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ENVIRONMENTAL MANAGEMENT PROGRAMME

Sea Cage Aquaculture Project, Saldanha Bay, Western Cape, South Africa.

JULY 2017

Prepared for:

Molapong Aquaculture

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

1 BACKGROUND INFORMATION

1.1 INTRODUCTION AND PROJECT INFORMATION

Molapong proposes to develop a sea-based aquaculture project to produce 2000 tons (t) of finfish in a phased approach. Mussels and seaweed will be produced alongside the finfish as mitigation to reduce water quality nutrient loading.

While the finfish are under development, 2000 t of mussels on a continuous line system will be installed. Seaweed will also be cultured experimentally to mitigate nutrient loading. Mussel production will be decreased as finfish culture develops and expands. Mussel and seaweed production will continue to form part of mitigating measures against nutrient loading from finfish production.

This project involves the phased installation of sea cages for the production of finfish in Saldanha Bay up to 2000 t/year. The identification of marine aquaculture sites is a complex process that must take into consideration a number of factors. These include physical (e.g. sea surface temperatures and currents), biophysical (e.g. harmful algal blooms and optimal culture temperatures), infrastructural (e.g. road access and airports), and existing resource-use issues (e.g. urbanisation, parks and recreational areas).

Saldanha Bay was identified as a suitable site as it meets the necessary requirements to successfully farm finfish species. The Saldanha Bay area is one of a very few areas in South Africa where sea cages can be installed successfully as proved through the initial trials.

1.1.1 Locality

Molapong has a lease agreement with the National Ports Authority for the use of two areas totalling five hectares (ha) of sea space for their current experimental project. The areas are located in Saldanha Bay in the Big Bay (South) and near Jutten Island. The preferred alternative would be Alternative 3: A new 40 ha site in Big Bay North, plus 15 ha near Jutten Island (expansion of existing lease area) with the current 4 ha experimental site in Big Bay South remaining operational until cages are located to the new lease areas. Three alternatives have, however, been considered in the process, which is dependent on the allocation of a sea space (see Figure 2).

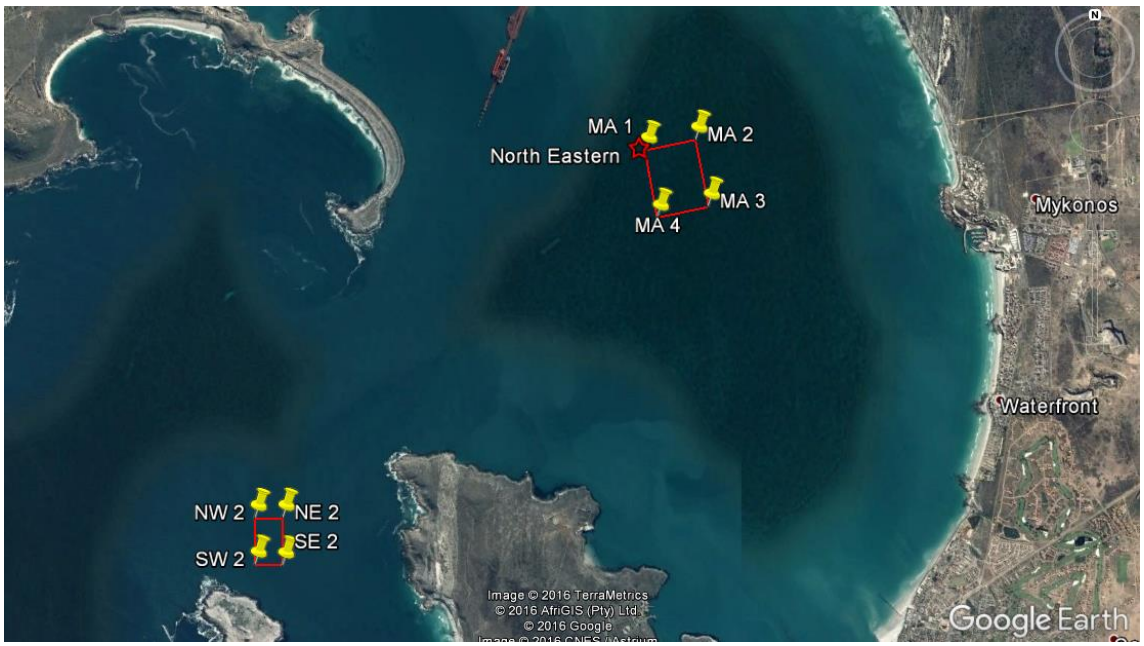

Figure 1: Preferred sites for Molapong Aquaculture

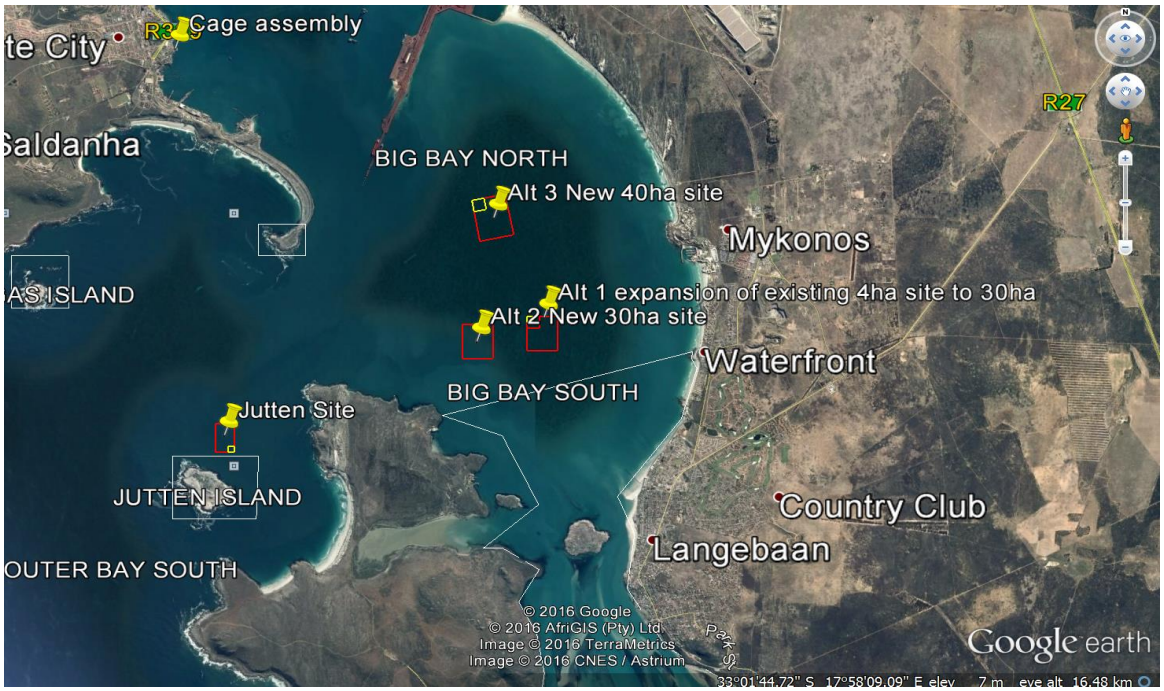

Figure 2: Locality map of all alternatives

Table 1: Geographic coordinates of the sites' vertices.

	SITE	LATITUDE	LONGITUDE
Alternative 1	Site 1 Extension of current experimental 4ha site	33° 2.279'S	18° 0.102'E
		33° 2.218'S	18° 0.448'E
		33° 2.603'S	18° 0.535'E
		33° 2.668'S	18° 0.184'E
	Site 2 (Expansion of 1ha to 15ha at Jutten)	33° 4.399'S	17° 57.409'E
		33° 4.398'S	17° 57.601'E
		33° 4.668'S	17° 57.601'E
		33° 4.668'S	17° 57.409'E
Alternative 2	Site 1 (New 30ha site in Big Bay South)	33° 3.380'S	18° 0.680'E
		33° 3.380'S	18° 1.002'E
		33° 3.704'S	18° 1.002'E
		33° 3.704'S	18° 0.680'E
	Site 2 (Expansion of 1ha to 15ha at Jutten)	33° 4.399'S	17° 57.409'E
		33° 4.398'S	17° 57.601'E
		33° 4.668'S	17° 57.601'E
		33° 4.668'S	17° 57.409'E
Preferred Alternative			
Alternative 3	Site 1 (New 40 ha site in Big Bay North)	33° 2.279'S	18° 0.102'E
		33° 2.256'S	18° 0.226'E
		33° 2.364'S	18° 0.251'E
		33° 2.384'S	18° 0.124'E
	Site 2 (Expansion of 1ha to 15 ha at Jutten)	33° 4.399'S	17° 57.409'E
		33° 4.398'S	17° 57.601'E
		33° 4.668'S	17° 57.601'E
		33° 4.668'S	17° 57.409'E
Part of all alternatives	Temporary Site (current 4 ha experimental site in Big Bay South)	33° 3.380'S	18° 0.680'E
		33° 3.382'S	18° 0.747'E
		33° 3.435'S	18° 0.746'E
		33° 3.435'S	18° 0.680'E

1.1.2 Infrastructure

Installation of the cages would be done using a grid system with a number of configurations possible to provide optimum conditions for the fish. Examples of mooring plans and cage configurations are provided below. The configurations for cage numbers must be flexible for stocking production density. The mooring lay-out would need be changed as required to mitigate sea conditions, visual impacts and to allow for fallowing. Configurations will not exceed a total coverage of approximately 30% of the total area of 59ha. The ALF will be consulted regarding the layout of aquaculture farms, to allow for access there will be a minimum width of 10m between the lines and the cages will be suspended at least 5m above the seabed allowing for adequate dispersion and preventing build-up of wastes below the cages.

Figure 3: Example of six cage grid (Source: FAO, 2015).

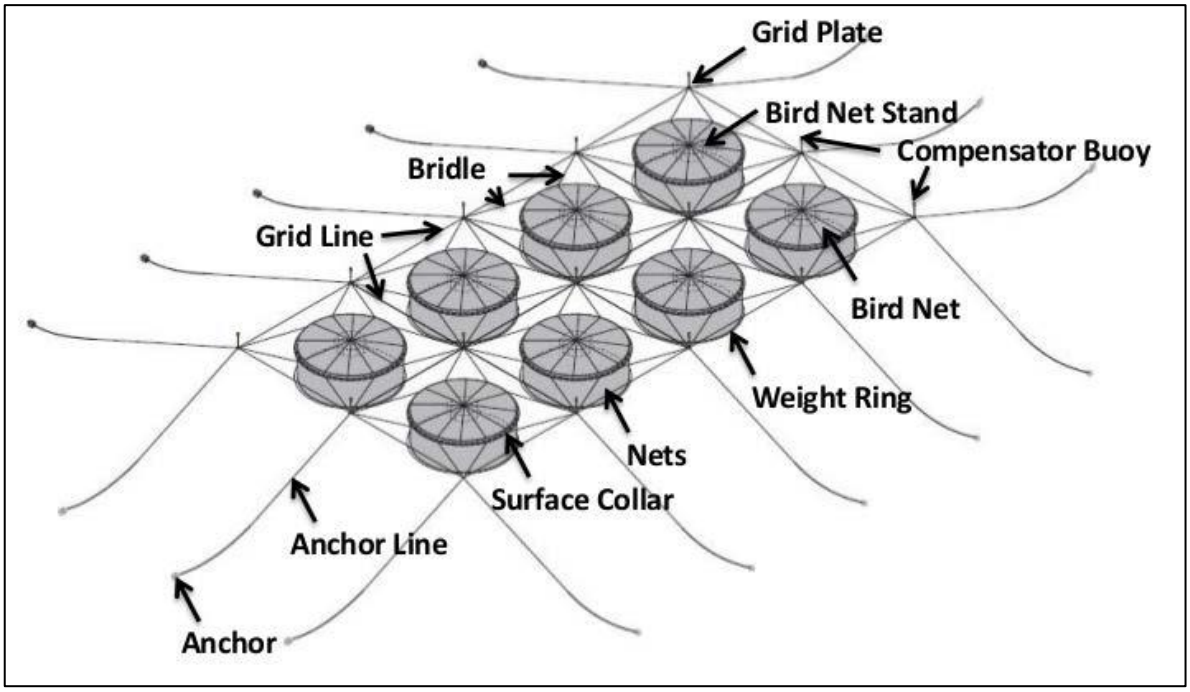

Figure 4: Grid system components (Source: FAO, 2015).

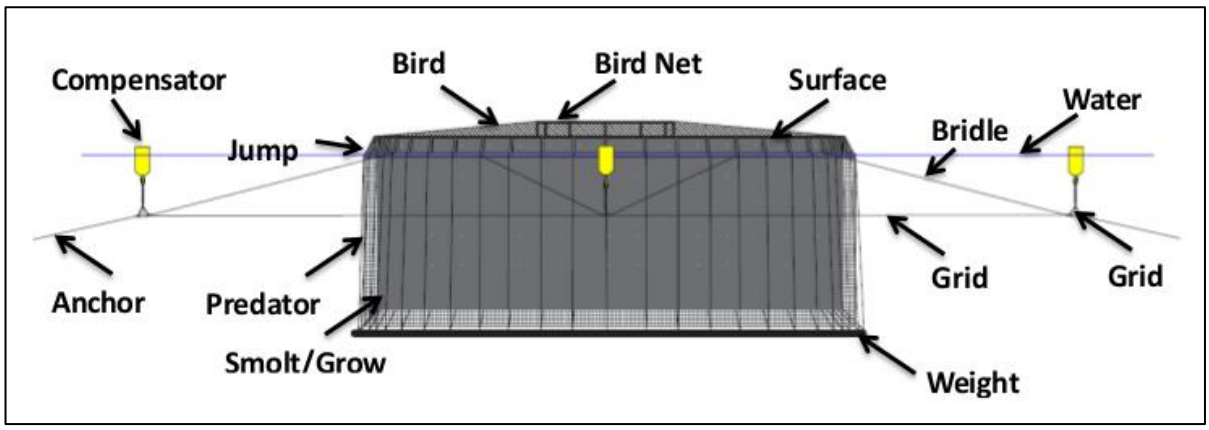

Figure 5: Side view of typical cage structure (Source: FAO, 2015).

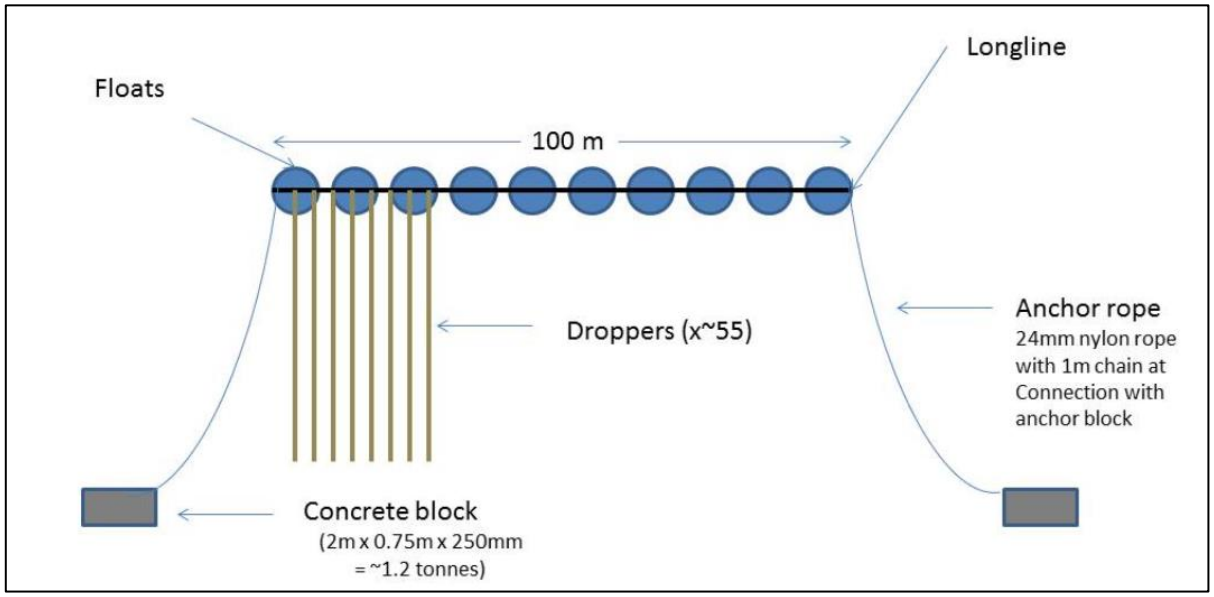

Figure 6: Typical mussel longline layout (Source: FAO, 2015).

1.1.3 Species

Molapong currently has a Marine Aquaculture Right for five species of salmonids i.e. Rainbow trout (*Oncorhynchus mykiss*), Atlantic salmon (*Salmo Salar*), Brown trout (*Salmo trutta*), King salmon (*Oncorhynchus tshawytscha*) and Coho salmon (*Oncorhynchus kisutch*). Molapong is in the process of amending this Right to include Mediterranean mussels (*Mytilus galloprovincialis)*, and seaweed.

The first two species, Rainbow trout and Atlantic salmon, have been tested in a previous research phase/pilot project in Saldanha and are considered to be the most suitable species to the South African and export markets. King and Coho salmon have not been farmed in South Africa, but the applicant will test their viability in an experimental project. Molapong has a NEMBA permit for these two species. Smolts would be obtained from the applicant's land based facilities in Soetfontein, Ceres and Fisantekraal outside Cape Town and transported to the project site in Saldanha Bay to be grown out in seawater for the market. Imported ova require import permits from DAFF. Mediterranean mussels (*Mytilus galloprovincialis)* and seaweed will be cultured to mitigate nutrient loading from finfish culture.

1.1.4 Production Process

A summary of the production process for finfish is as follows (note that all figures represent approximates and are not fixed):

- Approximately 115000 (100 g size). Smolts would be taken to the smaller sea cages every 45 days (5% transfer mortality loss), i.e. approximately 5 t;
- Smolts would be transferred to larger grow out cages when they reach 330 g, which would allow counting and grading;
- Cyclic harvesting would take place every 22 days, alternating 67 t (Cohort split harvest) of 2 kg fish with 240 t of 3.5 kg fish;
- Maximum Biomass in cages at any time would be approximately 790 t to produce the end target of 2000 t; and
- A maximum of 2000 t of 2-3.5 kg size fish would be harvested per year (with a 10% mortality loss per year).

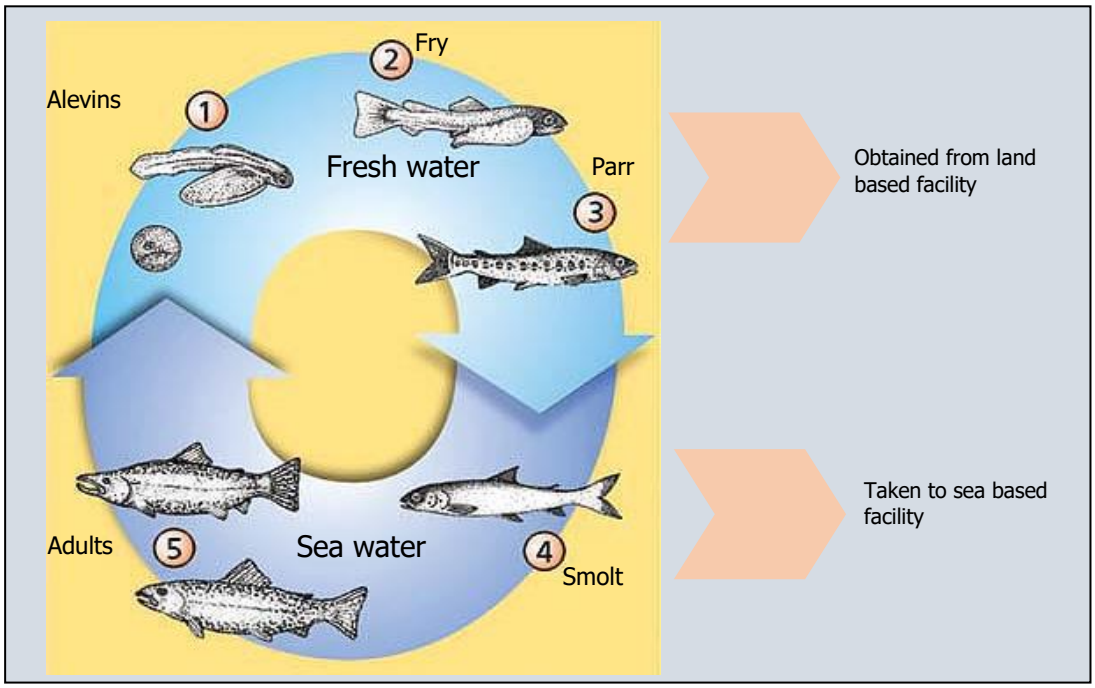

Figure 7: Life cycle of salmonids (adapted for this project from illustrations by Lisa Thompson and Michelle Babione in Meadows R, 2005)

A summary of the production process for mussels is as follows:

- Approximately 2000 t mussels will be cultured using the continuous double longline method;
- Approximately 15 ha will be utilized by 30 lines, 200 m in length each. The total coverage of the lease areas will then be 30%; and
- Mussel culture will rely on natural seed collection/settlement and re-seeding of production lines.
- Seaweed will rely on manual reseding/inoculation on ropes.

1.1.5 Phased Approach

While dealing with nature and environmental and climate changes, the responsible way forward would be to deal with this project in phases (**Table 2**).

Table 2: Project phases and tonnage of aquaculture produce.

	Phase 1 Current experimental phase (duration - 12 months)	**Phase 2 Year 1** (duration – 12-14 months)	**Phase 3 Year 2** (duration – 12-14 months)	**Phase 4 Year 3** (duration – 12-14 months)	**Phase 5 Year 4** (duration – 12-14 months)
Finfish tonnage	50	200	500	1000	2000
Mussel tonnage	0 (Establishment of mussel settlement lines)	80 (Seeding mussel production lines	320 (Harvesting mussels and reducing numbers)	800 (Harvesting mussels and reducing numbers)	2000 (Harvesting mussels and reducing numbers to keep with 2000 t)
Algae tonnage	0	50 (Establish sea weed lines)	100	500	1000

1.2 THE AFFECTED ENVIRONMENT AND ANTICIPATED ENVIRONMENTAL IMPACTS

1.2.1 Site Selection

A number of factors were considered to find a suitable location and position for the cages. The selected sites were chosen as it is sufficiently sheltered to provide optimal husbandry conditions resulting in optimal growth of the fish, and sufficient water displacement/depth under the cage would be provided to aid in the dispersal of the nutrients (uneaten feed and faeces) accumulating under the cages. Furthermore, the cages are moored in the designated aquaculture zone outside the controlled shipping lanes to ensure safety from and to marine traffic. Despite the fact that the cages are in a no-traffic zone, safety controls are presented in **Specification 5.6.11** of the OEMP to minimize the risk of possible marine traffic accidents.

It must be noted that the selected sites are close to Marine Protected Areas, which are breeding and nursery sites to populations of endangered and vulnerable sea birds and risks to these birds though the operation must be avoided, see also **Section 1.2.4**.

1.2.2 Terrestrial Environment

An existing site will be used as a site operations office/store. The assembly of the cages will take place at the existing designated small craft harbour dock area. The generation of waste (e.g. off cuts, weld waste etc.) during the assembly of the cages is considered as the prime environmental management risk issue. This is addressed in **Specification 5.6.3** of the OEMP.

1.2.3 Marine Environment

Accumulation of nutrients (uneaten feed and faeces) under the cages is an identified risk impact which may affect:

- Water quality around the cages and thus, in turn, may negatively affect wild marine organisms and farmed fish stocks of the immediate environment. This is addressed by **Specification 5.6.4 and 5.6.11** of the OEMP; and
- The benthic flora and fauna below the cages (sea floor). This is addressed by **Specification 5.6.8**.

Underwater cage netting needs periodic cleaning due to accumulation of deposits on the netting material (known as bio-fouling) and there are associated pollution concerns with regard to the removed solids and the use of anti-bio-fouling agents for this purpose. While the cage netting material selected for this project is smooth to reduce fouling, some off site cleaning (on land) is still required. This is addressed in **Specification 5.6.2** of the OEMP.

1.2.4 Fauna

The underwater cage netting used on this project comprises of knotless Dynema which is very strong and negates the need for additional predator netting. As no predator netting will be used, there will be negligible associated risks of entanglement with large marine vertebrates. The relatively small mesh size of the cage netting also limits the chances of any animal getting entangled in it.

Bird netting is fitted over the top of the cages to prevent aerial predation by birds and the cage netting sides extend 1.2 m above the water surface to prevent predation. Animals, predominantly large marine mammals, could potentially get entangled in infrastructure (netting, ropes etc.) that has been lost at sea or deposited on land due to poor maintenance, storm damage and/or in waste items e.g. bags, netting, wires/lines etc. This has however never been recorded during the trial phase. In addition, limited quantities of pollution (e.g. through poor handling of workboat fuels and other chemicals) could potentially negatively affect animal populations. As such, infrastructure maintenance and waste/pollution management and mitigation are discussed in **Specification 5.6.2 and 5.6.3**.

Sound maintenance of the cage netting is further required to:

- Prevent escapees (as addressed in **Specification 5.6.6**). While escapees are not considered to have a significant impact on the surrounding fauna, either through genetic contamination (there are no native communities of these species in the area with which to breed and the salmonids will not be able to access freshwater spawning grounds) or competition with or predation of other fauna (reliance of farmed fish on provided food), the loss of fish may hinder the project's success;
- Prevent predation, which results in fish losses; and
- Prevent bio-fouling which effects water quality.

The introduction of pathogens and parasites through fingerling introduction/husbandry conditions and the subsequent treatment of disease in the farmed fish stocks may affect other marine fauna. This is addressed in **Specification 5.6.7.**

1.3 BACKGROUND TO THE ENVIRONMENTAL MANAGEMENT PROGRAMME

Ecosense CC was appointed to compile the EMPr for this project, whose principal member M. Sasman is registered with SACNASP (400185/04) and has extensive experience in the compilation of EMPr's, including for marine based aquaculture projects.

This Environmental Management Programme (EMPr) thus sets out the management procedures that seek to avoid or minimize the potential negative impacts anticipated or to maintain or improve the quality of the surrounding natural and man-made environment during the course of the project.

This EMPr, is a requirement under the National Environmental Management Act (NEMA) Environmental Impact Assessment Regulations of December 2014 and fulfils the requirements per Appendix 4 of the EIA Regulations. A sectin reference checklist to indicate compliance has been included in **EMPr Annexure 5.**

The DAFF has undertaken a bay wide assessment for the establishment of an Aquaculture Development Zone (ADZ), within which the Molapong project may fall. The applicable environmental management specifications out of the ADZ application has been incorporated into this EMPr, should Molapong be required to adhere to it. Molapong also wishes

to become ASC certified[1]. The relevant ASC criteria that applies to the project has therefore also been incorporated into this EMPr. A summary of the relevant specifications and where it is reflected in this EMpr is included in **EMPr Annexure 6.**

1.4 OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

This EMPr aims to achieve the following objectives:

- To set out the mitigation measures and environmental specifications which are required to be implemented in order to ensure that potential negative impacts on the environment are minimised and positive impacts maximised;
- To provide a structure within which the environmental management requirements will be implemented, audited and reported on;
- To state standards and guidelines that are required to be achieved in terms of environmental legislation and authorization conditions; and
- To provide a clear indication of the environmental management requirements of each of the role players involved.

1.5 FORMAT AND STRUCTURE OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

This EMPr has been divided into a number of sections, as indicated in **Table 3**.

Table 3: Structure of the Environmental Management Programme.

Section 1	**Introduction**	Provides background information regarding the site, the proposed project and the EMPr.
Section 2	**Implementation of the EMPr**	Provides details regarding implementation of the EMPr.
Section 3	**Planning and design phase environmental management**	Provides environmental requirements for the planning and design phase of the project.
Section 4	**Pre-construction and construction phase environmental management**	This phase is noted, but since it is not applicable there is no environmental requirements for this phase (assembly of cages will be a repeated action and is therefore incorporated into the operational phase requirements).
Section 5	**Operational phase Environmental Management Plan**	Provides a set of environmental management procedures to be implemented during the installation and operation of the project. Additional procedures can be added as required.
	OEMP Appendices	Molapong Environmental Monitoring Plan, Waste Management Plan, Agreement on towing of cages, Incident Management report form.
Section 6	**Decommissioning phase requirements**	Provides environmental requirements for the decommissioning phase of the project (if/when this is considered).
Section 7	**References**	References other professional's documents used to source information background to this EMPr.
Section 8	**EMPr Annexures**	Environmental Authorisation, CV of EMPr drafter, Environmental Awareness Plan, ASC Standards, Summary table of specification requirements – Molapong, ADZ (if approved) and ASC.

[1] The Aquaculture Stewardship Council (ASC) is a global organisation working internationally with aquaculture producers, seafood processors, retail and foodservice companies, scientists, conservation groups, social NGO's and the public to promote the best environmental and social choice practices in aquaculture

1.6 INTERPRETATIONS

General abbreviations and definitions utilised in this EMPr are listed in **Table 4**.

Table 4: General abbreviations and definitions utilised in the EMPr.

ADZ	Aquaculture Development Zone.
ALF	Aquaculture Liaison Forum, which is a Saldanha Bay environs aquaculture industry information and monitoring/observation sharing consultative forum. Both DAFF and DEA&DP will be represented as well as any role-players with an interest in the industry. The ALF is intended to be a consultative forum, the details of which can be formalised by means of method statement or Standard Operating Procedure. If in conflict with any other forums that may come about, this can be reviewed accordingly.
ASC	Aquaculture Stewardship Council
Competent Authority	Relevant decision making authority i.e. DEA, DEADP or DAFF, depending on authorisation or permit required.
DEA	Department of Environmental Affairs (National).
DEA&DP	Department of Environmental Affairs and Development Planning (Provincial).
DAFF	Department of Agriculture, Forestry and Fisheries.
EMPr	Environmental Management Programme.
MSDS	Material Safety Data Sheet.
MOLAPONG	Molapong (proponent / developer).
MOM	Norwegian International Modelling-Ongrowing fish farms-Monitoring, which is currently being used by the experimental project and will serve to provide water quality results to the ALF and SBWQFT
NSRI	National Sea Rescue Institute
Licensed Landfill Site	Dumpsite for waste that has been licensed in terms of the National Environmental Management: Waste Act 59 of 2008, or has been permitted under previous legislation, i.e. National Water Act 36 of 1998.
Environment	The aggregate of surrounding objects, conditions and influences that influence the life and habits of man or any other organism or collection of organisms.
Site	The boundary and extent of project operations and infrastructure. On land – area where assembly of cages will take place. In the sea – total area wherein cages will be moored.
Site Operations Manager	The manager employed to the project to oversee day to day operations on the project site.
SBWQFT	Saldanha Bay Water Quality Forum Trust

2 IMPLEMENTATION OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

This EMPr document describes mitigation measures in detail, identifying specific people or organisations to undertake specific tasks, in order to ensure that negative impacts on the environment are minimised and positive impacts are optimized during project establishment and operations. This EMPr includes all relevant documentation contained or referred to within it, along with any amendments, Annexures or Appendices to this document.

2.1 KEY LEGISLATION APPLICABLE TO THE PROJECT

The following is a list of key laws that are applicable to the project. All relevant approvals and permits, or any other management requirements in terms of this, or any other legislation applicable to the project, as well as any future amendments to such legislation, are to be complied with. It should be noted that this is not a comprehensive list of all legislation that may apply, only those deemed most relevant to this context.

Table 5: Applicable Environmental Legislation.

ACT, ORDINANCE, BY-LAW	SECTION	DESCRIPTION	RELEVANCE TO THIS PROJECT
National Environmental Management Act (No 107 of 1998).	28(1)	Duty of Care responsibilities.	Responsible for the duty of care of natural assets.
Environmental Impact Regulations and listed Activities (2014).	Listing Notice 1	Activities requiring authorisation. Contents of EMPrs	The expansion of aquaculture activities exceeds the threshold and authorisation must be applied for. An EMPr is also required.
National Environmental Management: Biodiversity Act (No 10 of 2004).	65 & 69	Restricted activities involving alien species and Duty of Care relating to alien species.	The project may require permitting in terms of this legislation once the Alien and Invasive Species Regulations in terms of the Act have been finalised.
Marine Living Resources Act No 18 of 1998.	18	To provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources.	A Mariculture Right is required in terms of this legislation in order to undertake the project.
Marine Living Resources Act No 18 of 1998.	13	To provide for the conservation of the marine ecosystem, the long-term sustainable utilisation of marine living resources and the orderly access to exploitation, utilisation and protection of certain marine living resources.	A Mariculture Permit is issued with conditions including monitoring requirements, which is renewable on annual basis.
National Environmental Management: Integrated Coastal Management Act (No 24 of 2008).	58 & 69	Promote the conservation of the coastal environment, and maintain the natural attributes of coastal landscapes and seascapes, including pollution control and regulating discharge of effluents into the sea.	There is a requirement to prevent pollution of or undue damage to the coastal zone in/adjacent to the project location.
National Environmental Management: Waste Act (No 59 of 2008).	Chapter 4 Part 3 and 5	Regulates waste management in order to protect health and the environment.	Management of waste on site.
Occupational Health and Safety Act (No 85 of 1993).	All	Primarily aimed at ensuring the health and safety of persons at work, and visitors. Specifies the basic systems that need	Site staff and visitors need to be protected from health and safety risks.

ACT, ORDINANCE, BY-LAW	SECTION	DESCRIPTION	RELEVANCE TO THIS PROJECT
		to be in place and measures that need to be taken.	
Hazardous Chemical Substances regulations (25 August 1995).	9A(1)	Storage and handling of hazardous chemical substances.	Need to ensure the safety of people working with hazardous chemicals (specifically fuels), as well as safe storage, use and disposal of containers.
Animal Health Act No. 7 of 2002.	16 & 17	Control measures for the prevention of diseases and parasites and for schemes to promote animal health.	Implementing measures to prevent diseases.
Animal Diseases Act 35 of 1984		Veterinary Import permit / in transit permit and health certificate for ova	Certification that imported ova that are later used as fingerlings for the fish farm is certified disease free.
National Ports Act No. 12 of 2005.		The manner in which the project will be operated (including its location) will be directed by the Ports Authority.	Specifically related to marine hazards/use of the port.

2.2 RESPONSIBILITIES AND ORGANISATIONAL STRUCTURE

The organisational structure for the project during all phases of its development is depicted in **Figure 8**[2].

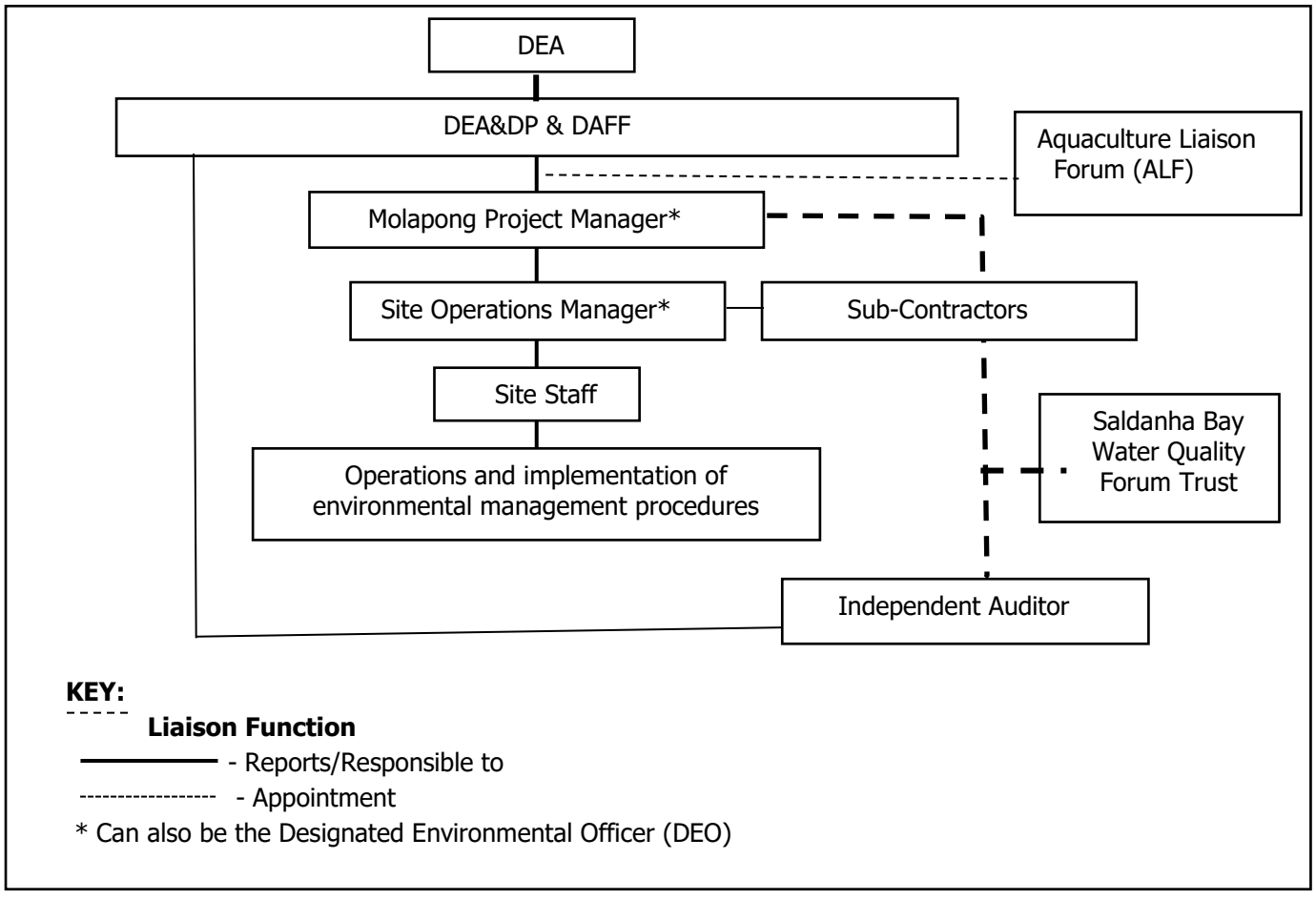

Figure 8: Environmental Management Organisational Structure.

[2] Assuming DEA as Competent Authority. If not the case, it will revert to the DEA&DP

The project and EMPr implementation responsibilities are detailed in the following sub-sections (in addition to any other specific tasks allocated to these entities elsewhere in the EMPr).

2.2.1 DAFF Responsibilities

- Allocating and enforcement of a Marine Aquaculture Right for the project as well as issuing other relevant permits; and
- Collaborating with the applicant on obtaining environmental auditing and monitoring information.
- Facilitate the establishment of and participation in the Aquaculture Liaison Forum (ALF)

2.2.2 Competent Authority (DEA / DEA&DP) Responsibilities

NOTE - It is likely that the DEA&DP will defer the Decision for authorisation to the DEA

- Environmental Authorisation Compliance monitoring and enforcement;
- Receiving auditing reports.
- Participation in the Aquaculture Liaison Forum

2.2.3 Molapong Project Manager Responsibilities

The Molapong Project Manager is responsible for the overall project management/implementation including:

- Ensuring that all required approvals/permits are in place for the project prior to commencement;
- Appointment of a DEO and other staff for the project and ensuring that they are made aware of the EMPr requirements; and
- Liaison with DEA, DEA&DP, DAFF and other authorities regarding compliance, project progress, incidents and participation in the Aquaculture Liaison Forum (ALF).
- Appointment of independent auditor, any specialist monitoring and issuing of monitoring data including membership of and participation in the monitoring objectives of the Saldanha Bay Water Quality Forum Trust (SBWQFT)

2.2.4 Site Operations Manager

The Site Operations Manager is the manager employed for the project to oversee day to day husbandry operations as well as the implementation of the EMPr on the project site.

2.2.5 Designated Environmental Officer

A person with aptitude and knowledge of environmental issues may be either designated or appointed as the Designated Environmental Officer (DEO) and will be responsible for:

- Implementation of the management procedures set out in the EMPr at the project site;
- Staff environmental awareness training according to an environmental awareness plan (refer to **EMPr Annexure 3** for environmental awareness plan)
- Ensuring that detailed environmental records are generated and kept as required by the Environmental Monitoring Plan and the EMPr;
- Regular internal review of the environmental procedures in the EMPr and their continued relevance and applicability and suggest revisions where appropriate; and
- Facilitating independent environmental monitoring through provision of information requested by independent monitoring body.

2.2.6 Independent Auditor

The Independent Auditor is responsible for compliance monitoring and impact/risk assessment of issues as a result of findings and operational circumstances as per the parameters/ requirements of any Licence or Authorisation conditions and the Environmental Monitoring Plan/ASC Standard (**OEMP Annexure 1**, **Section 5**).

It is envisaged that an audit will be undertaken annually for the first 5 years and thereafter bi-annually or as required by the authorities and the recommendation of the auditor. The independent auditor must be suitably qualified and experienced (with at least 5 years of applicable traceable experience of similar type audits) and is paid and appointed through the Proponent. An independence declaration must accompany each audit report. The auditor may also make recommendations on mitigation or modifications to the management plans in their audit reports. Audit reports are to be issued within 1 month of the audit taking place and issued to DEA, DAFF and DEA&DP by the proponent.

2.3 FINANCING OF ENVIRONMENTAL CONTROL

The implementation of the environmental control requirements outlined in this document shall be financed by the proponent, Molapong.

2.4 REVIEW AND AMMENDMENT OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The management procedures contained in the EMPr may need to be amended to ensure that the environmental management requirements of the document remain relevant to the site conditions and in light of experience gained on the project.

All proposed amendments shall be tabled by the Molapong Project Manager to DEA, DEA&DP and DAFF for approval prior to changes being made to the EMPr. Such draft amendments may also be tabled to the ALF and SBWQFT as appropriate

2.5 MONITORING, AUDITING AND REPORTING

The DEO, where applicable in collaboration with the Project Manager, will carry the responsibility of monitoring the implementation of the EMPr on site by all relevant parties on an on-going basis and address any non-compliance. The Independent Auditor is responsible for independent environmental compliance monitoring and impact monitoring as per the parameter requirements of any Permit or Authorisation conditions and the Environmental Monitoring Plan (**OEMP Annexure 1**, **Section 5**).

It should be noted that the Environmental Monitoring Plan applies specifically to the impacts associated with the benthic environment and is closely linked to the production cycle at the site. Sampling would primarily be carried out during periods of intensive production. The auditor may require a benthic specialist to assist in interpretation of any results and would be contracted by the Independent Auditor as required.

The ASC Standards also specifies that Independent 3rd Party Audits are conducted by accredited Conformity Assessment Bodies.

3 PLANNING AND DESIGN PHASE ENVIRONMENTAL MANAGEMENT

3.1 PLANNING PHASE

Adequate planning is crucial to the success of the project as a whole. Detailed proposals for expansions or new farms have to be submitted to the ALF for comment and should include the following aspects:

- Maintenance capacity
- Location (co-ordinates and size)
- Species
- Equipment
- Layout (location and individual orientation of structures)
- Mooring plan
- Surveys to be conducted prior to installation
- Measures to ensure equipment are securely in place
- Stocking density
- Feeding protocols (if any)
- Any other information requested by Authorities / liaison forums

3.2 DESIGN PHASE

3.2.1 Recommended Design Team

Developer (Molapong) - Ensure that all members of the design team involved in the detailed planning and design of the project are aware of the required environmental management measures and the existence of the EMPr.

Engineer - Engineers skilled in the design of infrastructure systems should determine infrastructure requirements and design appropriate systems/engineering studies.

Environmental Consultant - The Environmental Consultant should alert the planner at the conceptual stage of the development of crucial aspects relating to the environment, which are fulfilling an important role and should be taken into consideration. Opportunities for enhancement or rehabilitation of existing natural features should also be noted.

Specialist Consultants - As required to inform the developer of any specific issues that need to be addressed.

3.2.2 Design Process and Outcome

Design considerations as they relate to environmental impact and presentation of and motivation for the preferred design of this development have been considered in the Basic Assessment Report submitted to the authorities and is not repeated again.

3.3 DEVIATIONS FROM THE APPROVED PROJECT PLANS/CHANGE IN OWNERSHIP

Any significant changes to, or deviations from, the project description set out in the Environmental Authorisation (**EMPr Annexure 1**) which is based on the Basic Assessment Report submitted, must receive written approval from the Competent Authority before such changes may be effected. The Developer will be responsible for making such application in good time.

An application to the Competent Authority to amend the authorisation must be made in case of any changes of ownership of the land. Conditions of authorization and the contents of this EMPr must be made known to the new owner and are binding on the new owner.

4 PRE-CONSTRUCTION AND CONSTRUCTION PHASE ENVIRONMENTAL MANAGEMENT

No construction of land based built infrastructure would take place, as the project is sea-based. Any land-based activities would be limited to the assembly of cages and landing of product. Relevant management actions applicable to the assembly of cages have been included under **OEMP Section 5**.

The only construction related activity that has been identified would be placement or movement of anchors on the seafloor. Relevant management actions have been specified in **OEMP Section 5.6.3**

As there is already a pilot phase in place the expansion into a full production facility is regarded as operational development and addressed in the OEMP section.

5 OPERATIONAL PHASE ENVIRONMENTAL MANAGEMENT PLAN

This Operational phase Environmental Management Plan (OEMP) highlights key specifications applicable to the operations of the Molapong Sea-based Aquaculture Farm in Saldanha Bay, Western Cape.

5.1. INTERPRETATIONS

General abbreviations and definitions utilised in this OEMP are listed in **Table 6**.

Table 6: General abbreviations and definitions utilised in the OEMP.

ASC	Aquaculture Stewardship Council.
ALF	Aquaculture Liaison Forum, which is a Saldanha Bay environs aquaculture industry information and monitoring/observation sharing consultative forum. Both DAFF and DEA&DP will be represented as well as any role-players with an interest in the industry. The ALF is intended to be a consultative forum, the details of which can be formalised by means of method statement or Standard Operating Procedure. If in conflict with any other forums that may come about, this can be reviewed accordingly.
DAFF	Department of Agriculture Forestry and Fisheries.
DEA	Department of Environmental Affairs (National).
DEA&DP	Department of Environmental Affairs and Development Planning (Provincial).
DEO	Designated Environmental Officer.
EA	Environmental Authorisation – issued by the Competent Authority.
MSDS	Material Safety Data Sheet.
OEMP	Operational phase Environmental Management Plan.
SAHRA	South African Heritage Resource Agency - the statutory body responsible for heritage resource management.
Local Authority	Refers to Saldanha Bay Municipality.
Environment	The aggregate of surrounding objects, conditions and influences that influence the life and habits of man or any other organism or collection of organisms.
Environmental Management Plan	Environmental management plans forming part of the overarching Environmental Management Programme (EMPr), in this case the relevant plan is the Operational phase Environmental Management Plan (OEMP).
Site	The boundary and extent of project operations and infrastructure. On land – area where assembly of cages will take place. In the sea – total area wherein cages will be moored.
SBWQFT	Saldanha Bay Water Quality Forum Trust

5.2. RESPONSIBILITIES AND ORGANISATIONAL STRUCTURE

The organisational structure for the project applies throughout all of its phases and is depicted in **Figure 8.**

5.2.1 SOCIAL RESPONSIBILITIES

Utilise local labour from the Saldanha Bay Municipality area as much as possible. Where non-local specialist staff is required, implement a training programme to upskill local labour to assume these positions over a period of 5 years. Goods and services shall be procured from local, provincial or South African suppliers as far as possible, with the emphasis on BEE suppliers.

5.2.2 COMMUNITY RELATIONS

The Molapong Project Manager shall be responsible for responding to third party or public queries and/or complaints relating to construction operations and the dissemination of information to the community and the media (press releases etc).

The DAFF has committed (Molapong Aquaculture Panel meeting at Protea Hotel, Saldanha on 22 May 2017) to facilitating the establishment of an Aquaculture Liaison Forum (ALF), a consultative forum which would include Molapong as an industry producer. The DEA&DP as the Provincial Environmental Compliance department will also be actively involved and attend such ALF meetings, which will support confidence to stakeholders and industry that both monitoring, compliance and enforcement is being implemented.

The intention of the ALF is to ensure that stakeholders have a forum to share information, concerns and monitoring results so that all parties have an opportunity to discuss and take any necessary actions to address such needs as appropriate and within their respective mandates.

The DAFF and the participants invited shall decide the structure, operating process and frequency of meetings and reporting as part of the order of business from the inaugural meeting.

Updates shall be made available to stakeholders regarding installation of new cages and results of environmental monitoring in the reporting period.

It is anticipated that this Forum will convene within three months of any permit / authorisation issued regarding this application.

It is also significant that Molapong have applied for full membership of the Saldanha Bay Water Quality Forum Trust and have committed to sharing of water quality monitoring results, observations and assisting with the SBWQFT monitoring process for the Bay wide programme. This SBWQFT has a wide interest group of membership which also enhances the communication of information within the Community.

5.3. FINANCING OF ENVIRONMENTAL CONTROL

The implementation of the environmental control requirements outlined in this document shall be financed by the proponent, Molapong.

In addition, full membership of the Saldanha Bay Water Quality Forum Trust includes fees and contributions to the Bay wide monitoring efforts.

5.4. REVIEW AND AMMENDMENT OF THE EMPR

The management procedures contained in the EMPr may need to be amended to ensure that the environmental management requirements of the document remain relevant to the site conditions and in light of experience gained on the project.

All proposed amendments shall be tabled by the Molapong Project Manager to DEA, DEA&DP and DAFF for approval prior to changes being made to the EMPr. Such draft amendments may also be tabled to the ALF and SBWQFT as appropriate

5.5. MONITORING, AUDITING AND REPORTING

The DEO, in collaboration with the Project Manager (where applicable), will carry the responsibility of monitoring the implementation of the EMPr on site by all relevant parties on an on-going basis and address any non-compliance.

5.6. MANAGEMENT SPECIFICATIONS

The following Environmental Management Specifications shall apply to the project:

1. Cage assembly
2. Housekeeping and waste management
3. Infrastructure/equipment management
4. Water quality management
5. Pollution management
6. Escapee management
7. Disease management
8. Benthic environment
9. Marine animal management
10. Marine traffic management
11. Feed management
12. Incident management
13. Enforcement

Each specification is divided up as follows:

1. **Legislated Requirements**
   Legislation relevant to the particular specification

2. **Background/Anticipated Environmental Impacts/Risks**
   Background to site-specific conditions and/or the environmental impact being mitigated.

3. **Objectives**
   What the management specifications are trying to achieve.

4. **Performance Indicators**
   Identifies indicators that demonstrate the level of compliance with a procedure (assists with auditing of compliance).

5. **Procedures**
   The actual management specifications that aim to avoid or mitigate potential environmental impacts.

6. **Monitoring and Reporting**
   Describes the frequency and type of monitoring of each management section and how and in what forum this is reported on.

7. **Responsibilities**
   Describes who is responsible for what in terms of implementing the management specifications.

8. **Related Documents**
   Describes related documents that may exist containing guidelines or requirements related to the environment or records relating to the procedures.

9. **Breach**
   Applicable penalties if the specification is not complied with.

Where a specification lacks detail on the procedure to be followed, a method statement (template in **OEMP Annexure 3**) must be submitted to the DEO for approval prior to such action/task taking place.

OEMP MANAGEMENT SPECIFICATION	5.6.1. CAGE ASSEMBLY		
Version No.	01	**Date**	July 2017

1. LEGISLATED REQUIREMENTS

- National Environmental Management Act (No 107 of 1998).
- Occupational Health and Safety Act (No 85 of 1993).

2. BACKGROUND

- Staff involved in assembly of cages need controlled access to certain facilities.
- Once cage assembly has been completed the Contractor is to remove temporary fencing, containers, machinery and any other used materials from the site, disturbed or damaged areas will be rehabilitated.

3. OBJECTIVES

- Minimize environmental impact by locating facilities in an area where it has the least possible negative environmental impact whilst still being practical to the works.
- Provide access to staff welfare facilities including toilets, drinking water, eating areas.
- The Contractor shall ensure that all temporary structures, equipment, materials, waste and facilities used for assembly purposes are removed after completion. The site clean-up shall be to the satisfaction of the DEO
- The Contractor shall be responsible for rehabilitating/repairing areas damaged by activities related to the project as identified by the DEO.
- Leave the site in a sound, neat, tidy and stable condition after assembly works have been completed.

4. PERFORMANCE INDICATORS

- Designated and controlled works area during assembly process – signage, delineation/ fencing, supervision
- Adequate toilet facilities are provided and are maintained in a hygienic condition – no complaints from staff.
- Eating areas and drinking water provided to site staff in an easily accessible position.
- No evidence of remaining wastes or excess materials on site.
- No evidence of unrepaired damages caused by the Contractor's activities on site.
- All outstanding environmental penalties paid by the Contractor.

5. PROCEDURES

A. Work area

- The facilities at Pepper Bay, including office, storage containers and other temporary infrastructure needed for the running of the project, shall be used as agreed on by the DEO and the Contractor prior to works commencing.
- Temporary or safety / security fencing, if required, shall (unless otherwise specified by the Principal Agent) consist of either ready fencing or alternatively wooden or metal posts at 3m centres with two plain wire strands tensioned horizontally at 500 mm and 900 mm from ground level. The Contractor shall maintain the fence for the duration of the contract. Alternative fencing specifications are to be approved by the DEO.

B. Access

- The contractor shall ensure that access points for boats at the docks are approved and maintained in a serviceable condition to the satisfaction of the DEO and Project Manager.

C. Toilets

- Toilet facilities at Pepper Bay Offices will be made available for contractor staff.
- If the Contractor fails to provide and/or maintain all sanitation facilities in a clean and hygienic condition, the Project Manager may order the Contractor to suspend any or all work on the site until these requirements are met. No payment shall be made for any delays caused thereby nor shall extensions of time be granted for such delays.

D. Drinking water

- The Contractor shall ensure that drinking water is available for all staff on site. If no potable water source is available on site, then the Contractor shall import drinking water to the site.

E. Eating areas

- The Contractor shall designate restricted, sheltered places for eating. The Contractor shall provide adequate refuse bins with lids in all these places.

F. Clean-up and rehabilitation

- The Contractor shall ensure that all temporary structures, equipment, materials, waste and facilities used for assembly purposes are removed after completion. The site clean-up shall be to the satisfaction of the Principal Agent and the DEO.
- The Contractor shall be responsible for rehabilitating/repairing areas damaged by activities related to the project as identified by the DEO and the Project Manager. The Contractor's procedure for rehabilitation shall be approved by the DEO and the Project Manager.

6. MONITORING AND REPORTING

- The Contractor shall monitor daily with respect to compliance with the specifications.
- The DEO shall monitor minimum monthly that the specifications are complied with and provide the Contractor and Project Manager with an inspection report of any specifications not adequately complied with.
- The DEO shall provide a monthly summary report of compliance to the project team, DEA and DEA&DP.

7. RESPONSIBILITIES

- The Contractor shall ensure compliance with these specifications.
- The DEO shall be responsible for external monitoring and reporting regarding compliance with these specifications.
- The Project Manager shall issue site instructions to the Contractor where required to address non-compliance with the specifications.

8. RELATED DOCUMENTS

- Refer to **Specification 5.6.13 Enforcement** of this OEMP.

9. BREACH

- A penalty of R500 - R2000/day applies for failure to provide adequate toilet facilities in a hygienic condition, drinking water and eating areas for site staff.
- The cost of remediation plus a 20% value of the cost of remediation may apply for an assembly area in an unapproved location where it results in negative environmental impacts.

OEMP MANAGEMENT SPECIFICATION	5.6.2. HOUSEKEEPING AND WASTE MANAGEMENT		
Version No.	01	**Date**	July 2017

1. LEGISLATED REQUIREMENTS

- National Environmental Management: Waste Act (No. 59 of 2008).
- National Water Act (No. 36 of 1998) (protection of water resources).
- Occupational Health and Safety Act (No 85 of 1993) - Hazardous Chemical Substances Regulations.

2. BACKGROUND

- Solid waste produced during the assembly and maintenance of cages is mainly expected to be packaging, plastic, rope, etc. which could result in pollution of land and sea environments
- The NEMA Waste Act a requires that the principal contractor produce a Waste Management Plan and records of the quantities of waste disposed vs. that re-used/recycled.

3. OBJECTIVES

- Promote waste minimisation and recovery/recycling of waste generated on the site.
- Avoid litter and pollution.
- Ensure debris and waste material does not enter the water to minimise the risk of attraction and entanglement by seabirds, marine mammals and large predators, or safety risk to water users.
- Comply with waste management legislation and achieve responsible waste management and record keeping.
- Safe and responsible disposal of waste materials resulting from assembly of cages.
- Compliance with ASC Standard, Criterion 4.5 Non-biological waste from production.

4. PERFORMANCE INDICATORS

- No litter/dumping visible anywhere on the site.
- Good housekeeping - neat/safe stacking and storage.

5. PROCEDURES

A. Waste Management Plan

- Waste shall be managed in the following order (as is required by the NEM Waste Act):
    i. **Waste Elimination**: eliminate waste generation through efficient procurement, reduction in wasteful corrections due to poorly supervised work, etc.
    ii. **Waste Reduction**: good storage and management of materials to avoid unnecessary breakage/contamination.
    iii. **Waste Re-use on site**: reclaiming of materials otherwise considered as waste e.g. whole bricks and shutter ply out of the rubble stockpile.
    iv. **Waste Recycling/Recovery off-site** (*records required for verification*).
    v. **Waste Disposal** to a licensed landfill site (*records required for verification*) after separation into general *versus* hazardous waste categories.

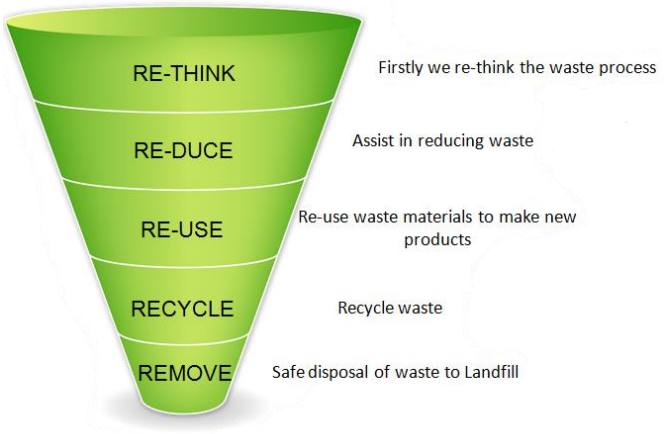

Figure 9: Waste Management Hierarchy (source: www.wastegroup.co.za).

- The Contractor, taking the above into account, submits to the DEO a Waste Management Plan (Refer to **Annexure 2** to this OEMP for a Waste Management Plan Template).

The Waste Management Plan entails the following:

i. The Contractor shall detail each waste anticipated to be produced during the project, anticipated quantities, the waste's classification (hazardous and SABS class or non-hazardous), the disposal method and any special precautions or legislative requirements for each waste type. This shall be reviewed a minimum of every 6 months to remain up to date.
ii. Specific details as to the destination of each waste type including contact details.
iii. Details of the system of waste sorting employed on site including separating hazardous from non-hazardous wastes, separating recyclable from no recyclable wastes and sorting out re-useable materials, and providing labelled bins for these different waste types.

B. General Housekeeping

- The contractor is to keep all working areas and the site in general in a neat and tidy condition at all times, including neat and safe stacking and storage of materials and equipment, and management of waste materials at appropriate intervals. Refer also to Section 25 ("Housekeeping on Construction Sites") of the Construction Regulations (18 August 2003) of the Occupational Health and Safety Act.

C. Refuse Control

- The Contractor shall provide labourers to clean up refuse at the assembly site and working areas daily.
- Litter and waste materials (excluding rubble and hazardous waste materials) shall be disposed of into bins. The separation and recovery of recyclable materials is required and is detailed in the Contractor's Waste Management Plan.
- Bins shall be provided at all eating areas. Bins that contain food residues shall be kept lidded and shall not be accessible to wild animals. Food waste must be carefully bagged and removed from site at least weekly.
- The Contractor shall provide sufficient bins on site to store the waste produced on a daily basis. Bins shall not be allowed to become overfull.
- The waste may be temporarily stored on site in a central fenced waste area e.g. with ready fence panels or a waste skip with a shade cloth/netting roof cover where there is a risk of wind dispersal of litter across the site, and which the DEO has approved. All waste storage areas shall be maintained to prevent these from becoming a breeding ground for pests or otherwise posing a health nuisance.
- No burning of burying of waste will be allowed
- The Contractor shall remove refuse collected from site weekly. Refuse must be disposed of at a licensed landfill site or reputable recycling depot.
- The Contractor shall ensure that waste litter is not deposited by employees anywhere on the site except in refuse bins.
- Remove litter and or waste entering the sea as soon as possible
- Environmental awareness training to all site staff

D. Hazardous Waste

- Petroleum, chemical, harmful and hazardous waste (which may include anti fouling chemical containers and

applicators) is to be temporarily stored in a sealed drum/s in a specifically designated area in the site camp. This waste shall be disposed of at a licensed hazardous waste disposal site (e.g. Vissershok). Storage and disposal etc. is also controlled through other relevant legislation, which must be complied with e.g. Hazardous Substances Act (No. 15 of 1973) and the Occupational Health & Safety Act (No 85 of 1993).

E. Re-Use/Recycling

- Wherever possible and practical, waste materials generated shall be recycled for example:
  - Paper/cardboard:
  - Metals:
  - Glass: and
  - Plastic (specific types only).
- Labelled containers for recyclable materials must be provided separate to general waste bins in the work area and taken to the relevant depot when full. This aspect must be detailed in the Contractor's Waste Management Plan and explained to the site staff during environmental awareness training sessions.
- Determine commercial usage of decommissioned infrastructure

F. Waste water

- Not applicable.

G. Record Keeping

- The weight/volume of all solid waste types generated on site shall be recorded as well as the quantities disposed of via recovery, recycling and to landfill. Reports shall be accompanied by copies of the disposal receipts from the entity accepting the waste as verification.
- Hazardous wastes require safe disposal certificates.

6. MONITORING AND REPORTING

- The Contractor shall monitor the site daily with respect to compliance with the specifications.
- The DEO shall monitor minimum monthly that the specifications are complied with and provide the Contractor and Principal Agent with an inspection report of any specifications not adequately complied with.
- The DEO shall provide a monthly summary report of compliance to the project team and copy this to DAFF, DEA & DEA&DP.
- The assembly site will be handed over to the Harbour Master for inspection and approval after completion of assembly.

7. RESPONSIBILITIES

- The Contractor shall ensure compliance with these specifications.
- The DEO shall be responsible for external monitoring and reporting regarding compliance with these specifications.
- The Principal Agent shall issue site instructions to the Contractor where required to address non-compliance with the specifications.

8. RELATED DOCUMENTS

- Refer to **Specification 5.6.13 Enforcement** of this OEMP.
- Refer to environmental awareness plan, **EMPr Annexure 3**
- ASC Standard, Criterion 4.5, **EMPr Annexure 4.**

9. Breach

- A penalty of R500 - R2000/day applies for to any party causing significant dumping of waste/littering on the cage assembly site or at sea or creation of a health nuisance through inadequate storage/periodic removal, in addition to covering the costs of its removal.

OEMP MANAGEMENT SPECIFICATION	5.6.3. INFRASTRUCTURE/EQUIPMENT MANAGEMENT		
Version No.	01	**Date**	July 2017

1. BACKGROUND/ ANTICIPATED ENVIRONMENTAL RISKS

- Principal infrastructure related to the project includes round sea cages, moorings and existing land base infrastructure.
- Principal equipment is a work boat/s.
- Visual impact of the project at this scale is anticipated to be low. The sea cages only protrude about 1.5 meters above the ocean surface and no new land-based infrastructure will be established.
- Marine infrastructure failure could result in loss of stock as well as safety risks to marine traffic (obstructions) and animals (entanglement).
- Fouling of cage netting can cause sagging and damage to the cage netting, a breeding site for pathogens and may hinder water circulation/dispersal of faeces and uneaten feed within the cages causing stress to the fish stock in the cages. Cleaning of nets can cause pollution, depending on the cleaning method used.
- Noise impacts from machinery/equipment.
- Potential impacts of concrete anchors on exposed heritage shipwreck materials.

2. OBJECTIVES

- Ensure that project infrastructure is maintained in a safe and serviceable condition to avoid failure that can result in safety risks to water users or fish escapees.
- Cleaning of cage netting, which shall be done on land, does not result in significant pollution of the surrounding environment.
- Administer approved antifouling agents.
- Limit noise impacts.
- Minimise visual impacts of associated infrastructure.
- Minimise the possibility of concrete anchors affecting exposed shipwreck material.

3. PERFORMANCE INDICATORS

- Infrastructure inspection logs completed.
- Infrastructure and work boats visibly in good repair.
- Land based facilities e.g. yard are clean and tidy.
- Only natural (environmentally friendly)/DAFF approved anti-fouling chemicals used, net cleaning is to be undertaken on land.
- Incident reports related to infrastructure failure incidents on file.
- Conform to ASC Standard, Criterion 3.4 related to escapees.
- Conform to ASC Standard, Criterion 4.7 Non-therapeutic chemical inputs.
- Conform to ASC Standard, Criterion 4.6 energy consumption and greenhouse gas emmissions (e.g. boats, fuel usage etc)
- No impact of moorings on exposed shipwreck materials.
- Adherence to visual impacts mitigation techniques.

4. PROCEDURES

- Finfish cages shall not occupy more than 30% of the total allocated lease area
- The following infrastructure shall be inspected by a competent person at regular intervals:
    - Sea cages - nets, cage frames/collars;
    - Longlines for mussels / seaweed
    - Mooring system – buoys, anchors, chains and ropes;
    - Work boat/s; and
    - Office/store site.
- Ensure moorings are not placed on exposed shipwreck sites or materials.
- Ensure mooring systems are well designed to prevent/limit movement of anchors and chains over the sea floor.

- Leave mooring anchors or blocks in place when undertaking cage net maintenance or following sites to avoid repetitive of the same activity at each site.
- Maintenance and replacement of worn components identified during the inspections contemplated above shall be undertaken as soon as possible.
- Keep marine structures clean and free of unnecessary equipment.
- Mussel spat will naturally settle on the anchor lines and as they grow are hand stripped, collected and given to the mussel farm.
- Mussel culture will be used next to the cages to mitigate nutrient loading from finfish.
- Seed ropes with specimens present in the area
- No disposal of mussels in the bay during red tide
- Avoid high density culture
- Use locally sourced seaweed
- Cage netting shall be cleaned on a regular basis to keep the netting free of significant deposits as a result of fouling. Only approved anti-fouling chemical agents shall be used. Nets shall be cleaned on land using jetted water and sun drying. Allow sufficient drying time to ensure low environmental levels of intermediates hosts and or pathogens.
- Undertake routine surveillance on and around marine farm structures and associated vessels and infrastructure for indications of non-native fouling species and remove where possible.
- Maintain effective anti-fouling coatings and regularly inspect farm structures and vessels for pests; clean structures and hulls regularly to ensure eradication of pests before they become established.
- The work boats shall, in particular, be inspected for oil/fuel leaks and undue generation of smoke or noise and repaired immediately as required.
- Maintain boats to withstand local weather conditions and fit boats with the necessary safety equipment to provide for a safe working environment.
- The office/yard area shall be maintained in a clean and tidy condition, free of litter or other sources of pollution and toilets are kept hygienic/in working order.
- All project components (rafts, cages, barrels, buoys/floatation devices, etc.) visible above the surface of the water as far as possible, including existing operations, should be coloured in grey based hues unless required in other hues for visual safety needs (e.g. mooring lines should be highly visible – bright anti-fouling coatings.
- Promote that project components are of a similar style, scale and have a consistent spacing between them to promote visual cohesiveness.
- Restrict operations at night.
- A contingency plan is in place for the towing away of cages from the site after significant storm damage if and when required to prevent any damaged components posing a risk to sea or bird life - refer to **Annexure 2 of this EMPr**.
- Serious infrastructure failure shall be investigated per the Incident Management **Specification 5.6.12** and action taken in order to avoid repeat incidences.
- Adopt appropriate maintenance and operational guidelines and standards for minimising noise in noise-generating equipment.

5. MONITORING AND REPORTING

- Infrastructure inspection reports (including marine and land based infrastructure) shall be completed by the designated competent person on a weekly basis and kept on the site file.
- If wreck sites are identified, the location and nature of any identified maritime and underwater cultural heritage resource should be provided to the South African Heritage Resources Agency. Should evidence of archaeological material be identified or disturbed, the Maritime and Underwater Cultural Heritage Unit at SAHRA must be notified. and
- A permit from SAHRA must be acquired prior to continuing with activities that will cause disturbance of wreck sites or artefacts.

6. RESPONSIBILITIES

- The **DEO** (or a person delegated by him) is responsible for infrastructure inspections and completion of inspection forms and is responsible for implementing this procedure on the project site.

7. RELATED DOCUMENTS

- Weekly infrastructure inspection checklists
- Completed Incident report (if applicable)
- Incident Management **Specification 5.6.12** of this EMPr.
- Escapee management **Specification 5.6.6** of this EMPr
- ASC Standard, Criterion 3.4 **EMPr Annexure 4**
- ASC Standard, Criterion 4.7 **EMPr Annexure 4**
- Agreement regarding towing of ages in event of a storm – **Annexure 4** to this OEMP

OEMP MANAGEMENT SPECIFICATION	5.6.4. WATER QUALITY MANAGEMENT		
Version No.	01	**Date**	July 2017

1. BACKGROUND/ ANTICIPATED ENVIRONMENTAL RISKS

- Cage culture releases nutrients (mainly ammonia, nitrogen and phosphorus) from uneaten feed and faecal matter into the immediate environment below and around the cage. This impacts water quality, specifically parameters such as turbidity and biological oxygen demand, and thus can negatively impact farmed fish stock and wild marine organisms in the vicinity of the cages.
- The amount of nutrients/sediment released into the immediate area will depend on the stocking density of the fish in the cage (influencing amounts of faecal matter produced) and quantity and quality of feed and efficiency of feed consumption. The impact/concentration of these substances is in turn reduced by tidal flushing in the area which assists in diluting and dispersing the nutrient matter, consumption of uneaten feed by wild marine life as well as other biological and chemical processes.

2. OBJECTIVES

- Ensure that the cage culture project does not significantly negatively impact on water quality parameters to the detriment of farmed fish/surrounding wild marine life.

3. PERFORMANCE INDICATORS

- Baseline water quality monitoring records are on file.
- The results of the analysis of the water quality parameters as recorded in the project operations records and the audit reports in terms of the Environmental Monitoring Plan (**OEMP Annexure 1**) do not show significant and consistent elevated levels compared to baseline parameter levels. In the case of significant elevated levels (e.g. above 10% of existing parameter scale), a detailed Incident Report Form is on file.
- Stocking records show stocking at levels concurrent with the project description and there are no obvious signs of overcrowding in the cages (e.g. stress/elevated mortalities etc.).
- Conformance with ASC Standard, Criterion 2.2 (see Annexure 4) relating to water quality in and near the site of operation.

4. PROCEDURES

- Baseline water quality monitoring shall be undertaken prior to any new cages being established on site.
- Periodic water quality monitoring shall be undertaken by the project and results kept on the site file.
- Stock shall be maintained as per the project description and overcrowding (higher than recommended stocking densities) of individual cages shall be avoided.
- An Incident Report shall be completed should results of the analysis of the water quality parameters show significant and consistent elevated levels compared to baseline parameter levels including steps taken to minimize/prevent recurrence of the problem.
- The Feed Management **Specification 5.6.11** of this OEMP shall be implemented.

5. MONITORING AND REPORTING

- Water quality monitoring and reporting shall be undertaken by project staff per the parameter requirements of the Environmental Monitoring Plan and as specified in the ASC Standard.

6. RESPONSIBILITIES

- The **Project Manager** (or a person delegated by him) is responsible for routine water sampling, submission of requisite samples to an analysis centre where required and recording and interpretation of results for project management purposes (apart from independent monitoring requirements).

- The appointed **Auditor** is responsible for independent monitoring of these parameters and reporting per the requirements of Licence and Authorisation conditions and the Environmental Monitoring Plan and ASC Standards as applicable.

7. RELATED DOCUMENTS

- Feed Management **Specification 5.6.11** of this OEMP.
- Environmental Monitoring Plan parameters, **OEMP Annexure 1**.
- ASC Standard, Criterion 4.7 **EMPr Annexure 4.**

OEMP MANAGEMENT SPECIFICATION	5.6.5. POLLUTION MANAGEMENT		
Version No.	01	**Date**	July 2017

1. BACKGROUND/ ANTICIPATED ENVIRONMENTAL RISKS

- Some solid waste will be generated during assembly of the cages (although anticipated to be low quantities) and from the office during the operational phase.
- Dead fish (mortalities are to be expected as part of the production process) are the principal solid waste generated at the cage sites. These must not be disposed of at sea (bio-security concerns and attraction of predators to the fish farm). Provide fish mortality to fishmeal farms in the area, where possible. Where not possible dispose of fish mortality in line with legal requirements.
- Fouling organisms removed from finfish cages (taken onshore for maintenance) should not be discharged back into the marine environment thereby ensuring that any introduced non-native fouling species not detected previously are not released back into the wild.
- Fuel and oils will be used in the operation of the work boats and generators used on the project site and spills of these substances are a potential source of marine pollution.
- Aquaculture chemicals e.g. disinfectants and medicines and anti-fouling chemicals (e.g. copper treatment) associated with net cleaning have the potential to negatively affect the natural ecosystem if introduced into the area surrounding the cage culture project.

2. OBJECTIVES

- Ensure sound waste management and avoid pollution of the marine environment through the sound management and minimal use of chemicals.
- In order to minimize release of copper from salmon farms into the environment, management practices of not cleaning copper treated nets in the aquatic environment but rather land-based cleaning facilities with appropriate effluent treatment is required.
- Minimise marine environment pollution by ensuring no disposal of dead fish or fouling species into the sea.

3. PERFORMANCE INDICATORS

- Proper solid waste storage and separation at the site office/yard is evident and disposal receipts indicating disposal of waste to a licensed waste site/service provider are available on file in cases where waste is not collected directly from site by the municipality.
- Waste may not be discarded overboard, all waste to be taken back to land and disposed of correctly, retrieve litter entering the sea immediately.
- No evidence of the use of antibiotics (e.g. product containers) on the project site without documentary evidence that the treatment is essential and under the supervision of a qualified veterinarian.
- Only approved anti-fouling chemicals used, preferably net cleaning undertaken on land.
- No fish mortalities in advanced stages of decay observed in the cages (indicating less than daily removal).
- No evidence of disposal of dead fish or fouling species noted in the marine environment.
- Do not release any blood and/or organic waste into the bay.
- No evidence of fuel/oil spills/pollution related to the work boat or equipment operating on site.
- Updated inventory and Material Safety Data Sheets (MSDS) are available on the site project file for all chemical substances stored/used on site.
- Conformance with ASC Standard, Criterion 4.7 related to non-therapeutic chemical input with specific reference to levels of copper.

4. PROCEDURES

- Bins shall be provided for the temporary storage of solid waste at the project site office/yard.
- Recyclable waste e.g. PVC off-cuts and cardboard packaging during the assembly and office paper during the operations phase shall be sorted separately and recycled wherever possible.
- Solid waste shall be removed by the municipality or alternatively disposed of at a licensed waste disposal site/recycling depot and disposal receipts retained on file.
- No routine antibiotics shall be used on this project. Only essential treatment with antibiotics shall be considered under the supervision of a qualified veterinarian.
- Only natural/DAFF approved anti-fouling chemical agents shall be used. Nets shall preferably be cleaned on

land using jetted water and sun drying.
- Fish mortalities shall be removed from the cages daily, recorded, frozen and disposed of at a licensed waste disposal site, or fishmeal farm, as appropriate and practical.
- Fouling species correctly disposed of.
- Refuelling of the work boat and generators shall not result in spillage and the pollution of the marine environment. Drip trays, spill containment and mop-up products as appropriate shall be employed.
- Use only recognised chemicals for specific purposes and apply only as prescribed by the manufacturer. Any prescribed withdrawal period shall be adhered to prior to harvest as per the MSDS and applicable food safety standards and regulations. Empty chemical containers shall be disposed of as per the MSDS.
- An up to date inventory register shall be kept on site for all chemicals used on the project site.

5. MONITORING AND REPORTING

- Monitoring and record-keeping of chemicals used on the project e.g. therapeutics shall be undertaken which shall include:
    - Chemical type/name;
    - Reasons for use;
    - Date of use;
    - Quantity/dosage used; and
    - Effectiveness of the chemical.
- Pollution incidents shall be recorded and reported on as per the Incident Management **Specification 5.6.12** of this OEMP.

6. RESPONSIBILITIES

- The **DEO** is responsible for implementing this procedure on the project site and for the monitoring and recording of chemical use on site.

7. RELATED DOCUMENTS

- Chemical inventory and use registers.
- MSDS.
- Incident Management **Specification 5.6.12** of this OEMP.
- Copper monitoring plan, Annexure 1 to Molapong monitoring plan, **OEMP Annexure 1.**
- ASC Standard, Criterion 4.7 **EMPr Annexure 4.**

OEMP MANAGEMENT SPECIFICATION	5.6.6. ESCAPEE MANAGEMENT		
Version No.	01	**Date**	July 2017

1. BACKGROUND/ ANTICIPATED ENVIRONMENTAL RISKS

- Small numbers of fish escapees may occur during fish transfer and handling; larger scale escapees may result from a failure/tearing of the containment nets (although the strength of the netting material makes this unlikely).
- Salmonids are not indigenous to the area and no wild stocks exist in the area. While there is a risk of introducing a foreign species into the harbour, it is likely that escaped fish would quickly either be eaten by predators or fail to find adequate feed, being adapted to an artificial food source. As Salmonids do not spawn at sea and have no way to access freshwater spawning grounds they cannot form self-sustaining feral populations in the area.
- Escapees however do have negative implications for the project e.g. financial

2. OBJECTIVES

- Conformance with ASC Standard Criterion 3.4 specifying escapees per production cycle.

3. PERFORMANCE INDICATORS

- Stocking records show minimal losses due to fish escape.

4. PROCEDURES

- As per the requirements of the Infrastructure Management **Specification 5.6.3,** all cage nets shall be regularly inspected and repairs shall be done immediately if required.
- Use all female or triploid salmonids
- During grading and harvesting "catch-nets" could be used.
- A rapid deployment emergency net panel shall be on hand to cover large tears if these are observed/occur.
- Develop and implement recovery procedures should escapes from finfish farms occur.

5. MONITORING AND REPORTING

- The DEO shall keep records of cage netting inspections per **Specification 5.6.2** as well as of significant fish escapes per the Incident Management report procedure in **Specification 5.6.12** of the OEMP.

6. RESPONSIBILITIES

- The **DEO** is responsible for implementing this procedure on the project site.

7. RELATED DOCUMENTS

- Stocking records/incident reports of significant escapees.
- Infrastructure Management **Specification 5.6.3** and the Incident Management **Specification 5.6.12.**
- ASC Standard, Criterion 4.7 **EMPr Annexure 4.**

OEMP MANAGEMENT SPECIFICATION	5.6.7. DISEASE MANAGEMENT		
Version No.	01	**Date**	July 2017

1. BACKGROUND/ ANTICIPATED ENVIRONMENTAL RISKS

- There is a risk of introducing disease into the environment when stocking the cages with fingerlings sourced off site.
- Husbandry conditions can lead to decrease in disease resistance for farmed fish and could in turn be a source of aquatic diseases in surrounding wild stocks near the cages (although not considered very likely) or other aquaculture ventures in the area that may be farming with similar species.
- A disease management program must always focus on prevention rather than treatment.

2. OBJECTIVES

- Prevent the introduction or proliferation of fish diseases that will negatively affect the viability of the venture and could potentially impact surrounding wild fish stocks/other aquaculture ventures.
- Avoid/limit the use of therapeutic chemicals that could negatively affect the natural ecosystem.
- Conformance with ASC Standard, Criterion 5.1 related to survival and health of farmed fish.

3. PERFORMANCE INDICATORS

- Documentation certifying that imported ova are free of IPN, IHN, VHS, PNV and BKD and fingerling originate from a farm certified by the State Veterinarian clear of such diseases.
- Fish disease vaccination, monitoring and treatment records are up to date in the site file.
- Scheduled medication prescribed by a veterinarian are not expired and stocks are audited.
- Husbandry conditions conducive to good fish health.
- No evidence of the use of antibiotics (e.g. product containers) on the project site without documentary evidence that the treatment is essential and under the direction or supervision of a qualified veterinarian.

4. PROCEDURES

- Only SPF (IPN, IHN, VHS, PNV and BKD) disease-free fish fingerlings, as certified by the State Veterinarian shall be stocked on site, record of all veterinary inspections shall be kept on file. Quarantine new juvenile/broodstock when introduced to identify and treat potential disease
- Import and transport permits for ova to the fingerlings supply farms shall be on file.
- Vaccines shall be developed against diseases encountered where applicable. Future stock may be vaccinated against such diseases.
- Cages shall be placed across the prevailing current to reduce the risk of cross infections between cages.
- Husbandry shall maintain conditions conducive to good fish health e.g. regular net cleaning, disinfection protocols e.g. for equipment, minimum daily removal of mortalities and good feed/water quality management.
- Fallowing of cage sites (at least annually) and the separation of different fish cohorts can reduce the risk of infection. Locate cages stocked with different cohorts of the same species as far apart as possible; if possible stock different species in cages successively.
- Malachite Green as a fungicide or bactericide is prohibited
- Restrict stocking densities to below 15-20 fish per m^3 to limit the spread of diseases and parasitic infections. Densities to be recorded.
- Regular disease and health monitoring shall be implemented - sick or stressed fish or mortalities will be investigated during the feeding regimes, sorting, net inspections, and grading processes for outward signs of disease and the results recorded on a register.
- Use bait size pesticides to avoid poisoning of non-targeted species.
- The project population shall in addition be sampled every 3 months by a professional aquaculture pathologist (at their recommended sample level) and analysed for potential disease.
- Fish mortalities shall be investigated if disease is suspected.

- In case of a suspected disease outbreak:
  - The temporary suspension of the introduction of fingerlings onto the project site and the harvesting of fish and transport off the site;
  - Arrange immediately for a professional aquaculture pathologist to visit the site, sample, analyse and confirm diagnosis of the disease.
  - Stop all inter-cage transfers of fish or equipment.
  - Treat adjacent finfish cages simultaneously even if infections have not yet been detected.
- In case of a confirmed disease outbreak:
  - Implement the recommendations of the aquaculture pathologist/veterinarian including measures to minimise further spread of the disease, treat the diseased population or apply preventative measures to minimise the reoccurrence of the disease;
  - Any suspected or identified disease listed as a controlled disease under the Animal Diseases Act (No 35 of 1984) must be reported to the Provincial Veterinary Authority
  - If an OIE (World Organisation for Animal Health) listed disease is diagnosed, the State Vet Services shall be contacted immediately and their instructions followed;
  - Humanely euthanize production animals to prevent suffering.
- All treatment of fish disease on the farm shall be recorded on a register indicating the date, type of treatment, no of fish/cages treated and the outcome of the treatment.
- Restrict chemical use in disease management.
- No routine antibiotics shall be used on this project. Only essential treatment with antibiotics shall be considered under the direction or supervision of a qualified veterinarian.
- Appoint an aquaculture veterinarian to conduct a health assessment at least annually.

5. MONITORING AND REPORTING

- The DEO will continuously monitor the fish for outward signs of health and table results in an inspection register in the site file.
- The aquaculture pathologist shall conduct sampling and monitoring of fish diseases every three months.
- Significant disease outbreaks shall be reported per the Incident Management report procedure in **Specification 5.6.12** of the OEMP.

6. RESPONSIBILITIES

- The **DEO** is responsible for implementing this procedure on the project site, including co-ordinating sampling by the aquaculture pathologist.

7. RELATED DOCUMENTS

- Disease-free certification of fingerlings.
- Stocking density records.
- Disease treatment/vaccination records.
- The Incident Management **Specification 5.6.12** of this OEMP.
- Environmental Monitoring Plan parameters, **OEMP Annexure 1**.
- ASC Standard, Criterion 5.1 **EMPr Annexure 4.**

OEMP MANAGEMENT SPECIFICATION	5.6.8. BENTHIC ENVIRONMENT		
Version No.	01	**Date**	July 2017

1. BACKGROUND/ ANTICIPATED ENVIRONMENTAL RISKS

- Settlement of solids to the sea floor (from uneaten feed and faecal, pseudofaeces and detritus material can cause ecological changes to the benthic environment which can include modified micro flora, benthic smothering resulting in a modified environment and even anaerobic conditions, establishment of harmful bacteria and elevated levels of hydrogen sulphide and methane.
- The reasonably small scale of the project and the fact that the cage area is exposed to a relatively high tidal flush, however reduces the risk of such impacts.
- Anchors will have some impact on the sea floor but is not seen as significant at this scale in this environment (commercial harbour) and the impact is considered reversible.

2. OBJECTIVES

- Ensure that minimal change/damage to the benthic environment occurs.

3. PERFORMANCE INDICATORS

- Reports in terms of the Environmental Monitoring Plan (**Annexure 1** of this OEMP) record no significant negative impacts on the benthic environment.
- Conformance with ASC Standard, Criterion 2.1 related to benthic biodiversity and benthic effects.

4. PROCEDURES

- The rotation of or movement of the cages within the project area to allow fallowing/distribution of accumulated nutrients shall be undertaken, should monitoring of the benthic environment (core sampling and visual (video) monitoring) indicate significant change in the benthic environment.
- The implementation of the Feed Management **Specification 5.6.11** of this OEMP shall be undertaken, ensuring efficient feeding of high quality feeds.

5. MONITORING AND REPORTING

- The DEO and an appointed benthic specialist will monitor the benthic environment to detect changes in the sediment composition (both physico-chemical and biological properties) compared with the baseline benthic assessment through core samples and visual inspection, per the OEMP **Annexure 1 Environmental monitoring plan parameters**.
- This includes an assessment of species composition and assemblages, determination of the concentration of carbon and nitrogen, redox potential and measurement of sulphide content. Physical characteristics of the seabed are also recorded and an accurate record of the layout and position of the sea cage infrastructure.

6. RESPONSIBILITIES

- The **DEO and appointed specialists** is responsible for monitoring of the benthic environment and reporting per the requirements of the Environmental Monitoring Plan. The Independent auditor will review such reports as part of the audit protocols. This review may require that the Independent auditor acquire the assistance of a benthic specialist to advise on such review.

7. RELATED DOCUMENTS

- Environmental Monitoring Plan, **OEMP Annexure 1.**
- Feed Management **Specification 5.6.11** of this OEMP.
- ASC Standard, Criterion 2.1 **EMPr Annexure 4.**

OEMP MANAGEMENT SPECIFICATION	5.6.9. MARINE ANIMAL MANAGEMENT		
Version No.	01	**Date**	July 2017

1. BACKGROUND/ ANTICIPATED ENVIRONMENTAL RISKS

- Cage farming may impact marine vertebrates in the surrounding area through competition from escaped farm stocks and disease (low risk addressed by other procedures in this EMPr).
- The highest risk is, however, entanglement with cage netting and cover netting, anchor lines and ropes by larger marine animals (e.g. sharks, turtles, dolphins, whales, seals and birds), often when they try to prey on the farmed stock.
- Changes in behavioural patterns of marine animals.
- Depletion of food sources, especially phytoplankton, for other organisms.
- Alteration of plankton community structure.

2. OBJECTIVES

- Minimise injury/death of marine animals through entanglement.
- Minimise opportunities for predators to be attracted to the area

3. PERFORMANCE INDICATORS

- Project records show no/minimal cases of entanglement by large marine animals (refer to incident management records).
- Conformance to ASC Standard, Criterion 2.5 related to the interaction of farms with wildlife and predators.

4. PROCEDURES

- The project shall maintain in good order the bird exclusion netting over the top of the cages. The netting shall be kept taut using a net support in the middle of the cage.
- Underwater cage mesh size shall not exceed 25 mm. This small mesh size will make entanglement by birds and other animals unlikely.
- There shall be adequate separation between rafts and longlines and primary and secondary fishnets.
- Any lost netting or ropes etc. which could pose a hazard shall be traced and retrieved before they pose a hazard to marine life.
- Remove all mortalities from the cages as soon as possible (minimum daily) to avoid attracting predators that scavenge on dead fish.
- Monitor the netting and ropes for entanglements on an ongoing basis and free any animals caught or summon assistance from local marine conservation authorities as required e.g. in case of injury.
- Farm personnel shall monitor the presence (and absence) of marine mammal species in the vicinity or general region of the farm sites, as well as observations of any time spent under or around the farm structures.
- Farm personnel shall keep a log of all cetaceans, seabirds and predators recorded in the vicinity of fish farms, including behavioural observations.
- Contact the NSRI should large marine mammals become entangled.

5. MONITORING AND REPORTING

- Monitor cage netting/ropes for entanglements on an ongoing basis (daily) and record all incidents per the Incident Management **Specification 5.6.12**.
- Marine animal observations and monitoring data should be periodically compiled and sent to relevant experts for analysis.

6. RESPONSIBILITIES

- The **DEO** is responsible for implementing this procedure on the project site, including monitoring and reporting requirements.

7. RELATED DOCUMENTS

- The Incident Management **Specification 5.6.12** of this OEMP.
- Incident records related to this procedure.
- ASC Standard, Criterion 2.5 **EMPr Annexure 4.**

OEMP MANAGEMENT SPECIFICATION	5.6.10. MARINE TRAFFIC MANAGEMENT		
Version No.	01	**Date**	July 2017

1. BACKGROUND/ANTICIPATED ENVIRONMENTAL RISKS

- Although marine traffic is very active in the port of Saldanha Bay, the cage site is located in an area which is not used by marine traffic without the permission of the Port Authority, therefore the risk is limited.
- Recreational users (e.g. sailing, kite surfing, paddling fishing etc.) may encounter cages, although most of the cages would be situated outside the areas used by recreational users.
- Visual impacts from precinct lighting.

2. OBJECTIVES

- Ensure minimum risk to and from marine traffic in the port as a result of the project infrastructure.
- Limit visual impacts on the seascape at night.

3. PERFORMANCE INDICATORS

- No marine traffic incidents/accidents reported (refer to incident reports).
- Conformance to ASC Standard, Criterion 7.1.2 related to communication.

4. PROCEDURES

- Ensure that all active aquaculture farms are accurately marked on navigational charts.
- Sea cages shall be fitted with radar reflectors, marker buoys and signal lighting to the satisfaction of the Port Authority to ensure safety. **Confirmation from the Port Authority as to whether lighting is required or not will be required 1 month prior to operation.**
- To limit visual impacts, utilise the minimum number of safety/warning buoys and lights as far as possible. Only demarcate the corner points of each precinct and the minimum interval distance along the precinct boundary to meet the Ports Authority safety requirements.
- Ensure that minimal non-navigational lighting occurs at night and using downward-pointing and shaded lights.
- If the Ports Authority requires flashing lights, ensure the lights flash simultaneously.
- Monitor that markers are functioning fully.
- Mark all equipment (buoys, raft and cage components) with an identifier unique to the Molapong to enable tracing of loose equipment/debris.
- Any lost buoys or ropes etc. which could pose a hazard to marine traffic must be traced and retrieved before they pose a hazard.
- The project shall adhere to any further requirements set out by the Port Authority and the South African Maritime Safety Authority (SAMSA).
- An effective communication system to register and respond to complaints must be implemented.

5. MONITORING AND REPORTING

- Implement monitoring of infrastructure per the Infrastructure Management **Specification 5.6.3** of this OEMP.
- All marine traffic incidents/accidents shall be recorded by the DEO as per the requirements of the Incident Management **Specification5.6.12** of this OEMP. This shall include reporting to the Port Authority.

6. RESPONSIBILITIES

- The **DEO** is responsible for implementing this procedure on the project site.

7. RELATED DOCUMENTS

- Incident Management **Specification 5.6.12** of this OEMP.
- Any additional documented requirements of the Harbour Master for this project/area.
- ASC Standard, Criterion 7.1 **EMPr Annexure 4.**

OEMP MANAGEMENT SPECIFICATION	5.6.11. FEED MANAGEMENT		
Version No.	01	**Date**	July 2017

1. BACKGROUND/ ANTICIPATED ENVIRONMENTAL RISKS

- Inefficient use of feed increases negative impacts on the surrounding water quality and benthic environment as indicated in other procedures in this report.

2. OBJECTIVES

- Compliance with health standards for seafood as per SABS and DAFF requirements.
- Use species and system specific highly digestible, high energy and low phosphorus fish feeds to maximize food conversion ratios and minimize waste.
- Responsible use of resources for feed.

3. PERFORMANCE INDICATORS

- Consistently good Feed Conversion Ratio (FCR) achieved on the project (as compared with anticipated/ similar cage culture FCR's for this species) recorded in the site records (note that other factors can influence poor feed conversion ratio and should be excluded before drawing conclusions about feed management).
- No spoiling/wastage of feed recorded due to poor storage or feeding conditions or techniques.
- Conformance with ASC Standard, Criterion 4.1-4.5 related to feed requirements.

4. PROCEDURES

- Feed shall be stored in a way that protects it from vermin and damp.
- Use high quality feeds within the prescribed expiry dates, from recognised feed companies. Feed ingredients, composition and manufacturing methods should be known.
- Use palatable feeds of the correct pellet or grain size to ensure lower levels of feed loss.
- Reduce levels of nutritional therapeutants and trace contaminants in fish feed using only the lowest effective doses, use the most efficient drug delivery mechanisms that minimise the concentrations of biologically active ingredients entering the environment.
- Limit feed wastage by careful feed application (by hand casting techniques) and carefully observe and adapt to the feed response.
- Track efficient use of feed through monitoring (refer to section 5 below).

5. MONITORING AND REPORTING

- The feeding program shall be monitored and recorded on an ongoing basis including:
  - Feed usage in terms of volumes/weight, grade, quality and application methods; and
  - Feed conversion ratio (FCR).
- Any unusually poor FCR's shall be investigated to ensure that the cause is not related to poor feed management.

6. RESPONSIBILITIES

- The **DEO** is responsible for implementing this procedure on the project site, including the monitoring and reporting requirements.

7. RELATED DOCUMENTS

- Feeding/FCR records.
- ASC Standard, Criterion 4.1-4.5 **EMPr Annexure 4.**

OEMP MANAGEMENT SPECIFICATION	5.6.12. INCIDENT MANAGEMENT		
Version No.	01	**Date**	July 2017

1. BACKGROUND/ ANTICIPATED ENVIRONMENTAL RISKS

- There is a need to investigate and document significant incidents that occur on the project site (e.g. poor water quality, disease outbreak, mass mortalities, marine traffic/marine animal injury incidents, fish escape, storm damage to sea cages etc.) in order to assess if current management measures are adequate to address the expected risks on the project, to guide action through documenting a clear, practical response to situations and allocating responsibilities and investigating the cause of the incident and making management adjustments were possible to prevent the reoccurrence of the incident.

2. OBJECTIVES

- Investigate incidents as a tool towards the development of a management response to prevent future incidences of a similar nature.

3. PERFORMANCE INDICATORS

- Detailed incident reports on the project site file.

4. PROCEDURES

- Any significant/extraordinary incident occurring on the project will be reported to the DEO immediately.
- Upon receiving a report of an incident, the DEO shall take any action required to contain/isolate the adverse effects and initiate emergency response if it cannot be contained.
- Once the incident area has been stabilised, the DEO shall complete the incident investigation form (refer to template form at the end of this procedure) and complaints register. This shall include a full investigation into the causes of the incident and how a recurrence can be avoided.
- Once the form has been completed, it shall be submitted to the Project Manager for review within one week of the incident who shall table any reports following significant incidents (refer to definition below) to DAFF.
- DAFF shall review the incident reporting forms of all significant incidents and provide technical input for response protocols where appropriate.
- Only resume with the activity once the problem has been stopped or the pollutant contained.

Definition

A reportable significant environmental incident is any inadvertent occurrence (including sabotage):

- In which the performance criteria specified in the EMPr or this monitoring plan have been inadvertently contravened, or
- Any environmental facet (air, water, soil) has been polluted/degraded through a spill or similar event or
- Any part of the project infrastructure is lost or has become a danger or potential danger to marine traffic or animals.

This will include but is not limited to:

- Spills of any noxious liquid or solid into the sea;
- Elevated nutrient levels above accepted percentage of baseline;
- Noise and odour complaints;
- Continuous lowered dissolved oxygen levels, below 4 mg/l average through the net water column;
- Significant mortality/outbreak of disease amongst the fish (more than 1% of the fish per day per cage); and
- Significant amount of sediment/negative impact on benthic environment being detected.
- Entanglement of marine animals or birds

Note: The above definitions do not include danger to human wellbeing. Such incidents will be managed with a parallel Occupational Health and Safety Act system.

Note: This definition is different from the definition of a significant incident defined in terms of section 30(1)(a) of NEMA as an unexpected sudden occurrence, including a major emission, fire or explosion leading to **serious danger to the public or potentially serious pollution of or detriment to the environment, whether**

immediate or delayed. The incidents dealt with by this procedure are localised and do not require the intervention of the provincial/national environmental authority. If the incident is deemed significant in terms of this legislation the procedure is overruled and the procedure legislated by the Department shall be assumed.

5. MONITORING AND REPORTING

- Per the responsibilities section 6 below.

6. RESPONSIBILITIES

- The **DEO** is responsible for completing the incident reports contemplated in this procedure.
- The **Project Manager** shall review incident reports and shall table any significant reports to DAFF and other relevant authorities e.g. Port Authority, DEA and DEA&DP.

7. RELATED DOCUMENTS

- Agreement regarding towing of ages in event of a storm – **Annexure 4** to this OEMP
- Incident Report Form **Annexure 5** to this OEMP.

OEMP MANAGEMENT SPECIFICATION	5.6.13. ENFORCEMENT		
Version No.	01	**Date**	July 2017

1. LEGISLATED REQUIREMENTS

- The conditions of authorisation for this development in terms of the National Environmental Management Act (No. 107 of 1998).
- Conditions of Marine Aquaculture right in terms of the Marine Living Resources Act (No 18 of 1998)

2. BACKGROUND

- Serious and persistent repeat non-compliances with the specifications of this OEMP shall be reported by the DEO to the DEA case officer who shall take action in terms of the enforcement procedures of their department under the provisions of the National Environmental Management Act.

3. OBJECTIVES

- To provide methods of enforcement to ensure that the provisions of this EMPr are implemented and to provide recourse for environmental damage.

4. PERFORMANCE INDICATORS

- Penalty issue log kept by the Project Manager.
- Proof of payment of penalties by the Contractor.

5. PROCEDURES

- These procedures are applicable to appointed contractors.
- Where the Contractor inflicts damage upon the environment or fails to comply with any of the environmental specifications contained within this EMPr, he shall be liable to pay a penalty for breach of the conditions of the environmental specifications which form part of the works contract.
- The Contractor is deemed NOT to have complied with this Specification if:
    - Within the boundaries of the site, site extensions and access roads there is evidence of contravention of the Specification;
    - Environmental damage ensues due to negligence;
    - The Contractor fails to comply with corrective or other instructions issued by the DEO/Project Manager within a specific time; and
    - The Contractor fails to respond adequately to complaints from the public.
- Penalties shall be issued per incident for the Contractor's responsibility at the discretion of the Principal Agent in consultation with the ESM.
- The amount of the penalty shall be determined by the DEO/Project Manager. The DEO/Project Manager shall inform the Contractor of the contravention and the amount of the penalty, and will deduct the amount from monies due under the Contract.
- Payment of any penalties in terms of the contract shall not absolve the offender from being liable from prosecution in terms of any law.
- The penalties listed under each of the specifications sections in this EMP (not necessarily an exclusive list) shall be issued in addition to any remedial costs incurred as a result of non-compliance with the environmental specifications and shall be imposed by the DEO/Project Manager on the Contractor for contraventions of the environmental specifications by individuals or operators employed by the Contractor and/or his sub-contractors. Where there are ranges, the amount shall depend on the severity and extent of the damage done to the environment:
- For each subsequent similar offence committed by the same team or individual, the penalty shall be doubled in value to a maximum value of R20 000.
- All monies collected through penalties shall be held by the DEO/Project Manager and be accounted for. A summary page is to be included with the monthly payment certificates as a record of penalties issued to date. Penalty funds shall be allocated a suitable local environmental cause agreed upon by the DEO/Project Manager at the end of the contract and payment must be confirmed.

6. MONITORING AND REPORTING

- The DEO shall monitor minimum monthly that the specifications are complied with and provide the Contractor and Project Manager with a written warning of any specifications not adequately complied with. Failure to rectify the non-compliance within the stipulated time frames in the written warning shall cause a penalty to be recommended to the Project Manager.
- The DEO/Project Manager shall indicate all recommended penalties in the monthly environmental summary report issued to the project team and DEA.
- The Project Manager shall account for all penalties issued and present these as part of the site meeting minutes.

7. RESPONSIBILITIES

- The Contractor shall ensure that any issued penalties are paid.
- The DEO shall be responsible for external monitoring and reporting regarding compliance with these specifications and recommend penalties accordingly after a warning letter and stipulated time frame to rectify the non-compliance has been issued.
- The Project Manager shall issue penalties to the Contractor in terms of breach with the Construction Contract, shall collect monies and ensure payment to the environmental cause identified at the end of the construction contract.

8. RELATED DOCUMENTS

- The penalty clauses in the Construction Contract.
- Suggested penalties under each Specification section.

6. OEMP ANNEXURES

OEMP annexures follow:

OEMP ANNEXURE 1: MOLAPONG ENVIRONMENTAL MONITORING PLAN PARAMETERS AND COPPER MONITORING

(See also ASC parameters, EMPr Annexure 4)

Note: this is an extract from the original monitoring plan for Molapong:

2. Monitoring

2.1 PRINCIPLE

The present MOM standard is based on the direct relationship that exists between the effluent from a fish farm and the environmental response seen in the vicinity of the fish farm. Environmental conditions and associated tolerance levels are extremely variable in marine waters. Therefore, it is more important to monitor environmental impact using critical effect parameters rather than measuring the actual effluent from a fish farm.

The principles for regulation of environmental impacts may be summarised as follows:

- The actual environmental effects are monitored, not just the volume of effluent;
- The monitoring intensity is adapted to the extent of impact;
- The system consists of modules that can be replaced or modified as appropriate according to new knowledge or legislations.
- For further details see 'Fisken og havet', number 5, 1997.

2.2 IMPACT ZONES

Fish farm effluent consists of large particles (waste feed pellets and intact faecal pellets), smaller suspended particles (feed dust and broken faecal pellets) and dissolved material (nutrients, organic compounds etc.). These types of effluents have different potential dispersal kinetics, and

affect the water column and sea floor at varying distances from the fish farm. A greater impact is accepted under a fish farm than further out into the recipient. Around a fish farm, various zones are formed, which are affected to different degrees (see Table 1), and where different environmental standards are used. The table gives information on the dominant source, and potential source of impact, which type of investigation is included in the monitoring of each individual zone and which environmental standards are applied in each case.

Table 1: Overview of impact zones

	Local impact zone	Intermediate impact zone	Regional impact zone
Definition	Area under and near a fish farm where most of the larger particles are deposited. This does not normally extend beyond 15 m from the fish farm.	Area between the local impact zone and the regional impact zone, where sedimentation of smaller particles occurs	Area beyond intermediate impact zone
Source of impact	Fish farm	The fish farm is the main source of impact, but other factors may also contribute	The fish farm is one of several sources of impact
Potential impact	Marked changes in benthic faunal communities and chemical conditions at the sea floor. Fouling of the cage group, reduced oxygen levels in the cages.	Gradually less impact	Increased primary production, and oxygen consumption in deeper water
Monitoring investigation	Mainly A and B	Mainly C	Mainly C
Environmental quality standard	Threshold values given in the present standard	Threshold values given in the present standard	N.A

2.3 MONITORING FREQUENCY

The repetition frequency of the B-investigation at the site is as shown in Table 2. The time of survey is determined by the production cycle at the site. Sampling is primarily carried out during periods of intensive production.

Table 2: Frequency of A- and B-investigations at the site (local impact zone) in relation to impacts at the site (site condition).

Monitoring level	
A-investigation	B-investigation
	Base line before production starts
	Once at full production

A control site 200 m away down current will be sampled under the B-investigation to act as a control site.

Should the conditions under the fish farm be unacceptable, an extended B-investigation may be carried out to ensure a correct evaluation of the site. This primarily encompasses a larger number of samples, but may also be extended to include additional parameters such as total organic carbon (TOC), medication (anti-parasitic and antibiotic compounds), total nitrogen, phosphor, zinc and copper.

This survey provides a documentation of the environmental conditions which, when compared with subsequent surveys, will reveal the extent to which the fish farm affects the recipient. A comparative survey should be carried out four years after establishment of the fish farm. The monitoring frequency for new recipients and for those already in use for fish farming is determined by the relevant authorities, based on the principle that monitoring intensity increases proportional to impact.

The monitoring programme is assessed regularly and adjusted as necessary according to the results obtained.

B-investigation

3.1 BACKGROUND

The B-investigation comprises a simple trend monitoring of the bottom conditions under a fish farm. Because the survey is repeated regularly, at intervals determined by the extent of the environmental impact, the development of the environmental impact can be followed successively. Both the average condition at the site and the conditions under different parts of the fish farm are revealed. The B-investigation comprises of many different parameters and is therefore less sensitive to anomalies in individual parameters.

The division between acceptable and unacceptable sedimentary conditions is set as the highest level of accumulation within which burrowing bottom fauna can survive in the sediment.

Sampling is carried out by divers from the cage group or boat.

NOTE: It may be difficult to carry out the B-investigation at sites with high water depth and/or a stony or rocky bottom.

3.2 AIM

The B investigation is a simple and frequent monitoring of the environmental state at the site, such that trends may be revealed.

3.3 PERSONNEL

The survey is carried out by personnel with the necessary training and competence.

NOTE: Competence requirements and training scheme is determined by DAFF.

3.4 PARAMETERS

The B-investigation encompasses three groups of sediment parameters (see Table B.3, Form for samples). All parameters are assigned points, according to the extent to which the sediment is affected by organic material. The higher the points, the more affected the sediment:

Faunal investigation (Group I): Investigation where the presence or absence of animals larger than 1 mm in the sediment is recorded. Presence of animals gives 0 points: no animals gives 1 point;

Chemical investigation (Group II): Quantitative survey where the pH and redox potential (E_h) is measured in the sediment. The recorded pair of measurements for pH/E_h is awarded points according to figure D1;

Sensory investigation (Group III): Qualitative investigation where sediment outgassing, smell, consistency, colour, grab volume and thickness of the layer of deposits is recorded. Presence of gas bubbles gives 4 points, absence of gas bubbles gives 0 points; pale/grey sediment gives 0 points, brown/black sediment gives 2 points; absence of smell gives 0 points, some smell 2 points and strong smell 4 points; firm consistency gives 0 points, soft consistency 2 points and loose consistency 4 points; a grab volume less than ¼ gives 0 points, a volume between ¼ and ¾ gives 1 point and a volume over ¾ gives 2 points; an accumulation of organic material on the sediment of less than 2 cm gives 0 points, between 2 and 8 cm gives 1 points and over 8 cm gives 2 points.

NOTE: Because the site condition is determined at once, the B-investigation does not include parameters that require laboratory analysis.

3.5 EQUIPMENT

The following equipment is required:

Winch: A portable or fixed boat winch may be used to retrieve grab samples. The winch may be omitted for sampling in shallow water;

Grab: A grab with a sampling area of at least 100 cm^2 is used. The grab shall close fully such that water and sediment does not leak out during hauling to the surface, and it is equipped with hinged flaps on the top, to allow inspection Group II and Group III parameters;

- pH measurement equipment: Both regular combination electrodes and ISFET electrodes may be used. The latter are very robust. Further, a field pH meter is required, together with buffer at pH 4.0 and 7.0 and distilled water;

- Redox measurement equipment: Redox electrode and reference electrode or a combination redox electrode. Further, a field redox meter and redox buffer is required;

Miscellaneous: Sieve with round mesh holes of 1 mm diameter, white plastic bath of dimensions appropriate to an open grab, volume measure for grab contents, plexi-glass cylinder for sub-sampling, magnifying glass (5x enlargement), electrode holder, disinfectant solution and vessel for disinfecting.

3.6 PREPARATION OF EQUIPMENT

Upon arrival at the site, the pH and redox electrodes are assembled and calibrated according to the manufacturer's instructions:

- pH, redox and reference electrodes are fastened to a holder such that the sensors are at precisely the same height (avoid direct sunlight). The pH electrode is calibrated in a buffer solution of pH 4.0 and 7.0. The buffer temperature is equivalent to that of the sea water (see C.4);

The electrodes are immersed into a beaker containing sea water or sea water buffer and stirred occasionally. The electrodes are ready for use after 30 min.

3.7 SAMPLING

The text in this section relates to completion of Table B.3 form for samples. The samples are taken in such a way as to be as representative as possible of the bottom conditions at the fish farm.

Sampling is carried out in accordance with the following guidelines: A minimum of 10 samples are taken, evenly spread across the sampling area. If the fish farm consists of dispersed cages, at least one sample is taken at each cage, independent of the number of cages. The sampling positions are marked on the fish farm cage map, and are revisited during future sampling. During sampling, if the grab is empty on retrieval, another attempt is made. If the second attempt is also unsuccessful, the bottom is likely to be rocky, without accumulation of organic material. This is noted in Table B.1 form for sampling locations.

NOTE: An empty grab does not guarantee the absence of accumulation

During the first survey at a site, the sea floor under the fish farm is mapped by taking 15-20 grab samples evenly spread out over the area occupied by the farm and the bottom substrate and water depth is noted.

3.7.1 Compact cage group

The sampling area comprises of the entire area under the cage group to its outer edges. If samples taken at the outer edges are strongly affected (condition 2 or 3), further samples are taken out into the transitional zone.

3.7.2 Dispersed cages

The samples are primarily taken beside the cages, particularly downstream of the prevailing current and towards the deepest area. Should there be many cages in an area; samples are also taken between the cages.

3.8 REPORTING

On completion of a survey, a short report is compiled which contains a chart, cage map, with sampling points marked and all forms filled in during the survey. The report shall give a brief description of the conditions under the fish farm and a comparison of the results from the different samples.

Eventual variation in the sedimentary conditions across different parts of the fish farm is noted. Individual samples classed as unacceptable are noted and assessed separately, even if the condition of the site as a whole is classed as acceptable, and advice is given on remedial measures to be taken.

The report contains a comparison with earlier investigations and reveals any developmental trends. A full data appendix is included and all information necessary to allow any other person to conduct an identical survey. The report should be presented in both paper and electronic format.

Benthic assessment

Changes in the benthic environment are the most conspicuous impact associated with finfish culture (Féral, 2000). Many other environmental impacts result from the accumulation of fish farm waste in the sediment. NCC, (1989) summarised the effects of finfish aquaculture on benthic infauna as follows:

- Anoxic zone: If present, usually restricted to the sediments directly below the cages.
- Opportunistic zone: Restricted to immediate vicinity of the cages or up to 30m from the site.

- Return to background: Normally occurs within 200m of the farm.

Settlement and waste accumulation directly beneath the cages are expected. Environmental monitoring serves as a means to quantify the impact of the fish farming operation. Any results obtained through a monitoring program can be used as an effective tool in adaptive management allowing any environmental impact to be significantly reduced.

Benthic assessments can be done in various manners. One assessment techniques will be utilized for the monitoring of cage impact during this experimental phase. The method will be:

1) Sediment core sampling

Sediment core sampling

10 (0.01m2) Sediment samples will be collected by a diver (or grab), 5 below the cage and 5 on the same depth contour 200 meters away (control) within the experimental area.

- Sediment core sampling is used for benthic infauna assessment (quantitative and qualitative).

The samples taken for infauna assessment will be fixed in 4-6% formaldehyde solution in seawater.

The samples for infauna assessment will be washed and screened to rid the sample of fine grains (<1mm). The remaining small animals will be counted and sorted before being stored in 70% ethanol for future reference. The results will be used to compare the individual count and number of taxonomic groups of the nominated site to that of the control site.

Samples will be taken before production start and again at peak production.

Water Quality

Soluble wastes from intensive finfish culture consist of materials excreted in urine or across the gills, and leached from the solid fraction (primarily waste feed and faeces) as it sinks. Changes to the water column will result from the release of soluble nutrients. This can cause alterations in the abundance and diversity of phytoplankton populations, potentially resulting in algal blooms (Gavine & McKinnon, 2002). Other potential water column impacts include increases in ammonia and phosphorous as well as a decrease in dissolved oxygen (DO) through respiration and microbial activity in the sediments.

Parameters that will be measured to indicate change in the water column include:

1. Dissolved oxygen

2. Transparency
3. Organic nutrients

Variances in DO levels in the water column are usually only detected in close proximity to the cages, but return to normal within a few metres (Heinig & Millar, 2003). DO levels will be logged daily in the cage and 30 meters away on the same depth contour at a depth of 5m.

Water transparency is measured using a secchi disk. Changes in the transparency can indicate the build-up of suspended solids as well as an increase in phytoplankton levels. Secchi disk readings will also be taken on a regular basis.

- Organic nutrients are excreted from the fish and also leached from settling waste and the sediment. Organic nutrients include compounds (such as ammonia) that can be harmful to aquatic life. Ammonia and Phosphor (P) levels will be tested in the cage and 30 meters away on same depth contour. Water samples will be taken for testing before production and at peak production.

The expected result from monitoring water quality is that little or no impact from the experimental farm will be detected. Acceptable water quality parameters should not be mistaken as an indication that finfish culture operations have little effect on the environment, as severe waste deposition can occur in the footprint area without influencing water quality (Heinig & Millar, 2003)

Visual description: Characterisation of the sediment based on colour, smell and presence of faecal and food pellets. This characterisation is not a quantitative assessment in the same sense as in the B- investigation, but is used as a background upon which to base the evaluation of benthic fauna.

Appendix B (normative): B-investigation, forms and tables

Table B.1 FORM FOR SAMPLING LOCATIONS

Company: **Concession no.:**

Site: **Date:**

Sampling location (number)										
Depth (m)										
Number of sampling attempts										
Bottom type: Shell-sand										
Sand/gravel										
Clay										
Mud										
Stony										
Rocky										
***Echinoderms**										
***Crustaceans**										
***Molluscs**										
***Bristleworms**										
***Malacoceros fuliginosa*										
Organisms from the fish farm										
Feed/ faeces										
Beggiatoa										
Spontaneous outgassing										
Outgassing during sampling										
Outgassing in the sample										

Grabb area:	

*Few/Many/One species dominate ** Number of individuals are noted

Signature:

Table B.2 FORM FOR CONTROL VARIABLES

	Sea water	Sediment	pH-buffer
Temperature			
pH			
E_h (mV)		**Reference elektrode potential (mV)**	

Table B.3 FORM FOR SAMPLES

Site: Date:

Gr.	Parameter	Points	Sample										Index
I	Animals	Yes (0) No											
											Condition (Group I)		
II	pH	Measured											
	E_h (mV)	Measured											
		+ ref.											
	pH/E_h	Points,											
		Condition (sample)											
											Condition (Group II)		
III	Outgassing	Yes (4) No											
	Colour	Pale/grey											
		Brown/black											
	Smell	None											
		Medium											
		Strong											
	Consistency	Firm											
		Soft											
		Loose											
	Grab (v)	v < ¼											
		1/4 ≤ v < 3/4											
		v ≥ 3/4											
	Thickness deposits (t)	t < 2 cm											
		2 ≤ t < 8 cm											
		t ≤ 8 cm											
		Sum											
		Corr. sum											
		Condition (sample)											
											Condition (Group III)		
II & III	Average value (Group II &												
		Condition (sample)											
											Condition (Group II & III)		

AVERAGE VALUE FOR SITE *Signature:*

TABLE B.4 Determination of condition for individual samples and condition for each parameter group

X: Index pH/E_h Corrected sum Average value (Groups II & III)	**X** < 1,1	1,1 ≤ **X** < 2,1	2,1 ≤ **X** < 3,1	**X** ≥ 3,1
Condition (Sample) Condition (Group II) Condition (Group III) Condition (Groups II & III)	1	2	3	4

TABLE B.5 Determination of average condition at the site

Condition (Group I)	& Condition (Group II & III) for site	⇒ Average value
A	1, 2 or 3	1, 2 or 3
A	4	4
4	1 or 2	1 or 2
4	3	4
4	4	4

B.1 INSPECTION OF SAMPLES

The sample is inspected and the results noted in B.1 form for sampling locations. Further details on pH and redox measurements are given in Appendix C.

The following procedure is applied:

- The closed grab is placed in the plastic basin and the top flaps are opened. pH, redox and reference electrodes are pushed 1 cm into the sediment. If necessary, the overlying water may first be drained off. The electrodes are held as steady as possible; the pH value is read when the given value is stable and the Eh value is read when the drift is less than 0.2 mV/s. Should stable values not be obtained within five minutes, the drift is marked by arrows. The values obtained are noted in B.1 form for sampling locations. For redox measurements, Eh is

calculated by adding the half-cell potential of the reference electrode (at the relevant temperature) to the measured value (see Appendix C).

- The electrodes are rinsed in sea water and any water droplets are removed with absorbent paper. During extended pauses, the electrodes are put into sea water of the same temperature as the samples. The electrodes are controlled in freshly collected sea water or sea water buffer at ½ hour intervals (see Appendix C.).
- A core sample is taken via the flaps on the upper side of the grab before the sediment is emptied into the basin, to be used for assessment of some of the Group III-parameters. Alternatively, the grab may be opened such that the sediment gently slides into the basin. The sediment is now assessed in terms of the Group III parameters, and the assigned points are noted in Table B.3 form for samples.
- The sediment in the basin is sieved through a mesh screen of 1 mm pore size. The material remaining on the mesh screen is transferred to a white tray and is surveyed under a hand-held magnifying glass (5x enlargement). Presence of animals in the sample is noted as 0 and absence is recorded as 1 in Table B.3 form for samples. Exception: A sample containing only the bristleworm *Malacoceros fuliginosa* is still assigned a point of 1. This species is capable of living on the surface of heavily affected sediments and is therefore not considered as infauna (animals living within the sediment).

In Table B.1 form for sampling locations, the following are noted:

- abundance of the different animal groups;
- eventual occurrence and abundance of *Malacoceros fuliginosa*;
- any other observations are noted at the bottom of the form.

NOTE: The sediment sample is not to be discarded at the fish farm because it may be harmful to the fish.

B.2 EVALUATION OF RESULTS

Table B.3 form for samples is further used both to determine the sediment condition with respect to each parameter group as well as to determine the average condition for the site.

The following are determined for each parameter group:

1. "Condition (sample)" (sediment condition for each individual sample)
2. "Index" (average value of all samples)
3. "Condition (Group)" (average condition for each parameter group).

Finally, the "average site condition" is determined based on the results from all three parameter groups.

Group I parameters (animals): This group distinguishes only between acceptable and unacceptable conditions at the site. The average value of the points for all samples is calculated and noted under "index".

If more than half of all the samples contain animals (Index $<$ 0.5), "Condition (Group I)" is deemed acceptable (A) (corresponds with conditions 1, 2 or 3). If less than half of the samples contain animals, (Index $\geq$ 0,5), "Condition (Group I)" is set to 4 (unacceptable).

In certain circumstances, if the bottom is hard and the retrieved grab contains a low volume of material (less than ¼ full), the amount of material may be too small for animals sampling. For this reason, it is only required that at least half the samples shall contain animals.

Exception: Samples taken on rocky bottoms where organic material is scooped up, but which do not contain primary sediment (and therefore no infauna), cannot be expected to contain animals and Group 1 parameters are excluded. As a result, these samples are not included in calculation of the average value for Group I parameters.

Group II parameters (pH/E_h): The pair of figures for measured pH and corrected E_h for each sample is plotted onto the figure in Appendix D. The figure distinguishes five intervals, to which each is allotted points. The recorded points are noted under "pH/E_h".

"Condition (sample)" is read from Table B.4 by using the points allotted for "pH/E_h" for each individual sample.

The average value of the points for all samples is calculated and noted under "Index".

"Index" is entered in Table B.4 and "Condition (Group II)" is read and recorded.

Group III parameters (sensory): The sum of points is calculated for each sample.

In order to compare directly points for Group III with points for Group II parameters, a "corrected sum" is calculated for each sample by multiplying the sum with 0.22.

"Condition (sample)" is read from Table B.4 by using the value for "corrected sum" for each individual sample.

The average value of all corrected sums is calculated and recorded under "index".

"Index" is entered into Table B.4 and "condition (Group III)" is obtained and recorded.

Group II & III parameters: For each individual sample, the average value of "pH/E_h" and "corrected sum" is calculated and entered under "average value (Groups II & III)".

"Condition (sample)" is read from Table B.4 by using the "average value (Groups II & III)" for each individual sample.

Thereafter, the "index" is calculated by taking the average value of all samples.

"Index" is entered into Table B.4 and "condition (Group II & III)" is obtained and noted.

Average site condition: Using "condition (group I)" and "condition (groups II & III)" the "average site condition" is given in Table B.5.

Appendix C (informative): pH and Redox potential

C.1 UTILITY

The B-investigation is suited to field work, and the given procedure can be applied for determination of pH and redox potential in sea water and marine sediments. In principle, the procedure may be used for samples collected with a water sampling device, a cylindrical core sampler, box core sampler or a grab.

NOTE: The procedure does not aim to operate at a precision level equivalent to that achieved under ideal laboratory conditions. The aim is that different operators with individually selected equipment shall achieve results repeatable to within ±0.1 pH units and ±25 mV E_h.

Thermodynamic assessment of E_h measured using platinum electrodes is not recommended. The parameter is used only as an empirical environmental parameter associated with a contamination gradient.

C.2 PRINCIPLE

pH and E_h are general chemical parameters controlled by acid-base and the reduction-oxidation equilibrium in the sample. The parameters can be determined non-destructively using electrodes inserted directly into the sample without the addition of chemicals. In the marine environment, the E_h value varies from +400 mV in surface water at atmospheric equilibrium to -200 mV in anoxic sediments or bottom water in fjords and basins with poor water exchange. The pH value normally varies between 8.0 and 8.1 in surface water down to 7.0 in naturally anoxic water masses and sediments.

In principle, pH (= -log{H+}) and pE (= -log{e-}) are analogue expressions for the negative logarithm of proton and electron activity. The relationship between pE activity and the E_h potential is obtained by the Nernst equation:

$$E_h = (RT/nF)\ln\{e-\} = 0{,}056\ pE \quad \text{at } 10\ °C,$$

where:
R is the molar gas constant;
T is the absolute temperature;
n is the number of particles and

F is Faradays constant.

It is important to note that the observed resting potential in the sample (Eobs) is equivalent to the difference between half-cell potential of the redox electrode (E_h) and the reference electrode (Eref):

$$Eobs = E_h - Eref$$

To determine the redox potential, the half-cell potential of the reference electrode must be known and added to the observed potential:

$$E_h = Eobs + Eref$$

Table C.1: Half-cell potentials at different temperatures for two Radiometer reference electrodes

t (°C)	Ag|AgCl E_{ref} (mV)	Calomel E_{ref} (mV)
0	236.55	-
5	234.13	272.83
10	231.42	271.87
15	228.57	270.78
20	225.57	269.49
25	222.34	268.04

The supplier of the reference electrode should be able to supply the precise E_{ref} at the relevant measuring temperatures. Table A.1 shows the half-cell potentials for two commercially available electrodes.

C.3 CHOICE OF MEASURING EQUIPMENT

There is a wide and ever-increasing choice of commercially available electrodes and measuring equipment, and the quality and user-friendliness is steadily improving. The two alternatives given in Table C.1 are examples of equipment tested in the field, but should not be considered as binding. The requirements for accuracy are such that most general field instruments and electrodes are suitable.

A platinum (Pt) redox electrode is used, and an Ag|AgCl electrode filled with KCl solution is suitable as a reference electrode.

The reference electrode must not contain metal ions that can lead to clogging of the salt-bridge when used in sulphidic samples. Calomel electrodes contain mercury and, if possible, should be avoided in field surveys.

ISFET technology (Ion Specific Field Effect Transistor) for measurement of pH is newer and less well-tried than traditional glass electrodes. An important advantage with ISFET sensors is that they are very robust compared with glass electrodes and tolerate drying during transport and storage (they require storage in air). One disadvantage with the first models that appeared on the market was that the shape of the electrode tips was unsatisfactory for penetration into the sediment sample. The measuring accuracy is sufficient for the present purposes. The response time and stability over time appears to be at least as good as, and possibly better than, glass electrodes.

C.4 TEMPERATURE CONTROL

All electrode potentials are temperature dependent. Temperature control is particularly important for pH measurements. Low temperature sensitivity is an important criterion for the choice of buffer solution and reference electrode.

Ideally during pH measurement, the sample and the buffer should be at the same temperatures. To achieve the above-mentioned replicability, it is sufficient that the samples are measured at a temperature that deviates less than 5 °C from the *in-situ* temperature, i.e. the temperature of the sample before it was removed from the sea floor. The temperature in the bottom water and sediments at Norwegian fish farms is often between 5 °C and 10 °C. Over large parts of the year, the air temperature will be approximately similar, or lower. The recommended working

temperature for calibration and measuring is therefore between 5 °C and 10 °C. A refrigerator, ice or buckets of sea water are simple, readily available means of maintaining the recommended working temperature.

If the pH meter is equipped with temperature compensation, variations between samples and between sample and buffer are compensated for, but changes in pH as a result of temperature changes during storage are not.

No particular attention is paid to temperature during measurement of the redox potential, but during conversion from cell potential to E_h, the half-cell potential of the reference electrode is used at the appropriate working temperature (Table C.1).

C.5 CALIBRATION OF PH

Two-point calibration of pH is carried out at the site before the start of the measurements. The instrument user manual must be followed. Two buffers are used, with pH values of 7.0 and 4.0, respectively. The pH-E_h diagram (Appendix D) is based on calibration in low ionic strength buffers (regular NBS or IUPAC buffers).

After calibration, the electrodes are placed in sea-water. Sea water has a higher salinity than the buffer solutions. This affects the diffusion conditions of the electrodes and causes some problems, such that it may take some time before the electrode gives a stable pH reading. The work should therefore be organised such that the electrodes are allowed to stand in sea water for approximately ½ hour before the measurements are started, preferably with occasional stirring. A somewhat longer response time may be expected during the first measurements after a calibration. During measurements, the electrodes are rinsed in sea water only. Alternatively, fresh water may be used with an additive of 30 -35 g salt (NaCl) per litre, but this cannot be used as a pH-buffer in the same way as sea water.

The pH of sea water is approximately 8.0 - 8.1 with only slight variation. In deep water, the pH can be somewhat lower, but seldom less than 7.6. Sea water is well buffered and freshly collected sea water may therefore be used as a working buffer to control the electrode during measurements, but care should be taken to avoid local conditions that may affect the pH, such as industrial effluent, algal blooms and brackish water layers.

It should not be necessary to re-calibrate a good pH electrode between measurements, but it should be controlled regularly in the working buffer, for example at ½ hour intervals. Should this reveal systematic deviation, the results may be corrected after the measurements are completed. Should there be a persistent deviation of more than 0.2 pH units from the value first measured, the operator should consider recalibrating the electrode and, if possible, repeating measurements.

C.6 CONTROL OF REDOX POTENTIAL

It is not necessary to calibrate platinum electrodes. However, the entire redox cycle should be controlled in a solution with a known redox potential, such as a redox buffer solution. Such a solution can be made by dissolving 1.0974 g $K_3Fe(CN)_6$, 1.2278 g $K_4Fe(CN)_6$ and 7.4551 g KCl in 1000 ml distilled water. This solution has a stable E_h of 430 mV at 25 °C, decreasing at lower temperatures. Between temperatures of 5 °C – 10 °C, the sum of the measured cell potential (Eobs) and the specified half-cell potential (Eref) should be between 400 mV and 430 mV.

An unstable pH/mV signal during measurement may be due to clogging of the salt-bridge or the salt-bridge not being covered by the sample. If the salt-bridge is clogged by sediment particles or precipitation, the electrode is damaged and must be replaced (refers to glass pH electrodes and reference electrodes, not ISFET or platinum electrodes).

Other causes of technical problems may be a weak battery, dampness or corrosion in the electrical contacts, static electricity or electrical noise from nearby electrical installations.

C.7 DEFLECTION/ RESPONSE TIME

The response time, i.e. the time taken before the instrument shows a stable value, is dependent on the composition of the sample and can be lengthy for E_h measurement. Assuming that a maximum of 4 to 5 minutes is available for each sample, it is important to establish routines that give as repeatable as possible results within this time-frame.

After the electrodes are inserted into the sample, there is an exponential decrease in deflection. A deflection of less than ±25 mV from the stable value is usually achieved within 1 to 2 minutes. A deflection of up to 0.2 mV per second at the moment of measurement is considered acceptable.

In certain circumstances, it may not be possible to fulfil even such relatively "mild" requirements as to deflection within a realistic time-frame. This is particularly the case in the transition from

reduced to sulphide-free sediment samples. Sulphide is adsorbed to platinum electrodes and can affect measurements in weakly-buffered samples several hours after contact. As illustrated in Figure C.1, this can result in poor replicability in samples with high E_h values recorded within the maximum acceptable waiting time (5 min.). Sulphide absorption does not affect the readings in the redox buffer or sediment samples with a redox potential lower than approximately 100 mV. The B-investigation is not affected either, because the assessments of condition (Appendix B) do not differentiate values E_h>100 mV.

If the measurements are always carried out first on a sulphidic sample, or even sea-water to which a small crystal of sodium sulphide (Na_2S) has been added, the measuring area is reduced at the upper end of the gradient, but the replicability is improved over the entire measuring area as a whole.

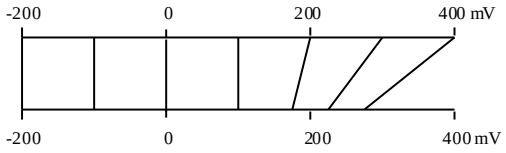

Figure C.1: Schematic illustration of the E_h gradient in marine sediment measured with a platinum electrode before (upper scale) and after (lower scale) contact with hydrogen sulphide.

Appendix D (normative): Point assignment for pH/E_h

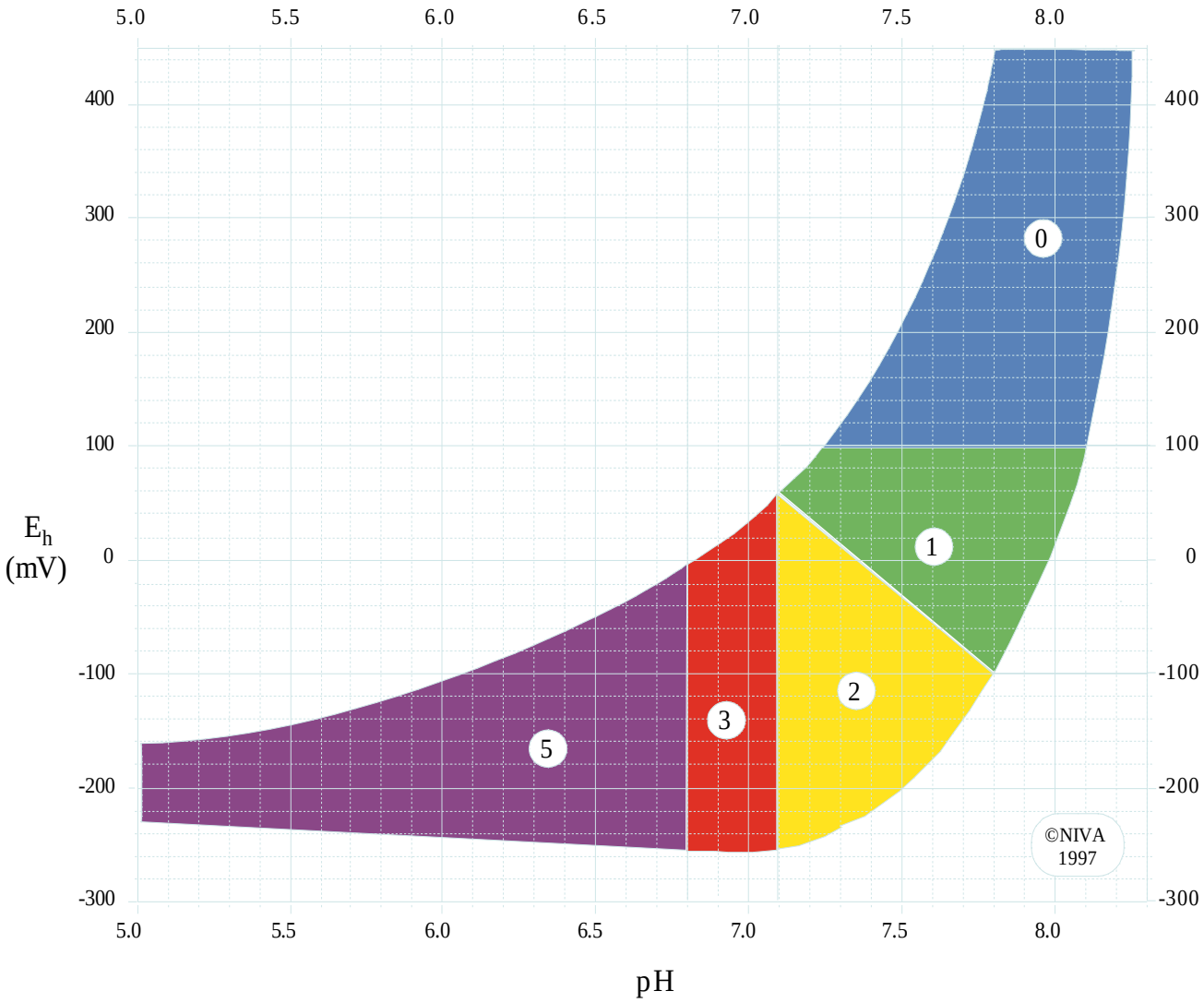

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Figure D.1 Point allocation based on redox potential and pH value

Annexure to Environmental Monitoring Plan for:

Molapong Aquaculture

Monitoring protocol for the copper loss rates from antifouling treated nets in Saldanha Bay.

Background

Molapong (Pty) Ltd. has two sites (1 Ha & 4 Ha) in Saldanha Bay on the West Coast of South Africa, of which one site is currently used for experimental salmonid cage farming in cages (4 Ha) and the other site for future experimentation. Molapong is in an advanced stage of completion of an experimental first stage and in the process of applying for a Marine Aquaculture Right and Commercial Permit.

The first experimental stage is very small scale and consists of two 50m diameter cages and the production will remain under 50 tons per year.

Marine bio-fouling is one of the biggest operational challenges experienced to date.

The problems have been dealt with by replacing the fouled net with clean net on a monthly basis. This process is operationally difficult due to the lack of a dedicated and purposefully built work boat. The process have production implications as fish needs to be starved before handling and the time taken for the net change itself during which fish cannot be fed. This changing of a net can take up to 3 days; this is a very costly exercise.

The fouled up net have suspected negative heath implications on the stock as well.

Molapong therefore are planning to use approved antifouling agents on the net in an environmental responsible way. SAMSA are the authority on shipping antifouling and we were referred to DAFF for guidance on approval, as SAMSA accepts anti-fouling paint systems which have been approved by one of the approved Recognised organisations as per Marine Notice 12 0f 2014 – List of Recognised Organisations (attached).

The Department of Environmental Affairs (DEA) has been approached for guidance on the application and environmental risk of using aquaculture antifouling and they have confirmed that the risk is low or negligible.

Correspondence received from DEA states the Following:
"*It is believed that the risk of toxic contamination to the immediate environment from the use of the paint is negligible depending on the scale of use. It is therefore advised that some monitoring of the risk be undertaken during the pilot phases of the operation. Should a significant impact be detected, the nets are to be removed to prevent further deleterious effects. Therefore, it is our view that you may proceed with the application of the paints during the pilot phase. If further wider application of the paints are to be used on other farming practices (ocean based), further considerations must be taken to the fact that the scale of the operation has changed. The DEA will then revisit our position based on the outcomes of the monitoring done on this project.*"

To test the impact from anti-fouling agent – Flexgard XI from manufacturer Flexbar on the environment, Molapong commits to following monitoring.

Monitoring

Copper concentrations in oyster-flesh will be determined to quantify the leaching rate/volume from the antifouling agents used on the nets.

A minimum of 200 g oyster meat will be collected per sample.

Analysis will be performed by Mérieux NutriSciences (formerly Swift Silliker Laboratories) sister laboratory in Europe. The laboratory is accredited to perform the copper analysis.

A 100 g oyster meat sample will be shipped to Europe and 100g will be kept as a retention sample.

A baseline sample will be collected to determine current/natural copper levels from Saldanha Bay Oyster Company's Big Bay site before the installation of the net treated with antifouling.

Copper concentrations will then be determined monthly, from the cage site and control site, for a period of 3 months following the first installation of antifouling treated nets to verify increase concentrations due to leaching.
Samples will be collected from oysters supplied by Saldanha Bay Oyster Company's Big Bay site which will be hung on the mooring buoys off the cages systems mooring structure. The buoys in the direction of the prevailing current will be selected for samples to be hung, to test the maximum leaching effect.

Control samples will be collected from Saldanha Bay Oyster Company's Big Bay site.

Oysters from the same batch will be tested for control and monitoring. An estimated 50 oysters will be required to produce 200g meat.

This sample animal on both the control and monitoring site will consist of at least 250 oysters each.

OEMP ANNEXURE 2: WASTE MANAGEMENT PLAN TEMPLATE

WASTE MANAGEMENT PLAN	Document No.	WMP 01
	No. of Pages	
	Revision No.	
	Date	

SEA CAGE AQUACULTURE PROJECT, SALDANHA BAY.			
CONTRACTOR		**PHONE NUMBER**	
RESPONSIBLE PERSON		**E-MAIL**	

1. Planning

a) All potential Waste Streams (generated during site establishment, construction and de-establishment) have been identified in the attached Waste Register.

b) The waste streams have been categorized into General and Hazardous waste. Hazardous waste has further been given a hazard rating (SABS code).

c) The Waste Register will be reviewed every month for accuracy.

2. Waste Sorting

a) Waste will be sorted into the following categories on site: *(e.g. clean rubble stockpiles, bins for different recyclables, hazardous wastes, wastes to landfill etc.):*

WASTE TYPE	SORTING, SEPARATION AND STORAGE METHOD ON SITE

3. Waste Storage/Handling on Site

a) Waste will be temporarily stored as follows: *(e.g. time on site, protection from weather, labeled bins/skips etc)*

4. Destination of Waste/Recovery/Recycling Method

WASTE TYPE	DISPOSAL TYPE (E.g. recovery/recycling/landfill)	DESTINATION (Incl. contact details of receiver)

5. Internal Monitoring Procedure

6. Document Control and Reporting Procedure

7. Training of Staff *(e.g. re on site sorting procedures etc.)*

8. Other

NAME	
SIGNATURE	
DATE	

OEMP ANNEXURE 3: METHOD STATEMENT TEMPLATE

Ecosense

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ENVIRONMENTAL METHOD STATEMENT

This Method Statement is to be completed by the person requiring the work to be undertaken (e.g. the Engineer or Contractor). This Method Statement will be assessed by the Environmental Site Manager (DEO) for potential negative impacts on the environment.

The Method Statement can only be implemented once signed off by the DEO as being environmentally acceptable.

The person undertaking the work (the Contractor or his representative undertaking the works on the site) must also sign the Method Statement, thereby indicating that the works will be carried out according to the methodology contained in the approved Method Statement.

The DEO will use the Method Statement to audit compliance by the Contractor with the requirements of the approved Method Statement.

Changes to the way the works are to be carried out must be reflected by amendments to the original approved Method Statement; amendments require the signature of the Engineer, denoting that the changed methodology or works are necessary for the successful completion of the works, and by the DEO as being environmentally acceptable. The Contractor will also be required to sign the amended Method Statement thereby committing him/herself to the amended Method Statement.

This Method Statement MUST contain sufficient information and detail to enable the DEO to apply his/her mind to the potential impacts of the works on the environment. The Contractor will also need to thoroughly understand what is required of him/her in order to undertake the works.

THE TIME TAKEN TO PROVIDE A THOROUGH, DETAILED METHOD STATEMENT IS TIME WELL SPENT. INSUFFICIENT DETAIL WILL RESULT IN DELAYS TO THE WORKS WHILE THE METHOD STATEMENT IS REWRITTEN TO THE DEO'S SATISFACTION.

WHAT work is to be undertaken?
(give a brief description of the works)

HOW is work to be undertaken?
(provide details on components, timeframes etc)

WHERE are the works to be undertaken?
(where possible, provide an annotated plan and a full description of the extent of the works)

WHEN are the works to start; what is the anticipated finish date?

DECLARATIONS

1) ENVIRONMENTAL SITE MANAGER

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

_____
(signed) (print name)

Dated:

2) PERSON UNDERTAKING THE WORKS

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to the above signatories and that the Environmental Site Manager will audit my compliance with the contents of this Method Statement

_____
(signed) (print name)

Dated:

3) APPROVING AUTHORITY (E.g. Principal Agent)

The works described in this Method Statement are approved.

_____ _____ _____

(signed) (print name) (designation)

Dated:

OEMP ANNEXURE 4: AGREEMENT REGARDING TOWING OF CAGES IN CASE OF STORM

(to be inserted as required)

OEMP ANNEXURE 5: INCIDENT REPORT FORM

INCIDENT REPORT FORM

Section One: To be completed by the person reporting the incident			
Name		**Designation**	
Contact number		**Physical location of incident**	
Describe the incident			
Was there damage/ contamination of any of the following? (Tick the appropriate box)			
Marine water column		**Marine floor/sediment**	**Air**
Was any of the following affected?			
Marine animals		**Shipping**	**Water quality**
What remediation has been undertaken? (describe)			
Has the damage/ contamination been completely remediated?			
If not, what residual damage remains (detail the residual damage)?			
If residual damage remains - what is the reason and what is planned with respect to the environmental damage?			
Upon investigation, what was found to be the cause of the incident? (Detail)			
Is this a repeat of a similar incident?			
What is the reason that planned changes did not prevent a recurrence of the incident?			
What is to be changed to ensure that the incident will not be repeated? (Detail)			
Section Two: To be completed by the Project Manager:			
Does the incident potentially compromise legislation?			
What action has been taken?			
In the opinion of the DAFF is the remediation action sufficient?			
If not, what further actions must be taken? (detail)			
Have all the required and appropriate actions been taken to the satisfaction of DAFF?			

Have all parties signed the incident form?	
Note: In the event of a significant incident which is defined in terms of section 30(1)(a) of the National Environmental Management Act as an unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of or detriment to the environment, whether immediate or delayed, the incident shall be reported to the Department of Environmental Affairs and Development Planning and an appropriate incident form completed and submitted to the regional office or as instructed by the competent official.	
Other Comments:	
Signed: _____ _____ Date DEO _____ _____ Date Project Manager	

7. DECOMMISSIONING REQUIREMENTS

Plan and make adequate financial provision for removal of all infrastructure upon cessation of farming operations. Should the project be decommissioned for any reason, a decommissioning risk report and method statement shall be compiled and submitted to DEA and DAFF.

As a minimum the report must address:

- De-establishment of the infrastructure on site - removal of cages, anchors, anchor and grid lines;
- Determine commercial usage of decommissioned infrastructure
- Removal/disposal/storage or re-use for another purpose of any project infrastructure and equipment from the site;
- Disposal of any remaining waste on site, no burning or burrowing of waste;
- The fate of any remaining fish;
- Address any other identified residual environmental risks as a result of the operations; and
- Water and benthic sampling and analysis 3 months after decommissioning.

Identify and assess any potential environmental and social risks associated with the preferred method statement and risk report. The report must be jointly agreed by the independent monitoring body and the Project Manager and must be accepted by DEA and DAFF for the project to be considered closed. The ALF should be notified before decommissioning commences.

When it becomes necessary to decommission the temporary cage construction site, the site manager and the operator will ensure that any negative environmental impact will be minimised. At a minimum, the following main actions will be performed:

a) Environmental awareness training to all site staff involved in the decommissioning phase.
b) Removal of any chemicals or wastes stored on site. Any plastics, oils, lubricants or fuels on site at the time of decommissioning will be disposed of or recycled through appropriate waste disposal channels.
c) After construction, all plant and equipment will be adequately cleaned, dismantled and removed.
d) The Site's temporary fence/safety barrier will be removed and stored for future use.
e) If a chemical toilet was necessary on site then it will be removed and wastes dispose of through municipal waste system.
f) No waste may be dispose of in to the surrounding sea area.
g) The site will be handed over to the Harbour Master for inspection and approval.

Impacts and Mitigation Measures from the decommissioning phase

The main impact from the decommissioning will be the generation of waste. Waste will mainly consist of organic waste (Bio-fouling) and HDPE (plastic trimmings and off cuts – recyclable) in relatively small quantities. If a reuse option cannot be found for the farm and leftover material their constituent materials will also be classed as waste. The materials arising in this situation will be recycled if feasible.

Waste management to take place in accordance with **OEMP specification 5.6.2**

8. REFERENCES

1. Ecosense Environmental Consultants CC. 2017. Basic Assessment Report: Molapong Aquaculture project, Saldanha Bay
2. Molapong. n.d. Ecological Risk Assessment
3. DAFF. 2012. Environmental Integrity Framework for Marine Aquaculture
4. Molapong. n.d. Environmental Monitoring Programme
5. Salmon Aquaculture Dialogue. 2012. ASC Salmon Standard Version 1.0
6. African Centre for Heritage Activities. 2016. Underwater Heritage Impact Assessment for the Development of an Aquaculture Development Zone (ADZ) at Saldanha Bay Western Cape
7. http://www.seafarm-systems.com/ accessed on 8-6-16
   Food and Agriculture Organisation. 2015. Aquaculture operations in floating HDPE cages – a field handbook
8. PISCES Environmental Services (Pty) Ltd. 2017. Concept for a proposed sea-based aquaculture development zone in Saldanha Bay, South Africa marine ecology specialist study (draft 8)
9. Saldanha Bay Water Quality Forum Trust 2015 The State of Saldanha Bay and Langebaan Lagoon (compiled by Anchor Environmental Consultants)
10. SRK Consulting. 2016. Proposed Sea-based Aquaculture Development Zone in Saldanha Bay: Visual Impact Assessment

9. EMPr ANNEXURES

EMPr annexures follow:

1. Environmental Authorisation.
2. Curriculum Vitae.
3. Environmental Awareness Plan.
4. ASC Salmon Standard.
5. Summary table of ASC / ADZ / Molapong environmental management specifications
6. EIA Regulations Appendix 4 checklist (Contents of EMPr)

EMPr ANNEXURE 1: ENVIRONMENTAL AUTHORISATION

(PENDING)

EMPr ANNEXURE 2: CURRICULUM VITAE

Environmental Assessment Practitioner Team for this EMPr

Kozette Myburgh has more than 10 years experience in impact assessment and environmental management (including various municipal and infrastructure projects), community / public participation, monitoring and evaluation. She has broad project management experience and has successfully obtained environmental authorizations for a number of projects. Kozette is a member of the the International Association of Impact Assessment (South Africa) (IAIASA) and Environmental Law Association (ELA) and has just completed her Masters degree in Environmental law.

Mark Sasman has extensive experience in practical input in detailing specifications and drafting of practical management plans. Mark is *Pr Sci Nat* registered and a member of the International Association of Impact Assessment (South Africa) (IAIASA). Mark also has more than 15 years experience in project management and EIA process integration and management.

Detailed curricula vitae are available on request.

EMPr ANNEXURE 3: ENVIRONMENTAL AWARENESS PLAN

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Basic Environmental Awareness:

The DEO shall compile a presentation for two levels of awareness training from the documentation, assessment and management plans available. These two presentation modules are to be aimed at Management and supervision and then at worker and general labour level.

The DEO shall also prepare feedback to both groups on a monthly basis on issues of compliance or standards and include toolbox talks to reinforce and support environmental best practice for land and sea based operations.

All new existing or new or temporary staff must be given a SHE induction and a register of all training awareness shall be kept by the DEO.

The following environmental awareness points must be added as part of SHE induction presentations to new staff:

1. **Why follow environmental site rules?**
   - Constitution of South Africa = "We have a right to a clean and healthy environment". Preserve environment for future generations.
   - Rules form part of Construction phase Environmental Management Plan – legally binding thus fines, disciplinary action and even removal of staff from site for non- compliance.

2. **No – Go Areas**
   - Stay out of restricted areas unless you have specific authorisation to work there e.g. neighbouring properties, lease areas, shipping lanes. Fines for non-compliance!

3. **Hazardous substances**
   - Hazardous substances to be used handled and stored safely in accordance with instructions of the Material Safety Data Sheet.
   - No oils, fuels, paints or chemicals or polluted wash water or mop up products containing these to be thrown out on site or into the sea, stormwater/sewer! Must be placed into sealed containers for removal from site.

4. **Fire**
   - No fires and burning of wastes are allowed on site. Permission must be obtained from Management for site braai's at the offices and stores leased areas.
   - No smoking near vegetated areas or flammable stores.

5. **Waste Control**
   - Clean work areas daily. Waste must be disposed of in the bins provided on site.
   - Plastics and litter that can blow around shall **immediately** be put into bins.
   - All food waste into bins with scavenger proof lids.
   - Rubble to be kept in central stockpiles (max total 10m³) and regularly removed.
   - Do not mix clean rubble with rubbish!
   - Explain recycling programme.
   - Waste containers to be available on craft and shall be serviced to the land-based stores daily

6. Animals

- Severe penalties for anyone caught trapping, removing an animal.
- Report problem wild animals e.g. whales, dolphins, sharks, nesting birds, snakes or trapped or injured animals to site management.
- Do not feed any wild animal. Keep food resources e.g. staff lunch packs, food refuse out of reach of wild animals
- Know first aid procedure in.

7. Material storage/stockpiles

- No stockpiling or staking or storage outside of designated work areas.

8. Vehicles, craft and machinery

- Drip trays placed under leaking static plant e.g. pumps, generators and parked vehicles during servicing and refuelling.
- Report all leaking machinery and oil/fuel spills immediately. Spills to be treated and machinery to be fixed or remove from site.
- Fuel spills to be reported
- Fuel spill kits to be located at fuelling areas and craft. All supervisors and craft operators shall be trained on spill kit use.

9. Toilets

- Report blocked or leaking toilets. Keep toilets clean.

10. Water wastage

- Do not waste water! Repair leaking hosepipes immediately and protect from damage / use correct fittings.

11. Archaeology (includes marine)

- Any suspected archaeological finds or human remains to be reported to site manager immediately and work stopped in the area until further notice.

EMPr ANNEXURE 4: ASC SALMON STANDARD

EMPr ANNEXURE 5: SUMMARY TABLE OF ASC / ADZ[3]/ MOLAPONG ENVIRONMENTAL MANAGEMENT SPECIFICATIONS

[3] Subject to approval by DEA

This table serves as a reference document for procedures that will be implemented by the Molapong project.

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
Planning Phase	EMPr 1.2.1, 2.1, 3	Consider/ take into account: topography; climate; natural ecosystems (flora and fauna); cultural and historical landscapes and archaeological sites (if applicable); planning and environmental approval requirements and specialist studies required; development requirements; site/spatial opportunities and constraints; and maintenance capacity		Principle 1: Comply with all applicable national laws and local regulations -	During the design and planning phase	Project Manager, Engineer, Consultants
Design Phase		Design team in place i.e. developer, engineer, environmental consultant, specialists consultants				
		All members of the design team are aware of the required environmental management measures and the existence of the EMPr				
		Design process and outcome				
		Significant changes/deviations from the project description must receive written approval from DEA&DP				
Siting of cages		Avoid the following areas to mitigate impacts: Big Bay North, Outer Bay South (not applicable to Molapong project)	Table 3 - 1:1, p.9			
		Coincide with the expansion of shellfish farms (not applicable to Molapong Project)	Table 3 - 1:3, p.9			
		Coincide with the development of finfish cage culture (Molapong project is for a finfish farm)	Table 3 - 1:4, p.9			
	EMPr 5.6.3	Mooring systems not to be placed on exposed shipwreck sites or materials				
Management	OEMP specifications	Specify requirements for existing and future operators	Table 3 - 1:6, 8, 9, p.10			
	OEMP 5.6.10	Confirmation 1 month prior to installation from port authority whether any lighting is required	Table 3-1:7, p.10			
EMPr	Molapong EMPr	Develop a template for individual operators to provide proposals (Not applicable to Molapong project, as the project would have an already approved EMPr as part of its EA)	Table 3-1:10, p.10			
		Review proposals (Not applicable as the Molapong proposal is currently under application)	Table 3-1:11, p.11			
		Individual EMP for each farm	Table 3-2:1, p.12			
Emergency Response	Incident Management Specification OEMP 5.6.12	Emergency response protocols	Table 3-1:13, p.11			
		Develop disentanglement protocols	Table 3-1:14, p.11			

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
Farm Layout	EMPr 1.1.2, 5.4	Consult the AMC specification re. layout (not applicable to Molapong, as the Molapong proposal is currently under application)	Table 3-2:2, p.12			
		minimum width of 10m between lines	Table 3-2:3, p.12			
		cages suspended 5m above the seabed	Table 3-2:4, p.12			
		cages do not occupy more than 30% of the total allocated area	Table 3-2:5, p.12			
		submit detailed proposals for expansions	Table 3-2:6, p.12			
Equipment	OEMP 5.6.9	Use structures and equipment suitable to the environment	Table 3-2:7, p.12			
	OEMP 5.6.3	Limit movement of mooring systems	Table 3-2:8, p.12			
	OEMP 5.6.9	To minimise entanglement, restrict mesh size and use environmentally safe aquaculture infrastructure	Table 3-2:9-10, p.13			
Visual Impacts	OEMP 5.6.3, p. 24 - 25	Grey based hues for project components	Table 3-2:9-11, p.13			
	OEMP 5.6.10, p.36	Similar style to promote visual cohesiveness	Table 3-2:9-12, p.13			
		Utilise the minimum number of safety buoys	Table 3-2:9-13, p.13			
		non-navigational lighting	Table 3-2:9-14, p.13			
		downward pointing shaded lights	Table 3-2:9-15, p.13			
		Mark all equipment for retrieval purposes	Table 3-2:9-16, p.13			
Decommissioning	EMPr, section 6 OEMP 5.6.2	Adequate financial provision	Table 3-2:9-17, p.13			
Specification: Cage Assembly						
Waste generation	OEMP 5.6.1	Securing work areas		Principle 6: 6.5, p.55 - Work environment health and safety	Contractor – daily, DEO – monthly report	Contractor, DEO, Project manager
Damage to surrounding areas		Appropriate fencing	Table 4-2: 20			
Lack of sanitation		Housekeeping and provision of refuse bins	Table 4 - 2 : 20, 23, p.18			
		Adequate toilet facilities				
		Availability of drinking water to staff				
Waste generation		Removal of temporary structures after work is complete				
Specification: Housekeeping and Waste Management						
Waste Generation	OEMP 5.6.2	Preparing and implementing a Waste Management Plan	Table 4 - 2 : 16, 21, p.18, 5-2: 25, p.26	Principle 4: 4.5, p.40 - Non biological Waste from production, 4.5.1	Contractor – daily, DEO – monthly report	Contractor, DEO, Project manager

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
Litter and pollution of surrounding environment		Housekeeping and refuse control	Table 4 - 2 : 20, 23, p.18, 5-2: 26, p.27			
Pollution of marine waters		Hazardous Waste management and disposal	Table 4 - 2 : 17-18, p.18, 5-2: 27, p.27			
		Recycling of waste materials	Table 4 - 2 : 22, p.18, 5-2: 24, p.26, 5-2: 32, p.27	Principle 4: 4.5, p.40 - Non biological Waste from production, 4.5.2		
		Record Keeping	Table 4 - 2 : 19, p.18			
Specification: Infrastructure and Equipment Management						
Infrastructure failure poses safety risk to marine animals	OEMP 5.6.3	Inspection log for infrastructure			Designated person for infrastructure inspection reports - weekly, permit from SAHRA prior to activities impacting shipwrecks or artefacts - Table 4 - 2 : 7-9, p.17	DEO
Pollution of marine environment		Avoid damage to heritage features through careful placing of moorings	Table 4 - 2 : 6, p.17	Principle 2: 2.4, p.24 - Interaction with critical or sensitive habitats and species		
Noise		Maintain and replace infrastructure	Table 4 - 2 : 33, p.19, Table 5 -2:13, p.26			
Heritage i.e. shipwrecks		Regular cleaning of cage netting	Table 5 -2: 2-4, p.25, 5 - 2:14, p.26, 5-2:67, p.29			
Heritage i.e. shipwrecks		Inspection log against pests	Table 5 -2: 15, p.26			
Cleaning of nets pose risk of pollution to marine animals and fish		Use smooth plastic coated knotless mesh - EMPr 1.2.4	Table 5 -2: 5, p.25			
		Routine surveillance for non-native fouling species	Table 5 -2: 1, 12, p.25			
		Do not use anti-fouling products based on heavy metals	Table 5 -2: 17, p.26			
Heritage i.e. Shipwrecks		Leave mooring anchors in place when undertaking cage maintenance	Table 5 -2: 6, p.25			
		Keep marine structures clean and free of unnecessary equipment	Table 5 -2: 18, p.26			
safety		Fit workboats with safety equipment	Table 5-2: 24, p.26			
		Inspection log for equipment i.e. boats				
Waste generation		Housekeeping and refuse control	Table 5-2: 28, p.27			
escapees		Contingency plan in place for infrastructure damage				

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
Visual		Grey based hues for all visible components, unless required in other hues for safety purposes - Mooring lines should be highly visible	Table 4 - 2 : 2, p.17, Table 5 -2: 113, p.33			
		Promote visual cohesiveness	Table 4 - 2 : 3, p.17			
Noise		Maintenance and operational guidelines against noise generation	Table 5 - 2 : 20, p.26, 5-2:111, p. 32			
Specification: Water Quality Management						
Water Quality	OEMP 5.6.4	Baseline water quality monitoring records		Principle 2: 2.2, p.21 - Water quality in and near the site of operation, 2.3, p.23 - Nutrient release from Production	Water quality Monitoring and reporting as per the Environmental Monitoring Plan	Project Manager, Auditor
		Incident Report Form				
		Conformance with ASC Standard, Criterion 2.2				
		Stocking Records				
Specification: Pollution Management						
Solid waste during cage assembly	OEMP 5.6.5	Housekeeping and provision of refuse bins			Record keeping of all chemicals used on site -	DEO
Solid waste i.e. dead fish at cage sites		Recycling of waste materials i.e. fish mortalities to fishmeal farms	Table 5 - 2 : 71, p.30			
Fuel and oil spillages		Disposal of non-recyclable material at a licensed waste disposal site				
Chemical impacts		Treatment with antibiotics under supervision of a qualified veterinarian	Table 5 - 2 : 10, p.25	Principle 5: 5.2.3, p.46 - Therapeutic Treatments		
Disease		Obtain health certificates when introducing new batches of finfish	Table 5 - 2 : 11, p.25			
Pollution and water quality impacts		Use DAFF approved anti-fouling chemical agents	Table 5 - 2 : 7, p.25			
		Clean nets on land and sun dry - net cleaning site should have effluent treatment	Table 5 - 2 : 4, p.25	Principle 4: 4.7, p.42 - Non-therapeutic chemical inputs, 4.7.2		
		Daily removal of fish mortalities as well as record keeping	Table 5 - 2 : 70,72, 84 p.30, 31	Principle 5: 5.1, p.44 - Survival and health of farmed fish, 5.1.4		
		Do not release any blood or offal into the bay	Table 5 - 2 : 73 p.30			
		Do not discard fouling organisms removed from netting taken onshore for maintenance back into the marine environment	Table 5 - 2 : 69, p.30			
		Correct refuelling procedures				
		Use only recognised chemicals for specific purposes, prescribed withdrawal period adhered to prior to harvest as per the MSDS and	Table 5 - 2 : 97, p.32	Principle 5: 5.2, p.46 - Therapeutic treatments		

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
		applicable food safety standards and regulations.				
		Correct disposal procedures for chemical containers	Table 4 - 2 : 19, 24, p.18, Table 5-2:99, p.32			
		Chemical inventory register - OEMP 5.6.5.5	Table 5-2:76, 98, p.30, 32			
		Copper treated nets		Principle 4: 4.7, p.42 - Non-therapeutic chemical inputs, 4.7.1, 4.7.3 - 4.7.5		
Specification: Escapee Management						
Fish escapees	OEMP 5.6.6	Cage nets to be regularly inspected and repairs shall be done immediately	Table 5-2: 65, p.29, 5-2: 68, p.29	Principle 3: 3.3, p.32 - Escapes, specifically 3.4.4	DEO - daily	DEO
		Use “catch-nets” during grading and harvesting	Table 5-2: 64, p.29			
		A rapid deployment emergency net panel shall be on hand to cover large tears if these are observed/occur	Table 5-2: 63, 64, p.29			
		Develop and implement recovery procedures	Table 5-2: 66, p.29			
Specification: Disease Management						
Introduction of disease / disease outbreak	OEMP 5.6.7	Implement a disease management programme		Principle 3, p.28 - Protect the Health and Genetic Integrity of Wild Populations, Principle 5: 5.1, p.44 - Survival and health of farmed fish, 5.1.1 - 5.1.7	DEO, aquaculture pathologist - every three months, Incident Management Report - any disease outbreak, Health assessment - annually	DEO and aquaculture pathologist
		Stocking of SPF disease free fish fingerlings only - veterinary record	Table 5-2: 75, p.30			
		Develop vaccines				
		Cage placement	Table 5-2: 79, p.30			
		Maintain good husbandry conditions	Table 5-2: 80,85 p.30, 31			
		Fallowing of cage site - minimum annually	Table 5-2: 48, p.28	Principle 3: 3.1, p.28 - Introduced or amplified parasites and pathogens		
		Limit and record stocking densities		Principle 5: 5.1, p.44 - Survival and health of farmed fish, 5.1.1 - 5.1.7		
		Regular disease and health monitoring	Table 5-2: 77, p.30			
		Sample and analyse fish population				
Chemical pollution		Malachite Green as a fungicide or bactericide is prohibited	Table 5-2: 93, p.31			

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
Introduction of disease / disease outbreak		Treat adjacent finfish cages simultaneously even if infections have not yet been detected	Table 5-2: 81, p.30			
		Quarantine new juvenile/broodstock when introduced to id and treat potential disease	Table 5-2: 82, p.30			
Chemical pollution		Use bait size pesticides to avoid poisoning of non-targeted species	Table 5-2: 96, p.31			
Introduction of disease / disease outbreak		Implement steps for **suspected** disease outbreak		Principle 5: 5.4, p.50 - Biosecurity Management		
		Implement steps for **confirmed** disease outbreak, humanely euthanize production animals to prevent suffering	Table 5-2: 83,87 p.30, 31			
		Record keeping	Table 5-2: 78, p.30	Principle 5: 5.1, p.44 - Survival and health of farmed fish, 5.1.1 - 5.1.7, 5.2, p.46 - Therapeutic treatments, 5.3, p.49 - Resistance of parasites, viruses and bacteria to medicinal treatments		
Chemical pollution		No routine use of antibiotics, restrict chemical use in disease management	Table 5-2: 89-90,95 p.31			
Introduction of disease / disease outbreak		Qualified veterinarian to conduct health assessment	Table 5-2: 86, p.31	Principle 5: 5.1, p.44 - Survival and health of farmed fish, 5.1.2		
Specification: Benthic Environment						
Ecological changes	OEMP 5.6.8	Rotation/movement of the cages within the project area	Table 5-2: 47, p.28	Principle 2: 2.1, p.19 - Benthic biodiversity and benthic effects, 2.3, p.23 - Nutrient release from Production	DEO, Benthic specialist	DEO, appointed specialist, Auditor
		Implement Feed Management Specification 5.6.11				
Specification: Marine Animal Management						
Net entanglement	OEMP 5.6.9	Maintain bird exclusion netting	Table 5-2: 74, 103,112, p.30, 32		DEO, Farm Personnel - daily	DEO
		Restrict cage mesh size to 25mm	Table 5-2: 74, p.30			
		Netting and lines to be kept taut at all times	Table 4 - 2 : 11, p.18, Table 5-2:16, p.26			
		Adequate separation between rafts and longlines and primary and secondary fishnets	Table 4 - 2 : 11, p.18			
		Trace and retrieve loose nets and ropes	Table 4 - 2 : 11, p.18			
Changes in marine animal behaviour		Mortalities removed daily				

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
Net entanglement		Monitor netting and ropes	Table 5-1: 5, p.23			
Changes in marine animal behaviour		Monitor and log marine mammal species and behaviour - implement monitoring steps 2.5.1 - 2.5.7 of the ASC standards	Table 5-2: 117, p.33	Principle 2: 2.4, p.24 - Interaction with critical or sensitive habitats and species, 2.5, p.25 - Interaction with wildlife, including predators		
Net entanglement		Contact NSRI should large marine mammals become entangled	Table 5-2: 116, p.33			
Specification: Marine Traffic Management						
Visual	OEMP 5.6.10	Fit sea cages with required safety features	Table 5-2: 21, p.26, Table 3-1:7, p.10		Designated person for infrastructure inspection reports - weekly.	DEO
Recreational		Implement Port Authority safety requirements	Table 4 - 2 : 4, p.17, 4-2:12, p.18, Table 5-1: 2, p.23			
Limited on marine traffic - Port Authority controlled		Downward pointing shaded lights				
		Monitor that markers are functioning fully	Table 5-1: 2, p.23			
Waste accumulation	OEMP 5.6.2	Waste may not be discarded overboard, all waste to be taken back to land and disposed of correctly	Table 4 - 2 : 13-14, p.18, 5-2:29, p.27			
		Retrieve litter entering the sea immediately	Table 4 - 2 : 15, p.18, 5-2:30, p.27			
Visual / safety	OEMP 5.6.10	Should flashing lights be required it should flash simultaneously	Table 5 - 1 : 4, p.23			
		Retrieve lost buoys or ropes etc. immediately, All equipment to be branded for retrieval purposes	Table 4 - 2 : 5, p.17,			
		Necessary safety equipment on platforms	Table 5-2: 22, p.26			
		Accurately marked on navigational charts	Table 5-1: 1, p.23			
		Adhere to Port Authority and SAMSA requirements	Table 5-2: 37, p.26			
	EMPr 5.2.2	Register and respond to complaints				
Specification: Feed Management						
Feed wastage	OEMP 5.6.11	Protect feed from vermin and damp	Table 5-2: 53, p.28	Principle 4: Use resources in an environmentally efficient responsible manner	Feeding Programme - daily, investigate poor FCR's	DEO
Water Quality,		High quality feeds	Table 5-2: 51, p.28	Principle 4:4.1, p.34 -		

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
Benthic environment impacts		Purchase registered feeds	Table 5-2: 49, p.28	Traceability of raw materials in feed, 4.2, p.35 - Use of wild fish for feed, 4.3, p.36 - Source of marine raw materials, 4.4, p.39 - Source of non-marine raw materials in feed		
		Use correct grain or pellet size	Table 5-2: 50, p.28			
		Reduce levels of nutritional therapeutants and trace contaminants. Use lowest effective doses, use efficient delivery mechanisms that minimise concentrations	Table 5-2: 51, 91,92 p.28, 31	Principle 5: 5.2, p.46 - Therapeutic treatments		
		Feed application through hand cast techniques	Table 5-2: 54, p.28			
		Record feed types and feeding rates	Table 5-2: 55, p.29			
		Monitor and manage feeding regimes	Table 5-2: 56, p.29			
		Comply with health standards for seafood as per SABS and DAFF requirements	Table 5-2: 23, p.26			
Greenhouse gas emissions	OEMP 5.6.3	Presence of an energy use assessment verifying the energy consumption on the farm and representing the whole life cycle at sea		Principle 4:4.6, p.41 - Energy consumption and greenhouse gas emissions on farms	As per ASC requirement	DEO
Specification: Farm Management						
Smolt	EMPr 1.1.3-1.1.4, OEMP 5.6.7	Documentation/certification from suppliers demonstrating compliance Import permits for ova to the fingerlings supply farms shall be on file.		Section 8: p.64-72	As required	DEO, Project Manager
Mussels	EMPr 1.1.4 OEMP 5.6.3	Seed ropes with specimens present in the area	Table 5-2: 39, p.27	Principle 3: 3.2, p.31 - Introduction of non-native species - EMPr 1.1.3, p. 4, Principle 3: 3.3, p.32 - Introduction of transgenic species		
		No disposal of mussels in the bay during red tide	Table 5-2: 40, p.28			
		Avoid high density culture	Table 5-2: 41, p.28			
Finfish	EMPr 1.1.2	Finfish cages do not occupy more than 30% of the total area	Table 5-2: 46, p.28			
Genetics	OEMP 5.6.6	Use all females or triploids salmonids	Table 5-2: 57, p.29			
		Implement sustainable management and planning measures	Table 5-2: 58, p.29			
		Adhere to DAFF genetic management guidelines	Table 5-2: 59, p.29			
		Implement the "Genetic Best Practice Management Guidelines for Marine Finfish Hatcheries"	Table 5-2: 62, p.29			
		Use appropriate spawning regimes	Table 5-2: 60, p.29			

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
Sea Weed / Gracilaria	EMPr 1.1, OEMP 5.6.3	Use locally sourced sea weed	Table 5-2: 100, p.32			
		Avoid the use of fertilizers and chemicals	Table 5-2: 101, p.32			
		Use as co-culture species for use in integrated multi trophic aquaculture	Table 5-2: 102, p.32			
Specification: Incident Management						
Poor water quality	OEMP 5.6.12 , 5.6.3	Report significant incidents to the DEO	Table 4-1: 2 - 5, p.16, Table 4-2: 34, p.20, Table 5-1:9, p.24		Complete an incident report within one week of receiving submission	DEO, Project Manager - review and report significant incidents to authorities
Disease outbreak		Contain and isolate effects - initiate emergency response if it cannot be contained	Table 4-1: 5, p.16, Table 4-2: 31, 35, p.19, 5-2:105, 106, p. 32			
Mass Mortalities		Complete an incident investigation form and complaints register and submit to the Project Manager	Table 4-1: 2 - 4, p.16, 5-2:109, 118, p. 32, 33			
Fish Escapees		Project Manager to report significant incidences to DAFF	Table 5-1:10, p.24, 5-2:109, 119 p. 32, 33			
Storm damage		DAFF to provide technical input where required	Table 4-2: 36, p.20			
Marine traffic/marine animal injury incidents		Resume with activity once the problem has been rectified	Table 4-2: 32, p.19, 5-2:107, 108, p. 32			
		Rectify Noise and odour complaints	Table 5-2:111, p.33			
		All public complaints received by operators forwarded to the DEO, provide response where required	Table 4-2: 29 - 30, p.19, Table 5-1:6, p.23			
Specification: Enforcement						
Non-compliances	OEMP 5.6.13	Failure to comply with the specifications of the EMPr			DEO- monthly	Contractor, DEO, Project manager
		Damage to the environment				
		Issue penalties per incident				
		Liable to prosecution in terms of the law				
		Penalties issued in addition to remedial costs				
		All monies collected shall be accounted for				
Stakeholder Communication						
Information Sharing	OEMP 5.2.2	Invite general public to register - part of the BA application process	Table 3-1: 15, p.11	Principle 7: 7.1 - 7.3, p.61 - 63 i.e. community engagement		
		Updates available to the committee i.e. environmental reports	Table 4-1:1, p.16, 3-1:		Bi-annual	DEO, Project

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
			16, p.11			Manager
		Notify stakeholders before installing new cages	Table 5-1:7, p.23		As required	
		Make available through the relevant forum results from environmental monitoring and reporting	Table 5-1:8, p.23			
		Comply with management programmes required by DAFF	Table 5-2:104, p.32			
Employment						
Job creation	OEMP 5.2.1	Utilise local labour	Table 4-2:25, p.19, 5-2:35, p.27	Principle 6: 6.1 - 6.12, p.52 - 60 - Develop and operate farms in a socially responsible manner	Throughout project lifecycle	Contractor, Project Manager
		Goods and services from local service providers	Table 4-2:26-27, p.19, 5-2:33, p.27			
		Implement a local recruitment policy	Table 5-2:36, p.27			
		Collect data on staff numbers, composition and origin	Table 5-2:37, p.27			
Environmental Awareness Training						
Awareness	EMPr section 2.2.5 , Annexure 3 of the EMPr	Environmental awareness training to all site staff	Table 4-2:28, p.19, 5-2:38, p.27	Principle 6: 6.11, p.59 - Education and training	Throughout project lifecycle	DEO
		Sign attendance register				
Decommissioning Phase						
Waste generation	EMPr, section 6, OEMP 5.6.2	Submit a method statement and decommissioning risk report (report to address items listed in the EMPr	Table 6-1:1, p.36		Submit a risk report to DEA&DP and DAFF	Project Manager, Operator
		Determine commercial usage of decommissioned infrastructure	Table 6-1:2, 10-11, p.36		Ongoing	
		No burning or burying of waste	Table 6-1:12, p.36			
		I.D. and assess any potential environmental and social risks associated with the preferred method statement and risk report	Table 6-1:3, p.36			
		Notify the AMC before decommissioning commences	Table 6-1:4, p.36			
		Removal of any chemicals or wastes stored on site through appropriate waste disposal channels	Table 6-1:5, p.36			
		All plant and equipment will be adequately cleaned, dismantled and removed.	Table 6-1:5, p.36			
		The Site's temporary fence/safety barrier will be removed				
		If a chemical toilet was necessary on site then it will be removed and wastes dispose of through municipal waste system				
		No waste may be dispose of in to the surrounding sea area	Table 6-1:6-7, p.36			

IMPACTS	EMPr REF	ACTIONS /PROCEDURES	ADZ requirement	ASC requirement	FREQUENCY	RESPONSIBILITY
		Remove litter and or waste entering the sea as soon as possible	Table 6-1:8, p.36			
		Environmental awareness training to all site staff	Table 6-1:9, p.36			
		The site will be handed over to the Harbour Master for inspection and approval				

EMPr ANNEXURE 6: EIA Regulations Appendix 4 checklist (Contents of EMPr)

Content of an Environmental Management Programme (EMPr)	Section Reference
1. An EMPr must comply with section 24N of the Act and include:	
(a) details of: (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	• 1.3. • EMPr Annexure 2.
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	• 1.1. Project Information • 1.2. Affected Environment
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	• EMPr Figure 1. • EMPr Figure 2.
(d) a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including:	
(i) planning and design;	• Chapter 3
(ii) pre-construction activities;	• Chapter 4
(iii) construction activities;	• Chapter 4
(iv) rehabilitation of the environment after construction and where applicable post closure; and	• N/A
(v) where relevant, operation activities;	• Chapter 5
(e) a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d);	• Sub-section 3 'Objectives' under each Management Specification in Section 5.6.
(f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to:	
(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	• Sub-section 5 'Procedures' under each Management Specification in Section 5.6.
(ii) comply with any prescribed environmental management standards or practices;	• Sub-section 1 'Legislated Requirements' under each Management Specification in Section 5.6.
(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	• Closure not applicable, but decommissioning requirements addressed in Chapter 6
(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	• N/A, although financing of environmental control is addressed in section 5.3
(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	• 2.5. • 5.5. • Sub-section 6 'Monitoring and Reporting' under each Management Specification in Section 5.6. • OEMP Annexure 1, EMPr Annexure 4
(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	• 2.5. • 5.5. • Sub-section 6 'Monitoring and Reporting' under each

	Management Specification in Section 5.6. • OEMP Annexure 1.
(i) an indication of the persons who will be responsible for the implementation of the impact management actions;	• 2.2. • 2.5. • 5.5. • Sub-section 7 'Responsibilities' under each management Specification in Section 5.6. • OEMP Annexure 1.
(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	• Sub-section 5 'Procedures' under each Management Specification in Section 5.6.
(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	• 2.2. • 2.5. • 5.5. • Sub-section 6 'Monitoring and Reporting' under each Management Specification in Section 5.6. • OEMP Annexure 1.
(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	• EMPr Figure 8. • 2.2. • 2.5. • 5.5. • Sub-section 6 'Monitoring and Reporting' under each Management Specification in Section 5.6. • OEMP Annexure 1.
(m) an environmental awareness plan describing the manner in which:	
(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	• 2.2.3. • EMPr Annexure 3.
(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	• EMPr Annexure 3.
(n) any specific information that may be required by the competent authority.	• N/A