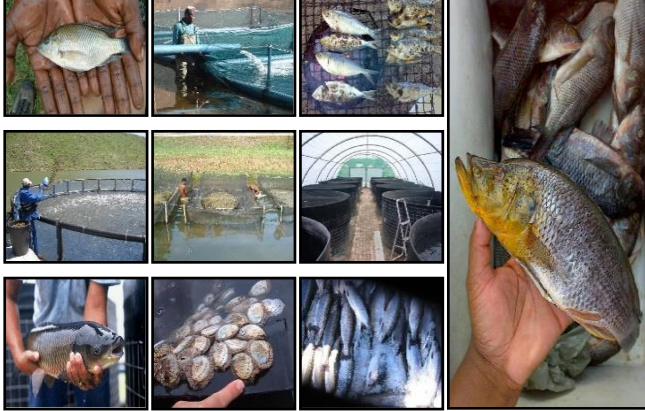


# NuLeaf

PLANNING & ENVIRONMENTAL



**DRAFT**

Environmental Management Programme (EMPr):  
Amatikulu Aquaculture Development Zone

Prepared for:  
The Department of Agriculture, Forestry and Fisheries

January 2019



agriculture,  
forestry & fisheries

Department:  
Agriculture, Forestry and Fisheries  
REPUBLIC OF SOUTH AFRICA

## Environmental Management Programme: Amatikulu Aquaculture Development Zone

<b>Document Control</b>	
<b>Document Title</b>	<b>Environmental Management Programme: Amatikulu Aquaculture Development Zone</b>
<b>Document Classification</b>	<b>Environmental Management Plan</b>
<b>Version</b>	<b>First Draft</b>
<b>Prepared By</b>	<b>NuLeaf: Planning and Environmental</b>
<b>Date</b>	<b>January 2019</b>

## Environmental Management Programme: Amatikulu Aquaculture Development Zone

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### **PREAMBLE**

This Environmental Management Programme (CEMP<sub>r</sub>) has been compiled to meet the requirements of the National Environmental Management Act (107 of 1998) (NEMA) and the related Environmental Impact Assessment Regulations (Regulation R 982 of 14 December 2014, as amended), specifically Appendix 4.

It has been compiled specifically for use in the proposed Amatikulu Aquaculture Development Zone (ADZ), where it will be implemented to ensure an environmentally sound and sustainable project.

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## SECTION 1: INTRODUCTION

The Department of Agriculture, Forestry and Fisheries (DAFF) are proposing the establishment of the Amatikulu Aquaculture Development Zone (ADZ) in KwaZulu-Natal. The Amatikulu ADZ aims to farm aquatic plants and animals in a sustainable manner, in order to provide high quality products, create business, and support long-term economic and social well-being.

This document incorporates the environmental management procedures that are to be implemented through the design, construction and operational phases of this ADZ.

### 1.1. OBJECTIVES AND PURPOSE OF THE EMPr

A key requirement of the National Environmental Management Act (NEMA) of 1998 is compliance with the principles of Integrated Environmental Management (IEM). Chapter Five of NEMA deals with IEM and its objective to promote the application of appropriate environmental management tools in order to ensure the integrated environmental management of activities.

Among these tools are Environmental Impact Assessments (EIAs) and Environmental Management Programmes (EMPr's). In compliance with the above-mentioned legislation, the Department of Environmental Affairs (DEA) requires that the assessed impacts of a proposed development are accompanied by mitigation measures that are captured in an Environmental Management Plan (EMPr).

This EMPr's purpose lies in it being used as a structured management tool to minimise potential environmental harm through cost-effective, sustainable and continually assessed measures. This EMPr refers to a wide range of interventions that can be made to improve or optimise performance in environmental management and promotes the minimisation of unavoidable environmental impacts and the prevention of avoidable impacts.

The objectives of this EMPr are derived from the following needs:

- a) The Amatikulu ADZ must remain compliant with legislative obligations.
- b) The Amatikulu ADZ relies on sustainable use of natural resources.
- c) The Amatikulu ADZ seeks recognition as an environmentally responsible and sustainable operation.
- d) The Amatikulu ADZ requires norms and standards by which it can be held accountable.
- e) The Amatikulu ADZ seeks to illustrate adequate environmental due diligence.

Specifically, this EMPr aims to:

- a) Set out environmental management guidelines to be followed during the entire lifecycle of the project - from design to operation and decommissioning.
- b) Be relevant to the nature and technology that will be used in the ADZ.
- c) Be reasonable and practical and provide for ease of implementation.
- d) Provide cost effective options for environmental management.
- e) Be flexible through ensuring sustainability.
- f) Provide a mechanism for environmental self-regulation.
- g) Fall within the legal requirements for the construction and operation of the ADZ.
- h) Provide clear standards for performance and monitoring.

The EMPr contains guidelines and requirements that will ensure that the Amatikulu ADZ does not impact negatively on the natural systems and surrounding areas in a significant manner.

### **1.2. AUTHOR OF THE EMPr**

This EMPr has been compiled by Mr. E. Hinrichsen of Nuleaf. In compiling the EMPr, he has made use of 20 years of environmental assessment experience in aquaculture and has used an approach similar to that in various provincial and national best management practice guidelines for aquaculture.

Hinrichsen holds the degrees BSc.Agric (Conservation, Genetics and Animal Physiology) and M.Phil (Aquaculture) and is also a SACNASP registered Professional Scientist (Pri.Sci.Nat).

### **1.3. LEGAL CONTEXT**

Although this EMPr in itself is not a legal document, it is an important outcome of the environmental assessment process and related environmental authorisation for the Amatikulu ADZ. Furthermore, the EMPr is a condition of authorisation and will therefore be binding on the Department of Agriculture, Forestry and Fisheries as the holders of the Environmental Authorisation. All tenants and operators of aquaculture activities and facilities in the ADZ will be bound by the prescriptions of the EMPr.

### **1.4. PROJECT BACKGROUND AND SITE DESCRIPTION**

The Amatikulu ADZ site stretches across approximately 108 Ha and will be used for the establishment of earthen pond and tanks-based aquaculture systems, both outdoors and indoors. The facilities will be supported by a comprehensive fresh and seawater reticulation systems, domestic water supply, wastewater treatment and



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discharge systems, primary processing facilities, offices, storerooms, workshops, feedstores and other infrastructure.

The ADZ will may include the farming of species such as Dusky Kob, Barramundi, Scallops, Sea Cucumbers, marine and freshwater Ornamental Fish and Ornamental Plants, Tilapia and Catfish.

### 1.5. ROLES AND RESPONSIBILITIES

Party	Responsibility
<b>Department of Agriculture Forestry and Fisheries as implementing agency of the ADZ</b>	<ul style="list-style-type: none"><li>a) Ensure adherence to, and compliance with, the EMPr in a timely manner. This relates to all phases of the project lifecycle.</li><li>b) Appoint an Independent Environmental Control Officer (ECO) during the Construction Phases.</li><li>c) Appoint an Environmental Officer (EO) to oversee day-to-day environmental matters.</li><li>d) Oversee the establishment and functioning of the ADZ Management Committee (AMC) and the Consultative Forum.</li><li>e) Ensure that a monitoring programme is drafted and implemented to assess compliance with the EMPr.</li><li>f) Ensure that contractors, tenants and operators undertake to adhere to the provisions of the EMPr as part of their respective contracts.</li><li>g) Ensure that independent Environmental Audits, including a Post Construction Close-Out audit is undertaken.</li><li>h) Ensure communication of environmental matters to all author relevant authorities and the communities / public at large.</li></ul>
<b>ADZ Management Committee (AMC)</b>	<ul style="list-style-type: none"><li>a) The AMC will comprise of DAFF, DEA (Oceans and Coasts / Biodiversity Branches), the KZN Department of Economic Development, Tourism and Environmental Affairs, and Ezemvelo KZN Wildlife Services.</li><li>b) The AMC Secretariat shall record the terms of operations for the AMC and maintain a register of stakeholders that must be kept informed in relation to the ADZ.</li></ul>

	<p>c) The overarching function of the AMC is to oversee, facilitate, manage and monitor aquaculture operations in the ADZ.</p> <p>d) The AMC will fulfil a coordinating and supervising role and ensure compliance with the EMPr throughout all phases of the ADZ.</p> <p>e) Oversee monitoring results and make decisions based on the outcomes thereof, which could lead to the amendment of operations within the ADZ.</p> <p>f) Receive and manage stakeholder comments.</p> <p>g) Note and, if necessary, coordinate a response to environmental incidents.</p> <p>h) Review and comment on new / expanded aquaculture farm proposals within the ADZ.</p>
<p><b>ADZ Consultative Forum</b></p>	<p>a) The ADZ Consultative Forum will include all other government departments, authorities and relevant local / public interest organisations, to review environmental monitoring data, advise on management and recommend measures.</p> <p>b) DAFF should invite representatives of relevant government departments, authorities, local organisations and ADZ operators to become members of the Consultative Forum.</p> <p>c) Forum members will join on a voluntary basis and at no costs to DAFF.</p> <p>d) The overarching function of the Consultative Forum is to review environmental monitoring data, advise on ADZ management and recommend measures.</p> <p>e) Key functions of the Consultative Forum are to:</p> <ul style="list-style-type: none"> <li>• Review environmental monitoring data related to the ADZ.</li> <li>• Make recommendations based on the outcomes of environmental monitoring.</li> <li>• Provide a platform for discussion of environmental management in the ADZ.</li> </ul>
<p><b>Environmental Officer (EO)</b></p> <p><b>Could be appointed by DAFF or serve in the role as a staff member of DAFF</b></p>	<p>a) Liaising with the suitably qualified service provider(s) appointed to attend to environmental sampling, monitoring and auditing aspects in the ADZ to ensure that monitoring is implemented as per the requirements.</p> <p>b) Receiving and reviewing monthly Farm Monitoring Reports.</p> <p>c) Receiving and reviewing environmental sampling, monitoring and</p>

	<p>audit results.</p> <p>d) Notifying the Chairperson of the AMC in the event any aspects require immediate attention.</p> <p>e) Reporting on environmental aspects at AMC meetings.</p>
<p><b>Environmental Control Officer (ECO)</b></p> <p><b>Must be appointed by DAFF as an independent</b></p>	<p>a) Understand, interpret, monitor, audit and implement the EMPr during the construction phases.</p> <p>b) Retain independence and report on environmental compliance in an objective manner.</p> <p>c) Explain the contents of the EMPr to the Contractor, the site staff, supervisors, operators and any other relevant personnel or stakeholders.</p> <p>d) Undertake environmental audits for the duration of the construction phases as required.</p> <p>e) Act as quality controller regarding all environmental concerns by conducting periodic site inspections, attending regular site meetings, pre-empting problems, suggesting mitigation and being available to advice on incidental issues that arise.</p> <p>f) Report on construction related environmental matters to the AMC.</p>
<p><b>Development Contractors</b></p>	<p>g) Ensure adherence to, and compliance with the EMPr during the construction phases.</p> <p>h) Ensure that all staff members, sub-contractors and suppliers have a comprehensive understanding of the EMPr and adhere to the provisions for the duration of the construction phase.</p> <p>i) Ensure that all staff members, sub-contractors and suppliers are aware of the environmental issues relating to the construction activities that they are undertaking on site and of all mitigating and precautionary measures that must be implemented.</p> <p>j) Ensure that training is undertaken for construction supervisors and crews to recognise environmental '<i>red flags</i>' and ensure that these will:</p> <ul style="list-style-type: none"> <li>• not be disturbed, damaged or removed and</li> <li>• Be brought to the immediate attention of the ECO to determine an action plan and way forward.</li> </ul> <p>k) Develop a layout of the operations of the construction site indicating</p>

	<p>the position of all construction activities, including but not limited to: offices, ablution facilities, storage areas, workshops, batching plant, stockpile areas, waste disposal facilities, hazardous substance storage area, access routes, etc. This layout plan is to be submitted to the ECO for acceptance prior to site establishment. Any changes to this plan will need to be reviewed in conjunction with the ECO.</p> <p>l) Ensure that all recommendations made in monitoring and audit reports are implemented throughout the construction phase.</p>
<p><b>ADZ tenants and operators</b></p>	<p>a) Ensure adherence to, and compliance with, EMPr in a timely manner.</p> <p>b) Serve as members of the ADZ Consultative Forum.</p> <p>c) Ensure that all staff members and suppliers have a comprehensive understanding of the EMPr and adhere to the provisions thereof.</p> <p>d) Ensure that all staff members and suppliers are aware of potential environmental issues and of all mitigating and precautionary measures that must be implemented.</p> <p>e) Ensure that staff members and suppliers are able to recognise environmental 'red flags' and ensure that these will:</p> <ul style="list-style-type: none"> <li>• Not be disturbed, damaged or removed; and</li> <li>• Be brought to the immediate attention of the EO to determine an action plan and way forward.</li> </ul> <p>f) Ensure that all recommendations made in monitoring and audit reports are implemented.</p>

## 1.6. ENVIRONMENTAL AWARENESS

In order to ensure that all personnel and service providers are aware of their responsibilities towards the environment, the following awareness plan must be implemented by the EO:

- a) All new personnel and service providers must be taken through an environmental awareness talk / induction when they first arrive at the project. The talk should cover the content of the EMPr and basic environmental housekeeping such as waste minimisation and litter, fire safety, no-go areas, use of ablution facilities etc. Each attendee must sign a register of attendance.
- b) All attendees to the above talk should be exposed to a six-monthly refresher session.
- c) Pertinent environmental issues should be discussed in all project meetings.
- d) Pertinent environmental issues and the solutions to these issues should be communicated through informative posters and other visual aids.

### SECTION 2: ENVIRONMENTAL MANAGEMENT IN THE PLANNING AND DESIGN PHASE

The planning measures entail environmentally responsive and sustainable design of the ADZ facilities and the facilities of the individual tenants. This includes the architectural, infrastructural and engineering services. All members of the planning and design team of each tenants are to be in possession of this EMP and must be aware of the environmental aspects, risks and mitigation measures. The following aspects must be used to guide the planning and design of any new production infrastructure or facilities in the ADZ.

#### 2.1. Development Footprint Planning

*To ensure the development footprint is kept to a minimum and that sensitive environments are taken into consideration.*

##### General mitigation:

- a) Only approved and designated sites may be developed with the ADZ.
- b) Consolidate the location of structures and infrastructure to localise and contain the development footprint. Retain all areas beyond the development footprint as natural / conservation landscape / open areas.
- c) Refine the final layout of roads, buildings and infrastructure so these are located within natural bush clearings rather than removing vegetation to make way for infrastructure. This will allow the development to blend in with the receiving environment to a greater extent both visually and ecologically.
- d) Combine access roads with power line servitudes, firebreaks etc. wherever possible.
- e) Combine bulk service infrastructure (water, sewage) into single trenches or alignments wherever possible.
- f) Plan to leave as much of the natural vegetation intact as possible.

#### 2.2. Visual Environment Planning and Lighting

*To ensure that the visual impact on the surrounding area and sense of place will be kept to a minimum.*

##### General mitigation:

- a) Make use of earth tones and natural materials rather than primary colours and high-tech finishes.
- b) Limit buildings to single storeys and make use of light, shallow gradient roofs.
- c) Visually break up large bulky buildings into smaller, subtler, less prominent shapes and planes.

- d) Make use of suitable paint colours on steel roofs to reduce the impact of glare from sunlight.
- e) Make use of earthy, muted colours and avoid pastel and primary colours.
- f) Make use of natural, non-reflective, earthy materials rather than high-tech reflective materials.
- g) Avoid large expanses of glass. Where glass is used, ensure that this is tilted and tinted to reduce glare.
- h) All areas beyond the development footprint are to be rehabilitated as natural bush using appropriate endemic species.
- i) Do a site assessment prior to construction in order to identify the largest trees and densest vegetation patches. Plan the facilities to accommodate and optimise these landscape features. This will limit the impact on the visual resource by retaining features in the landscape that contribute to the landscape character and screening capacity of the site.
- j) Appropriately screen service areas.
- k) Avoid the placement of unsightly services and infrastructure in visually prominent areas.

### Lighting:

- a) Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself).
- b) Limiting mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights.
- c) Making use of minimum lumen or wattage in fixtures.
- d) Making use of down-lighters, or shielded fixtures.
- e) Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.
- f) Tilt spotlight luminaires to direct the light to the intended spot, instead of allowing it to light areas outside its purpose;
- g) Do not over illuminate areas. Use the correct illuminance intensity for the purpose intended.

### **2.3. Water Use Planning**

#### General mitigation:

- a) Ensure that all water uses (including discharge) are legal as per the requirements of the National Water Act
- b) Ensure that all stormwater mitigation measures are in place to prevent water damage and erosion.
- c) Specify water saving devices and technologies wherever possible. Measures include the specification of low flow taps, and the use of grey water for activities such as road wetting and irrigation.
- d) Buildings and other hardened surface infrastructure should be design with adequate stormwater attenuation measures.

### 2.4. Socio-Economic Planning

*To ensure community beneficiation via job creation and skills transfer*

#### General mitigation:

- a) The local authorities, community representatives, and organisations on the interested and affected party database should be informed of the final decision regarding the project and the potential job opportunities for locals and the employment procedures for the construction and operational phases.
- b) Before the construction phase commences the applicant should meet with representatives from the local municipality / community to establish the existence of a skills database for the area. If such a database exists it should be made available to the contractors appointed for the construction phase.
- c) The applicant should liaise with the local municipality / community with regards the establishment of a database of local companies, specifically BBBEE companies, which qualify as potential service providers (e.g. construction companies, catering companies, waste collection companies, security companies etc.) prior to the commencement of the tender process for construction contractors. These companies should be notified of the tender process and invited to bid for project-related work.
- d) Where reasonable and practical, the applicant should appoint local contractors and implement a 'locals first' policy, especially for semi and low-skilled job categories. However, due to the low skills levels in the area, most the skilled posts are likely to be filled by people from outside the area.
- e) Where feasible, efforts should be made to employ local contractors that are compliant with BBBEE criteria.

## SECTION 3: ENVIRONMENTAL MANAGEMENT IN THE CONSTRUCTION PHASE

This section deals with construction related environmental aspects that apply to the Fish processing Facilities and its surrounding environment.

### 3.1. Clearing and Site Preparation

- a) All construction areas should be clearly demarcated, and all works limited to these areas.
- b) Clearing should be done incrementally to ensure that areas that are not immediately required are not exposed unnecessarily (no blanket clearing).

- c) Cleared vegetation could be retained as mulch, composted or used as brush-pack materials to prevent erosion to exposed areas.
- d) Excavated topsoil must be separately stockpiled for use during rehabilitation. Care must be taken not to mix topsoil with subsoil.
- e) Exposed construction surfaces must remain stable, or compacted, or covered with mulch or brush material to prevent erosion and dust generation during construction.
- f) Areas that will not be taken up by new infrastructure should be left intact.

### **3.2. Layout, Infrastructure and Services**

- a) Establishment of the ADZ must be in accordance with the approved site layout plan.
- b) Generally, the layout and construction works should be done to cause the least possible visual or other impacts to the surrounding environment.
- c) Adequate provision must be made for access from the existing roads.
- d) Adequate provision must be made for access control to the construction site to ensure that unauthorised people do not access the site and to ensure the safety of the community at large. Prohibition of entry for unauthorised persons must be displayed and enforced.
- e) Facilities and stores must be kept locked after hours and when the facilities are not occupied.
- f) Construction activities, stockpiling of any materials and the storing of machinery or equipment must be accommodated within demarcated construction areas.
- g) Gravel, sand and stone used during the construction must be obtained from a *bona fide* source, which holds the required authorisations in this regard.

### **3.3. Sensitive Areas**

A range of sensitive areas surround the Amatikulu ADZ area. In this regard:

- a) All natural features such as trees and rock outcrops should be protected and not harmed or removed unnecessarily.
- b) All fossils, archaeological and paleontological materials, graves and burial grounds, wetlands, mountain catchments and forests are protected by law and may not be disturbed in any manner without authorisation to do so.
- c) Uncontrolled or unmanaged effluent discharge or waste dumping is not permitted.

### **3.4. Stormwater Management in Construction**



The stormwater management measures that are to be implemented during the construction phase include:

- a) The topography of all areas across the project site should be inspected at the commencement of construction works to ensure that potential stormwater flows can be tied into temporary stormwater channels.
- b) Provision must be made for temporary stormwater channels across the construction site to direct site generated stormwater. These channels must be inspected regularly and maintained to ensure that they remain stable and functional.
- c) Before conclusion of the construction phase, these or alternative stormwater channels should be formalised as permanent features to deal with site generated stormwater flows. This can be done by means of concreting, stone-packing, establishment of vegetation growth or other suitable measures.
- d) All stormwater channels are to be maintained in the construction phase and should not be unnecessarily modified. However, should sections be seen to have exposed soils, these exposed areas should be addressed by brush packing and/or water attenuation structures that can be made of rock or stepped logs.
- e) No wastewater may be directed to stormwater channels. No potential contaminants may be placed in any areas where it can cause pollution to stormwater.
- f) Following any heavy storms or rains, the integrity of the stormwater channels must be inspected and repaired where required.
- g) Any exposed soils should be protected against stormwater and erosion wherever possible.
- h) The site may not be subjected to blanket clearing, while exposed soils should be protected against stormwater and erosion wherever possible.
- i) Exposed areas in which construction has been completed, should be rehabilitated with vegetation as soon after completion of works as possible.
- j) Material stockpiles must be protected against stormwater damage.

### **3.5. Management and Stabilisation of Soils in Construction**

Ignorance of the importance of soil and stabilisation management during construction can cause significant damage and negative environmental impacts. In this regard:

- a) Insofar as it is practically possible, all exposed soils must be stable, protected against erosion and maintained as a suitable growth medium.
- b) Where vegetation is removed, this should be done in a phased manner to prevent unnecessary destabilisation and erosion.

- c) When undertaking any earthworks, the topsoil must be stripped separately and retained for later re-use. Topsoil stockpiles must be stable, less than 2 meters high and free of invasive alien vegetation.
- d) Following the exposure of any soils for construction, shaping or other activities, a suitable vegetation cover must be established immediately after the works have been completed. Where appropriate, straw stabilisation, brush packing or hydro seeding with environmentally compatible grasses and plants may be used to prevent erosion.
- e) Barren soils should be tilled, treated with fertiliser or compost and vegetation cover encouraged and irrigated.
- f) Any erosion must be treated without delay. Where applicable, anti-erosion compounds may be used to prevent erosion.
- g) Paths and roads must be formalised and stabilised against erosion by means of suitable materials, compaction and functional design. Stormwater cut off trenches must be used to prevent erosion.
- h) No cement/concrete mixing may take place directly on the soil surface. Cement mixers are to be placed on large trays or within the confines of areas that are to be covered by foundation and floors, to prevent accidental spills from coming into contact with soil surfaces that will be rehabilitated.
- i) Dust on roads must be minimised by compaction, watering or by other forms of surface stabilisation where required.

### **3.6. Vegetation Management in Construction**

- a) Where any vegetation stripping is required, this is to be kept to a minimum. The operational footprint of the ADZ should not be allowed to encroach beyond that which has been approved.
- b) Indigenous plants and trees should be used in the landscaping surrounding the facilities.
- c) Cut, trimmed, mowed and felled vegetation must either be removed to a suitable disposal site or mulched or composted on site for further application. Cut vegetation can also be used as brush pack in the control of erosion.
- d) An active alien invasive vegetation control programme must be implemented in which alien plant species are removed, chemical treatments applied where appropriate and follow-up monitoring and control applied, as required.

### **3.7. Management of Fauna in Construction**

During the construction phase, the approach to fauna must include:

- a) Before any clearing or works on site, the ECO must conduct a thorough site inspection to identify and remove slow moving animals such as tortoises, to a suitable area.
- b) Where animals do not pose a risk to the construction activities and where they are not prone to harm or injury, animals should be granted freedom of movement and existence.
- c) Infrastructure must be designed and built in such a manner so as to prevent injury, harm or death to any animals. Stormwater channels must not be steep sided as tortoises may drown as a result of falling into these.
- d) Under no circumstances may animals be shot, trapped, killed, bewildered, injured, poisoned or harmed. Humane trapping of animals may only be carried out by a mandated authority or professional under permit.
- e) Acceptable deterrents may be used to discourage animals from entering into or inhabiting the project site. No animals may be poisoned.

### **3.8. Integrated Waste Management in Construction**

As construction activities generate waste, an integrated waste management approach must be followed in which all forms of waste are actively reduced, re-used or recycled, before being disposed of in a controlled in legal manner:

- a) The contractors and service providers appointed for establishment of the ADZ must make adequate provision for the collection, storage and disposal of waste based on the integrated approach of reduction, re-used and recycling wherever possible.
- b) Waste management must be formalised and not randomly applied when convenient. This will ensure that waste does not cause pollution and potential environmental degradation.
- c) Waste must be collected into suitable weather, wind and animal proof waste containers and removed to a legally registered disposal site on a regular basis. Waste containers may not be allowed to overfill.
- d) No loose litter will be permitted on the project site or the surrounding areas (especially applicable to windblown litter).
- e) The culture of integrated waste management through reduction, collection and disposal must be instilled with all employees by means of guidance and education.
- f) Hazardous waste (e.g. expired chemicals) must be disposed of via an approved hazardous waste disposal site.
- g) No burial or burning of any waste may be permitted on the development site or surrounds.
- h) A record of waste disposal (proof of receipt) at recognized waste disposal sites must be kept up to date.

- i) At the end of the construction period, all excess construction material and any remaining construction waste must be removed.

### **3.9. Ablution Facilities**

Ablution facilities and sewerage management is important in preventing pollution and in providing a safe and sanitary environment. All construction employees must be provided with guidance around the correct use of ablution facilities, as this is important in maintaining a hygienic environment and in curbing the spread of disease.

- a) Adequate provision must be made by construction contractors and service providers for ablution facilities and the management of these facilities (usually by means of appointing a subcontractor to provide and maintain portable facilities).
- b) If portable facilities are to be used, these must be secured against blowing over and they must be regularly emptied.
- c) No sewerage or wastewater may be dumped in stormwater systems or otherwise disposed of on the site in an un-formalised or illicit manner.
- d) Ablution facilities must be kept in a clean, neat and in a hygienic condition.

### **3.10. Construction Water Supplies**

Construction activities may require water for building, dust suppression, landscaping, for drinking purposes and washing:

- a) Adequate (in volume and quality) water supplies that are supplied in a legally compliant manner, should be provided for drinking purposes for construction employees.
- b) Water for construction and landscaping must be used sparingly. Where water is used for dust suppression, smaller volumes should be used at more regular intervals as opposed to dosing areas with large volumes that may lead to runoff and erosion.
- c) Water must be used wisely. Taps must be closed when not in use, while taps and pipes must be maintained to prevent leakage.
- d) Non-hazardous wash water may be led into open ground on the project site or in similar areas where there is no potential for environmental risk.
- e) If water has been contaminated (e.g. through cement mixing), it may not be released into the environment. This water must be kept in conservancy tanks for re-use or disposal at suitable disposal sites.

### 3.11. Chemicals and Hydrocarbon Fuels in Construction

- a) The use of all chemicals and fuels must be done in a responsible manner to ensure environmental safety.
- b) Care must be taken in the handling of all chemicals and hydrocarbon fuels (petrol, diesel, oils, etc.) as these are potential environmental pollutants.
- c) The use of chemicals must be responsible and in accordance with the prescribed application methods. Material Safety Data Sheets (MSDS) must be readily available and referenced during use and disposal.
- d) Empty chemical containers must be disposed of responsibly at a recognised disposal site for these materials and according to the directions provided in the MSDS.
- e) Mixing or handling areas for chemicals and filling areas for fuels must allow for the containment, treatment or removal of any spillage. Non-spill funnels should be used and these may not be cleaned in a manner that causes environmental contamination.
- f) When any paints are used, these must be used in a manner that does not cause any surrounding water and/or soil contamination. Paintbrushes and used containers may not be washed in a manner that causes similar contamination.
- g) Absorbents and remedial (*mop-up*) materials must be available and used on any spills. Any substrate contaminated by the spillage of hydrocarbons or other pollutants must be removed from site and disposed of at a registered waste disposal site.
- h) Care must be taken to ensure that fuel driven devices do not leak. Any leaks must be repaired without delay and the necessary hydrocarbon absorbents used on contaminated areas. All fuel driven devices such as generators, may only be used on trays which are placed on clean sand. Upon completion of the construction works, any contaminated sand must be removed and disposed of at a registered landfill site.
- i) No servicing of vehicles or other machinery may be done on site.
- j) Protective gear and clothing must be provided to employees that work with dangerous chemicals (as per the Occupational Health and Safety Act).
- k) Working firefighting equipment must be available in and around any chemical and hydrocarbon fuel store.

### 3.12. Fire Management in Construction

The potential risk for fire must be minimised, while the necessary emergency procedures and emergency equipment to deal with fire, must always be on-hand and in a working order.

- a) An appropriate number of fire extinguishers must be available on site.

- b) All “hot” works (welding, gas cutting, etc.), must be done with a working fire extinguisher close on hand.
- c) Employees that smoke should be made aware of the fire risks associated with smoking.
- d) A fire contingency plan must be developed and made known to all employees. This plan must include the location and operation of firefighting equipment, the identification of a responsible and trained staff member that will act as the fire marshal, the contact numbers of firefighting and emergency services and the site evacuation procedures.
- e) Contact numbers for the nearest firefighting and emergency services must be clearly displayed in an accessible area.

### 3.13. Construction Noise

Noise generation in the construction phase is not expected to be excessive and disturbance to surrounding people is unlikely. Nevertheless, all works are to be limited to take place between 07:00 am to 17:00 pm. No construction works are permitted on Sundays or on public holidays.

### 3.14. Post Construction Rehabilitation

At the completion of the construction phase the project site should be left in a manner that does not carry a legacy of construction related environmental damage:

- a) All excess construction equipment, materials and construction waste must be removed from the project site prior to commencement of operations.
- b) As certain areas of the construction work are completed, those areas should be subjected to rehabilitation in a progressive manner.
- c) Rehabilitation of areas exposed during construction must be done by means of establishing a suitable growth medium (by topsoil or by amelioration of soils with straw, brush or fertilisers), establishing vegetation cover where possible and dealing with the risks of stormwater damage.
- d) Where possible, indigenous vegetation and trees should be established.
- e) Alien plant species and declared weeds must be systematically eradicated.
- f) The site must be subjected to a post-construction audit, which is to be submitted to the AMC.

This section deals with the operational environmental aspects that apply to the ADZ and its surrounding environment.

### **4.1. The Landscape and Surrounding Biophysical Environment**

#### **4.1.1. Sensitive Areas**

The Amatikulu ADZ lies in close proximity to a range of sensitive areas, including the primary dune between the project site and the sea, the offshore Marine Protected Areas, the Amatikulu Estuary, as well as the Umlalazi Nature Reserve (north) and the Amatikulu Nature Reserve (south).

- a) Access to these sensitive areas from the ADZ is prohibited, unless for a specific purpose that has been permitted by the EO.
- b) All natural features such as trees and rock outcrops should be protected and not harmed or removed unnecessarily.
- c) All fossils, archaeological and paleontological materials, graves and burial grounds, wetlands, mountain catchments and forests are protected by law and may not be disturbed in any manner without authorisation to do so.
- d) Uncontrolled or unmanaged effluent discharge or waste dumping is not permitted.

#### **4.1.2. Stormwater Management**

The stormwater management measures that are to be implemented during the operational phase include:

- a) Following the construction phase, permanent stormwater channels would have been established to direct all onsite stormwater generation.
- b) All stormwater channels are to be maintained in the operational phase and should not be unnecessarily modified. However, should sections be seen to have exposed soils, these exposed areas should be addressed by brush packing and/or water attenuation structures that can be made of rock or stepped logs.
- c) No wastewater may be directed to stormwater channels. No potential contaminants may be placed in any areas where it can cause pollution to stormwater.
- d) Following any heavy storms or rains, the integrity of the stormwater channels must be inspected and repaired where required.
- e) Any exposed soils should be protected against stormwater and erosion wherever possible.

### 4.1.3. Management and Stabilisation of Soils

Ignorance of the importance of soil and stabilisation management can cause significant damage and negative environmental impacts. In this regard:

- a) Insofar as it is practically possible, all exposed soils must be stable, protected against erosion and maintained as a suitable growth medium.
- b) Barren soils should be tilled, treated with fertiliser or compost and vegetation cover encouraged and irrigated.
- c) Any erosion must be treated without delay. Where applicable, anti-erosion compounds may be used to prevent erosion.
- d) Paths and roads must be formalised and stabilised against erosion by means of suitable materials, compaction and functional design. Stormwater cut off trenches must be used to prevent erosion.
- e) Dust on roads must be minimised by compaction, watering or by other forms of surface stabilisation where required.

### 4.1.4. Management of Vegetation

- a) The operational footprint of the ADZ should not be allowed to encroach beyond that which has been approved.
- b) Indigenous plants and trees should be used in the landscaping surrounding the facilities.
- c) Cut, trimmed, mowed and felled vegetation must either be removed to a suitable disposal site or mulched or composted on site for further application. Cut vegetation can also be used as brush pack in the control of erosion.
- d) An active alien invasive vegetation control programme must be implemented in which alien plant species are removed, chemical treatments applied where appropriate and follow-up monitoring and control applied, as required.

### 4.1.5. Management of Fauna

During the operational phase, the approach to fauna must include:

- a) Where animals do not pose a risk to the operational activities and where they are not prone to harm or injury, these animals should be granted freedom of movement and existence.
- b) Infrastructure must be designed and built in such a manner to prevent injury, harm or death to any animals. Stormwater channels must not be steep sided as tortoises may drown as a result of falling into these.



- c) Under no circumstances may animals be shot, trapped, killed, bewildered, injured, poisoned or harmed. Humane trapping of animals may only be carried out by a mandated authority or professional under permit.
- d) Acceptable deterrents may be used to discourage animals from entering into or inhabiting the project site.
- e) No animals may be poisoned. The only exception to this is in the responsible control of vermin, in which case recognised poisons may be used in the prescribed methods.
- f) Under no circumstances may any dead fish be disposed in such a manner that it may encourage or attract animals to the ADZ.
- g) Operators must ensure that the ADZ does not become overrun with rodents or other pests (especially store rooms and feed stores). A responsible control program for such vermin must be implemented.

### **4.1.6. Fire Management**

The potential risk for fire must be minimised, while the necessary emergency procedures and emergency equipment to deal with fire, must always be on-hand and in a working order:

- a) An appropriate number of fire extinguishers must be available on site.
- b) The onsite fuel store must have the appropriate fire extinguishers close on hand.
- c) All “hot” works (welding, gas cutting, etc.), must be done with a working fire extinguisher close on hand.
- d) Employees that smoke should be made aware of the fire risks associated with smoking.
- e) A fire contingency plan must be developed and made known to all employees. This plan must include the location and operation of firefighting equipment, the identification of a responsible and trained staff member that will act as the fire marshal, the contact numbers of firefighting and emergency services and the site evacuation procedures.
- f) Contact numbers for the nearest firefighting and emergency services must be clearly displayed in an accessible area.

## **4.2. Operational Services**

### **4.2.1. Integrated Waste Management**

Fish farming produces various waste streams, which can be categorised as follows:

- a) General waste (office waste, discarded packaging, paper, plastic, glass, etc.).

- b) General organic waste from landscape maintenance.
- c) Dead fish and processing related organic waste (e.g. byproducts of processing), which is destined for silage treatment in the case of the ADZ.
- d) Sewerage and non-production related waste water.
- e) Hazardous waste materials and chemicals.

Given the various waste streams, an integrated waste management approach must be followed in which all forms of waste are actively reduced, re-used or recycled before being disposed of in a controlled in legal manner:

- a) Adequate provision must be made for the collection, storage and disposal of waste, based on the integrated approach of reduction, re-used and recycling wherever possible.
- b) Waste management must be formalised and not randomly applied when convenient. This will ensure that waste does not cause pollution and potential environmental degradation.
- c) Where possible, general waste should be separated into glass, paper and plastics so that these can be recycled.
- d) General waste must be collected into suitable weather, wind and animal proof waste containers and disposal to a legally registered disposal site on a regular basis. Waste containers may not be allowed to overfill.
- e) No loose litter will be permitted on the project site or the surrounding areas (especially applicable to windblown litter).
- f) The culture of integrated waste management through reduction, collection and disposal must be instilled with all employees by means of guidance and education.
- g) Vegetation matter from landscaping activities must be removed to a suitable disposal site or composted for later use.
- h) Dead fish, waste feed and any processing waste must be treated with formic acid to render it as a stable silage product that can be used as a fertiliser or animal feed additive.
- i) Hazardous waste (e.g. expired chemicals) must be disposed of via an approved hazardous waste disposal site.
- j) No burial or burning of any waste will be allowed on the project site or surrounds.
- k) A record of waste disposal (proof of receipt) at recognized waste disposal sites, must be kept up to date and on site.

### **4.2.2. Water, Wastewater and Ablution Facilities**

- a) Water for general use will be obtained from resources (groundwater) on site. Adequate (in volume and quality) water supplies, should be provided for drinking purposes.

- b) Water for landscaping must be used sparingly.
- c) Water must be used wisely. Taps must be closed when not in use, while taps and pipes must be maintained to prevent leakage.
- d) Non-hazardous (grey) wash water may be led into open landscape or used for irrigation on the project site, or into similar areas where there is no potential for environmental risk.
- e) If water has been contaminated by hazardous substances or high organic loads, it may not be released into the environment. This water must be treated or stored in a conservancy tank for suitable disposal.

General wastewater and sewage in the ADZ will be directed to a package plant for treatment on site, before release via a marine discharge point. Sewerage and wastewater management is important in preventing pollution and in providing a safe and sanitary environment for employees and for the production of products for human consumption. All employees must be provided with guidance around the correct use of ablution facilities, as this is important in maintaining a hygienic environment:

- a) Adequate provision must be made for ablution facilities and the management of these facilities. Ablution facilities must be kept in a clean, neat and in a hygienic condition.
- b) No sewage or wastewater may be dumped in stormwater systems or otherwise disposed of on the site in an un-formalised or un-authorised manner.
- c) Sewerage infrastructure must be maintained, and the layout thereof mapped in as-built plans.
- d) Sewerage pipes must be buried at an appropriate depth so that they do not interfere with the surface activities, while remaining practically accessible for maintenance and repair.
- e) Hazardous chemicals and other non-sewerage materials may not be dumped into sewerage system.

### **4.2.3. Electricity Supplies and Communications**

Communication networks and electrical installations must be managed and maintained in a condition that is safe to the environment and the people working in and around the ADZ:

- a) Bulk electricity and communication service providers must be sensitised to the EMP when providing services on site.
- b) Installations of, and modifications to internal electricity networks must be performed by qualified electricians, who must ensure the safety of such works.
- c) Infrastructure, operations and activities at the ADZ may not interfere with overhead or any other electrical and communication networks.

### 4.2.4. Chemicals and Hydrocarbon Fuels

The use and storage of all chemicals and fuels must be done in a responsible manner to ensure environmental safety. The main groups of chemicals are:

- a) Aquaculture chemicals and detergents
- b) Herbicides and insecticides
- c) Pesticides used in vermin control
- d) Hydrocarbon fuels
- e) Other

The principles in chemical storage and handling includes:

- a) Care must be taken in the storage and handling of all chemicals and hydrocarbon fuels (petrol, diesel, furnace oils, oils, etc.) as these are potential environmental pollutants. In certain instances, the methods of storage are prescribed by the South African National Standards (SANS), or by other legislation such as the Occupational Health and Safety Act and NEMA.
- b) Only recognised and registered chemicals may be used as herbicides, insecticides, pesticides and for other purposes. The use of chemicals must be responsible and in accordance with the prescribed application methods. Material Safety Data Sheets (MSDS) must be readily available and referenced during use, storage and disposal.
- c) Bait type pesticides must be used with care to prevent poisoning of non-target species.
- d) Chemicals must be stored in a dry, well ventilated, secure and lockable area, which is in compliance with the Occupational Health and Safety Act and other applicable legislation. Only authorised employees may have access to such stores.
- e) Chemicals should be recorded in a chemical register, indicating the date of purchase, use and expiry. Expired products and empty chemical containers must be disposed of responsibly at a recognised disposal site for these materials and according to the directions provided in the MSDS.
- f) Fuels and oils must be stored in suitable containers in a safe and lockable storage facility that allows for the containment of any spillage. Storage methods for small and bulk volume fuels are prescribed by the SANS.
- g) Mixing or handling areas for chemicals and filling areas for fuels must allow for the containment, treatment or removal of any spillage. Non-spill funnels should be used, and these may not be cleaned in a manner that causes environmental contamination.
- h) Absorbents and remedial (*mop-up*) materials must be available and used on any spills. Any substrate contaminated by the spillage of hydrocarbons or other pollutants must be removed from site and disposed of at a registered waste disposal site.

- i) Care must be taken to ensure that fuel driven devices do not leak. Any leaks must be repaired without delay and the necessary hydrocarbon absorbents used on contaminated areas.
- j) Protective gear and clothing must be provided to employees that work with dangerous chemicals (as per the Occupational Health and Safety Act).
- k) Working firefighting equipment must be available in and around any chemical and hydrocarbon fuel stores.

### **4.3. The Aquaculture Production Facilities**

#### **4.3.1. Sustainable Production Capacities**

The capacity of the receiving environment is a measure of its ability to accommodate an activity in a sustainable manner. This is determined by the degree to which environmental resources and services are used. To remain sustainable, the host environment must have an adequate capacity in terms of the required environmental resources and services.

- a) To prevent environmental degradation, the production capacities of the ADZ must be maintained in terms of the available water and other natural resources.
- b) Detailed records must be kept, allowing for forward-planning of production estimates to ensure that sustainable production capacities are maintained.
- c) Environmental capacity determination for aquaculture is not a once off exercise and requires continuous monitoring, decision-making and adaptive management.

#### **4.3.2. Management of Production Water**

Aquaculture activities add nutrients, metabolites and other wastes to the water column, which creates the potential for water quality deterioration.

- a) The use of water in aquaculture must be legally sanctioned.
- b) The quality of water that exits the ADZ after post-production treatment by physical and biological filtration must be within acceptable quality standards.
- c) Pre-development water quality tests must be conducted to provide a baseline against which monitoring results can be assessed.
- d) Regular monitoring of the water quality must be done to ensure that no contamination or environmental pollution occurs

- e) Feeding must be strictly controlled through a specific feeding regime that maximizes feed conversion efficiency, limits direct feed wastage and above normal fecal and metabolite releases from the production organisms.
- f) Aquaculture feeds should be:
  - As low as possible in phosphorous, while the phosphorous present should be highly attainable through digestion and absorption.
  - As low as possible in inedible components such as fines (i.e. dust).
  - Water stable but highly digestible to the production species.
- g) Samples of the inlet and outlet water for the ADZ must be independently taken and analyzed monthly by a laboratory that has been accredited by the South African National Accreditation System (SANAS).
- h) Results related to the analysis of these parameters must be reported to the AMC.
- i) Results of the water sampling and analysis should be compared to pre-production benchmarks.

### **4.3.3. Species and Escape**

The introduction of alien aquaculture species, potential diseases and foreign genetic traits into an area can pose a significant environmental risk.

- a) Although indigenous species are preferred for use as aquaculture species in the Amatikulu ADZ, certain exotic species may be permissible provided an Alien and Invasive Permit has been issued and provided the conditions that pertain to their use are complied with.
- b) In all instances the source of brood stock and externally obtained stock must be known and recorded.
- c) When fish are stocked into the system, care must be taken that secondary species are not accidentally introduced with the target species.
- d) No live organisms may be transported to or from the ADZ without a transport permit from the Ezemvelo KZN Wildlife Services.
- e) The disease and parasitic status of newly introduced organisms should be verified by a registered veterinarian with aquaculture experience.
- f) Adequate steps must be taken to prevent the escape of production organisms.

### **4.3.4. Feed and Feeding**

Feed and feed management is a primary cause of direct and indirect pollution of water resources used for aquaculture.

- a) Only registered aquaculture feeds may be purchased from recognized feed companies. The nutrient make-up, the primary ingredients and production techniques for the feeds must be known.
- b) A feed traceability programme must be employed in which the batch of feed can be matched to a specific feeding period and to specific batches or cohorts of production organisms, to allow for full and accurate recall of fish and/or feed.
- c) Feed producers must provide the date of manufacture, information pertaining to the ideal storage conditions and estimated shelf life.
- d) Feed stores must be lockable to prevent theft.
- e) Feed must be stored and used on a “*first-in-first-out*” basis to prevent unnecessary aging and deterioration in quality.
- f) Feed storage areas must be well ventilated, dry and free of vermin that can damage, contaminate and consume feeds. Dampness and heat can also damage feeds.
- g) It is good practice to store feeds on individual pallets that can allow for full ventilation of bags that would otherwise be in direct contact with floor and wall surfaces.
- h) Feed types and feeding rates must be recorded daily so that feed conversion efficiency can be calculated and monitored.
- i) Water quality monitoring must be correlated and checked against feeding rates and production biomass so that adjustments can be made to the feeding programme.
- j) Palatable feeds of the correct pellet or grain size should be used to ensure low levels of feed loss. Other factors such as feed position (e.g. floating or sinking) and feeding time of day must also be considered to minimize feed wastage.
- k) Feeding tempo and methods must be suited to the specific species, while feed distribution in a production unit must be even to ensure that all individuals are fed.
- l) Employees that are responsible for feeding must be well trained in feed application.
- m) The feeding strategy must be flexible and adaptive to ensure optimal intake and minimal wastage.
- n) Empty feed bags must be disposed of through an organized system for general waste.
- o) Small quantities of old or spoilt feed can be composted, but larger quantities must be disposed of responsibly through a formalized waste removal system.

### **4.3.5. Disease Monitoring, Control and Treatment**

Aquaculture disease is a threat, not only because of its potential impact on production, but also due to the potential of infecting downstream populations of aquatic organisms and the environment in general.

South Africa subscribes to the Aquatic Animal Health Code, issued by the Office International des Epizooties (OIE) and therefore this international disease code applies. None of the identified diseases in this code are permitted and are notifiable by law.

The objectives in disease management are:

- a) To ensure no diseases/parasites are introduced into the production facility through incoming stock.
- b) To implement good management practices, reducing the risk and potential introduction and spread of diseases/parasites in the ADZ or to the surrounding environment.
- c) To provide the protocols to continually monitor diseases/parasites in the production facilities.
- d) To ensure contingency plans are in place in the event of disease outbreaks.
- e) To farm fish that are healthy and safe for human consumption, producing a product that is of high quality using a certified method of control.

In order to maintain biosecurity:

- a) Incoming fish should be obtained from disease-free farms or sources. Any stock newly introduced into the system should be inspected by a qualified veterinarian to verify and ensure that the health status of the new stock is in order.
- b) Any stock leaving the farm should be subjected to a similar regime as above.
- c) Upon the detection of any disease, measures should be implemented to isolate and treat the disease without delay.
- d) Production tanks and equipment should be disinfected routinely.
- e) All persons should wash their hands upon entry to the facilities.
- f) No eating should be allowed within the facilities.
- g) No animals (pets) should be allowed within the facilities.
- h) All chemicals should be handled outside the production facilities.
- i) All staff clothing and foot wear should be cleaned and sanitized before entering the facilities.
- j) Fish handling equipment (nets, buckets, grading as well as harvesting equipment) should be disinfected before use.
- k) Fish handling equipment should be sanitized when used between tanks or production units.
- l) The introduction and disposal of any stock should be recorded, including the source and destination.
- m) Any disease outbreaks and mortalities must be recorded.
- n) Full records must be kept of mortalities and the probable cause of death as well as any remedial actions taken.



### Disease Indicators:

If unusual mortalities occur in conjunction with the following signs, disease may be present:

- a) Fish swimming to the edge of the water surface of the production tank.
- b) Unusual swimming patterns are observed.
- c) Reduced feed intake.
- d) Abnormal physical changes in/on animals.

### Disease Treatment:

Any drugs used for disease/parasite treatment should be corroborated by an independent veterinarian. Guidance should be sought from the veterinarian concerning treatments (drugs to be used as well as its concentration, dosage and related salient matters).

### Monitoring:

Disease monitoring should be a standard operating procedure conducted by qualified personnel. Health inspections should be recorded and filed. If any parasites or diseases are identified, during routine inspection, that may potentially threaten fish stock or the environment, veterinary consultation must be sought.

- a) Independent and routine health inspections should be conducted at least once in six months.
- b) Fish samples for health inspections should be preserved in a refrigerated / chilled container for no longer than twenty-four hours, before delivery to an independent veterinarian.
- c) Reports from health inspections must be filed.

### Containment and Contingency Protocol:

If fish have been contaminated during handling or transport and disease outbreaks do occur, the following actions must be taken:

- a) Animals indicating signs of any disease or parasitic infestation must be isolated.
- b) The pathway (cause) and extent of the disease should be determined. If the disease or parasite has spread through the farm all effluent water should be stopped (full quarantine) and a qualified veterinarian contacted for further advice.
- c) Personnel must work with healthy stock first before being exposed to infected animals.

- d) Mortalities must be removed and disposed of in a manner that minimizes the spread of diseases and in accordance with prescribed requirements.
- e) Equipment used to remove mortalities must be properly cleaned and sanitized.
- f) Samples of infected fish should be sent to an independent veterinarian or accredited laboratory for assessment and for the determination of further treatment regimes.
- g) Secondary samples should be analyzed to determine the success of treatments.
- h) After treatment all quarantine tanks must be fallowed and cleaned, ensuring all traces of the disease/parasite is destroyed.

### General:

- a) No aquaculture organisms may be introduced from an unknown origin.
- b) No live organisms may be transported to or from the ADZ without a transport permit from Ezemvelo KZN Wildlife Services.
- c) The disease and parasitic status of new stock imports should be verified by a qualified veterinarian.
- d) The ADZ should monitor the health status of its production stock as part of the daily operational activities. This includes behavioral monitoring, sampling, diagnostic dissection and microscopic investigation.
- e) A regular (at least six monthly) health assessment should be conducted by a suitably qualified veterinarian. The assessment must be diagnostic, with recommendations of treatments or management of any diseases or parasites.
- f) In addition to the health assessment above any detectable outbreaks of disease or large-scale mortalities must be investigated by a veterinarian. The cause, treatment and results of such events must be recorded.
- g) If an identified disease on the OIE Aquatic Animal Health Code is detected, the nearest State Veterinarian must be informed immediately, where after quarantine, culling and stock disposal measures may be implemented.
- h) Treatment of aquaculture diseases must be done by recognized methods and under the guidance of a qualified person. All treatments must be recorded in detail to reflect the date, treatment methods, substances, dosages and outcome.
- i) The storage and use of aquaculture chemicals and medications must be done in a safe and responsible manner as per their respective MSDS.
- j) If a disease breakout occurs, production systems should be isolated from each other and the surrounding environment.
- k) The following practices must be implemented to reduce the risk of aquaculture disease:
  - Isolation of production sectors with independent water supplies and equipment.

- Installation and use of foot baths and hand washing facilities for employees and at all farm entrances.
- Regular disinfection of equipment and working areas.
- Equipment dedicated to certain areas of the farm should not be used in others.
- Restrictions on access to foreign vehicles and people.
- Minimizing the potential for disease vector hosts to enter systems.

### **4.3.6. Managing Mortalities**

Mortalities are a normal occurrence, but the rate of such mortalities must be monitored to ensure that the numbers remain within acceptable limits. The disposal of dead organisms must be done in an environmentally responsible manner.

- a) If elevated mortality rates are detected the behavior of the remaining stock must be monitored and the physical and chemical characteristics of the water must be determined. Failing the detection of any adverse water conditions, disease should be checked for.
- b) Orderly notes must be kept of the numbers of dead organisms and behavioral patterns.
- c) Dead organisms must be removed from the production systems as soon as they are detected. If samples are required for diagnostic purposes, these must be taken and appropriately stored for this purpose.
- d) No fish mortalities may be buried. Fish mortalities must be frozen until such time as they can be disposed of at a registered waste disposal facility or ensiled on site.
- e) If large numbers die, the cause of death must be determined before disposal.

### **4.3.7. Aquaculture Chemicals**

No recognized list of acceptable aquaculture chemicals exists for South Africa. Chemicals are mainly used for the treatment of diseases and parasites, while some hormonal preparations, anaesthetics, disinfectants and water treatments are also found. Some concerns around the use of chemicals include the potential longevity of bioactive compounds in animal tissues, the fate and effect of these compounds or their residues in the aquatic environment (i.e. toxicity to non-target organisms) and the creation of antibiotic resistance.

- a) Operators should be encouraged to reduce their reliance on chemicals through the use of sound husbandry practices aimed at disease and stress prevention. More emphasis should be

placed on preventive measures where the use of chemicals is a last resort when other measures have proved to be inadequate.

- b) Preference must be given to the use of biodegradable chemicals.
- c) Responsible use of chemicals and treatments in aquaculture is characterized by:
  - Chemical application based on an accurate diagnosis.
  - The use of an appropriate compound and application method.
  - Chemical dosage for the minimum effective time.
  - The keeping of records and evaluation of treatments.
  - An awareness of potential chemical residues.
- d) Chemicals should be used for specific and not general purposes and this should be done according to the prescribed application methods. Dosages, application methods and the resultant outcome should be known and recorded in a treatment register.
- e) The use of chemical cocktails is not permitted.
- f) In the use of chemicals, consideration must be given to the potential for residues and the need for withdrawal periods before consumption of the aquaculture products.
- g) Chemicals must be stored in a dry, well-ventilated and lockable store. Chemicals must be clearly labeled and the purchase date, batch number, use and expiry date must be recorded. Expired chemicals must be disposed of at a suitable hazardous waste disposal site.
- h) The advice of an aquaculture veterinarian must be sought where the application methods for chemicals is uncertain.
- i) Employees must be trained in the handling and use of chemicals and they must be provided with the required protective gear.
- j) To prevent the development of disease resistance, the prophylactic use of antibiotics must be avoided.

### **4.3.8. Grading, Moving and Harvesting**

Aquaculture organisms are regularly graded for uniformity in size, growth monitoring and the prevention of cannibalism. As with stocking and harvesting, this requires a degree of handling, which must be done in a manner that causes the least possible stress or injury and which eliminates the potential of escape.

- a) No live organisms may be transported to or from the ADZ without a transport permit from the Ezemvelo KZN Wildlife Services.
- b) Aquaculture organisms should not be graded and moved unnecessarily.
- c) Grading and moving should be preceded by a period of starving so that the metabolism of the organisms does not impede their stress tolerance.

- d) Where possible, grading and moving should be done at lower temperatures to reduce metabolic rates and stress.
- e) Grading, moving and harvesting equipment and techniques should not cause unnecessary injury and stress and should be adequate to prevent escape.
- f) Harvesting and killing must be done by the most humane method possible, as per the protocols and conditions determined by the SPCA.

### **4.3.9. Predation**

Predation may occur in open production system at the Amatikulu ADZ.

- a) Traps may not be used to injure any predators. Traps may only be set if the animals can be caught live and without injury, for translocation to alternative areas. This must be done in consultation with the provincial conservation authorities.
- b) No poisons may be left out and no animals may be shot or otherwise harmed.

### **4.3.10. Production Records**

Comprehensive records are a cornerstone to the viability of any operation.

- a) Farm records must be written or electronically logged in a logical and tidy manner. Records must be safely kept and accessible for daily management and reference.
- b) Where possible, farm record should be supported by photographs, water quality analysis reports, incident reports, MSDS's and other information that may be of assistance.
- c) As a guideline, farm records should include the following:
  - Dates of all entries.
  - Identification of the person who made the entries.
  - Climatic and water quality data. This would usually involve parameters such as air temperature, rainfall, water temperature, dissolved oxygen levels, etc.
  - Water quality analysis records.
  - Copies of all applicable permits and authorisations.
  - A copy of the EMPr.
  - Detailed and up to date stocks register of the farm.
  - Production sampling records.
  - A detailed feed programme for the farm together with records of the feed stocks.
  - A mortality record.

- Health records.
  - Chemical and treatment application records.
  - Chemical registers indicating stocks, MSDS's, purchase and expiry dates.
  - A complaint register.
  - A daily diary of significant events, incident reports, feed response, etc.
- d) The ADZ must implement a traceability system in order to allow for the recall of potentially contaminated fish products from the distribution chain.

## SECTION 5: THE SOCIAL ENVIRONMENT

### 5.1. Employee Facilities and Employment Conditions

The conditions under which employees work and the impacts on the surrounding communities, are part of the environmental footprint of the Fish Processing Facilities. In this regard, the operators must ensure favourable, safe and legally compliant employment conditions, the preservation of basic human rights and the provision of adequate employee facilities:

- Provision must be made for clean and accessible ablution facilities for men and women.
- Provision must be made for clean drinking water for all employees.
- An area should be provided where employees may store personal goods and belongings. This area must be safe, dry and provide adequate privacy and protection from inclement weather for people and their belongings.
- Protective gear must be provided for certain tasks and for the handling of chemicals.
- The Fish processing Facilities must have first aid equipment and at least one employee must be trained in first aid provision.
- Relevant emergency service contact numbers must be clearly displayed.
- Basic legal employment conditions (i.e. for working hours, minimum wages, etc.) must be followed to ensure the maintenance of employee rights.
- Employees must be provided with opportunities for training and furtherance of skills.
- All new employees must be exposed to an environmental awareness training session.

### 5.2. Community Interaction

The Fish processing facilities will influence surrounding communities at various levels:

- Communities must be informed of the on-going activities adjacent to the areas in which they live and work.
- Whenever possible, new employees should be sourced from the surrounding communities in preference to importing personnel.
- Where possible, outside contractors should be sourced from local communities.

### **5.3. Dealing with Complaints**

Any complaints received by the Fish processing Facilities must be dealt with appropriately to ensure due consideration to the complainant and to ensure public and environmental safety:

- All complaints must be recorded in a complaints register, with details of the nature of the complaint, the person or organization that lodged the complaint, the date and the name of the responsible person dealing with the complaint.
- The complaint must be fully investigated. Further clarity may also be obtained from production and environmental records, from employees, from third party specialists or from the complainant.
- A strategy to deal with the complaint must be formulated, documented in the complaints register and communicated to the complainant.
- The formulated strategy must be implemented by the allocation of resources.
- The effects of the strategy should be monitored and the strategy modified if need be.
- Once the situation leading to the complaint has been resolved, the complainant must be informed. The date hereof should be recorded in the complaints register.
- Actions must be taken to prevent the situation from reoccurring and, if necessary, a contingency plan should be developed.
- If a situation leading to a complaint cannot be resolved under normal production conditions, an amicable solution should be devised with inputs from the complainant.
- If required, the relevant authorities should be involved in the resolve of a complaint.
- The complaints register must be reviewed regularly to ensure that all complaints have been dealt with effectively.

## **SECTION 6: ADDITIONAL ENVIRONMENTAL MANAGEMENT MEASURES**

In addition to the environmental management aspects highlighted in the section above, the environmental impact assessment and the specialist inputs therein, highlighted the following specific environmental management measures for the Amatikulu ADZ.

### 5.4. From the Ecological Assessment

- a) The development footprint of the ADZ should lie within the identified transformed habitat. Further excavations which impinge upon the prevailing water table should be avoided.
- b) Ensure that wetland system located to the west of the dune slack is managed and maintained as a conservation area. Any alteration of the present access route to the ADZ, which impinges upon the present crossing should be subject to evaluation and consideration to ensure that hydrological processes are maintained and where possible, improved.
- c) The identified coastal set back line should be sanctioned and recognized by the AMC. The coastal set back line allows for the maintenance of eco-morphological connectivity between the north and south of the coastline.
- d) Relic grow out ponds should in part be retained particularly on the seaward extent of the site.
- e) Proposals to limit or end the discharge of waters from the aquaculture project into the present disposal channel should be subject to specific consideration. Such consideration should give due consideration to the impact on the dune cordon.
- f) The removal of *Eucalyptus grandis* (and other exotic vegetation) within the dune slack should be undertaken in this region. The removal of *C equisetifolia* may also be considered following specific review of the impacts of the wholesale removal of these trees.
- g) Coastal set back line and recommended development footprint is to be maintained
- h) Incursion into the dune cordon to be subject to specific review. If required, the establishment of intake / outfall pipes into the sea should follow an alignment that ensures that the eco-morphology of the dune cordon is generally maintained in an undisturbed state i.e. avoidance of significant excavation and disturbance.
- i) If dune transgression is to be moderated, it will be important to maintain a level of freshwater disposal into the dune heel.
- j) The removal of exotic vegetation on the dune cordon should be considered, subject to specific review and consideration of the impacts of its removal on the ADZ.
- k) Intake and discharge pipes associated with the ADZ, if required, should be positioned within the coastal environment to the north of the ADZ. The exact position and the nature and design of these structures should be subject to specific evaluation in order to ensure that impacts of a bio-physical nature are moderated.
- l) Discharge waters from the ADZ should be subject to a sanitation process which ensures the neutralization of any biotic material. The use of ozonisers, ultra violet light or other methods should be considered.
- m) A policy of no loss of live biotic material from the ADZ into the ambient environment should be adopted.



### 5.5. From the Social Impact Assessment

- a) Raise awareness amongst construction workers about local traditions and practices.
- b) Inform local businesses that construction workers will move into the area to enable local businesses to plan for the extra demand.
- c) Ensure that the local communities communicate their expectations of construction workers' behaviour with them.
- d) Ensure that employment procedures/policies are communicated to local stakeholders, especially community representative organisations and ward councillors.
- e) Have clear rules and regulations for access to the construction site to control loitering. Consult with the local SAPS to establish standard operating procedures for the control and/or removal of loiterers at the construction site.
- f) Construction workers should be clearly identifiable by wearing proper construction uniforms displaying the logo of the construction company. Construction workers could also be issued with identification tags.
- g) The contractor should monitor areas where people gather in the field on a regular basis as this is normally the first indication that (informal) settlement might take place in the area. These people should be removed in co-operation with the local SAPS to prevent the formation and/or expansion of informal settlements in the area.
- h) Consult with the local municipality to establish a partnership as outlined in the municipality's IDP.
- i) An aggressive STI and HIV/AIDS awareness campaign should be launched, which is not only directed at construction workers but also at the community as a whole.
- j) Access at the construction site should be controlled to prevent sex workers from either visiting and/or loitering at the construction village or the construction sites.
- k) Local women should be empowered. This could be achieved by employing them to work on the project, which in turn would decrease their (financial) vulnerability
- l) New infrastructure should be located in close proximity to existing infrastructure of a similar nature, as far as possible.
- m) Inform neighbouring property owners when construction will take place, including information on the nature and timeframe of the construction activities.

### 5.6. From the Cultural Impact Assessment

- Known sites should be clearly marked in order that they can be avoided during construction activities.
- The contractors and workers should be notified that archaeological sites might be exposed during the construction activities.

- Should any heritage artefacts be exposed during excavation, work on the area where the artefacts were discovered, shall cease immediately and the ECO shall be notified as soon as possible.
- All discoveries shall be reported immediately to a heritage practitioner so that an investigation and evaluation of the finds can be made. Acting upon advice from these specialists, the ECO will advise the necessary actions to be taken.
- Under no circumstances shall any artefacts be removed, destroyed or interfered with by anyone on the site.
- Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or palaeontological artefacts, as set out in the NHRA (Act No. 25 of 1999), Section 51. (1).

### **5.7. From the Visual Impact Assessment**

- a) Respond to the natural environment during the planning of buildings and infrastructure.
- b) Retain / re-establish and maintain large trees, natural features and noteworthy natural vegetation in all areas outside of the development footprint. Adapt the development footprint to accommodate these where necessary.
- c) Retain natural pockets (wetland, river and other sensitive vegetation zones) as buffers within the development and along the perimeter.
- d) Retain vegetation in all areas outside of actual built footprints wherever possible.
- e) Soften hard spaces and parking areas through the retention of existing vegetation or the introduction of appropriate indigenous planting.
- f) Make use of muted earth tones, matt surfaces and natural materials rather than primary colours, reflective surfaces and high-tech finishes for all buildings, structures and infrastructure.
- g) Tilt large window areas to negate reflection impact.
- h) Limit the overall height of all buildings to a maximum of 12m.
- i) Visually break up large bulky buildings into smaller, subtler, less prominent shapes and planes.
- j) Avoid large areas of un-shaded reflective and hard paving surface.
- k) Avoid the placement of unsightly services and infrastructure in visually prominent areas.
- l) Appropriately screen service areas.
- m) Ensure that vegetation is not unnecessarily cleared or removed during the construction period.
- n) Reduce the construction period through careful logistical planning and productive implementation of resources.
- o) Plan the placement of lay-down areas and any potential temporary construction camps along the corridor in order to minimise vegetation clearing.
- p) Restrict the activities and movement of construction workers and vehicles to the immediate construction site and existing access roads.

- q) Ensure that rubble, litter, and disused construction materials are appropriately stored (if not removed daily) and then disposed regularly at licensed waste facilities.
- r) Reduce and control construction dust through the use of approved dust suppression techniques as and when required (i.e. whenever dust becomes apparent).
- s) Restrict construction activities to daylight hours in order to negate or reduce the visual impacts associated with lighting.
- t) Ensure that all infrastructure and the site and general surrounds are maintained and kept neat.
- u) Rehabilitate all disturbed areas, construction areas, roads, slopes etc. immediately after the completion of construction works. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.
- v) Monitor all rehabilitated areas for at least a year for rehabilitation failure and implement remedial action as required. If necessary, an ecologist should be consulted to assist or give input into rehabilitation specifications.
- w) Shielding the sources of light by physical barriers (walls, vegetation, or the structure itself);
- x) Limiting mounting heights of lighting fixtures, or alternatively using foot-lights or bollard level lights;
- y) Making use of minimum lumen or wattage in fixtures;
- z) Making use of down-lighters, or shielded fixtures;
- aa) Making use of Low-Pressure Sodium lighting or other types of low impact lighting.
- bb) Making use of motion detectors on security lighting. This will allow the site to remain in relative darkness, until lighting is required for security or maintenance purposes.

### **6.1. From the Estuarine Impact Assessment**

- a) If either abstraction or discharge of water was to be done via the estuary, this may only be done once approved (DEA Oceans and Coasts and DWS). In such instances a water quality monitoring programme must be developed and approved that ensures that the intake and effluent is compliant with the water quality standards for marine waters.
- b) The area within the estuary that are going to be altered must be clearly marked out and no construction activities must take place outside of this demarcated area.
- c) The demarcated area must be kept as small as technically possible. The area to be affected must be approved by a DEA official in conjunction with the AMC.
- d) *Zostera capensis* beds must be identified prior to construction and None of these beds are to be altered in any way.
- e) The discharge point needs to be closely monitored. Site inspections must be conducted once a week for the first month of operation. Thereafter, an inspection of the discharge point must be conducted once a month to monitor the level of localised erosion of the estuary bed at the discharge point.

- f) The development and approval of a mouth management must be pursued by the AMC in consultation with DEA Oceans and Coasts.
- g) Monthly water quality reports (intake and discharge) must be submitted to the AMC and DEA Oceans and Coasts.
- h) The effluent derived from the ADZ must be treated to meet requirements outlined in the National Guideline for the Discharge of Effluent from Land-Based Sources into the Coastal Environment as well as the National Water Quality Standards for Recreational Use due to the swimming beach being near the proposed discharge point.
- i) An estuarine biotic monitoring plan must be developed in consultation with the AMC before construction commences in the ADZ.

### **SECTION 7: MONITORING, REPORTING, AUDITING AND REVIEW**

Monitoring, reporting, auditing and review against the conditions of the Environmental Authorisation and the EMPr will ensure that the ADZ remains legally compliant and environmentally responsible.

#### **7.1. Auditing**

The aim of an audit is primarily to:

- a) Check the degree to which a facility meets a set of predetermined standards.
- b) Check that proper records are kept.
- c) Determine the effectiveness of specifications in the predetermined standards.
- d) Aid in logical communication and feedback to authorities.
- e) Recommend changes and updates to the EMPr.

The EO must manage the implementation of the EMPr and conduct internal audits. In addition to this the EO must:

- a) Ensuring that all tenants and their personnel are aware of the EMPr.
- b) Monitor the implementation of the EMPr and the condition of the environment.
- c) Address aspects that may cause environmental damage.

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- d) Keep a diary, photographic record (where possible) and complaints register.
- e) Note aspects that require updating in the EMPr.
- f) Keep compliance/non-compliance records that must be kept on site and made available to the AMC.

It is recommended that audits be done by means of an audit checklist as shown below.

Requirement / Issue /Specification	Compliance			Comments/ recommendations	CEMPr Ref.
	Yes	Part	No		

### 7.2. Review and Update of the EMPr

The EMPr is a live document requiring review and update:

- a) Notes should be kept of aspects in the EMPr that are not applicable, impractical, out-dated or not adequately addressed.
- b) The EMPr should be actively reviewed and updated at least once a year.
- c) Updated versions of the EMPr should be circulated to all tenants and the applicable authorities.

## SECTION 8: EXPANSION, MODIFICATION OR DECOMMISSIONING

### 8.1. Expansion and Modifications

The expansion or modification of the ADZ must be planned to minimise potential environmental impacts. In addition to this, applicable statutory authorisations for upgrade and expansion activities must be obtained, prior to commencement thereof:

- a) Plans for expansion and upgrade must be checked for environmental compatibility and the need for authorisations.
- b) Local and district authorities must be consulted to ascertain their statutory requirements.
- c) Relevant provincial and national authorities must be consulted to determine any further legislative requirements.
- d) Where construction activities take place, the related prescriptions related to construction in this EMPr must be followed.

### 8.2. Decommissioning

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This section deals with the basic steps that are required in the event of project termination or the decommissioning of individual elements within the ADZ:

- a) As the ADZ is subject to specific statutory authorizations, the authorities in the AMC must be informed of decommissioning.
- b) Infrastructure that is not subject to re-use, must be removed. Rubble, including piping, fencing and cabling from any demolition activities must be appropriately disposed of, before the area is stabilized and vegetated.
- c) Following removal of infrastructure, the soil should be rehabilitated by means of ripping, topsoil application or the use of fertilizers and compost. Quick growing, indigenous plant species that provide stability, must be established.
- d) To ensure that decommissioning and rehabilitation is acceptable, an external audit should be conducted after decommissioning and the results reported to the AMC