

PART 1: DRAFT ENVIRONMENTAL IMPACT REPORT

DEA Reference: 14/12/16/3/3/2/1078

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



Prepared by:



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FOREWORD

This report constitutes the Draft Environmental Impact Assessment Report and has been circulated digitally for Stakeholder comment for a period of 30 days.

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, will be captured in a Comments and Responses Register, which will be made available to all I&AP's and included in the Final Environmental Impact Assessment Report for submission to the National Department of Environmental Affairs.

All comments on the Draft Environmental Impact Assessment Report must be in writing and must reach NuLeaf by no later than close of business on **04 March 2019**.

Please mark all comments for the attention of:

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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).

SECTION A

1. INTRODUCTION

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

Aquaculture is defined as the farming of aquatic organisms including fish, molluscs, crustaceans and plants in controlled or selected aquatic environments, with some form of intervention in the rearing process to enhance production, such as regular stocking, feeding, protection from predators, etc. Farming also implies individual or corporate ownership of the stock being cultivated.

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 Draft Environmental Impact Report for the proposed project.

1.1. Project Applicant and Project Overview

By 2030, as stated by the Food and Agriculture Organization (FAO), fish farming will dominate fish supplies. With aquaculture already providing half of the global seafood demand, it is now well known that marine harvesting and 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.

In this regard, the South African Department of Agriculture, Forestry and Fisheries (DAFF) are (amongst other initiatives) facilitating the establishment of Aquaculture Development Zones, such as that which is proposed for Amatikulu in KwaZulu- Natal. Suitable land and sea-based sites have been identified for marine aquaculture activities along the South African coastline. Some of the sites are earmarked by the DAFF for the development of ADZ's and hatcheries. The aims of the Department are to negotiate and obtain consent from the land owners, undertake the EIA processes where necessary, declare an ADZ and develop the site by installing required basic infrastructure such as road, electricity, security fence, reservoir, water pump, water extraction and discharge pipeline etc. ADZ's have the ability to create an enabling environment that will promote growth and sustainability of the marine and freshwater aquaculture sector in South Africa, as well as to enhance the industry's contribution to economic growth.

The preferred site for the proposed aquaculture development zone is a 108 Ha piece of land owned by the Ingonyama Trust. However, only approximately 36 Ha of the site will be utilized for aquaculture activities.

The proposed 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.

A detailed project description is provided in Section 2.

1.2. Project Motivation

1.2.1. 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.

- *Does the proposed land use/development fit the surrounding area?*

The proposed site itself contains an existing aquaculture facility and the surrounding land uses include farming, tourism facilities and low-density informal housing.

- *Will the benefits of the proposed land use/ development outweigh the negative impacts of it?*

The benefits associated with the proposed establishment of the ADZ will be positive, contributing to economic growth, community beneficiation and employment opportunities. Most negative impacts may be mitigated thorough sensitive planning and other appropriate mitigation measures employed during construction and operation. These must be adhered to at all times in this sensitive environment.

- *Will the proposed land use/ development impact on the sense of place?*

Aquaculture activities are currently taking place on the site already, albeit at a much smaller scale. It can, therefore be said, that a visual impact already exists. However, the construction of the intake and discharge pipelines into both the sea and estuary could impact on the sense of place of beach goers and holiday makers.

- *Will the development set a precedent?*

The proposed ADZ will not set a precedent.

- *Will any person's rights be affected by the proposed land use/ development?*

No person's rights will be affected by the proposed ADZ. The proposed site is owned by the Ingonyama Trust and has the approval of the Tribal authority.

¹ Mandeni Local Municipality Spatial Development Framework, 2017/18

- *Will the proposed land use/ development compromise the urban edge?*

The proposed site is not located within the urban edge.

- *Will the land use/ development have any benefits for society in general?*

The proposed establishment of the ADZ will provide employment opportunities for the local community during both the construction and operational phases. There will also be an opportunity for skills development and transfer. The creation of jobs in the Mandeni Local Municipality is extremely important owing to the high unemployment rate and lack of available jobs.

1.2.2. 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 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.

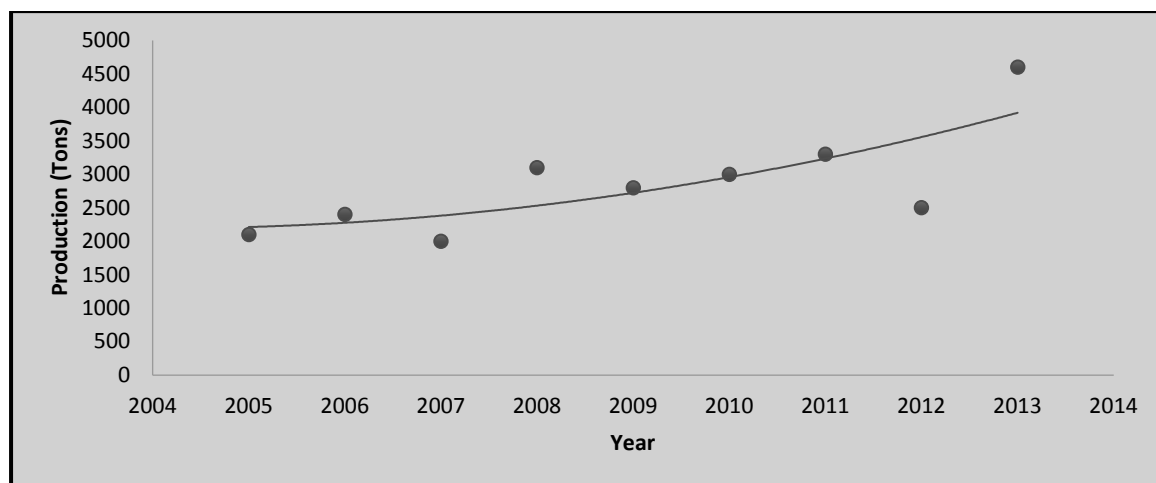


Figure 1: Growth in the South African aquaculture sector from 2005 to 2014

(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 develop 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.

1.3. EIA Project Team

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 EIA Project Team is comprised of the following members, inclusive of specialists who have provided inputs during the course of the project:

Table 1: EIA Project Team

Name	Organization	Role/ Specialist Study
Environmental Assessment Practitioners		
Peter Velcich	NuLeaf Planning and Environmental	Project Leader (SACLAP)
Etienne Hindrichsen	NuLeaf Planning and Environmental	Principle Assessment Practitioner, Aquaculture specialist (SACNASP)
Bryony van Niekerk	NuLeaf Planning and Environmental	Assistant Assessment Practitioner
Specialists		
Jan-Willem Boonzaaier	MBB Consulting	Civil Engineer
Simon Bundy	SDP Ecological and Environmental Services	Ecological Assessment
Sipho Gama	Kwenze Manje Consulting Project Management	Social Impact Assessment
Francois Coetzee		Cultural Heritage Impact Assessment
Tosca Grunewald	NuLeaf Planning and Environmental	Visual Impact assessment
Barry Clark	Anchor Environmental	Marine Impact Assessment
Amy Hunter	EOH Coastal and Environmental Services	Estuarine Impact Assessment
Paul Hansmeyer	Engeolab	Hydrological Assessment

1.4. Details and Expertise of the EAP

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.

Peter Velcich (Project Leader):

As Director of NuLeaf Planning and Environmental, Peter will act as an aide to Mr Etienne Hinrichsen in that he will be responsible for EIA oversight and quality control. In his own right he is a highly accomplished landscape architect, with specialisation in environmental planning and management, land use planning, master planning and tourism development. He is a Registered Professional Landscape Architect (PrLArch) with a Master's Degree in Landscape Architecture and 22 years of experience.

Etienne Hindrichsen (Lead EAP):

Etienne is the project coordinator, lead Environmental Assessment Practitioner (EAP) and client liaison. He is a leading authority on aquaculture planning in Southern Africa and has been practicing in the sector for more than 16 years. Although he has been involved in aquaculture policy, strategy and master planning in a number of SADC countries, and is regularly involved in feasibility assessment and planning, he specialises in statutory approvals (EIA's, water use licences, risk assessment etc.) and environmental management practices in the aquaculture sector.

Etienne has a wealth of planning and assessment skills in that he wrote the Environmental Impact Assessment Guideline for Aquaculture in South Africa (GN 201 of 2013), wrote the guideline and operation policy for water use in aquaculture in terms of the National Water Act 36 of 1998 and has written (and reviewed) a number of documents for DAFF on the subject (e.g. The Environmental Integrity Framework for Marine Aquaculture, 2012). Apart from having undertaken a number of aquaculture EIA's, he also recently completed the writing of the Regional Framework on Environmental Management for Sustainable Aquaculture Development in Africa for the African Union (2016).

Etienne's aquaculture planning work spans from having been the pioneering developer of cage aquaculture in the Lesotho Highlands, to aquaculture master planning in Namibia, harbour revitalisation plans in South Africa and more.

Etienne will also take the lead in the public participation component as he has been trained internationally in public participation (IAIA).

Etienne holds the degrees BSc.Agric and M.Phil (Aquaculture). He is a member of the International Association of Impact Assessors (SA), the Environmental Law Association and the Aquaculture Association of Southern Africa (previous chair). He has registered as a Professional Natural Scientist (Pri.Sci.Nat) with the South African Council for Natural Scientific Professions (SACNASP).

Bryony van Niekerk (Assistant EAP):

Bryony is an Environmental Practitioner and will provide direct assistance with all of the EIA components (report compilation, management and coordination of specialists, public participation etc.). Bryony has a BSc.Hons in Environmental Management and 5 years of experience, where she has specialised in environmental planning and management.

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

1.5. Objective of the Environmental Impact Report

Prior to the submission of this EIR, a comprehensive Scoping Process was undertaken. The main objectives of the Scoping report were to identify Interested and Affected Parties (I&AP's), motivate for the need and desirability of the proposed project and to identify key issues. The Scoping Report was circulated to all I&AP's for a comment period of 30 days extending from 2 July 2018 to 1 August 2018. All comments received on the draft scoping report were addressed and included in the final scoping report. This final scoping report was submitted to the Department of Environmental Affairs (DEA) on 16 August 2018. The DEA accepted the final scoping report and the plan of study for the EIA on 13 September 2018.

This Draft EIR is being circulated to all I&AP's for a comment period of 30 days. All comments received on this report will be included and addressed in the final EIR. For continuity purposes, comments received during the scoping phase have been included in Appendix E.

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 environmental impact assessment process are to:

- Identify the relevant policies and legislation
- Motivate for the need and desirability of the proposed project
- identify the location of the development footprint within the approved site as contemplated in the accepted scoping report based on an impact and risk assessment process
- Determine the nature, significance, consequence, extent, duration and probability of the impacts occurring
- Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted scoping report based on the lowest level of environmental sensitivity identified during the assessment
- Identify suitable measures to avoid, manage or mitigate identified impacts

It is important to note that the environmental impact assessment process must be undertaken in line with the approved plan of study for environmental impact assessment.

Appendix 3 of the 2014 NEMA EIA Regulations, as amended, stipulates and prescribes the content of the EIA Report and also specifies the type of supporting documentation that must form part of the submission of the EIA Report to the Competent Authority. Table 2 below details these requirements and refers the reader to relevant pages where specific information can be found for ease of reference.

Additionally, Appendix 3 states that an EMPr is required as part of the EIA Process. This EMPr can be found under Appendix G and has been compiled as per the requirements outlined in Appendix 4 of GN R326 of the EIA Regulations, 2014 as amended.

Table 2: EIA Requirements

EIA Regulations, 2014 Requirements	Page Reference
(a) details of-	
(i) the EAP who prepared the report; and	Section 1.3 and 1.4
(ii) the expertise of the EAP, including a curriculum vitae;	Appendix A
(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, 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 as well as the associated structures and infrastructure at an appropriate scale, or, if it is-	Appendix B
(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 2.4

(ii)	a description of the activities to be undertaken, including structures and infrastructure;	Section 2.3
(e)	a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	Section 2.5
(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 development footprint within the approved site as contemplated in the accepted scoping report;	Section 1.2
(g)	a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Section 3.1
(h)	a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including -	
(i)	details of the development footprint 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 5 and Appendix E
(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 E
(iv)	the environmental attributes associated with the development footprint 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 6 and Appendix F
(vi)	the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks	Section 6.1
(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 6 and Appendix F
(viii)	the possible mitigation measures that could be applied and level of residual risk;	Section 6 and Appendix G
(ix)	if no alternative development footprints for the activity were investigated, the motivation for not considering such; and	N/A
(x)	a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	Section 7
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will	Section 6

impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including—	
(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process;	Section 7
(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Section 6 and Appendix G
(j) an assessment of each identified potentially significant impact and risk, including-	Appendix F
(i) cumulative impacts;	
(ii) (the nature, significance and consequences of the impact and risk;	
(iii) the extent and duration of the impact and risk;	
(iv) the probability of the impact and risk occurring;	
(v) the degree to which the impact and risk can be reversed;	
(vi) the degree to which the impact and risk may cause irreplaceable loss of resources;	
(vii) the degree to which the impact and risk can be mitigated;	
(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Section 4 and Appendix D
(l) an environmental impact statement which contains—	Section 7
(i) a summary of the key findings of the environmental impact assessment	Section 7
(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and	Appendix B
(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Section 7
(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Section 7 and Appendix G
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Section 3
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Section 7 and Appendix G
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	N/A
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 7
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date	N/A

on which the activity will be concluded and the post construction monitoring requirements finalised;	
(s) an undertaking under oath or affirmation by the EAP in relation to-	Appendix H
(i) the correctness of the information provided in the reports;	
(ii) the inclusion of comments and inputs from stakeholders and I&APs;	
(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and	
(iv) 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;	
(t) where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(u) an indication of any deviation from the approved scoping report, including the plan of study, including—	N/A
(i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and	
(ii) a motivation for the deviation;	
(v) any specific information that may be required by the competent authority; and	N/A
(w) any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A

SECTION B

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

2.2. Site Selection

The preferred site and alternatives site were selected based on a report compiled identifying suitable sites for land based marine aquaculture development zones in South Africa, as well as, an environmental screening study undertaken by the CSIR for the proposed Amatikulu Site. Additional information regarding the site selection process is discussed under Section 3.

2.3. Description of the proposed activity

The proposed site 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 still 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 Amatikulu ADZ will be a land-based aquaculture development which will be comprised solely of tanks/ ponds/ tunnels or a combination thereof. Both marine and fresh water species will be farmed. A typical agricultural bow-tunnel consists of a steel frame that is covered with semi-translucent plastic sheeting. These can range in size and design with a typical single tunnel unit usually measuring approximately 8 x 30 meters. These tunnels are often erected side-by-side and end-to-end to create a multi-span production unit. The front and back ends of a tunnel may be constructed either of the same covering plastic or a more durable material such as brick and mortar.

The aquaculture production pond that are housed inside such tunnel system could be built of concrete, or they could be pre-moulded from fibreglass or other compound plastics. A conceptual layout has been developed. Please refer to Appendix B. The proposed ADZ will utilize and refurbish the old tunnels and pawn farm facility.

The proposed project will be broken down into two phases. Phase 1 will comprise the refurbishment of the existing earthen ponds and tunnel-based tank systems that were historically used for Prawn and Ornamental Fish culture. The refurbishment of the old tunnels will consist of waterproofing the concrete production tanks where required

and fitting the tunnels with new steel framework and cladding with new plastic. This plastic cladding will be covered with low density shade cloth to prevent wind and hail damage. Other 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 expansion 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.

The existing Amatikulu Pet Food Products facility will be decommissioned and the area where the effluent dams are located will be rehabilitated.

2.3.1. Species Selection

A range of potential freshwater and marine species were considered for the Amatikulu ADZ. Generally, these species have been chosen from a range of species that have been farmed in South Africa historically, or which show some degree of potential for future aquaculture use in land-based farming systems in South Africa. The species were evaluated based on certain criteria such as climatic suitability, aquaculture technology, ease of husbandry and marketability and profitability.

The outcome of this assessment determined the best suited freshwater and marine candidate species to be the following:

Table 3: Top freshwater candidate species

Ornamental	Small tank and small pond culture, in tunnels, under roof, in constructed buildings and to a lesser extent outdoors in small earthen, lined or fabricated ponds (with bird netting).
Tilapia	Medium to large fabricated pond culture, in tunnels or outdoors, and in earthen ponds (with bird net covering).
Catfish	Medium to large fabricated pond culture, in tunnels or outdoors, and in earthen ponds (with bird net covering).
Nile Crocodile	Mainly in penned enclosures (1/3 water 2/3 land) which can be indoors, in tunnels or outdoors

Table 4: Top marine candidate species

Dusky Kob	Medium to large fabricated pond culture, in tunnels or outdoors, and in earthen ponds (with bird net covering).
Barramundi	Medium to large fabricated pond culture, in tunnels or outdoors, and in earthen ponds (with bird net covering).
Sea Cucumber	Mainly large earthen ponds.

Refer to Appendix C for the full assessment.

It should, however, be noted that the intention of the proposed ADZ is to create an investment ready opportunity whereby the Developer can establish new species over time. Therefore, the list mentioned above is only a few of the species which could potentially be farmed.

2.3.2. Aquaculture Production Systems

The Amatikulu ADZ will be used to accommodate a range of aquaculture production facilities. These could include the following:

- Basic earthen ponds, which are usually only covered by bird netting. In certain instances these ponds may be lined with clay or compound plastic sheeting to prevent seepage. The size of earthen ponds can range in accordance with the species and landscape that is used. They can be as small as 10 square meters and range up to one hectare and more, with a typical depth of 1 – 2 meters.
- Tank systems can range in size and shape, but are typically square, rectangular or round and usually hold from half a cubic meter of water to 200 cubic meters and more. These systems are usually constructed from concrete, fibreglass or moulded compound plastics and are used either outdoors, inside of plastic bow tunnel systems, under roof in open sided shed structured or fully enclosed within buildings.

The final design will depend on the species that are chosen by the Developers that occupy the ADZ.



Figure 2: Examples of pond and tank systems used in ADZ

In the first phases of the development of the Amatikulu ADZ, harvested fish will be transported off site for processing. As the ADZ develops, a central processing facility may be developed, which will initially consist of basic facilities in which the insides of the fish will be removed (referred to as primary processing) and where the fish will be iced and transported from the site. These basic facilities will be housed indoors (typically a steel frame shed with isolated side walls and roof) in which a series of slaughtering tables will be arranged where fish will be gilled and gutted by hand. These facilities are likely to be associated with an ice making plant to provide ice for the

packing of fish. As production increases in the ADZ, consideration will be given to more advanced processing facilities in which fillets and other value added products may be prepared and in which blast and storage freezers may be added.

2.3.3. Services and Infrastructure

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 5: 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 6: 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 7: 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 8: 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 9: 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 10: 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

Waste Water Treatment

Three (3) package plants for the treatment of sewage are being proposed: one for domestic sewage, one for effluent emanating from the marine tunnels and one for effluent emanating from the freshwater tunnels. These facilities will be designed around site specific conditions, however, it will be similar in design to the following:

The waste water treatment facility will include all unit processes and treatment components required to accomplish screening, primary treatment, and nitrification, solids removal (secondary settling) and disinfection (chlorination) tanks. This system uses proven trickling filter technology and will consist of the following:

Screening Facility:

This facility will consist of an inlet box (civil) with bar screen and drip tray. Once a week, an operator will rake trapped matter (screenings) with a manual rake onto the drip tray and leave this to dewater. The (semi-dry) screenings from the previous week will be carted away by the operator to a licenced disposal site.

Primary Treatment Tank:

The raw sewage, after screening, will enter a two compartment anaerobic reactor. The anaerobic reactor will be a concrete structure. The anaerobic reactor has been designed with enough retention time to allow the solids and sludge to settle out and be digested in the first compartment, while the second will mainly contain grey water. Anaerobic conditions in this tank will ensure BOD removals of at least 40 % to 50 %. Additionally, aerobic sludge from the secondary settler will be recycled to the inlet of this tank, to be further digested. This reduces the overall sludge volume produced in the biological system.

Trickling Filter Feed Pumps:

These are installed in the primary treatment tank. After primary treatment, the effluent will be discharged into a pump sump (Anoxic Reactor) from where it will be re-circulated by open impeller submersible pumps (duty/standby) through the trickling filter. This sump has been sized with a hydraulic retention time in excess of 60 min, which allows for anoxic conditions to prevail.

Trickling Filter (Aerobic Reactor):

The trickling filter system consists of a bed of highly permeable medium, which serves as host for micro-organisms to attach to and grow on, and form a biological film. The wastewater is sprayed over and percolates through the media. Organic material in the wastewater is absorbed by the micro-organisms growing as a biological film on the media. In the outer portion of the film, aerobic organisms degrade organic material, whereas anaerobic organisms exist deeper into the biological film, i.e. near the surface of the media. The water, after percolating through the media, will be collected in the trickling filter basin. Biological solids that have become detached from the packing media have to be removed before the effluent is disinfected and can be finally discharged. Removal of the biomass is achieved in a conventional, secondary settler.

Clarifier:

The water from the trickling filter basin will be directed to the clarifier. Water from the trickling filter contains solids made up of a mixture of aerobic and anaerobic sludge. This sludge will be heavier (and lower in volume) than aerobic sludge produced in an activated sludge plant and does not produce scum. It will settle and accumulate at the bottom of the clarifier. Sludge will periodically be withdrawn from the bottom of the clarifier and will be gravitationally fed to the anaerobic reactor.

Disinfection:

Clarified water from the clarifier is discharged into the chlorine contact tank. This tank has been sized for an effective contact time of 20 min at Average Dry Weather Flow (ADWF). Disinfection will be provided by a hypochlorite dosing system.

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.

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

Table 11: 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	Pipelines will be constructed and operated to abstract seawater and to discharge waste water into the ocean. All of these pipelines will

	m or more or (ii) peak throughput of 120 liters per second or more	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 where such development occurs within (a) a watercourse (c) within 32 meters of a watercourse	Sea water abstraction pipelines will be located within 32 meters of the ocean and estuary.
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	The seawater abstraction pipeline and the waste water discharge pipeline start and end in the ocean respectively. They will run from the

	with a development footprint of 50 square meters or more	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 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.
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	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

	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	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	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: (a) Activities which are identified and included in Listing Notice 1 of 2014; (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 (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.	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)	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	In total up to 6 water reservoirs could be developed, each with a capacity of up to 2500 cubic meters. The southern portion of the proposed site encroaches marginally into the estuarine functional zone. Additionally, the

	setback line or within 1 km from the high-water mark of the sea	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.
4 (d) (i) (viii) (xii) (aa) (bb)	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	5m wide roads within the proposed site have been proposed. 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.
12 (d) (iv) (v) (vi) (vii) (viii) (xiii)	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. (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; (v) Within critical biodiversity areas identified in bioregional plans; (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. (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	Approximately 490 000 square meters of indigenous vegetation will be cleared for structures and infrastructure. 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. 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.
13 (d) (iv) (vii) (viii) (x)	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	The proposed site has been identified as an aquaculture development zone by DAFF.

	development setback line or within 100 m from the edge of a watercourse (viii) areas within a watercourse or wetland (x) critical biodiversity area	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.
14 (i) (ii) (iii) (iv) (v) (vi) (x) (xii) (a) (c); (d) (i) (vii) (x) (aa) (bb)	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 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>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 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>
18 (d) (v) (viii) (xii) (aa) (bb)	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>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</p>

		Reserve lie to the south west and north east of the site respectively.
23 (i) (ii) (iii) (iv) (v) (vi) (x) (xii) (a) (c); (d) (iii) (vii) (x) (aa) (bb)	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 seawards of the development setback line or within 1 km from the high water mark of the sea	Some of the existing infrastructure on site, such as the canals, buildings and storm water infrastructure, will be expanded. 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.
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	Aquaculture activities are already established and ongoing on the proposed site. In this regard, these existing activities and operations will be expanded. 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.

2.5. 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: <ul style="list-style-type: none"> <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. Additionally, the uThuleka Marine Protected Area has been declared, which is located between Mlalazi and Seteni Estuaries and which encompasses Amatikulu.	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	Department of Environmental Affairs	2004

	<p>ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed (see below).</p> <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</p>	South African Heritage Resources Agency (SAHRA)	1999

	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).		
The National Water Act 36 of 1998	This Act aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. The proposed development will have to ensure that local water resources are protected, used, developed, conserved, managed and controlled in a responsible way.	Department of Water and Sanitation	1998
The National Water Services Act 108 of 1997	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.	Department of Water and Sanitation	1997
National Environmental Management Waste Act 59 of 2008	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. The proposed development will be subject to this Act in terms of the disposal of waste.	Department of Environmental Affairs	2008
Hazardous Substances Act 15 of 1973	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.	Department of Health	1973

National Environmental Management: Air Quality Act 39 of 2004	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 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.	Department of Environmental Affairs	2004
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	National Government	2000

	planning, performance management, resource mobilisation and organisational change which underpin the notion of developmental local government.		
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
Ingonyama Trust Act 3KZ of 1994 (as amended)	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. 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.	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)	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).	Ezemvelo KZN Wildlife	1974

	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.		
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
Marine Living Resources Act (Act No. 18 of 1998)	To provide for the conservation of the marine ecosystem, the long-term sustainable utilization of marine living resources and the orderly access to exploitation, utilization and protection of certain marine living resources.	National Government	1998
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	Mandeni Local Municipality	2013

	<p>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.</p>		
<p>KwaZulu Natal Coastal Management Programme (draft of May 2017)</p>	<p>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.</p>		2017
<p>Integrated Management Plan: Amatikulu Nature Reserve</p>	<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

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. Background

In March 2009, DAFF commissioned a report that investigated land based sites that were suitable for marine aquaculture development along the South African coast line. The focus was on coastal provinces namely sites located in Kwazulu Natal, Eastern Cape, Western Cape and Northern Cape.

Sites were selected based on the following criteria:

- Physical features
 - Location and size
 - Topography
 - Climate
 - Water quality and supply
 - Oceanography and water discharge
 - Soil and vegetation

Criteria	Desirable	Undesirable
Location and size	<ul style="list-style-type: none"> • Located within 1 km of low water mark • Area larger than 2Km² 	<ul style="list-style-type: none"> • Should not be incompatible with conservation, recreation and amenity value of the area • Site should not be located adjacent to MPA • Avoid interaction with bird sanctuaries, sensitive areas like wetlands • Avoid conflict with fishing, diving etc.
Topography	<ul style="list-style-type: none"> • Elevations above mean sea level between 0-17m • Level land • Low slope of 1-5% for pond construction 	
Climate	<ul style="list-style-type: none"> • Site located above the 1:50 year flood line 	<ul style="list-style-type: none"> • Areas prone to cyclones and flooding

	<ul style="list-style-type: none"> • Access to fresh water during dry seasons to avoid hypersalinity in pond systems 	
Water quality and supply	<ul style="list-style-type: none"> • Cost-effective seawater intake and discharge • Deep water close to shore • Water depth of 5-10 m within 100 m of the low water mark • Headlands and other rock or jetty structures to attach pipelines • Remote from major rivers • Availability of reliable groundwater 	
Oceanography and water discharge	<ul style="list-style-type: none"> • Discharge site that allows for rapid dilution by seawater 	
Soil and vegetation	<ul style="list-style-type: none"> • Shallow depth of topsoil/aggregate • Sites vegetated by grasses and low shrubs • Coastal dune systems 	<ul style="list-style-type: none"> • Rocky soils and outcrops • Soils with high water permeability • Soils with high clay content • Soils with high sand and silt compositions • Rock soils and rock

- Economic factors and sustainability
 - Infrastructure and services: sites that have roads, buildings and equipment, access to power
 - Labour, trades and security: availability of skilled and semi-skilled labour, sites within 50 km of a town
 - Transportation and markets

Taking into account all of the available data at the time and based on the selection criteria, 17 preliminary sites were identified along the South African coast line of which two (2) were located in the KZN province. The first identified site included the proposed Amatikulu site and the second site was located further north near the town of Mtunzini.

These 17 preliminary sites were then subjected to further criteria and a site visit which resulted in 12 sites being eliminated, bringing the final list to five (5) sites of which one (1) was located in KZN.

The Amatikulu site was eliminated during the selection process, with the remaining potential site in KZN being the one near Mtunzini. Reasons why the Amatikulu site was eliminated are unknown as they are not discussed in the report.

Upon review of this report, the EAP and client deemed that the Amatikulu site is as suited to the establishment of an ADZ as the Mtunzini site, if not better. The Amatikulu site is already partially disturbed with existing aquaculture facilities on site. therefore, less vegetation clearing would have to be undertaken and the existing facilities can be upgraded and refurbished for the proposed ADZ. Additionally, the Amatikulu site is located within close proximity to the ocean and the Amatikulu Estuary, making water abstraction possible. Lastly, services are also already available on site and can be extended for the proposed ADZ.

3.2. Site Alternatives

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 in theory

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.

3.3. Layout Alternatives

Two (2) layout alternatives are under consideration for the proposed ADZ.

Preferred Alternative: Alternative 1

Refer to Appendix B for the alternative layout for the proposed ADZ.

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.
- Ensuring the ecological setback line is adhered to as far as possible.
- 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:

Two (2) 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, above the ecological setback line.

This preferred layout respects the ecological setback line, with the exception of one marine tunnel in the east.

Advantages of this layout for the proposed activity include the following:

- Ecological setback line is adhered to as far as possible
- Existing infrastructure will be refurbished as far as possible
- WWTW are located outside of the ecological setback line
- No development will occur on the primary and secondary dunes with the exception of the pipelines
- Inclusion of open space areas in the development envelope which aides in visual screening and landscape connectivity
- Less disturbance and development on the existing wetland
- Consolidated layout

Disadvantages of this layout for the proposed activity include the following:

- Infrastructure is located on areas of high sensitivity
- Infrastructure is located on wetland
- Discharge into a confirmed Marine Protected Area

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.

Layout Alternative: Alternative 2

Refer to Appendix B for the alternative layout for the proposed ADZ.

Two (2) 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.

Six (6) 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. two out of the three WWTW, as well as, the treatment extensions are located within the ecological setback line.

Advantages of this layout for the proposed activity include the following:

- Existing infrastructure will be refurbished as far as possible
- No development will occur on the primary and secondary dunes with the exception of the pipelines
- Inclusion of open space areas in the development envelope which aides in visual screening and landscape connectivity

Disadvantages of this layout for the proposed activity include the following:

- Development occurs within the ecological setback line
- WWTW are located within the ecological setback line
- Greater disturbance to the wetland on site owing to placement of infrastructure
- Infrastructure is located on areas of high sensitivity
- Infrastructure is located on wetland
- Discharge into a confirmed Marine Protected Area

Water Supply, Reticulation and Water Treatment

As per the Preferred Alternative: Alternative 1

3.4. 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.

3.5. 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.

3.6. 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.

3.7. 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.

3.8. 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.

3.9. 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.

SECTION D

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.

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 (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 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. Estuarine Environment

An estuarine impact assessment was conducted in January 2019.

The mouth of the aMatigulu estuary is approximately 100 km north east of Durban and 56 km south of Richards Bay. However, the estuarine system comprises of two separate estuaries that join at the mouth. The adjoining estuary is the Nyoni estuary. The combined estuary mouth closes from time to time and is classified as a "temporarily open/closed" estuary.

The aMatigulu-Nyoni estuary mouth is highly dynamic with significant variation in the open/closed state and location of the estuary mouth.

The natural situation regarding the aMatigulu-Nyoni estuary is that the aMatigulu and Nyoni estuaries are often joined. When they are joined, they function as one estuary and the mouth position lies to the north of their confluence. When separated, they function as completely independent estuaries. The separation of these two estuaries appears to always be driven by extreme flood events, which do not seem to occur on a regular basis. When these conditions occur, the breaching of the mouth takes place in a southerly position near the confluence of the two systems. Once the flood conditions recede, the Nyoni estuary may become separated from the aMatigulu estuary as has happened in the past.

It is important to highlight the dynamic nature of the estuary mouth with regards to the impact that abstracting and discharging water into the estuary will have on the mouth conditions and water quality of the estuary. Abstraction from the estuary may result in extended periods of mouth closure, which has an impact on the water chemistry as well as an impact on the distribution of vegetation species as brackish water intrudes further into the freshwater zones.

Conversely, the mouth state of the estuary will also affect the abstraction potential for the ADZ (i.e. open mouth conditions result in a drop in water level, therefore exposing the abstraction pipeline and reducing the availability of sea water).

The aMatigulu-Nyoni estuary has high diversity in macrophytes. The submerged macrophytes (particularly *Ruppia* and *Zostera*) are dependent on extended period of mouth open conditions. The salt marshes (including saline lawns of *Paspalum vaginatum* and *Sporobolus virginicus*) and the reedbeds respond to being flooded, particularly through back-flooding when the estuary water rises after the mouth closes. In terms of the importance of the presence of *Zostera capensis* beds in the aMatigulu-Nyoni estuary, *Zostera* play an important ecological role stabilizing sediment, preventing erosion, reducing water flow, trapping nutrients and organic materials and providing sheltered habitat for fish and invertebrates. *Zostera* beds also serve as a substrate for epiphytes and periphyton, which is a food source for a variety of other organisms. Due to these ecological services that *Zostera* provides to coastal zone, it is considered to be among the most productive and valuable ecosystems on Earth (Adams, 2016).

Zostera capensis is listed as **vulnerable** in the Red Data List of Species (IUCN, 2010; Short et al., 2010). Because it is a keystone species within the coastal environment the loss of seagrass can have significant cascading effects on higher trophic levels and ecosystem functioning. *Zostera capensis* have been recorded near the mouth of the amatikulu estuary in the past, however no noticeable signs were seen on site. It should be noted that the distribution of *Zostera capensis* is known to be highly dynamic within an estuary.

The Estuary Importance Score (EIS) takes size, the rarity of the estuary type within its biographical zone, habitat, biodiversity and functional importance of the estuary into account. Biodiversity importance, in turn, is based on the

assessment of the importance of the estuary for plants, invertebrates, fish and birds, using rarity indices. Estuary Importance was rated at 76, indicating that the estuary is rated as “**Important**”.

The Functional Importance of the Estuary is also **very high**. It serves an important nursery function for marine-living fish, is an important movement corridor for invertebrates and fish breeding in the sea, contributes to detritus, nutrients and sediments to the sea; and plays some role as a migratory stopover for coastal seabirds.

The Amatikulu-Nyoni Estuary in its present state is estimated to be 84% similar to natural condition, which translates into a Present Ecological Status (PES) of a **B Category**. This is mostly attributed to the following factors:

- Recreational activities in the lower reaches, particularly along the shoreline on the sea side, affecting bird abundance;
- Over exploitation of living resources (e.g. poaching and line fishing);
- Agricultural activities in the Estuary Functional Zone causing loss of estuarine habitat; and
- Flow reduction.

In addition, the aMatigulu/Nyoni also forms part of the core set of priority estuaries that requires protection to achieve biodiversity targets in the National Estuaries Biodiversity Plan for the NBA.

Taking into account, the current conditions (PES = B), the reversibility of some impacts, the ecological importance and the national conservation targets, the REC for the aMatigulu/Nyoni estuary is an **A/B Category**.

Refer to Appendix D.7 for the full report.

4.4. 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.

A marine impact assessment was conducted in November 2018.

The Amatikulu area falls within the Natal Bioregion, one of five inshore bioregions located around the coast of South. Harmer & Clark (2017) surveyed dune vegetation in the Amatikulu area. Dune vegetation is adapted to survive the harsh salt spray, wind and unstable sediment conditions of the coastal zone. Their resilience allows for vegetated dunes to serve as a protective barrier from coastal exposure. Dune vegetation was fragmented with small patches of dense coastal forest on the back dune. Beach morning glory *Ipomoea pes-caprae* and the treasure flower *Gazania rigens* was predominantly found at the bottom of the front dune, while the dune koko tree *Maytenus procumbens* and coastal red-milkwood *Mimusops caffra* characterised the back dune.

The beaches in the Amatikulu area are typically depauperate of fauna, due to physical environmental factors and the associated morphodynamic state of the beach. The dune vegetation in the Amatikulu area is characteristic of coastal dunes found in Kwa-Zulu Natal. Such vegetated dunes are, however, considered to be an uncommon habitat due to considerable loss of the habitat through urbanisation. Current factors threatening coastal dune habitats in KZN include urban development, recreational pressure, pollution and alien species. Their protection is important as they serve as a protective barrier from coastal exposure; they reduce beach erosion; and provide a habitat for numerous endemic terrestrial fauna. Although the vegetated dunes throughout the development area are fragmented, they offer important environmental services and are ecologically significant to the area.

The majority of the Amatikulu area is listed as ‘vulnerable’, while the mouth of the estuary is classified as ‘least threatened’.

Refer to Appendix D. 6 for the full marine impact assessment.

4.5. Protected Areas

Nature Reserves

- uMlalazi Nature Reserve: Located just 1 Km from Mtunzini on the KZN north coast. uMlalazi was formally declared in 1948 and is 1028 hectares. This Reserve is home to the Palmnut Vulture classified as Least Concern. The proposed Amatikulu ADZ is located 2 Km south of the Reserve.
- Amatikulu Nature Reserve: This Reserve includes the Amatikulu and Nyoni River Estuaries and covers approximately 2100 hectares. The proposed Amatikulu ADZ is located 3 Km north of the Reserve.

Siyaya Coastal Park

The Siyaya Coastal Park covers approximately 42kms of unspoilt coastline and stretches from the mouth of the Mlalazi River to the southern boundary of the Amatigulu Nature Reserve. It includes two nature reserves as well as pristine coastal dune forest, mangrove forests, swamp forest, grassland and ilala palm bushveld.

The proposed Amatikulu ADZ falls within the Siyaya Coastal Park, located between the uMlalazi Nature Reserve and the Amatikulu Nature Reserve.

Marine Protected Area

The Amatikulu ADZ is located directly adjacent to the newly proposed uThukela Banks Marine Protected Area, while intake and outfall pipeline for the proposed ADZ are located within the boundaries of the MPA. The Minister of Environmental Affairs published for public comment a notice (Notice no. R108) declaring her intention to establish the uThukela Banks Marine Protected Area (TBMPA) under section 22A of the National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003) (NEMBA: PAA) on 3 February 2016, along with a second notice (Notice no. 103) outlining draft regulations for the management of this MPA (Government Gazette No. 39646). On 24th October 2018, the Acting Minister of Environmental Affairs announced the approval of 20 new Marine Protected Areas, inclusive of uThuleka Banks.

This MPA was identified as a priority area for protection of threatened mud and gravel seabed habitats, reefs and submarine canyons. It is supported by South Africa's second largest river, the uThukela River, which provides nutrients and sediments to the area. The MPA preserves spawning and nursery areas for many different species such as prawns, other crustaceans and hammerhead sharks found within the turbid waters. Recent research has also revealed deep reef systems supporting a wide variety of seafans and black corals, as well as providing homes to some of South Africa's threatened linefish such as the seventy-four and black musselcracker (T. Livingstone, Ulwandle, 2018).

The proposed Marine Protected Area (MPA) consists of an inshore and offshore area. The inshore area consists of two Inshore Restricted zones and the remainder is an Inshore Controlled Zone. The intake and outfall pipeline for the proposed Amatikulu ADZ development fall within the uThukela Banks Inshore Restricted Zone 1 (TIRZ1). This comprises the inshore portion of the uThukela Banks Marine Protected Area and is defined as the section between the following two co-ordinates (I1) 29° 26.928' S, 31° 36.945' E and (I2) 29° 13.472' S, 31° 31.062' E running from the high water mark to the two meter depth contour.

Refer to Appendix D.6.

4.6. 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.

4.6.1. 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.

4.6.2. 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 D.1 for the full Ecological Report.

4.6.3. Ecological Setback Line

The Integrated Coastal Management Act (2009) identifies the objective of a coastal set back line as being to "protect and preserve". (ICM Act 24 of 2008 and its subsequent Amendment Act 36 of 2014).

It is understood that an MEC (or Provincial Minister) identifies and promulgates the requirements for the identification and establishment of a coastal set back line following engagement with authorities and the public, whereupon the Municipality delineates such a line. While no set back line or criteria for identification of a setback line has been promulgated by the Provincial authorities, given the nature of the Amathikhulu coastline, its rural setting and its present state where it is unencumbered by built structures, it is prudent to provide a draft coastal set back line that meets the requirements for development of the ADZ, going forward. In addition to the above, the setback line plays a functional role in the maintenance of various coastal processes, while it also acts to preserve infrastructure under varying climate change scenarios. This setback has been identified based upon the following:

- Recognition of the increasing level of beach and dune erosion that has arisen along the KwaZulu Natal coast and more importantly, the rapid erosion that has arisen at Tugela Mouth, where over 90m of shoreline has been lost in a matter of four years. Such transgression is accompanied by the loss of built infrastructure and the concomitant landward movement of the dune cordon.
- The line has been established to accommodate a 5,5m / annum retreat forecast over a period of 20 years - this aligns with methods applied in the United Kingdom for the placement of infrastructure on retreating coastlines (DEFRA 2001). A total set back from the dune cordon heel of 110m has been applied.
- The setback accounts for a number of ecological processes, in particular the maintenance of sub surface geohydrology and the maintenance of a vegetated slack. It is to be recalled that much of the habitat within this area is reliant upon the continued disposal of water from the aquaculture development into the slack and areas proximal to the heel of the dune cordon. Nonetheless, as indicated above, the maintenance of

a corridor, unencumbered by development, that runs shore parallel is considered to be of significance from an ecological landscape perspective.

Refer to Appendix D.1 for the full Ecological Report and Appendix A for the maps

4.7. 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 D.2 for the full Heritage Impact Assessment Report.

4.8. 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 D.3 for the Social Impact Assessment.

4.9. 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 D.4 for the Visual Impact Assessment.

SECTION E

5. PUBLIC PARTICIPATION

The public participation process followed to date has been informed by Section 41 of the NEMA Regulations. The Regulations state that:

5.1. Advertisement

The person conducting a public participation process must take into account any guidelines applicable to public participation as contemplated in section 24J of the Act and must give notice to all potential interested and affected parties of the application which is subjected to public participation by—

- (a) *fixing a notice board (of a size at least 60cm by 42cm; and must display the required information in lettering and in a format as may be determined by the department) at a place conspicuous to the public at the boundary or on the fence of—*
 - (i) *the site where the activity to which the application relates is or is to be undertaken; and*
 - (ii) *any alternative site mentioned in the application;*
- (b) *giving written notice to—*
 - (i) *the owner or person in control of that land if the applicant is not the owner or person in control of the land;*
 - (ii) *the occupiers of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;*
 - (iii) *owners and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;*
 - (iv) *the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;*
 - (v) *the municipality which has jurisdiction in the area;*
 - (vi) *any organ of state having jurisdiction in respect of any aspect of the activity; and*
 - (vii) *any other party as required by the department;*
- (c) *placing an advertisement in—*
 - (i) *one local newspaper; or*
 - (ii) *any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations;*
- (d) *placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in subregulation 54(c)(ii); and*
- (e) *using reasonable alternative methods, as agreed to by the department, in those instances where a person is desiring of but unable to participate in the process due to—*
 - (i) *illiteracy;*
 - (ii) *disability; or*
 - (iii) *any other disadvantage.*

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

Section 43 and 44 of the EIA Regulations (GN 982 of 2014 and amended in 2017 by GN 326) states that registered I&APs have the right to comment on all reports submitted and that these comments must be recorded and included in the reports. To this end, the following has been undertaken:

- The Draft Scoping Report was circulated for a period of 30 days to all I&APs, including Compliance Authorities on 2 July 2018
- Two (2) public meetings were held on 24 July 2018 to discuss the findings of the Draft Scoping Report. One at the Tribal Authority at 10 am and one at the Mtunzini Country Club at 17:00 pm
- The Final Scoping Report was circulated to all I&APs, including Compliance Authorities on 16 August 2018
- All comments received on the Draft Scoping Report were recorded in a comments and response report which formed part of the Final Scoping Report

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.

5.2. Comments and Response Report

As per the Regulations, all comments received from stakeholders and the responses have been recorded in a comments and response report.

5.3. Authority Participation

Authority participation has been incorporated into the public participation process. A complete list of stakeholders, inclusive of all identified organs of state can be found in Appendix E.

Refer to Appendix E for public participation document.

6. IDENTIFICATION OF IMPACTS AND RISKS TO THE RECEIVING ENVIRONMENT

6.1. 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. **significance = (extent + duration + magnitude) x 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.

6.2. 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.

6.2.1. Impact Assessment

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
Preferred Alternative (Alternative 1)			
Planning and Design Phase	Direct impacts:		
	Ground Water		
	None.		
	Hydrology (Surface Water)		
	Risk to ecological function of the riparian habitat along the estuary, wetlands and drainage lines	30 L	<ul style="list-style-type: none"> • Water Use planning and Specialist mitigation as per the EMPr (section 2.3 and 6.1).
Risk to hydrological function (quality and fluctuation properties) along the estuary, wetlands and drainage lines	36 M		
Marine Environment			

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
	Risk to coastal habitat of marine fauna	30 L	<ul style="list-style-type: none"> Specialist mitigation as per the EMPr (section 6)
	Risk to subtidal soft sediment	64 H	
Estuarine Environment			
	Risk to water quality of the estuary owing to poor dilution and mixing of aquaculture effluent	20 L	<ul style="list-style-type: none"> Specialist mitigation as per the EMPr (section 6.1)
	Risk of increased sedimentation of the estuary due to inadequate stormwater management	18 L	
	Risk to important habitat features such as <i>Zostera capensis</i> beds which are classified as Vulnerable	22 L	
	Risk to bed and banks of the estuary	22 L	
	Risk to change in estuary mouth dynamics due to abstraction	39 M	
	Risk to water quality and chemistry due to abstraction from and discharge into the estuary.	39 M	
	Biosecurity risk leading to the spread of diseases and introduced alien species to the estuary	33 M	
Coastal Dunes, Sand movement and Soil			
	Erosion risk to soils	18 L	<ul style="list-style-type: none"> Management and stabilization of soils as per the EMPr (section 3.5). Clearing and site preparation as per the EMPr (section 3.1). Ecological assessment as per the EMPr (section 5.4)
	Risk to sensitive coastal dunes	39 M	
Air			
	None.		
Biodiversity (Flora)			
	Risk to endangered vegetation and associated loss of species richness	39 M	<ul style="list-style-type: none"> Development footprint planning as per the EMPr (section 2.1.) Clearing and site preparation as per the EMPr (section 3.1). Vegetation Management as per the EMPr (section 3.6).
	Risk to sensitive habitats, specifically riparian zones, wetlands, dune slacks and dunes	26 L	
	Risk to Critical Biodiversity Areas	42 M	
	Risk to plant species of conservation importance	20 L	
	Risk of invasion of alien vegetation	18 L	
Biodiversity (Fauna)			
	Risk to faunal habitat, which has a high to moderate significance for fauna species conservation and habitat fragmentation	56 M	<ul style="list-style-type: none"> Development footprint planning as per the EMPr (section 2.1.) Clearing and site preparation as per the EMPr (section 3.1).

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
			<ul style="list-style-type: none"> Fauna Management as per the EMPr (section 3.7).
	Land use and Agricultural potential		
	None		<ul style="list-style-type: none">
	Heritage		
	None.		
	Visual		
	Risk to visual quality of the surrounding area and sense of place	30 L	<ul style="list-style-type: none"> Development footprint planning as per the EMPr (section 2.1.) Visual environment planning and lighting as per EMPr (section 2.2) Clearing and site preparation as per the EMPr (section 3.1).
	Socio-economic		
	None.		
	Municipal services and Traffic		
	None.		
	Indirect impacts:		
	Socioeconomics		
	Risk to Blue Flag Pilot beach status of Dokodweni Beach	42 M	<ul style="list-style-type: none"> Socioeconomic planning as per EMPr (section 2.4)
	Cumulative impacts:		
	Biodiversity (Flora)		
	Cumulative loss of endangered vegetation and associated loss of species richness	33 M	<ul style="list-style-type: none"> Development footprint planning as per the EMPr (section 2.1.) Clearing and site preparation as per the EMPr (section 3.1). Vegetation Management as per the EMPr (section 3.6).
	Cumulative loss of sensitive habitats	33 M	
	Cumulative reduction of plant species of conservation importance.	20 L	
	Cumulative loss of Critical Biodiversity Areas	48 M	
	Biodiversity (Fauna)		
	Cumulative loss of faunal habitat rated as high to moderate significance.	30 L	<ul style="list-style-type: none"> Development footprint planning as per the EMPr (section 2.1.) Clearing and site preparation as per the EMPr (section 3.1). Fauna Management as per the EMPr (section 3.7).
Construction Phase	Direct impacts:		
	Ground Water		
	Depletion of ground water due to overuse and waste during construction activities	16 L	<ul style="list-style-type: none"> Pre-construction planning, including development footprint planning and water use planning as per the EMPr (section 2.3) Clearing and site preparation, layout, infrastructure and services, storm water managements as per the EMPr (section 3.1, 3.2, 3.4) Construction water supplies as per the EMPr (section 3.10).
	Pollution and contamination of ground water	16 L	
	Hydrology (Surface Water)		
Disturbance and loss of ecological function of the habitat	33 M		

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
	(physical structure) along the estuary, drainage lines and wetlands		<ul style="list-style-type: none"> • Pre-construction planning, including development footprint planning and water use planning as per the EMPr (section 2.3) • Clearing and site preparation, layout, infrastructure and services, storm water managements as per the EMPr (section 3.1, 3.2, 3.4) • Integrated waste management as per the EMPr (section 3.8) • Construction water supplies as per the EMPr (section 3.10). • Fire management as per the EMPr (section 3.12) • Post construction rehabilitation as per the EMPr (section 3.14). • Specialist mitigation as per the EMPr (section 6)
	Pollution and contamination of surface water of the estuary, drainage lines and wetlands	20 L	
	Disturbance and loss of hydrological function (quality and fluctuation properties) of the estuary, drainage lines and wetland	39 M	
Marine Environment			
	Permanent loss or alteration of coastal dune habitat	21 L	<ul style="list-style-type: none"> • Specialist mitigation as per the EMPr (section 6)
	Permanent loss and/or modification of habitat and temporary disturbance of coastal marine fauna and flora	90 VH	
	Permanent loss or alteration of subtidal soft sediment habitat	90 VH	
	The effect of increased noise and vibration from construction on marine organisms	8 N	
	The effect of waste generated during construction on aquatic fauna.	30 L	
	The effect of the spillage of hazardous substances owing to the use of heavy machinery, construction vehicles and construction vessels.	30 L	
Estuarine Environment			
	Increased sedimentation of the estuary due to unmanaged stormwater	24 L	<ul style="list-style-type: none"> • Stormwater management as per EMPr (section 3.4) • Specialist mitigation as per the EMPr (section 6)
	Disturbance and alterations to the bed and banks of the estuary	65 H	
	Disturbance and destruction of <i>Zostera capensis</i> beds classified as Vulnerable, as well as, habitat availability for fauna and flora	65 H	
Coastal Dunes, Sand movement and Soil			
	Soil contamination and pollution	18 L	<ul style="list-style-type: none"> • Pre-construction planning, including development footprint planning and water use planning as per the EMPr (section 2.3) • Clearing and site preparation, layout, infrastructure and services, sensitive areas. storm water management as per the EMPr (section 3.1, 3.2, 3.3, 3.4)
	Soil erosion by wind and rain	18 L	
	Due erosion	36 M	

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
			<ul style="list-style-type: none"> Vegetation management as per the EMPr (section 3.6) Integrated waste management as per the EMPr (section 3.8) Chemicals and hydrocarbon fuels, and ablution facilities as per the EMPr (section 3.9 and 3.11) Rehabilitation as per the EMPr (section 3.14)
Air			
	Air pollution due emissions from construction vehicles and equipment.	21 L	<ul style="list-style-type: none"> Pre-construction planning, including development footprint planning and water use planning as per the EMPr (section 2.3) Clearing and site preparation, layout, infrastructure and services, sensitive areas. storm water management as per the EMPr (section 3.1, 3.2, 3.3, 3.4) Vegetation management as per the EMPr (section 3.6) Integrated waste management as per the EMPr (section 3.8) Chemicals and hydrocarbon fuels, and ablution facilities as per the EMPr (section 3.9 and 3.11) Fire management as per the EMPr (section 3.12) Rehabilitation as per the EMPr (section 3.14)
	Dust liberated by general construction activities and movement of construction vehicles.	21 L	
	Smoke from open fires used by site staff for heating and cooking as well as from uncontrolled fires	14 L	
Biodiversity (Flora)			
	<i>Removal of invader alien species found on site (positive impact).</i>	30 L	<ul style="list-style-type: none"> Pre-construction planning, including development footprint planning and water use planning as per the EMPr (section 2.3) Clearing and site preparation, layout, infrastructure and services, sensitive areas. storm water management as per the EMPr (section 3.1, 3.2, 3.3, 3.4) Vegetation management as per the EMPr (section 3.6) Integrated waste management as per the EMPr (section 3.8) Chemicals and hydrocarbon fuels, and ablution facilities as per the EMPr (section 3.9 and 3.11) Fire management as per the EMPr (section 3.12) Rehabilitation as per the EMPr (section 3.14) Specialist mitigation as per the EMPr (section 6)
	Loss of Endangered vegetation and associated loss of species richness	27 L	
	Disturbance of sensitive habitats, specifically riparian zones, wetlands, dune slacks and dunes rated as having a high sensitivity	39 M	
	Disturbance and destruction of critical biodiversity areas	75 H	
	Destruction to coastal environment	45 M	
	Increase in exotic vegetation/alien species	18 L	
Biodiversity (Fauna)			
	Loss of faunal habitat or conservation-important fauna species, specifically the critically endangered Pickergills Reed Frog	70 H	<ul style="list-style-type: none"> Pre-construction planning, including development footprint planning and water use planning as per the EMPr (section 2.3) Clearing and site preparation, layout, infrastructure and services, sensitive areas. storm water management as per the EMPr (section 3.1, 3.2, 3.3, 3.4)
	Loss of general faunal habitat and ecological connectivity.	36 M	
	Mortality of fauna	14 L	

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
	Poaching and snaring of fauna on site and to a lesser degree in the adjacent Nature Reserves (Amatikulu and uMlalazi) in the greater Kruger National Park	18 L	<ul style="list-style-type: none"> Vegetation and fauna management as per the EMPr (section 3.6 and 3.7) Integrated waste management as per the EMPr (section 3.8) Chemicals and hydrocarbon fuels, and ablution facilities as per the EMPr (section 3.9 and 3.11) Fire management as per the EMPr (section 3.12) Rehabilitation as per the EMPr (section 3.14) Specialist mitigation as per the EMPr (section 6)
Land use and Agricultural potential			
	None		•
Heritage			
	Damage to and / or destruction of archaeological, paleontological or historical artefacts unearthed during construction	8 N	<ul style="list-style-type: none"> Specialist mitigation as per the EMPr (section 6)
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, beach goers) within the study area	22 L	<ul style="list-style-type: none"> Pre-construction planning, including development footprint planning and water use planning as per the EMPr (section 2.3) Clearing and site preparation, layout, infrastructure and services, sensitive areas. storm water management as per the EMPr (section 3.1, 3.2, 3.3, 3.4) Vegetation management as per the EMPr (section 3.6) Integrated waste management as per the EMPr (section 3.8) Chemicals and hydrocarbon fuels, and ablution facilities as per the EMPr (section 3.9 and 3.11) Fire management as per the EMPr (section 3.12) Rehabilitation as per the EMPr (section 3.14) Specialist mitigation as per the EMPr (section 6)
	Visual impact of construction, lighting and dust on protected areas (i.e. the Umlalazi Nature Reserve and the Amatikulu Nature Reserve)	22 L	<ul style="list-style-type: none"> Integrated waste management as per the EMPr (section 3.8) Chemicals and hydrocarbon fuels, and ablution facilities as per the EMPr (section 3.9 and 3.11) Fire management as per the EMPr (section 3.12) Rehabilitation as per the EMPr (section 3.14) Specialist mitigation as per the EMPr (section 6)
Socio-economic			
	<i>Creation of short-term employment and business opportunities and the opportunity for skills development and on-site training (Positive impact).</i>	40 M	<ul style="list-style-type: none"> Pre-construction planning, including development footprint planning, water use planning and socioeconomics as per the EMPr (section 2.3 and 2.4) Clearing and site preparation, layout, infrastructure and services, sensitive areas. storm water management as per the EMPr (section 3.1, 3.2, 3.3, 3.4) Vegetation management as per the EMPr (section 3.6) Integrated waste management as per the EMPr (section 3.8)
	Noise, dust and safety impacts and disturbance to adjacent tourism developments and tourists/visitors to the adjacent Nature Reserves	21 L	<ul style="list-style-type: none"> Vegetation management as per the EMPr (section 3.6) Integrated waste management as per the EMPr (section 3.8)
	An increase in construction workers and associated increase in social problems for the community	21 L	<ul style="list-style-type: none"> Integrated waste management as per the EMPr (section 3.8)

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
	Increase in casual workers and associated increase in poaching.	28 L	<ul style="list-style-type: none"> Chemicals and hydrocarbon fuels, and ablution facilities as per the EMPr (section 3.9 and 3.11) Fire management as per the EMPr (section 3.12) Rehabilitation as per the EMPr (section 3.14) Specialist mitigation as per the EMPr (section 6)
	Increased risk of veld fires due to the presence of construction workers on site.	24 L	
Municipal services and Traffic			
	Increase in traffic on local roads due to construction vehicles.	21 L	<ul style="list-style-type: none"> Pre-construction planning, including development footprint planning, water use planning and socioeconomics as per the EMPr (section 2.3 and 2.4) Clearing and site preparation, layout, infrastructure and services, sensitive areas, storm water management as per the EMPr (section 3.1, 3.2, 3.3, 3.4) Vegetation management as per the EMPr (section 3.6) Integrated waste management as per the EMPr (section 3.8) Chemicals and hydrocarbon fuels, and ablution facilities as per the EMPr (section 3.9 and 3.11) Fire management as per the EMPr (section 3.12) Rehabilitation as per the EMPr (section 3.14) Specialist mitigation as per the EMPr (section 6)
	Increase in the number and frequency of construction vehicles accessing the site and the resultant noise, dust, and safety impacts on other road users, residents of the local community and adjacent tourism developments.	15 L	
Indirect impacts:			
Estuarine Environment			
	Alteration of the flow regime and the PES of the estuary due to invasion of alien vegetation	22 L	<ul style="list-style-type: none"> As above
	Increased sedimentation of the estuary from erosion caused by removal of stabilizing vegetation	18 L	
Biodiversity (Flora)			
	Loss of floral biodiversity, Red data species and protected trees due to increased incidence of veld fires	16 L	<ul style="list-style-type: none"> As above
Socio-economics			
	Loss of property and threat to human life due to increased incidence of veld fires	16 L	<ul style="list-style-type: none"> As above
Traffic and services			
	Degradation of local roads due to the increase in the numbers of heavy vehicles.	21 L	<ul style="list-style-type: none"> As above
Cumulative impacts:			
Biodiversity (Flora)			
	Cumulative loss of Endangered vegetation and associated loss of species richness.	22 L	<ul style="list-style-type: none"> As above
	Cumulative loss of ecological function of sensitive habitats,	26 L	

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
	specifically riparian zones, wetlands, dune slacks and dunes.		
	Cumulative loss of critical biodiversity areas	45 M	
	Cumulative reduction and damage to plant species of conservation importance	24 L	
	Biodiversity (Fauna)		
	Cumulative loss of faunal habitat for conservation-important fauna species, specifically the critically endangered Pickergills Reed Frog	42 M	<ul style="list-style-type: none"> As above
	Socio-economics		
	<i>Community upliftment and the opportunity to up-grade and improve skills levels in the area (positive impact)</i>	24 L	<ul style="list-style-type: none"> As above
	Traffic and services		
	Cumulative increase in traffic and the resultant noise, dust, and safety impacts on other road users, residents of the local community and adjacent tourism developments.	24 L	<ul style="list-style-type: none"> As above
Operational Phase	Direct impacts:		
	Ground Water		
	Depletion of ground water resources due to over use and waste during operation.	18 L	<ul style="list-style-type: none"> Landscape and surround environment, sensitive areas, stormwater management as per the EMPr (sections 4.1, 4.1.1, 4.1.2) Chemicals and hydrocarbon fuels, aquaculture chemicals as per the EMPr (section 4.2.4 and 4.3.7) Specialist mitigation as per the EMPr (section 6)
	Pollution and contamination of ground water	22 L	
	Hydrology (Surface Water)		
	Disturbance and loss of ecological function of the habitat (physical structure) along the wetlands, drainage lines	22 L	<ul style="list-style-type: none"> Landscape and surround environment, sensitive areas, stormwater management as per the EMPr (sections 4.1, 4.1.1, 4.1.2) Chemicals and hydrocarbon fuels, aquaculture chemicals as per the EMPr (section 4.2.4 and 4.3.7) Specialist mitigation as per the EMPr (section 6) Integrated waste management as per the EMPr (section 4.2.1) Water, wastewater and ablation facilities as per the EMPr (section 4.2.2) Management of production water as per the EMPr (section 4.3.2)
	Pollution and contamination of surface water	20 L	
	Addition of solids and nutrients to the marine environment owing to discharge	39 M	
	Changes to the water table (nutrient enrichment) owing to build up of organic material	39 M	
	Disturbance and loss of hydrological function (quality and fluctuation properties) along the wetlands and drainage lines	22 L	
Marine Environment			

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
	Impacts on water quality and physiological functioning of the marine system in a MPA due to effluent discharge.	26 L	<ul style="list-style-type: none"> • Landscape and surround environment, sensitive areas, stormwater management as per the EMPr (sections 4.1, 4.1.1, 4.1.2) • Chemicals and hydrocarbon fuels, aquaculture chemicals as per the EMPr (section 4.2.4 and 4.3.7) • Specialist mitigation as per the EMPr (section 6) • Integrated waste management as per the EMPr (section 4.2.1) • Water, wastewater and ablution facilities as per the EMPr (section 4.2.2) • Management of production water as per the EMPr (section 4.3.2)
	Disturbance and/or mortality of marine life due to the intake of seawater.	30 L	
	Sediment scouring and shifts in sediment movement patterns.	39 M	
	Spillage of hydrocarbons, fuels etc	39 M	
Estuarine Environment			
	Damage and destruction to aquatic features	42 M	<ul style="list-style-type: none"> • Landscape and surround environment, sensitive areas, stormwater management, fauna and flora as per the EMPr (sections 4.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4) • Chemicals and hydrocarbon fuels, aquaculture chemicals as per the EMPr (section 4.2.4 and 4.3.7) • Specialist mitigation as per the EMPr (section 6) • Integrated waste management as per the EMPr (section 4.2.1) • Water, wastewater and ablution facilities as per the EMPr (section 4.2.2) • Management of production water as per the EMPr (section 4.3.2) • Species and escape, disease monitoring, control and treatment as per the EMPr (section 4.3.3 and 4.3.5)
	Localized erosion of the bed and banks of the estuary due to effluent discharge.	52 M	
	Reduction of water volumes of the estuary due to abstraction. This could result in extended mouth closure conditions	60 H	
	Backflooding of the upstream sections of the estuary due to discharge of effluent during mouth closure conditions.	60 H	
	Change to water chemistry and quality of the estuary. Depending on the mouth conditions (open or closed) this could result in change in the salinity	60 H	
Coastal Dunes, Sand movement and Soil			
	Soil contamination and pollution	18 L	<ul style="list-style-type: none"> • Landscape and surround environment, sensitive areas, stormwater management, management and stabilization of soils, fauna and flora as per the EMPr (sections 4.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4) • Chemicals and hydrocarbon fuels, aquaculture chemicals as per the EMPr (section 4.2.4 and 4.3.7) • Specialist mitigation as per the EMPr (section 6) • Integrated waste management as per the EMPr (section 4.2.1) • Water, wastewater and ablution facilities as per the EMPr (section 4.2.2) • Management of production water as per the EMPr (section 4.3.2)
	Soil erosion	18 L	
Air			
	Air pollution by emissions from increased numbers of vehicles	22 L	

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
	Odours emitted from the facility owing to the processing of by-products and fish processing waste	30 L	<ul style="list-style-type: none"> • Landscape and surround environment, sensitive areas, stormwater management, management and stabilization of soils, fauna and flora as per the EMPr (sections 4.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4) • Chemicals and hydrocarbon fuels, aquaculture chemicals as per the EMPr (section 4.2.4 and 4.3.7) • Specialist mitigation as per the EMPr (section 6) • Integrated waste management as per the EMPr (section 4.2.1) • Water, wastewater and ablution facilities as per the EMPr (section 4.2.2) • Management of production water as per the EMPr (section 4.3.2) • Grading, moving and harvesting as per the EMPr (section 4.3.8)
Biodiversity (Flora)			
	Loss of vegetation types classified as Endangered	18 L	<ul style="list-style-type: none"> • Landscape and surround environment, sensitive areas, stormwater management, management and stabilization of soils, fauna and flora as per the EMPr (sections 4.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4) • Chemicals and hydrocarbon fuels, aquaculture chemicals as per the EMPr (section 4.2.4 and 4.3.7) • Specialist mitigation as per the EMPr (section 6) • Integrated waste management as per the EMPr (section 4.2.1) • Water, wastewater and ablution facilities as per the EMPr (section 4.2.2) • Management of production water as per the EMPr (section 4.3.2) • Fire management as per the EMPr (section 4.1.6)
	Disturbance of sensitive habitats, specifically riparian zones and dune slacks and dunes	18 L	
	Destruction and damage to plant species of conservation importance	20 L	
	Increase in exotic vegetation/alien species and bush encroachment into disturbed soils and areas in the event that the rehabilitation process is not successful.	24 L	
Biodiversity (Fauna)			
	impact on local marine life owing to farmed species escaping	28 L	<ul style="list-style-type: none"> • Landscape and surround environment, sensitive areas, stormwater management, management and stabilization of soils, fauna and flora as per the EMPr (sections 4.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4) • Chemicals and hydrocarbon fuels, aquaculture chemicals as per the EMPr (section 4.2.4 and 4.3.7) • Specialist mitigation as per the EMPr (section 6) • Integrated waste management as per the EMPr (section 4.2.1) • Water, wastewater and ablution facilities as per the EMPr (section 4.2.2) • Management of production water as per the EMPr (section 4.3.2) • Fire management as per the EMPr (section 4.1.6)
	Faunal disturbances, displacement of taxa and changes in distribution and abundance	27 L	
	Mortality of fauna	22 L	
	Poaching and snaring of faunal species by staff.	24 L	
Land use and Agricultural potential			

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
	None.		•
	Heritage		
	None.		•
	Visual		
	Visual impact of direct lighting and sky glow on sensitive visual receptors in close proximity to the proposed development.	22 L	<ul style="list-style-type: none"> • Landscape and surround environment, sensitive areas, stormwater management, management and stabilization of soils, fauna and flora as per the EMPr (sections 4.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4) • Chemicals and hydrocarbon fuels, aquaculture chemicals as per the EMPr (section 4.2.4 and 4.3.7) • Specialist mitigation as per the EMPr (section 6) • Integrated waste management as per the EMPr (section 4.2.1) • Water, wastewater and ablution facilities as per the EMPr (section 4.2.2) • Management of production water as per the EMPr (section 4.3.2)
	Visual impact of the proposed development on the visual quality of the landscape and sense of place of the region	28 L	
	Socio-economic		
	<i>Creation of long term employment and business opportunities as well as opportunities for skills development and transfer (positive impact)</i>	36 M	<ul style="list-style-type: none"> • Landscape and surround environment, sensitive areas, stormwater management, management and stabilization of soils, fauna and flora as per the EMPr (sections 4.1, 4.1.1, 4.1.2, 4.1.3, 4.1.4) • Chemicals and hydrocarbon fuels, aquaculture chemicals as per the EMPr (section 4.2.4 and 4.3.7) • Specialist mitigation as per the EMPr (section 6) • Integrated waste management as per the EMPr (section 4.2.1) • Water, wastewater and ablution facilities as per the EMPr (section 4.2.2) • Management of production water as per the EMPr (section 4.3.2) • Fire management as per the EMPr (section 4.1.6) • Employee facilities and employment conditions as per the EMPr (section 5.1)
	Noise, dust and safety impacts and disturbance to beach-goers, adjacent tourism developments and tourists/visitors to the adjacent Nature Reserves	20 L	
	Municipal services and Traffic		
	Operational cost of running services and infrastructure, specifically electricity	44 M	<ul style="list-style-type: none"> • Employee facilities and employment conditions as per the EMPr (section 5.1)
	Increase in the number and frequency of vehicles accessing the site, and the resultant noise, dust, and safety impacts on other road users, residents of the local community and adjacent tourism developments.	16 L	
	Indirect impacts:		
	Estuarine Environment		
	Change to water quality of the estuary due to unmanaged,	33 M	• As above

Activity	Impact summary	Significance- Post Mitigation	Proposed mitigation
	contaminated stormwater from the ADZ		
	Increase in sedimentation of the estuary as a result of erosion of sediment surrounding the pipelines	16 L	
Visual			
	Visual impact of the proposed development on the sense of place and visual character of the region..	24 L	• As above
Cumulative impacts:			
Biodiversity (Flora)			
	Cumulative loss of Endangered vegetation and associated loss of species richness.	33 M	• As above
	Cumulative disturbance of sensitive habitats, specifically riparian zones	33 M	
	Cumulative reduction and damage to plant species of conservation importance	24 L	
Visual			
	The accumulation of built forms and within an otherwise natural environment.	22 L	• As above
Socio-economics			
	<i>Creation of permanent employment and skills and development opportunities for members from the local community and creation of additional business and economic opportunities in the area (positive impact)</i>	33 M	• As above
	<i>Promotion of social and economic development in the local communities and improvement in the overall wellbeing of the community (positive impact)</i>	22 L	
Services and traffic			
	Cumulative increase in the number and frequency of vehicles accessing the site, and the resultant noise, dust, and safety impacts for other road users, adjacent tourism development and residents of the local communities.	22 L	• As above

Please refer to Appendix F for the full impact assessment

7. ENVIRONMENTAL IMPACT STATEMENT

The Amatikulu Site is not situated in any floristic centres of endemism.

According to the KZN 2016 CBA layer, the site lies within a **Critical Biodiversity Area: 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.

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**.

There is a 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**.

Two (2) **National Freshwater Ecosystem Priority Areas (NFEPAs)** wetlands are found within the proposed site, namely an unchanneled valley-bottom wetland located in the centre of the site and the Amatikulu estuary located south of the site.

The Amatikulu Estuary is located south of the proposed site and it is classified as a "temporarily open/closed" estuary. This estuary forms part of the core set of **priority estuaries** that requires **protection** to achieve biodiversity targets in the National Estuaries Biodiversity Plan for the NBA. The Estuary Importance Score (EIS) is rated at 76, indicating that the estuary is rated as "**Important**". Additionally, the Functional Importance of the Estuary is also **very high** and the Present Ecological Status (PES) of a **B Category, largely natural**. The REC for the aMatigulu/Nyoni estuary is an **A/B Category**.

Zostera capensis has been known to occur at the mouth of the estuary and is listed as **vulnerable** in the Red Data List of Species.

The Amatikulu ADZ is located directly adjacent to the newly proposed **uThukela Banks Marine Protected Area**. This MPA was identified as a priority area for protection of threatened mud and gravel seabed habitats, reefs and submarine canyons.

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

Preferred Alternative: Alternative 1

In the Preferred Alternative, cognisance is taken of the **ecological setback line** whereby majority of development occurs behind it with the exception of one marine tunnel located in the east. This is due to the fact that ultimately this proposed ADZ must function as a business and be economically viable.

Majority of the proposed development will be located in areas of **low and moderate** sensitivity, however, three (3) marine tunnels are located within an area designated as having a **high** sensitivity in terms of habitat status. Additionally, the abstraction of water and discharge of effluent will occur in the Amatikulu Estuary which has been rated as having a **very high sensitivity** owing to its Present Ecological Score and national priority.

The other option for water abstraction and effluent discharge is the ocean. However, these pipelines fall within the proposed **uThukela Banks Marine Protected Area**. The NEMBA: PAA does not specifically exclude construction of intake or outfall pipelines in MPAs generally or intake or discharge of waste water into the MPAs, nor are any of these activities specifically excluded under GN 103 or 108 (Draft Regulations for the Establishment and Management of the uThukela Banks Marine Protected Area). However, all of these activities are likely to be

considered unlawful under the Marine Living Resources Act No. 18 of 1998 (MLRA) when the MPA is formally established. The MLRA states that in Chapter 4 no person shall in any marine protected area, without permission dredge, extract sand or gravel, discharge or deposit waste or any other polluting matter, or in any way disturb, alter or destroy the natural environment; construct or erect any building or other structure on or over any land or water within such a marine protected area; or carry on any activity which may adversely impact on the ecosystems of that area. It should, however, be noted that the discharge into the MPA is permitted in terms of these Acts should the Minister/MEC grant exemption.

Statement

The construction impacts, if effectively managed according to the mitigation measures proposed in this report, the specialist reports and the draft EMPr will have **low, moderate and high** residual significance rating. **Moderate** post mitigation significance ratings are anticipated in terms of disturbance/ loss of hydrological function of watercourses, dune erosion, disturbance of sensitive habitats, destruction of coastal environment. This is due to placement of infrastructure and the construction of the pipelines in areas of moderate to high sensitivity. **High** post mitigation significance ratings are anticipated in terms of the estuarine environment, particularly relating to the alterations of the beds and banks of the estuary, as well as, the disturbance to the vulnerable *Zostera capensis*.

Additionally, **high** post mitigation significance ratings are anticipated for loss of critical biodiversity areas and loss of habitat for the critically endangered Pickergills Reed Frog.

Very High significance ratings are anticipated in terms of the marine environment in relation to permanent loss of habitat of coastal marine fauna and flora and loss of subtidal soft sediment owing to the construction of the pipelines. These impacts cannot be mitigated owing to the location of the proposed MPA. However, it should be noted that should an exemption be granted in terms of the NEM:PAA and MLRA, then these impacts can be mitigated to an acceptable level (i.e. low to moderate).

Operational impacts can similarly be mitigated to **low to moderate** residual significance ratings. **Moderate** post mitigation significance ratings are anticipated in terms of nutrient enrichment of the estuary, sediment scouring near the discharge pipeline, and erosion of the banks of the estuary near the discharge pipeline. **High** post mitigation significance ratings are anticipated in terms of the estuarine environment. Abstraction from, and discharge in the estuary could result in changes to the mouth dynamics (extended mouth closure), possible backflooding upstream and changes to the water chemistry.

In light of the sensitive nature of the Amatikulu Estuary and the high post mitigation significance during both construction and operation, it is recommended that abstraction from and subsequent discharge into the estuary is **not supported**.

Positive impacts include job creation and employment opportunities for both the construction and operational phases, as well as, skills transfer and development.

From the above discussion, it is recommended that the proposed ADZ at Amatikulu be supported (excluding the abstraction from and discharge into the Amatikulu Estuary) on the condition that all mitigation measures mentioned in this report, the specialist studies and the draft EMPr are implemented and adhere to throughout the project lifecycle.

Layout Alternative: Alternative 2

The Layout Alternative is located on the same site as the Preferred Alternative: Alternative 1, and as such, all arguments hold true for this alternative. It should be noted however, that in the Layout Alternative: Alternative 2, the development footprint is slightly larger and extends into the ecological setback line.

Statement

The Layout Alternative will result in slightly **higher** significance ratings for certain aspects such as, surface water, sensitive areas and flora during the construction phase. This is due to the larger development footprint and

infrastructure being located within the ecological setback line. The post mitigation significance for the construction phase will be **low, moderate and high** as per the Preferred Alternative. **Increased impacts** as compared to the Preferred Alternative are anticipated for disturbance and loss of ecological function of the wetland, dune erosion and loss of vegetation.

The operational impacts will be similar to those of the Preferred Alternative, with residual impacts being mostly of low to moderate significance. **Moderate** post mitigation significance is anticipated for localized flooding of the facility and surrounds due to development occurring within the ecological setback line.

Taking the above into consideration, it is recommended that the Layout Alternative **not** be supported due to the increase of the development footprint, development occurring within the ecological setback line and the associated increase in negative impacts on the receiving environment. The Preferred alternative, which respects the ecological setback line and has a consolidated footprint, is favoured.

No-Go Alternative

The No-go Alternative implies that the establishment of the Aquaculture Development Zone in Amatikulu will not take place. In this scenario, the receiving environment will not be impacted upon negatively in any manner, with particular reference to the Estuarine environment, Marine Protected Area, Critical Biodiversity Areas and Threatened Fauna and Flora protected flora.

However, it should also be noted that no positive impacts will be realized such as job creation and employment opportunities, skills transfer and development.

This would not be ideal owing to the high unemployment rate in the local municipality and the fact that the majority of the population lives in a rural environment. Additionally, direct employment benefits and community beneficiation will not materialize.

In light of the above it is not recommended that the No-go Alternative be supported.

8. RECOMMENDATION OF PRACTITIONER

From the above discussions, it can be seen that the Layout Alternative: Alternative 2 has higher post mitigation significance ratings, particularly in terms of disturbance to ecological function of the wetland on site, dune erosion due to development occurring within the ecological setback line, and loss of vegetation due to the increased development footprint. For these reasons, it is recommended that this alternative **not be supported**.

It is recommended that the Preferred Alternative: Alternative 1 be supported. However, in light of the sensitive nature of the Amatikulu Estuary and the high post mitigation significance, it is recommended that abstraction from and subsequent discharge into the estuary is **not supported**.

While Alternative 1 is the preferred alternative, it still poses quite a number of challenges and environmental impacts that cannot be easily mitigated in terms of sea water abstraction and discharge, fresh water abstraction and discharge, the location of the proposed MPA and the overall feasibility of the proposed project.

Additionally, should environmental authorization be granted, it should only be done on the following conditions:

1. a feasibility study be conducted to determine the feasibility of constructing a marine water intake pipeline.
2. dispersion modelling be undertaken to determine the dispersion and impact of discharged effluent into a Marine Protected Area.
3. an agreement is reached between the MPA and the client, permitting the discharge of effluent in to the MPA
4. a wetland offset is identified, within the same catchment, and rehabilitated to make up for the loss of the wetland on the Amatikulu site owing to the proposed development of the Amatikulu ADZ.
5. prior to construction, the presence of the Critically Endangered Pickergills Reedfrog must be confirmed.