



DESKTOP BIODIVERSITY ASSESSMENT: ERF 680 LEISURE BAY DEVELOPMENT -

Leisure Bay, KwaZulu-Natal

August 2021

CLIENT

Mary Chettle & Associates

Prepared by:

The Biodiversity Company

Cell: +27 81 319 1225

Fax: +27 86 527 1965

info@thebiodiversitycompany.com

www.thebiodiversitycompany.com



Desktop Ecological Assessment



Report Name	DESKTOP BIODIVERSITY ASSESSMENT: ERF 680 LEISURE BAY DEVELOPMENT -
Reference	Leisure Bay
Submitted to	Mary Chettle & Associates
Report Writer	<p>Martinus Erasmus </p> <p>Martinus Erasmus obtained his B-Tech degree in Nature Conservation in 2016 at the Tshwane University of Technology. Martinus has been conducting EIAs, basic assessments and assisting specialists in field during his studies since 2015. Martinus is a specialist terrestrial ecologist and botanist which conducts floral surveys faunal surveys which include mammals, birds, amphibians and reptiles.</p>
Reviewer	<p>Andrew Husted </p> <p>Andrew Husted is Pr Sci Nat registered (400213/11) in the following fields of practice: Ecological Science, Environmental Science and Aquatic Science. Andrew is an Aquatic, Wetland and Biodiversity Specialist with more than 13 years' experience in the environmental consulting field. Andrew has completed numerous wetland training courses, and is an accredited wetland practitioner, recognised by the DWS, and also the Mondi Wetlands programme as a competent wetland consultant.</p>
Declaration	<p>The Biodiversity Company and its associates operate as independent consultants under the auspice of the South African Council for Natural Scientific Professions. We declare that we have no affiliation with or vested financial interests in the proponent, other than for work performed under the Environmental Impact Assessment Regulations, 2017. We have no conflicting interests in the undertaking of this activity and have no interests in secondary developments resulting from the authorisation of this project. We have no vested interest in the project, other than to provide a professional service within the constraints of the project (timing, time and budget) based on the principals of science.</p>

Table of Contents

1	Introduction	1
1.1	Background.....	1
1.2	Scope of Work	2
1.3	Key Legislative Requirements.....	2
2	Methods	3
2.1	Assumptions and Limitations	3
2.2	Desktop Assessment	3
2.2.1	Ecologically Important Landscape Features.....	3
3	Results & Discussion.....	5
3.1	Desktop Assessment	5
3.1.1	Ecologically Important Landscape Features.....	5
3.1.2	Flora Assessment	10
3.2	Historical Data and project area state	12
3.2.1	Historical impacts and condition.....	12
3.2.2	Project Area Condition	16
4	Conclusion and Impact Statement	20
4.1	Conclusion	20
5	References.....	21
6	Appendices	22

List of Tables

Table 1-1	A list of key legislative requirements relevant to biodiversity and conservation in KwaZulu-Natal	2
Table 3-1	Summary of relevance of the proposed development to ecologically important landscape features.....	5

List of Figures

Figure 1-1	Map illustrating the location of the project area in relation to the general setting	1
Figure 3-1	Map illustrating the ecosystem threat status associated with the project area ..	6

Figure 3-2	Map illustrating the ecosystem protection level associated with project area ...	7
Figure 3-3	Map illustrating the location of Critical Biodiversity Areas proximal to the project area	8
Figure 3-4	Map illustrating the location of Landscape corridor Areas proximal to the project area	9
Figure 3-5	Map illustrating the hydrological setting of the project area	10
Figure 3-6	Map illustrating the vegetation types associated with the project area and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland	11
Figure 3-7	Historical Satellite images showing the activities within the area: 2015.....	13
Figure 3-8	Historical Satellite images showing the activities within the area: 2017.....	14
Figure 3-9	Historical Satellite images showing the state of the project area: 2021.	15
Figure 3-10	A picture taken from the centre of the project area in a western direction	16
Figure 3-11	A picture taken from the centre of the project area in an eastern direction.	17
Figure 3-12	The proposed development layout.	18
Figure 3-13	The proposed development layouts superimposed on the project area.....	19

1 Introduction

1.1 Background

The Biodiversity Company was appointed to undertake a desktop ecological assessment for Erf 680 in Leisure Bay, KwaZulu-Natal. It is proposed that an ecological Compliance Statement be compiled for Erf 680, referred to as the project area from hereon. The project is located in Leisure bay, KwaZulu-Natal (Figure 1-1). The proposed development will be within a distance of 100 meters inland of the high-water mark of the sea and with a cumulative footprint of more than 50 m² and therefore constitutes a listed activity in terms of sections 24(2) and 24D of the National Environment Management Act (Act 107 of 1998).

The assessment has taken cognisance of the recently published Government Notice 320 (dated 20 March 2020) and Government Notice 1150 (dated 30 October 2020) in terms of NEMA: "Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation".

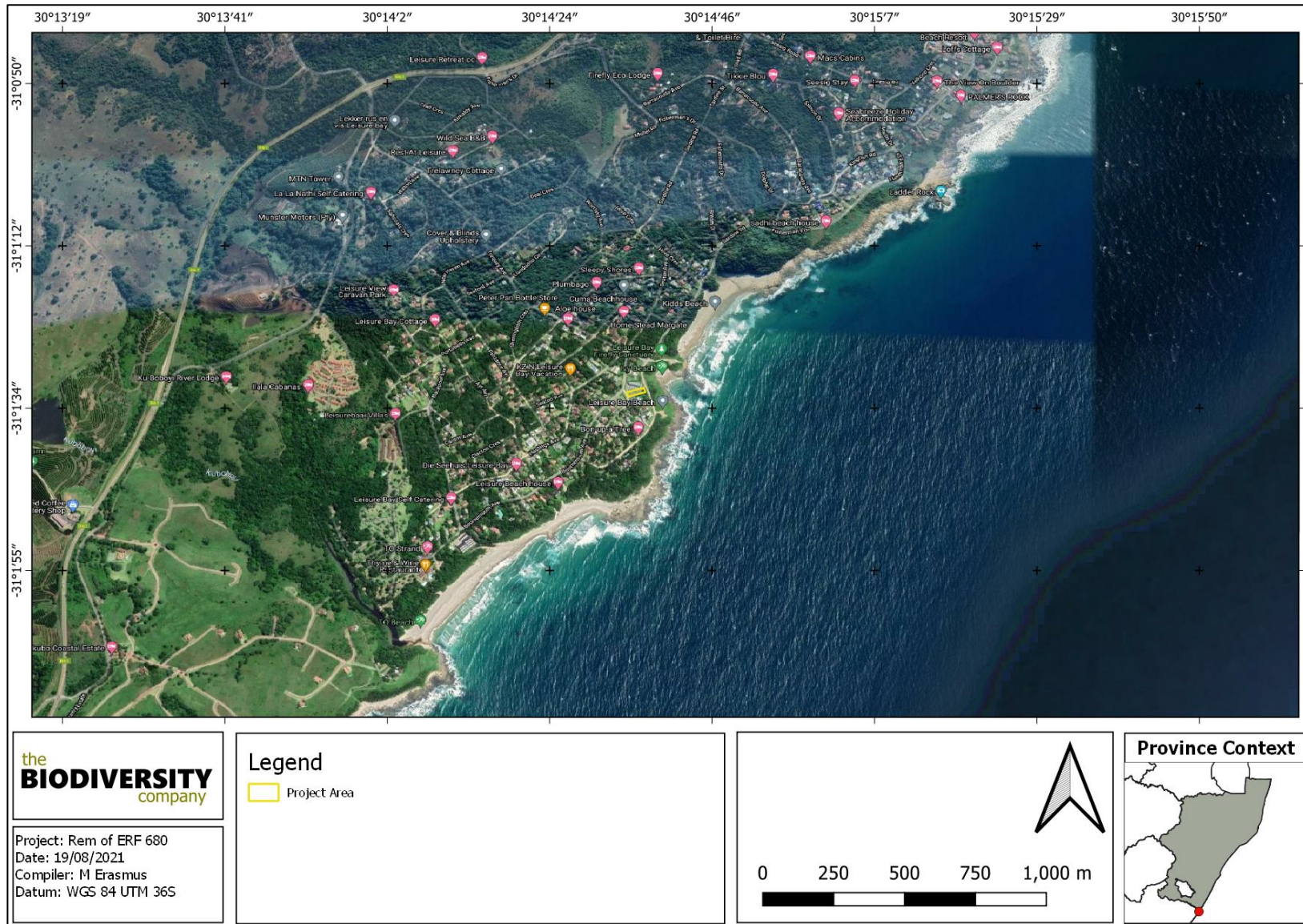


Figure 1-1 Map illustrating the location of the project area in relation to the general setting

1.2 Scope of Work

The aim of the biodiversity assessment was to provide information to guide the proposed development in consideration of any ecological sensitivities. This was achieved through the following:

- Desktop assessment to identify the ecologically important features within the landscape; and
- The prescription of mitigation measures for identified risks.

1.3 Key Legislative Requirements

The legislation, policies and guidelines listed below in Table 1-1 are applicable to the current project in terms of biodiversity and ecological support systems. The list below, although extensive, may not be complete and other legislation, policies and guidelines may apply in addition to those listed below.

Table 1-1 *A list of key legislative requirements relevant to biodiversity and conservation in KwaZulu-Natal*

Region	Legislation
International	Convention on Biological Diversity (CBD, 1993)
	The Convention on Wetlands (RAMSAR Convention, 1971)
	The United Nations Framework Convention on Climate Change (UNFCCC, 1994)
	The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES 1973)
	The Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention, 1979)
National	Constitution of the Republic of South Africa (Act No. 108 of 2006)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998)
	The National Environmental Management Protected Areas Act (Act No. 57 of 2003)
	The National Environmental Management Biodiversity Act (Act No. 10 of 2004)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 42946 (January 2020)
	The National Environmental Management Act (NEMA) (Act No. 107 of 1998) Section 24 , No 43110 (March 2020)
	The National Environmental Management: Waste Act, 2008 (Act 59 of 2008);
	The Environment Conservation Act (Act No. 73 of 1989) and associated EIA Regulations
	National Protected Areas Expansion Strategy (NPAES)
	Environmental Conservation Act (Act No. 73 of 1983)
	Natural Scientific Professions Act (Act No. 27 of 2003)
	National Biodiversity Framework (NBF, 2009)
	National Forest Act (Act No. 84 of 1998)
	National Veld and Forest Fire Act (101 of 1998)
	National Spatial Biodiversity Assessment (NSBA)
	World Heritage Convention Act (Act No. 49 of 1999)
National Heritage Resources Act, 1999 (Act 25 of 1999)	
Municipal Systems Act (Act No. 32 of 2000)	

Alien and Invasive Species Regulations, 2014

South Africa's National Biodiversity Strategy and Action Plan (NBSAP)

Conservation of Agricultural Resources Act, 1983 (Act 43 of 1983)

Sustainable Utilisation of Agricultural Resources (Draft Legislation).

White Paper on Biodiversity

Provincial

KwaZulu-Natal Nature Conservation Amendment Act, 1999, No. 5 of 1999

2 Methods

2.1 Assumptions and Limitations

The following assumptions and limitations are applicable for this assessment:

- The design and layout of the proposed development was provided by the client and any alterations to the design and/or layout may affect the accuracy of the assessment; and
- No fieldwork component was conducted for this assessment.

2.2 Desktop Assessment

The desktop assessment was principally undertaken using a Geographic Information System (GIS) to access the latest available spatial datasets in order to develop digital cartographs and species lists. These datasets and their date of publishing are provided below.

2.2.1 Ecologically Important Landscape Features

Existing ecologically relevant data layers were incorporated into a GIS to establish how the proposed development might interact with any ecologically important entities. Emphasis was placed around the following spatial datasets:

- National Biodiversity Assessment 2018 (Skowno *et al*, 2019) - The purpose of the National Biodiversity Assessment (NBA) is to assess the state of South Africa's biodiversity based on best available science, with a view to understanding trends over time and informing policy and decision-making across a range of sectors. The NBA deals with all three components of biodiversity: genes, species and ecosystems; and assesses biodiversity and ecosystems across terrestrial, freshwater, estuarine and marine environments. The two headline indicators assessed in the NBA are:
 - Ecosystem Threat Status – indicator of an ecosystem's wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition.
 - Ecosystem Protection Level – indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each

ecosystem type that is included within one or more protected areas. Not Protected, Poorly Protected or Moderately Protected ecosystem types are collectively referred to as under-protected ecosystems.

- Protected areas:
 - South Africa Protected Areas Database (SAPAD) and South Africa Conservation Areas Database (SACAD) (DEA, 2020) – These databases contains spatial data for the conservation of biodiversity in South Africa. It includes spatial and attribute information for both formally protected areas and areas that have less formal protection. SAPAD is updated on a continuous basis and forms the basis for the Register of Protected Areas which is a legislative requirement under the National Environmental Management: Protected Areas Act, Act 57 of 2003.
 - National Protected Areas Expansion Strategy (NPAES) (SANBI, 2010) – The National Protected Area Expansion Strategy (NPAES) provides spatial information on areas that are suitable for terrestrial ecosystem protection. These focus areas are large, intact and unfragmented and are therefore, of high importance for biodiversity, climate resilience and freshwater protection.
- KZN Biodiversity Spatial Plan (Ezemvelo KZN Wildlife, 2016) – The KZN Biodiversity Spatial Plan (KZN BSP) provides a spatial representation of land and coastal marine area required to ensure the persistence and conservation of biodiversity within KZN. The Plan has been produced as a tool for guiding protected area expansion priority areas, identification of stewardship sites and informing all other economic sector' strategic spatial planning processes with the intention of ensuring more sustainable development in KZN. These areas are reflected as:
 - Critical Biodiversity Areas (CBAs) – CBA: Irreplaceable - Areas considered critical for meeting biodiversity targets and thresholds, and which are required to ensure the persistence of viable populations of species and the functionality of ecosystems. CBA: Optimal – Areas which represent the best localities out of a potentially larger selection of available planning units that are optimally located to meet both the conservation target but also other criteria.
 - Ecological Support Areas (ESAs) - Areas are required to support and sustain the ecological functioning of Critical Biodiversity Areas (CBAs). For terrestrial and aquatic environments, these areas are functional but are not necessarily pristine natural areas. They are however required to ensure the persistence and maintenance of biodiversity patterns and ecological processes within the CBAs, and which also contributes significantly to the maintenance of Ecological Infrastructure.
 - Landscape Corridors – Macro-ecological corridors that were developed to facilitate ecological processes. Linkages for assemblages of species, specifically the matrix species along biogeographic features or across an altitudinal gradient.

- Important Bird and Biodiversity Areas (BirdLife South Africa, 2015) – Important Bird and Biodiversity Areas (IBAs) constitute a global network of over 13 500 sites, of which 112 sites are found in South Africa. IBAs are sites of global significance for bird conservation, identified through multi-stakeholder processes using globally standardised, quantitative and scientifically agreed criteria; and
- Hydrological Setting:
 - South African Inventory of Inland Aquatic Ecosystems (SAIIAE) (Van Deventer *et al*, 2018) – A South African Inventory of Inland Aquatic Ecosystems (SAIIAE) was established during the National Biodiversity Assessment of 2018. It is a collection of data layers that represent the extent of river and inland wetland ecosystem types as well as pressures on these systems. Ecosystem threat status (ETS) of ecosystem types is based on the extent to which each river ecosystem type had been altered from its natural condition. Ecosystem types are categorised as CR, EN, VU or LT. Critically Endangered, EN and VU ecosystem types collectively referred to as ‘threatened’ (Van Deventer *et al.*, 2019; Skowno *et al.*, 2019).
 - Estuary Ecosystem Map (Van Niekerk *et al.*, 2019) – Delineates the physical and biological processes and habitats necessary for estuarine function and health based on their historical extent and Estuarine Ecosystem Types at the landscape scale. This layer includes the threat status, protection level and condition of the Estuarine Ecosystems 2018 assessed for the National Biodiversity Assessment 2018.
 - Strategic Water Source Areas (SWSAs) (Le Maitre *et al*, 2018) – SWSAs are defined as areas of land that supply a quantity of mean annual surface water runoff in relation to their size and therefore, contribute considerably to the overall water supply of the country. These are key ecological infrastructure assets and the effective protection of surface water SWSAs areas is vital for national security because a lack of water security will compromise national security and human wellbeing.

3 Results & Discussion

3.1 Desktop Assessment

3.1.1 Ecologically Important Landscape Features

The relevance of the proposed development to ecologically important landscape features are summarised in Table 3-1.

Table 3-1 *Summary of relevance of the proposed development to ecologically important landscape features.*

Desktop Information Considered	Relevant/Irrelevant	Section
Ecosystem Threat Status	Relevant – Located within an Endangered ecosystem	3.1.1.1
Ecosystem Protection Level	Relevant – Located within a Not Protected ecosystem	3.1.1.2
Protected Areas	Irrelevant – The proposed development does not occur within or within 5km of any protected area.	-

Desktop Ecological Assessment

National Protected Area Expansion Strategy	Irrelevant – Does not overlap any NPAES areas	-
Important Bird and Biodiversity Areas	Irrelevant – The proposed development does not occur inside nor within 5 km of any IBA.	-
Critical Biodiversity Area	Irrelevant – The proposed development does not occur within any areas. Irreplaceable CBA and Landscape Corridor occurs 18 m from the project area.	3.1.1.3
South African Inventory of Inland Aquatic Ecosystems	Irrelevant – The project area is not located within any Estuarine Ecosystem. No major river or wetland systems occur within the 500 m regulated area	3.1.1.4

3.1.1.1 Ecosystem Threat Status

The Ecosystem Threat Status is an indicator of an ecosystem’s wellbeing, based on the level of change in structure, function or composition. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU), Near Threatened (NT) or Least Concern (LC), based on the proportion of the original extent of each ecosystem type that remains in good ecological condition. According to the spatial dataset the project area is located within EN ecosystems (Figure 3-1).

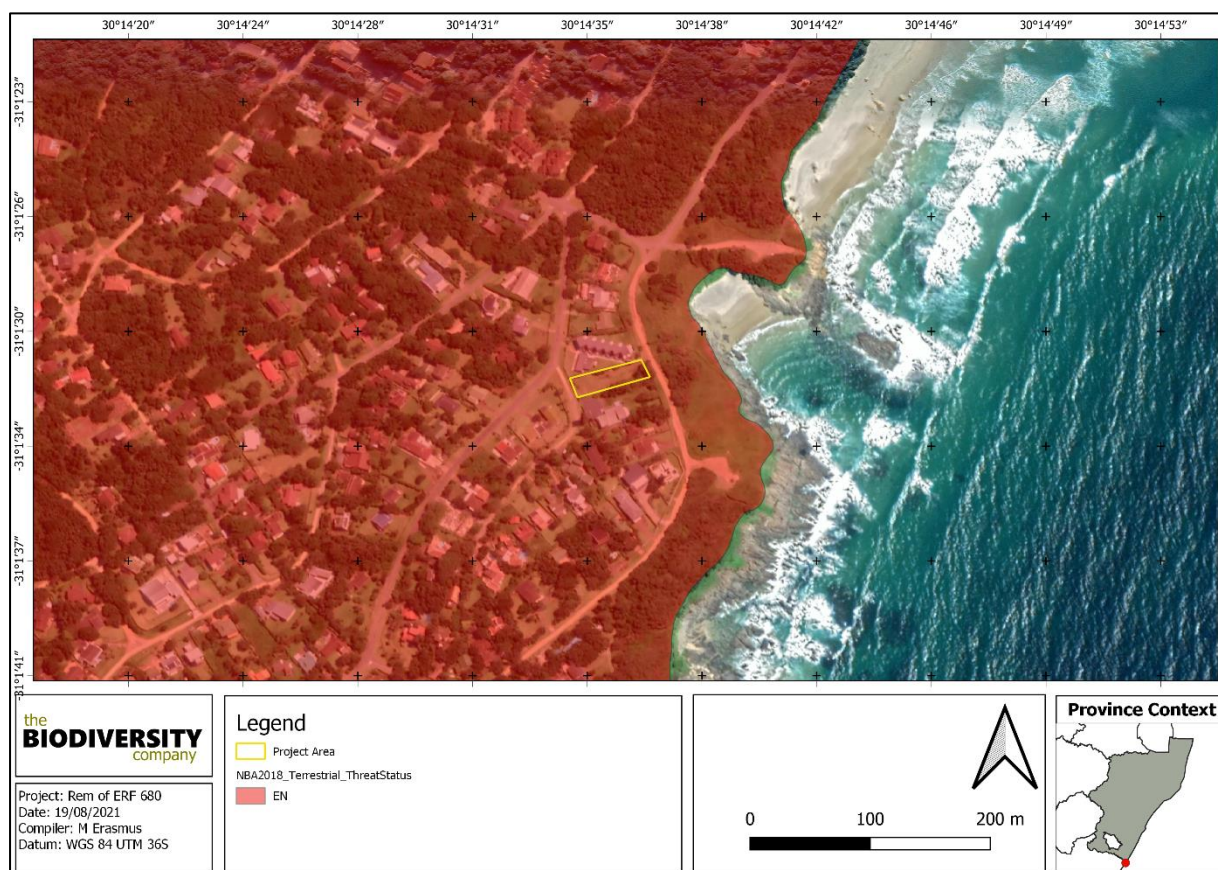


Figure 3-1 Map illustrating the ecosystem threat status associated with the project area

3.1.1.2 Ecosystem Protection Level

Indicator of the extent to which ecosystems are adequately protected or under-protected. Ecosystem types are categorised as Well Protected (WP), Moderately Protected (MP), Poorly Protected (PP), or Not Protected (NP), based on the proportion of the biodiversity target for each ecosystem type that is included within one or more protected areas. Not Protected, PP or MP ecosystem types are collectively referred to as under-protected ecosystems. The proposed development is located NP ecosystems (Figure 3-2).

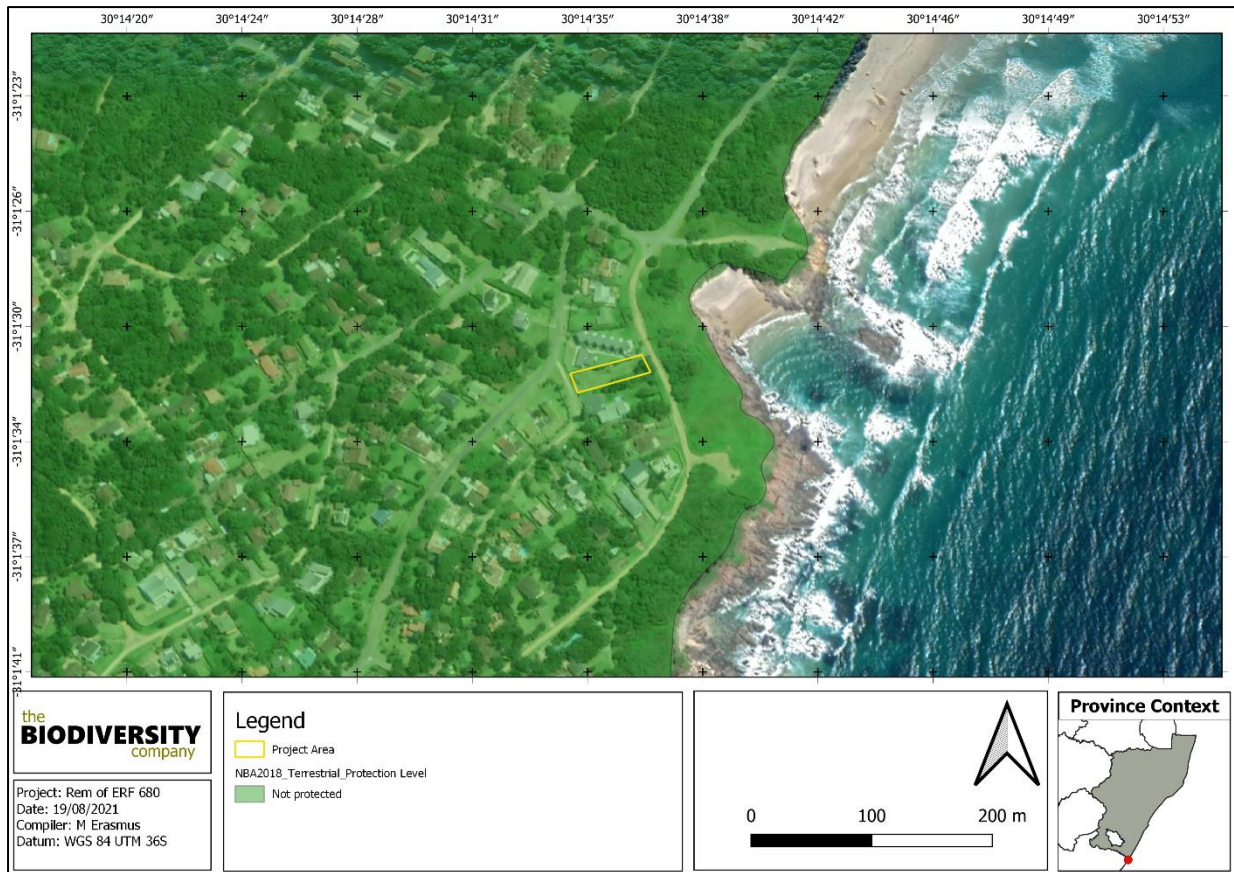


Figure 3-2 Map illustrating the ecosystem protection level associated with project area

3.1.1.3 Biodiversity Spatial Plan

Conservation of CBAs is crucial, in that if these areas are not maintained in a natural or near-natural state, biodiversity conservation targets cannot be met. Maintaining an area in a natural state can include a variety of biodiversity compatible land uses and resource uses (SANBI-BGIS, 2017). The project area is in close proximity(18m) from an area categorised as an Irreplaceable CBA (Figure 3-3) and Landscape Corridor (Figure 3-4). However, a road as well as brick wall exists between these areas and the project area. The project area and the associated development is not expected to have a direct impact on these areas; the areas are not only set apart from the project area by a cement wall, but also a secondary road.

Desktop Ecological Assessment

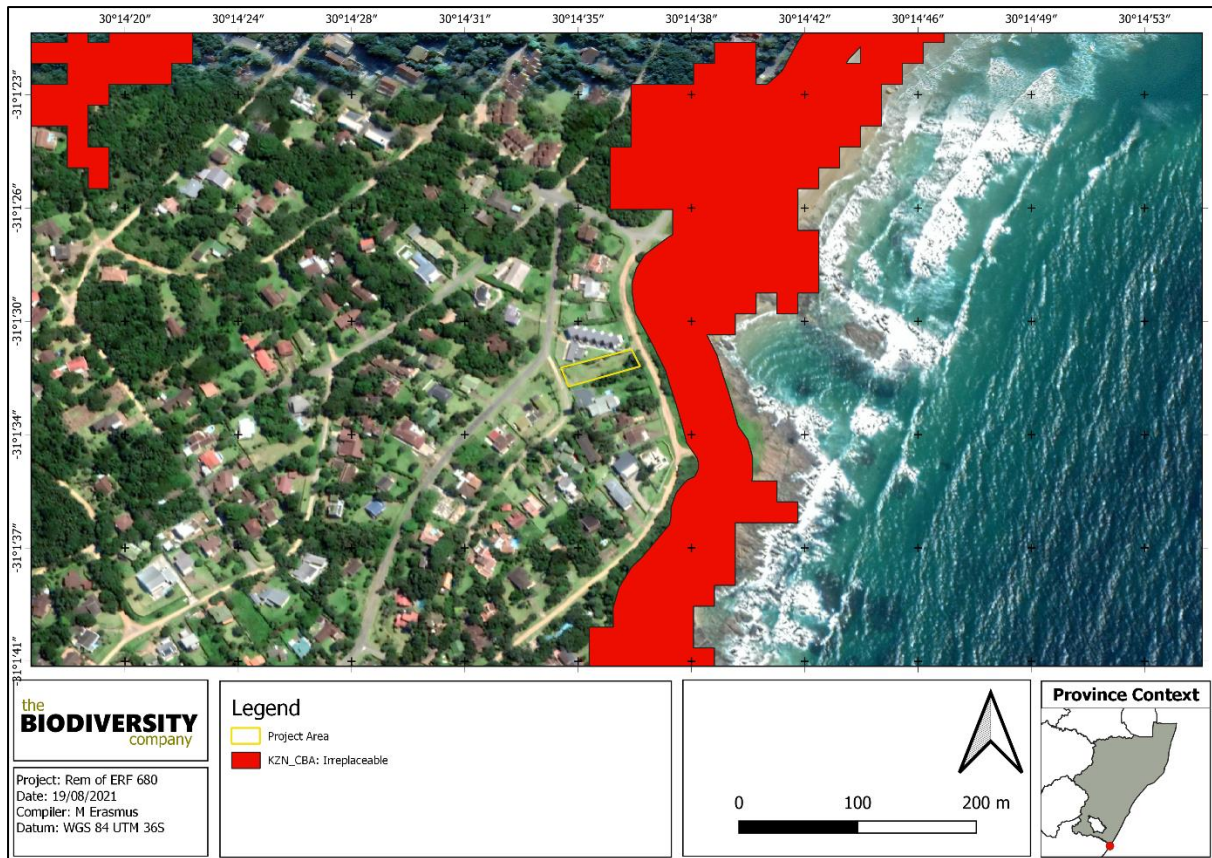


Figure 3-3 Map illustrating the location of Critical Biodiversity Areas proximal to the project area

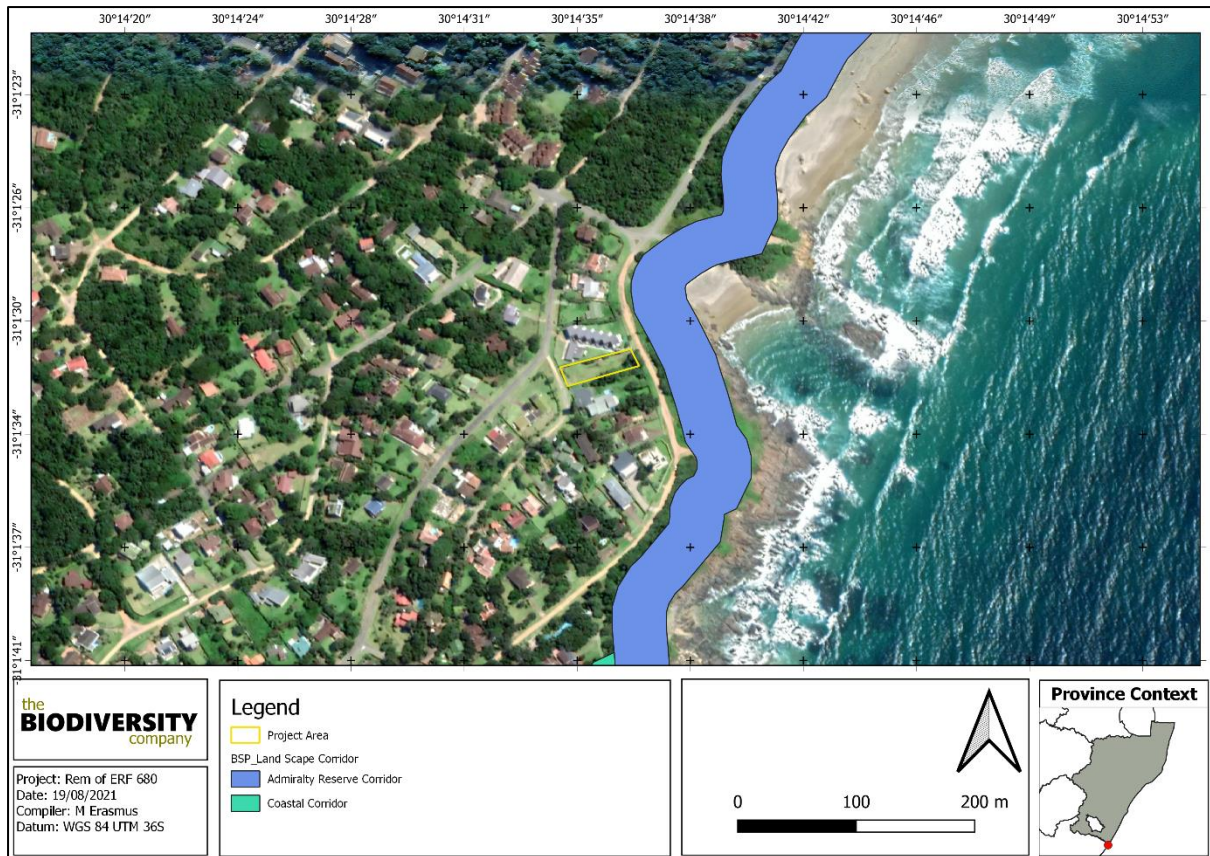


Figure 3-4 Map illustrating the location of Landscape corridor Areas proximal to the project area

3.1.1.4 Hydrological Setting

The project area is not located within any Estuarine Functional Zone. No major river or wetland systems occur within the 500 m regulated area (Figure 3-5).

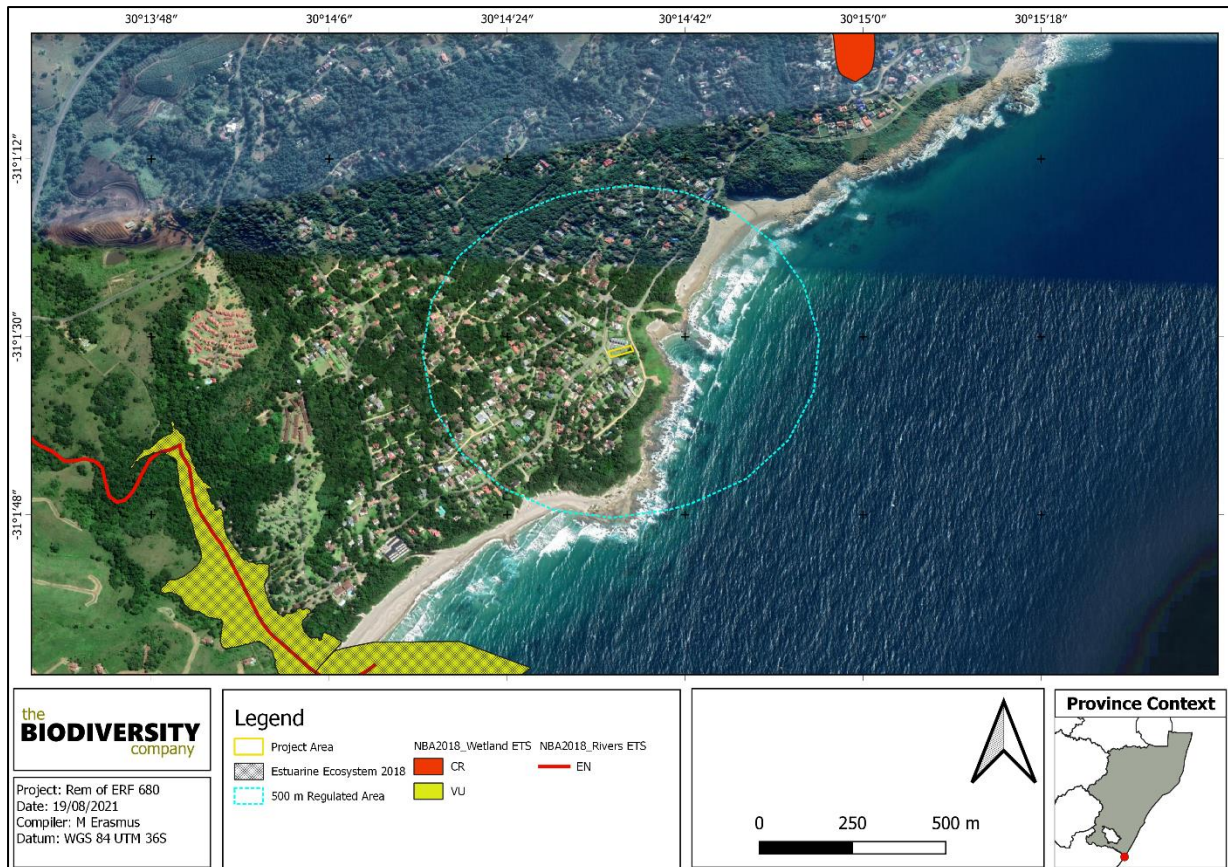


Figure 3-5 Map illustrating the hydrological setting of the project area

3.1.2 Flora Assessment

This section is divided into a description of the vegetation type expected under natural conditions and the expected flora species.

3.1.2.1 Vegetation Type

The proposed project area is situated within the Indian Ocean Coastal Belt (IOCB). The IOCB occurs as an almost 800 km long coastal strip between the South African border with Mozambique as far south as the mouth of the Great Kei River (near East London). It spans altitudes from 0–450 m (and higher up to 600 m in the Pondoland-Ugu Sandstone Coastal Sourveld). The landscapes of the IOCB are flat (Maputaland) or characterised by alternating rolling hills and deeply incised valleys (coastal stretch between Richards Bay and Port Edward in KwaZulu-Natal and then more markedly further south to Port St Johns as far as the Great Kei River mouth). Elevated plateaus and deep gorges are characteristic of the Pondoland coast and other regions with underlying sandstone geology. The belt is about 35 km wide at some places in the north (somewhat wider in the valley of the Thukela River), narrowing irregularly southwards to <20 km in parts of Pondoland to <10 km in several parts of the Wild Coast.

The east-west gradient of annual precipitation is remarkably steep, especially in Maputaland, with around 1 200 mm on the coast, while about 60 km inland (Ndumo) only about 60% of this amount occurs. Summers are hot to very hot, while winters are mild, with hardly any frost. The pronounced hot and damp tropical character of the climate of the IOCB in summer and its mild and slightly drier subtropical character in winter can be ascribed to the synergistic influence of

the unusual southbound shift of the Intertropical Convergence Zone and the warm Agulhas Current flowing close to the eastern coasts of South Africa.

On a fine-scale vegetation type, the project area overlaps with one vegetation type, the KZN Coastal Belt Grassland (Figure 3-6).

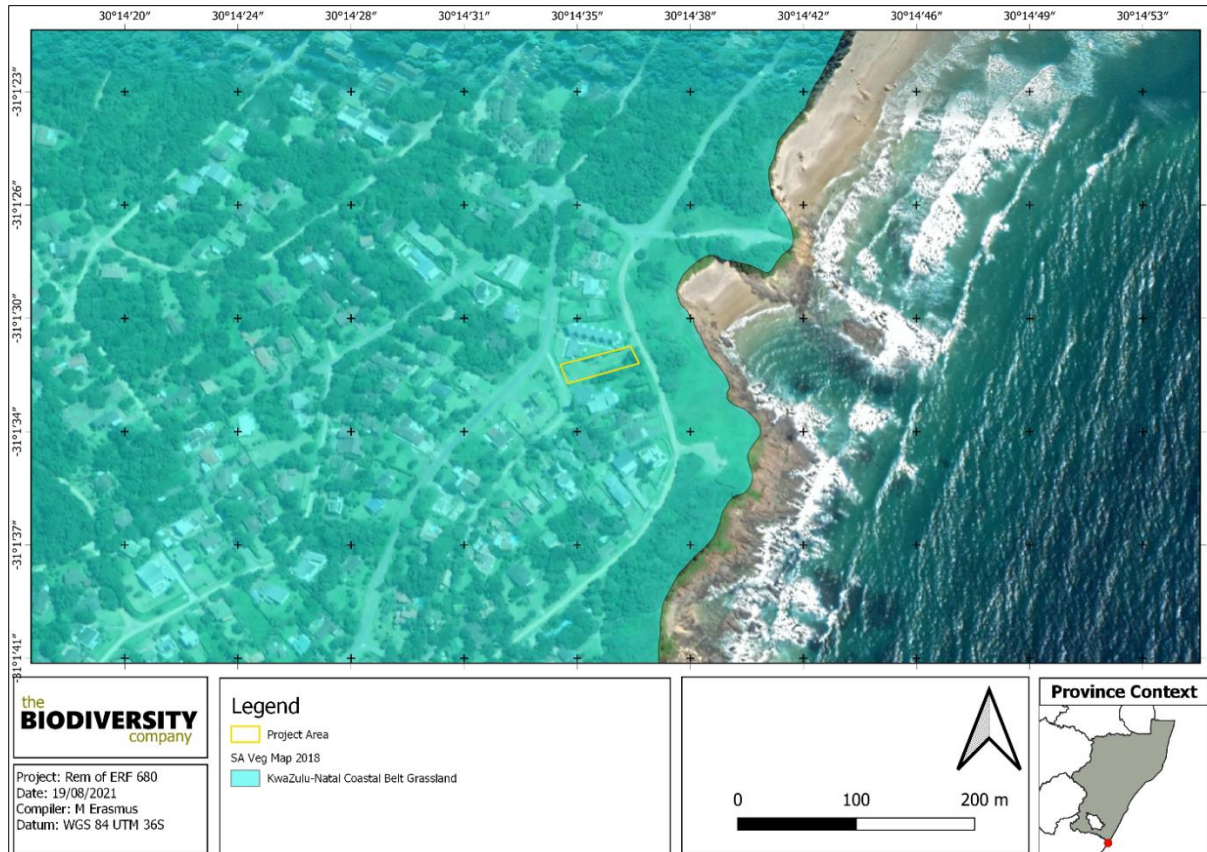


Figure 3-6 Map illustrating the vegetation types associated with the project area and surrounding landscape based on the Vegetation Map of South Africa, Lesotho & Swaziland

The **Maputaland Coastal Belt** is described as follows:

- i. Topography and Structure – Undulating coastal plains. The vegetation type at present is affected by a mosaic of very extensive sugarcane fields, timber plantations and coastal holiday resorts, with interspersed secondary *Aristida* grasslands, thickets and patches of coastal thornveld.
- ii. Important Taxa –
 - **Graminoids:** *Aristida junciformis* subsp. *galpinii* (d), *Digitaria eriantha* (d), *Panicum maximum* (d), *Themeda triandra* (d), *Alloteropsis semialata* subsp. *eckloniana*, *Cymbopogon caesius*, *C. nardus*, *Eragrostis curvula*, *Eulalia villosa*, *Hyparrhenia filipendula*, *Melinis repens*.
 - **Herbs:** *Berkheya speciosa* subsp. *speciosa* (d), *Cyanotis speciosa* (d), *Senecio glaberrimus* (d), *Alepidea longifolia*, *Centella glabrata*, *Cephalaria oblongifolia*, *Chamaecrista mimosoides*, *Conostomium natalense*, *Crotalaria lanceolata*, *Dissotis canescens*, *Eriosema squarrosus*, *Gerbera ambigua*, *Hebenstretia comosa*, *Helichrysum cymosum* subsp. *cymosum*, *H. pallidum*,

Hibiscus pedunculatus, *Hybanthus capensis*, *Indigofera hiliaris*, *Pentanisia prunelloides* subsp. *latifolia*, *Senecio albanensis*, *S. bupleuroides*, *S. coronatus*, *S. ryncholaenus*, *Sisyranthus imberbis*, *Stachys aethiopica*, *S. nigricans*, *Vernonia galpinii*, *V. oligocephala*.

- **Geophytic Herbs:** *Bulbine asphodeloides*, *Disa polygonoides*, *Hypoxis filiformis*, *Ledebouria floribunda*, *Pachycarpus asperifolius*, *Schizocarpus nervosus*, *Tritonia disticha*.
 - **Low Shrubs:** *Clutia pulchella*, *Gnidia kraussiana*, *Phyllanthus glaucophyllus*, *Tephrosia polystachya*.
 - **Woody Climbers:** *Abrus laevigatus*, *Asparagus racemosus*, *Smilax anceps*.
 - **Small Trees & Tall Shrubs:** *Bridelia micrantha* (d), *Phoenix reclinata* (d), *Syzygium cordatum* (d), *Acacia natalitia*, *Albizia adianthifolia*, *Antidesma venosum*.
- iii. Endemic Taxa – **Herb:** *Vernonia africana* (extinct). **Geophytic Herb:** *Kniphofia pauciflora*. **Low Shrub:** *Barleria natalensis* (extinct).
- iv. Conservation – Endangered. Target 25%. Only very small part statutorily conserved in Ngoye, Mbumbazi and Vernon Crookes Nature Reserves. About 50% transformed for cultivation, by urban sprawl and for roadbuilding. Aliens include *Chromolaena odorata*, *Lantana camara*, *Melia azedarach* and *Solanum mauritianum*. Erosion is low and moderate.

3.2 Historical Data and project area state

3.2.1 Historical impacts and condition

Historical Google Earth images were compiled and can be seen in (Figure 3-7 to Figure 3-9 in order to assist in the determination of the current desktop state of the project area.

In June of 2015 (Figure 3-7, top) the project area contained a stand of trees, assumed to be indigenous and natural. In November of the same year (Figure 3-7, bottom), the satellite images show a portion of the trees lost, it is assumed that between June and November of 2015 that the first major impact to the project area took place.

In 2017 (Figure 3-8) the stand of trees is reduced even more and the area further impacted and changed.

In Figure 3-9, which is the most recent image during the time of writing this report, the stand of trees can be seen reduced to a small stand and the area transformed even more.

Desktop Ecological Assessment



Figure 3-7 Historical Satellite images showing the activities within the area: 2015.

Desktop Ecological Assessment



Figure 3-8 Historical Satellite images showing the activities within the area: 2017.



Figure 3-9 Historical Satellite images showing the state of the project area: 2021.

3.2.2 Project Area Condition

Field photos of the current state of the area were provided and can be seen below. The information substantiates the condition reflected by the historical Google Earth images. In Figure 3-10 the project area can be seen to be transformed to a large extent and the ground layer dominated by Buffalo Grass (*Bouteloua dactyloides*) which is an exotic grass.



Figure 3-10 A picture taken from the centre of the project area in a western direction

In Figure 3-11, the remainder of the tree stand can be seen. The trees have been confirmed to be Milkwoods (*Sideroxylon inerme*) which are Nationally protected trees. According to the list of protected tree species under the National Forests Act, 1998 (Act NO.84 of 2014) in terms of section 15 (1) of the Forests Act, 1998 (DAFF, 2014), no person may cut, disturb, damage or destroy any protected tree or possess, collect, remove, transport, export, purchase, sell, donate, or in any other manner acquire or dispose of any protected tree or any product derived from a protected tree, except under a license or exemption granted by the Minister to an applicant and subject to such period and conditions as may be stipulated. Contravention of this declaration is regarded as a first category offence.

It is understood that the trees will not be harmed, the development plan (Figure 3-12) overlaid with the project area (Figure 3-13), shows that the trees have been considered and will be avoided, and incorporated into the landscape plan.



Figure 3-11 A picture taken from the centre of the project area in an eastern direction.

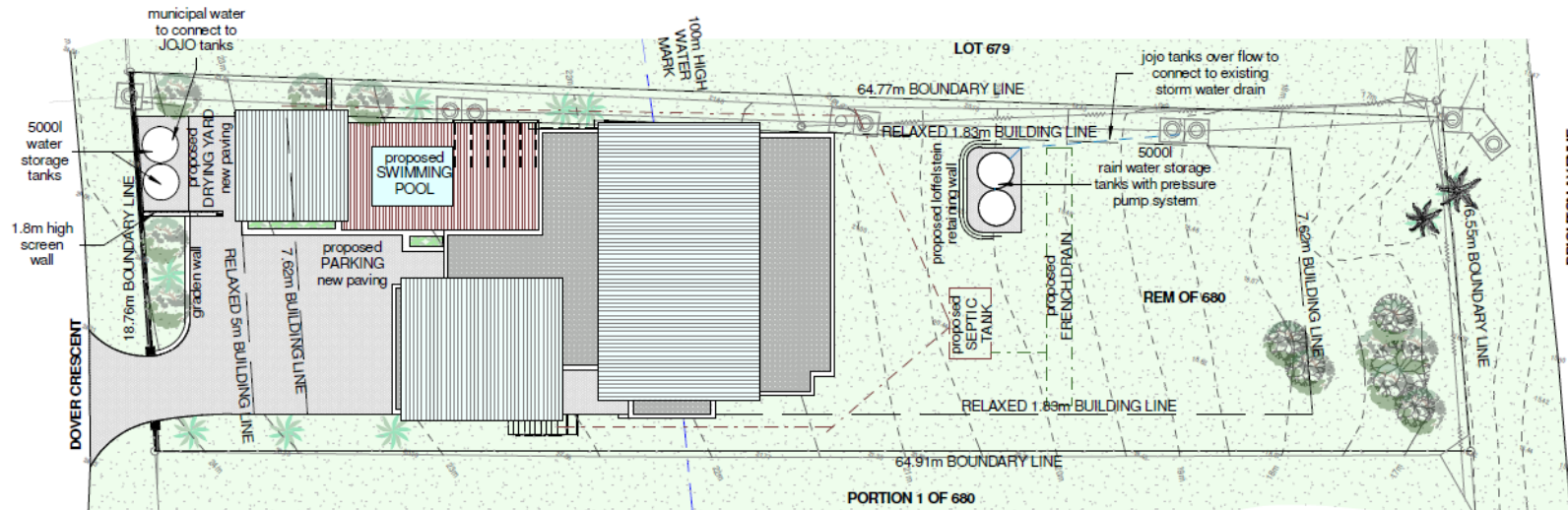
Proposed dwelling

Rem of 680
Leisure bay



AREA SCHEDULE			
DWELLING:	AREAS	F.A.R	COV.
GROUND FLOOR:			
PROPOSED DWELLING AREA	141.3m ²	141.3m ²	141.3m ²
PROPOSED COVERED ENTRANCE	6.8m ²	-	6.8m ²
PROPOSED COVERED BALCONIES	45m ²	-	45m ²
PROPOSED DOUBLE GARAGE	48m ²	-	48m ²
PROPOSED SWIMMING POOL	11.6m ²	-	11.6m ²
PROPOSED TIMBER DECK	40m ²	-	40m ²
LOWER GROUND FLOOR:			
PROPOSED DWELLING AREA	130.7m ²	130.7m ²	-
PROPOSED COVERED VERANDAH	36.3m ²	-	-
STAFF ROOM :			
PROPOSED DWELLING AREA	24.4m ²	24.4m ²	24.4m ²
TOTAL	484.1m²	296.4m²	317.1m²

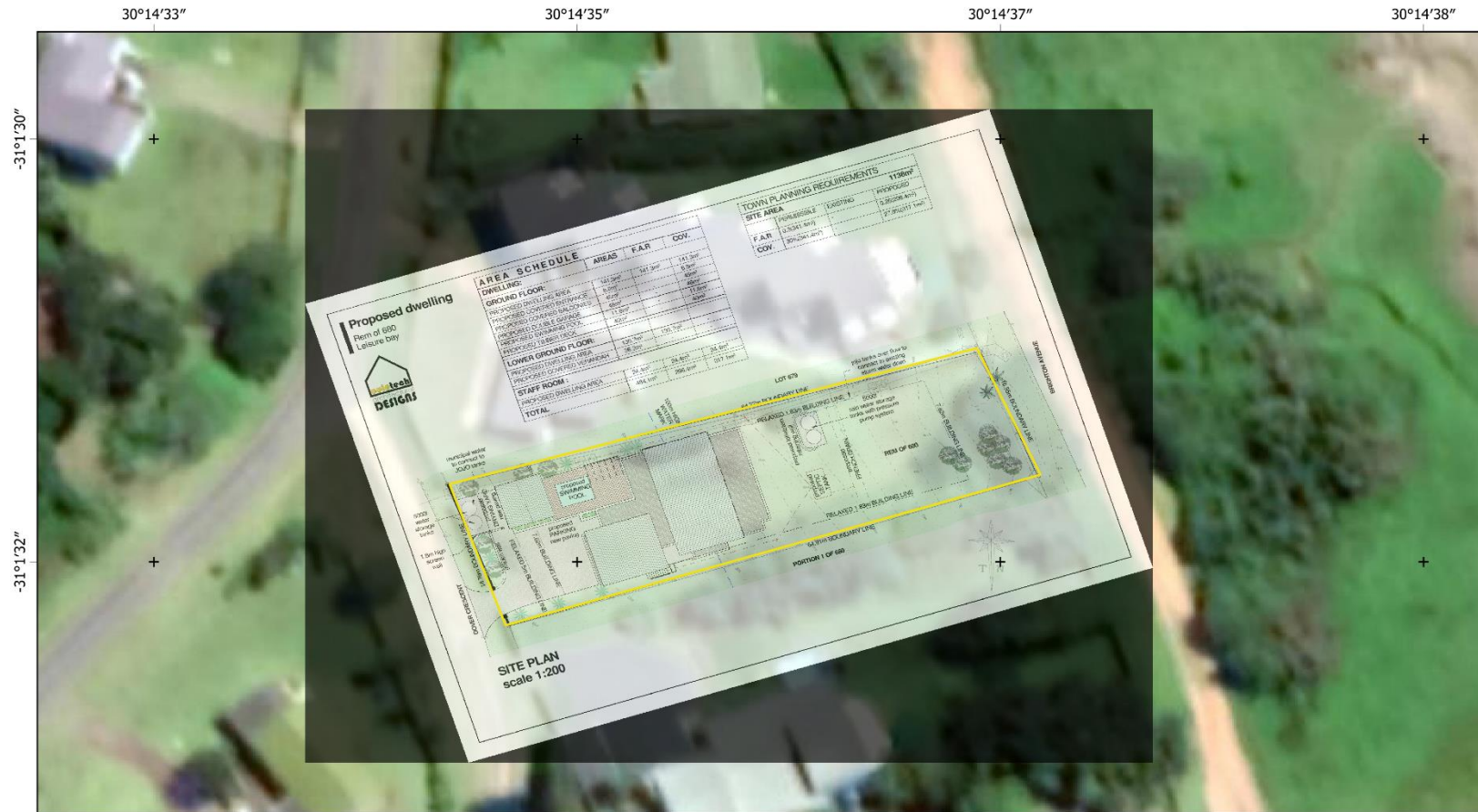
TOWN PLANNING REQUIREMENTS			
SITE AREA			1138m ²
	PERMISSIBLE	EXISTING	PROPOSED
F.A.R	0.3(341.4m ²)	-	0.26(296.4m ²)
COV.	30%(341.4m ²)	-	27.8%(317.1m ²)



SITE PLAN
scale 1:200



Figure 3-12 The proposed development layout.



the **BIODIVERSITY** company

Project: Rem of ERF 680
 Date: 19/08/2021
 Compiler: M Erasmus
 Datum: WGS 84 UTM 36S

Legend

Project Area

Province Context

Figure 3-13 The proposed development layouts superimposed on the project area.

4 Conclusion and Impact Statement

4.1 Conclusion

The completion of a comprehensive desktop assessment, in conjunction with the photographic records from the project area suggests there is a relatively high level of confidence in the information provided. The majority the desktop information provided in Table 3-1 were irrelevant, except for the project area being in an EN ecosystem.

The project area was found to be historically modified from its original state, dating back to 2015. Due to the extent of the historic disturbances that have been inflicted, this area hasn't recovered to a more natural state. This area can be regarded as transformed and does not contain more than 300 m² of indigenous vegetation of a EN vegetation type. The ecological characteristics of the project area are not representative of ecosystem and vegetation type, hence the project area is classified as transformed.

It is the opinion of the specialists that due to the nature of the historic modification to area, the project area is at such a point where it wouldn't be able to return to a more natural state without anthropogenic rehabilitation. The proposed development of the area is not envisioned to have any notable negative effect on the immediate area and surrounds. The project area does not represent the very high terrestrial and aquatic theme sensitivity as per the screening report. Based on the findings of this assessment, the terrestrial theme sensitivity is low. Since no freshwater resources are within the 500 m regulated area, the aquatic theme sensitivity is also low.

Considering the above-mentioned information, no fatal flaws are evident for the proposed project. It is the opinions of the specialists that the project, may be favourably considered. It is preferred that the protected trees remain *in situ*, but in the event these are to be destroyed or relocated, a permit will be required.

5 References

- Cooper-Bohannon, R., Mickleburgh, S., Hutson, A.M., Bergmans, W., Fahr, J. & Racey, P.A. 2020. *Eidolon helvum*. The IUCN Red List of Threatened Species 2020: e.T7084A22028026. <https://dx.doi.org/10.2305/IUCN.UK.2020-2.RLTS.T7084A22028026.en>.
- Le Maitre, D.C., Seyler, H., Holland, M., Smith-Adao, L.B., Nel, J.L., Maherry, A. & Witthüser, K. 2018. Identification, Delineation and Importance of the Strategic Water Source Areas of South Africa, Lesotho and Swaziland for Surface Water and Groundwater. WRC Report No TT 754/1/18, Water Research Commission, Pretoria.
- Mucina, L. & Rutherford, M.C. (Eds.). 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelizia 19. South African National Biodiversity Institute, Pretoria, South African.
- Mucina, L., Rutherford, M.C. & Powrie, L.W. (Eds.). 2007. Vegetation map of South Africa, Lesotho and Swaziland. 1:1 000 000 scale sheet maps. 2nd ed. South African National Biodiversity Institute, Pretoria.
- National Biodiversity Assessment spatial data. 2018. <http://bgis.sanbi.org/>. Accessed January 2021.
- Nel JL, Murray KM, Maherry AM, Petersen CP, Roux DJ, Driver A, Hill L, Van Deventer H, Funke N, Swartz ER, Smith-Adao LB, Mbona N, Downsborough L and Nienaber S. 2011. Technical Report for the National Freshwater Ecosystem Priority Areas project. WRC Report No. K5/1801.
- NEMBA. 2014. Government Gazette, Volume 584. No 37320. www.gpwonline.co.za. Accessed January 2021.
- Riis, T., Kelly-Quinn, M., Aguiar, F.C., Manolaki, P., Bruno, D., Bejarano, M.D., Clerici, N., Fernandes, M.R., Franco, J.C., Pettit, N., Portela, A.P., Tammeorg, O., Tammeorg, P., Rodríguez-González, P.M., Dufour, S. 2020. Global overview of ecosystem services provided by riparian vegetation. *Bioscience* 70: 501–514.
- SANBI-BGIS. 2017. Technical guidelines for CBA Maps: Guidelines for developing a map of Critical Biodiversity Areas & Ecological Support Areas using systematic biodiversity planning.
- SAPAD (South Africa Protected Areas Database) and SACAD (South Africa Conservation Areas Database) (2019). <http://egis.environment.gov.za>
- Van Deventer H, Smith-Adao L, Collins NB, Grenfell M, Grundling A, Grundling P-L, Impson D, Job N, Lötter M, Ollis D, Petersen C, Scherman P, Sieben E, Snaddon K, Tererai F. and Van der Colff D. 2019. *South African National Biodiversity Assessment 2018: Technical Report*. Volume 2b: Inland Aquatic (Freshwater) Realm. CSIR report number CSIR/NRE/ECOS/IR/2019/0004/A. South African National Biodiversity Institute, Pretoria.
- Van Niekerk, L., Adams, J.B., Lamberth, S.J., MacKay, F., Taljaard, S., Turpie, J.K., Weerts S. & Raimondo, D.C. 2019 (eds). *South African National Biodiversity Assessment 2018: Technical Report*. Volume 3: Estuarine Realm. CSIR report number CSIR/SPLA/EM/EXP/2019/0062/A. South African National Biodiversity Institute, Pretoria. Report Number: SANBI/NAT/NBA2018/2019/Vol3/A.

6 Appendices

Appendix A Specialist declarations

DECLARATION

I, Martinus Erasmus, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Martinus Erasmus

Terrestrial Ecologist

The Biodiversity Company

August 2021

DECLARATION

I, Andrew Husted, declare that:

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority; and the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of Section 24F of the Act.



Andrew Husted

Terrestrial Ecologist

The Biodiversity Company

August 2021

Martinus Erasmus

B-Tech Nature Conservation (*Cand Sci Nat*)

Cell: +27 82 448 1667

Email: martinus@thebiodiversitycompany.com

Identity Number: 9209035136082

Date of birth: 03 September 1992



Profile Summary

Working experience throughout South Africa and Africa.

Specialist experience with mining, hydropower, renewable energy, development and veld management.

Specialist guidance, support and facilitation for the compliance with legislative processes, for in-country requirements.

Specialist expertise includes Botany and Terrestrial Ecology.

Areas of Interest

Mining, Oil & Gas, Renewable Energy & Bulk Services Infrastructure Development, Sustainability and Conservation.

Key Experience

- Environmental, Social and Health Impact Assessments (ESHIA)
- Terrestrial Ecological Assessments
- Rehabilitation Plans and Monitoring
- Botany, especially in the Limpopo, Mpumalanga, Gauteng and North-West provinces in South-Africa.
- Veld management and Veld Condition

Countries worked in

Guinea
 Lesotho
 Liberia
 Mozambique
 Nigeria
 South Africa
 Swaziland
 Zambia

Nationality

South African

Languages

English – Proficient
 Afrikaans – Proficient

Qualifications

- B-Tech in Nature Conservation, Tshwane University of Technology, Pretoria, South Africa.
- National Diploma in Nature Conservation, Tshwane University of Technology, Pretoria, South Africa.
- Cand Sci Nat (118630)
- SASS Accredited

SELECTED PROJECT EXPERIENCE

Project Name: A biodiversity baseline and impact assessment for the proposed Umsimbithi Emakhazeni Coal Mining Project, in Mpumalanga Province, South Africa.

Personal position / role on project: Terrestrial Ecologist.

Location: Mpumalanga Province, South Africa (2017).

Main project features: To conduct a dual season terrestrial ecology baseline and impact assessment for the expected impact footprint area.

Project Name: Biodiversity Assessment associated with eThembeni Integrated Mixed-use Housing Development, KwaZulu-Natal province.

Personal position / role on project: Terrestrial Ecologist

Location: South Africa (2017).

Main project features: Conduct a detailed terrestrial ecology basic assessment for the expected impact footprint area.

Project Name: A biodiversity baseline and impact assessment for the proposed Pavua Hydropower Project, in Sofala Province, Central Mozambique.

Personal position / role on project: Assistant Botanist

Location: Sofala Province, Mozambique (2017).

Main project features: To conduct a dual season terrestrial and aquatic ecological baseline and impact assessment for the expected impact footprint area, including Gorongosa National. The study was required to meet national and IFC requirements, including a Critical Habitat assessment.

Project Name: A biodiversity baseline and impact assessment for the proposed Gold Mine Project, in Grand Cape Mt Province, Liberia.

Personal position / role on project: Assistant to specialist/ field technician

Location: Grand Cape Mt Province, Liberia (2015).

Main project features: To conduct a dual season ecological baseline assessment for the expected impact footprint area. The study was required to meet national and IFC (International Finance Corporation) requirements, including a Critical Habitat assessment.

Project Name: A biodiversity baseline and impact assessment for the proposed Siguiri Gold Mine Project, in Kankan Province, Guinea.

Personal position / role on project: Terrestrial Ecologist

Location: Siguiri, Guinea, West-Africa (2018)

Main project features: To conduct a dual season terrestrial ecological baseline and impact assessment for the expected impact footprint area. The study was required to meet national and IFC (International Finance Corporation) requirements, including a Critical Habitat assessment.

Project Name: A biodiversity baseline and impact assessment for the proposed Nondvo Dam Project in Eswatini, Southern Africa

Personal position / role on project: Terrestrial Ecologist (Botany)

Location: Swaziland (2019)

Main project features: To conduct a dual season terrestrial ecological baseline and impact assessment for the expected impact footprint area. The study was required to meet national and IFC (International Finance Corporation) requirements, including a Critical Habitat assessment.

Project Name: Biodiversity Baseline & Impact Assessment for the proposed Cuamba 15MW Solar PV Plant, Cuamba, Mozambique

Personal position / role on project: Terrestrial Ecologist (Botany)

Location: Mozambique (2019)

Main project features: To conduct a dual season terrestrial and aquatic ecological baseline and impact assessment for the proposed development.

OVERVIEW

An overview of the specialist technical expertise includes the following:

- Terrestrial Ecological Assessments.
- Faunal surveys which includes mammals, birds, amphibians and reptiles.
- Floral surveys
- Rehabilitation Plans and Monitoring for the terrestrial component.
- Botany, especially in the Limpopo, Mpumalanga, Gauteng and North-West provinces in South-Africa.
- Veld management
- Environmental Control Officer (ECO) experience

EMPLOYMENT EXPERIENCE**CURRENT EMPLOYMENT: The Biodiversity Company (August 2017 – Present)**

I started working at The Biodiversity Company in mid-2017.

The team at The Biodiversity Company have conducted stand-alone specialist studies and provided overall guidance of studies with a pragmatic approach for the management of biodiversity that takes into account all the relevant stakeholders, most importantly the environment that is potentially affected. We manage risks to the environment to reduce impacts with practical, relevant and measurable methods.

My roles include:

- Faunal and Floral surveys for baseline, basic or impact assessments;
- Floral surveys for vegetation verifications, management plans and alien invasive species control;
- Report writing;
- Equipment management;
- Technical assistant for fieldwork for the aquatics and wetland departments; and
- Specialist inputs to the above mention services.

EMPLOYMENT: Enviro-Insight (January 2015 – July 2017)

Desktop Ecological Assessment

Enviro-Insight assigned me to the role of general and field assistant. I assisted most specialists in field but also had administrative duties:

- The processing and uploading of several organisms to the ADU (Animal Demography Unit) virtual museum, which assists in obtaining spatial data concerning those species.
- Assisted with the generation of the companies' DNA database which distributes the DNA samples to the South African National Biodiversity Institute (SANBI).
- Assisted with field work involving all the different specialist work which includes mammalogy, herpetology and botany.

ADDITIONAL EXPERIENCE

<i>Compliance audits</i>	Conducting site investigations in order to determine the level of compliance attained, ensuring that the client maintains an appropriate measure of compliance with environmental regulations by means of a legislative approach
<i>Control officer</i>	Acting as an independent Environmental Control Officer (ECO), acting as a quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts
<i>Public consultation</i>	The provision of specialist input in order to communicate project findings as well as assist with providing feedback if and when required.
<i>Closure</i>	Primarily the review of closure projects, with emphasis on the closure cost calculations. Support was also provided by assisting with the measurements of structures during fieldwork.

ACADEMIC QUALIFICATIONS

B-Tech in Nature Conservation, Tshwane University of Technology, Pretoria, South Africa:

Title: The expansion of the distribution of *Xenopus muelleri*.

National Diploma in Nature Conservation , Tshwane University of Technology, Pretoria, South Africa

Andrew Husted

M.Sc Aquatic Health (*Pr Sci Nat*)

Cell: +27 81 319 1225

Email: andrew@thebiodiversitycompany.com

Identity Number: 7904195054081

Date of birth: 19 April 1979



Profile Summary

Working experience throughout South Africa, West and Central Africa and also Armenia.

Specialist experience with on-shore drilling, mining, engineering, hydropower and renewable energy.

Experience with project management of national and international multi-disciplinary projects. Including managing and compiling ESHIAs and EMPs

Specialist guidance, support and facilitation for the compliance with legislative processes, for in-country requirements, and international lenders.

Specialist expertise include Instream Flow and Ecological Water Requirements, aquatic ecology and wetlands resources.

Areas of Interest

Mining, Oil & Gas, Renewable Energy & Bulk Services
 Infrastructure Development,
 Sustainability and Conservation.

Key Experience

- Familiar with World Bank, Equator Principles and the International Finance Corporation requirements
- Environmental, Social and Health Impact Assessments (ESHIA)
- Environmental Management Programmes (EMP)
- Ecological Water Requirement determination experience
- Wetland delineations and ecological assessments
- Terrestrial Ecological Assessments
- Aquatic Ecological Assessments
- Rehabilitation Plans and Monitoring
- Aquaculture

Country Experience

Botswana, Cameroon
 Democratic Republic of Congo
 Ghana, Ivory Coast, Lesotho
 Liberia, Mali, Mozambique
 Nigeria, Republic of Armenia, Senegal
 Sierra Leone, South Africa
 Swaziland, Tanzania

Nationality

South African

Languages

English – Proficient

Afrikaans – Conversational

German - Basic

Qualifications

- MSc (University of Johannesburg) – Aquatic Health.
- BSc Honours (Rand Afrikaans University) – Aquatic Health
- BSc Natural Science
- Pr Sci Nat (400213/11)
- Certificate of Competence: Mondri Wetland Assessments
- Certificate of Competence: Wetland WET-Management
- SASS 5 (Expired) – Department of Water Affairs and Forestry for the River Health Programme
- EcoStatus application for rivers and streams

Publication of scientific journals
and articles.

SELECTED PROJECT EXPERIENCE

Project Name: The Environmental and Social Impact Assessment (ESIA) the proposed Nondvo Dam

Client: WSP

Personal position / role on project: Project Manager.

Location: Swaziland

Main project features: To conduct a dual season terrestrial and aquatic ecological baseline and impact assessment for the proposed dam. The study was required to meet national and IFC requirements, including a Critical Habitat assessment.

Project Name: The environmental flow assessment for the Mara River system

Client: IHE Delft Institute for Water Education

Personal position / role on project: Project Manager / Freshwater Ecologist

Location: Tanzania

Main project features: To conduct a dual season campaign to the Lower Mara River Basin in Tanzania to collect hydrological and ecological information as part of an environmental flow assessment on the Tanzanian side of the Mara River in collaboration with GIZ and NBI-NELSAP.

Project Name: The Environmental and Social Impact Assessment (ESIA) the proposed solar photovoltaic facility and transmission in Cuamba

Client: WSP

Personal position / role on project: Project Manager.

Location: Mozambique

Main project features: To conduct a single season terrestrial and aquatic ecological baseline and impact assessment for the proposed dam. The study was required to meet national and IFC requirements, including a Critical Habitat assessment.

Project Name: A biodiversity baseline assessment for the proposed Siguiri Gold Mine Project, in Kankan Province, Guinea.

Client: SRK Consulting.

Personal position / role on project: Project Manager.

Location: Siguiri, Guinea, West-Africa (2018).

Main project features: To conduct a dual season ecological baseline assessment for the expected impact footprint area. The study was required to meet national and IFC requirements, including a Critical Habitat assessment.

Project Name: A biodiversity baseline and impact assessment for the proposed Lesotho Bulk Water Supply Scheme, Lesotho.

Client: WSP.

Personal position / role on project: Wetland & Aquatic Ecologist, PROBFLO and Project Manager.

Location: Mophale's Hoek, Lesotho (2018).

Main project features: To conduct a dual season terrestrial and aquatic ecological baseline and impact assessment for the pipeline route and proposed weir. The study was required to meet national and IFC requirements, including a Critical Habitat assessment. The study also contributed to prescribing Instream Flow Requirements using PROBFLO for the system.

Project Name: A biodiversity baseline and impact assessment for the proposed Pavua Hydropower Project, in Sofala Province, Central Mozambique.

Client: Mott MacDonald.

Personal position / role on project: Project Manager.

Location: Sofala Province, Mozambique (2017).

Main project features: To conduct a dual season terrestrial and aquatic ecological baseline and impact assessment for the expected impact footprint area, including Gorongosa National. The study was required to meet national and IFC requirements, including a Critical Habitat assessment. The study also contributed to prescribing Instream Flow Requirements for the system.

EMPLOYMENT EXPERIENCE

CURRENT EMPLOYMENT: The Biodiversity Company (January 2015 – Present)

I founded The Biodiversity Company in 2015, now consisting of experienced ecologists who provide technical expertise and policy advice to numerous sectors, such as mining, agriculture, construction and natural resources. The team at The Biodiversity Company have conducted stand-alone specialist studies, and provided overall guidance of studies with a pragmatic approach for the management of biodiversity that takes into account all the relevant stakeholders, most importantly the environment that is potentially affected. We manage risks to the environment to reduce impacts with practical, relevant and measurable methods.

EMPLOYMENT: Digby Wells Environmental (October 2013 – December 2014)

Digby Wells assigned me to the role of Country Manager for the United Kingdom. This was a new endeavour for the company as the company's global footprint continues to increase. The primary responsibilities for the role included the following:

- **Client liaison** to be able to interact more efficiently and personally with current mining clients, mining industry service providers, legal firms and banking institutions in order to introduce Digby Wells as a services provider with the aim of securing work.
- **Project management** for international projects which may require a presence in the United Kingdom, this was dependent on the location and needs of the client. These projects would mostly be based on the Equator Principles (EP) and International Finance Corporation (IFC) Performance Standards.
- **Technical input** to provide specialist technical expertise for projects, this included fauna, aquatic ecology, wetlands and rehabilitation. Continued with the design and implementation of Biodiversity and Land Management Plans to assist clients with managing the natural

resources. Responsibilities also included the mentorship and management (including reviewing and guiding) other expertise such as flora, fauna and pedology.

EMPLOYMENT: Digby Wells Environmental (March 2012 – September 2013)

Manager of a multi-disciplinary department of scientists providing specialist services in support of national and international requirements as well as best practice guidelines, primarily focussing on the mining sector. In addition to managing the department, I was also expected to contribute specialist services, most notably focusing on water resources. Further responsibilities also included the management of numerous projects on a national or international scale. A general overview of the required responsibilities are as follows:

- **Project management** for single as well as multi-disciplinary studies on a national and international scale. This included legislation and commitments for the respective country being operated in, as well as included the World Bank (WB), EP and IFC requirements.
- **Individual and/or team management** in order to provide mentoring and supportive structures for development and growth in support of the company's strategic objectives.
- **Scientific report writing** to ensure that the relevant standards and requirements have been attained, namely local country legislation, as well as WB, EP and IFC requirements.
- **Report reviewing** in order to ensure compliance and consideration of relevant legislation and guidelines and also quality control.
- **Specialist management** to facilitate the collaboration and integration of specialist skills for the respective projects. This also included the development of Biodiversity and Land Management Plan for clients.
- **Client Resource Manager** for numerous clients in order to establish as well as maintain working relationships.

An overview of the tenure working with the company is provided below:

- **October 2013 – December 2014: London Operations Manager** – Deployed to establish a presence for the company (remote office) in the United Kingdom by means of generating project work to support the employment of staff and operation of a business structure.
- **March 2012 – September 2013: Biophysical Department Manager** – Responsible for the development and growth of the department to consist of four specialist units. This included the development of a new specialist unit, namely Rehabilitation.
- **January 2011 - February 2012: Ecological Unit Manager** – In addition to implementing aquatic and wetland specialist services, the role required the overall management of additional specialist services which included fauna & flora.
- **June 2010 - December 2010: Aquatic Services Manager** – This required the marketing and implementation of specialist programmes for the client base such as biomonitoring and wetland off-set strategies. In addition to this, this also included expanding on the existing skill set to include services such as toxicity, bioaccumulation and ecological flow assessments.
- **August 2008: Aquatic ecologist** – Employed as a specialist to establish the aquatic services within the company. In addition to this, wetland specialist services were added to the existing portfolio.

PREVIOUS EMPLOYMENT: Econ@UJ (University of Johannesburg)

- June 2007 – July 2008: Junior aquatic ecologist
 - Researcher
 - Technical assistant for fieldwork
 - Reporting writing
 - Project management

ADDITIONAL EXPERIENCE

<i>Compliance audits</i>	Conducting site investigations in order to determine the level of compliance attained, ensuring that the client maintains an appropriate measure of compliance with environmental regulations by means of a legislative approach
<i>Control officer</i>	Acting as an independent Environmental Control Officer (ECO), acting as a quality controller and monitoring agent regarding all environmental concerns and associated environmental impacts
<i>Screening studies</i>	Project investigations in order to determine the level of complexity for the environmental and social studies required for a project. This is a form of risk assessment to guide the advancement of the project.
<i>Public consultation</i>	The provision of specialist input in order to communicate project findings as well as assist with providing feedback if and when required.
<i>Water use licenses</i>	Consultation with the relevant authorities in order to establish the project requirements, as well as provide specialist (aquatics/wetland) input for the application in order to achieve authorisation.
<i>Closure</i>	Primarily the review of closure projects, with emphasis on the closure cost calculations. Support was also provided by assisting with the measurements of structures during fieldwork.
<i>Visual</i>	The review of visual studies as well as the collation of field data to be considered for the visual interpretation for the project.

ACADEMIC QUALIFICATIONS

University of Johannesburg, Johannesburg, South Africa (2009): MAGISTER SCIENTIAE (MSc)
- Aquatic Health:

Title: *Aspects of the biology of the Bushveld Smallscale Yellowfish (Labeobarbus polylepis): Feeding biology and metal bioaccumulation in five populations.*

Rand Afrikaans University (RAU), Johannesburg, South Africa (2004): BACCALAUREUS SCIENTIAE CUM HONORIBUS (Hons) – Zoology

Rand Afrikaans University (RAU), Johannesburg, South Africa (2001 - 2004): BACCALAUREUS SCIENTIAE IN NATURAL AND ENVIRONMENTAL SCIENCES. Majors: Zoology and Botany.

PUBLICATIONS

Mahomed D, Husted A, Fry C, Downs CT and O'Brien GC. 2019. Spatial shifts and habitat partitioning of ichthyofauna within the middle-lower region of the Pungwe Basin, Mozambique, *Journal of Freshwater Ecology*, 34:1, 685-702, DOI: 10.1080/02705060.2019.1673221

Tate RB and Husted, A. 2015. Aquatic Biomonitoring in the upper reaches of the Boesmanspruit, Carolina, Mpumalanga, South Africa. *African Journal of Aquatic Science*.

Desktop Ecological Assessment

Tate RB and Husted A. 2013. Bioaccumulation of metals in *Tilapia zillii* (Gervai, 1848) from an impoundment on the Badeni River, Cote D'Ivoire. African Journal of Aquatic Science.

O'Brien GC, Bulfin JB, Husted A. and Smit NJ. 2012. Comparative behavioural assessment of an established and new Tigerfish (*Hydrocynus vittatus*) population in two manmade lakes in the Limpopo catchment, Southern Africa. African Journal of Aquatic Science.

Tomschi, H, Husted, A, O'Brien, GC, Cloete, Y, Van Dyk C, Pieterse GM, Wepener V, Nel A and Reisinger U. 2009. Environmental study to establish the baseline biological and physical conditions of the Letsibogo Dam near Selebi Phikwe, Botswana. EC Multiple Framework Contract Beneficiaries.8 ACP BT 13 – Mining Sector (EDMS). Specific Contract N° 2008/166788. Beneficiary Country: Botswana. By: HPC HARRESS PICKEL CONSULT AG

Husted A. 2009. Aspects of the biology of the Bushveld Smallscale Yellowfish (*Labeobarbus polylepis*): Feeding biology and metal bioaccumulation in five populations. The University of Johannesburg (Thesis).
