreplaceability of resources; or*
    - *Resources are replaceable (the affected resource is easy to replace/rehabilitate, i.e. this is the most favourable assessment for the environment).*

Using the criteria above, the impacts have been further assessed in terms of the following:

- *Probability – The probability of the impact/risk occurring:*
    - *Extremely unlikely (little to no chance of occurring);*
    - *Very unlikely (<30% chance of occurring);*
    - *Unlikely (30-50% chance of occurring)*
    - *Likely (51 – 90% chance of occurring); or*
    - *Very Likely (>90% chance of occurring regardless of prevention measures).*

To determine the significance of the identified impact/risk, the consequence is multiplied by probability (qualitatively as shown in Figure D1).

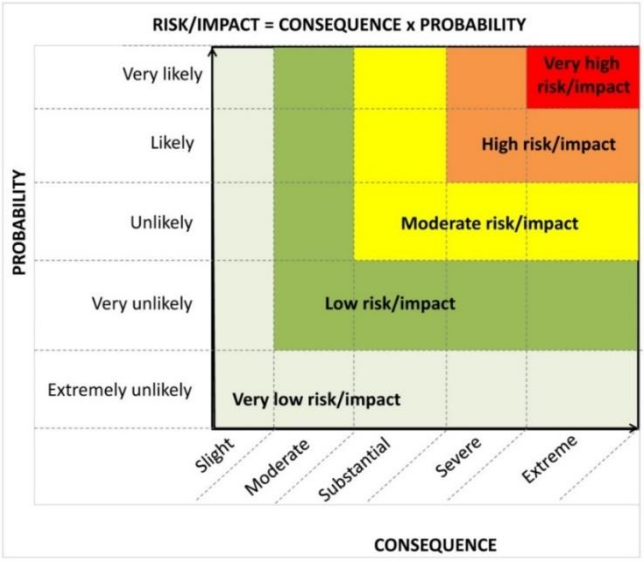

Figure D1. Guide to assessing risk/impact significance as a result of consequence and probability.

- *Significance – Will the impact cause a notable alteration of the environment?*
    - *Very low (the risk/impact may result in very minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);*
    - *Low (the risk/impact may result in minor alterations of the environment and can be easily avoided by implementing appropriate mitigation measures, and will not have an influence on decision-making);*
    - *Moderate (the risk/impact will result in moderate alteration of the environment and can be reduced or avoided by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated);*
    - *High (the risk/impact will result in major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making); and*
    - *Very high (the risk/impact will result in very major alteration to the environment even with the implementation on the appropriate mitigation measures and will have an influence on decision-making (i.e. the project cannot be authorised unless major changes to the engineering design are carried out to reduce the significance rating)).*

With the implementation of mitigation measures, the residual impacts/risks are ranked as follows in terms of significance:

- *Very low = 5;*
- *Low = 4;*
- *Moderate = 3;*
- *High = 2; and*
- *Very high = 1.*

Confidence – The degree of confidence in predictions based on available information and specialist knowledge:

- *Low;*
- *Medium; or*
- *High.*