Pearl Tangon Cultured Pearl Farm

Environmental Monitoring Report

10 December 2020

Myanmar Atlantic Company Limited

GEOCONSULT Environmental Consultant

Assoc: Bridge Myanmar Limited.

GEOCONSULT

Clean Water, Green Nature, Conserve Our World.

CONTENTS

LIST OF THE TABLES, FIGURES, AND APPENDIX

(A) LIST OF THE TABLES,

(B) LIST OF THE FIGURES,

(C) LIST OF THE APPENDIX

ABBREVIATIONS

AR	Annual record
CR	Chemical recorded
CSR	Corporate Social Responsibility
D Sitrep	Daily situational report
DOF	Department of Fishery
DR	Daily recorded
E Sitrep	Environmental Situational Report
ECD	Environmental Conservation Department
EHS	Environmental, Health and Safety Program
EMP	Environmental Management Plan
FR	Fuel recorded
GEOCONSULT	GEOCONSULT / Assoc Bridge Myanmar Limited
LR	Labotory record
M Sitrep	Marine situational report
M Worep	Monthly working report
MAC	Myanmar Atlantic Company Limited
MONREC	Ministry of Natural Resources and Environmental Conservation
MSR	Marine Situational Record
NR	Navigation recorded
PTF	" Pearl Tangon Cultured Pearl Farm"
SR	Structure recorded
T&R of PTF	Training and research Branch of Pearl Tangon Cultured Pearl Farm
WR	Waste recorded

INTRODUCTION

The *GEOCONSULT, Assoc: Bridge Myanmar Ltd (GEOCONSULT)* has carried out Environmental Management Services for Myanmar Atlantic Co., Ltd (MAC) since July 2017 for the proposed Pearl Tangon Cultured Pearl Farm (PTF).

MAC and GEOCONSULT (Independent Consultant) conducted compliance audit and monitoring program for MAC's "Pearl Tangon Cultured Pearl Farm" (PTF) in accordance with the Environmental Management Plan (EMP).

The objective of the audit and monitoring was to evaluate the effectiveness of the implementation of the environmental management program. Reporting of observed problems, obstacles and recommendations for issued identified during the review were provided in order to improve the effectiveness of the existing environmental mitigation measure and monitoring program.

The compliance audit and monitoring program were implemented in compliance with the EMP Procedures. Results of audit and monitoring were incorporated in the monitoring report and submitted to Environmental Conservation Department (ECD) as a biannual basis (six months interval).

EXECUTIVE SUMMARY

Summary of Project Description

The PTF of MAC's is the cultured pearl production area which are located at "Thayawthadangyi Island, Myeik Archipelago, Done Palel Village Tract, Kyunsu Township, Tanintharyi Region. The project has been operated since 1998. During the operation phase, various monitoring were conducted based on recommendations from EMP for PTF.

Summary of Monitoring

Monitoring Period

The environmental monitoring period is from 2020 January to June.

Monitoring Result

The environmental quality monitoring included air quality monitoring (PM 2.5 & PM 10), gas condition measurement (CO, CO_2, NO_2, and SO_2) and noise level measurement biannually. The monitoring also included Environmental, Health and Safety Program (EHS).

Based on the findings monitoring in the description of the **human environment**:

- Related the Region Government's remarked compliance was recorded for tourism commercial vessel entering to the pearl cultured farm area and visitors who visiting sea beach are allowed to pearl cultured farm camp area. There were be solved by instruction of MONREC.

Accordance to the **Physical Environment** monitoring record of PTF:

- There could be a no dust generated at project area due to seashore activities. Vessel schedule increase during offshore operation phase was only in a short time and expected to produce no change in air quality levels in the project area.
- Potential air quality impact was minimum and receptor's sensitivity was low. The residual significance for noise was considered as minor as mitigation measures were implemented during the operation phase was low. The residual significance was considered as none as the result of mitigation measures which were implemented during the operational phase.
- The noise level measured range is lower than the permissible level for the commercial and residential area. The residual significance for noise was considered negligible as mitigation measures were implemented during the operation phase.
- Sea Water column within the project area is characterized with all heavy and trace metals were recorded at low concentrations. Nutrients and chlorophyll levels were high and comparable to nearby survey results. The water column is likely to have a middle turbidity, a high dissolved oxygen concentration and a moderate salinity.
- The ground water quality analyzed from the tube well and Stream located in the project area can provide as good for drinking as some indication of the water quality.

Subject to the monitoring record of **Biological Environment:**

- The health of water condition of E-bay, PTF area are favourable to growth of Phytoplankton and to success of pearl oysters culture.
- PTF has higher species diversity.
- It is possible to conclude that a significant abundance and diversity of the benthic community is likely expected in the area.

This means PTF, that all of the commitments listed in the EMP, were adopted.

Summary of Auditing

MAC is responsible to implement monitoring program and mitigation measures during the operational phase. Following mitigation measures were implemented during the operational phase. Appendix (II) shown for the Environmental Audit Checklist Form.

- Environmental Monitoring Plan
- Biodiversity Management Plan
- Chemical Management Plan
- Waste Management Plan
- Emergency Response Plan
- Communications Plan
- Training and Awareness Plan
- Grievance Mechanism Plan
- Corporate Social Responsibility Plan (CSR)
- Marine Invasive Species Management Plan
- Effluent Management Plan
- Biofouling Management Plan
- Management and Monitoring Program for Coral Reefs, Seagrass Beds, and Seaweeds Species.

MAC and GEOCONSULT is pleased to submit the monitoring report of MAC's Pearl Tangon Cultured Pearl Farm (PTF) (Operational phase) to ECD according to EIA procedures.

1. PROJECT DECRIPTION

MAC which invested US $ 22.9 million on the proposed project is 57% foreign investment, aiming to carrying out to produce culture pearl at the above-mentioned address.

In accordance with the paragraph 7 of the terms and conditions of the MIC permit, dated 29th January 1998, the Myanmar Atlantic Company Limited (MAC) has to submit the Environmental Management Plan (EMP) to the Environmental Conservation Department (ECD), the Ministry of Natural Resources and Environmental Conservation (MONREC). MAC summited the EMP to ECD in August, 2018 and that was approved in 19 April 2019 accordance with the permission letter No. EIA-2/9(872/2019) by ECD.

The MAC has been allowed sea and the land area to operate culture pearl production joint venture with the State owned Myanmar Pearl Enterprise (MPE) and it located at Thayawthadangyi Kyun, Done Palel Village Tract, Myeik Archipelago, Kyunsu Township, Myeik District, Tanintharyi Region, Republic of the Union of Myanmar. This land is belonging to the Forest Department of MONREC, Myanmar.

On February 10th 1998, hold a commission meeting with MIC and MAC in order to issue the permit to run culture pearl production joint venture with MPE. As the meeting's result, the permit was issued to the MAC.

1.1 Description of the Project

1.1.1 Background

Atlantic Co., Ltd, domiciled in Australia, incorporated Myanmar Atlantic Co., Ltd (MAC) the Foreign Joint Venture Company, under the Myanmar Companies Act in August 1998. All the rights and obligations under the joint venture agreement were subsequently transferred to MAC. The MIC approved as registration number (302/1998) the incorporation of MAC and the subsequent investment activity.

MAC obligation under the joint venture agreement MPE is to share with MPE 20% of the pearl harvest from the contract Area. The MPE granted MAC, rights to conduct wild shell fishing, hatchery based oyster breeding, rearing of oysters and culturing of pearls in an area that is located in the Myeik archipelago area of the Taninthayi Region.

1.1.2 Type of the Project

The strategic alliance with MPE provides physical security and a compliance and regulatory framework. MPE participation provides MAC with long term security and protection and experienced trained personnel in pearl farming. The Development Stage has been completed and consisted of an experimental artificial oyster breeding program to MAC, proposed its project implementation plan as follows;

- Period of proposed capital to be brought in from the date of issue of MIC permit;
- Proposed initial duration of investment: 15 years (extendable 5 years respectively Ministerial orders);
- Total leased period: 50 years;
- Commencement date of construction: After the date of receiving MIC permit;

- Construction period: 24 months (land and sea site preparation period 6 months included).

1.1.3 Operating Area

The record of the MACs' operation respectively culture pearling are following:

Table (1) Operating Area **(Acres)**

No.	Location	Land Area	Sea Area	Total
1	Pearl Tangon Farm Area. (N Lat 12°16' 24.36"/E Long 98°00'30.61") + E bay II Site Area **(**N Lat 12°17' 42.51"/E Long 97°59'32.71")	217.63	2662.36	2879.99
2	Grants Camp Area. **(**N Lat 12°23' 37.82"/E Long 98°06'41.82")	77.64	681.16	758.80
3	The'lettan Camp Area. **(**N Lat 12°17' 36.40"/E Long 97°57'82.60")	8.51	195.03	203.54
5	Warden Camp Area **(**N Lat 12°07' 41.88"/E Long 98°00'08.35")	82.59	647.72	730.31
6	Germany Aww Site Area **(**N Lat 12°15' 45.76"/E Long 98°02'59.58")	39.89	362.75	401.84
	Total	425.46	4549.62	4974

Thayawthadangyi Island, where is located project area are one of the sensitive areas located in the proximity of the project area as a sharp protected area encompassing marine areas designated in 1970.

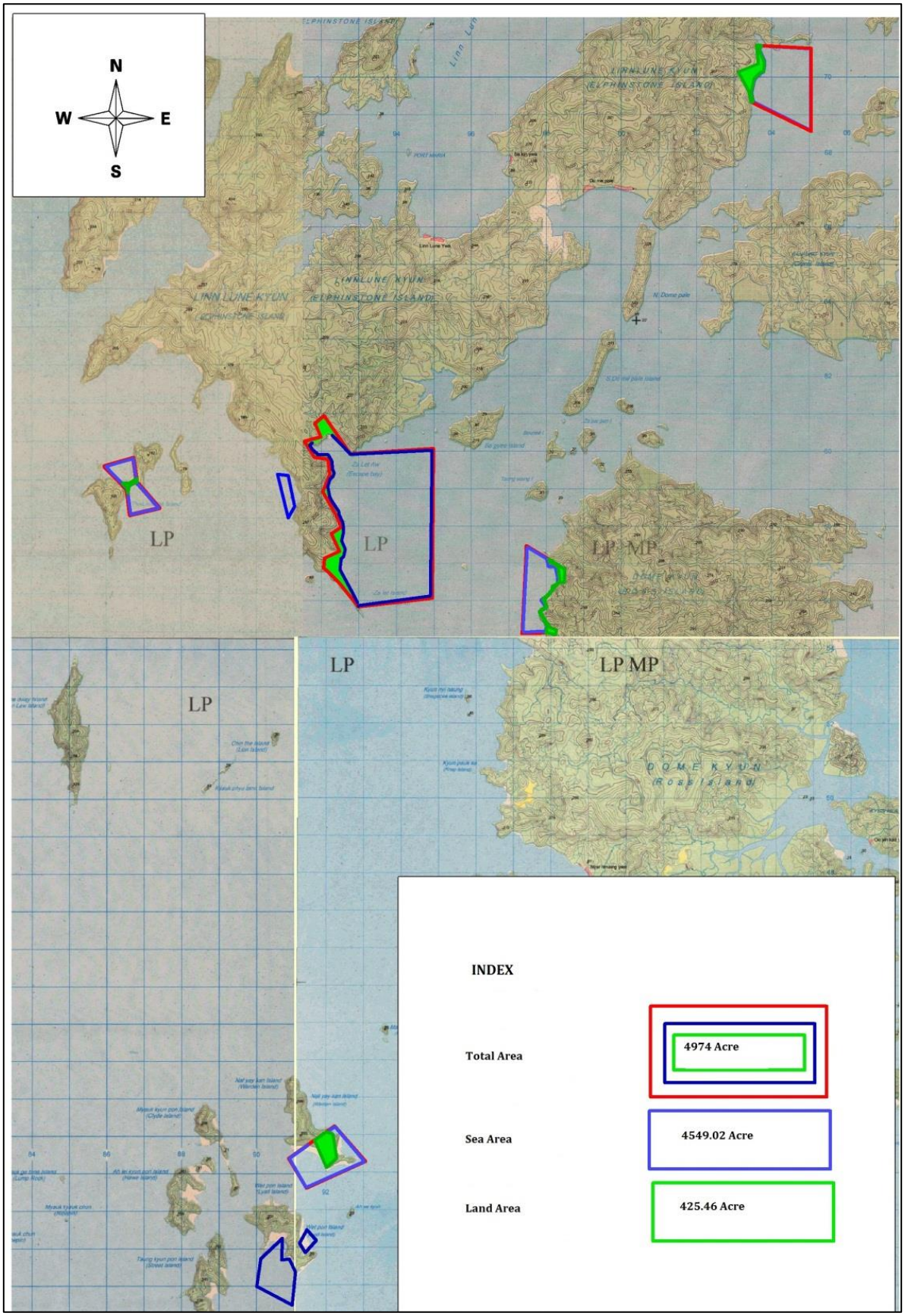

Figure (1) Operating Area

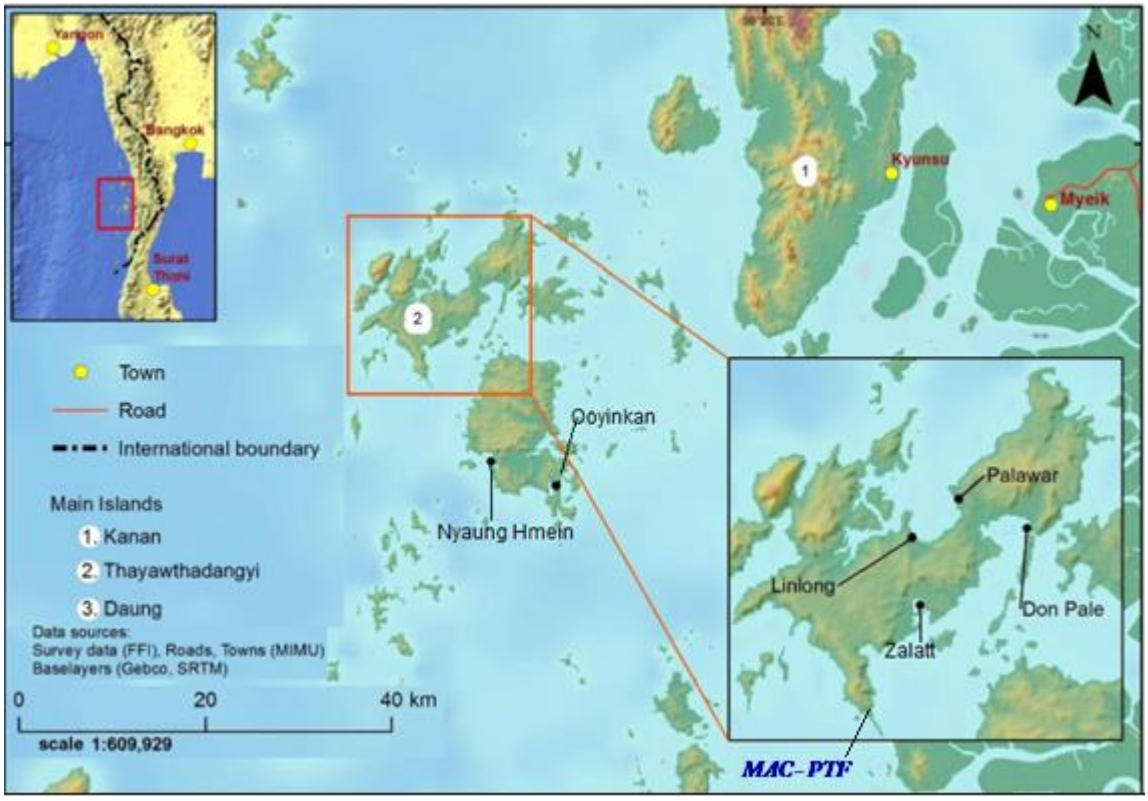

Figure (2) Neighboring Villages.

Figure (3) Study Location and Area

1.2 Operation Phase Activities

1.2.1 Project Process

During the operation phase, 208 local people will have opportunity for the employment. Production is based on a mix of the collection by diving for pearl oysters from the wild and oysters produced in land based hatcheries. Oysters are seeded with a nucleus to start the pearl culture process and then placed in net panels attached to a long line system on sea based grow -out farms to product the pearls to commercial sizes.

The total numbers of pearl oysters from both wild and hatchery sources that can be seeded is limited through an annual quota system applied within the industry. Industry participates in this process to protect and ensure the sustainability of the wild stocks of pearl oysters. Myanmar Pearl Enterprise is the primary regulatory agency for the pearling industry and maintains individual quotas on each licensed operator.

Structure Design

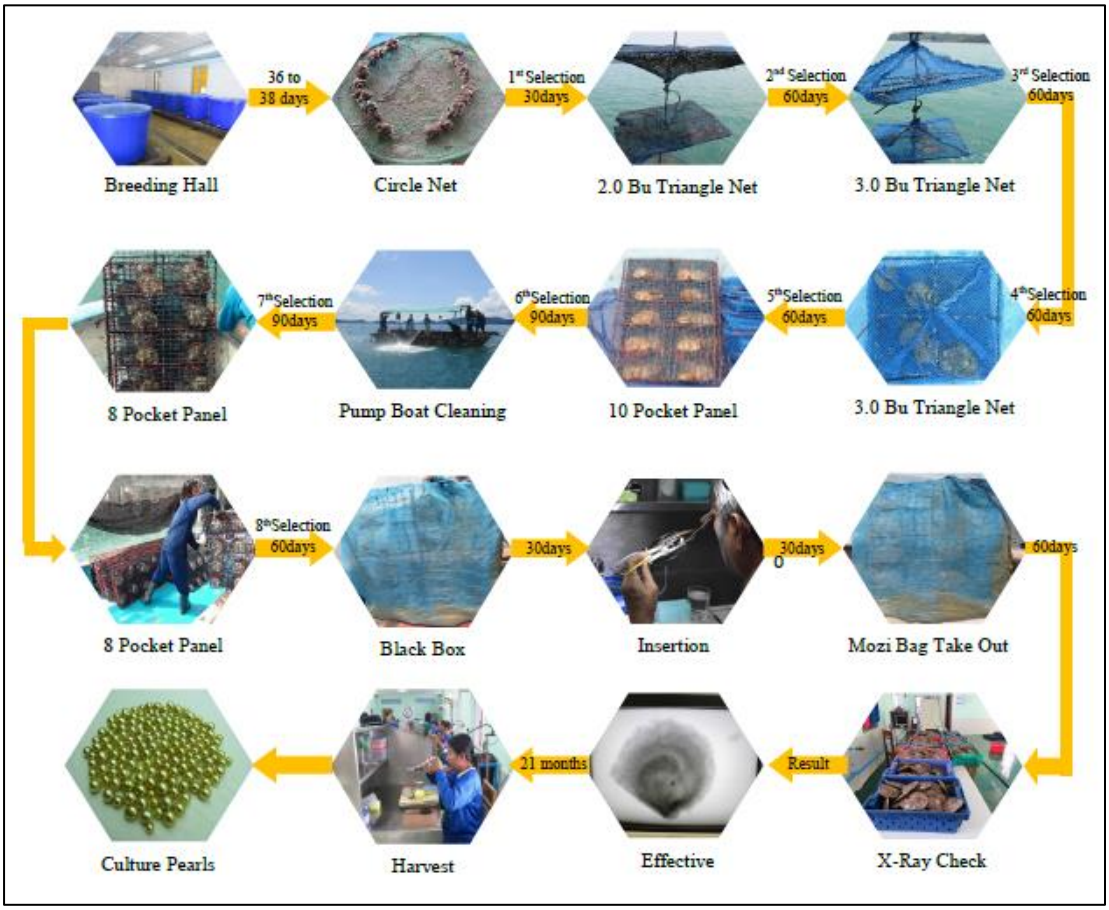

Figure (4) Operational Structure Design

1.2.2 Present Status of Project

At present, PTF and camps have been already constructed for 20 years. The operating stage is ongoing. The renovation and maintenance work is underway as the daily small matter. The important construction work is only shifting oyster rafts for emergency. According to the programme of MAC, the number of oysters which culture in PTF is culturing about 1,050,000 oysters.

1.3 Information on Environmental Management Services Team

This environmental study is to prepare Environmental Monitoring Report for PTF is conducted by GEOCONSULT. Detail is attached with **Appendix (I).**

1.4 Purpose of the Monitoring Report

This Monitoring Report has been prepared in order to comply with the EIA Procedure (2015) and to present the information on the compliance of MAC to the commitments outlines in the EMP Reports for the Project.

1.5 General Description

Table (2) General Description

Subjects	Description
Water Demand	The total estimated demand for water by the project during full operation is 5000 gallon per day (1,500,000 gallon per year).
Electricity Supply and Fuel Demand	The electricity supply during full operation will be from the own generators. There will be two (100 KVA). The total estimated demand for fuel for boats, machines and generators is Diesel 36,000 gallons, Petrol 9,600 gallons and Lubricants720 gallons per year.
Solid Waste Management	Solid waste generated at the site will primarily be domestic in nature (paper, plastics, packaging, waste food, etc.). This will be collected on a regular basis by the staffs. The staffs are willing to institute waste segregation and recycling procedures at the farm and the extent to which these can be effectively executed will be examined.
Sewage Treatment and Effluent Disposal	The sewage treatment system to service the demands of the project is built on land west of the project compound. The conventional sewage treatment system is installed. Being the conventional septic system design, the septic tank has a settling and decomposition chamber that allows the sewage solids to separate from the liquid, undergo partial decomposition, and be stored as sludge at the bottom of the tank. The effluent from the septic tank then flows by gravity into the subsurface absorption field where it infiltrates into the soil
Fire Management	The firefighting facilities such as fire hose reel, fire extinguishers, fire blanket are installed at various strategic places of the project. The fire drill is planned to organize regularly at the project. An emergency evacuation plan is developed and basic fire drill course is completed so as to quickly response in case of fire accident.

Table (3) Requirements for the Project Proponent as per the EIA Procedure

Incident	Description
Undertake continuous, proactive and comprehensive Self-monitoring of the Project and activities related thereto, all Adverse Impacts, and compliance with applicable laws, the Rules, this Procedure, Standards, the EMP.	MAC ensured that during the Project, the employees adopted the commitments set out in the EMP.
Notify and identify in writing to the Ministry any breaches of its obligations or other performance failures or violations of the Environmental Compliance Certificate (ECC) and the EMP as soon as reasonably possible and in any event, in respect of any breach which would have a serious impact or where the urgent attention of the Ministry is or may be required, within not later than twenty-four (24) hours, and in all other cases within seven (7) days of the Project Proponent becoming aware of such incident.	No breaches of the obligations of the EMP occurred during the Project. The official confirmation letter for EMP was received for this Project.
Submit monitoring reports to the Ministry not less frequently than **every six (6) months**, as provided in a schedule in the EMP, or periodically as prescribed by the Ministry.	As such, this report covers the entire Project.
Within ten (10) days of completing a monitoring report as contemplated in Article 108 and Article 109 in accordance with the EMP schedule, the Project Proponent shall make such report (except as may relate to National Security concerns) publicly available on the Project's website, at public meeting places (e.g. libraries, community halls) and at the Project offices. Any organization or person may request a digital copy of a monitoring report and the Project shall, within ten (10) days of receiving such request, submit a digital copy via email or as may otherwise be agreed upon with the requestor	MAC will disclose this Monitoring Report available on its website (http://www.myanmaratlantic.com), at public meeting places and at their Project offices. MAC will also send copies should any interested parties request one.

1.6 Structure of the Monitoring Report in Alignment with EIA Procedure

In addition, as per the EIA Procedure (2015), the Monitoring Report shall include:

1. Documentation of compliance with all conditions.
2. Progress made to date on implementation of the EMP against the submitted implementation schedule; as this Project is complete, the entire EMP has been implemented on schedule.
3. Difficulties encountered in implementing the EMP and recommendations for remedying those difficulties and steps proposed to prevent or avoid similar future difficulties;
4. Number and type of non-compliance with the EMP and proposed remedial measures and timelines for completion of remediation;
5. Accidents or incidents relating to the occupational and community health and safety, and the environment;
6. Monitoring data of environmental parameters and conditions as committed in the EMP or otherwise required.

2 IMPLEMENTING THE ENVIRONMENTAL MANAGEMENT PLAN

2.1 Objectives

The purpose of the Monitoring Plan is to ensure that environmental conditions are not significantly affected by the project, as determined by observations of the environment, as opposed to the implementation of controls of the impact factors per formed in the other plans.

2.2 Environmental Impact and Significance

The following table indicates the evaluation of environmental impact and its significance:

Table (4): Environmental Impact and Significance

Activities	Aspects of the risks	Impacts
General		
Water supply	Water resource depletion	Natural resource depletion
Sewage treatment and disposal	Effluent discharge to environment	Land/Water pollution
Solid waste disposal	Waste generation	Land/Water pollution
Use of Chemical products for cleaning, laundry,	Discharge to environment such as, liquid hatchery use	Water pollution
Use of electricity	Energy consumption	Resource depletion
Electricity generation	Spillage/Noise	Land/Water/Noise pollution
Ship/boats trip	Dust/Noise/ Spillage	Noise/Sea/Water pollution
Building maintenance	Raw materials depletion, Waste generation	Resource depletion
Kitchen	Waste generation	Resource depletion
Office works	Waste generation	Land pollution
Occupational Health &	**Safety**	
Ship/boat accident during transportation	Get injury/disease	Injury/Mortality
Occupational accidents	Cuts and amputations, Thermal burns/trips, slip and falls/ Crushing injury from material handling and falling objects/ Nuisance / Respiratory problems/ Headache and sickness	Injury/Mortality
Use of portable electrical equipment	Potential fatal electrical shocks or burns	Injury/Mortality
Generator running	Noise level higher than 80 dBA	Nuisance (noise)
Logistics		
Transportation	Accidental Spillage, CO2 emission	Groundwater contamination /Land pollution/Air pollution
Diesel storage	Diesel spill	Ground water pollution
Chemical storage (paints, detergents, pesticide, chlorine tablets or liquid chlorine)	Leak/spill/fire	Ground water/Air pollution

2.3 Physical Factors Collection and Analysis

The following is the methodology used for data collection and analysis in order to prepare this EMP report;

Table (5). Environmental Measured Locations

Environmental Quality	GPS Value	Measured Devices	Location
Particulate Matters and Gases	A-1: Lat: 12º 16' 26.57" N, Long : 98º 00' 27.53" E	Drager X-am 2500 (MQG-0011) , and FLANK (F7707) *(onsite)*	Within proposed site
Noise (source)	N-1: Lat: 12º 16' 26.10" N, Long : 98º 00' 29.96"E (Port. A.-Main Jetty) & N-2: Lat: 12º 16' 27.43" N, Long: 98º 00' 25.6" E (Port. B. -Residential Area)	Digital Sound Level Meter (UNI-T-UT353) *(onsite)*	Within proposed site
Sea Water (site)	W-3; Lat: 12º 16' 35.11" N, Long : 98º 00' 42.20" E	*Sent to laboratory*	Within Long Line site
Water (community)	W-2: Tube Well Lat: 12º 16' 32.01" N, Long : 98º 00' 22.93" E W-1: Stream Water Lat: 12º 17' 35.34" N, Long : 98º 00' 1415" E	*Sent to laboratory*	Outside of proposed site, at water tank

Figure (5) Environmental Measured Locations

Table (6): Frequency for Monitoring of the Environmental Quality

No.	Environmental Concerns	Parameters	Frequency
1	Water quality	As Mentioned as above table	Quarterly
2	Ambient air quality	PM10, PM2.5, CO,CO_2,SO_2, NO_2	Biannually
3	Occupational health and safety	PPEs and outfit for workers	Annually
4	Noise Level	Noise Level (Night/Day Time)	Biannually

2.4 Biological Monitoring

Arrange of factors that may affect the abundance and species diversity of macro fauna within Providence Bay were identified from the literature, such as depth, sediment size, and organic content of sediment, salinity, habitat type, temporal variation, temperature and nutrients.

Sediment samples may be collected by using hand held corers or by using an appropriate sample grab.

Table (7): Important Factors of Affected the Abundance and Species Diversity of Macro fauna

Factor	Approach
Depth	Controlled(18to20m)
Sediment size	Controlled(sand and coarse sand)/measured
Organic content	Measured
Salinity	Controlled/measured (equivalent areas)
Habitat type	Controlled(all soft sediment)
Temporal variation	Small scale (animal activity)– Controlled (samples collected at same time of day) Medium scale(season) –Controlled(sites sampled in all seasons) Large scale(annually)–Controlled(sites sampled over five years)
Temperature	Measured
Nutrients	Measured(both for sediment samples and water)

2.5 Difficulties Encountered and Remedies

As the operation conduct for over 20 years, the commitments in the EMP have been fully implemented. Given that the Project Developer and environmental consultant are both experienced in undertaking marine aquaculture and offshore studies, the majority of commitments in the EMP were implemented without difficulty. However, this Section includes a summary of the commitments where difficulties were encountered. Accordance to the restriction for areas in the COVID 19 period, there was difficulty for visiting to survey PTF for annual audit and some marine entities could not be sent to examine at the laboratory in time from distance location.

No other difficulties were encountered, and minor grievances have been received.

2.6 Compliance with EMP Guidelines

There are no significant impacts have been detected and no major complaint or opposition has been received at now.

2.7 Environmental Data Collection

GEOCONSULT carry out Environmental Management Services for MAC for the environment services to PTF. The environmental consulting team of GEOCONSULT visited to PTF for Biannual Environmental Data Collection from 10 February to 17 February, 2020.

3 SUMMARY ASSESSMENT OF EMP COMPLIANCE DURING REPORTING PERIOD

The outcome of the monthly environmental monitoring from January 2020 to June 2010 indicates that the project implementation is generally compliant with the EMP. While environmental, social and health and safety issues surfaced during this reporting period, none can be considered serious or significant and all are predicted and can be mitigated.

The salient points of EMP compliance are discussed in the following sections and this is followed by Table (8). This table presents the general assessment of compliance by the project during the reporting period with the conditions of the 2019 EMP.

Additionally, the details of the deficiencies in EMP compliance identified during the regular monitoring is presented in attached factors. This attachment is a tracking list of the noted deficiencies, the required actions and the commitments and/or actions taken by the PTF. This tracking list was adopted to document compliance and enhance EMP implementation.

3.1 Human environment

Based on the findings monitoring in the description of the human environment, the components of the receiving environment (RE) are presented in the following;

3.1.1 Grievance Redress

There is a complaint received during this period. The complaint was from Region Government who remarked on the company's permit extension recommendation. The Region Government wished to allow touring commercial vessel enter into the "Thel Hnitt Tan Island", substation of cultured pearl of PTF. Respect to the instruction of Minister of MONREC, the "Pearl Tourism Museum" was opened and vessel route was allowed in the area which not affected to the oyster culturing site. Consequently, the Myanmar Pearl Enterprise, District Office of Tourism Department, District Tourism Association and MAC discussed this matter and solved as the tourism vessel can access the island area which is not impact to oyster culturing site regarding with abiding the regulation of environmental conservation and the visitors were allowed who would to visit beach of island free of charge. Appendix (III)

3.1.2 Social Impacts

There are no social issues of all employees of PTF that came up during this reporting period.

3. 1.3 Occupational health and safety

There are no occupational health and safety issues of all employees of PTF that came up during this reporting period.

3.1.4 General

Marine traffic

The project is not located on any major international or regional shipping lanes, and marine traffic.

Port infrastructure

MAC use the port of Myeik and own two jetties at PTF and a jetty at Grants Camp as logistics base for the mobilization of vessels and equipment. There are no problem of port and jetty for local people.

Offshore fishery

The project is located in the offshore fishery zone, where 2,000 fishermen are registered to operate and from where foreign fishing activities have been recently banned. Despite being at a long distance from the coast (~70km), the shallow water depths (around 100m) indicates the possibility to encounter numerous fishing boats, a fact confirmed by the fishery monitoring conducted by Department of Fishery (DOF) for the Kyunsu area. The local people were no affected for their fishing area of nearby PTF.

3.2 Physical Environment

The finding result of laboratory of Training and Research Branch of Pearl Tangon Cultured Pearl Farm (T&R of PTF) related with Pearling Industry in the area is following;

Table (8): General assessment of Physical Environment with the project EMP (2019)

Issue	Monitoring Actions	Frequency	Remarks
Air	NO_2, SO_2,CO, PM10,PM25	-Biannually	2020 February measurement- annual record (AR) (Appendix-IV)
Water quality	-Collect water samples from within and outside and from control sites. -Investigate changes in water quality parameters compare with National Environmental Quality(Emission) Guidelines -Monitor impact of *in situ* cleaning of biofouling	-Daily for sea water temperature, pH, Salinity, Turbidity -Quarterly for sea water and fresh water quality standard DO, BOD, and COD.	-PTF Daily recorded (DR) (Appendix-V) -Labotory record (LR) (Appendix-VIII)
Noise	-Noise assessments -Noise assessments in response to community complaints or working outside of normal hours	- Biannually - During scheduled maintenance	2020 February measurement- annual record (AR) (Appendix-VI)
Weather	-Daily/Timely monitoring for- • Temperature • Tidal time & situation Ft. • Rainfall • Wind speed Water temperature	-Daily monitoring	-PTF Daily recorded (DR) & Marine situational report (M Sitrep) (Appendix-VII)

Fuel leaks	-Inspect vessels and onboard equipment to ensure no leaks	-Daily -During scheduled maintenance	-PTF Daily situational report (D Sitrep) -PTF Fuel recorded (FR)
Benthic environment	-Collect benthic sediment samples before, during and after lease installation. -Monitor changes in sedimentation, oxygen, and nutrient levels, as well as benthic community structure -Monitor impact of *in situ* cleaning of biofouling Video/photo documentation	To be confirmed	Surveyor of T & R of PTF (Appendix-VIII)
Marine fauna interactions	-Investigate movements of high priority species within direct operation area • Barnacle (*Balanus amphitrie*) • *Vibro Cholerae* Bateria • *V.Parahaem Olyticus* Bateria (Zooplankton) • *Redtide* • Fishes of Phytoplankthon guzzler ▪ Ngargyima ▪ Ngarmyeatsankyewl ▪ Ngarthaman • Record all observations of marine fauna interactions with infrastructure and vessels • Threatened & protected species • Boat strikes • Behavioural changes	Daily	-PTF Daily situational report (D Sitrep) -Quarterly report (Appendix-IX)
Structural integrity and stability of sea site infrastructure	-Inspections and maintenance of raft & longline infrastructure e.g. faults, damage, excessive biofouling and/or loose lines, buoys or nets -Monitor the effectiveness and suitability of the sea infrastructure design	- Regular scheduled inspections & maintenance - After severe weather - During net cleaning	-PTF Structure recorded (SR) -Schedule report of PTF
Navigation	-Inspections of navigation marks for faults or damage -Record any navigation issues in daily work log -Regularly review observations, complaints and vessel incident reports	-Regular scheduled inspections & maintenance for marks -Regular review of navigation issues	-PTF Navigation recorded (NR)

Escapement	-Record stock numbers in each longlines -Regularly review numbers to ensure significant numbers of stock are not escaping which also enables prompt recapture attempts if an escapement event does occur.	-Weekly -After severe weather -After net/panel changes -After significant predatory interactions	-PTF Structure recorded (SR) -Monthly working report
Disease, parasites and pests	-Regular inspections of stock for disease and parasites including both hatchery and sea cage stock to ensure early detection -Regular inspection of sea cage infrastructure for pests to ensure early detection -Regular inspections to ensure early detection of the unlikely occurrence of 'declared diseases' -Record diseases, parasites and pests - contribute to the species inventory for sea waters -Record the occurrence of pathogens, the treatment details and their effectiveness -Monitor biofouling i.e. amount, composition and details of its removal -Regularly review the occurrences of pathogens and the effectiveness of treatments given to assess if management measures are appropriate and adequate or need to be improved	-Daily visual inspections of stock -Fortnightly physical stock examination -Weekly inspections -Monthly removal of biofouling (To be confirmed)	-PTF Daily situational report (D Sitrep) -Monthly working report -Emergency report.
Chemical use	-Record chemical use in the Chemical Usage Register -Monitor frequency and doses used to ensure they are within acceptable and safe levels	-When using.	-PTF Chemical recorded (CR) -Monthly working report (MWR)
Waste production and disposal	-Regular inspection of waste storage containers -Record details about waste production and disposal • Bio waste e.g. numbers of dead oyster • General waste • Worn infrastructure • Review waste production and disposal procedures	-Daily inspection and empty of waste storage containers -Daily removal and disposal of deceased or moribund animals	-PTF Waste recorded (WR) -Monthly working report (M Worep)
Occupational health and safety	-PPEs and outfit for workers -Health care -Safety awareness	-Annually -Daily -Daily	-PTF Daily situational report (D Sitrep)

3.2.1 Effluent Minimisation

There are management practices and operational methodologies that can be used to minimise effluent voided on lanes, tracks and hardstands and around gateways. The effluent management system was found as:

- During effluent is discharged from the operation sheds directly to the drainages.
- When effluent cannot flow for directly from the operation sheds, effluent from the sheds is pumped to the storage ponds.
- Each operation unit has its own effluent storage pond;
- Effluent is stored in the ponds and allow for irrigation to occur.

The effluent measurement of PTF in monitoring period are following:

Table (9): Operational Waste Effluent Measurement of Pearl Tangon Pearling Farm

No.	Procedure	Waste factor	Measurement	Discharge System	Remark
1.	Hatchery	Breeding water	500 gal	Into sea	Twice a month. With the uncolleted spawn of oyster. No affect to sea.
2.	Seeding	Temporary store water	3000 gal/day	Into sea	When seeding period. Cleaning sea water. No affect to sea.
3.	Oyster cleaning	Waste of the vernical, sea weed, spongee	1 cuft (Cold season) & 2.5 cuft (Hot season) per 6 pocket panel	Into temporary waste deposit	Once a month. When the waste dried, used raw for animal feed
4.	Net preparing cleaning	Waste of the vernical, spongee	0.5 to 1.0 cuft for size of netper panel	Into temporary waste deposit	Once a month. When the waste dried, used raw for animal feed
5.	operation	Shell	According to the inspection,	the dead oysters shell be collected and transfer to MPE	Daily inspection

Table (10): Effluent Volume of Waste Liquid

No.	Effluent Source	Effluent Volume	Effluent Liquid Waste Volume
1.	Panel Workshop - Pressure Pump unit - Panel Repairing unit	(2,000 panel/ day) 5,500gallon/day 300 gallon/day	(2,000 panel/ day) 300cuft (wet)110cuft (dry) 100cuft (wet)30cuft (dry)
2.	Oyster seeding Section - Seeding Theater, - Oyster cleaning area	(Harvest period, 2,500 oyster/day) 2,500gallon/day 800gallon/day	(Harvest period, 2,500 oyster/day) 20cuft (wet) 50cuft (wet)
3.	Hatchery Section - Sand filter, - Hatching unit, - Collection unit,	(Hatching period 30 days) - 100 gallons/day - 200 gallons/30days - 2,000gallon/20days	(Hatching period 30 days) <0.5cuft None None
4.	Mechanical Workshop - General unit, - Johnson unit, - Fiber unit,	 - 50 gallon/day - 10 gallon/day - 50 gallon/day	 2-4 cu-ft <1 cu-ft 5 cu-ft
5.	Kitchen - Main Kitchen, - Mess	 - 400 gallon/day - 250 gallon/day	 5 cu-ft 2.5 cu-ft
6.	Fuel Store - Main Diesel Store, - Gasoline Store	(Emergency Only)	

3.2.2 Pollution and Erosion Control

Accordance with the monitoring record:

- There is no significant issue on pollution, air or, water reported during the reporting period. There are no concerns either with erosion and siltation from work sites.
- There are no problem for the panels cleaning site for sedimentation. The new set up system for waste sediment and deposition provide anti-pollution for sea water.
- The retaining walls have been constructed at along drainage and sea banks.
- The need for improvement of handling and storage of hazardous materials has been prepared.

This concern mostly with the provision of containment walls for above ground fuel tanks and the provision of proper hazardous waste storage facility.

Figure (6) Panels cleaning site

Figure (7) Drainage

Figure (8) Retaining walls

Figure (9) Containment walls for above ground fuel tanks

3.3 Biological Environment

The finding result of laboratory of Training and research Brunch of Pearl Tangon Cultured Pearl Farm (T&R of PTF) related with Pearling Industry in the area is following;

Table (11). General assessment of Biological Environment with the project EMP (2019)

No	Biological Environment	Reference	Monitoring Result of MAC
1	Phytoplankton	-Total of 81 species *Phytoplankton* under 23 families was recorded in adjacent area of PTF. (Zar Ni Ko Ko, *Study on the Phytoplankton in the Elphinstone Island and Water, Myeik Archipelago*, Myeik University, (April 2014).	- The species most commonly found in the samples from the monitoring by MAC's T&R of PTF were: *Eucalanus subcrassus* and *Eucalanus crass*us but also: *Acartia erythraea, Atlanta, Undinula vulgaris, Paracalanus aculeatus ,Oncaea venusta, Cresis clava* and *Oikopeura cophocerca.*

			-The health of water condition of E-bay, Zalatt Awnge, and Grants island area are favourable to growth of Phytoplankton and to success of pearl oysters culture.
2	Marine Macroalgag	- 29 species belonging to 13 genera of Chlorophyta. - 9 species belonging to 3 genera of *Phaeophyta.* - 31 species belonging to 18 genera of *Rhodophyta.* (Tin Kyu Kyu, *Diversity of Marine Benthic Macroalgag from Escape Bay and Adjacent Area, Elphinstone Island, Taninthayi Region,* April 2014)	--Total 69 species *Macroalgag* were recorded in PTF pearl culturing longline site. *(Chlorophyta, Phaeophyta, Rhodophyta)* - Healthy growing marine benthic macroalgae from MAC area show good conditions of environmental area. - E-bay farm has higher species diversity than Grant.
3	Biofuling Organisms	-A total of 30 species Biofuling Organisms including- - *bivalves* (7 species) - *barnacles* (2 species) - *hydroids* (4 species) - *seaweeds* (10 species) - *polychaetes* (3 species) - *bryozoa* (2 species) - *ascidians* (2 species) (Thet Lyar Win,*Study on the Diversity of Biofuling Organisms of Pearl Oyster Farm and Adjacent Area of Escape Bay, Elphinstone Island,Myeik Archipelago,* Myeik University, April 2014).	- All bivalves, barnacles, hydroids, seaweeds, polychaetes, bryozoan, ascidians of *Biofuling Organisms* are recorded in PTF. *(hydroids, seaweeds, polychaetes, bryozoan, Sponge)* - *Barnacle (Balanus amphitrite)* is the most dangerous fouling speceis. (Local name- *Kha-yinn*) is the most dominant species in MAC area.
4	Benthic communities	A total of 27 taxonomic groups were recorded and among them the dominant phyla *were foraminiferans, polychaeta, nematode, crustacea, mollusca, echinodermata* and *coelentrata*. About 24 taxa were recorded from 20-50 m depth while the intermediate depth of 51-100 m had the maximum taxa (27). Forams were abundant in shallow regions (20-50 m) while the *polychaete* showed no preference to water depth and were recorded regularly with high prevalence in all the locations. (Ansari, Z.A.; Furtado, R.; Badesab, S.; Mehta, P; Thwin, S., 2012)	-Sponge as the most abundant group in PTF area. *Crustacea* and *Mollusca* are second of the abundance respectively, while members of the *Echinodermata* made up just third of the total abundance .*Polychaetes* of the family *Siponidae* are a dominant *poychaete* component in sand and mud habitats from intertidal to abyssal depths and most *varunid* crabs live in mangroves or mudflats though some may also be found on driftwoods and flotsam out at sea and some occupy benthic environments.

5	**Coral Reefs**	- Total of 105 species including to 82 genera, 60 families, 14 *Phylum* of corals, associated flora and invertebrate faunas. - Total 22 species of corals and 83 species of coral associated flora and invertebrate fauna were founded. - 22 species of hard corals, 1 species of *Hydrozoa* including to 12 families under *Coelenterata*. -1 species of *Demospongiae* under *Porifera*, 1 species of *Amphineura* 21 species of *Gastropoda,* 7 species of *Bivalves* under *Mollusca*, 7 species of *Polychaetes* under *Annelida*, 7 species of *Crustacea* under *Arthopoda*, 3 species of sea *cucumber* including to *Holothuroide* under *Echinodermata*. - 1 species of *Phascolosoma* under *Sipuncula*, 2 species of *seagrasses* including to 1 family *Hydrocharitaceae* under *Phylum Anthophyta.* (Moe Lwin Lwin,*Study on Some Corals, Associated Flora and Invertebrate Fauna in Zalatt Awe Nge Escape Bay, Myeik Archiplago,* Myeik University, April 2014)	-- Total 2 species species of corals associated flora *Demospongiae* and *Coelenterata*. were recorded in front of PTF seashore. - Rich biodiversity has been found in reef. - That is a natural barrier protecting from erosion. - Good coral reefs are the important for pearl farm.
6	**Seaweed**	According to the National Report of Myanmar on Sustainable Management of the Bay of Bengal Large Marine Ecosystem, a number of the 122 genera and 307 species of seaweeds from Myanmar have been reported. (Department of Fisheries Myanmar, 2003.)	The species most commonly found in the samples from the monitoring by MAC's T&R of PTF were: *Eucalanus subcrassus* and *Eucalanus cras*sus but also: *Acartia erythraea, Atlanta, Undinula vulgaris, Paracalanus aculeatus ,Oncaea venusta, Cresis clava* and *Oikopeura cophocerca.*
7	**Mangroves**	The nearest mangrove areas, Zalatt Aww is located at 8 km from the north of PTF.	Mangroves are not found in the PTF area.

3.4 Difficulties Encountered and Remedies

The laboratory of the T&R branch of PTF is small scale. This is one of the difficulty for detail examination of Marine Organisms in timely. When the detail scan need major case are sent to the Marine Science Department of Myeik University and laboratory of Fishery Department in Yangon. So that may be lack of timely record. MAC has plan to extend the laboratory for Marine Biology item in future.

No other difficulties were encountered, and no grievances have been received.

CONCLUSION

MAC's complied with most of the mitigation measures prescribed in the EMP. Main issues are summarized below;

- Environmental monitoring and record were managed in order to ensure the safety and to reduce potential impact to the physical, biological, nuisance to community and working area.

- MAC conducted the engagement and evaluation under the operation management process to ensure that the process had minimized the hazards and environmental impacts potentially occurred from project activity, by installing the safety equipment and pollution control unit (e.g. septic tank) and developing the appropriately administrative and operational control to ensure the effectiveness of implementation.

- MAC's emergency management plan was in place for handling the emergency situations, covering environmental accident, logistic related incident, occupational incident. The specific emergency response team and reporting flow were clearly established and emergency drill was conducted.

- MAC solved accordance to the instruction of MONREC for the remark of Region Government that commercial boats of tourism to enter to the pearl farm site.

- MAC engaged communities in nearby project site through CSR programme to ensure the good relationship and perception.

As for future subject for main operation site of PTF, the following action may be taken;

- To monitor sea water flow to conserve for beach of seashore
- To monitor the possibility of the environmental impact on the area by the commercial tourism boats to support management for departmental concern
- To monitor the suggestion of previous monitoring report for fulfillment of environmental program.

Accordance with assessment on the Monitoring record are to ensure that environmental conditions are not significantly affected by the project, as determined by observations of the environment, as opposed to the implementation of controls of the impact factors per formed in the EMP.

As for the result of Environmental Monitoring, that can consider PTF complied with the task of EMP value. And also the value of total result of monitoring sectors are in line with the standard point. Therefore it is considered that there is no significant impact on environment.

Appendix (I)

Information on Environmental Management Services Team

This environmental study is to prepare Environmental Monitoring Report for PTF is conducted by GEOCONSULT (Assoc Bridge Myanmar Limited), the registered organization for transitional period registration- No. 0072. The team has measured baseline primary data of air quality including ambient air condition, water quality and noise level by using appropriate measuring instruments. Data interpretation and analysis are made based on the collected baseline data and also from secondary for the present and foreseeable conditions and impacts on both socioeconomic and environment.

GEOCONSULT, an organization cooperate with the Geographical Association of Myanmar (GAM) is conducting the Environmental Services. GEOCONSULT was formed with Chairman, Prof. U Maung Maung Aye (Patron of GAM) and Secretary, U Si Thu (CEO of Assoc: Bridge Myanmar Limited). The technical associate members for EMR of PTF are;

Table (12): Information on Environmental Management Services Team

Name	Position	Area of Expertise
Prof. U Maung Maung Aye	Chairman	Policies and Supervision
Prof. Dr. Aye Ko	Vice Chairman (Principal Consultant)	Meteorology; Modeling for Air Quality Risk Assessment and Hazard Management; Ground water and Hydrology;
Prof. Dr. May Myat Thu	Vice Chairmen (Consultant)	Socio-Economy; Land use; Geology and Soil; Meteorology
Prof. Dr. Nyo Nyo Tun	Consultant	Marine Ecology and Biodiversity; Marine Chemistry (and Laboratory); Water Quality;
Dr. Kay Thwe Hlaing	Consultant	Waste Management; Air Quality; Noise and Vibration;
Dr. Tin Moe Zin	Associate Consultant (Project Associate)	Laboratory and Chemical Analysis

Appendix (III)

Grievance Redress

Grievance Redress

There is a complaint received during this period. The complaint was from Region Government who remarked on the company's permit extension recommendation. The Region Government wished to allow touring commercial vessel enter into the "Thel Hnitt Tan Island", substation of cultured pearl of PTF. Respect to the instruction of Minister of MONREC, the "Pearl Tourism Museum" was opened and vessel route was allowed in the area which not affected to the oyster culturing site. Consequently, the Myanmar Pearl Enterprise, District Office of Tourism Department, District Tourism Association and MAC discussed this matter and solved as the tourism vessel can access the island area which is not impact to oyster culturing site regarding with abiding the regulation of environmental conservation and the visitors were allowed who would to visit beach of island free of charge.

Social Impacts

There are no social issues of all employees of PTF that came up during this reporting period.

The other social issue which was not concerned with MAC but concerning with local area. That issues was shortage of teachers in the Basic Education Schools of adjacent 6 villages and lack of health care programme, difficulty for water supply and lighting for those villages. PTF employed all seven local teachers (one high school subject teacher, four primary teachers and two Salone translator for primary class) for one Associate High School and five primary schools for those villages. And also shortage of medical care programme was arose in area such as lacked of medical employees and insufficient of medicine and clinical. The medical cover team of MAC lead by Medical Officer of PTF visited to adjacent four villages for twice a month to free serve clinical services. Beside, MAC donated a clinic building and medical equipment. Other items were donation water piping, school stationary and furniture and solar lighting for those villages by company's CSR programme.

Daw Thidar Way (6/Tayaka[N] 106372)
(MAC Reg. No.PB-P-080) High School Teacher
State Associate High School, Done Palel Aww Village

Daw Kyu Kyu Aye (6/Kasana[N] 021537)
(MAC Reg. No.PB-P-081), Primary Teacher,
State Associate High School, Done Palel Aww Village

Daw Naw Eal Htoo (6/Kasana[N] 055186)
(MAC Reg. No.PB-P-082), Salon Translator Teacher,
State Primary School, Done Palel Aww Salon Kone

Daw Naw Thaw Htoo (6/Kasana[N] 069770)
(MAC Reg. No.PB-P-083), Primary Teacher,
State Primary School, Done Nyaung Hmine Village

Daw Naw Say Dar (6/Kasana[N] 054113)
(MAC Reg. No.PB-P-084), Primary Teacher,
State Primary School, Done Zalatt Village

Daw Naw Juli Hla (6/Kasana[N] 122375)
(MAC Reg. No.PB-P-085), Salon Translator
Teacher, State Associate High School, Phayaw War
Village

U Nyi Nyi Soe (6/Kasana[N] 122571)(MAC Reg. No.PB-P-086),
Primary Teacher, Buddhist Monastery Primary School,
Done Oo Yin Kan Village

Figure (10) MAC Employed Local Teachers

Figure (11) Medical Cover Team

Figure (12) Clinic Donation

Figure (13) Water Pipe Donation

Figure (14) School Stationary Donation

Appendix (IV)

Air Quality

Air quality conditions in the PTF area are projected to be good due to its offshore location (40 mile south-west of the Myeik coast) and it is not identified as a specific issue. The ambient air quality measured at the perimeter of PTF area can provide some indication of the air quality within the project area. In this environmental monitoring for the PTF area, dust emission such as PM10 (particulates matter equal to or less than 40µg/m^3) which can not affect human respiratory and PM2.5 (particulate matters equal to or less than 22µg/m^3) which can not affect human lungs organs as the contents of gases and particulates emission to the ambient air were measured by on 11th and 12th February 2020 are shown in following table. The range of various pollutant levels measured at the perimeter of proposed project during the month of December are presented in below.

The ambient air conditions measured within the proposed project area provide some indication of the air quality within the project area. The measured values are as shown in Page 31-1 and 31-2. The mean concentrations of measured PM2.5 and PM10 values are within the range of WHO guideline values. And also the mean concentrations of measured Gas Condition of Project Area are within the range of WHO and ACGIH guideline values. Generally, the PM concentrations in the air are related to the microclimate conditions such as humidity, rainfall, temperatures of the proposed site. The temperature and humidity of the site on that day are 32°C and 7 % (Record of Weather Spark) respectively.

According to the measured concentration of the gases, all results indicated that they are well within the permissible limits of the international guidelines.

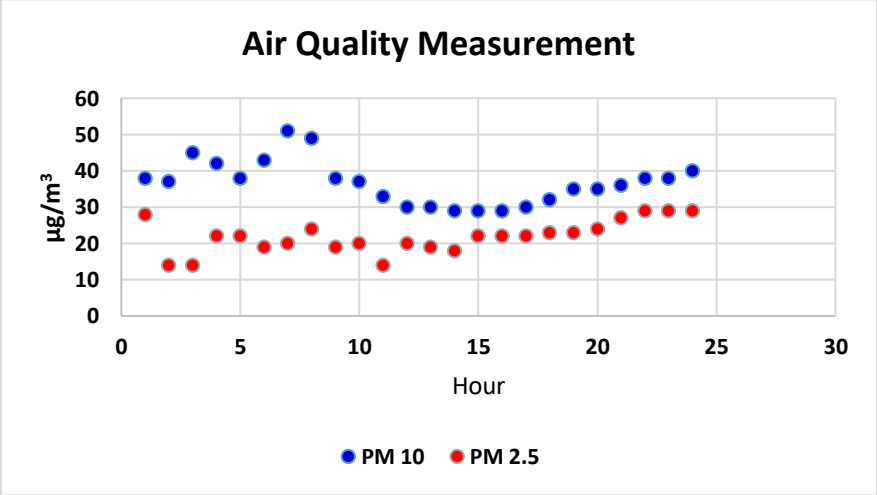

Figure (15) Air Quality Measurement

Comparison with National Emission Quality Guidelines and Dust conditions of site.

Parameter	Averaging Period	Average Result	NEQG Value
PM10	24 Hours	36.75	50
PM2.5	24 Hours	21.79	25

Figure (16) Location of Air Quality Monitoring Point

Appendix (V)

Water Quality

Sea Water Quality

The sea water quality analyzed from the sea site located in the proposed project area can provide some indication of the sea water quality of the project area. The following table shows the sea water parameters measured during the month of February 2020.

Water column within the project area is characterized by:

- Surface average water temperature around 29.76°C, with a thermocline identified at 25- 35 m depth in six months;
- Surface water average salinity around 32.31 PSU, which decrease at 33 near the bottom with the same trend as the temperature profile (influenced by thermocline);
- Low turbidity, average 2.56 NTU, which increases with depth;
- Surface water generally saturated in oxygen (100%) with dissolved oxygen, which drops to 33% between 35m and the seabed (hypothoxic values);
- Uniform pH profile between the sea surface and 25m depth, where the pH was average 8.82 Like the temperature profile (influenced by thermocline), a decrease in pH was observed between 25 m and 35 m, dropping from8.3 to 8.1;
- Concentration of total suspended solids were below the limit of detection (<5.0 mg/l-1) in all samples;
- Concentrations of nitrite and phosphate were below the detection limits (<0.01mg/l-1);
- Chlorophyll and pheopigment were below the limit of detection (<1.5µg/l-1);
- Although concentration of hydrocarbons were below detection limits (<0.1 mg/l-1), the presence of anthropogenically derived oil, such as lubricating or fuel oil, have been observed within project area.

Contamination was suggested to be a small scale input, possibly derived from passing fishing ships;

- All heavy and trace metals were recorded at low concentrations.
- Nutrients and chlorophyll levels were high and comparable to nearby survey results.

The water column is likely to have a middle turbidity, a high dissolved oxygen concentration and a moderate salinity.

Ground Water Quality:

The ground water quality analyzed from the tube well and Stream located in the project area can provide as good for drinking as some indication of the water quality. The following table shows the water parameters measured during the month of February 2020.

Figure (17) Location of Water Sources

Appendix (VI)

Noise Level

Noise monitoring was carried out in day time and night time.

Daytime noise monitoring result (hourly average) ranged Point (N-1) 51.54 dBA / Point (N-2) 49.27dBA and nighttime monitoring (hourly average) ranged Port (N-1) 46.81 dBA / Port (N-2) 44.99. Daytime noise monitoring result (hourly) ranged from 40.5 to 58.3 dBA and nighttime monitoring (hourly) ranged from 40.00 to 51.8 dBA.

The noise level measured in the perimeter of the project area can provide the indication of the existing noise level of the area as follows. The noise level measured is ranged from 43 to 58 dB (A) which is lower than the permissible level for the commercial and residential area. (Source: General EHS Guidelines: IFC-www.ifc.org)

The following bar chart also demonstrates the 24 hours trend of noise level measured at Pearl Tagon Farm from 12:00 PM of 14th February 2020 to 12:00 PM 17th February 2020 by technicians of GEOCONSULT.

Table (18): National Environmental Quality (Emission) Guidelines is used to compare current with noise level

Receptor	NEQG	
	Daytime 10:00-22:00	Nighttime 22:00-10:00
Residential, institutional, educational	55	45
Industrial, Commercial	70	70

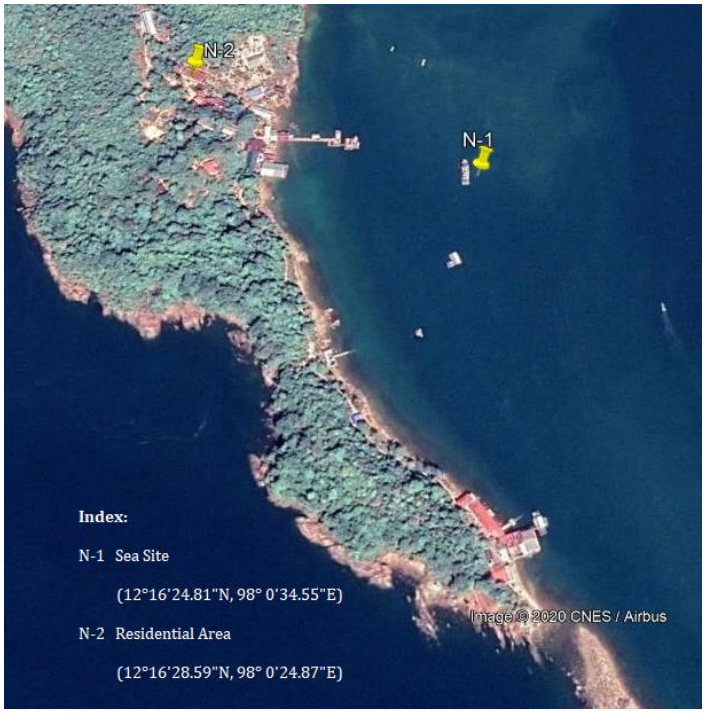

Figure (18) Location of Noise Monitoring Point

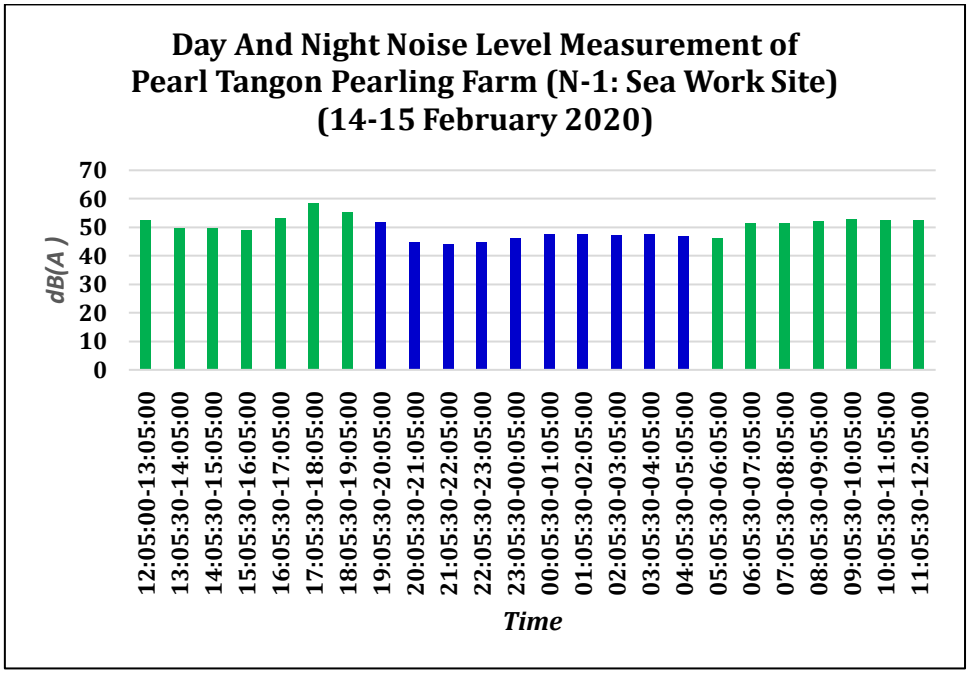

Figure (19) Noise Level Measurement of PTF (N-1: Sea Work Site)

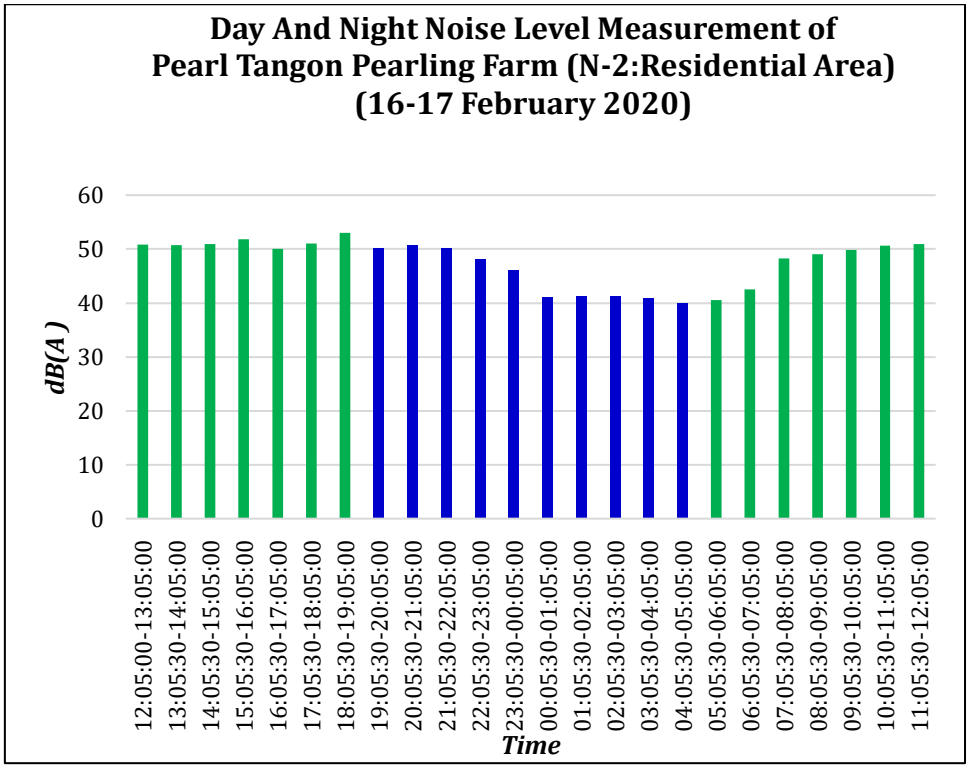

Figure (20) Noise Level Measurement of PTF (N-2: Residential Area)

Appendix (VII)

Environmental Situational Report (E- Sitrep)

Attached the E - Sitrep of PTF, period from January to June 2020, with following factors:

1. Quarterly Environmental Report of PTF.
2. Monthly Environmental (Land) situational report.
3. Monthly Environmental (Sea) situational report.
4. Marine situation record (MSR).

Appendix (VIII)

Benthic Environment

Sponge as the most abundant group in PTF area. *Crustacea* and Mollusca are second of the abundance respectively, while members of the *Echinodermata* made up just third of the total abundance. *Polychaetes* of the family *Siponidae* are a dominant *poychaete* component in sand and mud habitats from intertidal to abyssal depths and most *varunid* crabs live in mangroves or mudflats though some may also be found on driftwoods and flotsam out at sea and some occupy benthic environments.

Taking into account the former studies in adjacent areas and previous and timely monitoring record of T&R of PTF, as well as the water depth and sediments found at the PTF area, it is possible to conclude that a significant abundance and diversity of the benthic community is likely expected in the area.

Figure (21) Sponge

Figure (22) Barnacles

Figure (23) Mollusca

Appendix (IX)

Marine Fauna and Flora

Accordance with the marine fauna and flora monitoring record of PTF, following commercial marine fauna species were found and recorded in the area of monitoring period;

No.	Types of Fish	Habitat	Season	Monitoring Result of MAC
1	Sea cucumber	reef, bay	Oct-Apr	Found
2	Lobster	reef, bay	Oct-Apr	Found
3	Sand crab	bay, coast	Jan-Dec	Found
4	*varunid* crabs	bay, coast	Jan-Dec	Found
5	Mullet	bay, coast	Jun-Sep	Found
6	Shrimp/ prawn	bay, coast	Jan-Dec	Found
7	Grouper	reef, bay	Jan-Dec	Found
8	Snapper	reef, bay	Jan-Dec	Found
9	Porcupine fish (Diodontidae)	reef, bay	Jan-Dec	Found
10	Cuttlefish/ Squid	reef, bay	Jan-Dec	Most Found
11	Trash Fishes (mixed small size fish)	bay, coast	Jan-Dec	Most Found

There was no special marine entanglement report and record at PTF area in the monitoring period.

It was also possible to observe that the PTF area is very productive with high phytoplankton densities during the south west monsoon (July to September). The following marine flora species were found and recorded in the area of monitoring period;

No	Marine flora Species	Monitoring Result of MAC	Reference	Finding
1	Phytoplankton	- The species most commonly found in the samples from the monitoring by MAC's T&R of PTF were: Eucalanus subcrassus and Eucalanus crassus but also: Acartia erythraea, Atlanta, Undinula vulgaris, Paracalanus aculeatus ,Oncaea venusta, Cresis	-Total of 81 species Phytoplankton under 23 families was recorded in adjacent area of PTF. *(Zar Ni Ko Ko, Study on the Phytoplankton in the Elphinstone Island and Water, Myeik Archipelago, Myeik University, (April 2014).*	-The health of water condition of E-bay, Zalatt Awnge, and Grants island area are favourable to growth of Phytoplankton and to success of pearl oysters culture.

		clava and Oikopeura cophocerca.		
2	Marine Macroalgag	-Total 69 species Macroalgag were recorded in PTF pearl culturing longline site. (Chlorophyta, Phaeophyta, Rhodophyta)	- 29 species belonging to 13 genera of Chlorophyta. - 9 species belonging to 3 genera of Phaeophyta. - 31 species belonging to 18 genera of Rhodophyta. *(Tin Kyu Kyu, Diversity of Marine Benthic Macroalgag from Escape Bay and Adjacent Area, Elphinstone Island, Taninthayi Region, April 2014)*	- Healthy growing marine benthic macroalgae from MAC area show good conditions of environmental area. - E-bay farm has higher species diversity than Grant.
3	Biofuling Organisms	- All bivalves, barnacles, hydroids, seaweeds, polychaetes, bryozoan, ascidians of Biofuling Organisms are recorded in PTF. (hydroids, seaweeds, polychaetes, bryozoan, Sponge)	-A total of 30 species Biofuling Organisms including- - bivalves (7 species) - barnacles (2 species) - hydroids (4 species) - seaweeds (10 species) - polychaetes (3 species) - bryozoa (2 species) - ascidians (2 species) *(Thet Lyar Win,Study on the Diversity of Biofuling Organisms of Pearl Oyster Farm and Adjacent Area of Escape Bay, Elphinstone Island,Myeik Archipelago, Myeik University, April 2014).*	- Barnacle (Balanus amphitrite) is the most dangerous fouling speceis. (Local name- Kha-yinn) is the most dominant species in MAC area.

Accordance with the finding on the monitoring result, PTF area is-

- Rich biodiversity has been found in reef.
- That is a natural barrier protecting from erosion.
- Good coral reefs are the important for pearl farm.
- Pearl farm area is free from the fishing boats as well as rich of planktons so that many commercial marine fauna species depend in that area.

Myanmar Atlantic Co., Ltd.

"Pearl Banner Cultured Pearl Farm"

Tayawthahangyi Island, Kyunsu Township, Myeik Archipelago, Tanintharyi Region, MYANMAR

Myanmar Atlantic Co., Ltd.

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