

Final Scoping Report

The Proposed Establishment of an Aquaculture Development Zone in Amatikulu, Kwazulu-Natal



Prepared by:



August 2018

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FOREWORD

This report constitutes the Final Scoping Report and has been circulated digitally for Stakeholder information.

NuLeaf Planning and Environmental would like to thank all Stakeholders for their participation and input into this process to date.

All written comments received, including NuLeaf's response to each, have been captured in a Comments and Responses Register.

Please mark all future comments for the attention of:

Bryony van Niekerk

Email: bryony@nuleafsa.co.za

Tel: (012) 753 5792

Fax: (086) 571 6292

PUBLIC MEETING

Two public meetings were held on Tuesday, 24 July 2018:

- Tribal Authority at 10 am on 24 July 2018
- Mtunzini Country Club at 17:00 pm on 24 July 2018

ACRONYMS AND ABBREVIATIONS

CBA	Critical Biodiversity Area
CMP	Construction Management Programme
DWS	South African National Department of Water and Sanitation
EA	Environmental Authorisation
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report
EMPr	Environmental Management Programme
EMS	Environmental Management System
EO	Environmental Officer
S&EIR	Full Scoping and Environmental Impact Report
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
LED	Local Economic Development
NEMA	National Environmental Management Act, Act No. 107 of 1998
NEMPAA	National Environmental Management: Protected Areas Act, Act No. 57 of 2003
NPAES	National Protected Area Expansion Strategy
OMP	Operational Management Programme
SAHRA	South African Heritage Resources Agency

GLOSSARY OF TERMS

Alien Vegetation:	Alien vegetation is defined as undesirable plant growth which shall include, but not be limited to all declared category 1 and 2 listed invader species as set out in the Invasive Plants Species list in terms of the Conservation of Agricultural Resources Act (CARA) and plants in the lists associated with the Alien and Invasive Species (AIS) Regulations.
Alien Species:	A plant or animal species introduced from elsewhere: neither endemic nor indigenous.
Alternatives:	<p>In relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to:</p> <ul style="list-style-type: none">(a) The property on which or location where it is proposed to undertake the activity;(b) The type of activity to be undertaken;(c) The design or layout of activity;(d) The technology to be used in the activity; and(e) The operational aspects of the activity
Applicant:	Any person who applies for an authorization to undertake an activity or to cause such activity to be undertaken as contemplated in the National Environmental Management Act 107 of 1998, as amended, and the Environmental Impact Assessment Regulations of 2014 (as amended 2017).
Buffer zone:	Is a collar of land that filters out inappropriate influences from surrounding activities, also known as edge effects, including the effects of invasive plant and animal species, physical damage and soil compaction caused by trampling and harvesting, abiotic habitat alterations and pollution. Buffer zones can also provide more landscape needed for ecological processes, such as fire.
Construction Activity:	Any action taken by the Contractor, his subcontractors, suppliers or personnel during the construction process.
Ecology:	The inter relationships between organisms and their environments.
Environment:	All physical, chemical and biological factors and conditions that influence an object and/or organism.
Environmental Impact:	An Impact or Environmental Impact is the degree of change to the environment, whether desirable or undesirable, that will result from the effect of a defined activity. An Impact may be the direct or indirect consequence of the activity and may be simple or cumulative in nature.
Environmental Impact Assessment:	Assessment of the effects of a development on the environment.
Environmental Management Programme:	A legally binding working document, which stipulates environmental and socio-economic mitigation measures that, must be implemented by several responsible parties throughout the duration of the proposed project.

Indigenous:	Means a species that occurs, or has historically occurred, naturally in a free state within the borders of South Africa. Species that have been introduced to South Africa as a result of human activity are excluded (National Environmental Management: Biodiversity Act, 2004: Chapter 1).
Interested and Affected Party:	Any person, group of persons or organization interested in or affected by an activity contemplated in an application, or any organ of state that may have jurisdiction over any aspect of the activity.
Invasive vegetation:	Plant species that show the potential to occupy in unnatural numbers, any area, including pioneer species.
Mitigate:	The implementation of practical measures to reduce adverse impacts
Public Participation Process:	Is a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters.
Public Participation:	The legislated process contemplated in terms GN 982 of 2014 and amended in 2017 by GN 326, in which all potential interested and affected parties are informed of the proposed project and afforded the opportunity to input, comment and object.
Road Reserve:	The road reserve is a corridor of land, defined by co-ordinates and proclamation, within which the road, including access intersections or interchanges, is situated. A road reserve may, or may not, be bounded by a fence.
Road Width:	The area within the Road Reserve including all areas beyond the Road Reserve that are affected by the continuous presence of the road i.e. the verge.
Red data plant species:	All fauna and flora species that require environmental protection based on the International Union for Conservation of Nature (IUCN) categories and criteria.
Soil Compaction:	Mechanically increasing the density of the soil, through vehicle passage or any other type of loading. Wet soils compact easier than moist or dry soils.
Species:	Means a kind of animal, plant or other organism that does not normally interbreed with individuals of another kind. The term "species" include any sub-species, cultivar, variety, geographic race, strain, hybrid or geographically separate population (National Environmental Management: Biodiversity Act, 2004: Chapter 1).
The Contractor:	The contractor, as the developer's agent on site, is bound by the Environmental Authorisation (EA) and EMPr conditions through his/her contract with the developer and is responsible for ensuring that conditions of the EMPr and EA are strictly adhered to at all times. The contractor must comply with all orders (whether verbal or written) given by the ECO, project manager or site agent in terms of the EMPr.
The Developer:	Remains ultimately responsible for ensuring that the development is implemented according to the requirements of the EMPr and the conditions of the Environmental Decision throughout all phases of the project.

The Environmental Control Officer (ECO): The ECO is appointed by the developer as an independent monitor of the implementation of the EMPr i.e. independent of the developer and contractor.

The Environmental Officer (EO): A nominated representative of the Contractor to assist with day to day monitoring of the construction activities for the contract.

Vegetation: Is a collective word for plants occurring in an area.

Watercourse: A river or spring; a natural channel in which water flows regularly or intermittently; a wetland, lake or dam into which, or from which, water flows; and any collection of water which the Minister may by notice in the Government Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks" (National Water Act 36 of 1998).

EXECUTIVE SUMMARY

INTRODUCTION

An ADZ is an area that has been earmarked specifically for aquaculture activity. The development of ADZ's supports the National Aquaculture Policy Framework for South Africa (2013), aimed at creating an enabling environment that will promote growth and sustainability of the marine aquaculture sector in South Africa, as well as to enhance the industry's contribution to economic growth.

NuLeaf Planning and Environmental have been appointed by DAFF as an independent environmental assessment practitioner (EAP) to undertake the Full Scoping and Environmental Impact Report (S&EIR).

The main outcomes of the scoping report are to:

- Identify the relevant policies and legislation
- Motivate for the need and desirability for the proposed project
- Identify and confirm the preferred activity and technology alternative through the identification of impacts and risks
- Identify key issues associated with the proposed activity
- Identify mitigation measures to avoid, reduce or minimize identified impacts

PROPOSED ACTIVITY

The proposed development site is situated in the Mandeni Local Municipality which falls under the iLembe District Municipality in KwaZulu-Natal province, approximately 120 km north of Durban.

The site is approximately 108.37 Ha in size and was previously utilized as an ornamental fish and aquatic plant farm, as well as for the farming of prawns. Majority of this infrastructure is now in a state of disrepair; however, the following operations are currently being undertaken on site:

- Amatikulu Pet Products which consists of an administrative building and a factory facility that manufactures pet products, as well as a pack house and storeroom.
- Amatikulu Aquarium Plants, which consists of a hatchery, workshop, and several tunnels and water supply infrastructure for ornamental fish and aquatic plants.
- A water treatment facility.

The proposed development entails the establishment of an Aquaculture Development Zone (ADZ) to the north east of the Amatikulu estuary in KwaZulu-Natal. The ADZ will entail the establishment of aquaculture facilities that will be used for the farming of a range of species, which could include Dusky Kob, Barramundi, Scallops, Sea Cucumbers, marine and freshwater Ornamental Fish and Ornamental Plants, Tilapia, Catfish and Nile Crocodile.

Phase 1 will comprise the refurbishment of earthen ponds and tunnel-based tank systems that were historically used for Prawn and Ornamental Fish culture (activities will include the installation of water supply for farming, a facility to grow fingerlings, construction of a feed store, other storage facilities and offices). Phase 2 will entail the extension of the aquaculture facilities and the installation of civil infrastructure that will allow for the establishment of a range of production systems for a range of species. Infrastructure for the ADZ will include administration buildings, storage areas, fish processing and packaging facilities, access roads, electricity and water reticulation, sea water supply and discharge, pump stations, reservoirs and fencing.

Potable water and domestic sewage

Potable water will be sourced via three (3) boreholes that are currently utilized on site. Water abstracted from these boreholes will be pumped to a fresh water treatment facility. One (1) water storage tank has been allowed for. A package plant and a constructed wetland are recommended for treatment of domestic sewage. The final treated effluent may be used for irrigation on site.

Aquaculture: Freshwater Supply and discharge

Fresh water will be supplied to the fresh water tunnels via the three (3) boreholes currently operated on site. Fresh water will be pumped from the boreholes to an elevated water storage tank and from there distributed within a gravity network. For the fresh water drainage emanating from the aquaculture fresh water tunnels, it is proposed that a drum screen and bio filter combination be used to treat the effluent before it is discharged into the ocean or estuary.

Aquaculture: Sea water supply and discharge

Two (2) options are being investigated and proposed for the abstraction of sea water, one abstraction point from the ocean and one from the estuary. Two (2) points are being proposed to provide flexibility and options to the developer. The final point of abstraction will have to be determined following the outcome of a feasibility study. The sea water will be stored in an elevated water storage facility (allowing for 5 days storage) which will then be distributed to the relevant supply points via a gravity network.

For the sea water drainage emanating from the aquaculture marine tunnels, it is proposed that a drum screen and bio filter combination be used to treat the effluent before it is discharged into the ocean. A separate facility for fresh water and seawater effluent treatment is allowed for, although the proposal is for both facilities to discharge in one pipe into the sea.

FEASIBLE AND REASONABLE ALTERNATIVES

No site alternatives have been identified or evaluated for the proposed project.

The preferred site is predominately a brownfields/ disturbed site which was previously used as a prawn and ornamental fish farm. Most of these old ponds are now in a state of disrepair, however certain operations are still currently being undertaken on the site, namely, Amatikulu Aquarium plants which makes use of some of the old tunnels and hatcheries, Amatikulu Pet Products and a water treatment facility. The site is situated adjacent to the Amatikulu Estuary and Nature Reserve.

No other site alternatives are being considered for the establishment of an aquaculture zone due to the nature of the project. A range of species and production systems alternatives will however be employed.

PUBLIC PARTICIPATION

Public participation forms an integral part of the Environmental Impact Assessment (EIA) process. As per section 41 of the EIA Regulations (GN 982 of 2014 and amended in 2017 by GN 326), the following was undertaken:

- A list of Interested and Affected Parties (I&APs), as well as, authorities was compiled
- Written notification of the proposed development, including a background information document, was sent to all identified I&APs and authorities on 15 August 2017
- A printed advertisement was placed in the Zululand Observer, a local publication, on 18 August 2017
- Notice boards were placed at the main entrance to the property and in the surrounding area on 11 August 2017
- Pre-application meetings were held with the Competent Authorities (DEA, Provincial Authorities etc.) on 5th March 2018 in Cape Town and on 12 March 2018 in KZN.

The public participation process will continue throughout the EIA where I&APs will be invited to comment on both the draft scoping report and the environmental impact report. Additionally, public meetings will be held as and when necessary.

AREA/PROPERTY DESCRIPTION

Hydrology

The proposed site contains two (2) National Freshwater Ecosystem Priority Areas (NFEPA) wetlands, namely an unchanneled valley-bottom wetland located in the centre of the site and the Amatikulu Estuary located south of the site.

The Matikulu and Nyoni Rivers join approximately 5 km south west of the site to form the Matikulu Estuary (also referred to in this document as the Amatikulu Estuary). This Estuary is classified as permanently open even though it is frequently closed off from the ocean. The ecosystem threat status of the Matikulu/Nyoni Estuary is Least Threatened and is considered to have a Category B classification- largely natural with few modifications.

Wetlands

The only "true" wetland environment that can be identified within the subject area lies within the drainage line to the west of the ADZ and parallel to the access road to the present aquaculture facility. Three valley head wetland seep systems arise from the Pleistocene dune form to the lee of the ADZ and serve a small, channelled valley bottom system that flows parallel to the shore towards the Amatikulu estuary.

Biodiversity

The site does not lie within any threatened ecosystems, however, a small corner of the site in the far north encroaches into the Eshowe Mtunzini Hilly Grasslands which are classified as critically endangered.

Three (3) vegetation types are found within the proposed site: Subtropical Alluvial vegetation is found in the centre of the site covering the wetland area, Subtropical Dune Thicket covers the southern boundary of the site, while Maputaland Coastal Belt vegetation covers the northern portion of the site. Subtropical Alluvial vegetation and Maputaland Coastal Belt vegetation have a provincial conservation status of Endangered, while Subtropical Dune Thicket has a conservation status of Least Threatened.

According to the KZN 2016 CBA layer, the site lies within a CBA: Irreplaceable and an Ecological Support Area (ESA), with the exception of the portions of the site where infrastructure is located. The site is also located within a critical linkage landscape corridor known as the Tugela Corridor.

1. INTRODUCTION

The National Department of Agriculture, Forestry and Fisheries (DAFF) is proposing the establishment of an aquaculture development zone (ADZ) in Amatikulu.

An ADZ is an area that has been earmarked specifically for aquaculture activity. The development of ADZs supports the National Aquaculture Policy Framework for South Africa (2013), aimed at creating an enabling environment that will promote growth and sustainability of the marine aquaculture sector in South Africa, as well as to enhance the industry's contribution to economic growth.

The overall intention of the proposed project is to provide an aquaculture development area that is ready for investment opportunities.

In accordance with the Environmental Impact Assessment Regulations, 2014 (as amended in April 2017) in terms of sections 24(5) and 44 of the National Environmental Management Act, 1998 (Act No 107 of 1998) a Full Scoping and Environmental Impact Assessment process is required for the proposed establishment of the aquaculture development zone in Amatikulu. NuLeaf Planning and Environmental have been appointed by the National Department of Agriculture, Forestry and Fisheries to undertake and facilitate the process to obtain environmental authorization.

This document constitutes the Final scoping report for the proposed project.

1.1. Applicant Information

Company/entity name:	National Department of Agriculture, Forestry and Fisheries (DAFF)
Representative:	Mrs Zimasa Jika
Responsible position, e.g. Director, CEO, etc.	Director (Acting): Sustainable Aquaculture Management
Physical Address:	Foretrust Building, Martin Hammerslag Way, Foreshore, Cape Town
Postal Address:	Private Bag x2 Vlaeberg, 8018
Contact number:	021 402 3116
Email address:	ZimasaJ@daff.gov.za

1.2. Environmental Assessment Practitioner

NuLeaf Planning and Environmental have been appointed by DAFF as an independent environmental assessment practitioner (EAP) to undertake the Full Scoping and Environmental Impact Report (S&EIR).

NuLeaf Planning and Environmental (Pty) Ltd is a multidisciplinary company specialising in environmental, landscape and tourism service provision. Based in Pretoria, Gauteng, the company is able to work on projects within South Africa and further afield. This unique combination of expertise allows NuLeaf to offer integrated and sustainable solutions to support planners, developers and decision makers in both Government and the Private Sector.

NuLeaf's environmental scope includes Environmental Planning, Management and Impact Assessment, but due to the integrated nature thereof, a combination of these is often required. More specialised services include Integrated Management Planning, Visual Impact Assessments and Bioregional Planning.

Company/entity name:	NuLeaf Planning and Environmental
Contact person:	Etienne Hinrichsen

Physical Address:	Office 231, Building 8, CSIR Campus, Meiring Naude Road, Brummeria, 0184
Postal Address:	8A Trevor Street, Murrayfield. 0184
Contact number:	082 822 1236
Email address:	etienne@aquaeco.co.za
Affiliations:	South African Council for Natural Scientific Professionals (SACNASP), International Association of Impact Assessors (IAIA), Aquaculture Association of Southern Africa
Qualifications:	BSc.Agric (Majors in Animal Physiology, Animal Genetics & Conservation Management), M.Phil (Aquaculture)

Refer to Appendix A for the curriculum vitae of the EAP.

1.3. Objective of the scoping report

The Full Scoping and Environmental Impact Report process provided for in Regulations 21 and 23 read with Appendices 2 and 3 of GN R326 of the EIA Regulations, 2017, published under NEMA have been followed in the preparation of this report. The main objectives of the scoping report are to:

- Identify Interested and Affected Parties (I&AP's)
- Registration of I&AP's
- Identify the relevant policies and legislation
- Motivate for the need and desirability of the proposed project
- Identify and confirm the preferred activity and technology alternative through the identification of impacts and risks
- Identify key issues associated with the proposed activity
- Identify mitigation measures to avoid, reduce or minimize identified impacts

1.4. S&EIR Process

The full scoping and environmental impact report will be undertaken for the proposed activity and can be divided into three (3) phases, namely, Application phase, Scoping phase and the Environmental Impact Report phase.

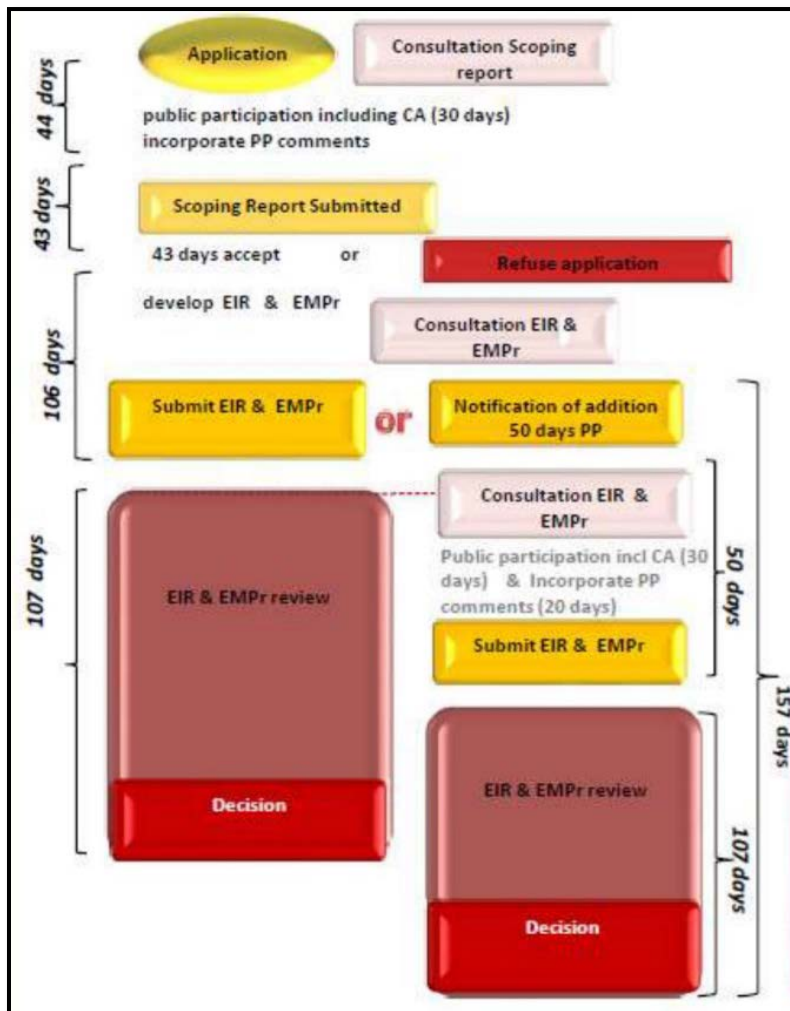


Figure 1: Full scoping and environmental impact report process

1.5. Scoping Report Compliance Checklist

Appendix 2 of the Environmental Impact Assessment Regulations, 2014 (as amended in April 2017) details the contents that must be contained in a Scoping Report.

The table below details these requirements and refers the reader to relevant pages where specific information can be found for ease of reference.

Table 1: EIA Requirements

EIA Regulations, 2014 Requirements	Page Reference
(a) details of-	
(i) the EAP who prepared the report; and	Section 1.2
(ii) the expertise of the EAP, including a curriculum vitae;	Appendix A
(b) the location of the activity, including-	
(i) the 21 digit Surveyor General code of each cadastral land parcel;	N/A
(ii) where available, the physical address and farm name;	N/A
(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 2.1
(c) a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	Figure 2, Figure 4 and Appendix D
(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	

(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	
(d) a description of the scope of the proposed activity, including-	
(i) all listed and specified activities triggered;	Section 2.3
(ii) a description of the activities to be undertaken, including structures and infrastructure;	Section 2.2
(e) a description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	Section 2.4
(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 2.5
(h) a full description of the process followed to reach the proposed preferred activity, site and location within the site, including -	
(i) details of all the alternatives considered	Section 3
(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 6.3 and Appendix B
(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	Appendix B
(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 4
(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Section 5
(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 5.1
(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 5
(viii) the possible mitigation measures that could be applied and level of residual risk;	Section 5
(ix) the outcome of the site selection matrix;	N/A
(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	Section 3.1
(x) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 7
(i) a plan of study for undertaking the environmental impact assessment process to be undertaken, including -	Section 6
(i) a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	Section 3

(ii) a description of the aspects to be assessed as part of the environmental impact assessment process;	Section 6
(iii) aspects to be assessed by specialists;	Section 6.2
(iv) a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;	Section 5.1
(v) a description of the proposed method of assessing duration and significance;	Section 5.1
(vi) an indication of the stages at which the competent authority will be consulted;	Section 6.3
(vii) particulars of the public participation process that will be conducted during the environmental impact assessment process; and	Section 6.3
(viii) a description of the tasks that will be undertaken as part of the environmental impact assessment process;	Section 6
(ix) identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	Section 5.2
(j) an undertaking under oath or affirmation by the EAP in relation to-	Appendix E
(i) the correctness of the information provided in the report;	
(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	
(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(k) an undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	Appendix E
(l) where applicable, any specific information that may be required by the competent authority and	N/A
(m) any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

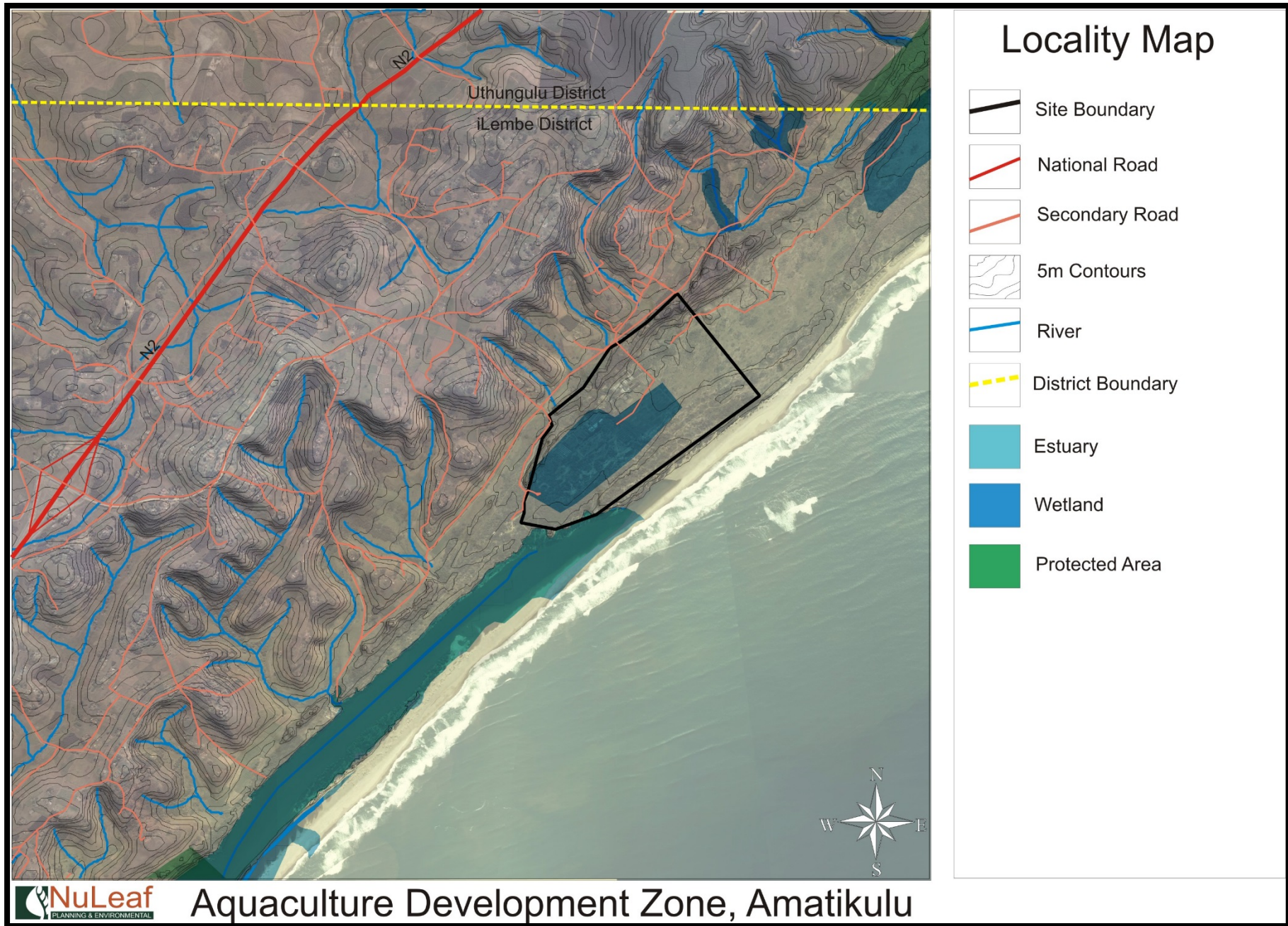
2. PROPOSED ACTIVITY

2.1. Location

The proposed development site is situated in the Mandeni Local Municipality which falls under the iLembe District Municipality in KwaZulu-Natal province, approximately 120 km north of Durban. The site has an area of approximately 108.37 Ha in size and is situated north east from the Amatikulu estuary and is characterized by a low lying estuarine coastal zone with tropical vegetation and predominantly sandy substrate. Refer to Map 1 and Appendix D.

The coordinate points for the corners of the proposed property are:

	Latitude	Longitude
North East point	29° 3'56.82"S	31° 39'7.92"E
Eastern point	29° 4'18.87"S	31° 39'25.09"E
Southern point	29° 4'45.81"S	31° 38'49.89"E
South West point	29° 4'47.29"S	31° 38'33.05"E
North West point	29° 4'22.98"S	31° 38'39.69"E



Map 1: Locality

2.2. Description of the proposed activity

An ADZ is an area that has been earmarked specifically for aquaculture activity. The purpose of an ADZ is to encourage investor and consumer confidence, create incentives for industry development, provide aquaculture services, manage risk associated with aquaculture, as well as to provide skills development and employment for coastal communities. The development of ADZ's supports the Aquaculture Policy Framework objectives, aimed at creating an enabling environment that will promote growth and sustainability of the aquaculture sector in South Africa, as well as to enhance the industry's contribution to economic growth.

The proposed site in Amatikulu has been selected by DAFF to establish an ADZ.

The site is approximately 108.37 Ha in size and was previously utilized as an ornamental fish and aquatic plant farm, as well as for the farming of prawns. Majority of this infrastructure is now in a state of disrepair; however, the following operations are currently being undertaken on site:

- Amatikulu Pet Products, which consists of an administrative building and a factory facility that manufactures pet products, as well as a pack house and storeroom.
- Amatikulu Aquarium Plants, which consists of a hatchery, workshop, and a number of tunnels and water supply infrastructure for ornamental fish and aquatic plants.
- A water treatment facility.

The proposed development entails the establishment of an Aquaculture Development Zone (ADZ) to the north east of the Amatikulu estuary in KwaZulu-Natal. The ADZ will entail the establishment of aquaculture facilities that will be used for the farming of a range of species, which could include Dusky Kob, Barramundi, Scallops, Sea Cucumbers, marine and freshwater Ornamental Fish and Ornamental Plants, Tilapia, Catfish and Nile Crocodile. The layout has been detailed in the attached concept design report in Appendix D.

Phase 1 will comprise the refurbishment of earthen ponds and tunnel-based tank systems that were historically used for Prawn and Ornamental Fish culture (activities will include the installation of water supply for farming, a facility to grow fingerlings, construction of a feed store, other storage facilities and offices).

Phase 2 will entail the extension of the aquaculture facilities and the installation of civil infrastructure that will allow for the establishment of a range of production systems for a range of species. Infrastructure for the ADZ will include administration buildings, storage areas, fish processing and packaging facilities, access roads, electricity and water reticulation, sea water supply and discharge, pump stations, reservoirs and fencing.

Potable water

There are three (3) boreholes on the proposed site that are currently in use. Two (2) are located in the north western portion of the site, behind the existing offices and one (1) near the centre of the site where the existing ornamental fish tunnels are situated. Water abstracted from these boreholes will be pumped to a fresh water treatment facility. One (1) water storage tank has been allowed for, totalling 5 days water demand. The table below details the potable water demand calculated.

Table 2: Potable water demand calculations

J1876 - Amatikulu Potable Water Demand					
Description	Unit	Demand	Population	kl/day	l/s
Factory Demand	m ³ /day	30.0	1	30.0	0.69
Factory Workers	l/person/day	100.0	500	50.0	1.16
Offices/shops	l/person/day	100.0	10	1.0	0.03
Average Annual Daily Demand (AADD)				81.0	1.89

Water losses @10% of daily demand				8.1	0.2
Sub-total (incl. water losses)				89.1	2.1
Seasonal Peak Factor				1.5	1.5
Daily Peak Factor				2.4	2.4
Sub-total (incl. PF)				320.76	7.47
Instantaneous Peak				4.00	4.00
Total Demand				1283.04	29.88

Sewage

Preliminary demand calculations were done to determine the expected domestic sewage generation. The total domestic sewerage generated is calculated to be 228.2 Kl/day based on approximately 510 staff members. Owing to the fairly small sewer flow generated, a package plant and a constructed wetland are recommended. The final treated effluent may be used for irrigation on site.

Table 3: Domestic Sewage demand calculations

J1876 - Amatikulu Domestic Sewerage					
Description	Unit	Demand	Population	kl/day	l/s
Factory Demand	m ³ /day	21.0	1	21.0	0.49
Factory Workers	l/person/d	70.0	500	35.0	0.81
Offices/shops	l/person/d	70.0	10	0.7	0.02
Average Dry Weather Flow (ADWF)				56.7	1.32
Peak Factor				3.5	3.5
Peak Dry Weather Flow (PDWF)				198.5	4.6
15% Allowance for Extraneous Flow				29.77	0.69
Peak Wet Weather Flow (PWWF)				228.2	5.3

Aquaculture: Freshwater Supply and discharge

Fresh water will be supplied to the fresh water tunnels via the three (3) boreholes currently operated on site. Fresh water will be pumped from the boreholes to two (2) elevated storage tanks each capable of holding 2500 cubic meters of water, and from there distributed within a gravity network. A pipeline of 1210 m will be constructed to transport the fresh water from the boreholes to the treatment facility/ storage tanks. From there a 250 mm pipeline of approximately 1235 m in length will be constructed to transport fresh water from the treatment facility/ water storage tanks to the supply points at the fresh water tunnels.

Table 4: Fresh water aquaculture demand calculations

J1876 - Amatikulu Fresh Water Aquaculture Demand					
Description	Unit	Demand	Population	kl/day	l/s
Fresh Water Aqua culture	m ³ /day	3 000.0	1	3 000.0	69.44
Average Annual Daily Demand (AADD)				3 000.0	69.4
Water losses @10% of daily demand				300.0	6.9
Sub-total (incl. water losses)				3 300.0	76.4
Seasonal Peak Factor				1	1

Daily Peak Factor				1	1
Sub-total (incl. PF)				3300.00	76.39
Instantaneous Peak				1.00	1.00
Total Demand				3300.00	76.39

For the fresh water drainage emanating from the aquaculture fresh water tunnels, a 355 mm diameter pipeline of approximately 1940 m was allowed for. The pipeline will run parallel to the fresh water tunnels located to the north of the site and run to the fresh water treatment works located in the west of the site. Preliminary calculations were done to determine the quantity of effluent generated. Based on the small flows generated, it is proposed that a drum screen and bio filter combination be used to treat the effluent before it is discharged into the ocean or estuary. A 500 m length pipeline has been allowed for from the treatment facility to the ocean. A separate facility for fresh water and seawater effluent treatment was allowed for, although the proposal is for both facilities to discharge in one pipe into the sea or estuary.

Table 5: Fresh water aquaculture effluent demand calculations

J1876 - Amatikulu Fresh Water Aquaculture Effluent					
Description	Unit	Demand	Population	kl/day	l/s
Fresh Water Aqua Effluent	m ³ /day	2 400.0	1	2 400.0	55.56
Average Dry Weather Flow (ADWF)				2 400.0	55.56
Peak Factor				1.0	1.0
Peak Dry Weather Flow (PDWF)				2 400.0	55.6
15% Allowance for Extraneous Flow				276.00	8.33
Peak Wet Weather Flow (PWWF)				2 676.0	63.9

Aquaculture: Sea water supply and discharge

Two (2) options are being investigated and proposed for the abstraction of sea water, one abstraction point from the ocean and one from the estuary. Two (2) points are being proposed to provide flexibility and options to the developer. The final point of abstraction will have to be determined following the outcome of a feasibility study.

A total of 5800 m of pipeline has been allowed for, for the abstraction of sea water. This includes abstraction from both the ocean and the estuary. The sea water will be stored in four (4) elevated water storage tanks of 2500 cubic meters each (allowing for 5 days storage), which will then be distributed to the relevant supply points via a gravity network.

Preliminary sea water calculation demands were done as detailed in the table below

Table 6: Sea water calculation demands

J1876 - Amatikulu Sea Water Aquaculture Demand					
Description	Unit	Demand	Population	kl/day	l/s
Sea Water Aqua culture	m ³ /day	3 000.0	1	3 000.0	69.44
Average Annual Daily Demand (AADD)				3 000.0	69.4
Water losses @10% of daily demand				300.0	6.9
Sub-total (incl. water losses)				3 300.0	76.4

Seasonal Peak Factor				1	1
Daily Peak Factor				1	1
Sub-total (incl. PF)				3300.00	76.39
Instantaneous Peak				1.00	1.00
Total Demand				3300.00	76.39

For the sea water drainage emanating from the aquaculture marine tunnels, a 355 mm diameter pipe of approximately 1345 m has been allowed for. The pipeline will run parallel to the marine tunnels and run to the sea water treatment works located in the west of the site. Preliminary calculations were done to determine the quantity of effluent generated. Based on the small flows generated, it is proposed that a drum screen and bio filter combination be used to treat the effluent before it is discharged into the ocean. A 500 m length pipeline has been allowed for from the treatment facility to the ocean. A separate facility for fresh water and seawater effluent treatment was allowed for, although the proposal is for both facilities to discharge in one pipe into the sea or estuary.

Table 7: Sea water aquaculture effluent demand

J1876 - Amatikulu Sea Water Aquaculture Effluent					
Description	Unit	Demand	Population	kl/day	l/s
Sea Water Aqua Effluent	m ³ /day	2 400.0	1	2 400.0	55.56
Average Dry Weather Flow (ADWF)				2 400.0	55.56
Peak Factor				1.0	1.0
Peak Dry Weather Flow (PDWF)				2 400.0	55.6
15% Allowance for Extraneous Flow				276.00	8.33
Peak Wet Weather Flow (PWWF)				2 676.0	63.9

Roads

Gravel roads, 5 m wide will be constructed throughout the site totalling an area of 37 650 m² (3,77 Ha). A paved parking area, approximately 2245 m² (0,22 Ha) in size is proposed just north of the current office building.

Electrical Reticulation

The existing Eskom lines on the property will be extended to service the proposed development.

2.3. Detailed description of the listed activities associated with the proposed development as applied for

Table 8: Listed activities potentially triggered by the proposed development

Activity Number (s) (in terms of the relevant Listing Notice):	Description of each listed activity as per the detailed project description	Description relevant to the project
Listing Notice 1: GN R 327		

3 (iii)	The development and related operation of facilities or infrastructure for the slaughter of animals with (iii) wet weight product throughput of fish, crustaceans or amphibians exceeding 20 000 kg per annum	Although the aquaculture development zone will initially focus on primary production only, a central service are will provide slaughtering and processing facilities for farmed animals.
4 (iii)	The development and related operations of facilities or infrastructure for the concentration of animals for the purpose of commercial production in densities that exceed (iii) 30 square meters per crocodile at any level of production and more than 20 crocodiles per facility	Nile crocodiles have been identified as a species to be farmed in the aquaculture development zone.
6 (i) (ii) (iii)	Development and related operation of facilities, infrastructure or structures for aquaculture of (i) finfish, reptiles or amphibians, where such a facility, infrastructure or structures will have a production output exceeding 20 000 Kg per annum, (ii) molluscs and echinoderms exceeding 30 000 Kg per annum and (iii) aquatic plants where such a facility, infrastructure or structures will have a production output exceeding 60 000 kg per annum (wet weight)	The aquaculture development zone will consist of a cluster development that includes a range of aquaculture species. More than 20 000 kg of finfish, reptiles (possibly crocodiles) and other suitable species will be farmed per annum.
9 (i) (ii)	The development of infrastructure exceeding 1000 m in length for the bulk transportation of water or storm water (i) internal diameter of 0,36 m or more or (ii) peak throughput of 120 liters per second or more	Pipelines will be constructed and operated to abstract seawater and to discharge waste water into the ocean. All of these pipelines will have a combined length of 14 700 m. The internal diameter of the fresh water and marine water drainage pipes will be 0,36 m.
10 (i) (ii)	The development and related operation of infrastructure exceeding 1000 meters in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slime under the assumption of : (i) Structure with an internal diameter of 0,36 meters or more; (ii) With peak throughput of 120 liters per second or more	Pipelines will be constructed and operated to abstract seawater and to discharge waste water into the ocean. All of these pipelines will have a combined length of 14 700 m. The internal diameter of the fresh water and marine water drainage pipes will be 0,36 m.
12 (i) (ii) (iii) (iv) (v) (vi) (x) (xi) (xii); (a) (c)	The development of (i) canals (ii) channels (iii) bridges (iv) dams (v) weirs (vi) bulk storm water (x) buildings (xi) boardwalks (xii) infrastructure where all exceed 100 square meters in size	Sea water abstraction pipelines will be located within 32 meters of the ocean and estuary.

	where such development occurs within (a) a watercourse (c) within 32 meters of a watercourse	
13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic meters or more	It is envisaged that the aquaculture development zone will hold at least 15 000 cubic meters of water in reserve reservoirs. This design volume has been calculated as being adequate for a 20% recharge of the entire facility, meaning the production facilities could hold as much as an additional 75 000 cubic meters. The total standing volume, although split between a multitude of systems could therefore be as high as 90 000 cubic meters.
15	The development of structures in the coastal public property where the development footprint is bigger than 50 square meters	The seawater abstraction pipeline and the waste water discharge pipeline start and end in the ocean respectively. They will run from the facility, through the dunes and the beach.
17 (i) (ii) (iii) (v) (e) (f)	Development (i) in the sea, (ii) in an estuary (iii) littoral active zone, (v) within a distance of 100 m inland of the high water mark of the sea or estuary in respect of (e) buildings of 50 square meters or more, or (f) infrastructure or structures with a development footprint of 50 square meters or more	The seawater abstraction pipeline and the waste water discharge pipeline start and end in the ocean respectively. They will run from the facility, through the dunes and the beach.
18	The planting of vegetation or placing of any material on dunes or exposed sand surfaces of more than 10 square meters, within the littoral active zone for the purpose of preventing the free movement of sand, erosion or accretion	During the rehabilitation process after construction has occurred, dunes will be revegetated as per the requirements in the EMPr.
19 (i) (ii) (iii)	The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic meters from (i) a watercourse (ii) the seashore (iii) the littoral active zone, an estuary or a distance of 100 m inland of the high-water mark of the sea or estuary	Sand from the pristine primary sand dunes will be removed during the installation of the seawater abstraction pipeline located to the east of the site. Another sea water abstraction pipeline is proposed in the estuary as well.
19A (i) (ii) (iii)	The infilling or depositing of any material of more than 5 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 5 cubic meters from (i) a watercourse (ii) the	Sand from the pristine primary sand dunes will be removed during the installation of the seawater abstraction pipeline located to the east of the site. Another sea water

	seashore (iii) the littoral active zone, an estuary or a distance of 100 m inland of the high-water mark of the sea or estuary	abstraction pipeline is proposed in the estuary as well.
25	The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2000 cubic meters but less than 15 000 cubic meters	A package plant in conjunction with a constructed wetland will be used for the treatment of effluent (from fish farming activities and for sewerage from the facilities). Although the full recharge volume has been set at 15 000 cubic meters over a period of a day, the treatment plant will not be required to deal with this volume of water simultaneously.
30	Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No 10 of 2004)	A biodiversity permit will be needed for the farming of protected and/or invasive species. A separate application for an Alien and Invasive Species permit will be required for any alien species. This permit is currently being compiled.
34 (iii)	The expansion or changes to an existing facilities or infrastructure for any process or activity where such expansion or changes will result in the need for a permit or license or an amended permit or license in terms of national or provincial legislation governing the release of emissions, effluent or pollution but excluding (iii) the expansion is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will be increased by 50 cubic meters or less per day	With the expansion of the already existing aquaculture facilities on site, this will trigger the need for water use authorizations and a coastal waters discharge permit. The exclusion does not apply as the envisaged discharge will be greater than 50 cubic meters per day.
41 (i) (ii) (iii)	The expansion and related operation of facilities, infrastructure or structures for aquaculture of (i) Finfish, crustaceans, reptiles or amphibians, where such facility, infrastructure or structures will have a production output exceeding 20 000 kg per annum (wet weight) (ii) molluscs and echinoderms where the annual production output of such facility, infrastructure or structures will be increased by 30 000 Kg or more and (iii) aquatic plants where the annual production output of such facility, infrastructure or structures will be increased by 60 000 Kg or more (wet weight)	There is an existing ornamental fish farm already operating on the property. This operation will be expanded and upgraded.
Listing Notice 2: GN R. 325		

6	<p>The development of facilities or infrastructure for any process or activity which requires a license in terms of national or provincial legislation governing the generation or release of emissions, pollutant or effluent, excluding:</p> <p>(a) Activities which are identified and included in Listing Notice 1 of 2014;</p> <p>(b) Activities which are included in the list of waste management activities published in terms of Section 19 of NEMWA, in which case NEMWA applies; or</p> <p>(c) The development of facilities or infrastructure for the treatment of effluent, wastewater or sewage where such facilities have a daily throughput capacity of 200 cubic meters or less.</p>	A Coastal Waters Discharge permit is required for the discharge of effluent into the sea. This permit is currently being compiled.
15	The clearance of an area of 20 hectares or more of indigenous vegetation	Approximately 49 hectares of vegetation will be cleared for the proposed development.
Listing Notice 3: GN R. 324		
2 (d) (v) (viii) (xii) (aa) (bb)	<p>The development of reservoirs for bulk water supply with a capacity of more than 250 cubic meters (v) in an estuarine functional zone (viii) Critical biodiversity area (xii) outside urban areas in (aa) areas within 10 km from National Parks of 5 km from any terrestrial protected area (bb) areas seawards of the development setback line or within 1 km from the high-water mark of the sea</p>	<p>In total up to 6 water reservoirs could be developed, each with a capacity of up to 2500 cubic meters.</p> <p>The southern portion of the proposed site encroaches marginally into the estuarine functional zone. Additionally, the proposed site is located within a CBA 1. The Amatikulu Nature Reserve and the Umlalazi Nature Reserve lie to the south west and north east of the site respectively.</p>
4 (d) (i) (viii) (xii) (aa) (bb)	<p>The development of a road wider than 4 meters with a reserve less than 13,5 meters in (d) Kwazulu-Natal (i) in an estuarine functional zone (viii) Critical biodiversity area (xii) outside urban areas in (aa) areas within 10 km from National Parks of 5 km from any terrestrial protected area (bb) areas seawards of the development setback line or within 1 km from the high-water mark of the sea</p>	<p>5m wide roads within the proposed site have been proposed.</p> <p>The southern portion of the proposed site encroaches marginally into the estuarine functional zone. Additionally, the proposed site is located within a CBA 1. The Amatikulu Nature Reserve and the Umlalazi Nature Reserve lie to the south west and north east of the site respectively.</p>

<p>12 (d) (iv) (v) (vi) (vii) (viii) (xiii)</p>	<p>The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for is for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>(d) Kwazulu-Natal (iv) within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p>(v) Within critical biodiversity areas identified in bioregional plans;</p> <p>(vi) Within the littoral active zone or 100 metres inland from high water mark of the sea or an estuarine functional zone, whichever distance is the greater, excluding where such removal will occur behind the development setback line on even in urban edges.</p> <p>(vii) On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation (viii) a protected area in terms of NEMPAA (xiii) in an estuarine functional zone</p>	<p>Approximately 490 000 square meters of indigenous vegetation will be cleared for structures and infrastructure.</p> <p>Majority of the proposed site is covered by Maputaland Coastal Belt Vegetation, Subtropical alluvial Vegetation and Northern Coastal Forest Vegetation, all of which are classified as Endangered.</p> <p>The southern portion of the proposed site encroaches marginally into the estuarine functional zone. Additionally, the proposed site is located within a CBA 1. The Amatikulu Nature Reserve and the Umlalazi Nature Reserve lie to the south west and north east of the site respectively.</p>
<p>13 (d) (iv) (vii) (viii) (x)</p>	<p>The development and related operation of facilities of any form of aquaculture (d) Kwazulu-Natal (iv) in an estuarine functional zone (vii) areas on the watercourse side of the development setback line or within 100 m from the edge of a watercourse (viii) areas within a watercourse or wetland (x) critical biodiversity area</p>	<p>The proposed site has been identified as an aquaculture development zone by DAFF.</p> <p>The southern portion of the proposed site encroaches marginally into the estuarine functional zone. Additionally, the proposed site is located within a CBA 1. The Amatikulu Nature Reserve and the Umlalazi Nature Reserve lie to the south west and north east of the site respectively.</p>
<p>14 (i) (ii) (iii) (iv) (v) (vi) (x) (xii) (a) (c); (d) (i) (vii) (x) (aa) (bb)</p>	<p>The development of (i) canals exceeding 10 square meters (ii) channels exceeding 10 square meters in size (iii) bridges exceeding 10 square meters (iv) dams including infrastructure and water surface area exceeds 10 square meter in size, (v) weirs exceeding 10 square meters (vi) bulk storm water outlets exceeding 10 square meters (x) buildings exceeding 10</p>	<p>A wetland covers a large portion of the site. To this end, the following infrastructure will be created on top of/ within 32 m of a watercourse: the waste water treatment facilities in the west, the 3 ornamental fish funnels, the processing area, 3 marine tunnels will be constructed</p>

	<p>square meters in size, (xii) infrastructure or structures exceeding 10 square meters or more where development occurs within (a) a watercourse (c) within 32 m of a watercourse in (d) Kwazulu-Natal (i) in an estuarine functional zone, (vii) critical biodiversity areas (x) outside urban areas in (aa) areas within 10 km of National Parks or 5 km from any terrestrial protected area (bb) areas seawards of the development setback line or within 1 km from the high water mark of the sea</p>	<p>on top of the wetland while the remaining 2 in the east will be within 32 m, one office.</p> <p>Additionally, roads will be constructed within this wetland, as well as, all of the supply and discharge pipelines and associated pump stations.</p> <p>The southern portion of the proposed site encroaches marginally into the estuarine functional zone. Additionally, the proposed site is located within a CBA 1. The Amatikulu Nature Reserve and the Umlalazi Nature Reserve lie to the south west and north east of the site respectively.</p>
<p>18 (d) (v) (viii) (xii) (aa) (bb)</p>	<p>The widening of a road by more than 4 meters or the lengthening of a road by more than 1 Km in (d) Kwazulu-Natal (v) in an estuarine functional zone (viii) critical biodiversity areas (xii) outside of urban areas aa) areas within 10 km of National Parks of 5 km from any terrestrial protected area (bb) areas seawards of the development setback line or within 1 km from the high water mark of the sea</p>	<p>Existing roads on the property will be lengthened by more than 1 km in order to create a gravel road network throughout the proposed facility.</p> <p>The southern portion of the proposed site encroaches marginally into the estuarine functional zone. Additionally, the proposed site is located within a CBA 1. The Amatikulu Nature Reserve and the Umlalazi Nature Reserve lie to the south west and north east of the site respectively.</p>
<p>23 (i) (ii) (iii) (iv) (v) (vi) (x) (xii) (a) (c); (d) (iii) (vii) (x) (aa) (bb)</p>	<p>The expansion of (i) canals expanded by 10 square meters (ii) channels expanded by 10 square meters in size (iii) bridges expanded by 10 square meters (iv) dams including infrastructure and water surface area expanded by 10 square meter in size, (v) weirs expanded by 10 square meters (vi) bulk storm water outlets expanded by 10 square meters (x) buildings expanded by 10 square meters in size, (xii) infrastructure or structures expanded by 10 square meters where such development expansion occurs within (a) a watercourse (c) within 32 m of a watercourse (d) Kwazulu-Natal (iii) in an estuarine functional zone, (vii) critical biodiversity areas (x) outside urban areas in (aa) areas within 10 km of National Parks of 5 km from any terrestrial protected area (bb) areas</p>	<p>Some of the existing infrastructure on site, such as the canals, buildings and storm water infrastructure, will be expanded.</p> <p>The southern portion of the proposed site encroaches marginally into the estuarine functional zone. Additionally, the proposed site is located within a CBA 1. The Amatikulu Nature Reserve and the Umlalazi Nature Reserve lie to the south west and north east of the site respectively.</p>

	seawards of the development setback line or within 1 km from the high water mark of the sea	
24 (d) (iv) (vii) (viii) (x)	The expansion and related operation of facilities of any size for any form of aquaculture in (d) Kwazulu-Natal (iv) in an estuarine functional zone (vii) areas on the watercourse side of the development setback line or within 100 m from the edge of a watercourse (viii) areas within a watercourse or wetland (x) critical biodiversity area	<p>Aquaculture activities are already established and ongoing on the proposed site. In this regard, these existing activities and operations will be expanded.</p> <p>The southern portion of the proposed site encroaches marginally into the estuarine functional zone. Additionally, the proposed site is located within a CBA 1. The Amatikulu Nature Reserve and the Umlalazi Nature Reserve lie to the south west and north east of the site respectively.</p>

2.4. Applicable Legislation, policies and/or Guidelines

The following legislation may be applicable:

TITLE OF LEGISLATION, POLICY OR GUIDELINE	APPLICABILITY TO THE PROJECT	ADMINISTERING AUTHORITY	DATE
LEGAL FRAMEWORK			
Constitution of Republic of South Africa	This is the fundamental law of South Africa, setting out the Bill of Rights as well as the relationship of various government structures to each other.	National Government and Constitutional Court	1996
Conservation of Agricultural Resources Act 43 of 1983	Provides for control over the utilization of the natural agricultural resources of the Republic. The proposed project will be required in terms of this legislation to ensure that: <input type="checkbox"/> The soil mantle is protected and conserved, <input type="checkbox"/> The natural water sources are protected, <input type="checkbox"/> Vegetative cover is conserved and weeds and invader plants are removed from the site.	Department of Agriculture, Forestry and Fisheries	1983
National Environmental Management Act 107 of 1998	To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote cooperative governance and procedures for co-ordinating environmental functions exercised by organs of state; to provide for certain aspects of the administration and enforcement of other environmental management laws; and to provide for matters connected therewith.	Department of Environmental Affairs	1998
National Environmental Management: Protected Areas Act 57 of 2003	The Act provides for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes; for the establishment of a national register of all national, provincial and local protected areas; for the management of those areas in accordance with national norms and standards; for intergovernmental co-operation and public consultation in matters concerning protected areas, and for matters in connection therewith. The Umlalazi Nature Reserve and Amatikulu Nature Reserve lie to the east and west of the proposed site.	Department of Environmental Affairs	2003
National Environmental Management: Biodiversity Act 10 of 2004	The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework set out by NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed (see below).	Department of Environmental Affairs	2004

	<p>Rare or protected species may be affected during construction.</p> <p>The Act lists species that are threatened or require protection to ensure their survival in the wild, while regulating the activities, which may involve such listed threatened or protected species and activities which may have a potential impact on their long-term survival. The Act has listed flora and fauna species.</p> <p>This Act also provides the regulatory framework for use of alien and invasive species for the aquaculture purposes. Where any listed alien and invasive species to be used for aquaculture in the ADZ, this can only be done with authorisation in terms of this Act.</p>		
National Spatial Biodiversity Assessment, 2011	The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.	Department of Environmental Affairs	2011
National Forests Act 84 of 1998	<p>This Act provides for the management, utilisation and protection of forests through the enforcement of permitting requirements associated with the removal of protected tree species, as indicated in a list of protected trees (first promulgated in 1976 and updated since).</p> <p>Although not anticipated, should any protected tree species require removal or relocation within the project area, a permit will be required.</p>	Department of Agriculture, Forestry and Fisheries	1998
National Veld and Forest Fire Act 101 of 1998	The purpose of this Act is to prevent and combat veld, forest and mountain fires throughout the Republic. The Act provides for a variety of institutions, methods and practices for achieving this purpose.	Department of Water Affairs	1998
National Heritage Resources Act 25 of 1999	<p>The National Heritage Resources Act legislates the necessity for cultural and heritage impact assessment in areas earmarked for development, which exceed 0.5 hectares (ha) and where linear developments exceed 300 metres in length.</p> <p>In this regard, the proposed development site will be subject to engagement with the South African Heritage Resources Agency (SAHRA). Potential impact on cultural heritage, paleontological or archaeological resources through excavation activities or disturbance will need to be monitored. Permits may be required per the National Heritage Resources Act (Act No. 25 of 1999).</p>	South African Heritage Resources Agency (SAHRA)	1999

The National Water Act 36 of 1998	<p>This Act aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users.</p> <p>The proposed development will have to ensure that local water resources are protected, used, developed, conserved, managed and controlled in a responsible way.</p>	Department of Water and Sanitation	1998
The National Water Services Act 108 of 1997	<p>The Act legislates the necessity to provide for the rights of access to basic water supply and basic sanitation; to provide for the setting of national standards and of norms and standards for tariffs; to provide for water services development plans; to provide a regulatory framework for water services institutions and water services intermediaries; to provide for the establishment and disestablishment of water boards and water services committees and their powers and duties; to provide for the monitoring of water services and intervention by the Minister or by the relevant Province; to provide for financial assistance to water services institutions; to provide for certain general powers of the Minister; to provide for the gathering of information in a national information system and the distribution of that information; to repeal certain laws; and to provide for matters connected therewith.</p>	Department of Water and Sanitation	1997
National Environmental Management Waste Act 59 of 2008	<p>The Waste Act reforms the law regulating waste management in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation.</p> <p>The proposed development will be subject to this Act in terms of the disposal of waste.</p>	Department of Environmental Affairs	2008
Hazardous Substances Act 15 of 1973	<p>To provide for the control of substances which may cause injury or ill-health to or death of human beings by reason of their toxic, corrosive, irritant, strongly sensitizing or flammable nature or the generation of pressure thereby in certain circumstances, and for the control of certain electronic products; to provide for the division of such substances or products into groups in relation to the degree of danger; to provide for the prohibition and control of the importation, manufacture, sale, use, operation, application, modification, disposal or dumping of such substances and products; and to provide for matters connected therewith.</p>	Department of Health	1973
National Environmental Management: Air Quality Act 39 of 2004	<p>To reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development; to provide</p>	Department of Environmental Affairs	2004

	for national norms and standards regulating air quality monitoring, management and control by all spheres of government; for specific air quality measures; and for matters incidental thereto.		
Occupational Health and Safety Act 85 of 1993	The purpose of this Act is to provide for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery; the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with, the activities of persons at work. The proposed development will therefore be subject to this Act during the construction and operational.	Department of Labour	1993
Integrated Environmental Management Information Series	IEM is a key instrument of NEMA and provides the overarching framework for the integration of environmental assessment and management principles into environmental decision-making. The aim of the information series is to provide general information on techniques, tools and processes for environmental assessment and Management. These various documents have been referred to for information on the most suitable approach to the environmental assessment process for the proposed development.	Department of Environmental Affairs	1992
Local Government: Municipal Structures Act, No. 117 of 1998	To provide for the establishment of municipalities in accordance with the requirements relating to categories and types of municipality; to establish criteria for determining the category of municipality to be established in an area; to define the types of municipality that may be established within each category; to provide for an appropriate division of functions and powers between categories of municipality; to regulate the internal systems, structures and office-bearers of municipalities; to provide for appropriate electoral systems; and to provide for matters in connection therewith	National Government	1998
Local Government: Municipal Systems Act, No. 32 of 2000	To provide for the core principles, mechanisms and processes that are necessary to enable municipalities to move progressively towards the social and economic upliftment of local communities, and ensure universal access to essential services that are affordable to all; to define the legal nature of a municipality as including the local community within the municipal area, working in partnership with the municipality's political and administrative structures; to provide for the manner in which municipal powers and functions are exercised and performed; to provide for community participation; to establish a simple and enabling framework for the core processes of planning, performance management, resource mobilisation and organisational change which underpin the notion of developmental local government.	National Government	2000

Spatial Planning and Land Use Management Act 16 of 2013	This Act provides a single and uniform national framework for spatial planning and land use management. Regulations prescribe to any matter relating to the Act, which includes national norms and standards, policies and directives, measures to be taken if a municipality fails to fulfil their planning mandate, procedures for lodging, consideration and deciding applications or appeals, codes of conduct for Tribunal members etc., are provided within SPLUMA.	iLembe District Municipality	2013
Ngonyama Trust Act 3KZ of 1994 (as amended)	<p>The Act establishes both the framework for the administration of the land for the benefit of communities, and in which land rights are to be granted and at the same time protecting trust land. The Ingonyama Trust was established in 1994 by the Ingonyama Trust Act 3 of 1994, as amended to hold the land in title for “the benefit, material welfare and social well-being of the members of the tribes and communities” living on the land. The Ingonyama Trust Act places emphasis on the property clause as per section 25 of the Constitution and gives a stronger mandate for the Board to protect the land and ensure the benefit of communities from the proceeds of the land.</p> <p>The land where the Amatikulu ADZ will be established is in custodianship of the Ingonyama Trust. Yet, the Department of Agriculture, Forestry and Fisheries are acting as the facilitating implementing agent for the ADZ under agreement with the Ingonyama Trust.</p>	Ingonyama Trust	1994
National Environmental Management: Integrated Coastal Management Act, 2008 (Act No 24 of 2008)	The ICM Act promotes co-ordinated and integrated management and sustainable use of the country's coastal resources and aims to provide equitable access to South Africa's rich and diverse coastline and the use of its resources in a manner that is ecologically, socially and economically sustainable. The primary objectives of the ICM is to define and determine the extent of the coastal zone, provision for the coordinated and integrated management of the coastal zone, preserve, protect and enhance the status of the coastal management, ensure there is equitable access to the coastal public property and to give effect to certain international law obligations.	Department of Environmental Affairs	2008
KwaZulu Natal Nature Conservation Ordinance 15 of 1974 (as amended)	<p>Provisions for the preservation of flora and fauna and the regulation and control of hunting, fishing and moving of fish and other animals, which are delegated to the provincial administration (KwaZulu Natal).</p> <p>The applicability of this ordinance is in its regulation around the collection, movement and keeping of aquatic organisms that may be used in the farming activities of the ADZ.</p>	Ezemvelo KZN Wildlife	1974

Sea-Shore Act 21 of 1935	The purpose of this act is to declare the State President to be the owner of the sea-shore and the sea within the territorial waters of the Republic; and to provide for the grant of rights in respect of the sea-shore and the sea, and for the alienation of portions of the sea-shore and the sea and for matters incidental thereto.	Department of Environmental Affairs	1935
REGIONAL PLANNING POLICIES			
Mandeni Local Municipality IDP	<p>The Mandeni Municipality has identified certain strategic objectives to address challenges which include promoting and facilitating development and investment along the coast in a harmonized and sustainable manner both environmentally, economically and socially.</p> <p>The agricultural sector has been identified as one of the four (4) drivers for economic growth in the KZN province. In Mandeni Municipality, the agricultural sector is dominated by sugar cane farming and forestry, however, the municipality is investigating aquaculture farming in the Dokodweni area.</p>	Mandeni Local Municipality	2014/2015
iLembe District Municipality Biodiversity Sector Plan, as part of the iLembe IDP 2017 - 2022 Check iLembe IDP 2017 - 2022	The Biodiversity Sector Plan for the iLembe District Municipality is a precursor to the Bioregional Plan, with the main objectives being to identify and map critical biodiversity assets in the area, provide associated management guidelines, ensure that aquatic and terrestrial biodiversity targets are met and to conserve the ecological and evolutionary processes that allow biodiversity to persist over time. The key purpose of this BSP is to assist and guide land use planners and managers within the iLembe District and its respective local municipalities, to account for biodiversity conservation priorities in all land use planning and management decisions, thereby promoting sustainable development and the protection of biodiversity, and in turn the protection of ecological infrastructure and associated ecosystem services.	iLembe District Municipality	2014
Mandeni Coastal Management Plan	The aim of the Mandeni municipal CMP is to achieve the ICM objectives in the coastal area under municipal jurisdiction, part of which means ensuring consistency with national and provincial objectives. The Mandeni CMP has established mechanisms for the comprehensive participation of representatives from all sectors of coastal communities, as well as providing management tools to empower decision-makers to manage and utilise the coast. In addition, the Mandeni CMP provides input into local planning initiatives, such as Integrated Development Plans and Spatial Development Frameworks of the Mandeni Municipality through the associated coastal Development Management Tool.	Mandeni Local Municipality	2013

KwaZulu Natal Coastal Management Programme (draft of May 2017)	The Provincial Coastal Management Programme is a provincial policy directive for the management of the coast through an integrated, coordinated, uniform approach, and includes strategies and plans for the effective implementation of the Integrated Coastal Management Act (24 of 2008). The KwaZulu Natal Coastal Management Programme, which is currently in draft format, aims to provide direction for coastal management in KwaZulu Natal over a five year period and sets out goals and objectives for the achievement of integrated coastal management in the Province.		2017
Integrated Management Plan: Amatikulu Nature Reserve	<p>The Integrated Management Plan for Amatikulu Nature Reserve is the primary and overarching management document for the nature Reserve for the period 2009-2013. It forms the framework within which the Nature Reserve will be managed and developed towards the achievement of its management objectives.</p> <p>The principles underlying the IMP for the ANR are based on general principles guiding the attainment of sustainability – protecting biodiversity; sound resource management; equitable and appropriate community involvement and beneficiation; the creation of viable and sustainable business opportunities; and clear policies, objectives and operational guidelines.</p>	Ezemvelo KZN Wildlife	2009-2013

2.5. Activity Motivation

2.5.1. Integrated Development Plans (IDP's), Spatial Development Frameworks (SDF's) and Other Guidelines

Dokodweni beach, located in the south adjacent to the proposed site, has been identified as a tourism node with great potential for improving the district tourism sector. Also of note, is that Dokodweni beach recently obtained Blue Flag status¹.

The Mandeni Municipality has identified certain strategic objectives to address challenges which include promoting and facilitating development and investment along the coast in a harmonized and sustainable manner both environmentally, economically and socially.

The agricultural sector has been identified as one of the four (4) drivers for economic growth in the KZN province. In the Mandeni Local Municipality, the agricultural sector is dominated by sugar cane farming and forestry, however, the municipality is investigating aquaculture farming in the Dokodweni area.

2.5.2. Need and Desirability

Global Perspective

Aquaculture is defined as the propagation, improvement, trade or rearing of aquatic organisms (plant and animal) in controlled or selected aquatic environments (fresh, sea or brackish waters) for any commercial, subsistence, recreational or other public or private purpose.

Aquaculture is a global sector with the potential to contribute greatly to the diversification of the agricultural economy, create skills, broaden economic participation, reduce poverty, enhance food security and increase employment and business opportunities for all sectors of society; including women and the youth. Some of the underlying drivers of global aquaculture development include:

- Fish farmed in aquaculture convert animal feed resources (protein) more efficiently than traditionally farmed terrestrial animals, mainly since they are cold blooded and do not waste energy for body temperature regulation.
- Fish can be farmed in water in an integrated manner, meaning that the water is not consumed/wasted.
- The spatial requirements for high density aquaculture is relatively small, meaning that vast tracts of land (such as for crop farming) is not necessary.
- Fish products are in demand and have been shown to be a healthier alternative to traditionally consumed red meats.

The Food and Agriculture Organisation (FAO) of the United Nations (UN) estimates that by 2030, fish farming will dominate global fish supplies. With aquaculture already providing more than half of the global seafood demand, it is now considered likely that marine harvesting and terrestrial rangeland farming has reached its capacity in many parts of the world. Aquaculture and intensified agriculture remains the only alternative to supplying a growing food need, fuelled by an increasing global population (Alexandratos *et al* for the FAO, 2012).

Although the FAO State of World Fisheries and Aquaculture Report (2016) found that Africa accounted for only 2.32 % of global aquaculture production in 2014, the FAO State of World Fisheries and Aquaculture Report (2014) highlighted that Africa showed the fastest continental growth in average annual aquaculture

¹ Mandeni Local Municipality Spatial Development Framework, 2017/18

production (11.7%) between 2000 and 2012. This growth will increasingly lead to the expansion of aquaculture on the African continent, and particularly in South Africa.

South African National Perspective

South Africa's Aquaculture sector has high growth potential due to increasing demand for fish in the face of declining fish stocks in the ocean and South Africa's abundance of marine and freshwater resources. The sector also offers significant potential for rural development, especially for the marginalised coastal communities. (Amatikulu Briefing session). The goal is to grow Aquaculture to play a major role in the supply of fish products, and an enhanced role in job creation and contribution to national income.

The historical development of aquaculture in South Africa has been slow and several initiatives have failed. However, South Africa is participating in this global shift that is driven by demand, market and industry globalisation, and rapidly expanding application of advanced aquaculture technologies.

The National Aquaculture Policy Framework for South Africa (2013) was developed in reaction to a realization that the country is faced with rapidly diminishing marine fish stocks, an increasing demand for seafood and a developing global aquaculture sector that has become a significant agro-economic driver and food production alternative.

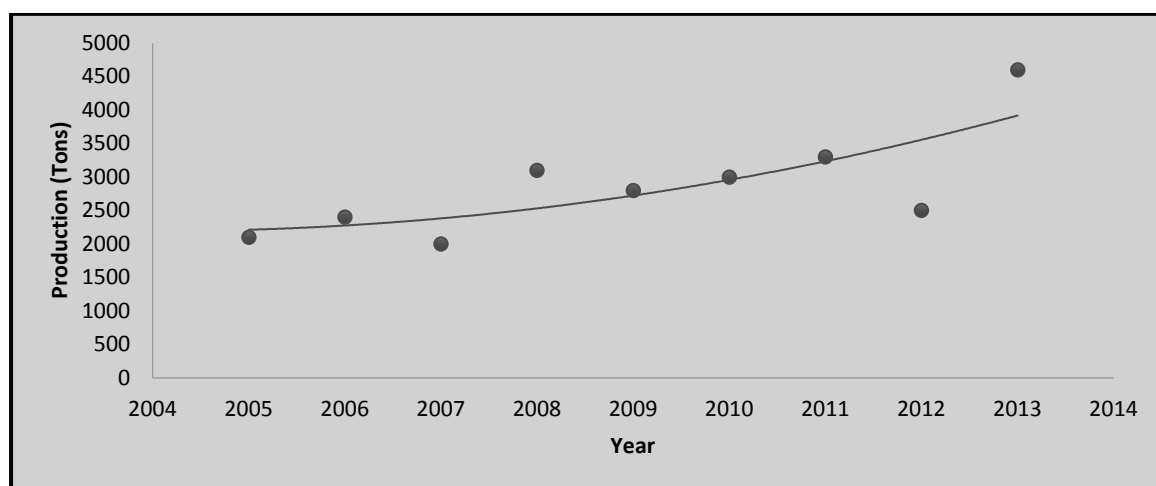


Figure 2: Growth in the South African aquaculture sector from 2005 to 2014

(Source: DAFF, 2014).

Operation Phakisa, which was established in 2014 after a lengthy strategic planning session, has a permanent steering committee and delivery unit housed by the National Department of Agriculture, Forestry and Fisheries (DAFF), who are acting as the applicants for the Amatikulu Aquaculture Development Zone (ADZ). This office has identified individual aquaculture projects for which developmental support must be fast-tracked, while accepting applications from projects that are seeking developmental and other support.

After the launch of Operation Phakisa, the State President in the 2015 State of the National Address referred to it as a tool in the implementation of the National Development Plan 2030. In the 2016 State of the Nation Address, the President elaborated further on aquaculture development as a future area of growth.

The 2015 conference of the Aquaculture Association of Southern Africa (AASA) in Polokwane emphasised the imminent growth of aquaculture on the African continent. Africa is widely recognized as the next major global aquaculture development zone, and this is in no small way underscored by the fact that the World Aquaculture Society brought the World Aquaculture Conference to South Africa in 2017 (Cape Town).

Further context to the state of aquaculture in South Africa can be obtained from the following key reports:

- A Profile of the South African Aquaculture Market Value Chain (2014).
- Operation Phakisa: Unlocking the Economic Potential of South Africa's Oceans.

Project Specific Perspective

The development agenda for aquaculture by the South African Government (refer to the policy position) has resulted in the need to stimulate investment and development. To do this, a range of potential aquaculture zones were identified through a national investigation, leading to the identification of zones in Saldanha, Coega, East London, Amatikulu and others. In these areas, government takes the lead in establishing infrastructure and dealing with overarching regulatory requirements. In this manner the development of aquaculture can be clustered around common services and so contribute to the creation of a more vibrant aquaculture sector for South Africa.

The related benefits of such an aquaculture development zone lies in local diversification of the agricultural economy, the creation of direct jobs in production and indirect jobs in the surrounding expanded value chain, the creation of opportunities for upskilling in a non-traditional sector, direct and indirect food security and diversification in the use of natural resources.

The main purpose of the ADZ seeks to address poverty and unemployment in the coastal area of Amatikulu by creating skill-based employment. The infrastructure development on the site will require a labour force which will be sourced from the surrounding local disadvantaged communities. Once the farm has been established, people from the surrounding community will have an opportunity to develop skills in the farming of aquatic organisms.

Additionally, the ADZ will encourage investor and consumer confidence, create incentives for industry development, provide marine aquaculture services, manage risk associated with aquaculture, as well as provide skills development and employment for coastal communities. The development of ADZs supports the Marine Aquaculture Policy objective aimed at creating an enabling environment that will promote growth and sustainability of the marine aquaculture sector in South Africa, as well as to enhance the industry's contribution to economic growth.

Employment Estimates

The proposed Amatikulu Aquaculture Development Zone will have roughly 12.6 Ha of freshwater production space and 24.6 of marine production space.

For the construction of these facilities and the related infrastructure it is conservatively estimated that at least 100 direct full-time employment opportunities will be created for a period of at least one year.

Expansion of the existing ornamental fish production at Amatikulu (which currently employs 13 people) could see a quadrupling of employment opportunities to around 50. Some of these people would be able to serve the staffing needs to produce other fresh and marine species.

Extensive pond culture of freshwater table fish (e.g. tilapia), could yield around 8 tons per hectare per annum. Although the global averages for labour units per ton of fish vary greatly from country to country, Sub-Saharan Africa reports high labour to production rates, which would be typical for expensive and informal pond culture. Rates of 0.46 tons per person per annum (FAO Aquaculture Newsletter No. 45, 2010) would see a labour component of 110 people, were half of the freshwater area be used for extensive pond culture. However, given the nature of an aquaculture development zone, high density production could see a yield of up to 300 tons of table fish per annum. The labour ratio would however not be equivalent, given the specialisation of staff and mechanisation that will be required. Using labour ratios for North Africa and Asia that approach 10 tons per person per annum (FAO Aquaculture Newsletter No. 45, 2010), this could result in around 190 employment opportunities.

Extensive pond culture of cob at a nearby farm in Mtunzini currently results in the employment of around 22 people on a farm similarly sized to the marine component that is proposed for Amatikulu. However, at an expected yield of around 5 tons per hectare per annum, this labour component could be as high as 250 if one uses the high labour to production rates reported for Sub-Saharan Africa. Using more realistic labour rates that would apply to the type of production environment in an aquaculture development zone (as taken from reported rates in North Africa and Asia) will see labour rates similar to those reported by the Mtunzini cob farm (i.e. around 22). This would be significantly higher for high density marine production systems, but the economic feasibility for these systems has not been proved in South Africa.

The numbers in the preceding paragraphs illustrate that the Amatikulu Aquaculture Development Zone could conservatively create 250 direct employment opportunities in primary production, were the zone to be fully occupied. Depending on the level of post-harvest processing and value adding, a similar number of employment opportunities could be created again for downstream activities, totalling 500 jobs (excluding upstream services such as feed and equipment manufacturer).

At a reported unemployment rate of 35.2% from the 2011 census for the uMlalazi Local Municipality, these employment opportunities are much needed.

3. FEASIBLE AND REASONABLE ALTERNATIVES

Chapter 1 of Government Notice 928 of the NEMA EIA Regulations, 2014 (as amended by GN 326 in April 2017), defines alternatives, in relation to a proposed activity, as one of the following:

- The property on which or location where it is proposed to undertake the activity
- The type of activity to be undertaken
- The design or layout of the activity
- The technology to be used in the activity
- The operational aspects of the activity

And includes the option of not implementing the activity.

Appendix 2 of the NEMA EIA Regulations also makes allowance for the scenario where no alternatives are investigated, including alternative locations. In this case, a motivation for not considering alternatives must be presented.

3.1. Preferred Alternative: Location

Site

There is only one (1) site under consideration for the proposed establishment of the ADZ.

The preferred site is predominately a brownfields/ disturbed site which was previously used to operate a prawn and ornamental fish farm. Most of these old ponds are now in a state of disrepair, however certain operations are still currently being undertaken on the site, namely, Amatikulu Aquarium plants which makes use of some of the old tunnels and hatcheries, Amatikulu Pet Products and a water treatment facility. The site is situated adjacent to the Amatikulu Estuary and Nature Reserve.

Advantages of this site for the proposed development include:

- Portions of the site are already disturbed i.e. brownfields site
- The site was previously used for aquaculture, and ornamental fish farming is currently occurring on site
- The site is located near the Indian Ocean making sea water abstraction possible

Disadvantages of this site for the proposed development include:

- The site is classified as a Critical Biodiversity Area and an Ecological Support Area
- The site is a critical linkage corridor
- Vegetation on site is classified as Endangered

No other site/location alternatives are being considered for the establishment of an aquaculture zone due to the nature of the project.

Layout

The preferred layout for the proposed Amatikulu Aquaculture Development Zone (ADZ) has been informed by a range of practical, technical and environmental considerations. These considerations have resulted in the preferred layout as presented in the Scoping Report, which represents the culmination of a reiterative process in which an engineering team, aquaculture specialist and ecology specialists worked through a range of design options to optimise the aquaculture feasibility and the preservation of ecological integrity. Some of the main considerations at arriving at the current layout included:

- Ensuring that the ecologically sensitive primary dune is catered for by not allowing any development in this zone.
- Using as much of the historical fish farming footprint and existing infrastructure as possible.
- Separating marine and freshwater production systems to allow for protection of freshwater resources (groundwater) from contamination with seawater.
- Allowing for treatment systems for all drainage and discharge water so that the determined discharge water quality specification can be met, regardless of whether the water is returned to the Amatikulu Estuary or discharged offshore.

The proposed layout is as follows:

Five (5) fresh water production areas are located in front of the secondary dune in the north of the site. Adjacent to these areas in the east, are the freshwater and sea water treatment facilities and storage tanks. Majority of the secondary dune will be left as open natural areas.

Ornamental fish tunnels, as they are currently operating, will remain near the centre of the site adjacent to the fresh water production areas.

The location of the current office will remain as an office, with a new office building and parking area located just behind it near the entrance gate to the property.

The processing area and an additional ornamental farming area (which is existing) will be located to the west of the offices. A secondary dune located north of the processing area is classified as open natural area.

Five (5) marine aquaculture areas are proposed, spanning almost the entire length of the site. These areas are situated to the north of the primary dune, which is classified as open natural areas.

The sewage, fresh water, and marine water treatment works will be located in the south western corner of the site.

Water Supply, Reticulation and Water Treatment

The current water supplies to the Amatikulu ADZ consist of a proposed seawater supply (offshore intake pipe), brackish water supply from the estuary and freshwater supply from three well points on site. As the ADZ will accommodate marine and freshwater farming systems, this spectrum of salinity is required.

The marine facilities, and certainly the operation of a marine hatchery, will not be possible without the offshore intake pipe. The alternative of using a system of beach wells has been eliminated in this regard as the beachfront is not stable, and due to the possibility of the water being of a low salinity due to a subterranean movement of freshwater in this area.

The water reticulation systems operated from a double set of storage reservoirs for both fresh and seawater. No alternatives are possible to this proposed supply arrangement. It has however been proposed that the water outlet and discharge drainage systems be implemented as open channels as opposed to using pipes. This will result in less maintenance risk, in situ treatment of water through the depositions of suspended solids and in-channel bio-remediation, while creating habitat for a range of aquatic animals.

It has been proposed that both fresh and seawater drainage be treated through screen and bio-filtration before release back to the estuary and/or directly to the sea. Aside from the open channels indicated above, this treatment can be improved by settlement of solid materials in an artificial wetland system. Moreover, the water collected post-treatment should be pumped back into the aquaculture supply reservoirs to reduce the dependence on newly pumped sea and freshwater.

Refer to Appendix D for the proposed layout.

3.2. Alternative: Land-use

The tribal land that makes up much of the area for the proposed ADZ could conceivably be used for other animal or crop farming, tourism, urban and rural development. These alternatives have been excluded based on the historical use of the area for aquaculture.

3.3. Alternative: Production technologies

Species Alternatives

Being a proposed ADZ in which infrastructure will be established for a range of different potential aquaculture businesses has led to the consideration of a range of species for farming. These species have been chosen for their suitability to the area and the types of production systems that are suitable to this ADZ. Preference has been given to expansion of the existing ornamental fish production activities (marine and freshwater), without the introduction of species that could be potentially invasive.

Other freshwater species include tilapia (excluding the invasive Nile tilapia), indigenous Sharptooth catfish, and indigenous Nile crocodile. Marine species alternatives include indigenous mullet, indigenous Dusky cob and Grunter. Alien species such as commercially farmed prawn species and Barramundi will be subjected to ecological risk assessment and their inclusion will be subject to the issuing of an Alien and Invasive Species Permit from the Department of Environmental Affairs. Freshwater and marine ornamental plants, as well as indigenous seaweed culture will be encouraged as this is a means of integrating the treatment of discharge water into the production cycle; resulting in cleaner discharge and the production of high demand seaweed products.

System Alternatives

As an ADZ that will be utilised by a range of operators, the exact design of production systems may vary. However, a range of basic principles have been applied to system design alternatives. These include:

- Where possible, the existing aquaculture footprint and infrastructure should be used and refurbished.
- Earthen pond culture may be used provided that their construction and operation does not impact negatively on the water table. Where seawater is to be used in pond culture, this can only be done with a system of lining to protect the freshwater resources (groundwater).
- Tank culture is encouraged as this allows for greater recirculation of water, as well as removal of any pollutants in discharge water.

3.4. Alternative: Aquafeed

Modern aquaculture feeds are far advanced in terms of palatability, around the reduction of feed waste and the lowering of wasteful metabolites from the production species. Moreover, viable commercial aquaculture depends on the scientific application of feeds in such a manner as to prevent overfeeding, maximise growth and feed

conversion efficiency. For these reasons it is proposed that only aquaculture specific formulated and registered feeds be allowed and that other feed alternatives (such as feeding with trash fish and other potential pollutants) be disregarded. Each farming entity must table a planned feed application protocol, associated with growth and waste monitoring.

3.5. Alternative: Production Waste

The waterborne wastes have been discussed above. Aquaculture can also generate organic waste through dead fish and any processing will lead to additional waste materials. As an optimal alternative solution is recommended that all non-consumable waste fish be treated through a silage process (consisting of the milling of the material and the addition of a low concentration of acid to lower the pH). This fish silage is stable, odourless and can be used as animal feed and fertiliser additives.

3.6. Alternative: Energy

A range of energy alternatives are being considered in the design of the ADZ. These include the possible use of solar power to drive certain pumps and systems, the use of wave and current action pumps for seawater supply and the reduction of overall energy dependence through use of solar heating, high volume/low pressure pumps that are more efficient and air lift systems to move water.

3.7. No-go alternative

The No-Project Alternative implies that the proposed establishment of the aquaculture development zone in Amatikulu and all associated infrastructure will not take place. In this scenario no negative environmental impacts relating to ground/surface water and biodiversity will be incurred.

The No Project Alternative also implies that no positive impacts or benefits will be experienced in the region, such as the generation of approximately 100 employment opportunities for the construction phase and 250 employment opportunities during the operational phase.

4. AREA/PROPERTY DESCRIPTION

The section below provides an overview of the proposed development in terms of the biophysical nature of the site (i.e. groundwater, biodiversity, visual, cultural/historical features) and the socioeconomic status of the area.

Baseline specialist studies were used to inform the following sections; however, it should be noted that the studies are not exhaustive. More detailed inputs will form part of the environmental impact report where necessary.

4.1. Physical characteristics

4.1.1. Climate

The iLembe District has a moderate climate with a mean annual temperature ranging from 21°C at the coast to 16°C inland at higher altitudes, where the winter annual minimum temperatures approaches 12°C. The site falls within a summer rainfall area and has a mean annual precipitation ranging from 650mm to 1200mm, generally declining from coastal areas to inland areas².

4.1.2. Topography

The proposed site is characterised by flat coastal plains where the height above sea level ranges between 0-125 m above sea level.

4.1.3. Geology

Majority of the site is covered by greyish sandy soils while the northern boundary of the site is covered by red and yellow soils that have a low to medium base status and are freely draining.

4.1.4. Hydrology

The proposed site contains two (2) National Freshwater Ecosystem Priority Areas (NFEPAs) wetlands, namely an unchanneled valley-bottom wetland located in the centre of the site and the Amatikulu estuary located south of the site.

The Tongani, Thukela and Matigulu Rivers have been identified as free flowing rivers and are designated as an aquatic landscape corridor.

The Thukela River, the largest river in the District Municipality, flows through Mandeni LM. The Nyoni and Matigulu Rivers converge at the coast to form one estuary mouth. The Nyoni River, which is located just to the south west of the site, is considered to have a unique channel configuration that runs parallel to the coastline for about 8 Km before joining the Amatikulu River forming the Estuary. The ecosystem threat status of the Matikulu/Nyoni Estuary is Least Threatened and is considered to have a Category B classification- largely natural with few modifications.

The Matikulu/Nyoni Estuary is located just south of the proposed development site. This Estuary is classified as permanently open even though it is frequently closed off from the ocean.

4.2. Wetlands

The only "true" wetland environment that can be identified within the subject area lies within the drainage line to the west of the ADZ and parallel to the access road to the present aquaculture facility. Three valley head wetland seep systems arise from the Pleistocene dune form to the lee of the ADZ and serve a small, channelled valley bottom system that flows parallel to the shore towards the Amatikulu estuary.

² iLembe Biodiversity Sector Plan, 2014

Four hydro geomorphic units (HGMs) have been identified within 500m of the ADZ. All wetland environments are associated with the catchment of an unnamed stream. HGM's 1,2 and 3 lie outside of and are elevated above the subject ADZ area on communal property within the Amatikulu Reserve. These minor catchments will not be directly affected by the development of the ADZ. However, HGM 4 is likely to be affected by any activities relating to the upgrade to the access road.

4.3. Marine Environment

The proposed site of the ADZ lies within a coastal zone that has been generally referred to (until recently) as being a prograding coastline (Green et al 2013; Cooper 1991; Tinley 1982). A prograding coastline, which can generally be considered an anomaly within the South African coastal context, is a shoreline that shows extensive accretion in a seaward direction.

4.4. Biodiversity

An ecological evaluation of the land presently demarcated as having potential for utilisation as an aquaculture facility was undertaken. The evaluation considered areas of ecological significance within the study area and highlighted those as areas of ecological "sensitivity."

Potential areas of concern identified are as follows:

- The impacts that such upgrades may have on the prevailing landforms and habitat. Ecologically important habitats that are considered to lie within the broader study area and may be affected by the development, include the beach-dune habitat form, portions of historical estuarine- wetland environment and emergent swamp forest identified at points around the site.
- The present level of environmental services provided by the above habitats require evaluation in order to forecast possible impacts on their ecological state which should inform decision makers, engineers and other members of the professional team on the final layout and operational aspects of the ADZ.
- It follows that the situation of the ADZ within a dynamic zone such as the supra tidal coastal environment may in turn pose a threat to infrastructure and operations of the facilities and in this regard sound planning would ensure that such risks are recognized and addressed.

4.4.1. Flora

The site does not lie within any threatened ecosystems, however, a small corner of the site in the far north encroaches into the Eshowe Mtunzini Hilly Grasslands which are classified as critically endangered.

Three (3) vegetation types are found within the proposed site: Subtropical Alluvial vegetation is found in the centre of the site covering the wetland area, Subtropical Dune Thicket covers the southern boundary of the site, while Maputaland Coastal Belt vegetation covers the northern portion of the site. Subtropical Alluvial vegetation and Maputaland Coastal Belt vegetation have a provincial conservation status of Endangered, while Subtropical Dune Thicket has a conservation status of Least Threatened.

According to the KZN 2016 CBA layer, the site lies within a CBA: Irreplaceable and an Ecological Support Area (ESA), with the exception of the portions of the site where infrastructure is currently located. The site is also located within a critical linkage landscape corridor known as the Tugela Corridor. This corridor splits from the Tugela North Corridor before the border with uMzinyathi District and runs north parallel to the border. Landscape corridors were developed to facilitate evolutionary, ecological and climate change processes, as well as, to create linked landscapes for the conservation of species in a fragmented landscape.

4.4.2. Fauna

Mammals

Fauna that are endemic to the Amathikulu region are considered to be typical of the central coastal environments of Kwa Zulu Natal. The ADZ and surrounds have been subject to a high level of transformation, including the introduction of an almost, annual fire regime, human settlement, changes in habitat form (e.g. transgressive dune to Casuarina plantation) and other influences. As a consequence of such change, much of the larger fauna that may have been present in the region in or around the early 1900's has been ousted from the region (McCracken 2007). Some species, such as common duiker (*Sylvicapra grimmia*) and steenbok (*Raphicerus campestris*), genet (*Genneta tigris*) and mongoose, which are able to adapt to increasing human presence and transformed environments, do however remain present within the area. The proximal Amathikulu Nature Reserve and other protected areas act as potential refugia to terrestrial vertebrates and invertebrates which may move from within the confines of these protected areas into areas around the ADZ.

The ADZ study area offers suitable habitat for many terrestrial species, including smaller mammals, anurans and birds. The site in general is accessible to most species, not being cordoned by fencing in any manner and forming part of a north-south corridor link between the more northerly Siyaya system and the uMlalazi Nature reserve and the Amathikulu River and its associated nature reserve.

Amongst the mammal species that are considered to be present within the site, most of these species are members of the Order Rodentia and Insectivora, which are often related to graminoid or sedge dominated habitats or are able to exploit transformed habitats. A number of smaller carnivores are likely to be present within the region including mustellids and the striped weasel (*P. albinucha*). The Cape clawless otter (*A. capensis*) is also likely to be present within the site and may under certain circumstances, prove to be a problem animal to large scale fish producers.

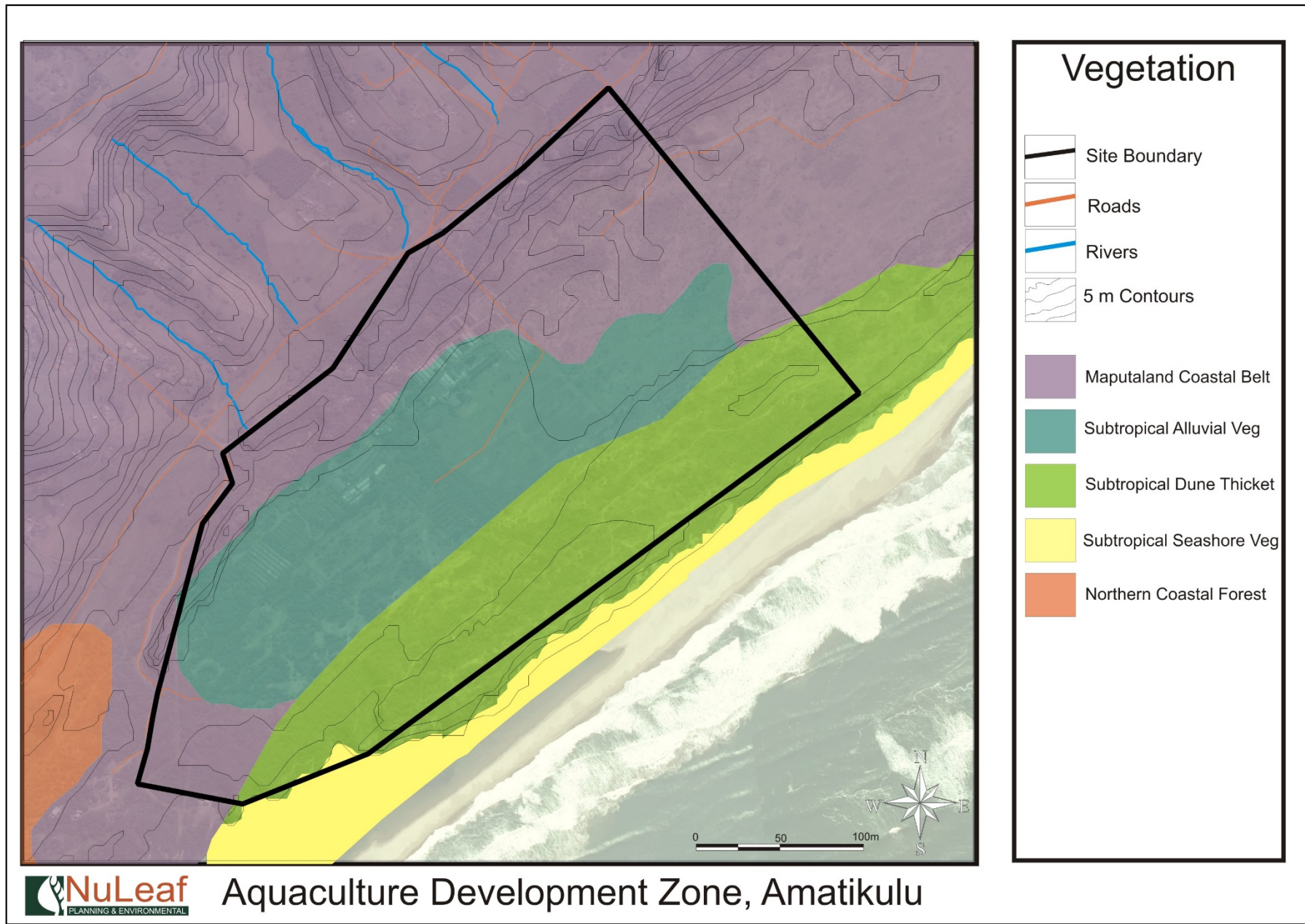
Reptiles

A number of reptiles are likely to be present, particularly members of the Order Squamata (snakes) with exploitation of both abundant rodent populations and the generally diverse but transformed habitat within the ADZ. With generally high volumes of water available at points that vary from shallow ephemeral pans to deep excavations with permanent water, as well as varying vegetation communities ranging from graminoid to sedge dominated habitat, amphibian diversity on site should be considered to be "high". Notable, is the high likelihood of the presence of *Hyperolius pickersgilli* which is found only in isolated patches of reed communities between Richards Bay and Durban. This species is considered "critically endangered" and of high conservation significance.

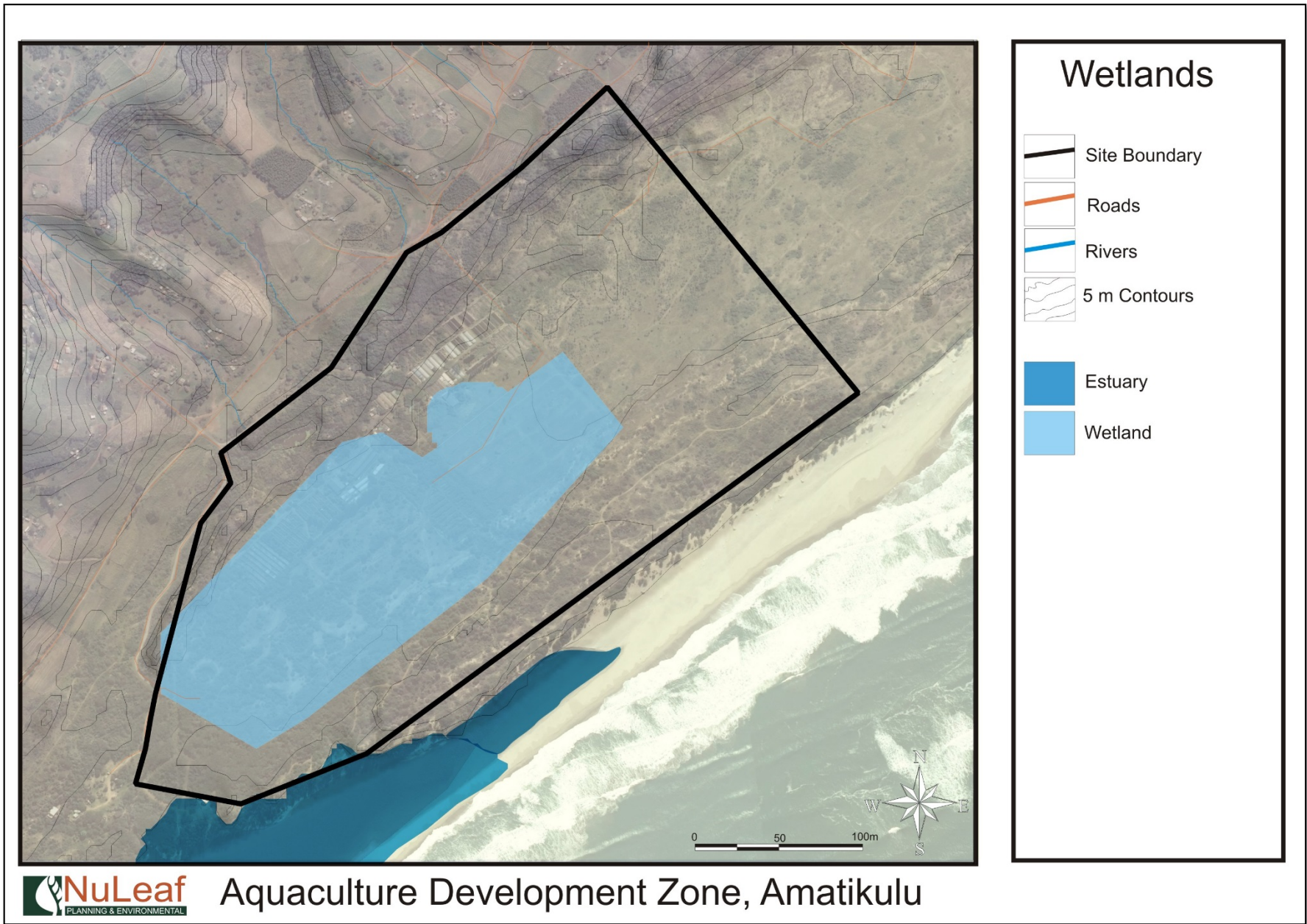
Avifauna

The presence of sedge communities with available open surface water, offers a number of avian (bird) species forage and predatorial opportunities. Consideration of the SABAP 2 Pentad for this area (2900_3135 QDGC: 2931BA) indicates a species list of 254, recorded since 2004. Species listed within the pentad show a mix of species associated with coastal forest (*Narina trogon*- *Apaloderma narina*), estuarine and freshwater environments (Cape cormorant, reed cormorant and white breasted cormorant – *Phalacrocorax spp*) and grassland species (Cape and yellow throated longclaw - *Macronyx capensis* and *M. croceus*). It is likely that species such as Southern red bishop (*Euplectes orix*) will utilize much of the sedge habitat in the former grow out ponds as nesting sites, as will species such as red knobbed coot (*Fulica cristata*).

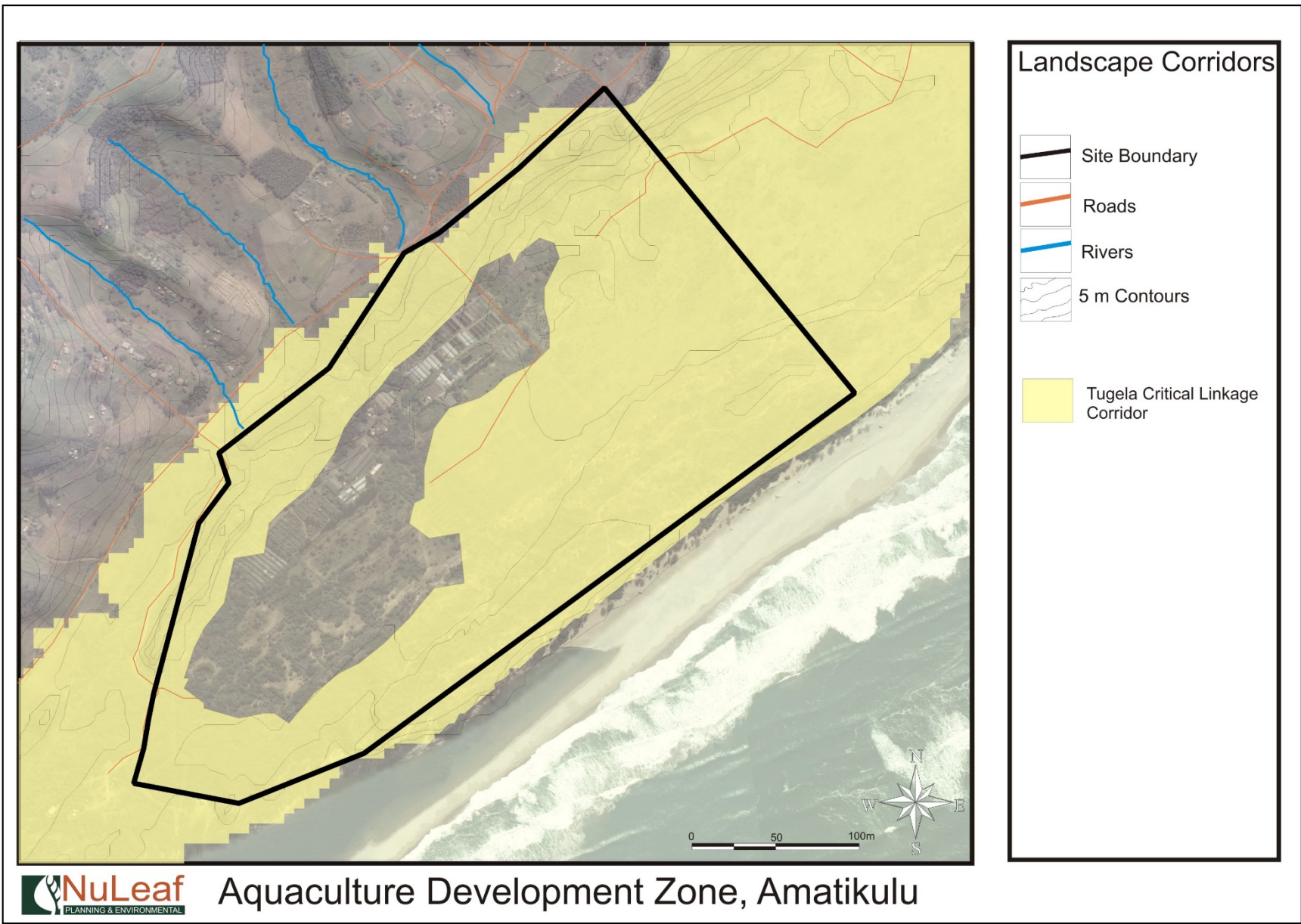
Refer to Appendix C.1 for the full Ecological Report.



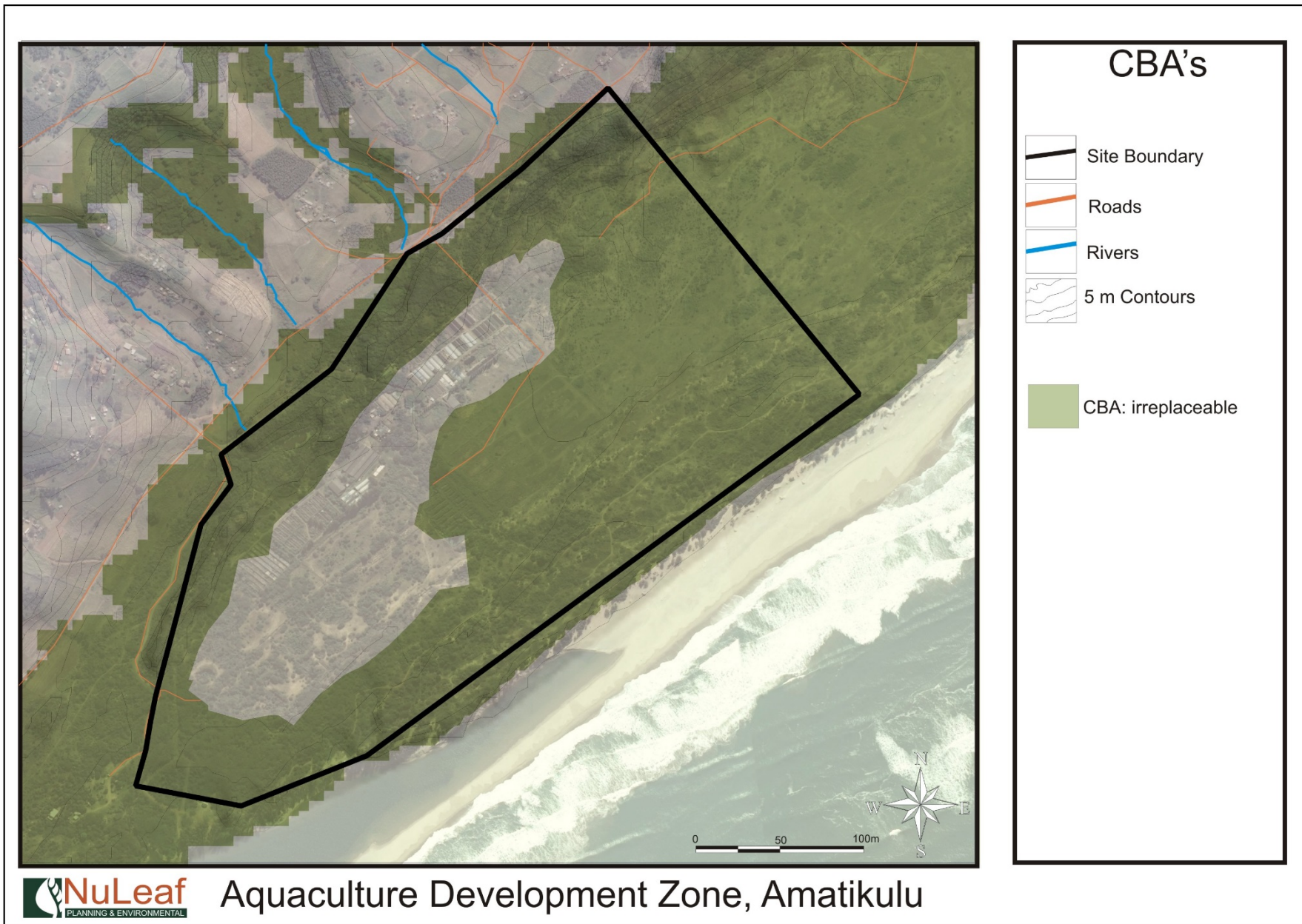
Map 2: Vegetation covering the proposed site



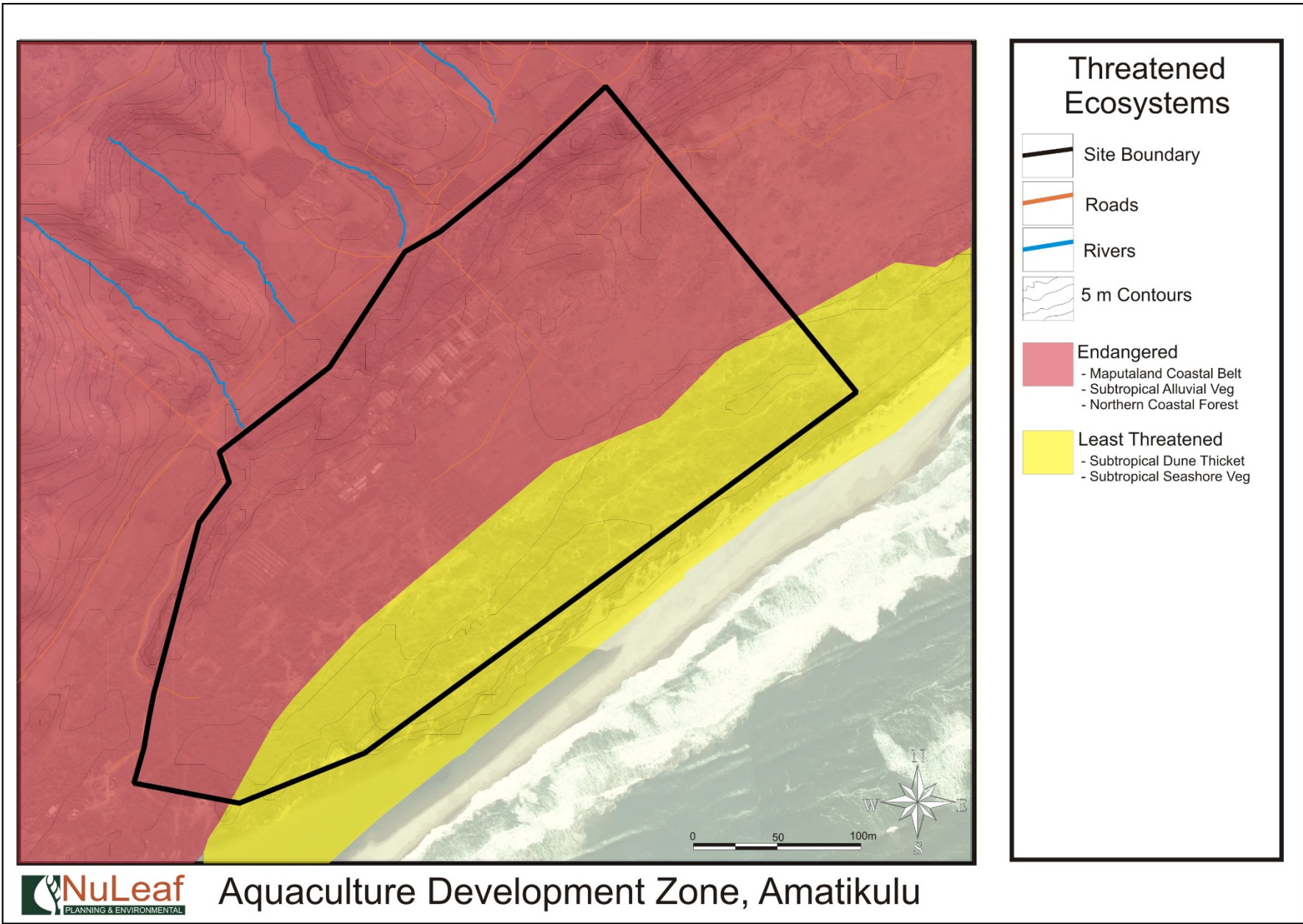
Map 3: Wetlands



Map 4: Landscape Corridors



Map 5: Critical Biodiversity Areas



Map 6: Threatened Ecosystems

4.5. Heritage

A Phase 1 Cultural Heritage Impact Assessment was undertaken for the proposed project in accordance with the provisions of Sections 38 (1) and 38 (3) of the National Heritage Resources Act (Act No 25 of 1999).

No Stone Age, Iron Age or historical settlements, structures, features or assemblages were recorded during the survey.

Additionally, no high palaeontological sensitivity zones are located in the proposed site.

Refer to Appendix C.2 for the full Heritage Impact Assessment Report.

4.6. Socioeconomic Character

A baseline social impact assessment was conducted in order to gain an understanding of the socioeconomic status of the area and how the proposed project could potentially impact the local communities, both positively and negatively.

In order to obtain baseline information on the social conditions characterizing the study area on individual, community, institutional and organisational level in terms of current and predicted future changes with and without the project, data was collected via the following methods:

- Site visits on 20 October 2017, which covered visual observations of the affected area, including structures, land use, and activities;
- A meeting with local stakeholders on the 25th of January 2018;
- A desktop study of Census 2011 to determine any significant social trends in the area;
- A desktop aerial study of the affected area through the use of Google Earth;
- A desktop study of the Integrated Development Plan (IDP) of the affected Local Municipality (Mandeni);
- Relevant sections from the Spatial Development Frameworks (SDF) as summarised in the IDP.

The manufacturing and agricultural sectors (where sugar cane is the main agricultural activity) play a significant role in the municipal economy. The tourism industry in the Mandeni Local Municipality (LM) is regarded as small but developing.

Mandeni Local Municipality (MLM) is predominately rural in nature where the Ingonyama Trust has authority over the majority of its land mass. Due to the rural nature of the local municipality, the majority of the local population reside in traditional rural settlements scattered haphazardly through the LM.

The population in MLM is growing at a rate of 0.81% per year where a 7% increase was seen between 2001 and 2011.

The unemployment rate in MLM has shown a massive decline, going from 45.1% in 2001 to 28.6% in 2011. Despite the relatively low unemployment rate, approximately 40.4% of the population have no source of income and 24.3% earn less than R400 per month, meaning that almost 64.7% of the population live below the poverty line.

There were major improvements in educational attainment within the municipality between 2001 and 2011, where the number of people with no schooling declined from 19.2% to 10.1%. Additionally, the number of people completing matric increased from 22.3% to 30.6% showing an overall improvement in the level of education in the LM.

Potential impacts have been identified for the proposed establishment of the ADZ at Amatikulu relating specifically to changes to geographical, demographic, economic, institutional and empowerment processes, as well as, socio-cultural processes. The impacts are as follows:

- Potential impacts relating to land acquisition and disposal, including availability of land
- Influx of construction workers/job seekers that will lead to a change in the number and composition of the local community, and impact on economy, health, safety and social well-being
- Potential to enhance economic and employment opportunities for vulnerable communities (*positive impact*)
- Increase equal opportunities to resources (*positive impact*)
- Increased demand on municipal services i.e. water, sewage, power

Refer to Appendix C.3 for the Social Impact Assessment.

4.7. Visual

A visual impact assessment report was conducted for the proposed establishment of the ADZ to identify and quantify the possible visual impacts related to the proposed project.

The visual quality of the region is generally high with large tracts of vegetation and subsistence agriculture characterising most of the visual environment. The entire area where the Amatikulu ADZ is proposed to take place is considered highly sensitive to visual impacts due to its generally low level of transformation. The key visual experience is linked to the use of the road network and associated views of the surrounding landscape, which is characterised by rolling hills, valley bottom wetlands and sandy dunes with low levels of transformation.

Viewer incidence is highest along the roads surrounding and properties directly adjacent to the site. Second to these, are homesteads in close proximity to the site. Considering the proximity of the development to the well-known tourist destination, the Prawn Shak and Amatikulu Estuary, it is expected that any potential visual impact along the property boundaries to the west and south west would be viewed in a negative light. Therefore, overall viewer perception of receptors within the study area will be assumed to be mostly negative.

Overall, the Visual Absorption Capacity (VAC) of the site and surrounds is high, due mainly to the nature of the vegetation (i.e. natural bushveld vegetation). Where the natural vegetation has been cleared to make way for agriculture, or where vegetation has been heavily grazed, VAC is low.

Refer to Appendix C.4 for the Visual Impact Assessment.

5. IDENTIFICATION OF IMPACTS AND RISKS TO THE RECEIVING ENVIRONMENT

5.1. Methodology

Appendix 2 and 3 of Government Notice 326 requires that the nature, significance, consequence, extent, duration and probability of impacts likely to occur must be determined. A summary of the criteria and the rating scales listed below were used to assess the potential impacts that could occur as a result of the proposed development. Professional experience of the EIA Project Team and specialist input were used to determine the ratings.

The impacts anticipated to occur as a result of the proposed development were assessed/ evaluated to determine their significance. The following assessment criteria was used:

Extent (how far the impact extends):

- (1) Very low: within the site only
- (2) Low: within the local neighbourhoods
- (3) Medium: within the region
- (4) High: Nationally
- (5) Very high: Internationally

Duration (the timeframe over which the effects of the impact will be felt):

- (1) Very short: 0-2 years
- (2) Short: 3-5 years
- (3) Medium: 5-15 years
- (4) Long: >15 years
- (5) Permanent

Magnitude (the severity or size of the impact):

- (0) None
- (2) Minor
- (4) Low
- (6) Moderate
- (8) High
- (10) Very High

Probability (the likelihood of the impact actually occurring):

- (1) Very improbable: Less than 20% sure of the likelihood of an impact occurring
- (2) Improbable: 20-40% sure of the likelihood of an impact occurring
- (3) Probable: 40-60% sure of the likelihood of an impact occurring
- (4) Highly probable: 60-80% sure of the likelihood of that impact occurring
- (5) Definite: More than 80% sure of the likelihood of that impact occurring

The **significance** of the potential impacts is determined by the sum of the individual scores for extent, duration and magnitude multiplied by the probability of the impact occurring i.e. $\text{significance} = (\text{extent} + \text{duration} + \text{magnitude}) \times \text{probability}$.

The significance rating scale is interpreted as follows:

- **(2-12) Negligible:** Impact would be of a very low order. In the case of negative impacts, almost no mitigation and or remedial activity would be needed, and any minor steps, which might be needed, would be easy, cheap, and simple. In the case of positive impacts, alternative means would likely be better, in one or a number of ways, than this means of achieving the benefit.
- **(13-30) Low:** Impact would be of a low order and with little real effect. In the case of negative impacts, mitigation and / or remedial activity would be either easily achieved or little would be required, or both. In case of positive impacts alternative means for achieving this benefit would likely be easier, cheaper, more effective, less time-consuming, or some combination of these.
- **(31-56) Moderate:** Impact would be real but not substantial. In the case of negative impacts, mitigation and / or remedial activity would be both feasible and possible. In the case of positive impacts, other means of achieving these benefits would be about equal in time, cost, and effort.
- **(57-90) High:** Impacts of a substantial order. In the case of negative impacts, mitigation and / or remedial activity would be feasible but difficult, expensive, time-consuming or some combination of these. In the case of positive impacts, other means of achieving this benefit would be feasible, but these would be more difficult, expensive, time-consuming or some combination of these.
- **(91-100) Very High:** Of the highest order possible. In the case of negative impacts, there would be no possible mitigation and / or remedial activity and in the case of positive impacts, there is no real alternative to achieving the benefit.

5.2. Anticipated impacts and mitigation measures

Section 2 of Appendix 2 of the EIA Regulations describes the contents of a Scoping Report and states that the report must include *positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected*. Both the construction and operational phases of the proposed activity could potentially impact the receiving environment in terms of biodiversity, hydrology and socio-economic aspects to name a few.

The table below details the potential impacts that may occur as a result of the proposed activity, as well as, recommended mitigation measures. This table may be updated once the draft scoping report has undergone public review and comments are received.

5.1.1. Construction Phase

The table that follows details the assessment of the significance of anticipated environmental impacts during the construction phase according to the impact assessment criteria.

Potential impacts:	Extent (1-5)	Duration (1-5)	Magnitude (0-10)	Probability (1-5)	Significance	Proposed mitigation:	Extent (1-5)	Duration (1-5)	Magnitude (0-10)	Probability (1-5)	Significance
PREFERRED ALTERNATIVE											
Direct Impacts											
Ground water											
Depletion of ground water due to overuse and waste during construction activities	3	2	6	3	33 M	<ul style="list-style-type: none"> • Buffer zones around any wetlands should be established and regarded as No-Go areas for the development. • Install a drainage diversion system to divert clean runoff around areas of potential pollution, e.g. batching areas, workshops, etc. • Ensure that all construction personnel are trained in water wise principles, and that they practise prudent use of water during the construction phase. 	3	2	4	2	18 L
Pollution and contamination of ground water due to: <ul style="list-style-type: none"> • Surface runoff • Unmanaged sewage discharge, leaks and spills • Solvent, paints and chemical spills • Hydrocarbon and fuel leaks and spills 	3	2	8	4	52 M		3	2	6	3	33 L
Hydrology (surface water/estuary/ocean)											
Disturbance and loss of ecological and hydrological function of wetlands located on site due to placement of infrastructure and removal of vegetation	2	2	8	5	60 H	<ul style="list-style-type: none"> • Buffer zones around any wetlands should be established and regarded as No-Go areas for the development. 	2	2	6	4	40 M

Disturbance and loss of ecological and hydrological function of the Amatikulu Estuary owing to the placement of infrastructure (intake and discharge pipes) as well as manipulating the mouth of the Estuary	3	5	10	5	90 VH	<ul style="list-style-type: none"> Install a drainage diversion system to divert clean runoff around areas of potential pollution, e.g. batching areas, workshops, etc. Ensure that all construction personnel are trained in water wise principles, and that they practise prudent use of water during the construction phase. 	3	4	8	4	60 H
Soil and Sand											
Soil contamination and pollution due to: <ul style="list-style-type: none"> Unmanaged surface runoff (grey water, cement slurry and wash water) Unmanaged sewage discharge, leaks and spills Solvent, paints and chemical spills Litter and other inert construction waste. Hydrocarbon and fuel leaks and spills 	1	2	6	4	36 M	<ul style="list-style-type: none"> Conserve topsoil through pre-emptive stripping and stockpiling prior to the commencement of works in any area, pending reapplication during rehabilitation. All storm water should be diverted to a point where the water must be released in a controlled manner that will not initiate or enhance any erosion. 	1	2	4	2	14 L
Soil erosion by wind and rain due to: <ul style="list-style-type: none"> The removal of stabilising vegetation Soil compaction by movement of construction vehicles, equipment and activities Decrease in water infiltration and an increase of water runoff in construction areas Disturbance of sensitive soils 	1	4	6	3	33 M		1	4	4	2	18 L
Dune erosion due to: <ul style="list-style-type: none"> The removal of stabilizing vegetation Placement of marine pipeline 	2	4	8	4	56 M		2	4	6	3	36 M
Air											
Air pollution due to emissions from construction vehicles and equipment.	3	1	4	4	32 M	<ul style="list-style-type: none"> Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. No vegetation outside of the demarcated construction areas may be removed whatsoever. 	3	1	4	3	24 L
Dust liberated by general construction activities and movement of construction vehicles.	2	1	6	4	36 M		2	1	4	3	21 L

						<ul style="list-style-type: none"> A dust abatement programme should be used. Standard dust abatement measures include watering or otherwise stabilising soils, covering haul trucks, employing speed limits on unpaved roads, minimising vegetation clearing, and promptly re-vegetated after construction is completed. 					
Biodiversity (Flora)											
<i>Removal of invader alien species found on site (positive impact).</i>	1	1	4	3	18 L	<ul style="list-style-type: none"> Minimize the construction footprint and where possible, restrict all construction related activities to previously disturbed areas or transformed vegetation Vegetation disturbance and removal must be kept to a minimum and the areas monitored to ensure that areas are exposed for brief periods of time only. Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. No vegetation outside of the demarcated construction areas may be removed whatsoever. All sites disturbed by construction activities must be monitored for colonization by invasive alien plant species 	1	1	4	5	30 L
Loss of Endangered vegetation and associated loss of species richness due to: <ul style="list-style-type: none"> Site clearing ahead of construction General construction activities and movement of construction vehicles Unmanaged sewage discharge, leaks and spills Solvent, paints and chemical spills Hydrocarbon and fuel leaks and spills Litter and other inert construction waste 	1	4	6	5	55 M		1	4	4	4	36 M
Disturbance of sensitive habitats, specifically wetlands, dune slacks, dunes due to: <ul style="list-style-type: none"> Site clearing ahead of construction General construction activities and movement of construction vehicles Unmanaged sewage discharge, leaks and spills Solvent, paints and chemical spills Litter and other inert construction waste. Hydrocarbon and fuel leaks and spills 	1	4	8	4	52 M		1	4	8	3	39 M
Destruction to coastal environment owing to placement of infrastructure such as feeder pipelines and discharge pipes	3	4	10	4	68 H		3	4	8	3	45 M
Destruction and damage to plant species of conservation importance due to:	1	5	8	4	56 M		1	5	4	2	20 L

<ul style="list-style-type: none"> • Site clearing ahead of construction • General construction activities and movement of construction vehicles 													
Biodiversity (Fauna)													
Loss of faunal habitat for conservation-important fauna species, specifically the critically endangered Pickergills Reed Frog, due to: <ul style="list-style-type: none"> • Site clearing ahead of construction • General construction activities and movement of construction vehicles • Construction dust • Construction material, litter and other inert construction waste 	2	4	8	5	70 H	<ul style="list-style-type: none"> • Minimize the construction footprint and where possible, restrict all construction related activities to previously disturbed areas or transformed vegetation • Vegetation disturbance and removal must be kept to a minimum and the areas monitored to ensure that areas are exposed for brief periods of time only. • Remove only the vegetation where essential for construction and do not allow any disturbance to the adjoining natural vegetation cover. No vegetation outside of the demarcated construction areas may be removed whatsoever. 	2	4	8	4	56 M		
Loss of general faunal habitat and ecological connectivity.	3	4	6	4	52 M	<ul style="list-style-type: none"> • All sites disturbed by construction activities must be monitored for colonization by invasive alien plant species 	3	4	4	3	33 M		
Land Use & Agricultural Potential													
None.						•							
Heritage													
<i>Possible discovery of new artefacts (positive impact)</i>	1	5	4	2	20 L	<ul style="list-style-type: none"> • If archaeological or historical 'chance finds' are encountered, then work in the area must be halted, and a heritage specialist must be called to assess the situation and make recommendations. • If any fossils are discovered during the construction then a palaeontologist must be called to assess their importance and rescue them if necessary. 	1	5	4	3	30 L		
Damage to and / or destruction of archaeological, paleontological or historical artefacts unearthed during construction.	1	5	4	2	20 L		1	5	2	1	8 N		
Visual													

The visual impact of construction, lighting and dust on sensitive visual receptors (i.e. users of roads and observers residing in homesteads/farmsteads, tourism accommodation) within the study area	3	2	6	3	33 M	<ul style="list-style-type: none"> Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting. No afterhours construction work or work on weekends or public holidays is permitted. A dust abatement programme should be used. Standard dust abatement measures include watering or otherwise stabilising soils, covering haul trucks, employing speed limits on unpaved roads, minimising vegetation clearing, and promptly re-vegetated after construction is completed. 	3	2	6	2	22 L
Visual impact of construction, lighting and dust on protected areas (i.e. the Umlalazi Nature Reserve and the Amatikulu Nature Reserve) within the study area.	2	2	6	3	30 L		2	2	6	2	22 L
Socio-economics											
<i>Stimulation of the local economy (positive impact)</i>	3	1	4	2	16 L	<ul style="list-style-type: none"> Where feasible, training and skills development programmes for locals should be run throughout the construction period. Where reasonable and practical, the applicant should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. Establish an employment strategy that is known and communicated to potential job seekers. An aggressive STI and HIV/AIDS awareness campaign should be launched, which is not only directed at construction workers but also at the community as a whole. 	3	1	4	3	24 L
<i>Creation of short-term employment and business opportunities and the opportunity for skills development and on-site training. (Positive impact).</i>	2	1	6	3	27 L		3	1	6	4	40 M
An increase in construction workers and associated increase in social problems for the community, including: <ul style="list-style-type: none"> An increase in alcohol and drug use; An increase in crime levels; An increase in teenage and unwanted pregnancies; An increase in prostitution; An increase in sexually transmitted diseases (STDs). An increase in vandalism. 	3	1	4	3	24 L		2	1	4	3	21 L
Services & traffic											
Increase in demand on municipal services i.e. water, power, sewage, roads.	2	2	6	4	40 M	<ul style="list-style-type: none"> Formalize access roads and make use of existing roads and tracks where feasible, rather than creating new routes through naturally vegetated areas. 	2	2	4	3	24 L

						<ul style="list-style-type: none"> • Ensure that all staff is trained in water wise principles, and that they practise prudent use of water at all times. • Upon completion of the construction period, the Contractor shall ensure that the access roads are returned to a state no worse than prior to construction commencing. • Install sufficient and effective sanitation services at both the construction site and the construction village 					
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5.1.2. Operational Phase

The table that follows details the assessment of the significance of anticipated environmental impacts during the operational phase according to the impact assessment criteria.

Potential impacts:	Extent (1-5)	Duration (1-5)	Magnitude (0-10)	Probability (1-5)	Significance	Proposed mitigation:	Extent (1-5)	Duration (1-5)	Magnitude (0-10)	Probability (1-5)	Significance
PREFERRED ALTERNATIVE											
Direct Impacts											
Ground water											
Depletion of ground water due to overuse and waste during operation	3	4	6	3	39 M	<ul style="list-style-type: none"> • Runoff from roads must be managed to avoid erosion and pollution problems. • Ensure that all groundwater use is permissible in terms of the National Water Act. • No drainage line crossings may be developed without the express permission / authorisation of DWS 	3	4	4	2	22 L
Pollution and contamination of ground water due to: <ul style="list-style-type: none"> • Surface runoff • Unmanaged sewage discharge, leaks and spills • Solvent, paints and chemical spills • Hydrocarbon and fuel leaks and spills 	3	4	8	4	60 H		3	4	6	3	39 M

<ul style="list-style-type: none"> Inadequate cleaning and disposal of water used in aquaculture 						<ul style="list-style-type: none"> Monitor water consumption to ensure that there is no undue waste. Keep up to date records of water monitoring. Undertake six monthly potable water monitoring to ensure that the output quality of the water complies with the minimum standards as prescribed by DWS Undertake six monthly production water monitoring to ensure that the output quality of the water complies with the minimum standards as prescribed by DWS 					
Hydrology (surface water)											
Pollution of the Amatikulu Estuary and the Marine environment owing to discharge	3	4	10	4	68 H	<ul style="list-style-type: none"> Runoff from roads must be managed to avoid erosion and pollution problems. Ensure that all surface water use is permissible in terms of the National Water Act. No drainage line crossings may be developed without the express permission / authorisation of DWS Monitor water consumption to ensure that there is no undue waste. Keep up to date records of water monitoring. Undertake monthly potable water monitoring to ensure that the output quality of the water complies with the minimum standards as prescribed by DWS Undertake six monthly production water monitoring to ensure that the output quality of the water complies with the minimum standards as prescribed by DWS Regularly inspect functionality of screen filter, biofilters and other means of cleaning production use. 	3	4	6	3	39 M
Disturbance and loss of ecological and hydrological function of the wetlands due to runoff, discharges into the wetland, changes to surface characteristics (uncontrolled access) and sedimentation and siltation from erosion	3	4	6	3	39 M		3	4	4	2	22 L
Addition of solids and nutrients to the marine environment owing to discharge	3	4	8	4	60 H		3	4	6	3	39 M

Changes to the water table (nutrient enrichment) owing to build up of organic material	3	4	8	3	45 M		3	4	6	2	26 L
Soil											
Erosion due to soil compaction by uncontrolled movement of staff and runoff	1	4	6	4	44 M	<ul style="list-style-type: none"> Maintain all roads in good condition to prevent dust and erosion. Runoff from roads must be managed to avoid erosion and pollution problems 	1	4	4	2	18 L
Air											
Air pollution by emissions from increased numbers of vehicles	3	4	4	4	44 M	<ul style="list-style-type: none"> Maintain site vehicles and equipment in an acceptable state of repair. Personnel, vehicles and equipment to move along designated routes No off-road driving is permitted. 	3	4	2	3	27 L
Odours emitted from the facility	2	4	6	3	36 M		2	4	4	2	20 L
Biodiversity (Flora)											
Loss of vegetation types classified as Endangered due to uncontrolled vegetation clearing, encroachment of alien invasives and litter and waste	3	5	6	4	56 M	<ul style="list-style-type: none"> No bush clearing is allowed Maintenance workers and staff may not trample natural vegetation and work should be restricted to dedicated roads, paths and gardens within the development footprint No unauthorised access is permitted to buffer areas or any natural areas outside of the facility footprint. No wood may be collected for firewood or any other purpose 	3	5	4	3	36 M
Increase in exotic vegetation/alien species in areas that failed to rehabilitate properly	1	4	6	3	33 M		1	4	4	2	18 L

						<ul style="list-style-type: none"> Regulate and control movement over the site. Personnel, vehicles and equipment to move along designated routes 					
Biodiversity (Fauna)											
Mortality of predatory bird species owing to improper disposal of fish and fish feed	2	5	6	3	39 M	<ul style="list-style-type: none"> Disposal of fish and unused feed is to be done to a licenced disposal facility or via a suitable on-site arrangement that prevents access to scavengers. 	2	5	4	2	22 L
Visual											
Visual impact of direct lighting and sky glow on sensitive visual receptors in close proximity to the proposed development.	2	5	6	3	39 M	<ul style="list-style-type: none"> Retain and maintain natural vegetation in all areas outside of the development footprint. 	2	5	4	2	22 L
Visual impact of the proposed development on the visual quality of the landscape and sense of place of the region	3	5	6	3	42 M	<ul style="list-style-type: none"> Maintain the general appearance of the facility as a whole, including roads and servitudes Monitor rehabilitated areas, and implement remedial action as and when required 	3	5	6	2	28 L
Socio-economics											
<i>Creation of long term employment and business opportunities as well as opportunities for skills development and transfer (positive impact)</i>	3	5	4	2	24 L	<ul style="list-style-type: none"> The operator is responsible for making the necessary arrangements for transporting staff to and from site on a daily basis. The recruitment selection process should seek to promote gender equality and the employment of women wherever possible. 	3	5	4	3	36 M

6. PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT

The environmental impact report is the third phase in the EIA process and will be undertaken should the scoping report be accepted by the DEA.

The aim of the EIR process is to address and assess the significant risks and impacts identified in the scoping report through a consultative process inclusive of specialist studies. The results of the specialist studies will be incorporated into the Environmental Impact Report. Additionally, all significant impacts, as well as, the cumulative effects thereof, will be assessed. Mitigation measures to avoid or reduce the severity of the identified impacts will be detailed in the Draft Environmental Management Programme (EMPr).

The main objectives of the EIR are as follows:

- To determine the policy and legislative context of the project
- Describe the need and desirability of the proposed project
- Determine and assess the nature and significance of the identified impact on the receiving environment
- Identify suitable mitigation measures in order to avoid/reduce identified impacts

6.1. Aspects to be addressed in EIR

Assuming approval of the Scoping Report, the following key aspects will be addressed in the Environment Impact Assessment phase:

- Provide a detailed description of the proposed activity
- Specialists will conduct studies. Their findings will be incorporated into the report and used to inform the process
- Refine the proposed layout based on specialist inputs and recommendations
- Environmental impacts on the receiving environment will be fully assessed and evaluated, inclusive of cumulative impacts
- Provide an environmental management programme for the lifecycle of the proposed project (planning and design, construction and operation phases). The EMPr will contain all mitigation measures to be implemented to avoid and/or reduce the negative impacts to the receiving environment
- A detailed public participation report will be compiled detailing all measures undertaken during the process (advertisements, meeting minutes, comments and response report etc.)
- Provide an environmental impact statement and EAP recommendation

6.2. Aspects to be assessed by specialists

The following specialist studies will be undertaken to assess the risk to the receiving environment:

- Heritage impact assessment (already undertaken)
- Terrestrial ecology impact assessment and Wetland delineation
- Assessment of aquaculture specific impacts
- Visual impact assessment (already undertaken)
- Social impact assessment

The table below details the terms of reference for each specialist study

Table 9: Terms of Reference for Specialist Studies

Specialist study	Terms of Reference
Heritage Impact Assessment	<ul style="list-style-type: none"> • Phase 1 Heritage Impact assessment investigation in accordance with the provisions of Sections 38(1) and 38(3) of the National Heritage Resources Act (Act No. 25 of 1999) (NHRA) • Identify and provide a detailed description of all artefacts, assemblages, settlements and structures of an archaeological or historical nature (cultural heritage sites) located on the study area • Estimate the level of significance/importance of these remains in terms of their archaeological, historical, scientific, social, religious, aesthetic and tourism value • Assess any impact on the archaeological and historical remains within the area emanating from the development activities • Propose recommendations to mitigate heritage resources where complete or partial conservation may not be possible and thereby limit or prevent any further impact
Terrestrial ecology impact assessment	<ul style="list-style-type: none"> • A high-level ecological screening of the entire site to determine ecologically sensitive / no-go areas for development, so that this information can be used from a spatial perspective in the concept layout, which will inform the EIA process • The development of a methodology to determine ecological sensitivity of the site in relation to the proposed development and layout. Consideration of dune ecology (considering possible marine abstraction and discharge infrastructure), coastal wetlands and the adjacent Matigulu estuary. • Faunal and floral (species) richness assessment and determination of any threatened or near threatened species or effects on such species due to the proposed development • Identify and describe ecological risks or disturbances to ecological processes that may occur as a result of the development • Undertake sampling of terrestrial affected habitat through site sampling and transect development from highwater mark westwards. Use will be made of the coastal delineation to determine an ecological coastal set back line. Faunal assessments will be undertaken through habitat evaluation and site review through diurnal and nocturnal periods. • Undertake wetland functional assessment on delineated wetland systems (above) utilizing primary data collection

	<ul style="list-style-type: none"> • Estuarine assessment using desktop data and primary data collection • Provide mitigation measures • Devise a monitoring programme for the site
Assessment of aquaculture specific impacts	<ul style="list-style-type: none"> • High level identification of environmental risks common to aquaculture, such as biodiversity impacts, waste impacts and disease. • Determination of the degree to which these impacts will apply to the Amatikulu ADZ • Provide mitigation measures • Devise a monitoring programme for the site
Visual impact assessment	<ul style="list-style-type: none"> • The creation of a detailed digital terrain model (DTM) of the potentially affected environment • The sourcing of relevant spatial data to develop an understanding of the existing visual character and quality of the receiving environment. This includes cadastral features, vegetation types, land use activities, topographical features, site placement, etc. • The identification of sensitive environments upon which the proposed development could have a potential visual impact • The creation of viewshed analyses from the proposed development area in order to determine the visual exposure and the topography's potential to absorb the potential visual impact. The viewshed analyses will take into account the dimensions of the proposed structures
Social impact assessment	<ul style="list-style-type: none"> • Determination of the status quo of the area • Current land use of the area, settlement patterns etc. • Define the economic processes in the area such as employment status and household income • Determine the baseline institutional and empowerment processes i.e. service delivery • Socio-cultural processes relate to the way in which humans behave, interact and relate to each other and their environment, as well as the belief and value systems which guide these interactions • Overview of the expected change processes as well as the expected impacts that might occur as a result of the change processes taking place. • Recommendations on how the assessment of the potential impacts should be undertaken within the EIA Phase.

6.3. Public participation

Public participation forms an integral part of the Environmental Impact Assessment (EIA) process. As per section 41 of the EIA Regulations (GN 982 of 2014 and amended in 2017 by GN 326), the following was undertaken for the Scoping phase:

- A list of Interested and Affected Parties (I&APs), as well as, compliance authorities was compiled
- Written notification of the proposed development, including a background information document, was sent to all identified I&APs and compliance authorities on 15 August 2017
- A printed advertisement was placed in the Zululand Observer, a local publication, on 18 August 2017
- Notice boards were placed at the main entrance to the property and in the surrounding area on 11 August 2017
- Pre-application meetings were held with the Competent Authorities (DEA, Provincial Authorities etc.) on 5th March 2018 in Cape Town and on 12 March 2018 in KZN

Refer to Appendix B for proof of placement.

The public participation process will continue during the EIR phase of the EIA process. The public participation process will follow on from the scoping phase and include the following:

- Upon completion of the Draft Scoping Report, all stakeholders will be notified, and the document made available for comment for a period of 30 days
- A public meeting will be held 2 weeks after the draft is made available to stakeholders
- All comments and issues raised will be addressed in a comments and response report and included in the Final Scoping Report submitted to the competent authority
- Notification of the acceptance or denial of the final scoping report to all stakeholders
- Invitation to comment on the draft environmental impact report for a period of 30 days
- Notification of the availability of the final environmental impact report
- Notification of environmental authorization or denial and the stakeholder's right to appeal the decision

Additionally, throughout the entire process, the stakeholder list will be updated and maintained as and when necessary, all comments received will be addressed in a comments and response register. Further public meetings will also be held if needed.

7. CONCLUSION AND RECOMMENDATIONS

7.1. Risks and Challenges identified

The following potential risks and challenges with establishing the ADZ have been identified:

Water Supply

The feasibility of obtaining seawater to the site needs to be investigated. Two (2) methods are proposed in the report; abstracting seawater from the Amatikulu Estuary and abstracting seawater from the ocean.

The abstraction of seawater from the Amatikulu Estuary and subsequent discharge of treated wastewater back into the Amatikulu Estuary is likely to result in impacts on the estuary environment. Whilst this option is financially more feasible than abstracting and discharging into the ocean, it carries a higher environmental risk, with moderate to high significance ratings post mitigation. The Amatikulu Estuary is classified as a temporary open/closed estuary, and therefore the salinity of the water will vary according to the state of the estuary mouth. Additionally, the Amatikulu Estuary is considered to be regionally significant and in good condition.

The other source for the abstraction of water and discharge, is the ocean. This too has associated environmental impacts, although less significant. This option is, however, more expensive and subject to further feasibility investigation.

Economic Feasibility

- High infrastructure costs associated with the construction of a marine inlet and outlet pipeline.
- Potential loss of capital due to non-performance of the ADZ (Aquaculture projects along the KZN coastline have failed before)

Environmental Considerations

- The Amatikulu Estuary could potentially form part of the proposed Operation Phakisa Thukela Marine Protected Area
- Potential conflicts with proposed environmental coastal setback lines identified by the Ecologist, as well as, risk lines identified by Province

7.2. Further Information needed

In order to make an informed decision and to progress forward in the establishing of the ADZ at Amatikulu, the following further actions are recommended:

- Identification of specific impacts associated with aquaculture
- Estuarine impact assessment

7.3. Statement

It is the recommendation of the EAP that further studies identified above be undertaken to inform the decision-making process.