December 2016

SFG2883

ENVIRONMENTAL AND SOCIAL MANAGEMENT FRAMEWORK

MALDIVES – SUSTAINABLE FISHERIES DEVELOPMENT PROJECT

Ministry of Fisheries and Agriculture

Contents

Abbreviations and Acronyms

BP	Bank Procedures
BPEO	Best Practical Environmental Option
BATNEEC	Best Available Technology Not Entailing Excessive Costs
CBO	Community Based Organizations
CC	Component Coordinators
CMA	Community Managed Area
EA	Environmental Audit
EEZ	Exclusive Economic Zone
EIA	Environnemental Impact Assessment
IEE	Initial Environmental Evaluations (IEEs)
EMP	Environmental Management Plan
EPA	Environmental Protection Agency
EPR	Environmental Project Report
EHSC	Environmental and Health Safety Committee
ESSO	Environmental and Social Safeguards Officer
ESMF	Environment Social Management Framework
EIA	Environmental Impact Assessment
ESA	Environmental and Social Assessment Environmental
ESIA	Environmental and Social Impact Assessments
ESMP	Environmental and Social Management Plan
FAO	Food and Agricultural Organization
FAD	Fish Aggregating Devices
GHG	Greenhouse Gas
GEF	Global Environmental Facility
GRC	Grievance Redress Committee
GRM	Grievance Redress Mechanism
GRS	Grievance Redress Service
ICZM	Integrated Coastal Zone management
IDA	International Development Agency
IFAD	International Fund for Agricultural Development
IOTC	Indian Ocean Tuna Commission
IP	Indigenous People
IPM	Integrated Pest Management
IC	Island Councils
NGO	Nongovernmental Organization
O&M	Operation and Maintenance
MEDeP	Mariculture Enterprise Development Project
MNDF	Maldives National Defence Force
MoFA	Ministry of Fisheries and Agriculture
MPS	Maldives Police Services

MPAs	Marine Protected Areas
MRDF	(Maniyafushi) Mariculture Research and Development Facility
M&E	Monitoring and Evaluation
MCS	Monitoring, Control and Surveillance
MMA	Marine Managed Areas
MoU	Memorandum of Understanding
MPA	Marine Protected Area
MRC	Marine Research Centre
NGOs	Non-Governmental Organizations
PSP	Private Sector Participation
RHA	Risk Hazard Assessment
SER	Simple Environmental Review
SEP	Stakeholder Engagement Plan
SESA	Strategic Environmental and Social Assessment
SOP	Series of Projects
SWIOFish	South West Indian Ocean Fisheries Governance and Shared Growth Projects
PMU	Project Management Unit
PPP	Public Private Partnership
RPF	Resettlement Policy Framework
SCD	Stakeholder Consultation and Disclosure
SER	Simple Environmental Review
SFDP	Sustainable Fisheries Development Project
SWIO	South West Indian Ocean
SWIOFC	South Western Indian Ocean Fisheries Commission
TCs	Technical Coordinators
UNEP	United Nation Environment Program
VLD	Vessel Locating Devices
VMS	Vessel Monitoring System
WB	World Bank

1. Chapter 1: Introduction to Maldives Sustainable Fisheries Project

1.1 Background

Maldives is an island nation scattered in the Indian Ocean comprising of a double chain of 1,190 small coral islands distributed into 26 geographical atolls. Of these 188 islands are inhabited by a local resident population of 338,434. Out of these islands 109 are tourist resorts and 128 are used for industrial, agricultural or other activity. The islands in general are very small with only 33 islands having a land area no bigger than 1km^2 with an average elevation of less than 1m above sea level. The total land area is estimated at approximately 235 km^2. Maldives' unique archipelagic coral islands provides the country with an extremely rich and diverse marine ecological system. With more territorial sea than land, marine resources have played a vital role shaping the contours of economic development, with nature-based tourism being the key driver of economic growth and fisheries an important sector of employment for the local population[1].

The climate of the Maldives is governed by the Indian Ocean monsoon regime –with the drier North East Monsoon dominating from January to March and the wetter and stormier South West Monsoon from May to December. Average air temperature is about 28^{o}C and sea surface temperatures are between 28-29^{o}C.

The "Total Maldivian Population" enumerated in Census 2014, is given as 344,023 individuals growing at an annual rate of 1.76% per annum. 27% comprised of children under the age of 5 years, 68% within the age group between 15 and 64 and 5% above the age of 65 years.

The Maldives relies totally on coastal and marine resources for subsistence and its economic development. Tourism and fishing are the major economic activities, contributing 28% and 1.5% to the Gross Domestic Product (GDP) respectively. Fisheries remain a large source of employment, the largest source of physical exports, one of the few local industries supplying the tourist resorts and a major food supply for the local market. The main export commodity of the country is skipjack tuna, yellowfin tuna and other tuna related species with a few reef species. The fisheries sector is particularly important in outer atolls and accounts for 20% of employment. The main products exported are tuna species, reef fish such as grouper, snapper, aquarium fish and sea cucumbers currently generating $110 million in export revenue. The processing of fish contributes another 1.2% towards the GDP from manufacturing from the fish processing sector.

Agriculture accounts for 1.7% of GDP. Farmers living on their islands normally grow crops such as vegetables (aubergines, squash, pumpkins, and chilies), fruits (watermelon, papaya, coconut) and a variety of root crops in their home gardens, or allocated fields. Currently there are about 6,412 farmers registered from 74 inhabited islands, of which the majority are subsistence or smallholder farmers. Fifty three percent of the registered farmers are female. An additional 78 uninhabited islands with about 1,380 hectares of land are leased over the long-term to the private sector for commercial agriculture development.

Fisheries sector is a key player in the national economy providing employment, a source of protein in the diet and is the livelihood of almost all the inhabited islands. Tuna remains as the single most important export commodity of the Maldives earning about 160 million US$ a year. In 2014, it accounted for 1.7%

of GDP and 11% of the labour force, and currently generates the equivalent of approximately $163 million in export revenue in 2013.

The fisheries sector is challenged by several physical, technical, human resources and financial constraints which make it difficult for the Ministry of Fisheries and Agriculture to enable and establish sustainable development of the sector. Despite these challenges the Maldives government has a high level of commitment to manage the fisheries and is striving to achieve these objectives.

1.2 Overview and Need of Fishery Sector Development in Maldives

Fishery industry in Maldives is an important sector. It provides a means of livelihood for over 20 percent of the local working population. The main target is tunas (accounts for over 90% of the total national landings) and reef fishes. Maldives is one of the largest tuna fishing nations in the Indian Ocean with a reported landing of around 126,000mt in 2014, and the pole and line skipjack tuna fishery is certified by the Marine Stewardship council.in 2012

The Maldivian tuna fishery comprises of four main components; pole-and-line, handline, longlining and trolling. The most important is still the traditional live bait pole-and-line fishery. The fishery was certified by the Marine Stewardship Council (MSC) in November 2012. The main target species is skipjack tuna (*Katsuwonus pelamis*), but small amounts of juvenile yellowfin tuna (*Thunnus albacares*) are also caught in the fishery of which about 5-10% is bigeye tuna (*Thunnus obesus*). Handline fishery is still expanding which targets surface dwelling large yellowfin tuna (> 70 cm FL). A Maldivian longline fishery is being developed following the termination of the licensing scheme for foreign longliners in 2010. Trolling fishery is minor and targets mainly neritic species of Kawakawa (*Euthynnus affinis*) and frigate tuna (*Auxis thazard*), but occasionally also catches skipjack and yellowfin tuna.

The current fish catch consists mainly of skipjack tuna, yellowfin tuna and a variety of reef fish[2]. Skipjack tuna, comprised approximately 55% of the total catch in 2014 (Figure 1). More details on key fisheries sub-sectors follow below:

Skipjack tuna fisheries

Though the share of skipjack tuna has been on the decline in the last five years, its role in the livelihood of the islanders remains significant. Key factor for the decline would be the development of the handline yellowfin tuna fleet. Many vessels have been adapted to exploit the large yellowfin handline fishery. Hence the decline in the skipjack catch while the yellowfin catches has increased. Apart from the fishermen who are involved in the harvesting sector, women are engaged in the production of dried or smoked fish (commonly known as "Maldive Fish") and other variety of eatables (fish condiments). Dried fish exported to Sri Lanka by the cottage[3] industry generates additional export earnings.

[2] In the Maldives, the term 'reef fishery resources' refers to all fisheries except tuna fisheries

[3] Cottage Industry – small scale processors who process fish in their households and sell through middlemen. The main products from these processors are dried fish and salted dried fish.

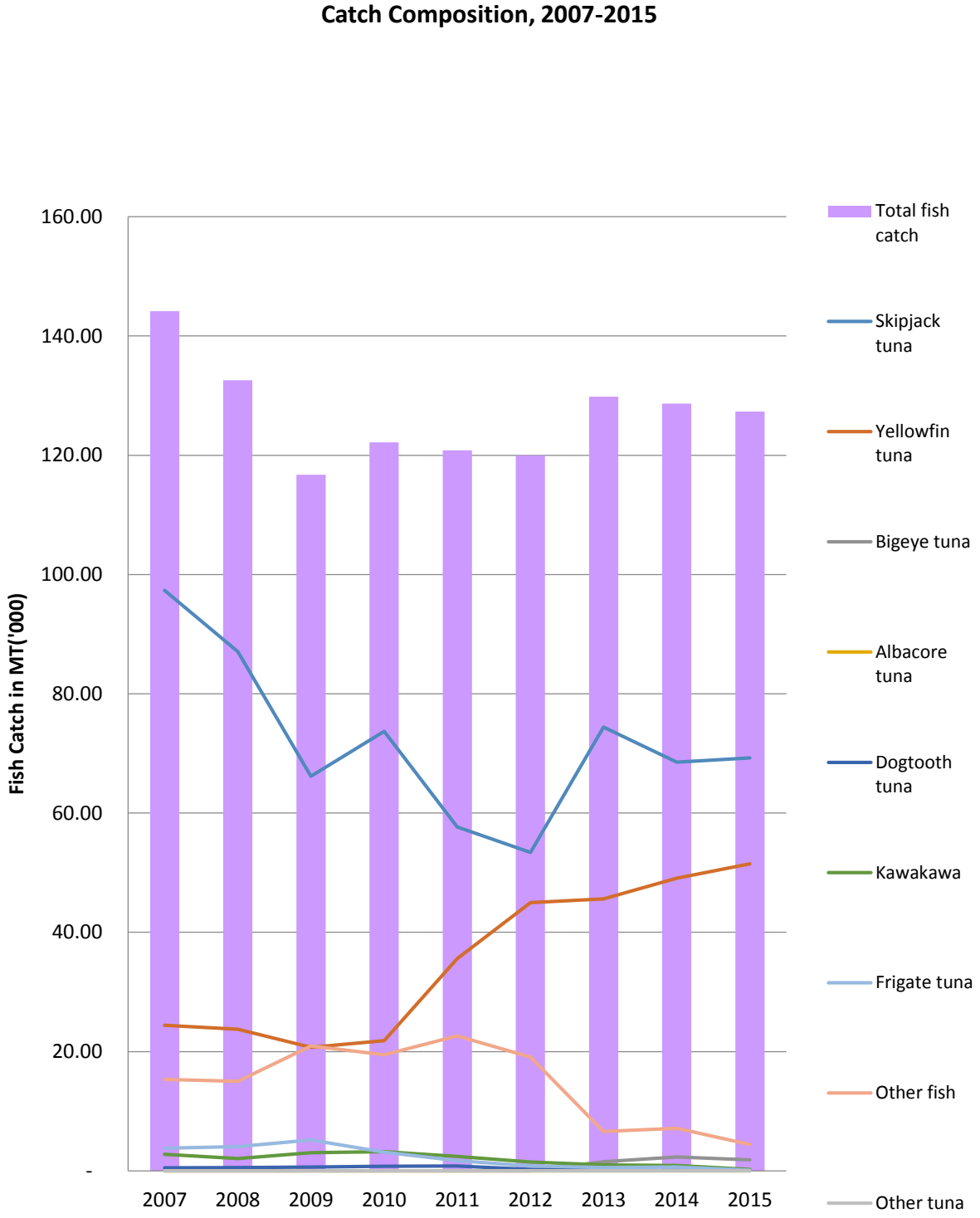

Figure 1. Catch composition, 2007-15

Yellowfin tuna fisheries

Yellowfin tuna is the second most important fish species caught in the Maldives comprising approximately 38% of the total national catch. With the increase in access to overseas fresh fish markets, demand for large yellowfin tuna has expanded. This has created a favourable environment to develop the hand-line yellowfin tuna fishery targeting surface dwelling schools of large yellowfin tuna. The Government of Maldives began to promote long-lining for local fishermen between 100 to 200 nautical miles within the exclusive economic zone (EEZ) of the Maldives. So far forty one vessels have obtained licenses and are in operation as of November 2016. The technically demanding nature of long-lining operations compared to the very basic pole-and-line and hand-line fisheries traditionally practiced in the country has hindered the development of a long-lining fleet in the country. The major portion of the yellowfin tuna caught in the Maldives is exported, while the rest is consumed locally mainly by hotels and restaurants. Yellowfin tuna is exported to different countries such as Thailand, France, Italy, UK, Tunisia, Germany, Iran, Spain, Sri Lanka, Switzerland, USA and Netherlands.

Reef fish fisheries

The reef fishery resources were hardly exploited until the late 1990s. However, with the increase in socio-economic benefits from the tourism sector, together with the improved air and sea transportation, reef fisheries have developed significantly for export[4] and local consumption. Reef fish are significantly purchased by the tourist resort operators and consumed by the tourist guests; communities also depend on reef fishery as a source of income.

Recreational fishery has been emerging within the resorts as night fishing for reef fish and big game fishing for sailfish and dolphin fish. The extractions from these recreational fisheries are not accounted in the catch landings. The data collection in these area needs to be improved with an institutional setup.

Aquaculture

Although aquaculture exists as a well-established industry in other regions, the Maldivian aquaculture industry is in its infancy. The Government of Maldives has carried out pilot scale projects over the past decade on the aquaculture of pearl oysters (*Pteria penguin*), Maldivian clownfish (*Amphiprion nigripes*), and brown marbled groupers (*Epinephelus fuscoguttatus*). To date, only one commercial aquaculture facility is in operation and a few more hatcheries coming up on the long term leased islands.

The Mariculture Enterprise Development Project (MEDeP) under the assistance of International Fund for Agricultural Development (IFAD) is being implemented by the Ministry of Fisheries and Agriculture. The project is working with Barakathul Bahru Pvt. Ltd to commercialize the culturing of Sandfish in the Maldives. The objective is to build Sandfish culture capacity of island communities working in partnership with MEDeP in order to increase their income and employment especially for youth and women from mariculture activities. MEDeP has been formulated with the goal of expanding livelihood opportunities and

[4] Exportation of reef fish began in 1994 mainly targeting grouper products and then followed by aquarium fish and sea cucumber.

reducing vulnerability of the communities. The company is supplying hatchery-produced Sandfish juveniles; Sandfish grow-out feed, constructing Sandfish pen/cages for beneficiaries at the initial stage of Sandfish farming; training beneficiaries in pen/cage construction, Sandfish feeding and grow-out monitoring, and other aspects of grow-out. The project has piloted 30 pens and is working on completing the remaining 70 pens for the beneficiaries.

Market linkages, value addition, and quality control scenario:

Maldivian skipjack pole-and-line fishery has been recognized as one of the most environmentally friendly fishery operations. The fishing methods of one by one pole and line method is highly selective and has virtually no bycatch. The Maldives has obtained third party eco-label certification through the Marine Stewardship Council (MSC), to promote the sustainability of the Maldivian fishery in the world market and hopefully fetch higher prices for the country's pole-and-line fishery products. However, exploiting the true export market value of the product will depend on improvements in quality, value addition and access to wider markets. Despite the potential for Maldive Fish to be marketed at much higher prices, the product has not gained any market advantage over the years, mainly due to the lack of quality and branding.

Markets for Maldives seafood are global and highly competitive. The possibilities for developing new value-added products to utilize the high quality raw material available in the Maldives needs proper planning, assessment of comparative advantage for specific product lines over other global players. As such it is essential, to bring adequate quality control measures in place, empowering the women involved in processing, proper packaging and labelling of products for earning higher revenues for products and women involved in these activities.

Opportunities for Sustainable Development of Fisheries in Maldives

Maldives has an excellent opportunity to further develop its fisheries sector and capitalize on the potential benefits. Maldives fisheries sector has a range of factors in its favour – large, abundant and valuable fish stocks, especially skipjack tuna; a skilled and committed fisheries workforce; a large and modernizing fishing fleet; and a growing onshore sector of private companies processing and exporting fish products.

Pole and line fishing using vessels of similar size to Maldivian *masdhoni* have been shown to be the most economically efficient fishing units. This gear used by Maldivian fishermen has shown to be highly selective. Maldives has an existing system for protecting and conserving the environment, and the use of pole and line method for harvesting is environmentally friendly. This technique can be marketed as one of the inherent values of the fish harvest and aqua-production from Maldives, in response to international trends towards eco-friendly fishing.

Maldivian fish products are already exported to a variety of niche markets around the world. Processed tuna (canned, pouched) from Maldives is MSC certified and so carry a premium price. It already commands a higher than normal price in Europe because of the pole and line method used in fishing, and the environmentally friendly policy and regulatory framework of fisheries in the country.

The strong international market for seafood provides an opportunity for further exports and earnings in the future. At the same time, exploiting these opportunities should be based on sustainable wealth generation and income. Commercial tuna fishing for export in the Maldives requires a fishing licences for its sale and the policy have been to maintain the fishing capacity at sustainable levels. Tuna being highly migratory and straddling Maldives's policy is also to harmonize the conservation and management measures being implemented by the Indian Ocean Tuna Commission (IOTC).

In addition, in 2009, the Ministry, in collaboration with the World Bank started a pilot program to initiate a Vessel Monitoring System (VMS) in the Maldives and the government has started to implement a full-scale VMS for all fishing vessels in the Maldives with the support from the IFAD Post-tsunami project. To date 120 vessels have been equipped with VLDs. To provide a credible dissuasion for violations of laws and regulations, the Coast Guard of the Maldives National Defence Force (MNDF) oversees the surveillance, monitoring and enforcement. In addition, this assists in information gathering on fishing operations, decide on national policies and advice on strategic and tactical decisions about enforcement. Monitoring Control and Surveillance uses air patrol, sea patrol through a tri partite agreement between Sri Lanka, India and the Maldives. The enforcement modes used depend on the resources available, the nature of the regulations and the characteristics of the fishery. The institutional arrangement foresees collaboration and cooperation between various Ministries and Agencies notably the Maldives Police Services, the Coast Guard, the Maldives Customs Services and the Department of Immigration and Emigration and Ministry of Fisheries & Agriculture.

1.3 Environmental Vulnerability and Sectoral Context

Maldives is a low-lying island state with most of its population dependent on fisheries and tourism sectors. Climate change and its implications provides major challenge for the country, which, in the worst-case scenario threatens even the very existence of the country through sea level rise. More immediate impacts would be felt through climate variability and extreme weather events on fragile coral reefs and coastal zone, fisheries, tourism, freshwater, agriculture, infrastructure and livelihoods.

Environmental vulnerability and fragility was highlighted by the Indian Ocean tsunami which hit Maldives on 26 December, 2004. It was a nation-wide disaster which caused severe damage to the physical infrastructure of many islands, especially to those in the tourism and fisheries sector. Total damages were estimated to be US$470 million, 62% of GDP, not reflecting the indirect cost of environmental damage including substantial soil erosion and salinization of aquifers on many affected islands (World Bank, ADB & UN system 2005). Fishery sector in Maldives is most affected by above challenges and requires concert steps for its sustainable development in the country.

The main government policies are geared to expanding the scope and diversification of the fisheries sector in a sustainable manner through a better integration and access of local fishermen into international markets; providing training and financial assistance to fishermen; improved research to better manage marine fisheries resources and livelihood diversification through mariculture; and monitor and control the Exclusive Economic Zone under the full control of the Maldivian government as the fishery industry is the main source to support livelihood of the fishing communities.

1.4 Project Development Objectives:

The Project Development Objective (PDO) is to enhance governance and diversified sustainable use of marine fishery resources to create job and income opportunities in the targeted atoll communities.

The PDO and the activities flowing from the PDO will support higher level objectives, both at regional and the national levels; in brief: to the benefit of the South West Indian Ocean (SWIO) regional agenda that aims at conservation of marine resources, and sustenance of economy and jobs.

1.5 Project Beneficiaries

The main project beneficiaries will be the households where fishing is a vital component of livelihoods, small-scale commercial fishers. Activities to augment, sustain and conserve the marine fishery will benefit all 9,544 fisher households currently employed in the fishing sector (vessel owners, fishing crew, and workers in the value chain of tuna fishing) by reversing the trend of declining and threatened fishery resources. The main beneficiaries of new mariculture and improved conservation regime of reef fishery will be island communities of Maldives, many of them are traditionally skilled in fishing, have no alternative income earning options, but are gradually withdrawing from fishing and fishing related activities (owing to lack of meaningful income from such activities). The project will also target producer and professional organizations, industry or fisher associations and an expanding set of local atoll level individuals who are part of the export chain for reef fisheries, to increase the net benefits from mariculture.

1.6 Project Components

The proposed project is the fourth in the SWIOFish SOP. As articulated in the SOP description, a central thrust of the SOP is that while the challenges are regional in nature, addressing them requires action at the national level, which will yield regional benefits, enhance ownership and efficiency, and strengthen national institutions which will help enhance the overall health of fisheries in the region. Project implementation follows a principle of subsidiarity, whereby only project activities that are transnational will be managed at the regional level through a regional body. For example, Component 1 Enhanced Regional Collaboration under SWIOFish1 and SWIOFish2 (Maldives is a beneficiary country under this component in both projects), is administered through the Indian Ocean Commission (IOC). All activities under the proposed SWIOFish4 (Maldives) Project will be implemented at the national level, similar to proposed SWIOFish3.

The project is aligned with government sector policy and in its design would center on the principles of sustainable management and governance of marine fisheries resources, which are directly linked to wellbeing of the regional fishery stock. Other than 'Project Management, Monitoring and Evaluation', the project will consist of two components – one focusing on improved management of the capture fishery, and the other to develop a diversified fisheries economy so that sufficient jobs and income are created to be able to (i) compensate for the near-term loss of jobs owing to improved management of capture fishery on one hand, and (ii) to create additional meaningful income-earning jobs for inclusive development of the remote

atolls, especially for women and youth. Provided below are summary descriptions of the interlinked components of the project. For additional details, see Annex 2.

Component A: Augmentation of Institutional Capacity for Marine Fisheries Management (at a cost of US$5.09 million. This Component is designed to enhance the Government's capacity to implement a more effective fisheries sector monitoring and internal control system of key marine fisheries value chains, and will focus on delivery of the Indian Ocean Regional agenda of: (i) improving the overall fisheries management; (ii) establishing marine zoning covering the entire Maldivian EEZ for long-term benefits. It will also prepare a longer-term plan to establish and operationalize in-country skill and capacity building activities, to be able to create skills and capacities essential for sustenance and growth of the fishery sector in Maldives.

The five sub-components include (A1) development of key fisheries management and planning instruments such as fisheries policy and legislative framework, zoning covering the entire Maldivian EEZ, and support to coral reef and reef fishing management plans which are essential for regional conservation and retaining IOTC fishing quota; (A2) development and implementation of fisheries management activities to ensure compliance with IOTC and EU requirements, including expanded MCS, vessel licensing and management systems, electronic observer systems for commercial marine fisheries, and augmentation of reporting systems, and collaboration with the SWIO Sub-Regional Fisheries Monitoring Centers; (A3) support to long-term national plan for fisheries management (capture fishery) including sampling programs, stock assessments, conservation zone surveys which will contribute to regional assessments and subsequent actions; and (A4) fisheries sector capacity building focusing on strengthening local and national skills related to fishery management and mariculture.

Component B: Support to Mariculture and Diversification of Fisheries (at an estimated cost of US$13.56 million). There is substantial prospect of economic growth by diversifying capture fishery, and equally substantial possibility of meaningful job creation in remote atolls from mariculture – both of which are pre-requisites for sustenance of the capture fishery resources in the Maldivian EEZ. Diversification into mariculture and subsequent gradual shift away from capture fishery is important to minimize impacts on coral reefs (a very important resource for the region as a whole), and to sustain the reef fish population, especially groupers. However, mariculture is nascent in Maldives; and to be able to develop this sector, even at a demonstration scale, it is important that the primary inputs – seeds, feed and access to finance exist. In addition, development and growth of fishery and mariculture are intricately connected with improved and new capacity for providing extension services, and consistent delivery of research and exploration. The minimum requirement, therefore is a combination of the following essential elements: (i) research, demonstration and extension, without establishment and continuity of which there will be neither diversification nor growth; (ii) a government-financed "design, build, operate and transfer" (DBOT) contract for multi-species hatchery, without which mariculture cannot start[5]. Once the first set of demonstration farms are serviced by this hatchery, other such hatcheries are expected to be financed by private sector in future; (iii) a sufficient number of household level mariculture out-grower farms, to be able to demonstrate technical and commercial viability, and attractive income for expanded number of households across atolls, without which mariculture of a viable scale to be able to absorb fluctuations in the

[5] Except for sea cucumber, for which a private sector hatchery exists, and is currently partnering with the IFAD-financed Mariculture Enterprise Development Project.

export market will never be established; and (iv) initial support[6] for backward linkages such as supply of imported fish feed, and forward linkages such as connecting to collectors and exporters of mariculture products.

The four sub-components include (B1) Development and demonstration of mariculture production and technology package, including operationalization of the MRDF as a center of excellence for the entire SWIO region; (B2): Promotion of development of mariculture out-grower schemes and seafood growth clusters, including provision of incentive grants for community custodianship of the coral reef resources and loans/grants towards start-up investments in mariculture development, support to "small enterprises" for establishing out-grower contractual arrangements between small producers and larger private sector aggregators; (B3): support to multi-species hatchery; and (B4): Scoping of long-term marine fisheries diversification studies.

Component C: Project Management, Monitoring and Evaluation (tentative cost: US$2.09 million). This component would provide equipment, technical assistance, training, and incremental operating cost to strengthen the overall administrative capacity and capability of the Ministry of Fisheries and Agriculture and its Project Management Unit (PMU) to manage, implement, and monitor and evaluate project activities. Specifically, support will include staffing and operation of the PMU; establishment of adequate financial management and procurement management systems; implementation of the communication plan and grievance redress activities; monitoring and evaluation (M&E) and third party audits; preparation and implementation of specific environmental impact assessments as per the national laws; coordination with other ministries such as the Ministry of Environment and Energy and other stakeholders including Bank of Maldives and the private sector; and special evaluation studies. The aim is that the PMU and its operational systems will be transformed during the project period to merge back into the regular divisions of MoFA.

B. Project Financing

The Government of Maldives sought regional IDA to finance the proposed Project, in addition to national IDA grants. As the fourth project in the SWIOFish SOP, the Project meets the criteria for accessing regional IDA: (a) the SOP currently directly involves six countries[7]; (b) it supports policy harmonization for ecological connectivity and regional integration in the Indian Ocean Region; (c) it has spillover benefits, and avoids negative spillover impact at the regional level beyond the country boundaries; and (iv) the project, through continued support to the SWIOFC, provides a platform for a high-level of policy harmonization between countries and is part of a well-developed and broadly supported regional strategy. All components and sub-components of the project have strong linkage to the Indian Ocean Regional agenda, and as such, the project will be financed by US$1.5 million in national IDA grant, and US$15.2 million in regional IDA.

[6] Once the demonstration out-growers farms are established and their production reaches a level where profits from export of mariculture products is comparable to the current profits from export of live capture reef fishes, it is anticipated that private sector will take up complementary investments in supply (and eventual manufacture) of fish feed; value chain development for new products; enhanced networks and logistics to facilitate larger export. To avoid crowding out private sector investment or to avoid being perceived as disincentives to the entrepreneurs and private finance, the project does not finance these activities or elements (which, otherwise, could be considered essential elements of any plan for mariculture development).

[7] Comoros, Mozambique and Tanzania under the on-going SWIOFish1 (P132123); Madagascar under the proposed SWIOFish2 (P153370); Seychelles under the proposed SWIOFish3 (P155642); and Maldives under the proposed SWIOFish4 - Maldives Sustainable Fisheries Resources Development Project (P157801).

1.7 Objective of the Environmental and Social Assessment and Management Framework

Projects and Programs financed with IDA resources need to comply with World Bank Operational Policies. Therefore, components and related activities eligible for funding under this project will be required to satisfy the World Bank's safeguard policies, in addition to conformity with environmental legislation of the Government of Maldives.

However, since details of sites and specific investments of the project are not available at this stage, site-specific Environmental and Social Assessments cannot be conducted. What is possible at this stage would be to carry out an identification of generic issues that are typically associated with activities that would potentially be funded by the project and apply the information to site specific environmental assessments, as and when the need arises.

Therefore, the purpose of this document is to outline a framework for environmental assessment and management, giving details of potential environmental issues and guidelines on what type of environmental assessment tools to be applied for various sub-project activities. This will serve as the basis in the preparation of, site-specific specific Environmental and Social Assessments (ESAs) and/or Environmental and Social Management Plans (ESMPs). As stated earlier, it is being submitted in lieu of a project environmental and social assessments and has formed the basis for appraising the environmental and social aspects of the project. It will be made available for public review and comment in appropriate locations in the Maldives and in IDA's Public Information Center in accordance with World Bank's policy of Access to Information.

It is expected that detailed environmental and social assessments (ESAs, ESMPs) for sites and/or for activities will be carried out (in accordance with this Framework) by the implementing agencies and will be reviewed and cleared by the Environmental Protection Agency (EPA), or any other agency, as applicable, under prevailing national environmental legislation in the Maldives. If applicable and by IDA for all physical activities prior to the approval of disbursement of funds.

The objectives of this Environmental and Social Assessment and Management Framework (ESMF) are:

a. To establish clear procedures and methodologies for environmental and social planning, review, approval and implementation of subprojects to be financed under the Project
b. To carry out a preliminary assessment of environmental and social impacts from project investments and propose generic mitigation measures.
c. To specify appropriate roles and responsibilities, and outline the necessary reporting procedures, for managing and monitoring environmental and social concerns related to subprojects
d. To determine the training, capacity building and technical assistance needed to successfully implement the provisions of the ESMF
e. To provide practical resources for implementing the ESMF

1.8 Due Diligence Principles

This ESMF considers and incorporates principles of due diligence that will be applied during project preparation and implementation in managing potential environmental and social risks that may be encountered. The key due diligence principles are as follows:

Principle 1: Review and Categorization. All physical interventions will be subject to a social and environmental review and shall be categorized based on the magnitude of potential impacts and risks in accordance with environmental and social screening criteria.

Principle 2: Social and Environmental Assessment. As per the Government of Maldives regulatory requirements, where necessary Initial Environmental Evaluations (IEEs) or Environmental and Social Impact Assessments (ESIAs) will be undertaken to address, as appropriate, the relevant social and environmental impacts and risks. The Assessment will also propose mitigation and management measures relevant and appropriate to the nature and scale of the proposed project as described earlier.

Principle 3: Applicable Social and Environmental Standards. The ESMF will refer to the applicable World Bank Operational Policies and Environmental Health and Safety (EHS) Guidelines, as well as policies and standards of the Government of Maldives. The Assessment will establish the project's overall compliance with, or justified deviation from, the respective World Bank Operational Policies, Performance Standards and EHS Guidelines where applicable. The Assessment will address compliance with relevant Maldivian laws, regulations and permits that pertain to social and environmental matters.

Principle 4: Environmental and Social Management System. For all physical activities, an Environmental and Social Management Plans (ESMPs) and monitoring indicators will be developed which addresses the relevant findings, and draws on the conclusions of the assessments. The ESMPs will describe and prioritize the actions needed to implement mitigation measures, corrective actions and monitoring measures necessary to manage the impacts and risks identified in the assessments. These actions will be costed and reflected as part of the contractual documents of the civil works contracts.

Principle 5: Consultation and Disclosure. For all activities affected communities will be consulted within a structured and culturally appropriate manner. If principle project activities or subproject activities are assessed to have significant adverse impacts on affected communities, the process will ensure their free, prior and informed consultation as a means to establish whether those activities have adequately incorporated affected communities' concerns. In order to accomplish this, this framework as well as all other safeguard instruments will be made available to the public by the borrower for a reasonable minimum period. The process will be documented and account will be taken of the results of the consultation, including any actions agreed resulting from the consultation. For projects with adverse social or environmental impacts, disclosure will occur early in the assessment process, and on an ongoing basis.

Principle 6: Grievance Redress Mechanism. To ensure that consultation, disclosure and community engagement continues throughout project implementation, a grievance redress mechanism will be established, scaled to the risks and adverse impacts of the project or subproject, as part of the management system. The grievance redress mechanism will allow for concerns and grievances about the project's social

and environmental performance raised by individuals or groups from among project-affected communities to be received and to facilitate resolution of those concerns and grievances.

Principle 7: Monitoring and Reporting. All ESMPs will be monitored based on the monitoring schedule identified in the ESMP by the relevant responsible party. The Environmental and Social Officer will be responsible to ensure the monitoring activities have taken place including his/her monitoring and consolidate monitoring report is prepared bi-annually.

Principle 8: Training. Training to ensure project staff, staff of civil contracts and other parties who would play a role in managing environmental and social impacts will be necessary to ensure successful implementation of this ESMF. Necessary budget should be allocated to carry out the training plan.

1.9 ESMF Preparation Approach

The ESMF has been prepared in accordance with applicable World Bank safeguard policies, national regulations and is based on literature reviews, data gathering and analysis from previous studies.

Documentary Review and Primary Data Collection: The following documents were reviewed for analysing the fisheries sector, relevant policies framework, institutional aspects and associated environmental and social issues:

- Maldives – Sustainable Fisheries Development Project preparation Aide Memoire and the proposed project concept notes to gain deeper understanding of the objectives and activities;
- The national policies and legislations relevant to project activities such as:
  a. The Constitution of Maldives;
  b. Relevant legislations specific to fisheries, environment and other related project areas
  c. Strategic Action Plans of key sectors;
  d. Policies specific to sectors of fisheries, environment, lands, regional / county development, etc.;
- The World Bank Safeguard Policies and other applicable national sector safeguards documents;
- Environmental and Social Management Framework documents prepared for similar development projects for the environmental sector;
- Environmental Impact Assessment Reports for similar project area and scope.

In addition to literature review additional information was collected through consultations. Existing working conditions, and associated environmental and social issues assessment were made through select site visits. These data collection and assessment includes:

- Assessment of the value of key receptors and their sensitivity to impacts;
- Baseline conditions of key environmental parameters such as air quality, sediment quality, sea water quality through review of recent environmental assessment reports conducted in the project area.
- Socioeconomic baseline conditions obtained through literature review of relevant reports recently prepared for the project area;
- Review of existence of sensitive and protected areas close to the project area;
- Indications of limitations and uncertainties;

- The natural resource base existing in the proposed project intervention areas was profiled from existing data and information from key government office and non-state actors through the scoping exercise and presented as baseline information.

Beneficiaries Identification and Stakeholder's consultation: The main beneficiary is the Ministry of Fisheries and Agriculture (MoFA) and the Marine Research Centre (MRC). However, collaboration is required with various ministries and government offices including the Ministry of Environment and Energy, Environmental Protection Agency, Ministry of Tourism, Ministry of Housing, Ministry of Economic Development, Maldives National Defence Force (MNDF) - Coastguard, Maldives Police Services, Maldives Customs Services, Maldives National University, and the local Island Councils. The Stakeholder engagement was undertaken through consultative meetings during the SFDP project formulation and site visits in selected project intervention areas and involved the following:

- Meetings with the Component Coordinators, Technical Coordinators and staff with a view to understanding the design, scope and objective of the SFDP
- Agency level consultations with technical officers of implementing agencies to better understand the local priority intervention areas, the selection process and criteria, as well as availability of capacity for management of the social and environmental mitigation process;
- Community meetings at selected project intervention sites was not conducted for this specific project due to uncertainties at this stage. The project management does not want to raise the expectations in the formulation phase. Lessons learnt and experiences gained from meetings conducted for similar projects reaching to different island community stakeholders, thereby enabling community concerns to be captured and addressed in the ESMF. Once the project starts there will be opportunities for community involvement and for the stakeholders to take the ownership;
- Consultation will be held with stakeholders and nominated agency representatives to review the Draft ESMF and identify the gaps that needed to be completed to produce the final document;
- Instituting a review process during engagement to ensure that the objective is well understood by the stakeholders and the data gathered is sufficient in addressing the scope of the assignment.

Data Analysis and Outcome: The data and information generated using the above methodologies were used for preparation of this ESMF. The data analysis was aimed to garner analysed data and information for the following: -

- Environmental and social aspects likely to be impacted by the project activities;
- Potential environmental and social impacts of SFDP activities with special emphasis on project activities and other activities involving infrastructure construction, natural resource management or activities in or near critical natural habitats;
- Mitigation measures for potential impacts;
- Roles and responsibilities of participating institutions in implementation of the ESMF;
- Reporting and monitoring framework for the ESMF implementation such as structures / tools for environmental reporting, and ESMF monitoring indicators;
- Grievance handling mechanism to address concerns by project beneficiaries, environmental complaints, and related social conflicts.

1.10 Implementation of ESMF

This ESMF shall be used a guiding document and shall be followed for entire project cycle starting with project screening followed by site assessment, design considerations, impact assessment, mitigation measures selection, regulatory compliance, capacity building, project construction and sustainable operation. Institutional arrangement shall ensure that ESMF is integrated into planning of each project/subproject.

1.11 The ESMF as a Living Document

ESMF shall be maintained as a dynamic document and shall be updated based on the following considerations time to time:

- Any aspects not envisaged at the project preparation stage and thus not covered in ESMF. Such aspects shall be assessed and appropriate measures shall be included in the ESMF.
- Unexpected situations and/or changes in the project or sub-component design.
- Change in policies, new regulations, change of safeguard policies of funding agencies, international treaties
- Experience gained from implementation of ESMF and need for improvement in the ESMF
- Changes in the Government setup and institutional framework requiring appropriate alignment in ESMF

Any change and modification in ESMF shall be shared with World Bank and communicated to targeted beneficiaries and other stakeholders.

2. Chapter 2: Introduction to Prevailing Environmental and Social Conditions in Project Area

The Republic of Maldives, is a South Asian island country, located in the Indian Ocean about 671 km southwest of Sri Lanka. It is one of the world's most geographically dispersed countries, as well as the smallest Asian country by both land area and population. Malé is the capital and most populated city, for its central location. The chain of twenty six atolls stretches from Ihavandhippolhu Atoll in the north to Addu City in the south with 1190 coral islets stretched over an area of 90,000 km^2.

The atolls are composed of live coral reefs and sand bars, situated atop a submerged ridge 960 km long that rises abruptly from the depths of the Indian Ocean. The islands consist of coral, sea grass, seaweed, mangrove and sand dune ecosystems which are of great ecological and socio-economic significance. Generic physical characteristics across the atolls, including topographic, geographic and climatic conditions across the atolls do not vary on great scale. Similarly, the terrestrial ecosystems and marine ecosystems across the atolls are similar, except for minor variations such as the presence of mangroves, wetlands and sensitive marine protected areas. Maldives is home to a number ecologically sensitive marine habitats in shallow and intertidal zones which have been designated as protected areas by the Ministry of Environment.

With global warming and the shrinking of the polar ice caps, the Maldives is directly threatened, as none of its islands rises more than six feet above sea level. In 1987, the Maldives got a preview of this threat when one-third of the nation was flooded. To stave off flooding as much as possible, Government has banned the collection of coral. While atoll specific data availability is limited, the project specific assessment will determine the baseline condition of the sub project area. Generalized country specific information on the physical and biological aspects which is largely common to all atolls is given in the following sections:

2.1 Physical Environment:

2.1.1 Geographic and Topographic Characteristics

The islands of the Maldives are flat, with topographic variations generally less than two meters at highest elevation across. Over 80% of the total land area of the country is less than one meter above mean sea level and the highest point recorded in the country is a beach storm ridge at Fuvahmulah, in the Southern most Atoll with an elevation of four meters above mean sea level. Historically the Maldives is divided into 26 natural atolls, however based on a scientific evidence concluded in the 2004 the Maldives is classified into 16 complex atolls, five oceanic faros and four oceanic platform reefs. The 2008 Constitution of the Maldives, in its Schedule Two, divides the Maldives into 20 administrative atolls, and the capital Island of Malé. Most of the atolls have a number of channels or openings in the outer reef which provide access to the islands in the enclosed interior sea or lagoon of the atoll. The shape of the atolls varies from circular and oval, to pear shaped. Some are fairly large such as Huvadhu Atoll in the south, which has approximately 250 islands and a lagoon area covering approximately 2,800 sq. km. Other atolls are very small and contain only a single island, such as Kaashidhoo and Gaafaru in the North Malé Atoll.

The islands can be divided physiographically into three zones namely: i) the foreshore or lower beach, ii) the beach crest (beach top) and iii) the inner island. The foreshore or lower beach zone, which includes the beach area between the high tide line and the beach crest, is totally exposed to wave action, wind and salt spray. It is unstable and composed mainly of coarse coral sand in the lower portion and shingle. The beach

crest or beach top rises gradually and sometimes abruptly to a height of 0.8 to 1 m above the high tide line and includes a stable beach frontage composed of coral sand and rubble. It is exposed to winds and salt spray and its lower margin is occasionally or, in the case of an eroding beach, regularly inundated by seawater during spring tides. The beach crest may extend 5 to 20 m. The microclimate of the inner islands, protected by the beach-crest communities make them good environments for growth of larger trees.

Out of 1,192 coral islands 1,074 are vegetated islands and approximately 450 un-vegetated islands. Vegetated islands comprise both natural vegetated islands and artificial vegetated islands. The un-vegetated islands include natural sand banks (*Finolhu*), natural coral conglomerates above High Tide Level (*Huraa*) and artificial un-vegetated islands. Inhabited Islands in all 3 zones are built up with housing units, either one (most commonly) or two stories and small home garden plots as well as buildings such as restaurants, office buildings and shops. The inhabited islands land use plans are developed with designated areas for industry, harbors.

2.1.1.1 Coastal zone and beaches

Land is the scarcest resource in the Maldives, comprising only 1% of the total reef area 21,436 km^2 . Given the small size of the islands (> 96% of the islands are less than 1km^2 in area), the whole land area can be considered coastal zone. Coastal zone and beaches are naturally dynamic with accretion and erosion patterns depending on complex interplay of oceanographic, climatic, geological, biological and terrestrial processes compounded by human activities.

Coastal ecosystems provide products and services that underpin people's well-being, such as the role they play in the provision of food security, livelihoods and health. These contributions to human wellbeing are made both directly through the products (provisioning services such as through fisheries, tourism, medicine and fuel etc.) provided by marine and coastal ecosystems, as well as indirectly through the variety of life support and production support functions they generate (regulating and supporting services such as fisheries productivity and shoreline protection etc.), and their intrinsic worth (or existence value) to people (cultural, spiritual, aesthetic services).

2.1.1.2 Land Use

Land use in the Maldives revolves around 6 main types of utilization: human settlements, infrastructure islands (e.g. airport, waste disposal, oil storage), economic (tourism, agriculture, fisheries, aquaculture), stewardship or varuvaa, recreation and administrative (e.g. defense). Population increase remains the main pressure on land, despite consistently falling population growth rates, for instance: 3.4 in the 1990s to 1.6 in 2006. The impacts of population increases are more pronounced due to the small land area of the islands, leading to increased competition for the utilization of the little available land and encroachment of beaches for human settlements and other needs.

2.1.1.3 Soils

The soils in the islands of the Maldives are geologically young. They consist of substantial quantities of the unweathered coral parent material, coral rock and sand. Soils are coarse in texture and shallow in depth with a top layer of brown soil (0 to 40 cm in depth) followed by a transition zone on top of the underlying parent material of coral reef limestone. In some low-lying areas and areas subjected to significant mechanical breakdown from human activity, fine deep soils are found with accumulated deposits of clay. In the wetland environment called *kulhi* the depth of the clay is substantial due to the accumulation of material from marine and biological sources over a long period, however as the limited wetlands in the Maldives is protected this material is not used for building purposes. In many places, top layers of the soils

have a weakly developed structure and at times a 30 cm thick hard-pan layer cemented with calcium carbonate is present, preventing penetration of the roots of most plants except large trees. The water-holding capacity of the soil is very poor due to high porosity and very high infiltration rates. The soils of the Maldives are generally alkaline with pH values between 8.0 and 8.8, this high alkalinity is due to the presence of excess calcium. The soils that contain higher levels of humus, as found in depressions and wetlands, are less alkaline. The quality of the soils in the small islands is generally poor with marked deficiency in nitrogenous nutrients, potassium and several micronutrients particularly iron, manganese and zinc. Though the phosphorus content of the soils is high it is unavailable to plants as it is present mostly in the form of calcium phosphate.

2.1.2 Water Resources

Freshwater resources are scarce in the Maldives. There are no rivers or streams in the islands. The main source of freshwater in the islands is the groundwater aquifer. Increased extraction exceeding natural recharge through rainfall over the years, has dramatically depleted the freshwater availability in inhabited islands. Sewerage contamination and salt water intrusion have made the water in inhabited islands unfit for portable sources thus many inhabited islands obtain water via reverse osmosis of sea water or rain water harvesting for portable uses and drinking water consumed is usually bottled and transported to the Islands.

2.1.3 Climate

The Maldives, in general, has a warm and humid tropical climate with average temperatures ranging between 25ºC to 30ºC and relative humidity ranging from 73 per cent to 85 per cent. The country receives an annual average rainfall of 1,948.4 mm. There is some variation in climatic conditions between northern and southern atolls. The Table 2.1 provides a summary of key meteorological findings for Maldives.

Table 2.1: Key meteorological Conditions of Maldives

Parameter	Value
Average Rainfall	9.1mm/day in May, November 1.1mm/day in February
Maximum Rainfall	184.5 mm/day in October 1994
Average Air Temperature	30.0º C in November 1973 31.7º C in April
Maximum and Minimum Temperatures	34.1º C in April 1973 17.2º C in April 1978
Average Wind Speed	3.7 m/s in March 5.7 m/s in January, June
Maximum Wind Speed	W 31.9 m/s in November 1978

2.1.4 Wave Energy and Tidal Effect

Wave energy is important for sediment movement and settlement, and it is also a crucial factor controlling coral growth and reef development. Waves have been attributed to the diversity and the abundance of coral and algal species. These aspects have implications for the type and perhaps the supply of sediments to the island. Tides affect wave conditions, wave-generated and other reef-top currents. Tide levels are believed to be significant in controlling amount of wave energy reaching an island, as no wave energy crosses the edge of the reef at low tide under normal conditions. In the Maldives, where the tidal range is small (1m), tides may have significantly important influence on the formation, development, and sediment movement

process around the island. Tides also may play an important role in lagoon flushing, water circulation within the reef and water residence time within an enclosed reef highly depends on tidal fluctuations.

2.1.5 Natural Hazard (Seismicity, Tsunami, Typhoons):

Maldives is not prone to seismicity. However, seismicity of the surrounding plate margins while not in the immediate vicinity of the Maldives causes earth tremors, and more recently the tsunami, which originated some 700km away was experienced. Monsoon weather patterns characterize the islands, but the impact of typhoons has occurred mainly in the form of storm waves which travel out as swell. Several destructive storms have been recorded in the natural hazard history of the Maldives.

2.2 Biological Environment

2.2.1 Terrestrial Flora

The tropical vegetation of Maldives differs in the inhabited and in the uninhabited islands. Inhabited islands have small groves of coconut, banana, papaya, drumstick and citrus trees by the homesteads, while breadfruit trees and coconut palms are grown in available patches of land. On the other hand, uninhabited islands natural vegetation line of the beach crest composes of strand plant communities including a distinct association of trees and shrubs and a few sand binding creepers and herbaceous plants. These strand plant communities include the *Scaveola taccada (Magoo), Pemphis acidula (Kuredhi), Suriana maritime (Halaveli), Tournefortia argentea (Boashi)* and *Guettarda speciosa (Uni)*. Despite the poor and infertile soils, and lack of different habitats, the Maldives has a relatively diverse vegetation cover. The plant communities in the islands grow as per the physiographic morphology of the Islands. According to the Fifth National Report to the United Nations Convention on Biological Diversity, the flora of the country consists of 583 vascular plants of which 323 (55%) are cultivated plant species, while 260 are native and naturalized plants. Of the 260 native or naturalized plant species, fewer than 100 are truly indigenous.

Each of physiographic zone in an Island provides relatively uniform environment with its own associated plant community. As a result of the harsh environmental of the foreshore conditions, this zone supports no vegetation except occasional creeping sand-binders such as *Ipomoea littoralis* and *I. biloba* along with a few individuals of *Launaea pinnatifida* and *Portulaca alata* in the upper portion. The microclimate of the inner islands, protected by the beach-crest communities, supports the growth of a number of trees and shrubs, which occur either in pure stands or as a mixed forest. In many islands coconut grows abundantly in the areas immediately adjacent to beach crest vegetation and in moist areas the shelter provided by a complete coconut tree canopy supports the growth of under story tree species such as *Morinda citrifolia* and *Guettarda speciosa*. In some places, *Pandanus odoratissimus, Calophyllum inophyllum* and *Hibiscus tiliaceus* are also found in low numbers within coconut groves. In moist areas small pure stands of *Hernandia nymphaeifolia, Cordia subcordata* and *Barringtonia asiatica* are present.

2.2.2 Wetland Ecosystems

There are at least 75 islands with wetland or mangroves in the Maldives. The wetland or mangrove areas cover a total area of approximately 8.01 km^2 according to a survey conducted by the Ministry of Planning and National Development in 2007. The island of Gan in the Lamu Atoll are noted as one of the largest inhabited islands that also has wetland areas. Wetland areas in the Maldives are listed on the sensitive list and development activities are approved only after environmental due process of screening for EIAs. Development activities in close proximity to these areas on inhabited islands may be limited to environmental sustainable projects.

2.2.3 Faunal Diversity

The islands of the Maldives are not known for their abundant wildlife in comparison and demonstrate a rather small proportion of the representatives in comparison to the rich terrestrial faunal diversity of the region. Maldivian reptilian fauna including: two gecko (*Hemidactylus spp*) commonly seen throughout the country; two agamid lizard including the common garden lizard or blood sucker *Calotes versicolar*; the snake skin, *Riopa albopunktata*; and two species of snakes including the common wolf snake *Lycodon aulicus*, and *Typhlops braminus.* One species of frog is known, the short-headed *Rana breviceps*, and a larger toad, *Bufo melanostictus* has also been found. Among the reptiles of the Maldives, the Maldivian Black Turtle (*Melanochelys trijuga thermalis*) is a species of turtle listed on the International Union for Conservation of Nature (IUCN) Red List as 'near threatened'. The Maldivian black turtle is currently found in only three islands which are protected: K. Kaashidhoo, M. Muli and HDh. Kunburudhoo. Maldives has also been noted to be particularly rich in spider species. Some 130 insect species including scorpions, centipedes, rhinoceros beetle and paper wasps were identified during scientific investigations across the islands. The only native mammals endemic to the country are the two subspecies of fruit bats, *Pteropus giganteus ariel* and *Pteropus hypomelanus maris.* The latter is very rare and has been recorded only once in the Maldives, in Addu Atoll (Holmes et al, 1994). Other mammals, all likely to have been introduced, are the house mouse, black rat, Indian house shrew and cats (Webb, 1988). In the homestead, the domesticated animals reared are chickens and goats.

Over 167 bird species have been recorded in the Maldives including seabirds, shorebirds and terrestrial birds, a majority include breeding residents, southern winter visitors (shearwaters and storm-petrels), and northern winter visitors (mostly waders, raptors, passerines, as well as some terns). For some of the latter, the Maldives lies at the southern end of the major Indus-Valley – West Indian flyway. A few are introductions, and imported as pets. Very few bird species reside in the country, most of which are seabirds. Terrestrial birds are very minimal compared to other tropical islands and most are likely to be introductions. At least 40 to 50 species of seabirds are seen in the Maldivian waters, of which only 13-15 are known to nest and breed in the country. Some of them are terns including *Sterna sumatrana, S. albifrons, S. anaethetus, S. dauglli, S. bergi, S. bengalensis,* and *S. fuscata, S. saundersi*; others include two species of noddies, *Anous stolidus* and *A. tenuirostris*, as well as the white tern *Gygis alba monte* which is known to breed only in Addu Atoll (Anderson, 1996). Others such as frigate birds, white-tailed tropic birds, boobies and some shearwaters are also known to breed in the Maldives (Shafeeg, 1993). Most of the shorebirds found are common winter visitors to the Maldives; however, there are some resident and immigrant species. Four subspecies of bird have been identified as endemic to the Maldives (MHAHE, 2002). The bird subspecies endemic to the Maldives are Maldivian pond heron (*Ardeola graii phillipsi*), Maldivian little heron (*Butorides striatus albidulus*), central Maldivian little heron (*Butorides striatus didii phillipsi*), and the Maldivian water hen (A*mouronis phoenicurus maldivus*).

2.2.4 Marine Biodiversity

In contrast to the terrestrial biological diversity found in the country, marine biological diversity shows an outstanding richness, especially in the coral reefs. Indeed, the marine biodiversity of the archipelago is among the richest in the entire region, and the Maldives' has been recognized as having one of the world's most diverse marine ecosystems.

More than 250 different species of hermatypic corals exist, belonging to 41 genera from the north and 55 from the south. Over 1 200 reef fish species have been recorded15 (Pernetta, 1993). As many as 5000 different shell species, 100–200 sponge species, more than 1000 species of marine crustaceans and over

100 species of echinoderms exist. A large range of different types of marine algae16 have also been documented (Pernetta, 1993). In addition, a variety of sharks, eels, rays, dolphins, whales and aquarium fish are commonly observed throughout the archipelago. Five species of endangered turtles, namely loggerhead turtles, green turtles, hawksbill turtles, olive ridley turtles and leatherback turtles, are also know to live in Maldivian waters (Frazier and Frazier, 1987).

The Marine Research Centre (MRC) of the Ministry of Fisheries and Agriculture, has documented economically important fish species in the Maldives. Some 900 species have been identified, nearly 300 of which were completely new records for the Maldives, and 7 of which had never before been recorded anywhere in the world. A second study records some 899 species of pelagic and shore fish, including 201 records new to the Maldives (Randall and Anderson 1993).

Tuna fishing remains particularly important to the economy of the Maldives. Eight different types of tuna and similar fish are harvested commercially form the open seas. Tuna fishing requires live bait fish which are caught in lift nets near the reef and kept alive in the flooded hull of the dhoni. Bait fish are composed of species associated with the reef, and are dependent on a thriving reef environment. Twenty different species, regularly caught and used as bait fish, may be classified in to this group.

Over the last few decades many efforts have been made to ensure the protection of the marine biodiversity and the most sensitive reef ecosystems and habitats of vulnerable charismatic marine species, along with wetlands and mangrove ecosystems have been demarcates as protected areas.

2.2.5 Protected areas:

A total of 33 Marine Protected Areas has been gazetted across the country (Figure 3.1). For the most part these are relatively small, averaging only a few hectares in area. Apart from the traditional live bait fishing and recreational diving, all other activities are officially prohibited in MPAs.

Several government departments are responsible for ensuring the conservation and sustainable use of marine and coastal biodiversity in the Maldives, including the Ministry of Environment and Energy Ministry of Economic Development, the Ministry of Fisheries and Agriculture, and the Local Government Authority. The Environment Ministry not only has the mandate to conserve marine and coastal biodiversity but also promotes sustainable economic development practices via the promotion of environmental management in development activities.

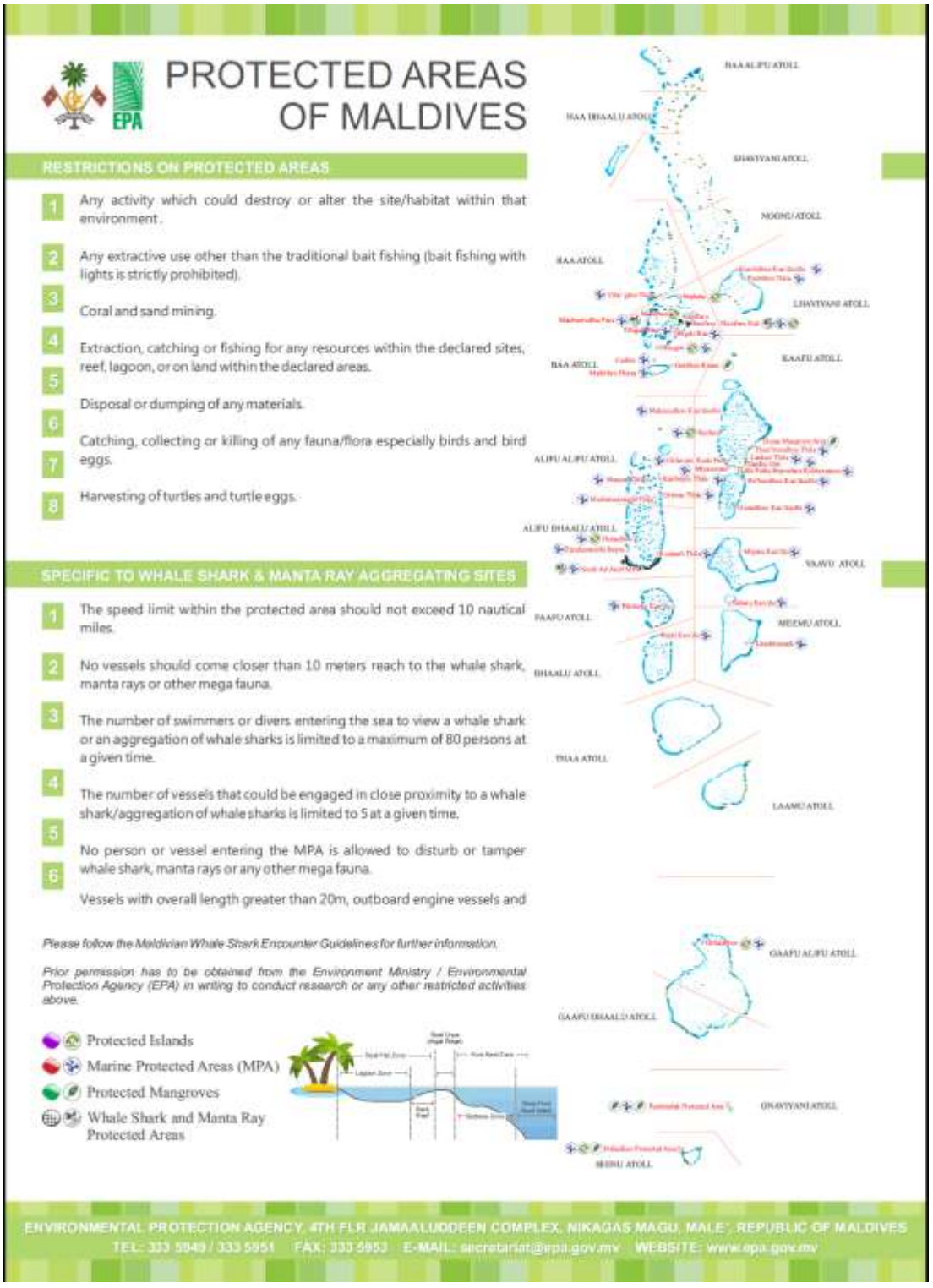

Figure 3.1 Map of the Protected Areas of the Maldives

2.3 Socio-Economic Environment

2.3.1 Demography

The total population enumerated in Census 2014 is 407,660. Details of the total population enumerated is given **in Table 2.2** and **Table 2.3** provides the Resident Population by sex, nationality and locality (Atolls) as per 2014 Census.

Table 2.2: Total Population Enumerated in Census 2014, by Sex

Population	Both Sexes	Male	Female
Total Population	407,660	230,453	177,207
Resident Population	402,071	227,749	174,322
Maldivian	338,434	171,962	166,472
Foreign 1_/	63,637	55,787	7,850
Non-Resident Maldivian	5,589	2,704	2,885

Source: National Bureau of Statist

Map of Total Resident Population

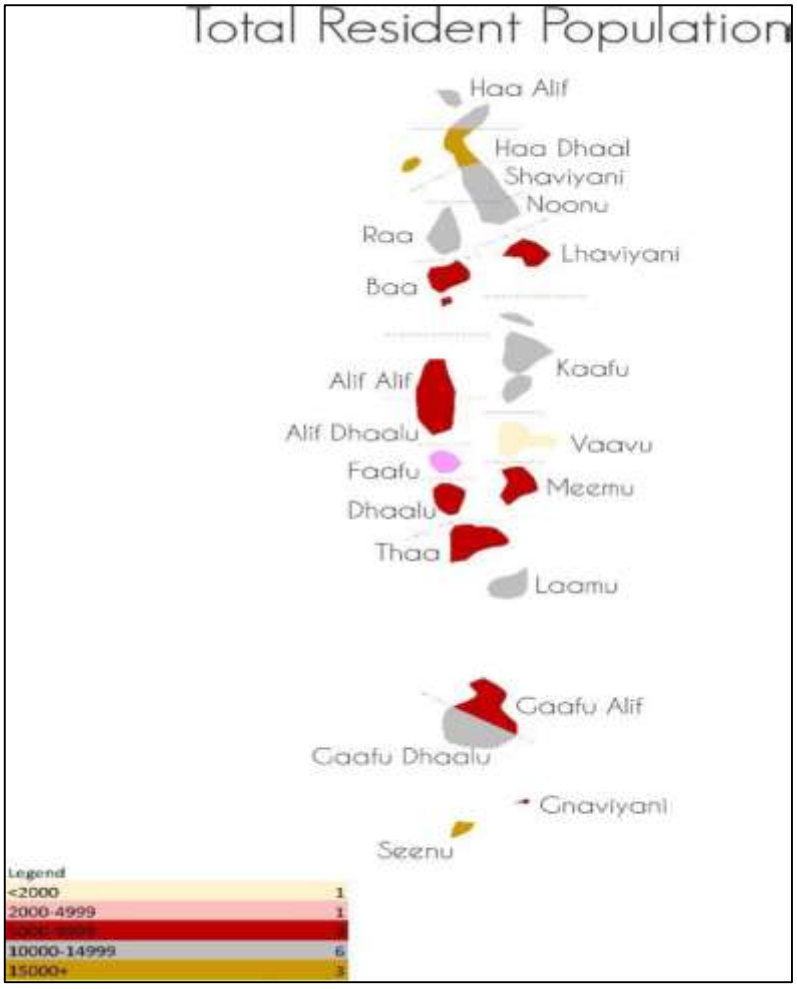

Table 2.3: Resident Population by sex, nationality and locality (Atolls), 2014

Locality	Resident Population 2014									
	Total			Maldivians			Foreigners			
	Both sexes	Male	Female	Both sexes	Male	Female	Both sexes	Male	Female
Republic	**402,071**	**227,749**	**174,322**	**338,434**	**171,962**	**166,472**	**63,637**	**55,787**	**7,850**
Male'	**153,904**	**85,438**	**68,466**	**129,381**	**64,443**	**64,938**	**24,523**	**20,995**	**3,528**
Atolls (Includes Administrative and Non-Administrative Islands)	**248,167**	**142,311**	**105,856**	**209,053**	**107,519**	**101,534**	**39,114**	**34,792**	**4,322**
Administrative Islands	**211,543**	**108,274**	**103,269**	**195,539**	**94,399**	**101,140**	**16,004**	**13,875**	**2,129**
North Thiladhunmathi (HA)	**13,672**	6,464	7,208	**12,939**	5,876	7,063	**733**	588	145
South Thiladhunmathi (HDh)	**19,541**	9,310	10,231	**18,515**	8,449	10,066	**1,026**	861	165
North Miladhunmadulu (Sh)	**12,636**	5,909	6,727	**12,091**	5,497	6,594	**545**	412	133
South Miladhunmadulu (N)	**11,229**	5,403	5,826	**10,483**	4,782	5,701	**746**	621	125
North Maalhosmadulu (R)	**15,819**	7,823	7,996	**14,862**	7,069	7,793	**957**	754	203
South Maalhosmadulu (B)	**9,601**	4,904	4,697	**8,878**	4,280	4,598	**723**	624	99
Faadhippolhu (Lh)	**8,380**	4,073	4,307	**7,905**	3,663	4,242	**475**	410	65
Male' Atoll (K)	**14,092**	8,565	5,527	**12,166**	6,777	5,389	**1,926**	1,788	138
North Ari Atoll (AA)	**6,475**	3,456	3,019	**5,905**	2,991	2,914	**570**	465	105

Locality	Resident Population 2014									
	Total				Maldivians				Foreigners	
	Both sexes	Male	Female		Both sexes	Male	Female		Both sexes	Male	Female
South Ari Atoll (ADh)	**9,086**	4,913	4,173		**8,145**	4,045	4,100		**941**	868	73
Felidhu Atoll (V)	**1,811**	1,052	759		**1,601**	878	723		**210**	174	36
Mulakatholhu (M)	**5,022**	2,552	2,470		**4,705**	2,293	2,412		**317**	259	58
North Nilandhe Atoll (F)	**4,365**	2,161	2,204		**4,119**	1,969	2,150		**246**	192	54
South Nilandhe Atoll (Dh)	**5,786**	3,019	2,767		**5,305**	2,590	2,715		**481**	429	52
Kolhumadulu (Th)	**9,656**	5,020	4,636		**8,901**	4,382	4,519		**755**	638	117
Hadhdhunmathi (L)	**12,676**	6,648	6,028		**11,795**	5,859	5,936		**881**	789	92
North Huvadhu Atoll (GA)	**9,221**	5,126	4,095		**8,334**	4,335	3,999		**887**	791	96
South Huvadhu Atoll (GDh)	**12,690**	6,816	5,874		**11,587**	5,857	5,730		**1,103**	959	144
Gnaviyani (Gn)	**8,510**	4,085	4,425		**7,984**	3,612	4,372		**526**	473	53
Addu City (S)	**21,275**	10,975	10,300		**19,319**	9,195	10,124		**1,956**	1,780	176
Non Administrative Islands	**36,624**	34,037	2,587		**13,514**	13,120	394		**23,110**	20,917	2,193
Resorts	**28,367**	26,093	2,274		**11,609**	11,269	340		**16,758**	14,824	1,934
Industrial Islands and Others	**8,257**	7,944	313		**1,905**	1,851	54		**6,352**	6,093	259
Source: National Bureau of Statistics											

2.3.2 Housing

As per 2014 census, there were 68,249 resident households, out of which 55,949 were Maldivian households and 12,300 as other households. Out of the total households, 39 percent of households are in Male' and 60 percent of households are found in administrative islands of the Atolls and 1 percent in the non-administrative islands of the atolls. The average household size in Male' for a Maldivian household is 5.5 and other households is 6.1. Household size for the whole nation for Maldivian households was at 5.4 percent and 8.1 percent for other households. The household types are divided into 2 categories, which are housing units and collective living quarters (Refer **Table 2.4** for details).

Table 2.4: Total Households by type of housing, by locality, 2014

Type of Households	Republic	Male'	Atolls		
			Atolls	Administrative Islands	Non-Administrative Islands
Housing Units	65,765	25,673	40,092	39,919	173
Collective living quarters	2484	1066	1418	968	450

Source: Census, 2014

3. Environmental and Social Legislation, Regulatory and Institutional Framework in the Republic of Maldives

This chapter seeks to present a review of relevant legal, institutional and administrative framework relevant to the project. International laws and conventions that bear relevance to the implementation of the project have also been highlighted.

3.1 Constitutional and Regulatory Framework Overview

3.1.1 Overview of the Constitution of the Republic of the Maldives, 2008.

The Maldives democratisation story began in 1932 with the first written Constitution and the introduction of universal adult suffrage. The Reform Agenda, proposed by the then President, culminated in the adoption of a new Constitution in 2008, set the country on a path of change that was unprecedented in the country's history. The changes introduced represented a paradigm shift in Maldivian society: political parties started functioning; oversight institutions, including the Human Rights Commission, the Anti-Corruption Commission, the Auditor General's Office, and an independent Elections Commission, were established; the new constitution provided for a complete separation of powers between the executive, legislative, and the judicial branches of the State.

Article 22 - Protection of the environment: The State has a fundamental duty to protect and preserve the natural environment, biodiversity, resources and beauty of the country for the benefit of present and future generations. The State shall undertake and promote desirable economic and social goals through ecologically balanced sustainable development and shall take measures necessary to 6 foster conservation, prevent pollution, the extinction of any species and ecological degradation from any such goals.

Article 23 - Economic and social rights: Every citizen the following rights pursuant to this Constitution, and the State undertakes to achieve the progressive realisation of these rights by reasonable measures within its ability and resources: (a) adequate and nutritious food and clean water; (b) clothing and housing; (c) good standards of health care, physical and mental; (d) a healthy and ecologically balanced environment; (e) equal access to means of communication, the State media, transportation facilities, and the natural resources of the country; (f) the establishment of a sewage system of a reasonably adequate standard on every inhabited island; (g) the establishment of an electricity system of a reasonably adequate standard on every inhabited island that is commensurate to that island.

Article 67 – Responsibilities and duties: The exercise and enjoyment of fundamental rights and freedoms is inseparable from the performance of responsibilities and duties, and it is the responsibility of every citizen (a) to respect and protect the rights and freedoms of others; (b) to preserve and protect the State religion of Islam, culture, language and heritage of the country; (c) to preserve and protect the natural environment, biodiversity, resources and beauty of the country and to abstain from all forms of pollution and ecological degradation; (d) Every person in the Maldives must also respect these duties.

Article 230 - Decentralised administration: The administrative divisions of the Maldives shall be administered decentrally.

Article 231- Election of Councils: All members of councils created for decentralised administration shall be democratically elected by secret ballot by their respective communities.

Article 232 – Responsibilities: The responsibilities of councils elected to provide for decentralised administration shall include: (a) to provide democratic and accountable governance; (b) to foster the social and economic well-being and development of the community; (c) to establish a safe, healthy and ecologically diverse environment; (d) to achieve such other objects as prescribed by law.

Article 248 - Land, sea and naturally occurring valuable resources: (a) The land, sea, and seabed, including all fish within the territory of the Maldives, and all naturally occurring resources, including metallic ores, petroleum and gas, shall vest in the State. (b) All living, non-living and naturally occurring resources of value within the Exclusive Economic Zone of the Maldives and the seabed shall vest in the State

Article 249 - Ownerless property: Any property found within the territory of the Maldives and any property occurring in the seabed or found drifting in the sea, save those naturally occurring or formed in the sea, without a rightful owner, shall vest in the State. (b) All property such as gold, silver, other precious metals, jewellery, money and items of historical interest, excavated within the territory of the Maldives without a rightful owner, shall vest in the State.

3.1.2 Decentralization Act

The Decentralization Act establishes the local councils as the highest political authority in the locality and who shall have executive powers to be exercised in accordance with this Act. The Act establishes Atoll Councils, Island Councils and City Councils. As per Articles 24 (e) and 42 (e) of the Decentralization Act provision of electricity, water, sewerage and other utility services in their jurisdictions according to the laws of the Maldives is the responsibility of Island Councils and City Councils respectively. Articles 24 (b) and 42 (b) of the Act Mandate Island Councils and City Councils to provide adequate waste management services. As per Article 23 (h), (i) and Article 41 (g), Island Councils and City Councils are responsible for release of land for development according to the provisions of the Land Act, the Land Use Plan of the island, and any guidelines issued by the Ministry responsible for land.

3.2 Environmental Regulation, Institutional Framework and Policies

3.2.1 The Environmental Protection and Preservation Act, 1993

The Environmental Protection and Preservation Act (EPPA, Act No: 4/93) is the framework environmental law in Maldives and came into force on 19th March 1993. It aims at improving the legal and administrative co-ordination of the diverse initiatives in the field of environment with the ultimate objective of integrating environmental considerations into the country's overall economic and social development. The authority responsible for the Environment Act is the Ministry of

Environment and Energy. The following Articles 2, 4, 5, 6, 7, and 8 of the law are relevant to this project.

Article 2 states that the concerned government authorities shall provide the necessary guidelines and advise on environmental protection in accordance with the prevailing conditions and needs of the country. All concerned parties shall take due considerations of the guidelines provided by the government authorities. **Article 4** states that the Ministry of Environment shall be responsible for identifying protected areas and natural reserves and for drawing up the necessary rules and regulations for their protections and preservation. According to **Article 5 (a)** of the Act, an Environmental Impact Assessment study shall be submitted to the Ministry of Environment before implementing any development project that may have a potential impact on the environment. As per **Article 5 (b),** The Ministry of Environment shall formulate the guidelines for EIA and shall determine the projects that need such assessment as mentioned in paragraph (a) of this clause. As per Article 6, the Ministry of Environment has the authority to terminate any project that has any undesirable impact on the environment. A project so terminated shall not receive any compensation. **Article 7** states that any type of waste, oil, poisonous gases or any substances that may have harmful effects on the environment shall not be disposed within the territory of the Maldives. In cases where the disposal of the substances becomes absolutely necessary, they shall be disposed only within the areas designated for the purpose by the government. If such waste is to be incinerated, appropriate precaution should be taken to avoid any harm to the health of the population. **Article 8** states that Hazardous/Toxic or Nuclear Wastes that is harmful to human health and the environment shall not be disposed anywhere within the territory of the country.

3.2.2 The Environmental Impact Regulations, 2012

Environmental Impact Assessment Regulations were issued by the Ministry of Environment and Energy (MEE) on 8 May 2012. The first step in environmental assessment process involves screening of the project to be classified as one that requires an Environmental Impact Assessment (EIA) or not. Based on this decision, the Ministry, EPA and other stakeholders decides the scope of the EIA which is discussed with the proponent and the EIA consultants in a "scoping meeting". The consultants then undertake the EIA starting with baseline studies, impact prediction and finally reporting the findings with impact mitigation and monitoring programme. This report follows the principles and procedures for EIA outlined in the EIA regulations. The EIA report is reviewed by EPA following which an EIA Decision Note is given to the proponent who should implement the Decision Note accordingly. As a condition of approval, appropriate environmental monitoring may be required and the proponent shall have to report monitoring data at required intervals to the EPA. The project proponent is committed to implement all impact mitigation measures that are specified in this EIA report. Furthermore, the proponent is committed to environmental monitoring and shall fulfil environmental monitoring requirements that may be specified in the EIA decision note as a condition for project approval. The processes specified in this ESMF for the EIA or EMP preparation is based on the EIA regulations of 2012. Any requirement to carry out civil engineering works, such as construction of channels or harbours would need to comply with the requirements of the Environmental Impact Assessment Regulations, 2007. The requirement for and the regulations relating to the preparation of Environmental Impact Assessments are set out in the Environment Impact Regulations, 2007 which are enforced under Environment Protection and Preservation Act (Law No. 4/93).

Under this Law: (a) The "environment" means all the living and non-living things that surround and effects the lives of human beings; and (b) A "project" is any activity that is carried out with the purpose of achieving a certain social or economic objective.

This regulation has undergone number of amendments in 2013, 2015 and 2016. These amendments included revision of EIA review period and associated costs, qualification required for monitoring the Environmental Management Plan, revision to the list of projects that requires EIAs, projects that can be undertaken by simply applying mitigation measures defined by EPA such as for dredging of harbors, clearance of vegetation within allocated plots for households and for roads, transferring EIA decision making to Minister of Tourism for tourism related activities; categorization of EIA consultants, point system for consultants to assess performance and license suspension, a code of conduct for consultants, and increment to the fine for non-compliance of regulation and violations.

3.2.3 The Regulation on Environmental Liabilities (Regulation No. 2011/R-9)

The objective of this regulation is to prevent actions violating the Environmental Protection and Preservation Act 4/93 and to ensure compensations for all the damages that are caused by activities that are detrimental to the environment. This include all the activities that area mentioned in clause 7 of EPA Act as well as those activities that take place outside the projects that are identified here as environmentally damaging. The regulation sets mechanisms and standards for different types of environmental liabilities and equal standards that shall be followed by the implementing agency while implementing the regulation. According to this regulation the Government of Maldives reserves the right to claim compensation for all the activities which have breached the Environmental Protection and Preservation Act 4/93.

3.2.4 Environmentally Sensitive Areas (ESA) List, 2014.

Environmentally Sensitive Areas (ESA) are islands with unique features, reef systems, mangroves, wetlands, sea grass beds or places that are vital to the long-term maintenance of biological diversity, beach sediments, soil, water and other natural resources and features especially as they relate to human health, safety, and welfare, both on an island and in an atoll context. These features are highly valued, both for their scenic beauty and for the habitats they provide for the flora and fauna. The compilation of the list was initiated in 2009 with the assistance of the local Island Offices and other stakeholders. The list has been produced to identify environmentally and economically significant areas to offer protection, safeguard and enhance the conservation of the biological diversity of the country.

Commencing from 1st January 2011, under the Environmental Protection and Preservation Act: 4/93, the sites listed had been identified as Environmentally Sensitive Areas (ESAs). This ESA list helps in safeguarding, minimizing and mitigating the environmental impacts from different development projects, by monitoring the development in the area with the involvement of all stakeholders. The areas identified in the ESA are not protected areas. A site/habitat being identified as an ESA does not indicate that sustainable development cannot take place. It encourages development to take place, taking into consideration the conservation of the sensitive area, there

by mitigating the negative impacts. It has been noted that ESA cannot be used as a reason for refusing sustainable development applications.

3.2.5 Handling of trees and palms

Pursuant to Environment Protection and Preservation Act, Law Number 4/93, the Environment Ministry has made a by-law with the purpose of educating developers about the importance of trees including best management practices for maintaining trees and provide standards for preservation of trees in the Maldives and set down rules and regulations to be adhered to prior to commencing felling, uprooting, digging out and exporting of trees and palms from one island to another in Maldives. The bylaw states that the cutting down, uprooting, digging out or exporting of trees and palms from one island to another is only permitted if it is necessary and there is no other alternative. It further states that for every tree or palm removed in the Maldives two more should be planted and grown in the island. The bylaw prohibits the removal of the following tree types;

- The coastal vegetation growing around the islands extending to about 15 meters into the island are protected by this bylaw;
- All the trees and palms growing in mangrove and wetlands spreading to 15 meters of land area are protected under this bylaw;
- All the trees that are in a designated protected area;
- Trees that are being protected by the Government in order to protect species of animal/organisms that live in such trees; and
- Trees/palms that are unusual in their structure.

3.2.6 Regulation on Sand and Aggregate and Coral Mining

This regulation addresses sand mining from islands and sand banks. Sand and aggregate mining from beaches of any island whether inhabited or uninhabited is banned for protection of the islands. Permissions for sand and aggregate mining from other areas shall be obtained from the relevant authorities. There is another similar regulation named "Regulation on Coral Mining (1990), which is only applicable to coral mining from the 'house reef' of islands and the atoll rim reefs

3.2.7 Regulation Governing Reclamation and Dredging of Islands and Lagoons of Maldives 2013/R-15

The Article 22 of the Constitution states that the State shall undertake and promote desire based economic and social goals through ecologically balanced sustainable development and shall take measures necessary to foster conservation, prevention pollution, the extinction of any species and ecological degradation from any such goals and this regulation is constituted for the purpose of pursuing this undertaking. It determines the guidelines that would minimize the damage caused to the environment due to reclamation and dredging pursuant to Article 3 of Environment Protection and Preservation Act. This regulation is enforced by the Environmental Protection Agency.

3.2.8 Law of Fisheries (No. 5/87) (Direct Relevance to the project)

The major governing regulation is the Fisheries Act of the Maldives (Act no: 5/87), which empowers the Ministry of Fisheries and Agriculture (MoFA) to manage and develop all marine living resources in the maritime zones of the Maldives in a sustainable manner. The Fisheries Act specifically provides for the sustainable management of fisheries resources and their ecosystems in the maritime zones of the Maldives; provides for the control of fishing and related activities

carried out by all persons within the maritime zones of the Maldives and over Maldivian persons on the high seas and foreign nationals working on Maldivian registered vessels on the high seas; and provides for the best practice management of aquaculture and for administrative and enforcement functions to be carried out in connection therewith. The objectives of this Act are:

i. To provide for the long-term conservation and sustainable use of fisheries resources of the Maldives for the present and future generations of the Maldives; and
ii. To provide a framework for a transparent management of the fisheries resources of the Maldives in accordance with principles of equity and good governance; and
iii. To promote value addition to the fish and fisheries products of the Maldives with a view to ensuring the maximum economic and social benefits to the Maldives; and
iv. To promote the efficient and effective regulation of the aquaculture industry in order to contribute to the protection of the marine environment of the Maldives, support economic development, and the food security of the people of the Maldives; and
v. To provide an effective framework to prevent, deter and eliminate illegal, unreported and unregulated fishing; and
vi. To ensure a timely and effective implementation of international fisheries and related conservation and management obligations of the Maldives

The Fisheries Act (5/87) is primarily an act that unequivocally provides the MOFA with the mandate to oversee all fisheries activities in the country. In addition, it describes the conditions for the licensing of foreign vessels or joint ventures in the EEZ, provides for apprehension of vessels, arrest, and penalties. This legislation empowers the Ministry to establish and administer regulations for sustainable utilization and conservation of fisheries stocks and living marine resources, including protecting threatened species and establishing conservation areas. There are other applicable laws which backs up these and include the Ocean Territories Act (Act No. 6/96), Environment Protection and Preservation Act (Act No. 4/93), and other laws, decrees, and regulations relating to the use of the exclusive economic zone (EEZ), fisheries, environment, business, foreign investment etc.

The Fisheries Act is supplemented by regulations, rules, and presidential decrees. Various MOFA regulations include those on: fishing in lagoons; prohibitions in fishing; banned fishing gear and methods; protected marine life; protection of certain species from harvest, prior permission required for non-traditional gear; reporting violations of the Fisheries Act and regulations; reporting of all fish catch and effort; issuing of licences to fish in the Maldivian EEZ; describes licence issuance and requirements for the vessels licensed to fish in the EEZ; marine scientific research in Maldivian waters; catch and export of yellowfin/bigeye tuna; installation of fish cages and culture in fishing lagoons; and installation of FADs on fishing grounds. The Ministry of Fisheries and Agriculture has statutory responsibility for the rational and sustainable management of all living marine resources within the Exclusive Economic Zone (EEZ) of the Maldives. Several legislative actions in the Maldives have been undertaken specifically for marine turtle conservation.

Currently the Fisheries Act is being reviewed with the assistance of the Food and Agriculture Organizations (FAO). New amendments are proposed with a view to ensuring that the amended

Fisheries Law takes into account the rapidly changing dynamics of local fisheries (including increased range of local fishing operations); incorporation of aquaculture regulations; provides a stronger legal basis for dealing with violators, enhancement of fisheries information provision to MOFA; and includes previously missing aspects of the MOFA mandate for fisheries and marine resources conservation and protection.

3.2.9 Dewatering Regulation (213/R-1697)

This regulation is constituted for the purpose of ensuring that the drainage of water in the islands of the Maldives in the process of dewatering and subsequent dumping of discharge water into the soil or to the sea, is conducted with minimal impact to the environment. Given water is the source of life and one of the essential elements forming the environment, the purpose of this regulation is to avoid contamination of the groundwater table, to mitigate the damage caused to the water table; and to protect the habitat, the environment, the public and all living organisms from the impact of dewatering. This regulation is enacted from the rights vested on the Ministry of Environment from Article 3 of Act 4/93(Maldives Environment Protection and Preservation Act). This regulation is enforced by the Environment Protection Agency on behalf of the Ministry. In addition to the institutions of the state, it is a responsibility of every individual to protect the groundwater table of the islands of the Maldives and to manage it in a sustainable manner. The process of dewatering for any industrial purpose shall be conducted on any island pursuant to the guidelines prescribed in this regulation and after having obtained permission in writing from the implementing agency or from their delegate.

3.2.10 Waste Management Regulation, 2013

Waste Management Regulation (WMR) was published on August 2013 and is effective from February 2014. It has been implemented by Environmental Protection Agency (EPA). The aim of WMR is to implement the national waste policy which contains specific provisions to: (a) Implement measures to minimize impacts on human health, (b) Formulate and implement waste management standards, (c) Implement an integrated framework for sustainable waste management, (d) Encourage waste minimisation, reuse and recycling (e) Implement Polluter-Pays Principle (f) Introduce Extended Producer Responsibility

WMR contains four main sections: (i) Waste management standards: Defines standards for waste collection, transfer, treatment, storage, waste site management, landfills and managing hazardous waste. (ii) Waste management Permits: Defines approval procedures for waste sites, (iii) Waste transfer: Standards and permits required for waste transport on land and sea, including trans-boundary movements, (iv) Reporting requirements: Defines reporting and monitoring requirements and procedures, (v) Enforcement: Defines procedures to implement WMR and penalties for non-compliance.

If any hazardous waste including electronic waste is to be disposed in the Maldives, it should be handled by waste sites specifically approved to manage hazardous and Special Category waste. Transportation and handling shall also conform to the standards specified in WMR. If the waste is to be exported for reuse or disposal in another country, an application needs to be submitted to EPA 3 months prior to the shipping date. EPA will issue an approval based on compliance with

WMR clauses and international conventions. Thus, all the subprojects will need to comply with the WMR in disposing construction and decommissioning related wastes as applicable.

3.2.11 Noise and Excessive Vibration (Pollution Control) Regulations, 2008

These regulations apply to operation of equipment or machinery and engagement in commercial or industrial activity that is likely to emit noise or excessive vibrations. The regulations specify the limits or levels within which these shall be undertaken. The Regulations also stipulate in the second schedule that construction activities undertaken during the night should not emit excessive noise beyond the permissible levels.

3.2.12 Convention on Conservation of Biological Diversity, Regulations 2006

The Maldives ratified the Convention on Biological Diversity (CBD) on 28 October 1992. Ten years later in 2002, the Maldives developed the first National Biodiversity Strategy and Action Plan (NBSAP). The vision of the first NBSAP was:

> "a nation which appreciates the true value of the natural environment, utilizes its natural resources in a sustainable manner for national development, conserves its biological diversity, shares equitably the benefits from its biological resources, has built the capacity to learn about its natural environment and leaves a healthy natural environment for future generations (2002, p. 20)."

At the 12th Conference of the Parties to the CBD, Parties further agreed that the fifth national reports should facilitate the provision of essential information for a mid-term review of progress towards the implementation of the Strategic Plan for Biodiversity 2011-2020 and progress towards the Aichi Biodiversity Targets. The Government has formulated a second NBSAP to address biodiversity issues, and developed an implementation plan with achievable targets. The new NBSAP is in line with the CBD targets for 2010- 2020. The Government of the Maldives has developed and adopted planning procedures and processes that consider biodiversity conservation. The incorporation of biodiversity conservation in the Fourth Tourism Master Plan, the Strategic Action Plan 2009-2013, the National Sustainable Development Strategy (NSDS) and Third National Environment Action Plan (NEAP III) are particularly noteworthy.
The NBSAP 2016-2025 will be a 10-year plan and is designed to address 6 broad areas of concern. A strategy with SMART targets was developed for each such area. Each target has an indicator and will be achieved through implementing the broad suggestive actions. Each action has a separate indicator, baselines, and responsible agency and is time bound. Monitoring of the progress of NBSAP and conducting its reviews will be carried by the government agency responsible for implementing the environmental mandate. The strategies under the NBSAP 2016-2025 are:

Strategy 1 - Strengthen the governance, policies and strategies for biodiversity
Strategy 2 - Enhancing communication and outreach through awareness programmes and capacity building
Strategy 3 - Work together globally for biodiversity conservation
Strategy 4 - Ensure sustainable use of biological resources
Strategy 5 - Address threats to conserve biodiversity
Strategy 6 - Strengthen information management and resource mobilisation

3.3 Environmental Policies and Guidelines:

3.3.1 National Waste Water Quality Guidelines, Maldives, 2007

Waste water is one of the by-products in households and many industries which use water in a non-consumptive manner. It is also perceived to have very little value. It is therefore easily discharges in a least cost manner, without considering the total impact, including the economic impact, on the environment in which it is discharged. In many instances, the emphasis is places on low production cost with maximum profit. Developing countries are usually targeted for this approach because disposal of domestic and production waste is perceived not to be high on their priority list. In the case of the Republic of Maldives will a two-pronged approach in waste water management. On the one hand government, has taken a deliberate decision to protect its natural resources and citizens against the irresponsible discharge of waste water. An example of government's attention is the signing of the Islamabad Declaration.

The Government of the Republic of Maldives will follow a two-pronged approach in waste water management. On the one hand government, will set waste water guidelines for domestic and industrial waste. The purpose of guidelines is to guide individuals, organizations, licence holders, governments and regulators on the best way to achieve water quality goals for sustainability. On the other hand, individuals, organizations and licence holders will have to prove to government and the regulator that they are following international best practice in terms of Cleaner Production". The Guidelines were compiled considering the complexity and the nature of waste water and its interaction with the different environments into which it is discharged. It was therefore decided to define guidelines for waste water discharge based on its origin, the environment into which it is discharged and its effect on the most sensitive user of that receiving environment. In this regard an application to discharge waste water should not only be based on the competence of the applicant to comply with the prescribed maximum values in the guideline. The applicant will also have to prove to government that the production of waste water is per best Clean Production principals and that the waste water will not jeopardise the sustainable use by the most sensitive water user in the receiving environment. These waste water guidelines are therefore only guidelines. The guidelines will be used by government as one of the tools to protect its people and environment as well as to ensure sustainable use natural resources.

3.3.2 National Solid Waste Management Policy, 2008

The Government of Maldives announced the National Solid Waste Management Policy on February 3, 2008. The Policy has been prepared to reflect the status of solid waste management in the Maldives. The policy contains strategic principles that create the underlying logical and philosophical structure of the policy. They also represent universally accepted practices in waste management viz Polluter pays principle, Integrated solid waste management, Waste management hierarchy, Best Practical Environmental Option (BPEO), Best Available Technology Not Entailing Excessive Costs (BATNEEC), Equity, Proximity principle, Private Sector Participation (PSP)

The overall policy framework for solid waste management is condensed into the following five Principle Objectives:

- Establishing and activating waste management governance;

- Creating waste producers' duties and responsibilities;
- Establishing waste management infrastructure;
- Activating the waste management system; and
- Influencing consumer choices and waste management practices.

Under the Principle Objectives are 12 policies and numerous strategies that systematically apply the strategic principles. These regulations outline the responsibility of the waste generator and prescribe proper mechanism of handling all waste through segregation, recycling and reuse. Infrastructure subprojects proposed under SFDP would generate significant volumes of construction debris. The proponents should ensure that the waste is managed in line with the provisions of these regulations.

3.3.3 Energy Policy

The National Energy Policy and Strategy is significant in that it embodies the principles that are set out in in the Strategic Action Plan of the Government and provides for developing greater sustainability, conservation and efficiency in energy whilst promoting low carbon technologies and the quality of energy supply. The National Energy Policy has nine key policies. Policy 1: Provide all citizens with access to affordable and reliable supply of electricity, Policy 2: Achieve carbon neutrality in the energy sector by 2020, Policy 3: Promote energy conservation and energy efficiency, Policy 4: Increase national energy security, Policy 5: Promote renewable energy technologies, Policy 6: Strengthen the management capacity of the energy sector, Policy 7: Adopt an appropriate pricing policy for the energy sector, Policy 8: Ensure customer protection, Policy 9: Enhance the quality of energy services.

3.3.4 The National Energy Action Plan

The National Energy Action Plan (2009-2013) that have been adopted to guide the development of the energy sector in the Maldives. In addition, a number of policies have been developed to encourage private investments in the energy sector - including a zero-import duty for RE related merchandise and the introduction of FIT regulations. The Energy Action Plan (2009-2013) includes a series of actions, measures, programmes and targets to be met over five years to achieve greater energy efficiency and conservation awareness, together with reductions in CO2 emissions. The key strategies in the action plan include: Provide all citizens with access to affordable and reliable supply of electricity through:, Developing utilities to upgrade and manage power infrastructure on the islands and improve the efficiency and quality of services; Encouraging private sector participation to develop, manage and sustain electric services; Encouraging national and international investments to develop and sustain energy; and Introducing incentives to power sector developers to ensure affordability of energy supply by facilitating access to grants and concessional finance.

Energy action plan also aim to Achieve carbon neutrality by year 2020 through: Developing plans for energy sector to include forecast of energy usage by different sources, GHG emissions and assessing status of carbon neutrality; Setting and monitoring targets to track energy sources, composition, efficiency and losses to achieve carbon neutrality and sustaining it; Adopting standards for exhaust emission for power plants, vehicles and vessels that use fossil fuel in order to improve air quality; and Promoting carbon capture and sequestration.

Energy Action Plan also aim to promote energy conservation and energy efficiency to reduce costs through: Promoting energy efficiency and energy conservation to achieve economic use of energy without lowering the quality of service rendered; Promoting energy efficiency in electricity production, distribution and usage via workshops involving necessary stakeholders; Promoting demand side management with focus on large energy users; Identifying all areas of improvement and provide technical advice in fuel conservation and efficiency in different modes of transport; and Introducing incentives to encourage greater use of electric vehicles by establishing charging stations using RE sources.

It also plans to promote Renewable Energy (RE) technologies through: Introducing and demonstrating new renewable technologies application; Facilitating and promoting research opportunities for locals and international parties by informing about potential of RE sources within the country; Developing human resource capacity for RE throughout the country by introducing RE related courses in college curriculum; Encouraging and promote bio fuels; and Encouraging the development of power generation capability by utilizing the household waste and bio fuels.

3.4 Social Policies and Regulations.

3.4.1 Maldives Tourism Act, 1999

The Maldives Tourism Act (Law No. 2/99) provides for the determination of zones and islands for the development of tourism in the Maldives: the leasing of islands for development as tourist resorts, the leasing of land for development as tourist hotels and tourist guesthouses, the leasing of places for development as marinas, the management of all such facilities; and the operation of tourist vessels, diving centres and travel agencies, and the regulation of persons providing such services. The Act has undergone several amendments to take in the sectors development goals. The Government of the Maldives has developed and adopted planning procedures and processes that consider biodiversity conservation. The incorporation of biodiversity conservation in the TMP IV, the Strategic Action Plan (SAP) 2009-2013, the NSDS and the NEAP III are particularly noteworthy in this context.

Recent amendments related to EIA regulation as it applies to tourism sector is of importance: Clause 15: Permanent change to the [natural] environment, land and island (i) Any form of development which may permanently change the [natural] environment of an island, plot of land or lagoon, lent for the development of tourist resorts shall be conducted with written permission from the Ministry of Tourism. (ii) The permission for any development which will change the existing [natural] environment permanently as mentioned in sub-clause (a) of the Act shall be granted by the Ministry only after making an Environment Impact Assessment (EIA) report of that proposed development. (iii) The authority to decide on matters that will bring a permanent change to the [natural] environment as mentioned in sub-clause (a) of the Act, and to do the EIA report concerning those matters, and to grant permission for those matters, rests only with the Ministry of Tourism (iv) All regulations required to be in place under this clause shall be made by the Ministry of Tourism.

3.4.1.1 Regulation on the Protection and Conservation of Environment in the Tourism Industry (2009)

This regulation is made pursuant to Law No. 2/99 (Maldives Tourism Act) and stipulates the standards for the protection and conservation of environment in the tourism industry. The purpose of this regulation is to protect the environment in the tourism industry and to encourage and facilitate sustainable development of tourism. In this regulation, unless the context otherwise requires, "tourism industry" means any island leased for the development and operation of a tourist resort, tourist hotel, tourist guest house, yacht marina, and islands leased under the Maldives Uninhabited Islands Act (Law No. 20/98) and all other places and facilities registered under Ministry of Tourism and Civil Aviation for the provision of service to tourists. In this regulation, unless the context otherwise requires, "property leased for the purpose of tourism" means islands leased for the development and operation of a tourist resort, tourist hotels, tourist guest houses, yacht marinas, and islands leased under the Maldives Uninhabited Islands Act (Law No. 20/98).

The regulation focuses on number of activities including waste management including requirements such as (i) bins to collect waste to be kept in various areas in an easily accessible manner in all resorts, picnic islands, marinas or such places leased for tourism purposes and such bins need to be in a clean and sanitary state, with the lid closed; (ii) food and beverages, putrefying items, plastics, paper, glass, iron and items such as cans and toxic or hazardous waste to be kept in separate bins for each type, and shall be labelled as such; and (iii) waste disposal in tourist resorts, picnic islands, and marinas operating in the Maldives shall be carried out in a manner that would have the least impact on the environment, and in accordance with the laws and regulations and in accordance with the following rules prescribed by the Ministry of Tourism and Civil Aviation. It is important to note, the regulation allows food waste and biodegradable waste to be dumped into the ocean in the absence of a designated area in the region.

3.4.2 The Tourism Master Plan

The Tourism Master Plan IV (TMP IV) of the Maldives was launched on 29 September 2013. The TMP IV recognizes that the entire tourism industry depends on a wholesome environment and the conservation of nature. The Plan emphasizes that the tourism sector has strong interest in helping the agencies responsible for environment and conservation, both for the sake of the tourism industry itself, as well as for the sake of future generations of Maldivians. The strategies and actions specific to biodiversity conservation in the TMP IV (2013) are: Improving waste management practices of local communities; Developing and enforcing management plans for sensitive environments; Establishing marine managed areas in resort house reefs; Implementing a "Responsible Visitor Programme"; Implementing climate change adaptation programme for tourism industry; Implementing a low carbon programme for tourism industry and Strengthening environmental monitoring for evidence based decision-making.

3.4.3 The Historical and Cultural Property Law (Law No: 27/79)

The Historical and Cultural Property Law of the Republic of Maldives (Law No: 27/79) was ratified on July 22, 1979. The law is vague and does not clearly define cultural and historical property and has no rules regarding trade and export of heritage items. No further developments on the management and protection of physical cultural resources (archaeological sites, findings of artefacts, sites of historical significance) have taken place. Therefore, an appropriate legal

framework is essential for promoting and preserving culture and heritage. It is an offence to damage destroy or dismantle any objects or buildings that are of historical and cultural value found within the Republic of Maldives.

Cultural and historical objects or buildings as stated in this Law are objects and places that were used by the inhabitants of Maldives or foreigners who lived in Maldives and which may help to gather information of a certain period. Cultural and historical buildings as stated in this Law are buildings that were constructed or raised by the inhabitants of Maldives or foreigners who stayed in Maldives, to live or pray, or as a monument for some person, or a memorial for any other such purpose, which may help to gather information of a certain period. Carrying out research work on cultural or historical objects and buildings with the prior permission of the appropriate authorities of the Government and without impairing its originality, is exempted from this Law.

3.4.4 Maldivian Land Act, 2002

The Act governs the allocation of Maldivian land for different purposes and uses and other issues regarding the issuing of land, issuing of state dwellings for residential purposes, conduct regarding state dwellings or private dwellings constructed for residential purposes and the sale, transfer and lease of Maldivian Land. All transactions concerning the issuing, receiving, owning, selling, lease, utilizing and using Maldivian land shall be conducted in compliance with this Act. In accordance with section 3 of this Act, land shall be allocated for the following purposes and uses. (a) For the construction of households and buildings for residential purposes. (b) For commercial use. (c) For social use. (d) For environmental protection. (e) For government use.

3.4.5 Public Health Protection Bill

The purpose of this act is to establish policies for protection of public health, identify persons responsible for protection of public health, define how public health protection policies will be implemented and establish policies to limit basic rights ensured under the Maldives Constitution to Maldivians and people living in Maldives to necessary extents to protect public health.

3.4.6 Gender

Promoting and protecting the rights of vulnerable groups have been among the most important objectives of the Government's human rights policy and has announced that the nation has made significant progress in this regard. The Domestic Violence Prevention Act, the Prevention of Sexual Harassment and Abuse Act, and Sexual Offences Act have strengthened the legal framework to protect women, children, and migrants from violence and sexual abuse. The President ratified the Bill on Gender Equality on 23 August 2016. On ratification, the Act has now been published in the Government Gazette. The Gender Equality Act seeks to ensure to eliminate discrimination between genders and establishes the role of government and other agencies in the implementation of the Act. This act will cements the national standards on gender equality, and confirm that the policies and legal framework are consistent with the Convention on Elimination of All Forms of Discrimination against Women.

The Disability Act boosted the protection and rights afforded to persons with disabilities. Now, persons with disabilities have access to financial assistance, there are regulations on minimum

standards and identification of persons with disabilities, and room for affirmative action including access to gainful employment.

More recently the Anti-Trafficking Act was a milestone in combating trafficking in the country, especially affording protection to the large number of migrant workers in the country from exploitation. The National Action Plan to Combat Trafficking in Persons for 2015-2019 has been finalised. The Parliament has, on 27 April 2015, approved Maldives accession to the Optional Protocol to prevent, suppress and punish trafficking in persons, especially women and children. This will undoubtedly boost the protection framework offered to migrant workers in the country.

There has been no question about the role and the participation of women in politics and decision-making in the Maldives. Women in the Maldives have always been among the most emancipated in the region, without the systemic barriers of race, class, and caste that are prevalent in some parts of the world. Maldivian women have had the constitutional right to vote since 1932, which is way ahead of some developed countries. Maldivian women have always, without question, had equal pay, and paid maternity leave. Women have the same access to education and employment opportunities, with girls doing even much better than boys in higher education. Despite the apparent parity, challenges remain. Therefore, the Government is now concentrating on making women economically empowered by introducing targeted micro-loans, single mother benefits, home-based employment opportunities, and day-care facilities. The Government policy framework hopes to see women, one half of our population, become more productive citizens of the country, in whatever capacity they choose for themselves.

The President’s human rights policy is guided by the belief, that human rights are not just about international instruments or pieces of law. It is also about belief; belief that needs to be carefully cultivated and nurtured.

The 2008 Constitution bans discrimination on grounds of sex except as prescribed by Islamic Shari'ah. This sits uneasily with the Maldives' earlier commitments to international agreements including the Convention on the Elimination of All Forms of Discrimination (CEDAW) in 1993 and the CEDAW Optional Protocol in 2006 (with reservations on Articles 7 (a) and 16). The Maldives is also signatory to several international instruments addressing gender equality including the Commonwealth Action Plans on Gender Equality, and is party to all major human rights treaties, except for the Conventions on the Rights of Migrant Workers and their families.

3.4.7 Other Social Laws

Legislation relating to human rights and labour is listed in Table 3.1.

Table 3.1 Social Legislation Summary

Year	Name	Details
1984	*International Convention on the Elimination of All Forms of Racial Discrimination*	Accession 24 April 1984
1990	*Prevention of Terrorism Act (Act No.10/1990)*	The Act prohibits acts of terrorism, and imposes severe punishment for offenders.
1991	*Convention on the Rights of the Child*	1991 Ratified 11 February 1991
1993	*Convention on the Elimination of All Forms of Discrimination Against Women*	Accession 1 July 1993
2002	*Optional Protocol to the Convention on the Rights of the Child on the sale of children, child prostitution and child pornography*	Ratified 10 May 2002
2004	*Convention Against Torture and other Cruel, Inhuman or Degrading Treatment or Punishment*	Accession 20 April 2004
	Optional Protocol to the Convention on the Rights of the Child on the involvement of children in armed conflict	Ratified 29 December 2004
2006	*Human Rights Commission Act (Act No. 6/2006)*	Established the Human Rights Commission as an independent legal entity mandated to protect, promote and sustain human rights in the Maldives, and to assist NGOs.
	Human Rights Commission of Maldives	The Human Rights Commission of the Maldives was first established on 10 December 2003 as an independent and autonomous statutory body by Decree by the President of the Republic of the Maldives. The Commission was later re-established under the Human Rights Commission's Act in 2006. The aim of the Commission is to lead the promotion and protection of Human Rights under the Maldives Constitution, Islamic Shari'ah and regional and international Human Rights Conventions ratified by the Maldives. Although the Human Rights Commission currently focuses mainly on the public sector, the Commission also works with the private sector, specifically in creating awareness on human rights issues.

Year	Name	Details
	Optional Protocol to the International Covenant on Civil and Political Rights (OPICCPR)	Ratified 19 September 2006
	International Covenant on Economic, Social and Cultural Rights (ICESCR)	Ratified 19 September 2006
	Optional Protocol to the Convention on the Elimination of All Forms of Discrimination Against Women	Ratified 13 March 2006
	Optional Protocol to the Convention Against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment	Accession 22 June 2006 (founding member)
2008	*Employment Act (Act No. 2/2008)*	Specifies the rights and duties of employers and employees. The Employment Act specifically prohibits forced labour, discrimination at the work place, and child labour.
2009	*Pension Act (Act No. 8/2009)*	Mandates upon every employer to enrol all employees on a defined contribution pension scheme.
	Employment Tribunal	The Tribunal was established pursuant to the Employment Act with the objectives of examining and arbitrating legal matters arising in the work environment between the employer and employee and any matters ascribed to the Employment Tribunal pursuant to the Employment Act or any other Act or regulation or under any agreement, in an expeditious and simple manner.
2010	*The Convention on the Rights of Persons with Disability (CRPD)*	Ratified 1 April 2010
2013	*Anti-Human Trafficking Act (Act No. 12/2013)*	Under the Act trafficking in persons is declared criminal offence in the Maldives. The enactment of measures also ensures added protection to trafficked victims. The Act also criminalizes offenses such as forced labour and fraudulent recruitment as acts of human trafficking.
2014	*Right to Information Act (Act No. 1/2014)*	The Act widens and improves the scope for the right to information in the Maldives thereby increasing transparency and accountability in the Government. This Act also layout the procedures for an individual to receive and acquire information held by the Government.

Year	Name	Details
2014	*Sexual Harassment Prevention Act (Act No. 16/2014)*	Defining sexual harassment in work place and assigns responsibilities for prevention of different stakeholders of such acts and sets out penalties for the offenders.
2016	*Gender Equality Act (Act No. 18/2016)*	The Gender Equality Act seeks to ensure to eliminate discrimination between genders and establishes the role of government and other agencies in the implementation of the Act.
other	*The President of Maldives Award for Human Resource Development in the Tourism Industry*	The Award was established to encourage hoteliers and resort operators to invest and contribute towards training and development of staff in order to demand for qualified staff within the tourism industry.

3.5 International Conventions

The Maldives is party to a number of international conventions[8] but has not yet signed or ratified any. In the context of this project, Maldives is a contracting party (CPC) to the Indian Ocean Tuna Commission (IOTC), and has a legal obligation to implement the resolutions agreed by its members. Illegal, unregulated and unreported (IUU) activities still continue in the IOTC Area of Competence, and actions to reduce such activities have been taken through the implementation of Port State Measures (Resolution 10/11) and implementation of a Regional Transhipment Observer Programme (Resolution 11/05 and 12/05) to monitor all authorized transhipments in the IOTC Area of Competence. However, unauthorised transhipments and IUU activities evade detection due to the lack of electronic coverage and monitoring of this area. In May 2014, the Maldives co-sponsored a Memorandum[9] submitted by the United Kingdom which proposes mandatory VMS coverage of fishing vessels, carrier vessels and support vessels flying the flag of a CPC and vessels authorised to fish in the IOTC area. This will include all fishing vessels when fishing outside of waters of national jurisdiction. This resolution will oblige CPCs to electronically track and monitor activities of all vessels both national and joint venture under bi-lateral and multilateral agreements. The proposal also call for the implementation of the centralised VMS for 2017 and defining the rules for sharing that data.

The Table 3.2 summarises the progress Maldives has made to recommendations of the Scientific Committee and Specific Resolutions relevant to the work of the Scientific Committee.

Table 3.2: Summary response on the progress made to recommendation of the SC and specific Resolutions relevant to the work of the Scientific Committee.

Resolution	Scientific requirement	CPC progress
15/01 On the recording of catch and effort by fishing vessels in the IOTC area of competence	Paragraphs 1–10	Logbook data collection system has been established in 2010; logbooks revised in 2013 based on the new requirements of Res 13/03. Each fishing vessel should have a logbook on

[8] Biodiversity, Climate Change, Climate Change-Kyoto Protocol, Desertification, Hazardous Wastes, Law of the Sea, Ozone Layer Protection, Ship Pollution

[9] IOTC, 2014., IOTC–2014–S18–PropJ[E]

Resolution	Scientific requirement	CPC progress
		board to record catch and effort and reporting of catch and effort data is mandatory. For the first time, in 2013 Maldives reported the catch and effort data by IOTC requirements of 1x1 geographic gird. A new web-enabled database to compile the data in new format is complete and will be operational by June 2015
15/02 Mandatory statistical reporting requirements for IOTC Contracting Parties and Cooperating Non-Contracting Parties	Paragraphs 1- 7	Maldives has been regularly providing total catch/effort and size data for the stock assessment work of the working party meetings. Maldives have submitted the 2014 catch and effort data on June 30, 2015. Longline data was submitted to IOTC 28/8/2015
15/05 On the conservation for striped marlin, black marlin and blue marlin	Paragraph 4	Catches of black marlin in the Maldives are from handline, caught in coastal areas outside of the atolls. Black marline may also be caught in LL bycatch which are reported. Maldives is making efforts to collect catch/effort and size data from its landings.
13/04 On the conservation of cetaceans	Paragraphs 7– 9	The logbooks have fields to record cetaceans. Furthermore, the observer & bycatch sampling programme is keeping track of interactions. There are plans to produce a report after the first year of completion the observer programme that should provide summary of such interactions
13/05 On the conservation of whalesharks (*Rhincodon typus)*	Paragraphs 7– 9	Whale sharks are protected in the Maldives. None of the fisheries in the Maldives are known to harm the whalesharks. Maldivian flagged vessels only recently started fishing on high seas. These vessels are only longline vessels and are unlikely to encounter any interaction that is worthy of reporting for fishery purpose. The logbooks do have a field for recording such unusual encounters if any. An observer scheme is now in place to verify any such interactions
13/06 On a scientific and management framework on the conservation of shark species caught in association with IOTC managed fisheries	Paragraphs 5-6	All species of sharks are protected in the Maldives and actively targeting sharks inside Maldivian waters is prohibited. The main types of fishery in Maldives are the pole and line and the handline tuna fishery. Observations suggest that interaction with sharks is minimal in these fisheries and any shark that is caught is released live.

Resolution	Scientific requirement	CPC progress
		The Regulation on longline fishing in Maldives stipulates that all live sharks must be released immediately should they be caught in the longlines and any dead sharks must be landed at an inspection site for verification. However at present there are no inspection sites and all dead sharks are discarded at sea. Shark interactions are recorded in detail in the log books and quality information on shark interactions has been reported to the IOTC as required. Under the recently formulated shark NPOA, review and analysis of longline bycatch is given a priority. LL shark bycatch data form 2014 have been provided to IOTC
12/09 On the conservation of thresher sharks (family Alopiidae) caught in association with fisheries in the IOTC area of competence	Paragraphs 4-8	Shark fishing is prohibited in Maldivian waters. See section on Resolution 13/06 for details. . An observer scheme is now established and the information on shark interactions will be verified through these observer schemes.
12/06 On reducing the incidental bycatch of seabirds in longline fisheries.	Paragraphs 4-8	The Appendix 2 of "Regulation longline fishing in Maldives" gives 6 ways to mitigate the bycatch of seabirds as per the relevant IOTC resolutions. Implementation of one of these mitigation measures is mandatory. Interactions with seabirds should also be reported as per the IOTC requirements through the logbooks.
12/04 On the conservation of marine turtles	Paragraphs 3, 4, 6–10	Maldives is signatory to the Indian Ocean – Southeast Asian (IOSEA) Marine Turtle Memorandum of Understanding. A second 10-year Turtle Moratorium is in force from 2008-2018 that includes banning of hunting, taking, or harming turtles, including harvesting of eggs. Appendix 2 of Regulation on Longline Fishing in the Maldives describes turtle mitigation measures during longline fishing operations, including release of live turtles having dehookers and line cutters on vessels as per the relevant IOTC resolutions.
11/04 On a regional observer scheme	Paragraphs 9	An Observer scheme has been established in the Maldives and one observer has now been trained and mobilized. The observer started

Resolution	Scientific requirement	CPC progress
		work on October 2015 and has now undertaken 4 observer trips. In addition to this, MRC has deployed observers on over 80 fishing trips. The information collected by the observers are consistent with the IOTC requirements and has proven to be very useful to validate the information provided in the fisheries log books. The government of Maldives will expand the observer program over the next 2 years to progressively attain the necessary level of coverage as required by the IOTC resolutions. One observer has been recruited and his work has started in September of this year.
05/05 Concerning the conservation of sharks caught in association with fisheries managed by IOTC	Paragraphs 1–12	Shark fishing is prohibited in Maldives waters (the entire EEZ). The ban is effective from May 2010. The only fishery likely to catch shark would be longline fishery. Currently there are 12 active longline vessels (targeting BET/YFT) operating between 100nm to 200nm of Maldives EEZ. The Regulation Longline Fishing in Maldivian waters requires shark by-catch to be released alive if possible and landed otherwise to an inspection port

3.6 Development priorities and Sustainable Development Goals

At the United Nations Sustainable Development Summit on 25 September 2015, more than 150 world leaders adopted the new 2030 Agenda for Sustainable Development, including the Sustainable Development Goals (SDGs). The 17 new Sustainable Development Goals also known as the Global Goals with 169 targets, aim to end poverty, hunger and inequality, take action on climate change and the environment, improve access to health and education, build strong institutions and partnerships, and more. Cooperation between environment and fisheries sector are becoming increasingly important.

"Goal 14 – Life below water" of the Sustainable Development Goals: "Conserve and sustainably use the oceans, seas and marine resources for sustainable development" is a particularly significant goal, as 70% of the world is covered in water and humans rely on oceans and the marine space for a significant proportion of their food, transport, employment, recreation, energy and culture and this is only likely to increase in the future.

On aquaculture, the strategy is to achieve targets on increasing sustainable aquaculture production, enhancing food and nutrition security and providing pathways out of poverty for fishers and fish farmers in developing countries, in line with the SDGs. The project objectives will strategies contributing to the Goals (SDGs – 1, 2, 3, 5, 8, 9, 12, 13, 15 and 17) with an emphasis on

strengthening fisheries governance, developing improved fish breeds and feeds, and delivering on nutrition. Work Areas of relevance are:

- Conservation, management and sustainable use of biodiversity
- Capture Fisheries Management.
- Governments and stakeholders are supported to strengthen capacity to participate in international governance mechanisms and develop and adopt instruments that contribute to improved and increased provision of goods and services in agricultural sector production systems in a sustainable manner.

3.7 Compliance with World Bank Operational Policies

3.7.1 World Bank Safeguard Policies

The World Bank has a number of Operational Policies (OPs) and Bank Procedures (BPs) concerning environmental and social issues, which together are referred to as the Bank's Safeguard Policies. If, during the development of a project, it is considered that it is possible that a proposed project activity could be the subject of one of the safeguard policies, that policy is considered to have been triggered. In the subsequent development of the project, that activity must be considered in more detail to determine whether it is actually of no concern or adequate mitigation can be applied to address the concern, or the activity should be removed from the project (or the whole project should be dropped). The sections below address those Safeguard Policies that have been triggered by the project under review, and the actions that have been taken to ensure that the requirements of those policies will be satisfied in the further development of the project.

Safeguard Policies Triggered by the SFDP Projects	Yes	No
Environmental Assessment (OP/BP 4.01)	√	
Natural Habitats (OP/BP 4.04)	√	
Pest Management (OP 4.09)		√
Physical Cultural Resources (OP/BP 4.11)		√
Involuntary Resettlement (OP/BP 4.12)		√
Indigenous Peoples (OP/BP 4.10)		√
Forests (OP/BP 4.36)		√
Safety of Dams (OP/BP 4.37)		√
Projects in Disputed Areas (OP/BP 7.60)		√
Projects on International Waterways (OP/BP 7.50)		√

3.7.1.1 Environmental Assessment (OP/BP 4.01)

The project is expected to bring positive environmental benefits to the project areas as the entire design of the project is based on the need to conserve the marine resources, avoid and stop unsustainable capture and yields, comply with the best regional and international standards, and

diversify into mariculture as an alternative to threatened reef fisheries. As per the scope of the SFDP, the project is categorized as an Environmental Category B in relation to environmental assessment (EA) requirements of the World Bank, and the project triggers the Environmental Assessment safeguard policy (OP/BP 4.01). The categorization is predominantly due to project activities including the construction of new/upgrading facilities and the establishment of mariculture activities that can pose environmental impacts unless managed in a sound manner during operations. The project will not lead to potential large scale significant and/or irreversible impact as the impacts will be largely localized to project sites and can be managed via stringent due diligence and adherence to national and international sectoral standards. Specific standalone environmental impact assessments and subsequent permits from the Ministry of Environment will be needed for the (i) multi-species hatchery; (ii) augmentation of the infrastructure of the MRDF; and (iii) out grower farms for mariculture and it is through these assessments that site specific impacts will be identified.

This Environmental and Social Management Framework (ESMF) will serve as a roadmap outlining the prerequisite environmental and social screening and assessments that will need to be undertaken for all project activities, as per the national environmental legislations of the Maldives and the Bank's OP4.01 and other triggered safeguards policies. The ESMF will apply to all components of the project.

3.7.1.2 Natural Habitats (OP/BP 4.04)

The policy on Natural Habitats is triggered because all of the islands in Maldives are surrounded by coral reefs which are significant natural habitats. The overall project will not conduct any activities within designated protected marine or terrestrial areas. The ESMF has in place due diligence measures to avoid or reduce the impacts to the coral reefs, marine ecosystems and associated fauna and flora during the establishment and subsequent operation of mariculture out grower farms (in the remote atolls, selected specifically to avoid impacts on corals and water quality). The project will not involve the introduction of any non-native species for the purpose of mariculture.

3.7.1.3 Involuntary Resettlement (OP/BP 4.12)

The objective of this policy is to:

I. avoid or minimize involuntary resettlement where feasible, exploring all viable alternative project designs;
II. assist displaced persons in improving their former living standards, income earning capacity, and production levels, or at least in restoring them;
III. encourage community participation in planning and implementing resettlement; and
IV. Provide assistance to affected people regardless of the legality of land tenure.

This policy also covers any loss of land or other assets resulting in relocation or loss of shelter, loss of assets or access to assets and loss of income sources or means of livelihood whether or not the affected people must move to another location. The policy also applies to the involuntary restriction of access to legally designated parks and protected areas resulting in adverse impacts on the livelihoods of the displaced persons. An important clarification on policy application, however, provides for two specific natural-resource exclusions: the policy does not apply to projects involving national or regional regulation of natural resources to promote their sustainability; or to community-based projects that restrict access to natural resources outside of parks or protected areas where the scope and extent of restrictions are decided by the involved communities themselves (even though some individuals in the community might disagree). Instead, good practice suggests that social analysis (since it is not site or project specific) should be done, and

policy measures should be put in place to address social impacts, including, as appropriate, social safety nets for vulnerable groups.

OP 4.12 is recommended to be triggered if and when some of the potential investments in the project areas might lead to the loss of land or structures and/or the loss of access to areas of importance for livelihood support. These issues have been taken into consideration whilst conducting the ESMF, and none of the interventions that have been considered / proposed by the project would cause such problems. Moreover, the screening protocols and mitigation guidelines referred to under OP/BP 4.01 above will ensure that any interventions considered in future within the project itself will not cause involuntary resettlement and / or loss of livelihood. As an 'insurance' for this issue, an outline Resettlement Policy Framework (RPF) has been provided so that if any resettlement and / or livelihood issues should arise, they can be resolved satisfactorily.

3.8 Adequacy of Government of Maldives Environmental Clearances

The Government of Maldives (GOM) has a number of environmental policies, regulations and standards of specific relevance to environmental protection as highlighted in detail in the sections above. The main legal instrument pertaining to environmental protection is the Environmental Protection and Preservation Act (Law No. 4/93) of the Maldives, passed in April 1993. This Act provides the Ministry of Environment and Energy with wide statutory powers pertaining to environmental regulation and enforcement. This umbrella law focuses on issues such as environmental impact assessment, protected areas management and pollution prevention. In addition the Government of Maldives also enforces the Environmental Impact Assessment Regulations, which came into force in May 2007, as per the statutory requirements of the EPPA. The EIA Regulations have been the basis for Environmental Impact Assessment in the Maldives and since its advent it has helped to improve the quality of EIAs undertaken in the country. All solid waste management projects have been categorized as types of projects that will require the preparation and subsequent environmental clearance from the EPA. Maldives has a sound track record of implementing the Environmental Impact Assessment process. The technical capacity of the EPA is reasonably good in terms of ensuring the adequacy of EIAs and their implementation.

4. Chapter 4: Generic Assessment of Environmental and Social Impacts

4.1 Background

The overall SFDP project is likely to have positive environmental and socio-economic impacts in the short, medium and long term than negative. This is predominantly as the project modality and projects design takes sustainability and environmentally sound operations in to the forefront from a perception of planning, location, implementation and monitoring. Any project activities that may pose negative impacts would not be significant and mitigation measures can be adopted both at the project development stages and at implementation stages. The potential generic impacts identified are presented in this chapter.

The scoping process for the impacts assessed for the ESMF involved the review of project appraisal documents, preparatory documents submitted to the World Bank as part of the preparatory phase, sector development documents prepared under the World Bank Masterplan studies and other previous ESMF documents prepared for the fisheries development projects in the Maldives, stakeholder consultations with national and local government, civil society, communities, business developers etc.

The information collected was used to identify valued aspects for the impacts assessment and prioritize them as being of "high", "moderate" or "low" value. Low value aspects were not assessed further in this ESMF. A valued aspect was categorized as being of moderate value where there is a potential for negative or direct positive impacts, but where the valued aspect is not a priority investment area for SFDP based on the project discussions. Valued environmental aspects that were rated as high priority and similar in nature were grouped together as coastal and marine ecosystems.

Table 4.1. Identified Valued Aspects and Areas of Potential Impacts from SFDP

Valued Aspects	Impacts	Priority (high, moderate or low)
Coastal and Marine Ecosystems		
Coral reefs	Potential direct positive impact through increased research, MCS, management of fisheries and other marine resources.	High
Offshore habitats	Potential direct positive impact through increased research, MCS, and management of fisheries and other marine resources.	High
Lagoons	Potential direct positive or negative impact through use of lagoons for fishery or mariculture activities – assess jointly with other coastal and marine aspects as "Coastal and Marine Ecosystem"	High
Sensitive areas/ Mangrove habitats	Potential direct positive impact through increased research, MCS, and management of fisheries and other marine resources. Management of or investment in mangrove forest not a priority of the project.	Moderate
Protected Species/areas	Potential direct positive impact Management of or investment in protected species/areas not a priority of the project.	Moderate

Socio-cultural Aspects		
Social capital	Potential direct positive (long-term) and negative (short-term) impacts Priority investment area as part of the capacity-building for fisheries management and development of the aquaculture sector, introduction of aquaculture courses at the university, courses for aquaculture farmers at extension level	High
Human Capital	Potential direct positive impact. Priority investment area as part of capacity building for government, private and community stakeholders	High
Vulnerable Groups	Potential direct positive (long-term) and negative (short-term) impact May be targeted for investment if access controls may affect livelihoods	High
Cultural Property and Antiquities	Potential direct or indirect negative impacts, if new fisheries infrastructure or enterprises built near historical or cultural sites Not a management or investment priority of the project	Low
Human health and Public Services	Potential indirect positive impacts Food and economic security through improved livelihood opportunities Human health and public services not targeted	Low
Valued Economic Aspects		
Commercial and artisanal fisheries	Potential direct positive (long-term) and negative (short-term) impacts Improved management of fisheries resources and increased economic benefits	High
Mariculture	Potential direct positive and negative impacts Opportunities to develop a managed mariculture sector A managed hatchery operationalized and providing fingerlings to stakeholders Increased economic benefits from mariculture to the local communities Target for investments	High
Tourism	Potential direct positive and negative impacts Management of marine environment and resources on which tourism is directly dependent on	High
SME Development	Potential direct positive and negative impacts on the enterprises, diversification from exploitation of fisheries resources to cultured resources, creating economic opportunities and value added products Micro-investment anticipated under the project	High
Heavy industry	Potential indirect positive or negative impacts	Low
Institutional Aspects		
National and local Governments	Potential direct positive and negative impacts. Improved capacity to institutionalize functions, or restricted capacity to participate effectively	High
NGO's, CBO's and Private Sector	Potential positive impacts from involvement in investments	High

	and increased engagement with government institutions, or negative impacts from access restrictions, capacity to participate effectively in the project and to monitor adequately	

4.2 Positive Impacts of overall project

The project objective is to improve governance in the fisheries sector, through better data collection, stronger enforcement of conservation measures, and renewed emphasis on management strategies to engage and enlist communities in the effort, it is expected that the impacts of SFDP will be largely positive.

Positive impacts are expected to include:

- Improved data collection system, better knowledge of species, ecosystems, catch, economic benefits
- Improved and reduction of Illegal, Unreported and Unregulated (IUU) fishing
- Increased Maldivian presence in deep sea fishing, bringing greater socioeconomic benefits
- Establishment/strengthening of sustainable institutions for governance, monitoring and compliance
- Strengthening of co-management will improve fisheries practices, sustainable harvesting, improved livelihoods, and coping mechanisms to deal with access controls or other loss of access to fisheries
- Communications and awareness for fishers, other key actors (enforcement) and general public
- Research and financial support for value-added businesses
- Strengthening of Fisheries Management, Fisheries Compliance and Marine Research to give industry a stronger voice in policy and governance
- Market research for improved mariculture investment opportunities
- Loans schemes to promote small business development, allow for diversification away from fisheries, and compensation for those forced to leave or reduce their traditional fishing activities
- Improved income generation and wealth creation of fishery-dependent communities;
- Economic empowerment of artisanal fishers through value addition to fish landings and improved health standards at landing facilities;
- Enhanced ecosystem productivity through improved conservation of coastal and marine habitats;
- Development of existing and alternative livelihoods will relieve pressure on exploitation of coastal and marine resources;
- Better appreciation of the value of ecosystems, thus providing a stronger case for their conservation;
- Livelihood enhancement and diversification by giving support to increased adoption of livelihood diversification opportunities.
- Enhanced ecosystem productivity through improved conservation of coastal and marine habitats;

- Improved service delivery resulting from the construction of the hatchery
- Development of alternative livelihoods improving income levels;
- Support for existing MMAs and MPAs is likely to improve livelihood benefits;
- Pressure on natural resources will be alleviated from established eco-tourism related activities

4.3 Negative impacts of overall project

The negative impacts are largely localized and tied to access restrictions that may be implemented in certain fisheries or geographic locations. They may include but are not limited to:

- Rights-based management or restrictions in access to fisheries resources could reduce income for some fishers
- Restriction of access to fisheries through improved management of the marine conservation areas
- Short-term reduction in income to people engaged, if any (and even if negligible), in illegal or unsustainable fishing activities due to strengthened MCS
- Localized environmental and possible social impacts from infrastructure construction
- Further development in crowded or ecologically sensitive coastal areas
- Development impacts from subproject investments, which are highlighted in detail in the commencing sections.
- Potential cumulative impact of many new micro, small, or medium-size enterprises undertaking similar activities near environmentally sensitive areas.

4.4 Negative Impacts resulting from project activities under Component B.

Component B will support the establishment infrastructure such as training and research centres and laboratories as well as infrastructure to conduct mariculture activities which will include civil works. Such interventions will lead to localized environmental impacts typical to civil works, such as the need of construction material, generation of dust, noise etc. and occupational and safety impacts that need to be managed accordingly.

The establishment of out grower farms for mariculture development, where the project aims to provide community development grants to project communities to finance start-up investments into community-based aquaculture/mariculture production, for example cage cultivation of species and operations at the multi species hatchery and MRDF will also pose potential operational impacts. Mariculture operations will entail the establishment of infrastructure on the ocean/lagoons, such as fish cages and/or pens, in order to run culture farming practices. The civil works impacts for such interventions are limited to the siting of the facilities as they should typically be sited well away from sensitive environments, shipping routes, and entrances to harbours, close to recreational beaches, off the coast close to solid waste management facilities and sites used for other designated purposes. The construction phase impacts will be small and short lived for sea cage deployment. It will be the operational phase that should be of concern, where the impacts of elevated nutrient levels around the cage sites might be observed.

The type and scale of any ecological change related to mariculture development will depend on the method, the level of production and the physical, chemical, and biological characteristics of the area in question. Ecological change has been associated with the large scale production of bivalves

and seaweeds and the release of dissolved and particulate waste from fish, shrimp, and bivalve culture. Disturbance to ecosystems and wildlife can be caused by destruction of marine wetland habitats, while uncontrolled introductions and transfers pose the threat of effecting the natural biodiversity of marine ecosystems.

Other atypical environmental impacts of mariculture operations include eutrophication from feeds and effluents, release of antifouling chemicals and antibiotics. The project will adhere to the environmental regulations of the country and as such will monitor the impacts of aquaculture sites with stringent measures for mitigation and managing operational impacts both within the project modality and safeguards mechanisms.

Mariculture is not new to the Maldives and in the last decade a few projects have been initiated with the islands and undergone EIAs where site specific impacts have been noted to be manageable via environmental controls being established from the very onset of the project.

4.5 Social Impacts

The social impacts due to the project will mostly be beneficial. The project has a focus on creating meaningful jobs for households in remote atoll communities, especially women, and the currently unemployed or underemployed youth. No involuntary resettlement or physical displacement envisaged due to project interventions. The project design ensures that there will be no chance of any economic or livelihood displacement impacts, including restriction of access, during installation of mariculture out grower farms and construction of the facilities such as multi-species hatchery or the quarantine and quality assurance laboratories, or from marine zoning plans. However, the ESMF, prepared in lieu of an overall project-specific Environmental (EA) and Social Assessment (SA), has a provision that in the unlikely event that physical or livelihood displacements occur, appropriate mitigation plans will be prepared and implemented, satisfying the Banks Involuntary Resettlement Policy (OP/BP 4.12). The ESMF outlines detailed guidelines of measures for environmental and social risk mitigation and institutional arrangements for conducting environmental and social assessment, instruction to the preparation of Environmental and Social Assessments (ESIAs), Environmental and Social Management Plans (ESMPs), and other such measures as well as implementation and monitoring.

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5. Chapter 5: Environmental and Social Management Framework

The Environmental and Social Mitigation Plan outlined as a framework below consists of a set of measures to ensure sound implementation of environmental and social safeguards from planning through to operation and eventual decommissioning (where applicable) of the activities to be financed by SFDP. It outlines a plan for determination of adverse environmental and social impacts through a system of screening, assessment, management and monitoring to ensure that project interventions are implemented with zero/minimal impacts.

5.1 Environmental and Social Screening under Components B

Environmental and social screening is counted to be a useful tool in identifying safeguard issues in large investment programs consisting of many sub-projects. The main objective of Environmental and social screening of sub-projects will be to (a) determine the anticipated environmental/social impacts, risks and opportunities of the sub-project (ii) determine if the anticipated impacts and public concern warrant further environmental/social analysis, and if so to recommend the appropriate type and extent of assessments needed.

At the national level, screening is the process by which proposed developments are reviewed to determine the level of environmental assessment to which they should be subjected, which could range from none at all up to a full Environmental Impact Assessment (EIA). At the project level, screening is the process of reviewing a proposed activity against a checklist of factors to determine whether it is likely to have adverse environmental effects, and if so, what mitigation measures should be applied. The present ESMF is largely concerned with the project level, but some notes are provided on national screening for completeness.

5.1.1 Negative List

It is recommended that the following types of subprojects are not financed by the Project, and therefore should be considered as a "Negative List":

- Sub-projects that involve the significant conversion or degradation of critical natural habitats such as sensitive ecosystems.
- The introduction of any new exotic marine species (note: this provision does not apply to any native and/or naturalized species, or any micro-algae that is imported as live feed)
- Activities that could dangerously lead to the exposure of sensitive/critical/vulnerable habitats
- Construction of permanent buildings within the wetlands
- Construction of walls in or around wetlands which will interrupt water flow
- The tidying of wetlands or mangroves by the removal of dead wood that serves as habitat for multiple fish species
- Establishing mariculture activities in close proximity to designated protected marine/terrestrial habitats
- Extraction of raw material from protected areas
- Filling of wetlands within protected areas and outside in strategic landscapes.

5.1.2 National Level Screening

The Maldives national requirements for environmental assessment are set out in the Environmental Impact Assessment (EIA) Regulations, 2012. Part III of those regulations includes a description of the Screening Process applied to development proposals. Schedule D of the Regulations is a screening list of all development types for which full EIA is mandatory. According to Schedule D included in Amendment 2 to the EIA regulation 2012, fisheries and aquaculture practices that require preparation of an EIA are:

I. Commercial aquaculture projects
II. Fish processing facilities

Proposed developments that do not fall within Schedule D are subject to manual screening by the EPA, for which a Screening Form (**Annex 1**) must be submitted providing relevant development details. Within 10 days, the EPA will decide whether the proposed development is approved, or needs further study, which may be required in the form an EIA or EMP

The National level screening should be conducted for the following activities:

- Development and demonstration of mariculture production and technology package, including operationalization of the MRDF.

- Promotion of development of mariculture out-grower schemes and seafood growth clusters provision of loans/grants towards start-up investments in mariculture development

- Support to multi-species hatchery and to "small enterprises" for establishing out-grower contractual arrangements between small producers and larger private sector aggregators

In practice, all reports are required to be submitted to EPA and a copy of EIA is sent to the respective councils for their contentment. Relevant councils are also invited to scoping meetings. However, EPA should be consulted at the outset, to determine whether the formal national screening process should be applied. A specific TOR for the EMP is issued by the EPA at the post scoping meeting which is conducted after the emulation of the screening form once submitted.

5.1.3 Project Level Screening

At the project (component) level, proposed sub-component activities need to be subjected to screening to determine whether they should be subject to an Environmental / Social Review. (This is a simple review, by the PMU environmental and social officer, of the likely implications of the activity, to determine whether it is acceptable, and if so, whether any particular mitigation measures should be applied.). The objective here is to provide a level of environmental / social review that is appropriate to the small scale of the sub-component activities, i.e. without the need to conduct an EIA.

All interventions identified under Component B that do not undergo national screening and subsequent preparation of safeguard instruments will be subject to a project level environmental and social screening with the objective to: (a) determine the anticipated environmental and social impacts, risks and opportunities of sub-project; and (ii) determine if the anticipated impacts and public concern warrant further analysis, and if so to recommend the appropriate type and extent of Environmental and Social Analysis needed as per the set criteria in the ESMF. The screening checklist to be used for this purpose is presented in **Annex 2**. An outcome of the above environmental and/or social reviews will, in most cases, be the development of Environmental and Social Management Plans (ESMPs).

5.2 Environmental Assessments

5.2.1 Environmental Impact Assessments (EIAs)

It is envisioned that the three major subprojects under Component B will require individual EIAs as per the national regulations of the Maldives. These subprojects include the up gradation work for

operationalization of the MRDF, all loan/grant financed start-up investments in mariculture development as well as the establishment of the multi-species hatchery.

Annex 3 presents a detailed account of the environmental clearance procedures applicable to EIAs and **Annex 4** provides a Generic structure of EIAs as per EPA requirements.

Annex 8 of the ESMF provides a best practice EIA prepared for the Development of Aquatic Animal Quarantine facility at Ibrahim Nasir International by the MoFA which has been formally cleared by the EPA, as guidance.

5.2.2 Environmental and Social Management Plans (EMPs)

All physical sub-projects/activities in addition to the assessments will prepare ESMPs that will describe and prioritizes the actions needed to implement mitigation measures, corrective actions and monitoring measures necessary to manage the impacts and risks identified in the screening assessments, IEEs or ESMPs. A generic terms of reference for ESMP is provided in **Annex 5.** The project will ensure that all works contracts will include the EMPs, and the cost of implementing the ESMPs will be identified as an item in the Bill of Quantities for the respective contracts of physical interventions.

Measures and actions that address identified impacts and risks will favour the avoidance and prevention of impacts over minimization, mitigation wherever technically and financially feasible. Where risks and impacts cannot be avoided or prevented, mitigation measures and actions will be identified so that the activities operates in compliance with applicable national laws and regulations etc., and meets the requirements of relevant World Bank Environmental Health and Safety standards. A detailed set of Environmental Management guidelines for Construction Sites is presented in **Annex 6**, taking in to account typical impacts during infrastructure subprojects in the Maldives.

5.2.3 Specific Management Measures to be included when implementing Grouper and Sea Cucumber Mariculture

The following respective recommended measures must be incorporated in to the design and operation of mariculture activities under the SFDP in order to ensure that potential environmental impacts are managed from the design stage.

Grouper Farming

- Atolls where cages have to be implemented should have a lagoon with sufficient depth (minimum 10m) to permit good water exchange and wastes dispersion.
- Sites for cage location have to be studied in order to know water exchange rate between lagoon and open sea, currents and environment capacity to absorb farming wastes.
- Each farm should have a maximum biomass in cages of 2.2 tons. Results of the studies will permit to determine the number of farm to be implemented in each lagoon.
- Farm superficies is around 90 m².
- Cages are non-permanent facilities and can be removed easily to another place if important potential contamination is suspected. After 2 or 3 years; it is expected to have the development of an anoxic zone under the cage (black mud) including feed wastes deposit. Moving the cages to another area will allow these areas to recuperate.
- It is important to reserve in the lagoon, for each farm a total surface of 400m² to allow cages to move allowing water flow to be continuous.

Sea Cucumber Farming

For sea cucumber cage culture to ensure environmental impact will be low the following measures need to be implemented.

- Cages should be submerged in shallow sandy area which presents poor biodiversity.
- Cages have to be placed at sufficient distance to permit a good water exchange and prevent any oxygen depletion problems.
- Cage should remain in place for 3 years until maintenance time. During this time it will work as an artificial reef for the area, attract and feed a lot of reef fish, including juveniles of commercial species.
- After 3 years, cages should be removed from water during several weeks in order to replace grids and bottom allowing the sand substrate to reconstitute.
- Feed should be spread only two times a week in small quantity (5kg per cage) and will be quickly consumed by the sea cucumber and by the potential competitors (fish, shrimp) living in or close to the cage.
- Cages are non-permanent facilities and can be removed easily to another place after harvesting if important contamination is suspected.

5.3 Environmental Management during Mariculture Operations for inclusion in site specific EMPs

Maintaining a good mariculture environment is the key to ensuring sustainable use of fish culture zones and successful rearing of healthy and high quality adult fish. Marine fish farm operators must therefore thoroughly understand the impacts of fish culture activities, natural factors on the culture environment and fish stock.

As the Maldives currently does not have specific guidelines development for the environmental management of mariculture activities they will have to look at international best practice. The Food and Agriculture Organization (FAO), under the Code of Conduct for Responsible Fisheries which is internationally accepted, presents a set of technical guidelines that will present further understanding of the environmental management mechanisms and tools to be undertaken during the operation or mariculture farms and will be a useful tool when developing environmental management plans for mariculture operations. The guidelines present examples of good mariculture practices that will assist in putting in place good management measures to manage the mariculture environment, reduce diseases and spread, fish kills and also to stringently mitigate pollution via including adequate precautions, monitoring and contingency responses in day to day operations. The prime objective of these measures being to regulate detrimental environmental conditions such as increases in organic matter, low dissolved oxygen levels and high bacterial contents that can affect other organisms and ecosystems in close environments to the locations where mariculture is undertaken.

FAO has produced 29 detailed Technical Guidelines, so far, to assist the international community in taking the necessary practical steps to implement the provisions foreseen in the Code, under which the following 5 presented in **Table 5.1** are on Aquaculture based activities and provide best practice guidance on implementing sustainable aquaculture/mariculture. The documents should be used as reference and guidance accordingly.

The Agriculture, Fisheries and Conservation Department of the Government of Hong Kong have developed best practice guidelines for the management of under the Accredited Fish Farm Scheme which is widely implemented. Proper management will ensure that a healthy culture environment and seabed is maintained. A healthy seabed is an effective buffer zone which is crucial in keeping satisfactory water quality. Fish culturing activities produce organic waste like residual fish feed, fish

waste and fish carcasses. Under normal conditions, feed coming out from fish rafts is largely consumed by wild fish, while any remaining residual feed and organic waste are either consumed by benthic species such as crabs and snails and are decomposed by bacteria when they reach the seabed. A negligible amount of organic matters will flow out of the culture zones with tides and currents. With regard to Environmental Management of Mariculture, Document 2 of the Good Aquaculture Practice series of the Agriculture Fisheries and Conservation Department, Hong Kong, China has been developed in reference to the FAO guidelines and presents specific measures to be adopted for sound environmental management during mariculture operations. This document can also be referred to as a set of best practice guidelines to be used in the development of similar documents under the project as well as guidance during operational phase mitigation measure identification on site specific EMPs.

Table 5.1- Best Practice Guidelines with regard to Environmental Management in Aquaculture and Mariculture.

Title of Guideline (Descending order since latest publication)		Abstract of what the guideline entails
1	Aquaculture Development-6- Use of wild fishery resources for capture-based aquaculture-2011	The objective of the guidelines is to assist countries to develop aquaculture, in particular that involving significant use of natural resources, in a sustainable way that produces the greatest social and economic benefits without compromising the underlying resource base for future generations. The heavy dependence of capture-based aquaculture (CBA) on wild resources and its implications for wild populations have been increasingly recognized in the last decade. These guidelines address the actual and potential impacts of wild-seed harvest on target and non-target (bycatch) species (including threatened species), on biodiversity, and on the environment and marine ecosystem. The guidelines also consider harvest and post-collection practices, grow-out, feed and broodstock, social and economic factors, and governance considerations. They also identify CBA principles and guidelines for good practices, and provide numerous illustrative case studies from a diverse range of species and fisheries.
2	Aquaculture Development-5. Use of wild fish as feed in aquaculture-2011	The objective of these guidelines is to assist those concerned to ensure both aquaculture growth and equitable and sustained use of available fish stocks. The guidelines cover a number of issues relevant to the use of wild fish in feeds in aquaculture, ranging from ecosystem and environmental impacts, ethical issues and responsible use of fish as feed, aquaculture technology and development, and statistics and information needs for management. However, issues relating fisheries management are not covered here, as these have been considered within separate sets of guidelines related to fisheries management and there exist several sets of technical guidelines on the sustainable management of fisheries and several continuing initiatives to improve sustainable management of fisheries which inter alia would also apply to feed-fish fisheries.

Title of Guideline (Descending order since latest publication)		Abstract of what the guideline entails
3	Aquaculture Development-3. Genetic resource management-2008	Guidance is provided on broodstock management and domestication, genetic improvement programmes, dissemination programmes for genetically improved fish, economic considerations in genetic improvement programmes, risk assessment and monitoring, culture-based fisheries, conservation of fish genetic resources, gene banks, a precautionary approach and public relations. The effective management of genetic resources, risk assessment and monitoring can help promote responsible aquaculture by increasing production output and efficiency, and help minimize adverse impacts on the environment. The benefits of the responsible application of genetic principles to aquaculture should be communicated to consumers, policy-makers, scientists and others interested in responsible fisheries and aquaculture.
4	Aquaculture Development-2. Health management for responsible movement of live aquatic animals-2007	These Technical Guidelines on Health management for responsible movement of live aquatic animals have been developed to support sections of FAO's Code of Conduct for Responsible Fisheries (CCRF) addressing responsible fisheries management (Article 7), aquaculture development (Article 9), international trade (Article 11) and fisheries research (Article 12). The objective of these guidelines is to assist countries in reducing the risk of introduction and spread of serious transboundary aquatic animal diseases (TAADs). Although they deal primarily with safe transboundary movement at the international level, they are also applicable to domestic movements between different provinces, geographical areas or zones of differing disease status. These Technical Guidelines also include guidance for health management at the farm and farm-cluster level, to the extent that these local production units are involved in the spread of TAADs.
5	Aquaculture Development-1. Good aquaculture feed manufacturing practice-2001	The guidelines cover a number of issues, ranging from ingredient purchasing, processing, bulk storage, handling, monitoring, and documentation, to issues such as employee training and safety, customer relations, and the delivery of finished goods to the farmer. However, issues relating to the handling and management of manufactured aquaculture feeds by farmers on the farm are not covered here, as these will be considered within separate guidelines to be produced at a later date concerning good on-farm feed management practices.

Specific guidelines for the use within the SFDP on control and monitoring of mariculture farms in the Maldives will also be prepared under the project**. Annex 7** provides the selection criteria for Atolls and Households for the out grower programs which will be implemented within the project.

In Addition the Quarantine Guidelines within the Guideline on the import and inspection of live plants, plant parts and live animals to the Maldives, administered by the Plant and Animal Health Management Section of the Ministry of Fisheries and Agriculture will also be adhered too during the export and import of native fish species.

5.4 Overall Management of Environmental Issues

It is recommended that the project / component should adopt over-arching principles of engagement. This should be developed in consultation with stakeholders at the start of the project and be disseminated to all people working on the project and to project partners. This can be as simple as 'Do no harm to the environment and natural resources', but it will be a reminder to all that even an obviously beneficial sub-project could have some harmful consequences.

The Environmental and Social Officer and the Project Director of the project will take responsibility to ensure Environmental Management. They would be responsible for undertaking the initial screening together with the relevant partners and EPA, ensure appropriate assessment and/or preparation of EMPs for each subproject takes place in a timely manner and is included in contract documents and monitoring environmental performance and reporting. Similarly, a member of the team should be allocated responsibility as Community Liaison Officer to deal with relations with people who may be affected by the development, construction or operation of sub-components.

The implementation of most of the mitigation measures for physical infrastructure subprojects will lie with the selected contractor during construction stage of and implementation of mitigation measures during operations will be the responsibility of the operator of the centers and out grower farms.

5.5 Procedure for Management of Physical Cultural Resources – protection and chance find procedures

If any person discovers a physical cultural resource, such as (but not limited to) archeological sites, historical sites, remains and objects, or a cemetery and/or individual graves during excavation or construction, the Contractor shall:

1. Stop the construction activities in the area of the chance find;
2. Delineate the discovered site or area;
3. Secure the site to prevent any damage or loss of removable objects. In cases of removable antiquities or sensitive remains, a night guard shall be arranged until the responsible authorities take over;
4. Notify the Supervising Officer who in turn will notify the responsible authorities immediately (within 24 hours or less);
5. Responsible authorities are in charge of protecting and preserving the site before deciding on subsequent appropriate procedures. This would require a preliminary evaluation of the findings to be performed by archeologists. The significance and importance of the findings should be assessed according to the various criteria relevant to cultural heritage; those include the aesthetic, historic, scientific or research, social and economic values used by the Government of Maldives;
6. Decisions on how to handle the finding shall be taken by the responsible authorities. This could include changes in the layout (such as when finding an irremovable remain of cultural or archeological importance) conservation, preservation, restoration and salvage;

7. Implementation for the authority decision concerning the management of the finding shall be communicated in writing by relevant local authorities; and
8. Construction works could resume only after permission is granted from the responsible local authorities concerning safeguard of the physical cultural resource.

5.6 Resettlement Policy Framework

It is not expected that people will be adversely affected by actions undertaken as part of the projects. Indeed, the avoidance of a need for resettlement and / or loss of income is one of the screening criteria. However, in the event that any intervention (e.g. the establishment of new conservation areas or increased level of management effectiveness of existing conservation areas) will lead to involuntary resettlement and / or loss of livelihood, a resettlement policy framework (RPF) has been prepared as part of the ESMF.

This RPF is generic. The detailed social impacts of individual sub-components cannot be known until the subcomponents are proposed and designed. Similarly, it is not possible to include material such as an entitlement matrix at this stage, because that would also be specific to the sub-component concerned.

Broad Principles

This framework aims to outline the principles to be applied in the resettlement and rehabilitation of any project affected persons (PAPs) so that they do not suffer adverse effects from the project and they improve, or at the minimum retain, their previous standard of living, earning capacity and production levels. The resettlement actions should minimize dependency and be sustainable socially, economically and institutionally. Special attention must be paid to improvement of the living standards of any vulnerable or marginalized groups. The broad principles of the policy are as follows:

- Adverse impacts on persons affected by the project should be avoided to the extent possible.
- Where adverse impacts are unavoidable, the PAPs will be assisted in improving or regaining their standard of living. Vulnerable groups will be identified and assisted to improve their standard of living.
- All information related to resettlement preparation and implementation will be disclosed to all concerned, and community participation will be included within planning and implementation.
- Individuals losing land, house or other assets will be consulted for mitigation measures well before the required land is taken.
- Persons affected by the project who do not own land or other property but who have an economic interest in it or will lose their livelihoods (e.g. tenants and squatters), will be assisted as per the broad principles of this policy.
- A valuation exercise will be undertaken in advance of project implementation in order to value any land or assets that may be needed by the project, either temporarily or permanently.
- A census and socio-economic survey of affected communities will also be undertaken.
- PAPs who will permanently lose land or access to land should be offered alternative land if practicable, or financial compensation if not.
- Any financial compensation should be at full present market replacement cost, including all legal and removal fees.
- All replacement land and compensation payments should be provided before the start of any project work.
- Any PAPs losing their homes will be provided with assistance with removal and ongoing rehabilitation.
- If PAPs are to be resettled, the host community, if any, should be consulted in advance and, if needed, specific measures should be provided to address their concerns.

- If necessary, an entitlement framework of different categories of PAPs should be prepared and budgeted for. However, anyone moving into the project area after a specific cut-off date will not be entitled to compensation or assistance.
- An appropriate grievance redress mechanism will be established at project level to ensure the prompt resolution of any complaints or disputes.
- All activities related to the planning, implementation, and monitoring of resettlement should include the involvement of women and vulnerable groups.
- All consultations with PAPs shall be documented. Consultations will continue during the implementation of resettlement and rehabilitation.
- If appropriate, a Resettlement Action Plan (RAP) will be prepared by the proponents, including a fully itemized budget and an implementation schedule.

Definitions

The following definitions are used in the documents and/or can be used during the project:

(i) Cut-off Date: The cut-off-date shall be the date of start of the census and socio-economic survey undertaken by the project authority.

(ii) Project Affected Person: PAPs are those who stand to lose all or part of their physical and nonphysical assets including homes, productive land, community resources, commercial properties; livelihood; and socio-cultural network.

(iii) Project Displaced Person: A displaced person is a person who is compelled to change his/her place of residence and/or workplace or place of business, due to the project.

(iv) Project Affected Family: A family whose primary place of residence or other property or source of livelihood is adversely affected by the acquisition of land for a project or involuntary displacement for any other reason.

(v) Family: A 'family' is a man and woman sharing a household, along with their dependents, including parents and children.

(vi) Vulnerable Person: A person who is poor, physically or mentally disabled/handicapped, destitute, disadvantaged for ethnic or social reasons, an orphan, a widow, a person above sixty years of age, or a woman heading a household.

(vii) Entitled Person: A person adversely affected by the project who is entitled to some kind of assistance as per the project entitlement framework.

(viii) Host Community: People living in or around areas to which people physically displaced by a project will be resettled who, in turn, may be affected by the resettlement.

The Process

Declaration of the project and its impact zone

As the first step in the process, the Government of Maldives or the respective Atoll or Island Council will inform the community well in advance about the project, its features and its likely adverse and positive impacts.

Social Screening: Identification and Categorization of Impacts

The purpose of screening is to provide an overview of the nature, scale and magnitude of the issues, in order to determine the need for conducting a Social Impact Assessment (SIA) and preparing a Resettlement Action Plan (RAP). After identifying the issues, the applicability of the Bank's social safeguard policies is established, along with the local regulatory requirements. Based on this screening, the boundaries and focus areas for the SIA, along with the use of specific instruments, are determined.

Social Impact Assessment (SIA)

All planned activities will require SIAs. In carrying out an SIA, the project will need to undertake a survey for the identification of the persons and their families likely to be affected by the project. The survey must include:

- Members of families who are residing, practicing any trade, occupation or vocation in the project affected area.

- Project Affected Families who are likely to lose their house, homestead, commercial establishment, agricultural land, employment or are alienated wholly or substantially from the main source of their trade, occupation or vocation, or who will lose any other immovable property or their source of livelihood.

- People losing access to private property or common property resources.

The survey results will be disseminated among the affected community.

Resettlement Action Plan (RAP)

Based on the social impact assessment survey, the project will prepare an action plan to minimize and/or mitigate the adverse impacts as identified during the survey. The draft mitigation plan in the form of a comprehensive resettlement action plan (RAP) will be again disseminated among the affected individuals / community. The feedback received from the affected groups will be incorporated to the extent possible before finalization of the RAP. The RAP will take into account the magnitude of impacts and accordingly prepare for Bank approval a resettlement plan that is consistent with the above principles before the subproject is accepted for Bank financing. The cost of RAP implementation will be entirely dependent upon the nature and scale of the social mitigation / compensation required for the subject sub-project.

RAPs should include the following details:

(i) The extent of the area to be taken for the sub-project;
(ii) A list of project affected families and the likely number of persons to be displaced by impact category;
(iii) The extent and nature of land and other immovable property in the affected zone, by family;
(iv) A list of the names of persons whose livelihood depends on the natural resources of the project area;
(v) A list of persons who have lost or are likely to lose their employment or livelihood, or who have been alienated wholly and substantially from their main sources of occupation or vocation consequent upon the acquisition of land and / or structures for the project;
(vi) A list of occupiers, to include tenants and informal occupiers / squatters;
(vii) Quantified impacts by types of impact and type of the affected;
(viii) A list of public utilities and Government buildings which are likely to be affected;
(ix) A comprehensive list of compensation and benefit packages which are to be provided to project affected families by impact category;
(x) Details of the extent of land available for resettling and allotting land to the project affected families;
(xi) Details of the basic amenities and infrastructure facilities which are to be provided for resettlement;
(xii) Grievance Redress Mechanism;
(xiii) The time schedule for shifting and resettling the displaced families;
(xiv) The ongoing support to be provided to resettled families, including any necessary help in re-establishing their livelihoods;
(xv) Arrangements for monitoring the resettlement process.

Benefits for Project Affected Families

Resettlement and rehabilitation (R&R) benefits must be extended to all the Project Affected Families. The details of such benefits should be defined within an entitlement matrix. The entitlement matrix given below will guide preparation of Resettlement Action Plan (RAP).

Type of Impact	Unit of entitlement	Eligibility	Mitigation measures
Loss of agriculture land	Household	Legal land owner	Compensation for loss of land or land of same size and quality If loss of land is less than 10% of total land holding, three months of average income as subsistence grant If loss of land is between 10 to 25% of total land holding, six months of average income as subsistence grant If loss of land is more than 25% of total land holding, one year of average income as subsistence grant
Loss of residential land	Household	Legal owner of land	Compensation for loss of land or land of same size and quality
Loss of residential structure	Household	Legal owner of structure; tenants; non-titleholders	Compensation for loss of structure Six months of rental allowance at market rate
Loss of commercial structure	Household	Legal owner of structure; tenants; non-titleholders	Compensation for loss of structure Six months of rental allowance at market rate
Loss of livelihood	Individual	Employee of commercial structure, labour in agriculture fields; non-titleholders; etc.	Six months of income
Loss of Community/ public structure/ facility	Community		Project to replace any structure / facility impacted by the project

5.7 Information Disclosure

Disclosure of relevant project information will help affected communities understand the risks, impacts and opportunities of the Project. The implementing agency will publicly disclose the ESMF and all Environmental and Social Assessment documentation, the management program and action plan(s) for public review and comment in appropriate locations in the Project area.

The documentation will also be made available on the implementing agencies web site both in English and in local languages. Newspaper and other media outlets will alert the community to the availability of the documentation. The website will also enable the community opportunity to provide comment electronically.

All safeguards documentation will also be made available in the World Bank Info shop and Maldives World Bank external website.

5.8 Grievance Redress Mechanism and Handling Complaints

Like any other development programme SFDP is likely to elicit complaints from the project beneficiaries and the public. The complaints may be diverse ranging from aspects of location of the subprojects, sharing of benefits and how the project is implemented. Handling of grievances is significant since it helps to manage operational risk during implementation. The Project Appraisal Document (PAD), Strategy Documents, Environment Impact Assessment (EIA) reports and project management plans may have interrogated and identified numerous project risks and potential sources of grievances.

An examination of safeguard triggered areas in the ESMF for SFDP provides a preview of the potential areas for grievances. Some of the potential grievance areas include the possibility of project areas affecting environmentally significant areas (ESAs). Subprojects that will undergo full EIA study will bring out potential risks that may arise from its implementation and therefore elicit complaints from the communities in the neighbourhood.

ESMF therefore is part of the risk analysis and is important as a fundamental step towards getting ready for grievances redress management. Other elements are the understanding of the capacity available for Grievance Redress Mechanism (GRM) at the level of institutions and personnel as well as instruments and tools for GRM and designing the plan.

The following sections describe the procedures that will be followed by SFDP to address complaints or concerns submitted by people who may benefit from or impacted by SFDP sub-projects. It intends to provide clarity and predictability on how complaints will be received, assessed, sorted, resolved and monitored. Specific activities are described for each of these steps.

A three tier grievance mechanism, prepared and tested under other Bank financed projects, will be established and will be accessible to all community members. The Island Council will be the first level of contact for any aggrieved person. A Community Advisory Board, to be developed in each of the participating Islands, will receive complaints received by the Island Council for advice as appropriate. In case the aggrieved person is not satisfied, he or she can approach the Ministry of Fisheries and Agriculture. The E&S Safeguards Coordinator in the PMU will be the contact person at MoFA. In case the issue is not resolved, the aggrieved person has the option of approaching judiciary. In cases where vulnerable persons are unable to access the legal system, the Government of Maldives will provide legal support to the vulnerable person(s). The PMU will assist the vulnerable person(s) in getting this support from the Government of Maldives. The PMU will also ensure that there is no cost imposed (such as for travel and accommodation) on the aggrieved person if the person belongs to the vulnerable groups. The verdict of the judiciary will be final.

The project specific Grievance Mechanism is summarized below:

Tiers of Grievance Mechanism	Nodal Person for Contact	Contacts, Communication and Other Facilitation by Project	Timeframe to address grievance
First Tier: Island Council / Community Advisory Board	Island Council is the first level of contact in case of any grievance. Once the Community Advisory Board has been created, it will be the first level of contact in specific grievance related to the management of the project or any other issue related to land; access and adverse impacts on the community.	• In the Administration Area of the Project, there will be an Information Board listing the names and contact telephones.	15 days
Second Tier: Ministry of Fisheries and Agriculture (MoFA) – E&S Safeguards Coordinator of the Project Management Unit (PMU).	The grievance will be forwarded to the E&S Safeguards Coordinator at the PMU.	• Only after exhausting the first tier. • Website advertisement, public notices in print media. • The aggrieved person can attend the hearing by PMU in person. The E&S Safeguards Coordinator will be responsible to ensure that there is no cost imposed (such as for travel, etc.) on the aggrieved person if the person belongs to the vulnerable groups. • Further, the project will assist the vulnerable aggrieved person if such a person is requested to attend the hearing in person.	60 days
Third Tier: Independent Institutions such as Anti-Corruption Commission, Human Rights Commission… etc.	Independent Institutions and the Judiciary will remain as an option for an aggrieved person and/or community in case that the others tiers haven not been effective.	• Only for vulnerable person(s) as per the grievance mechanism of the project. • Only after exhausting both first and second	As per established Laws of Maldives and relevant procedures

Tiers of Grievance Mechanism	Nodal Person for Contact	Contacts, Communication and Other Facilitation by Project	Timeframe to address grievance
OR the Judiciary / Assistance to Vulnerable Persons beyond the Project's Grievance Redress Mechanism		tiers of the grievance mechanism.	prescribed under the Institutional or Judicial procedures

5.9 Monitoring ESMF Implementation, Compliance and Reporting

5.9.1 Monitoring of ESMF and Implementation of the ESMF

Several indicators shall be used in monitoring implementation of the ESMF. These include:

- Capacity building – To determine whether officers with roles in implementation of the ESMF have the necessary skills to execute their mandate;
- Dissemination of ESMF documents;
- Screening and review process comprehensively executed;
- Appropriate environmental and social assessment instruments prescribed during the screening stage are applied promptly. Approval timelines should not frustrate project commencement;
- Environmental Management and Monitoring Plans (EMMPs) outlined in SER and EIA reports implemented;
- Other indicators drawn from safeguard parameters that may become apparent during implementation / application of ESMF on SFDP sub-projects.

The aim of monitoring is to assess the progress of implementation of the ESMF and determine whether the proposed mitigations have resulted in dealing with negative impacts and whether further interventions are needed or monitoring is to be extended in some areas. Monitoring indicators will be dependent on specific project contexts.

Monitoring and surveillance of micro-projects should take place on a "spot check" basis at it would be difficult to undertake continuous surveillance on all the micro-projects financed under the project. The monitoring process would be based on observations by SFDP technical officers, appointed consultants and stakeholders to determine the trends in ESMF implementation and report on the same.

The following matrix provides a generic outline to be used for tracking whether the ESMF has been applied during implementation of projects close to sensitive receptors.

ESMF Implementation Monitoring Matrix

Activity	Objective / Target	Monitoring Indicator	Responsibility
Capacity Building	Officers and communities with roles in implementation of the ESMF have the necessary skills to execute their mandate	• Training Reports • Roles competently handled	PMU
Dissemination of ESMF	Adequate dissemination of ESMF stakeholders	• Copies of ESMF available at PMU and site offices; • Copy of ESMF posted on WB portal and SFDP website	PMU
Screening and Review Mechanisms	All projects screened prior to implementation	• Screening forms filled and records kept	PMU
Preparation of Environmental and Social Impact Assessment Reports	Appropriate environmental and social assessment instruments prescribed during the screening stage are applied	• SER prepared by communities with assistance of Environmental & Social Safeguard Officers (ESSO) and submitted to EPA for review and record; • Independent consultants hired to prepare EPR/EIA reports and the said reports submitted to EPA for approval	•Communities / ESSO PMU
Environmental Licenses	EPR and ESIA study reports reviewed and licenses issued in a timely manner so as not to frustrate commencement of projects	• EPR approved within 30 days of submission • ESIA study reports reviewed within 90 days	EPA
Monitoring and evaluation at subprojects level	Environmental Management and Monitoring Plans (EMMPs) outlined in SER and EIA reports implemented	Periodical monitoring reports as per recommendations of SER or EIA	Communities; EPA Implementing Agencies

5.9.2 Environmental and Social Compliance Monitoring and Reporting

Supervision of the ESMPs, along with other aspects of the project, will cover monitoring, evaluative review and reporting in order to achieve, among others, the following objectives:

- determine whether the project is being carried out in conformity with environmental and social safeguards and legal agreements;
- identify issues as they arise during implementation and recommend means to resolve them;
- recommend changes in project concept/design, as appropriate, as the project evolves or circumstances change; and identify the key risks to project sustainability and recommend appropriate risk management strategies to the Proponent.

An appropriate environmental supervision plan will be developed aiming to ensure the successful implementation of the ESMPs across the project.

Quarterly, the PMUs will collaborate with project proponents in the field and, will monitor the implementation of the respective environment mitigation measures outlined for all project interventions. Annually, the Project Implementation in collaboration with the environmental and social officer based in the PMUs will have responsibility of carrying out this monitoring by regularly visiting the project sites, and pursuing the following corrective measures as required.

Compliance monitoring comprises on-site inspection of construction activities to verify that measures identified in the ESMPs are included in the clauses for contractors are being implemented. This type of monitoring is similar to the normal technical supervision tasks ensuring that the Contractor is achieving the required standards and quality of work. Photo documentation of non-compliance as well as best practices is recommended as a means of recording implementation conditions efficiently.

A standard Environmental and Social Compliance Monitoring Checklist for Project Activities is presented in **Annex 10.**

Monitoring of compliance with ESMP specifications by the contractor is essential for proper environmental management and will be conducted primarily by the implementing agency. Ensuring compliance with environmental safeguards is an integral part of the monitoring program. Each respective ESMP will outline monitoring responsibilities and parameters. The environmental and social officer of the implementing agency will withhold the overarching responsibility for maintaining all documentation in line with the ESMF and ensure timely reporting to the World Bank.

Regular World Bank missions will include specialists to monitor the project's compliance with World Bank ssafeguard policies. The progress of environmental monitoring will be formally communicated to IDA through regular progress reports and updates as per the compliance monitoring agreement made during project implementation.

5.9.3 Monitoring State of the Environment

The Project Management Unit should be responsible and ensure that the monitoring protocols suggested in respective EIA report is implemented in a timely manner for all the components of SFDP. This would be done by:

- Undertaking annual environmental and social audit (EA) of 30% sample of the approved projects under components 1, 2 and 3 based on their risk profile;
- Submitting the audit report to PMU, EPA and the World Bank for review;
- Ensuring closure of environmental and social monitoring actions.

It should be noted that none of the approved projects should have high significant impacts and hence all projects are expected to be exempted from annual audits.

The annual audit would be done in accordance with the Environmental Impact Assessment and Audit Regulations and would involve:

- Inspection of the project site to determine environmental and social management practices in place;
- Review of documents and records;
- Sampling and analysis where necessary to determine the current environmental and social conditions of the project sites;
- Review existing monitoring programs and procedures in place for control and corrective actions;
- Examination of records of environmental incidences and complaints/grievances received from local communities;
- Prepare a list of current, residual and future environmental and social risks;

- Interviews with neighbouring communities and other stakeholders to get their views on the site operations.

5.10 Capacity Building on Environmental and Social Safeguards

Effective implementation of the Environmental and Social Management Framework will require capacity development for SFDP PMU, the implementing institutions as well those responsible for implementing sub-projects at grass-root levels. Implementers need to understand inherent social and environmental issues and values and be able to clearly identify indicators of these.

5.10.1 Training objectives

The overall objective of the training is to mainstream environmental and social consideration into participatory processes of sub-project identification, planning, implementation and mitigation as well as monitoring of the mitigation activities in the sub-projects and main projects activities.

The specific objectives of the training include:

- To ensure that key stakeholders understand the ESMF, how to apply it to sub-projects and other activities of SFDP;
- To actively involve stakeholders and projects affected communities in the screening of environmental and social aspects of SFDP projects from design, planning, monitoring and implementation;
- Domesticating the ESMF to fast track the implementation of the associated subprojects.

5.10.2 Scope of the ESMF Training

While undertaking this study capacity needs assessment identified requirements to strengthen capacity on social and environmental evaluation, screening, mitigation and monitoring. It was established that knowledge of environmental management adhering to the requirements of World Bank is inadequate. SFDP aims to enhance capacity to enable it have a dedicated staff and creates awareness through the project; who can follow on social and environmental challenges of the project to ensure maximum benefits.

The capacity building exercise will take into consideration the integration and fulfilment of the requirements of World Bank Environmental and Social Safeguards as well as those of the Environmental Act, Fisheries Act and applicable policies and regulations. The programme involves training directly linked to the implementation of the ESMF as well as training on aspects influencing success of ESMF, and will be clustered to cater for various target groups. Topics to be covered included:

- Background of the SFDP project – its objectives, target groups and footprints;
- Role of ESMF in implementation of SFDP sub-projects;
- Environmental Act and relevant environmental regulations;
- World Bank Environmental and Social Safeguards;
- Project screening methods;
- Environmental Impact Assessment (EIA) and Environmental Audit (EA) procedures;
- Project activities and their potential environmental and social impacts
- Development of environmental management/mitigation plans;
- Responsibilities for ESMF implementation, monitoring and reporting;

- Use of Standardized EMPs by Communities to develop Simple Environmental Review reports.
- Fisheries Act and relevant regulations
- International Instruments such as UNCLOS, Fish Stock Agreement, Port State Measures etc
- Regional Fisheries Management Organization such as IOTC, SWIOFC

The Environmental and Social Officer will be trained by the Environmental Specialist and Social Specialist of the World Bank project team on the ESMF implementation, safeguards and procedural requirements of World Bank.

All contractors are expected to disseminate and create awareness within the workforce ESMP compliance, and any staff training necessary for their effective implementation. Where contractors do not have existing environmental staff, E&S Coordinator and MEE will make arrangements for adequate capacity building within the workforce to be involved. Where construction work is to be undertaken by community members, training should be provided by the E&S Coordinator and Island Councils, who have been pre-trained on the project and ESMPs. That training should consist of an introductory talk, dissemination of the guidelines, and an on-site talk prior to the start of each new task within component implementation.

Training on safeguards with regard to operations will be provided within the project modality for out grower mariculture operators and other relevant operators.

6. Chapter 6: Implementation Arrangements

6.1 Project Implementation Arrangements

MoFA has the sole mandate, jurisdiction and experience in managing fisheries, and therefore, is the obvious choice to lead project implementation. The MoFA has implemented or participated in implementation of Bank-financed projects, but not in the recent past. Further, the MoFA has a large mandate, but limited staff. There is an urgent need to staff-up in most divisions of MoFA including the divisions responsible for compliance monitoring, implementation of mariculture activities, training and extension – who will be involved in preparation and implementation of the project. Given the reduced working hours of the government staff in Maldives, it is unlikely that the existing staff will be able to provide any time for the project. A special purpose vehicle in the form of a PMU, with adequate number of technical staff, including expert staff on mariculture, aquaculture research, and market studies, environmental management, social inclusion (gender), financial management, financial planning, and procurement, was therefore, deemed necessary.

MoFA has set up this PMU to manage the project and achieve the PDOs; coordinate project activities on a full-time basis and directly execute some of the project activities. Most activities will be implemented by the regular divisions of the MoFA. In addition, a Steering Committee at the MoFA has been set up for inter-sectoral coordination.

The PMU organizational structure mimics the structure of the MoFA. This is important because: (a) the actual execution of project activities will take place using the MoFA divisions and their field offices, and a clear coordination between the PMU and the relevant MoFA division is needed; (b) the additional expertise and staff created under the PMU will need to be absorbed in the respective MoFA divisions at closure of the project, such that the long-term capacity created is not lost, and used for sustenance and expansion of the outcomes of the project, including as anticipated for future phases of the SOP; (c) given the shortage of qualified fisheries experts in Maldives, the organizational structure of the PMU would be such that it becomes easy for MoFA to depute their permanent staff of regular divisions to the PMU in a manner that the staff could clearly see career advantages if they join the PMU (and be back to their parent divisions when the deputation is over).

The PMU will collaborate with and seek support from and partnership with a range of other agencies to strengthen the capacity of the main implementing actors. These will include international knowledge centers, including the World Aquaculture Alliance; academic and research institutes including the Maldives National University; private sector business houses and industries including the Maldives National Chamber of Commerce and Industry; civil society groups, atoll level community organizations and other government departments responsible for development and protection of marine resources (such as the Ministry of Environment).

The PMU to be established within the MoFA will need to second/hire environmental specialists to focus on the tasks and responsibilities outlined in the ESMF in the role of an Environmental and Social Officer (ESO).

The Environmental and Social Officer at the PMU; will be responsible for the implementation of all steps presented in the environmental management framework of the ESMF. The facilitation of the preparation of environmental and social mitigation instruments, such as EIAs, SIAs and ESMPs, requesting for environmental clearances from relevant authorities such as the EPA where applicable,

and monitoring/reporting on compliance of due diligence mechanisms set forth in the ESMF and relevant trainings. He/she will be responsible for the implementation of environmental and social management plans and grievance mechanism; liaison with other agencies, contractors and engineering supervisors at the island level; monitoring and evaluation; and training for all safeguards assessments it is required, the PMU will outsource detail studies to consultants and manage them. The PMU Environmental and Social Officer will be responsible for ensuring the delivery of such outsourced tasks. He/she will be responsible for the preparation of quarterly compliance summaries and formally communicating to IDA on environmental and social safeguards matters. He/she will be responsible for the preparation of quarterly compliance summaries and formally communicating to IDA on environmental and social safeguards matters. The ESC will be responsible for managing the Environmental and Social Officers (ESOs) assigned to the field.

Environmental and Social Officer in the field; will be responsible for ensuring Island level activities as per the ESMF are well managed and report to the ESC based in the PMU. They will assist in collecting data and the timely completion of environmental and social instruments, such as ESMPs and ESIAs, in collaboration with Island Councils and take proactive efforts during monitoring/reporting on compliance of due diligence mechanisms set forth in the ESMF as well as conduct trainings as instructed by the ESC of the PMU who will provide them with training as required. They will be required to conduct regular monitoring visits and facilitate good communication between the ICs and the PMU on safeguards issues and provide guidance to the ICs. Project monitoring officers can be trained to meet this dual purpose..

ANNEXES

Annex 1- EPA EIA Screening Form and English Translation

Ministry of Environment and Energy

Environmental Protection Agency

Environmental Protection Agency
Green Building, 3rd Floor, HandhuvareeHingun
Male', Rep. of Maldives, 20392
Tel: [+960] 333 5949 [+960] 3335951
Fax: [+960] 333 5953

Email: secretariat@epa.gov.mv
Website: www.epa.gov.mv

National Emblem

Ministry of Environment and Energy Environmental Protection Agency

DEVELOPMENT PROPOSAL SCREENING FORM

Form No: _____

(Office Use)

A Development Proposal Screening Decision will be issues after the receipt of this Development Proposal Screening Form.

The form is divided in 2 parts, please complete all parts.

Part 1: Proponents Information

Name of person submitting form: ……

On behalf of (company, other person, self): ……

Address: ……

Telephone Number: …… ID Card Number: ……

Fax Number: …….. Date: Year…….. Month ……. Day ……..

Email: …….. Signature: ……

Part 2: Project Description

Project Title: ……

Type of Development: ……..

Location of Project: ……

Duration of Project: ……

Government Agencies responsible for Authorization: ……

……

Brief description of the project activities not exceeding 3 A4 size papers in chronological order (include information about equipment and machinery to be used): ……

……

Details of existing environment of the project location and the changes that will be brought to the environment by the project, not less than 5 A4 size papers: ……

……

- Please use additional sheets where appropriate

As the proponent of this project, we hereby declare that to the best of our knowledge the information provided here are accurate and complete.

Name: ……

Date: Year ……. Month …….. Day ……

Signature: …….

Annex 2- ENVIRONMENTAL AND SOCIAL CHECKLIST

Subproject Name:
Proponent:
Island/Ward:
Reviewer:

		Yes	No
A: Type of Project – Will subproject or any site involved in the subproject			
1	Build or rehabilitate any structures or buildings?		
2	Be located in or near an area where there is an important historical, archaeological or cultural heritage site?		
3	Be located within or adjacent to any areas that are or may be protected by government (e.g. protected tree, heritage site, protected area)?		
4	Be located on a water harvesting roof?		
5	Be located in an area where plans for future land uses may affect the project?		
6	Produce solid wastes during construction, operation or decommissioning?		
If the answer to any of questions 1-6 is "yes", please use the indicated section(s) of the ESMF for guidance on how to avoid or minimise typical impacts or risks. If the answer to Question 2 or 3 is "yes" the process required for EIA must be followed.			
B: Environment – Will the subproject or any site involved in the subproject			
7	Risk causing contamination of drinking water?		
8	Need to cut down any trees?		
9	Be located within or adjacent to environmentally sensitive areas (e.g. mangroves, wetlands), threatened species or a protected tree?		
10	Require freshwater during operations?		
11	Release any pollutants or any hazardous, toxic or noxious substances to the air during construction or operation?		
12	Will there be any liquid discharge to ground water aquifer or the lagoon during construction or operations?		
13	Involve use, storage, transport, handling or production of substances or material that can be harmful to human health or raise concerns about the actual or perceived risks to human health?		
If the answer to any of questions 6-11 is "yes", please use the indicated section(s) of the ESMF for guidance on how to avoid or minimise typical impacts or risks. If the answer to Question 7, 8, 9, 11 or 13 is "yes" the process required for EIA must be followed.			
C: Social –			
14	Will the proposed project require additional improvement works before executing work?		
15	Would this project create new and additional jobs?		
16	Are there health impacts during implementation stage?		
17	Will this project affect livelihood adversely? (If answer is yes and livelihoods will be affected adversely please attach details of how it will be impacted and the type, magnitude and severity of impact)		
18	If livelihoods will be impacted, are there adequate alternatives or compensations considered? (If yes, please provide details)		
19	Are there any disputes/complaints from the neighbouring properties?		
If the answer to any of questions 16, 17, or 18 is "yes", please use the indicated section(s) of the ESMF for guidance on how to avoid or minimise typical impacts or risks.			

Annex 3– ENVIRONMENTAL CLEARANCE PROCESS

It is recommended that each proponents/investors go through the environmental clearance process for their subprojects. All the planned installations that fall under a sub-project can be lumped together as a single project.

The following process follows the EIA regulations issued by EPA in 2012.

Step	Environmental Clearance Procedure for the major subprojects.
1	The Proponent prepares a Development Project Screening form and Submit to EPA.
2	EPA will complete the process and inform the proponent either to: (i) undertake the preliminary Environmental assessment or (ii) to prepare an Environment Management Plan.
3	If a preliminary Environment Assessment is required, the Proponent will prepare the report and submit to EPA for further appraisal. If an EMP is required, follow Step 5.
4	EPA will issue a decision on the Environment Assessment and request to either: (i) prepare an EMP or; (ii) and Environment and Social Impact Assessment. For an EMP, follow Step 5; and for an ESIA, follow Step 7
5	Proponent will prepare an EMP and submit to EPA for approval.
6	EPA will evaluate the EMP and issue an approval. No further approvals are required after an **EMP approval is granted.**
7	Proponent will prepare and submit an EIA report.
8	EPA will evaluate and either: (i) request additional information or; (ii) **issue a Decision Note**. If a Decision Note is issued, no further approvals are required. If additional information is required, follow Step 9.
9	Proponent will prepare the additional information and submit to EPA.
10	If the additional information is adequate, EPA will issue a **Decision Note.** If inadequate additional requests can be made and Step 9 will need to be followed. EPA reserved the right to reject a project if there are significant environmental impacts that cannot be substantially mitigated. This situation is very unlikely for the ASPIRE projects, given its low impacts.

Note: All the application forms are available from EPA website: www.epa.gov.mv.

Annex 4– STUCTURE OF AN EIA

The Environment Impact Assessment (EIA) Report would cover the following sections and is based on the EIA regulations 2012.

Cover Page:
Should contain the project title, location(s), consultant names, proponent names and date

Executive Summary:
Should be prepare in local language or if the report is in English, in both Dhivehi and English.

Introduction:
A summary of information relating to the proponent, contractors, costing and terms of reference.

Project description:
A brief description of the project including its rationale, objectives, main components, activities, work plan, project management arrangements, inputs (such as solar panels, inverters, water for panel washing) and expected output (including solar panel decommissioning waste).

Analysis of Alternatives:
This section would address alternatives for the proposed action, which would include the "no project" alternative as well as other alternatives considered before selecting the proposed action. These may include alternative sites and solar panel types.

Legal and regulatory considerations:
A summary of the pertinent legislation, regulations and standards, and environmental policies that are relevant and applicable to the proposed subproject, and identify the appropriate authority jurisdictions that will specifically apply to the project. Include permits, approvals and agreements (including roof-lease agreement, if available) in the EIA document.

Description of the environment:
A summary of existing conditions around the site, including any vegetation cover present, adjoining building and how their widows are arranged. An assessment of social conditions in the proposed facility and surrounding buildings may be required.

Potential Impacts:
This section would identify potential environmental impacts that may arise as a result of the proposed project. All cumulative effects will be considered – positive and negative, direct and indirect, long term and short term. A stronger focus should be on social impact assessment, particularly surrounding buildings and social equity issues.

Mitigation Measures:
This section would include a detailed explanation of how the potential environmental impacts identified above could be mitigated.

Monitoring Plan:
This section should include a long term plan for monitoring to ensure that there no adverse impacts due to the project.

Environmental Management Plan:

Considering the nature of the sub-projects, it is unlikely that any major or irreversible environmental impacts will be encountered. Therefore, the most important section of the EIA would be the section on Environmental Management Plans (EMPs). Prediction of potential adverse environmental and social impacts arising from project activities will be at the core of the environmental impact assessment process. By following the procedure described in this document and the EIA Regulations 2012, the environmental assessments to be conducted under the Project will be able to identify environmental and social impacts as a result of implementing the sub-projects. While impact identification is important, an equally essential element of this process is to develop measures to eliminate, offset or reduce impacts to acceptable levels during implementation and operation of the projects.

The integration of such measures into project implementation and operation is supported by clearly defining the environmental requirements within a EMP. EMPs provide an essential link between the impacts predicted and mitigation measures specified within the EIA and implementation and operation activities. The plan outlines the anticipated environmental impacts, the mitigation measures to minimize these impacts, responsibilities for mitigation, timescales, and costs of mitigation and sources of funding.

The SFDP subprojects are classified as Category B Projects. World Bank guidelines state that detailed EMP's are essential for Category A projects, but for many Category B projects, a simple EMP may suffice. The EMP will address the following aspects:

- Summary of impacts
- Description of Mitigation Measures
- Description of Monitoring Programs
- Institutional Arrangements/responsibilities
- Implementation Schedule and Reporting Procedures
- Cost estimates and sources of funds

No fixed format has been suggested for EMPs but the Table below provides an example of an EMP to be placed within an EIA.

Anticipated Affect	**Mitigation**	**Monitoring**	**Responsibility**	**Schedule**	**Cost and financing**

Annex 5: Generic Environmental and Social Management Plan (ESMP) TOR

Objective and Scope of Preparation of Environmental and Social Management and Monitoring Plan (ESMP)

In order to ensure short and long term environmental impacts that would arise due to improvement and rehabilitation work (to be described in the first section based on the sub-project/activity), an ESMP plan will need to be developed as per the scope presented below and in accordance with the ESMF of the Project:

1. *Identification of impacts and description of mitigation measures:* Firstly, Impacts arising out of the project activities need to be clearly identified. Secondly, feasible and cost effective measures to minimize impacts to acceptable levels should be specified with reference to each impact identified. Further, it should provide details on the conditions under which the mitigatory measure should be implemented (ex; routine or in the event of contingencies) The ESMP also should distinguish between type of solution proposed (structural & nonstructural) and the phase in which it should become operable (design, construction and/or operational).
2. *Enhancement plans:* Positive impacts or opportunities arising out of the project need to be identified during the preparation of the check list and Environmental Assessment process where applicable. Some of these opportunities can be further developed to draw environmental and social benefits to the local area. The ESMP should identify such opportunities and develop a plan to systematically harness any such benefit.
3. *Monitoring programme:* In order to ensure that the proposed mitigatory measures have the intended results and complies with national standards and donor requirements, an environmental performance monitoring programme should be included in the ESMP. The monitoring programme should give details of the following;
    - Monitoring indicators to be measured for evaluating the performance of each mitigatory measure (for example national standards, engineering structures, extent of area replanted, etc.).
    - Monitoring mechanisms and methodologies
    - Monitoring frequency
    - Monitoring locations
4. *Institutional arrangements:* Institutions/parties responsible for implementing mitigatory measures and for monitoring their performance should be clearly identified. Where necessary, mechanisms for institutional co-ordination should be identified as often monitoring tends to involve more than one institution.
5. *Implementing schedules:* Timing, frequency and duration of mitigation measures with links to overall implementation schedule of the project should be specified.
6. *Reporting procedures:* Feedback mechanisms to inform the relevant parties on the progress and effectiveness of the mitigatory measures and monitoring itself should be specified. Guidelines on the type of information wanted and the presentation of feedback information should also be highlighted.
7. *Cost estimates and sources of funds:* Implementation of mitigatory measures mentioned in the ESMP will involve an initial investment cost as well as recurrent costs. The ESMP should include costs estimates for each measure and also identify sources of funding.
8. *Contract clauses:* This is an important section of the ESMP that would ensure recommendations carried in the ESMP will be translated into action on the ground. Contract documents will need to be incorporated with clauses directly linked to the implementation of mitigatory measures. Mechanisms such as linking the payment schedules to implementation of the said clauses could be explored and implemented, as appropriate.

The format to present the ESMP in a matrix is provided below:

Stage	Activity	Environmental Issues	Mitigatory measures	Locality	Frequency of Implementation / Applicat ion	Cost	Implementation Responsibility	Monitoring Responsibility	Monitoring Frequency	Implementation Progress
Preconstruction / design / planning										
Construction										
Operational										

Important to note the following when using this template:

The EMP that will be prepared should have all sections in place, except the last column on Implementation
Progress

What go in as the EMP to the bid and contract documents of construction contractor is the sections highlighted in blue, as Implementation Progress is not relevant at the time of bidding and Operational responsibilities would lie with the council.

Any activity that may be identified as the responsibility of design engineers should not be part of the EMP that goes into the bid and contract documents of construction contractors

Important to note: The consultant is responsible to ensure the ESMF requirements are taken into consideration in the designing of infrastructure.

The ESMP Presentation

The ESMP should follow the same sequence as the tasks described above including the ESMP matrix provided above.

Consultant Qualifications

The design consultant team should include an expert with at least 8 years of experience preparing environmental management and monitoring plans for infrastructure construction, improvement and rehabilitation, costing of mitigation measures and preparing contractor clauses necessary to capture ESMP implementation needs.

Reporting and feedback schedule

All submissions related to the assignment should be submitted to Project Management Unit, as hard copies and electronically. The duration of the consultancy is x months. During the final submission of the ESMP report, if changes requested during the draft report stage have not been incorporated in a satisfactory manner to the client and the World Bank, the consultant will be required to work further on the document until it is considered satisfactory.

Annex 6: Environmental Management in Construction Sites

Management of Construction Sites

It is acknowledged that most of the physical sub-components will be small-medium scale activities undertaken by local contractors. Nevertheless, it is necessary to apply best practice management measures to ensure that the work will have a minimum effect on the natural environment.

- Vehicles must not be washed at construction sites.
- All liquid fuel and lubricant storage tanks must be 'bunded' to retain the entire contents of the tank in the event of leakage or rupture.
- Construction sites must be watered to suppress dust whenever appropriate during the dry season.
- All site drainage water must be passed through a sediment trap.
- Care must be taken to prevent cement laden drainage water from entering the wetlands.
- Temporary toilets must be provided for construction workers.
- All sewage must be treated before discharge, e.g. using septic tanks.
- All effluents must comply with any national environmental standards.
- All emissions (e.g. from engines, crushers, batching plants, etc.) must comply with any local environmental standards.
- All motor-driven generators, compressors, pumps, etc., must be properly silenced.
- The running of machinery and lighting in the vicinity of housing must be limited to normal working hours.
- All solid wastes must be properly disposed of Management of construction solid wastes and toxic wastes below).
- Proscribed toxic and hazardous substances must not be used or disposed of (see below).
- All plant, equipment and wastes must be removed at the end of construction, and each site must be restored to its original condition.
- A Code of Practice must be issued to all construction workers. This should specify required behaviour, e.g.: No unauthorised cutting of trees or branches.
    - No lighting of fires.
    - No hunting or fishing.
    - No disposal of any kind of waste into water courses
    - Behaviour to comply with defined local cultural and religious sensitivities.
    - No unauthorized entry onto private property
    - Recommended health protection measures (see also Health and Safety below).

Environmental Standards – Contractors must comply with any national environmental standards. In the absence of relevant national standards, international standards should be applied, e.g. as published in the World Bank Pollution Prevention and Abatement Handbook, 1997.

Toxic and Hazardous Materials – Contractors must not use any substances which are internationally banned.

Management of construction solid wastes and toxic wastes

- Waste generation is to be minimised. The treatment of waste should follow the hierarchy: Avoid > Minimise > Reuse > Recycle > Treat > Dispose.
- All waste arising during construction is to be disposed of to the island's recognised waste disposal site. Recyclable materials (e.g. glass, cans, plastics, paper) should be separated and recovered. Organic waste should be composted.

- Any toxic or hazardous waste must be either returned to its source, or stored and disposed of separately in consultation with EPA; this includes oil filters, batteries, empty paint cans and the packaging of toxic construction materials.
- The empty containers of toxic or hazardous liquids must be punctured or crushed to avoid them being used subsequently for drinking water.
- Waste lubricating oil is to be stored prior to recycling.
- Vehicle batteries are to be stored prior to recycling.
- Vehicle tyres are to be stored prior to recycling.
- Construction generated wood, paper, glass bottles, cans, plastic and other recyclables are to be separated and recycled.
- No waste is to be burnt.

Management of Land

- Topsoil must be removed and stored for future use, before any further excavation work.
- In the case of temporary land take in agricultural areas, the positions of all walls, fences and hedges should be recorded, and they should be replaced at the end of construction.
- All land used temporarily during construction must be restored to its pre-construction condition.
- Cut and fill volumes must be planned to minimize the generation of spoil.
- Spoil from excavation must only be disposed of in planned spoil disposal sites that have been approved by the EPA; specifically, excavated spoil must not be dumped in wetlands or lagoons or on agricultural land.
- Completed spoil heaps must be profiled, covered in topsoil and grassed to maintain stability.
- All excavations below ground level should be bunded to prevent water inflow or outflow.
- Water pumped out of excavations should be passed through a settlement facility before disposal.
- The use of heavy machinery should be minimized to avoid soil compaction.
- Arrangements must be made for the halting of work and the consultation of specialists from the National Museum, in the event that any potential archaeological remains are uncovered during excavation.

Management of Transport

- All vehicles must be in a safe and legal condition with respect to all of their systems.
- All vehicles must comply with national regulations on emissions and noise.
- All drivers must be properly licensed for the class of vehicle they are driving.
- All vehicles must carry a fire extinguisher and first aid kit.
- All construction vehicles must have upward facing exhaust pipes.
- All vehicles must have audible indicators for reversing.
- Public roads must be promptly cleaned if affected by material loss.
- Truckloads of construction materials or spoil must be covered to prevent dust or losses.
- Where public roads are to be used, an official ‗construction route' is to be defined, avoiding housing as much as possible, and this route should be marked with road signs.
- Unsurfaced haul roads must be watered to suppress dust whenever appropriate during the dry season.
- Vehicles must not be washed at construction sites.

Community Facilities

- Consultation is required with neighbouring communities before the start of construction, to identify any notable features or issues of local concern.
- Features that are to be protected during construction (cemeteries, mature trees, wells, etc) should be marked with brightly coloured tape.

- Excavation works below ground level in the vicinity of settlements should be marked with posts and tapes for safety.
- Temporary bridges or diversions must be provided wherever existing footpaths, tracks or roads are to be cut by construction works.
- Temporary water supplies are to be provided where either an existing water source is to be interrupted by construction, or access to the existing supply is severed.

Health & Safety

- All employed construction workers must be given a medical examination (including sight and hearing tests) before being accepted for employment. This must be repeated annually. The results of these medical examinations must be kept by the contracting company.
- All employees must be given printed information on the health implications of their work and how to avoid problems. This should incorporate advice in the field of sexually transmitted diseases (STDs), including HIV / AIDS.
- All construction workers must be given H & S training.
- All construction workers must be provided with a set of appropriate personal protective clothing and equipment (e.g. hard hat, hard boots, leather gloves, ear defenders and dust mask). Workers are required to wear appropriate protective equipment before being allowed on active construction sites.
- A permit to work 'system is to be instituted for all work at hazardous locations, e.g. working over water or in boats.
- All excavations below ground level should be marked with posts and tape.
- Drinking water, toilet and washing facilities must be provided at each active site.
- Each active site must be equipped with a comprehensive First Aid kit and eyewash bottle.
- All construction vehicles must carry a fire extinguisher and first aid kit.
- All (legal) toxic or hazardous materials (e.g. water chlorination agents) must be stored in a locked, waterproof, ventilated enclosure.
- All compressed gas bottles must be stored, chained in the upright position, in a locked ventilated enclosure.
- International occupational health standards must be applied to all contractors 'workplaces. Contractors should consult the World Bank Environment, Health and Safety Guidelines.

Annex 7: CRITERIA FOR SELECTION OF ATOLLS & HOUSEHOLDS

The selection of the atolls and households for project intervention will be based on a number of basic socio-economic requirements, which aim to ensure that the right conditions are created for achieving the project objective of creating family-based, gender equitable and economically profitable enterprises.

In context of the Maldives, there are number of overall contextual advantages, which eliminate a set of selection criteria from the usual list of considerations applied to such a selection process. The preliminary assessment has established that all indicated atolls present suitable environment for the relevant type of mariculture, and present no issues of isolation for main transport and commercial hubs. In addition, the presence of governance rules and structures that allow individual households access to atoll areas needed for these households to securely establish production activities in the lagoons ensures the mitigation of potential local conflicts over lagoon access and use. Finally, the population has basic level of education that would allow workers to grasp technical innovation and be able to manage a production micro-enterprise.

However, in addition to the above stated advantages of the overall environment, there are also a number of risks that cannot be mitigated through the selection process, but must be recognized at this stage. These relate mainly to outward migration and alternative youth employment opportunities that may alter the population dynamic and demographic fabric of the targeted communities, and which lay outside of the scope of influence of this intervention and cannot be pre-determined in the selection process.

Having outlined the above parameters, there are a number of social and economic criteria that will be applied during the atoll selection process. These include: the presence of communities interested to be engaged in mariculture; the presence of a critical mass of households large enough to provide strong enough incentive for inclusion into the value-chain by other key upstream and downstream players; and strong community leadership interested and committed to support the development of the proposed activities. Among the economic criteria for selection there are considerations related to the extent to which mariculture development activities fit into the rest of the local livelihoods options; as well as the existence of a relatively more developed support infrastructure regarding transport, communications, storage etc.

Beyond the selection of the atolls, the selection process will extent to identifying the most appropriate households to be targeted. The criteria that will be applied include: (1) willingness to accept female ownership and technical management of the enterprise; (2) express strong interest in the new production activity; (3) understanding of the proposed activity both in terms of technical and financial/resource commitment; (4) sufficient labor capacity and capital or ability to access finance to engage in the new activity; and finally, (5) the consideration that other existing livelihood options do not impede household engagement.

Annex 8- Environmental and Social Monitoring Checklist for Project Activities

Title of project :

Proponent :

Contractor's Name :

Monitoring Date :

Monitor's Name & Designation :

Issue	Proposed mitigation measures (from the ESMP)	Implementing Responsibility	Compliance Yes/No	Reason for non-compliance	Follow up Action

Photo-documentation of Issue Identified Above

Issue # (from description above)	Date of photograph	Photograph depicting issue

Ministry of Fisheries and Agriculture

Environmental Impact Assessment

Development of Aquatic Animal Quarantine Facility at Ibrahim Nasir International Airport

Report Prepared by LaMer Pvt Ltd:

Hussein Zahir
Shahama A. Sattar
Mohamed Aslam
Aishath Abdulla

Proponents Name:
Ministry of Fisheries and Agriculture

Signature:

July 2016

Land and Marine Environmental Resources Group Pvt Ltd, Maldives

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Consultants Declaration

I certify that to best of my knowledge the statements made in this Environmental Impact Assessment report for Development of Aquatic Animal Quarantine facility at Ibrahim Nasir International Airport, are true, complete and correct.

Name: Hussein Zahir

Consultant Registration Number: 04-07

Signature: 

Company Name: Land and Marine Environmental Resource Group Pvt Ltd

Date: 20th July 2016

Proponents Declaration and commitment letter

Re: Development of Aquatic Animal Quarantine facility at Ibrahim Nasir International Airport

As the proponent of the proposed project WE guarantee that WE have read the report and to the best of our knowledge all non-technical information provided here are accurate and complete. Also we hereby confirm our commitment to finance and implement all mitigation measures and the monitoring program as specified in the report.

Signature: 

Name: Shafiya Naeem

Designation: Aquatic Pathologist

Ministry of Fisheries and Agriculture

Date: 20th July 2016

1 Non-technical Summary

Background

The non-technical summary outlines the findings of the Environmental Impact Assessment of the proposed construction of a live aquatic animal quarantine facility at the Ibrahim Nasir International Airport. The proponent of the project is the Ministry of Fisheries and Agriculture.

The proposed project is a part of the institutional strengthening component of the Mariculture Enterprise Development Project (MEDeP) implemented by the Ministry. It involves construction and set up of the live aquatic animal quarantine facility, which is inclusive of a quarantine building and pump station. The seawater for the holding tanks will be sourced through a seawater well located at the lagoon area to the west of project site (back reef area of Hulhule reef), while wastewater discharge will be through pipeline laid from facility to the western reef (pipeline south of facility and run near quay wall of harbor southern side of Hulhule Island Hotel, close to the along-side berthing area for fuel tanker ships).

Key impacts, mitigation measures and alternatives

Impacts on the environment from various activities of the construction work and during the operation of the facility have been identified through interviews with the project management team, field data collection and surveys. The impacts identified are also described according to their location, extent and characteristics.

Impact analysis was done using the Leopold matrix. Impacts due to project were few and minimal, mainly with low effects. Impacts were mainly envisaged on seawater quality and marine environment, as well as vegetation (due to removal of coconut palms). Details of impact analysis are discussed in Section 9 of the report.

Detailed mitigation measures are discussed in Section 11 of the report. Given the minimal impacts, mitigation measures due to project are few. However, the formulation of contingency plans in case of equipment breakdown or incidence of other events such as fire and floods should be given a priority.

Due to the scope of the project and the means of implementation, an alternative scenario has also been given for the means of wastewater disposal. The ‘no project’ alternative is also considered. Although this would mean avoidance of environmental impacts, this option is not feasible due to the necessity of the project, especially if the mariculture sector was to expand.

Hence the project, with current designs and methods is considered feasible, and Consultant feels that appropriate mitigation measures have been given in the report.

1. ދަތުރު

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ދިވެހިރާއްޖެ ފަރާތްތަކާއި ދިވެހިންނާ ގުޅުންހުރި (ދިވެހިރާއްޖެ ސަރުކާރާ ތިމާވެށި ތަންތަނުގައި ހުންނަ ފަރާތްތަކާ) ގުދަނުގައި ހުންނަ ތަކެތި ގެންނަ ގޮތުގައި ކަނޑުމަގުން ދަތުރުކުރާ ދަތުރުތަކަށް ދަތުރު ދިނުމުގެ ގޮތުގައި ދަތުރުތަކުގެ ގޮތުގައި ދަތުރުތަކުގެ ގޮތުގައި ދަތުރުތަކ

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2 Introduction

The proposed project involves the construction and establishment of an aquatic animal quarantine facility at the Ibrahim Nasir International Airport, by the Ministry of Fisheries and Agriculture (MoFA). The project is a part of the institutional strengthening component of the Mariculture Enterprise Development Project (MEDeP), which is a five year project commenced in 2013 and being implemented by MoFA, with financial and technical assistance from International Fund for Agricultural Development (IFAD). The main goal of MEDeP is to expand livelihood opportunities and reduce vulnerability, while the development objective is to enhance income and employment especially for youth and women from mariculture activities. MEDeP has two components; Institutional strengthening and mariculture value chain development, each of which has a number of sub-components. As prior mentioned, the construction of a national quarantine facility falls under the institutional strengthening component.

While as a general policy MoFA discourages the import of live aquatic animals for mariculture purposes, the establishment of a quarantine facility will allow better quarantine of such animals in instances where import of live aquatic animals becomes necessary for mariculture development. It is anticipated that in the near future, only the brood stock of the sea cucumber Sandfish (*Holothuria scabra*) will be imported and quarantined at the facility as this species is already being cultured in the country, and has been for a number of years. Given the potential for further investments in the culture of this species, the need for establishment of a quarantine facility is evidently clear.

The estimated cost of the proposed project is MRF 5 million.

2.1 Purpose of the report and need for the EIA

This document presents the findings of an Environmental Impact Assessment (EIA) for establishment of an aquatic animal quarantine facility at Ibrahim Nasir International Airport. Developers of such development projects are required to carry out EIA studies under the Environmental Act of Maldives. The developer is required to obtain approval of the Environmental Protection Agency (EPA), prior to the implementation of any development activities on the island.

Land and Marine Environmental Resource Group Pvt Ltd won the bid for the project to prepare the EIA and to provide assistance in other environmental related activities. This EIA

is prepared in accordance with Environmental Impact Assessment Regulations 2012 and the environmental policy and guidelines of the Government of Maldives.

3 Terms of Reference (ToR)

All development projects that have a socioeconomic environmental relevance and are listed in Appendix Raa of the EIA Regulations 2012 are required to submit an Environmental Impact Assessment report which forms the basis for project approval. As such, projects are required to follow a screening process identifying the environmental impacts associated with the project. Projects which are not listed in the above mentioned Schedule has to follow a screening process, based on which EPA decides whether the project requires the submission of an Initial Environment Evaluation report or an Environmental Monitoring report. Based on the findings of this report, EPA as the regulator makes a decision on whether the specified project further requires the submission of an EIA based on the impacts associated with the project.

In accordance with the regulations of Ministry of Environment and Energy, an EIA application form and project brief was sent stating the nature of the project and likely impacts associated with the environment. The scoping meeting was held at the Environmental Protection Agency (EPA) on the 26th of May 2016 with the project proponent, consultant and EPA officials. Based on the discussions at the meeting, draft TOR which had been submitted was finalized and approved by EPA on the same day (see Appendix 2).

4 Project Setting

The project conforms to the requirements of the Environmental Protection and Preservation Act of the Maldives, Law no. 4/93. The EIA has been undertaken in accordance with the EIA Regulation 2012 of the Maldives by a registered consultant. Furthermore, it adheres to the principles underlined in the regulations, action plans, programs and policies of the following Ministries of the Government of Maldives.

- Ministry of Environment and Energy (MEE)
- Ministry of Fisheries and Agriculture (MoFA)

These are discussed in detail in Table 1 below.

Table 1. Legislations pertaining to the project

Legislation	How does current project conform to legislation
Environmental Protection and Preservation Act (Law 4/93)	EIA undertaken as stipulated in the Act, which states that any developmental project which has a potential impact on the environment should have an EIA done prior to commencement of the project. List of such projects are given in the EIA Regulations 2012
Third National Environment Action Plan (2009 – 2013) (NEAP III)	The plan sets out the agenda for environmental planning and management for the period of 2009 – 2013. One of the targeted goals of the plan is to strengthen the EIA process. By undertaking the EIA prior to the project, the project ensures that environmental impacts due to the project are minimized.
National Biodiversity Strategy and Action Plan (NBSAP)	The objective of NBSAP was to *"achieve biodiversity conservation and sustainable utilization of biological resources in the Maldives"* by integration of biodiversity conservation into all areas of national planning, policy development and administration (MHAHE, 2002). To achieve this objective, one of the first actions listed is "formulation and adoption of suitable development planning procedures, land use plans and strengthening of the EIA process". The current project conforms to this policy, by carrying out the EIA prior to commencement of the project, so as to minimize impact on the environment and to incorporate ways of environmental monitoring and management during the project works.
Regulation on import of live animals	The Regulation on import of live animals was formulated to establish measures and a quarantine system which should be followed when importing live animals. The Regulation defines measures which should be followed when importing live animals such as: • The presence of a veterinary certificate • Health standards of animals being imported

	• Animals of which import is prohibited • Quarantine measures if necessary The regulation has specific clauses for animals such as cattle, birds, cats. In addition, the regulation also specifies guidelines which should be met by the carrier vessels of these animals
By-law on cutting down, uprooting, digging out and export of trees and palms from one island to another	The bylaw states that the cuttings down, uprooting, digging out and export of trees and palms from one island to another can only be done if it is absolutely necessary and there is no other alternative. It further states that for every tree or palm removed in the Maldives two or more should be planted and grown in the island. The bylaw prohibits the removal of the following tree types; • The coastal vegetation growing around the islands extending to about 15 meters into the island are protected by this bylaw; • All the trees and palms growing in mangrove and wetlands spreading to 15 meters of land area are protected under this bylaw; • All the trees that are in a designated protected area; • Trees that are being protected by the Government in order to protect species of animal/organisms that live in such trees; • Trees/palms that are unusual in structure The coconut palms located at the plot will be transplanted elsewhere on the island by Maldives Airports Company Ltd.
Dewatering Regulation (2013/R-1697) – 31st January 2014	The Dewatering Regulation has been formulated to introduce measures so as to minimize impact on the environment and ecosystem due to dewatering which may be carried out as part of construction works or during other works. Any development which requires dewatering as part of the project, can only implement the dewatering phase after obtaining the required approval from the Environmental Protection Agency, which is the implementing agency for the regulation. The regulation does not apply to dewatering which may be required for the installation/cleaning of a groundwater well for personal use or use of groundwater for agricultural purposes. Prior to carrying out dewatering the proponent of such projects have to submit an application form to EPA with required documents which are detailed in the regulation and application form. It is also the responsibility of the proponent to inform the relevant councils, if there are residential areas or agricultural lands within 100m radius of the site where dewatering will be carried out. The regulation further details what should be done with the water extracted during dewatering, and what actions should

	be taken if dewatering impact resource users within 30m radius of the site. The regulation further specifies fines which will be applicable if the regulation is not followed. The proposed project will conform to the regulation, by first submitting an application to carry out dewatering within the project site. The proponent will also carry out all the additional measures necessary to obtain the approval for EPA and to abide by the regulation.
Waste Management Regulation (R-58/2013)	This Regulation was gazetted on the 5th of August 2013 and came into effect 6 months from the date, on 5th of February 2014. The main objective of this regulation is to implement the national policy on waste management. Article 8 of the regulation addresses management of hazardous waste, where Section Raa specifies that transport of hazardous waste from one location to another should be in a manner where the waste is packed in tightly sealed containers so as to prevent leakage. The Article further specifies that hazardous waste should not be dumped or burnt under any circumstance. Hazardous waste has to be separated and stored separately in a manner which ensures no leakage of waste. As per the regulation, hazardous waste generated during the project will be collected and stored separately and as per the regulation. Transportation will also be as per the Regulation. Waste from site will be managed by MACL commercial department as a commercial contract for waste collection and disposal (system already in place for all operators on Airport land).
Waste Incineration Guideline (2016)	The Waste Incineration Guideline prepared by EPA is intended to facilitate the construction and operation of waste incinerators safely and to mitigate the adverse environmental and health impacts that may arise. This guideline should be considered as minimum requirement applicable to all facilities.

5 Project Description

5.1 Project Proponent

The proponent of the proposed project is the Ministry of Fisheries and Agriculture.

5.2 The Project

The proposed project involves the construction and establishment of a live aquatic animal quarantine facility at the Ibrahim Nasir International Airport, for the instance whereby live animals to be used as brood stock for mariculture purposes need to be imported.

The quarantine facility is proposed to be a two-storey building, located next to the existing Terrestrial plant and animal quarantine facility located on the eastern side of Hulhule. The facility consists of a quarantine building, pump station that supplies sea water to the quarantine building and a Pathology laboratory (which is proposed to be housed in the existing quarantine facility). The site plan and structural designs are shown in Appendix 3 and 4 (respectively) of the report.

5.2.1 General building layout

The quarantine building of the facility is a two-storey building. The ground floor has the Seawater intake tank as well as the waste seawater discharge tank and the changing rooms. Six fiberglass tanks are also located on the ground floor, with additional 6 tanks being located on the first floor of the building. The first floor also has the storage area.

The pump station is located within the plot allocated for the quarantine facility. Seawater taken from the seawater well located in the lagoon area is supplied to the pump station, which then supplies this seawater to the quarantine building.

Aquatic animals are held in 5 ton fiberglass tanks with filtered and disinfected static seawater. The tanks are aerated. Within 24 hours 100% water in the tanks is renewed.

The seawater intake and discharge system includes the following components:

- Pump station
- Seawater well (close to reef edge)
- Seawater pit in the pump station
- Fresh seawater intake pipeline (between well and pit)

- Fresh seawater pumping pipeline (between pump and seawater collection tank in the quarantine building)
- Fresh and waste seawater collection tanks in the quarantine building
- Fresh and waste seawater filtration and disinfection mechanisms
- Waste seawater discharge pipeline (between waste seawater collection tank and sea)

Sand-filtered seawater from the reef-edge well is first collected in the pit in the pump station, from where it is pumped into the seawater collection tank in the quarantine building. At this collection tank, the water is sand-filtered, cartridge-filtered and UV-disinfected and sent to the holding tanks, where the animals to be quarantined are held. The waste water coming from the holding tanks is collected in waste seawater collection tank in the quarantine building, from where the water is sand-filtered, cartridge-filtered and UV-disinfected and sent to the sea. The wastewater discharge location is western reef southern side of Hulhule Island Hotel (pipeline run near southern side harbor quay wall and run on to western reef edge).

5.2.2 **Quarantine Facility Operational process**

The current focus of mariculture is on the Sandfish, *Holothuria scabra* which although not a native species, has been cultured in the Maldives for a number of years. Given that it is the brood stock of this species which is anticipated to be imported into the country in the near future, the current Standard Operating Procedure (SOP) for the Quarantine facility has been developed for quarantine of this species. The draft SOP provided by the Ministry of Fisheries and Agriculture is given in Appendix 5. The report summarizes key areas of the SOP and refers readers to Appendix 5 for the detailed SOP.

As identified in the SOP, “the purpose of this Sandfish quarantine SOP is to run the Sandfish quarantine facility smoothly according to predefined standards and procedures to minimize negative impacts of sandfish importation” (Ministry of Fisheries and Agriculture, 2016). Operation of the Quarantine facility and implementation of the SOP is under the mariculture development policy of MoFA. Quarantine of aquatic animals is currently carried out under the Regulation on import of live animals of MoFA.

The SOP identifies the personnel responsible for the operation of the facility, namely Head of the Quarantine facility, Quarantine Officers and an Administrator. It also details required qualifications of these personnel as well as their responsibilities.

Section 5 of the SOP details operation procedures for the following processes at the quarantine facility:

a) Getting in and out of the quarantine facility
b) Maintaining the facility when no animals are under quarantine
c) Getting documentation ready to receive a batch of quarantine animals
d) Facility cleaning and disinfection for receiving a batch of quarantine animals
e) Tank preparation
f) Water Intake, storage, filtration, disinfection and pumping into holding tanks
g) Waste water collection, filtration, disinfection and discharge into the Sea
h) Water quality management
i) Animal health observation and assessment
j) Dead animal disposal
k) Packing material Disposal
l) Facility cleaning and disinfection after quarantining a of batch animals
m) Health and safety

Each of the above process is described and explained in Section 5. For each processes, where relevant, the following information is also supplied:

n) Equipment and Materials
o) Records and Checklists
p) Health and Safety
q) Cautions and Interferences

Details of all the processes will not be discussed in the EIA report. Readers are referred to the Draft SOP given in Appendix 5 for these details. However, as TOR specifies to provide details of disposal of dead animals, this is given below as provided in the SOP.

a) Get authorization of HOCF for removing the dead bodies for disposal or laboratory examination
b) If the decision was to dispose the dead bodies:
    - Sterilize the dead bodies in autoclave
    - After sterilization incinerate the dead bodies

This is the first SOP for the quarantine facility and is living document which will be revised and improved based on knowledge and experience gained through operation of the facility.

5.3 Need for the Project

Mariculture is gaining increasing importance in the Maldivian fisheries sector and as a business venture. While the general policy of the Ministry of Fisheries and Agriculture is to discourage import of live aquatic animals to be used as brood stock for such ventures, it has to be prepared for such instances where this is necessary. As per current scenario, the Sandfish, *Holothuria scabra* is cultured in the Maldives and while not a local species, the culture has been carried out for a number of years. It is anticipated that additional companies will invest in this business and thus the import of brood stock of this species will then be necessary. Therefore, the need for a quarantine facility is clear, to allow better monitoring of health of live aquatic animals which will be imported into the country.

5.4 Location and Extent of Site Boundaries

The quarantine facility is proposed to be constructed adjacent to the existing Terrestrial plant and animal quarantine facility located on the western side of Hulhule close to Hulhule Island Hotel (Figure 1 and Appendix 3: Site plan).

Figure 1. Location of project site at Hulhule (red boundary) (Imaged sourced from Google Earth)

5.5 Project management

5.5.1 Construction phase and schedule for implementation

The project duration for the construction and establishment of the live aquatic animal quarantine facility at Hulhule is expected to be completed in 5 months. Listed below are the construction phases and detailed work schedule (Table 2).

Table 2. Work schedule for construction of quarantine facility

Activity	2016				
	July	Aug	Sep	Oct	Nov
Hiring contractor					
Sit preparation					

Foundation, and underground concrete tanks					
Concrete structure: ground, fist and floors					
Masonry and plastering					
Fiberglass tank installation					
Seawater intake system: pump room, pumps, filtration, disinfection, and pipelines					
Seawater discharge system: pumps, filtration, disinfection, and pipelines					
Aeration system: air blowers and pipelines					
Operationalization					

5.5.2 Workforce requirements, availability and logistics

Contractor for the project has not been identified as yet. Hence, details of the workforce and logistics is assumed to be similar to other construction projects of this scale. It is estimated that a workforce of 20 to 30 workers will be required for the project. Given that the project is at Hulhule, no temporary facilities will be constructed for the accommodation, as workers are expected to travel between Hulhule and Male' on a daily basis.

5.6 Major Inputs and Outputs

5.6.1 Inputs (description of the project in terms of raw materials, processes, equipment and work force)

5.6.1.1 Access to site, mobilization and material unloading

Construction material such as cement, aggregate, sand and other materials will be brought to the island on barges and heavy cargo *dhonis*. Materials will be brought to the harbor area in front of Hulhule Island Hotel (closest to the project site) and unloaded at the harbor front. These will then be transported to the project site and stored on site in warehouses (or open air).

5.6.1.2 Land clearance

The existing vegetation at the site it is composed of very few Coconut palms (4 palms). These coconut palms will be transplanted elsewhere at Hulhule by the staff of the airport.

5.6.1.3 Construction work

Construction Material

Construction materials and machinery are shown in Table 3.

Table 3. Inputs to the project in terms of materials and machinery

	Input resource(s)	Source/Type	How to obtain resources
Construction Phase	20-30 workers	Foreign workers/local	Contractor staff
	Construction material	**Masonry works:** Construction blocks, river sand, cement	Purchased locally/ imported
		Roofing: Timber; wooden shingle for roof, prefabricated materials	
		Electrical: electrical cables and wires, DBs, MMCBs and MCBs, PVC pipes, light weight, PVC conduits, fittings for sewerage pipe connections	
		Finishing: floor and wall tiles, gypsum boards, zinc coated corrugated metal roof, paint, varnish, lacquer, thinner, dry walls etc.	
	Fresh water	Desalinated water	Use existing water supply at Hulhule'
	Electrical energy		Use existing power supply at Hulhumale'.
	Machinery and equipment	• Excavator • Loader • Tower crane • Concrete mixer • Concrete delivery pump • Material hoist • Truck crane • Dump truck	Contractor for construction work (machinery)
Operational phase	Fresh water and waste water	Desalinated water	MACL gird– connect to existing water supply and sewerage network
	Seawater	Seawater well in lagoon (for use in holding tanks)	Sourced from lagoon and transported to pump station through pipeline
	Electrical energy		MACL gird– connect to existing power grid
	Firefighting equipment	• Fire alarm system (smoke detectors) • Portable Fire Extinguishers • Hose reel system • Fire hydrant system • Fire blanket	All mainly imported from China
	Quarantine facility waste sea water disposal	Waste seawater pumped to western reef edge	Through pipeline laid to the western reef close to along-side berthing area for fuel tanker ships

Construction methodology

Seawater pump station and main building

- Foundation work and dewatering

The foundation systems of both the quarantine building and seawater pump station building is pad footing with tie beams.

The seawater pump station is a single storey building with foundation level at 0.8m. However the seawater collection tank within the pump station is partially sunk into the ground with the bottom slab of the tank at 3.6m below ground level. Hence dewatering would be required for this work and water extracted will be disposed off at nearby area, possibly within project site.

The main building or quarantine building is a two storey building with foundation proposed at a depth of 1.55m. Hence dewatering will be required and extracted water will again be disposed off at nearby areas.

Excavation will be undertaken using a combination of mechanical and hand excavation with the use of an excavator and dump truck. Excavated material will be reused for filling after foundation works are completed and any remaining will be disposed at MACL designated location at Hulhule.

- Main structure and masonry work

Masonry works will be done using construction blocks caste at site and locally purchased. Plastering will be done using river sand and cement.

Seawater well (seawater intake)

The seawater well is situated in the back reef area just off the Hulhule Island Hotel service harbor (western side). The well has a width of 1.8m with wall thickness of 150mm. The base of the well is located about 0.6m below seabed, while the top of the well is above sea level. The well will be constructed on land at the project site and installed at the given location in the lagoon.

Utility services during construction phase

Power and water requirement for the construction stage of the project will be met by existing power and water network.

Utility services during operational phase

Power and water requirement during the operational phase will also be sourced through connection to the existing networks for both utilities.

Waste management during construction phase

All construction related waste will be collected and transported to Thilafushi for proper disposal.

Waste management and disposal during operational phase

Solid waste generated during the operational phase (excluding dead/diseased animals or harmful waste) will be collected at a designated area and transported to Thilafushi for proper disposal. Harmful/toxic waste to be disposed will also be transported to Thilafushi, as per EPA guidelines.

Dead/diseased animals which are sent for disposal will be incinerated, after sterilization in the autoclave. Incineration will be undertaken using the existing incinerator installed at the Plant and Animal quarantine facility (adjacent to the proposed live aquatic animal quarantine facility).

Wastewater management and disposal mechanism for operational phase

The waste water coming from the holding tanks is collected in waste seawater collection tank in the quarantine building, from where the water is sand-filtered, cartridge-filtered and UV-disinfected and sent to the sea. The wastewater discharge location is within the harbor basin to the west of the facility.

Contingency plans

Contingency plans has not been developed as yet, though the proponent has said that these will be prepared prior to operation of the facility. These plans will address following issues:

- Incidence of fires
- Incidence of floods – follow disinfection procedures and drainage of water into the treatment reservoir prior to disposal
- Breakdown of equipment – installation of essential backup equipment

5.6.1.4 Emergency plan in the incidence of spills and safety

First aid kits will be available on site. In the event of minor injuries, where possible, first aid kit will be used. In the event of major injuries, workers will be taken to the Hospital at Hulhumale' or Male' if necessary.

All workers will be provided with sufficient work safety equipment, while contractor is responsible to ensure that all safety equipment are provided and are in good condition.

Fuel and hazardous material will be stored on land at the project site. Fuel will be stored in barrels; therefore spills are expected to be minor or insignificant. Furthermore the fuel and other hazardous material storage area will be plastered with anti-seep chemical (water proofing chemical).

5.6.1.5 Project management

Project management for the quarantine facility construction works will be handled by Project Implementation Unit of Ministry of Fisheries and Agriculture. Site based office and temporary accommodation facilities will not be constructed as part of the project due to small scale.

5.6.2 Outputs (development concept and built environment)

5.6.2.1 Site Planning and design

The site plans and structural designs have been drawn by BINArch Design Associates Pvt Ltd.

5.6.2.2 Quarantine building and pump station

The key outputs of the project are the two storey Quarantine Building which houses the holding tanks, pathological labs and the Pump station. The seawater intake pipeline will be laid on the western side reef (northern side of Hulhule Island Hotel); while the discharge pipeline will be laid southern side of Hulhule Island Hotel and run to the western reef edge.

6 Methodology

The approach to data collection and compilation of this report includes;

- Consultation and discussion with the proponent with regard to design and work methodology that would be used to implement the proposed activities of the project,
- Examination of the existing environment to identify significant environmental components that are likely to be affected,
- Consultation with major stakeholders to exchange information on the project and to follow the EIA procedures required for the report, and
- Evaluation of available and relevant literature on environmental impacts associated with similar projects.

Information on existing environment was collected during the field visit to the project site in July 2016.

6.1 General condition of site

General condition of proposed site for quarantine facility construction was assessed visually for vegetation pattern and condition of plot.

General marine environment condition of the seawater intake pipeline location and discharge location were done by qualitative method. General substrate condition was assessed visually, estimating cover of live corals and other benthic categories (Refer to Figure 2 for survey site).

6.2 Water quality analysis

Groundwater and seawater samples were tested from ground pit, discharge water pipe end and in-take pipeline location using Hanna multi probe water test meter (HI 9828) and Hanna Turbidity meter (HI93703) (Figure 2).

Figure 2. Location and coordinates of points for reef survey (R1, R2) and seawater sampling (S1, S2) and ground water sampling site (G1).

7 Existing environment

7.1 Geographic location of Hulhule Island

Hulhule island where Ibrahim Nasir International Airport is located sits on the southern corner of North Male' Atoll at a distance of approximately 1.2km to the north east of Male'. Ibrahim Nasir International Airport is the main international airport and hence the ideal location for the development of a quarantine facility for plants and animals to be brought to Maldives.

The proposed location for the development of the quarantine facility is at the eastern side of Hulhule, adjacent to the existing Terrestrial Plant and Animal quarantine facility (Figure 3).

Figure 3. Location of Hulhule in North Male' Atoll (right) and location of project site with close-up (red block in left picture)

7.2 Climatology

7.2.1 Wind climate

Wind climate in the Maldives is dominated by the Indian monsoon climate South West (SW) monsoon and North East (NE) monsoon. The Indian monsoon system is one of the major climate systems of the world, impacting large portions of both Africa and Asia (Overpeck et, al., 1996). The monsoon climate is driven by the atmospheric pressure differences that arise as a result of rapid warming or cooling of the Tibetan Plateau relative to the Indian Ocean (Hastenrath 1991; Fein and Stephens 1987). During the summer of northern hemisphere the Tibetan Plateau warms rapidly relative to the Indian Ocean which results in an atmospheric pressure gradient (Low pressure over Asia and high pressure over the Indian Ocean) between the Asian landmass and the Indian ocean, which drives the prevailing wind from south to westerly directions. The period during which prevailing winds are from south to westerly direction is known as the SW monsoon. In the winter of northern hemisphere the continent cools relative to the ocean. This reverses the pressure gradient (low pressure over the Indian Ocean high pressure over the Asian landmass) and the prevailing winds become northeasterly. The period during which prevailing winds are from northeasterly directions is known as NE monsoon. The transitions from NE to SW monsoon and vice versa are distinctly different from SW or NE monsoon. During these transition periods the wind becomes more variable.

The SW monsoon lasts between May and September while the NE monsoon lasts between December and February. The period between March and April is the transition period from the NE monsoon to SW monsoon known locally as the Hulhangu Halha, while the transition period from SW monsoon to NE monsoon is known as Iruvai Halha. Iruvai halha lasts from October to November (Table 4). The SW monsoon is generally rough and wetter than the NE monsoon. Storms and gales are infrequent in this part of the world and cyclones do not reach as far south as the Maldivian archipelago (Ministry of Construction and Public Works, 1999).

Table 4. The months characterizing the two monsoon periods and the transition periods

Season	Month
NE-Monsoon (Iruvai)	December
	January
	February
Transition Period 1 (Hulhangu Halha)	March
	April
SW-Monsoon (Hulhangu)	May
	June

	July
	August
	September
Transition Period 2 (Iruvai Halha)	October
	November

Wind analysis is based on daily averaged wind data from Hulhule for the period of January 1989 – December 2008. In this analysis wind directions and speed were plotted as wind rose diagrams and the frequency distributions of the wind speeds from different directions were obtained.

Wind rose plot (Figure 4) and the frequency distribution of the wind speed (Table 5) shows that the prevailing directions of the westerly winds are between WSW and WNW. Wind from these directions sums up to 49.24% of the year. The prevailing directions of easterly winds are between NE and E that sums up to 26.69% of the year. Winds from all other directions sums less than 25% of the year. These prevailing westerly and easterly directions are also the directions from which the strongest winds blow. Wind speed distribution (Table 4) shows that for winds stronger than 8m/s, the westerly prevailing wind directions contribute up to 36% while the easterly prevailing directions contribute up to 16%. Based on these results it is evident that the winds at Male' Atoll are almost confined to 5 directions, WSW, W, WNW, NW and EEN.

Table 5. Frequency distribution of wind speed

Wind direction	Frequency of Occurance																		Sum (%)
	Wind Speed (Knots)																		
	<=2	>2 - 4	>4 - 6	>6 - 8	>8 - 10	>10 - 12	>12 - 14	>14 - 16	>16 - 18	>18 - 20	>20 - 22	>22 - 24	>24 - 26	>26 - 28	>28 - 30	>30 - 32	>32 - 34	>34 - 36	
N	0.16%	0.30%	0.85%	0.57%	0.26%	0.05%													2.19%
NNE		0.11%	0.43%	0.96%	0.48%	0.09%	0.03%												2.11%
NE		0.19%	0.92%	1.65%	1.68%	1.16%	0.54%	0.28%	0.11%	0.03%	0.02%								6.57%
ENE		0.06%	0.75%	1.60%	1.97%	2.72%	3.09%	2.10%	1.43%	0.65%	0.17%	0.02%							14.55%
E		0.25%	0.67%	0.90%	1.18%	0.87%	0.90%	0.40%	0.26%	0.09%		0.02%	0.03%						5.57%
ESE		0.14%	0.12%	0.37%	0.25%	0.11%	0.08%	0.08%	0.03%										1.18%
SE		0.02%	0.03%	0.14%	0.17%	0.03%	0.06%	0.02%	0.02%										0.48%
SSE		0.06%	0.23%	0.12%	0.02%	0.06%													0.50%
S		0.11%	0.37%	0.22%	0.19%	0.05%	0.02%												0.95%
SSW		0.26%	0.64%	0.71%	0.31%	0.25%	0.06%												2.24%
SW		0.08%	0.48%	1.13%	1.09%	0.51%	0.20%	0.09%	0.05%	0.02%									3.65%
WSW		0.25%	0.99%	1.79%	1.82%	1.46%	1.06%	0.73%	0.31%	0.11%	0.02%		0.02%	0.02%					8.56%
W		0.51%	2.02%	3.49%	4.30%	4.38%	3.06%	2.64%	1.37%	0.78%	0.48%	0.23%	0.02%	0.02%	0.02%				23.31%
WNW		0.42%	1.43%	2.33%	3.40%	3.12%	2.52%	1.89%	1.38%	0.31%	0.28%	0.12%	0.09%	0.03%	0.02%			0.03%	17.38%
NW		0.33%	1.01%	1.91%	1.68%	1.09%	0.93%	0.43%	0.30%	0.16%	0.05%								7.87%
NNW		0.28%	0.84%	0.85%	0.50%	0.22%	0.12%	0.06%	0.03%										2.90%

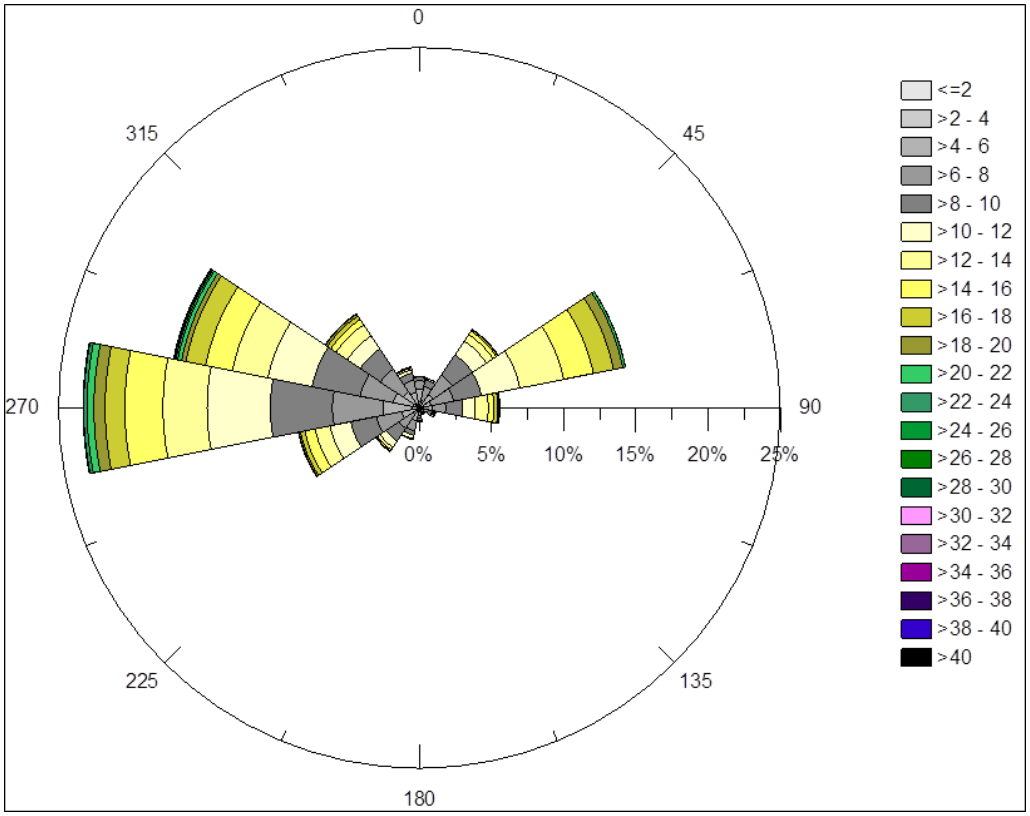

Figure 4. Wind rose graph for the daily averaged wind data from Male' International Airport (years 1989-2008)

7.3 Terrestrial environment

7.3.1 Vegetation at site

The project site is adjacent to the existing cleared area and thus has the presence of very few vegetation. The mature vegetation at site includes 4 Coconut palms (Figure 5) which will be removed and transplanted elsewhere on the island by the Maldives Airports Company Limited.

Figure 5. Coconut palms at the project area that needs to be transplanted (left)

7.3.2 **Groundwater and soil**

The proposed plot area is a reclaimed land very close to the harbor area. The soil is composed of coral sand and rocks. Groundwater sample was collected from northern side of project plot from an existing pit. Water test was done in-situ using Hanna Multiprobe test meter. Table 6 below shows the results of this test.

Table 6. In-situ water testing carried out near project site

Reading	Temperature (°C)	pH	Dissolved Oxygen (mg/l)	Conductivity (µS/cm)	Salinity (ppt)
1	28.61	8.89	1.11	29601.02	18.77
2	28.61	8.88	1.11	29601.02	18.77
3	28.61	8.88	1.11	29601.02	18.77
4	28.61	8.88	1.11	29601.02	18.77
5	28.61	8.88	1.11	29601.02	18.77
6	28.61	8.87	1.11	29601.02	18.77
7	28.61	8.87	1.12	29651.02	18.83
8	28.61	8.86	1.12	29651.02	18.83
9	28.61	8.87	1.12	29651.02	18.83
10	28.61	8.87	1.12	29651.02	18.83
Average	**28.61**	**8.875**	**1.11**	**29621.02**	**18.79**

7.4 **Marine environment**

The proposed seawater intake line (seawater well) at Hulhule is located just west of the Hulhule Island Hotel harbor. The reef flat area is shallow with average depth of 1.5- 2.0m deep. The reef substrate at the site is dominated by rock and rubble, while live coral cover is very low (<1%.). The only live coral observed at the site was Pocillopora colonies (Figure 6). The western reef area has been severly impacted by various development works at the airport island including large scale reclamation, coastal protection and also harbor development works.

Reef fish abundance at the site was sparse, with only few species observed. Juveniles of Acanthurids, Labrids and Pomacentrids were observed.

Similar to site R1, site R2 also was dominated by rock and rubble, while live coral cover was very low (<1%). The area was significantly impacted by reclamation works and coastal protection works (quay wall and seawalls). Average depth of back reef area up to the reef edge was 1.5-2.0m MSL.

Figure 6. General reef condition at the proposed seawater intake pipeline location (left), reef condition at discharge water pipe line area (right)

7.4.1 Seawater

Seawater testing was done in-situ at proposed discharge location (S1) and seawater intake site (S2) using Hanna multi-probe water test meter and Turbidity meter. Table 7 to 9 below shows results of the water test.

Table 7. Results of seawater test at Site S1 (proposed waste water discharge location)

Reading	Temperature (°C)	pH	Dissolved Oxygen (mg/l)	Electrical Conductivity (µS/cm)	Total Dissolved Solids (g/l)	Salinity (ppt)
1	29.13	8.19	5.67	50520	25	33.05
2	29.13	8.21	5.7	50740	25	33.22
3	29.13	8.21	5.7	50760	25	33.23
4	29.13	8.22	5.8	50780	25	33.24
5	29.13	8.22	5.8	50800	25	33.26
6	29.13	8.22	5.8	50820	25	33.27
7	29.13	8.22	5.8	50850	25	33.29
8	29.13	8.21	5.9	50860	25	33.31
9	29.13	8.21	5.9	50890	25	33.32
10	29.13	8.21	5.9	50900	25	33.33
Average	**29.13**	**8.21**	**5.797**	**50792**	**25**	**33.25**

Table 8. Results of seawater test at Site S2 (proposed seawater intake location)

Reading	Temperature (°C)	pH	Dissolved Oxygen (mg/l)	Electrical Conductivity (µS/cm)	Total Dissolved Solids (g/l)	Salinity (ppt)
1	28.61	8.71	6.19	50520	26	32.03
2	28.61	8.73	6.22	50740	26	32.2

3	28.61	8.73	6.22	50760	26	32.21
4	28.61	8.74	6.32	50780	26	32.22
5	28.61	8.74	6.32	50800	26	32.24
6	28.61	8.74	6.32	50820	26	32.25
7	28.61	8.74	6.32	50850	26	32.27
8	28.61	8.73	6.42	50860	26	32.29
9	28.61	8.73	6.42	50890	26	32.3
10	28.61	8.73	6.42	50900	26	32.31
Average	**28.61**	**8.73**	**6.32**	**50792**	**26.00**	**32.23**

Table 9. Turbidity test done in-situ using Hanna Turbidity meter

Site	Turbidity (FTU)*
S1	0.63
S2	0.25

*FTU is equivalent to NTU

8 Stakeholder consultation

8.1 Consultation with Health Protection Agency

As part of the consultation process for the EIA, the Health Protection Agency (HPA) of the Maldives was consulted to discuss their requirements in establishing such a facility. Their main concerns were the health clearance certificate that should come with any stock and the disposal of the dead animals and other waste produced at the quarantine facility. Since the first concern is a process that should be undertaken prior to the quarantine stage, the consultants mostly discussed the latter. It has been decided that the incinerator at the existing Terrestrial plant and animal quarantine facility of MoFA will be used for disposal of waste produced in the facility.

The EIA consultant enquired about any existing guideline or protocol for disposing dead animals. HPA do not have any such guidelines, but they have guidelines for operating laboratories.

The representatives from HPA also mentioned that if the quarantine facility discover any disease in the aquatic animals that could impact the human health or other aquatic animals or crops, such information should be shared with the relevant authorities including HPA and immediate action should be taken to address the issue. List of people consulted with is given in Appendix 6

8.2 Consultation with Maldives Airports Company Limited

Consultation with Maldives Airports Company Limited was carried out at the facility on the 5th of July 2016. List of people consulted with is given in Appendix 6. The EIA consultant initially explained regarding the project and enquired about waste and wastewater disposal at the airport facility, so as to clarify whether these systems could be utilized by the project.

Solid waste generated at the airport is collected and transported to Thilafushi on a regular basis, as there is no Solid waste management facility (or incinerator) at Hulhule. When consulted, staff at MACL stated that an arrangement can be made to collect waste generated from the quarantine facility and send to Thilafushi for disposal (for a fee). However, it has been decided to use the incinerator at the existing Terrestrial plant and animal quarantine facility of MoFA. The plant incinerates waste at temperatures of 300^{o}C as per the FAO guidelines (information given by Mohamed Anees, Manager of Terrestrial plant and animal quarantine facility).

Sewage disposal is through direct disposal to sea, without any treatment. Hulhule network has specific areas with secondary treatment. The quarantine facility has few staff and effluent generation is not expected to have a significant impact on the marine environment, even with connection to the existing sewage network. Those consulted at MACL have no objections towards connection of sewage system at the facility to this system.

9 Environmental Impacts

9.1 Impact Identification

Various methods are available to categorize impacts and identify the magnitude and significance of the impact, such as checklists, matrices, expert opinion, modelling etc. Impacts on the environment from various activities of the project construction work (constructional impacts) and post construction (operational impacts) have been identified through interviews with the project management team, field data collection surveys and based on past experience in similar development projects. Data collected during field surveys can be used to predict outcomes of various operational and construction activities on the various related environmental components. This data can also be used as a baseline for future monitoring of the environment.

Possible impacts arising from the construction and operation works are described according to their location, extent (magnitude) and characteristics. They are also further categorized by intensity of impacts (negligible, minor, moderate and major) for identifying best possible remedial (mitigation measures) action to be taken. Below are the impact categories.

Table 10. Impact prediction categorized

Impact category	Description	Reversible/ irreversible	Cumulative impacts
Negligible	The impact has no significant risk to environment either short term or long term	Reversible	No
Minor	The impact is short term and cause very limited risk to the environment	Reversible	No
Moderate	Impacts give rise to some concern, may cause long term environmental problems but are likely short term and acceptable	Reversible	May or may not
Major	Impact is long term, large scale environmental risk	Reversible and Irreversible	Yes, mitigation measures has to be addressed

The concept of the Leopold Matrix (Leopold et. al., 1971) has been used to classify the magnitude and importance of possible impacts which may arise during the constructional and post constructional stage of the proposed project. This is one of the best known matrix methodology used for identifying the impact of a project on the environment. It is a two dimensional matrix which cross references between the activities which are foreseen to have

potential impacts on the environment and the existing conditions (environmental and social) which could be affected.

The matrix has the actions which may cause an impact on the horizontal axis and the environmental conditions which may be impacted on the vertical axis. While the original Leopold matrix lists 100 such actions and 88 environmental conditions, not all are applicable to all projects. Hence the matrix used in the current assessment is a modified matrix customized to this project.

Each action which is evaluated is done so in terms of magnitude of impact on the environmental condition and significance of this impact. In addition to this probability of impact as well as duration of impact is also assessed and shown separately. All probable and significant actions, their magnitude of impact and duration of impact are further described in the text.

This version of the Leopold Matrix has been adopted from Josimovic et. al (2014) and the EIA adopts the grading scales used in the paper referred. Listing of these grading scales are shown in Table 11 below.

Table 11. Grading scales for the four impact evaluation criteria

Evaluation criteria	Designation	Scale
Impact Probability	M	Impact is possible (probability <50%)
	V	Impact is probable (probability >50%)
	I	Impact is certain (probability = 100%)
Impact Magnitude	0	no observable effect
	1	low effect
	2	tolerable effect
	3	medium high effect
	4	high effect
	5	very high effect
Impact significance	P	limited impact on project site (immediate site)
	I	Impact of importance at Island level
	A	Impact of importance at Atoll level
	N	Impact of national character
	M	Impact of cross-border character
Impact duration	P	Occasional/temporary
	D	Long term/permanent

The proposed project involves construction and establishment of a live aquatic animal quarantine facility at Hulhule (Ibrahim Nasir International Airport). The construction phase of the project is not envisaged to have many environmental impacts, while the operational phase has few potential impacts which are discussed below.

The severity of impacts is predicted by reviewing the design plans and construction methodologies. Mitigation measures are formulated in light of the information revealed by the project engineers.

9.2 Limitation or uncertainty of impact prediction

Uncertainty of impact prediction are mainly due to the lack of long term data, inherent complexity of ecosystem and lack of coordinated monitoring programs with consistent methodologies which can be used to predict outcomes or reliability of predictions of previous projects.

The impacts are predicted by reviewing the survey data collected during the field visits and information revealed by the designers and engineers. The data collected during the field visit is limited in terms of number of days to a week or few more, which limits the overall understanding of even the short term environmental conditions.

The time limitation of EIA field data collection and report preparation is also a hindrance to properly understanding the environmental factors dictating the conditions of the habitat.

9.3 Constructional Impacts

In any development project major direct impacts to the environment (either short term or long term) occur mainly during the construction phase. Potential direct or indirect impacts on the environment from the proposed works include:

- Loss of marine habitat
- Impact on vegetation
- Impacts due to noise and vibration
- Risk of pollution on natural environment and workers

9.3.1 Loss of marine habitat

The seawell for collection of seawater for the quarantine facility is located within the lagoon area on the western side of Hulhule, close to the project site. Seawater collected from

the well is transported to the pump station. The location where sea well is proposed to be located has <1% live coral cover. Therefore average value of expected impact magnitude on marine habitat (due to positioning of sea well at the site) is 0.08 with impact on project site. This is envisaged to be a permanent impact as location of seawall will not change over time.

9.3.2 Impact on terrestrial vegetation

The key vegetation at the site consists of 4 coconut palms which will be transplanted elsewhere on the island by the Airport staff. Hence impact due to vegetation clearance is envisaged to negligible with an average value of impact magnitude of 0.15.

9.3.3 Impact on groundwater

Hulhule hosts the main International airport, where various infrastructure have been constructed over the years. The proposed project is of a relatively small scale, in comparison to the other work on-going at the airport (Run reclamation and airport expansion project). Furthermore, the project site is located quite close to the shoreline and hence even though dewatering is required for foundation laying works, the project is not expected to have any impact on the groundwater resource of the island.

9.3.4 Impacts due to noise and vibration

Generation of noise during construction projects is an unavoidable impact. However, the proposed project is at the airport and not close to residential areas and the noise generated is envisaged to be on the scale of that from other construction projects of this scale. Hence total average value of expected impact magnitude is negligible and mainly of significance to immediate project site and nearby facilities and will be felt for the project duration (temporary impact).

9.3.5 Pollution of the natural environment

Such development projects have the potential to pollute the environment during the construction phase, through improper disposal of waste and accidental spills. All construction waste will be collected and transported to Thilafushi for proper disposal. The operation of heavy machinery and all work will be carried out by an assigned contractor who is experienced in the work. Hence the impact potential for accidental spills is very minor, though in the instance it happens, the impact would be moderate with a long term effect on the environment.

9.3.6 Risk of accidents and pollution on workers

As mentioned earlier, the probability of accidents is low with work being carried out by experienced people. However, in the event of an accidental spill or any other source of environmental pollution, impact on the workers is envisaged to be of medium effect, with the potential to have a long term impact.

9.4 Operational impacts

9.4.1 Impact on marine environment

The proposed means of discharge of waste seawater is by discharge into the sea. The waste water is sand-filtered, cartridge-filtered and UV-disinfected prior to being sent to the sea. The wastewater discharge location is western side reef at southern side of Hulhule Island Hotel near the along-side berthing area for tanker ships supplying fuel to airport facility. The reef condition is similar to the reef survey site R1 (very low live coral cover) and hence impact on marine habitat due to discharge of waste water is envisaged to be negligible.

9.5 Impact Analysis

An analysis of the impacts due to the project was done using the Leopold matrix. Impacts are assessed according to probability of impact, significance of impact, magnitude of impact and duration of impact. Tables 12 to 15 gives the assessment for the impacts, and these are further discussed above with their scoring.

As evident from Tables below, the project has few activities which have the potential to have an impact (minimal on most cases) on the environment. All impacts are envisaged to be limited to the project site, though due to nature of impact, most are long term impacts.

Table 12. Assessment of Probability of impact from project activities

	Envisaged Impact factors	Construction phase				Operational phase
		Land clearance	Accidental fuel spillage	Excavation for laying of foundation	Installation of seawater well	Discharge of wastewater
Physical component	Sea Water		I			V
	Land					
	Coastal zone					
	Ground water			M		
	Air					
	Noise			I		
Biological component	Ecosystems quality	I	I		M	V
	Diversity of flora	I				
	Diversity of fauna					
Socio-cultural components	Landscape					
	Landuse					
	Economy					
	Accidents		M			

Table 13. Assessment of significance of impact from project activities

	Envisaged Impact factors	Construction phase				Operational phase
		Land clearance	Accidental fuel spillage	Excavation for laying of foundation	Installation of seawater well	Discharge of wastewater
Physical component	Sea Water		P			P
	Land					
	Coastal zone					
	Ground water			P		
	Air					
	Noise			P		
Biological component	Ecosystems quality	P	P		P	P
	Diversity of flora	P				
	Diversity of fauna					
Socio-cultural components	Landscape					
	Landuse					
	Economy					
	Accidents		P			

Table 14. Assessment of magnitude of impact due to project activities

	Envisaged Impact factors	Construction phase				Operational phase	Sum	Average
		Land clearance	Accidental fuel spillage	Excavation for laying of foundation	Installation of seawater well	Discharge of wastewater		
Physical component	Sea Water	0	3	0	0	2	5	1
	Land	0	0	0	0	0	0	0
	Coastal zone	0	0	0	0	0	0	0
	Ground water	0	0	1	0	0	1	0.2
	Air	0	0	0	0	0	0	0
	Noise	0	0	0	0	0	0	0
Biological component	Ecosystems quality	1	1	0	1	2	4	0.8
	Diversity of flora	1	0	0	0	0	1	0.2
	Diversity of fauna	0	0	0	0	0	0	0
Socio-cultural components	Landscape	0	0	0	0	0	0	0
	Landuse	0	0	0	0	0	0	0
	Economy	0	0	0	0	0	0	0
	Accidents	0	3	0	0	0	3	0.6
Cumulative values of IF according to environmental factors		2	7	1	1	4		
Average		0.15	0.53	0.08	0.08	0.31		

Table 15. Assessment of duration of impact due to project activities

	Envisaged Impact factors	Construction phase				Operational phase
		Land clearance	Accidental fuel spillage	Excavation for laying of foundation	Installation of seawater well	Discharge of wastewater
Physical component	Sea Water		D			D
	Land					
	Coastal zone					
	Ground water			P		
	Air					
	Noise			P		
Biological component	Ecosystems quality	D	D		D	D
	Diversity of flora	D				
	Diversity of fauna					
Socio-cultural components	Landscape					
	Landuse					
	Economy					
	Accidents		P			

10 Alternatives

The proposed project involves the construction of live aquatic animal quarantine facility at Ibrahim Nasir International Airport (Hulhule). Given the scale of the project, alternative measures are available only for few project activities. However, not all alternatives are better or reasonable alternatives and hence have not been considered. Considered alternatives are described below:

10.1 Considered alternatives

10.1.1 Wastewater discharge method

Proposed type: Discharge into sea after treatment (through pipeline laid from facility)

Alternate type: discharge through existing wastewater discharge pipeline on the island

Selected type: the proposed project will discharge large volumes of wastewater on a daily basis (during the period of quarantine operation). Hence discharge through existing pipeline is not a feasible option. Therefore the proposed method is selected.

10.1.2 The no-project scenario

The no-project scenario is also an available option. If this option is selected, the environmental impacts due to the project will be avoided. However, impacts due to the project are envisaged to be minor. Furthermore, the project is a necessity, as a regulatory process and animal disease control of mariculture related project's import of brood stock. Hence the no-project scenario is not a feasible option.

11 Mitigation Plan

Impacts due to the project are few and of low intensity. However, mitigation measures have been identified for the few potential impacts due to the project. Mitigation measures are proposed to reduce or eliminate the severity of any predicted adverse environmental effects and improve the overall social and environmental performance of the project.

Mitigation measures are mainly discussed both for the construction and operation stage of the project (Table 16). While during the construction phase, it is important to minimize impacts due to the constructional methods used, development of contingency plans for the operational phase is key, for proper mitigation of potential impacts. Contingency plans should be developed for the incidences of equipment breakdown and natural incidences.

Commitment from the proponent for carrying out the proposed mitigation and monitoring plan is given in the declaration of the proponent.

Table 16. Identified possible impacts and their relevant mitigation measures

Possible Impacts	Mitigation measures	Location	Time frame (Phase)	Impact intensity	Institutional responsibility	Cost (MRF)
Impact on groundwater due to dewatering	Disposal of water at nearby areas to project site so as to allow re-percolation into the groundwater lens	Project development plot	During construction	Minor, short term impact	Project proponent/ contractor	N/A
Water contamination	Properly sealing empty oil cans, paints and other similar containers. Machinery and equipment properly serviced to avoid leakage of lubricants or any other hazardous material that can cause groundwater contamination	Project development plot	During construction	Minor, short term impact	Project proponent/ contractor	N/A
Solid waste generation	Dispose solid waste on a regular basis to Thilafushi	Land/Social	During construction	Minor, short term	Project proponent/ contractor	N/A
Vegetation clearance	Replant the 4 coconut palms removed from project site elsewhere on the island (by MACL staff) In the instance that a coconut palm or tree from the site is felled, two or more palms or trees should be planted elsewhere on the island as per stated in the "*By-law on cutting down, uprooting, digging out and export of trees and palms from one island to another*".	Land	During construction	Minor	Project proponent to facilitate with the help of MACL	N/A

12 Monitoring Program

Monitoring is the systematic collection of information over a long period of time. It involves the measuring and recording of environmental variables associated with the development impacts. Monitoring is needed to;

- Compare predicted and actual impacts
- Test the efficiency of mitigation measures
- Obtain information about responses of receptors to impacts
- Enforce conditions and standards associated with approvals
- Prevent environmental problems resulting from inaccurate predictions
- Minimize errors in future assessments and impact predictions
- Make future assessments more efficient
- Provide ongoing management information
- Improve EIA and monitoring process

Impact and mitigation monitoring is carried out to compare predicted and actual impacts occurring from project activities to determine the efficiency of the mitigation measures. This type of monitoring is targeted at assessing human impacts on the natural environment. Impact monitoring is supported by an expectation that at some level anthropogenic impacts become unacceptable and action will be taken to either prevent further impacts or re-mediate affected systems. Mitigation monitoring aims to compare predicted and actual (residual) impacts so that effectiveness of mitigation measures can be determined.

Monitoring will not be undertaken during construction work due to minimal impacts. Monitoring during the operational phase will be carried out according to the monitoring programme in Table 17. Cost for the monitoring (data collection) activities will be covered by the proponent (commitment to carrying out and financing the mitigation and monitoring work is given in the Proponents Declaration on Page vi).

Table 17. Monitoring programme for operational phase of the project

Monitoring parameter	Frequency or timing	Cost
Seawater quality (temperature, pH, salinity, turbidity, total dissolved solids and dissolved oxygen).	a. Immediately after construction b. After every quarantine batch	MRF 10,000.00 per test set or using portable test kit

The EIA monitoring report structure provided in the EIA report bylaw 2012 (2012/R-27) shall be used for the monitoring report preparation.

13 Conclusion

The environmental impacts associated with proposed project are considered minor and few due to the scope of the project. This conclusion is based on the evaluation of various components of the proposed project and the existing environment. The proposed project site is located at the reclaimed land area near existing infrastructure, where vegetation cover is minimal with presence of only few coconut palms (4 coconut palms). Marine environment within project scope is also devoid of live coral and already utilized as a harbor area. Hence impacts on terrestrial and marine environment is expected to be minor.

Although dewatering is required for foundation laying work, this is of small scale and water will be disposed off at shoreline or close to project site. Hence impact on groundwater table is also greatly minimized.

During the operational phase of the project, the infrastructure will be connected to existing power and water grid of the island, while effluents will be disposed through the existing sewerage network. Wastewater from the holding tanks will be disposed directly to sea after treatment, through a pipeline laid from the facility to the western side reef at southern side of Hulhule Island Hotel near the alongside berthing area for fuel tanker ships. While impacts due to these activities are not anticipated to have a significant impact, it is crucial that contingency plans are in place prior to commencement of the operation of the facility, so as to address issues due to equipment breakdown or other similar incidences.

Although the “no project” scenario has been considered, this is not feasible given the necessity of the project, especially if the mariculture of sea cucumber was to expand within the country. While the government does not encourage import of brood stock, there is great potential for this scenario, once the sector expands. Furthermore the facility will be part of regulatory framework in ensuring negative impacts such as spread of disease is avoided due to imported brood stock.

Therefore, with due consideration to the environmental components identified above and the extent of the project activities and their likely and predicted impacts identified, the consultant concludes that the project components and designs are feasible and appropriate mitigation measures have been considered to correct and minimize unfavorable environmental changes.

Acknowledgements

The consultant acknowledges the contribution provided by the team members in this report for the valuable contribution to the report writing process and at the field. The consultant also acknowledges the assistance provided by the Marine Research Centre and Maldives Airports Company Limited (MACL).

CVs of team members are given below.

بسم الله الرحمن الرحيم

CURRICULUM VITAE

1. POSITION: Environmental Specialist/EIA Consultant

2. NAME OF FIRM: LaMer Group

3. NAME: Hussain Zahir

4. DATE OF BIRTH: 10th February 1966

5. NATIONALITY: Maldives

6. EDUCATION:

Masters of Philosophy (MPhil) in Coral Reef Ecology
University of Newcastle upon Tyne. Newcastle Upon Tyne, United Kingdom
2006

Marine Biology B.Sc. (Hon)
University of Newcastle Upon Tyne.
Newcastle Upon Tyne,
United Kingdom
1993-1996

7. MEMBERSHIP OF PROFESSIONAL SOCIETIES:

8. OTHER TRAINING:

1988. Marine Science Institute, University of Philippines
Certificate of completion of training course on Scleractinian Coral Taxonomy

1989. Chulalongkorn University. Bangkok. Thailand
Certificate of Completion of training Course on Coral Taxonomy, Ecology and Management

1998 Okinawa International Centre, Okinawa, Japan
Certificate of participation on training course on Conservation and Sustainable Management of Coral Reefs

1999 Korean Research and Development Institute, Seoul, South Korea
Certificate of Completion of the Training Course on marine coastal zone conservation and management

1990. Department of Marine Sciences. Chulalongkorn University. Bangkok. Thailand
Workshop on Taxonomy of Soft Bottom Invertebrates (ASEAN-Australian Coastal Living Resources Project)

1991. Mc Master University, Hamilton, Ontario. Canada.
Training on Boring Sponges of Coral reefs in Maldives

1996 Turtle Specialist Group, Convention on the Conservation

of Migratory Species of Wild Animal (CMS) and government of India. Bhubaneshwar, India

Workshop and Strategic Planning Session for the Conservation of Sea Turtles of the Northern Indian Ocean

1999. United Nations Environment Program. Environment for South Asia and Pacific, organized by SACEP and Ministry of Home Affairs, Housing and Environment.

National Training for State of the Environment and Data Collection and Reporting

9. COUNTRIES OF WORK EXPERIENCE:

10. LANGUAGE AND DEGREE OF PROFICIENCY:

Dhivehi -Mother Tongue
English -Proficient

11. EMPLOYMENT RECORD:

Nov 2007- Present	Senior Reef Ecologist Marine Research centre, Ministry of Fisheries Agriculture and Marine Resources Male', Maldives.
Feb 2006- October 2007	Reef biologist Marine Research centre, Ministry of Fisheries Agriculture and Marine Resources Male', Maldives.
July 2001- January 2006	Senior Research Officer Marine Research centre, Ministry of Fisheries Agriculture and Marine Resources Male', Maldives.
June 2000 to Present	Marine Biologist/ Director (Part Time) Land and Marine Environmental Resource Group of Pte Ltd
July 1996 to July 2001	Research Officer Marine Research Centre , Ministry of Fisheries Agriculture and Marine Resources
1988 to 1992	Biological Aid Marine Research Centre , Ministry of Fisheries Agriculture and Marine Resources
1986 to 1988	Marine Research Centre , Ministry of Fisheries Agriculture and Marine Resources Trainee

12. DETAILED TASKS ASSIGNED:	WORK UNDERTAKEN THAT BEST ILLUSTRATES CAPABILITY TO HANDLE TASKS:
Marine Research Centre, Ministry of Agriculture and Marine Resources	**National coordinator of Global Coral Reef Monitoring Network** *Responsibilities:* Including Implementation and management of the programme activities in the country through the GCRMN Regional Node for south Asian Region in Srilanka. Current programme of activities include, establishing and monitoring of coral reefs to assess the recovery processes after the 1998 Bleaching and to monitor the temporal changes to the reef system. Responsibilities also include coordination and implementation of socioeconomic monitoring at designated pilot sites to asses the livelihood and their dependence on coral reef resources. Coordinating the establishment national reef database to share information at national, regional, and global level is also part of the program of activities. **Coral Reef Degradation in the Indian Ocean (CORDIO) Programme** *Responsibilities:* include implementation and management of the identified projects/ Studies funded by CORDIO. Currently involved biophysical studies designed to understand the reef recovery processes after a severe disturbance in coral reefs **Catalogue of Common Coral Reef of Maldives, 1996** *Year: 1996* *Location:* Maldives.
Task Undertaken Independent Consultant	**Initial Environmental Evaluation, Tsunami Emergency Assistance Project, Maldives** *Year: 2006* *Location:* Ha. Filladhoo, HDH. Nolhivaranfaru, Sh. Maroshi, N. Maafaru, DH. Meedhoo, M. Kolhufushi and Th. Madifushi, Maldives *Client: ADB* *Project features:* Rehabilitation of damaged infrastructures (electricity)due to the tsunami of December 2004 in the Maldives financed by ADB under Tsunami Emergency Assistance project *Positions held:* Domestic Environmental Specialist *Responsibilities:* Initial Environmental Evaluation for the Repair and Reconstruction of Diesel powered generator housed in the above 7 island communities. Environmental issues specific of diesel power generation in the local and national context were addressed following ADB environmental guidelines. I **Initial Environmental Evaluation, Tsunami Emergency Assistance Project, Maldives** *Year: 2005* *Location:* Ugoofaaru, Manadhoo , Dhidhdhoo, Maldives *Client: ADB* *Project features:* Rehabilitation of damaged infrastructures (harbours)due to the tsunami of December 2004 in the Maldives financed by ADB under Tsunami Emergency Assistance project *Positions held:* Domestic Environmental Specialist *Responsibilities:* Initial Environmental Evaluation of the project sites; Ugoofaaru, Manadhoo and Dhidhdhoo for the tsunami

emergency assistance project: TA-0001 (MLD). Specific Task include rapid environmental assessment of the project sites, prepare environmental evaluations based on filed data and community Consultants, predict environmental impacts and propose an environmental monitoring plan for the project activities.

Marine Biodiversity assessment, Faafu atoll, Maldives,
Year: 2003
Location: Faafu atoll, Maldives
Client: ADB
Project features: Identification of potential biodiversity hotspots (sites/species) as part of identifying priority areas for an MCPA planning project funded by ADB. Project involves assessment of socioeconomic and biophysical assessment of the short listed sites identified for the project.
Positions held: Biodiversity Environmental Specialist
Responsibilities: Marine Biodiversity assessment Faafu atoll Maldives. ADB regional technical assistance for coastal and Marine resource management and poverty reduction in south Asia. (ADB RETA 5974). A project implemented by Ministry of Fisheries, Agriculture and Marine Resources. Assignment involves detail preparation of marine biodiversity and Coastal management issues with special reference to grouper fishery and resource management.

Environmental Impact Assessment Report for the Development of Fish Processing Plant at Ha. Huvahandhoo, Maldives,
Year: 2002
Location: Maldives
Client: Jausa Fishery Links
Project features: Construction of a tuna processing plant
Positions held: Marine Biologist
Responsibilities: The EIA report involves collection and assessment of baseline and secondary environmental data both at the marine and terrestrial environment of the project site. It also involved a risk assessment and evaluation report. An environmental management plan was also developed as part of the EIA.

Task Undertaken as an employee o f Land and Marine Environmental Resource Group Pte Ltd

Replacement of wastewater collection, septic tanks and disposal systems in Ga.Villingili, Ga.Dhaandhoo, Gdh.Gahdhoo
Year: 2007-Ongoing
Location: Ga.Villingili, Ga.Dhaandhoo, Gdh.Gahdhoo
Client: American Red Cross
Project features: Design and construction of wastewater disposal systems in the specific islands
Positions held: EIA Specialist
Responsibilities: Environmental Impact Assessment research and analysis.
Preparation and submission of the Environmental Impact Assessment Report.

Environmental Impact Assessment for Reethi Rah Resort Redevelopment
Year: 2005
Location: Reethi Rah Resort
Client: Kersner International, Hotel Group
Resort development at Reethi Rah Resort
Positions held: Marine Biologist
Responsibilities: The EIA involves collection and assessment of baseline and secondary environmental data and marine and terrestrial environment of the project site. This is one of the largest reclamation project for resort development and assessment of impact of dredging and reclamation on the coastal marine habitats was a major component of this study

Environmental Impact Assessment Report for Villa Hakatha at Thilafushi, Male Atoll
Year: 2001
Location: Male Atoll
Client: Villa Hakatha,Maldives
Positions held: Project Biologist
Responsibilities: The EIA report involves collection and assessment of baseline and secondary environmental data both at the marine and terrestrial environment of the project site. It also involved a risk assessment evaluation report. An environmental management plan was also developed as part of this EIA.

Development at Baa. Landaagiraavaru, Maldives
Year: 2000
Location: Baa. Landaagiraavaru, Maldives
Client: Club mediterranee *Project features:*
Positions held: Project Biologist
Responsibilities: The EIA involved collection of Oceanographic data, Study of the beach environment, Vegetation, reef quality and reef water quality. The study examined the impacts of the island and mitigation measures where appropriate. The study also forms the baseline data for future monitoring of the environmental changes due to the resort development

Environmental state for the proposed channel dredging & associated Barrier Island at Sun Island Resort.
Year: 2000
Location: Sun Island Resort, Maldives
Client: Tekton Design Associates Pvt. Ltd
Positions held: Project Biologist
Responsibilities: The Study involved assessment of the potential environmental impact on the coastal shoreline of the island and on to the reef environment within close proximity of the proposed project site.

Tasks undertaken as an employee of Riyan Design and Management Pte Ltd

Environmental Statement for the Proposed Redevelopment of Reethi Rah Resort
Year: 2000
Location: Reethi Rah Resort
Client: Reethi Rah Resort
Positions held: Project Biologist
Responsibilities: This Study Involved assessment of the existing

status of the islands environment and identification of potential environmental impact areas related to the proposed redevelopment plans. Formulation of an environmental monitoring plan that would enable the client to record the environmental changes that may be related to anthropogenic activities or natural.

Environmental Statement for the Proposed Redevelopment of Reethi Rah Resort
Year: 2000
Location: Reethi Rah Resort
Client: Reethi Rah Resort
Positions held: Project Biologist
Responsibilities: This Study Involved assessment of the existing status of the islands environment and identification of potential environmental impact areas related to the proposed redevelopment plans. Formulation of an environmental monitoring plan that would enable the client to record the environmental changes that may be related to anthropogenic activities or natural.

Proposed Beach Nourishment at M. Medhufushi. An assessment of Environmental Design Parameters
Year: 2000
Location: M.Medhufushi
Client: Vaaly Brothers Pte.Ltd
Positions held: Project Biologist
Responsibilities: The study involved examination of the beach characteristic
Including the sediment properties, beach profiles. Identification of a borrow site by Comparing the borrow sediment characteristics of the borrow site and the native beach sand.

Environmental Evaluation of Small-bore Sewer System (SBS) in Lh. Hinnavaru and K. Gulhi
Year:1999
Location: Lh. Hinnavaru and K. Gulhi
Client: Maldives Water and Sanitation Authority
Project features: The Study Involved ground water/ Seawater analysis of sewage pollution; reef surveys hydro graphic /oceanographic surveys and survey of the slopes of the sewage lines.
Positions held: Project Environmental Analyst

Assessment of Oil Contamination in Male' Groundwater from Vehicle Garages and Petrol Stations.
Year:1999
Location: Male', Maldives
Client: Maldives Water and Sanitation Authority
Positions held: Project Environmental Analyst
Responsibilities: The study involved Ground water analysis of oil contamination and assessment of general working conditions and practices in the vehicle garages and petrol stations in male'.

Environmental Impact Statement for the Proposed Beach Protection Works at Nika Island Resort
Year:1999

Location: Male', Maldives
Client: Nika Island Resort
Positions held: Project Biologist
Responsibilities: The project involves assessment of physical environmental condition such as the wave, current sediment characteristics, bathymetry at the project site (Nika Island Resort). Assessment of the status of the reef at the project site and an evaluation of the possible impacts on the reef and the physical environment as a result of the proposed beach protection work.

Environmental Monitoring of F. Filitheyo Resort Development
Year:1999
Location: F.Filitheyo
Client: AAA Trading Company Pvt.Ltd
Positions held: Project Biologist

Environmental Monitoring of M. Medhufushi Resort Development
Year:1999
Location: M. Medhufushi, Maldives
Client: Vaally Brothers Pte Ltd
Position Held: Project biologist

Environmental Monitoring of Lh. Kanuhuraa, Maldives
Year:1999
Location: Lh. Kanuhuraa
Client: SIMDI Hotel Management Pte Ltd
Positions held: Project Biologist

Environmental Monitoring of R. Meedhupparu Resort Development
Year:1999
Location: R. Meedhupparu
Client: Cowrie Investment Pvt Ltd, Maldives
Positions held: Project Biologist
Responsibilities: The Monitoring programmes involved periodic measurements of the beach profiles around the islands, reef quality surveys, ground water/ seawater analysis and environmental auditing

Tasks Under Taken as a Freelance Consultant

Environmental impact Assessment for the F. Filitheyo Resort Development
Year:1998
Location: F.Filitheyo
Client: AAA & Trading Company, Maldives
Positions held: Project Biologist

Environmental Impact Assessment for Lh. Madhiriguraidhoo Resort Development
Year:1997
Location: Lh. Madhiriguraidhoo
Client: Guardian Agency Pte Ltd
Positions held: Marine Biologist

Environmental Impact Assessment for B. Fonimagoodhoo Resort Development
Year:1997
Location: B. Fonimagoodhoo, Maldives
Client: Thasmeen Ali, M. Sheeraazeege, Maldives
Positions held: Marine Biologist

Environmental Impact Assessment for M. Hakuraahuraa Resort Development
Year:1997
Location: M. Hakuraahuraa
Client: Fantasea Pte Ltd, Maldives
Project features:
Positions held: Marine Biologist
Responsibilities: The EIA studies Involved collection of oceanographic data studies of the beach environment, vegetation, reef quality and ground water / Seawater quality. These studies examined the impacts of the development on the island and mitigation measures where appropriate. The studies also form the baseline data for the future monitoring of the environmental changes due to the resort development

13. Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Date: 7 May 2008
[*Signature of staff member or authorized representative of the staff]* *Day/Month/Year*

Full name of staff member Hussain Zahir
Full name of authorized representative:

CURRICULUM VITAE

1. POSITION: Geological Specialist

2. NAME OF FIRM: Riyan Pvt Ltd

3. NAME: Mohamed Aslam

4. DATE OF BIRTH: 6 October 1969

5. NATIONALITY: Maldivian

6. EDUCATION:

University of Auckland, NewZealand,
Master of Science (Msc) in Geography ,2004

University of Wales, United Kingdom
Bachelor of Science (Hons) (Bsc) ,in Geological Oceanography, 1997

7. MEMBERSHIP OF PROFESSIONAL GROUPS:

A presiding member of International EC-safety cooperation organisation (IESCO)

Member, Climate Change Technical Team, Integrated Climate Change Strategy - Maldives, Ministry of Environment, Water and Energy (Presently).

Member, Technical Committee on Harbour Construction and Land Reclamation, Ministry of Planning and National Development (April 2001 – July 2003).

Member, Project Co-ordinating Committee, Fuahmulaku Harbour Project, Ministry of Construction and Public Works (April 2001 – July 2003).

Member, Technical Focal Group, Maldives Protected Area Systems Project, Ministry of Home Affairs Housing Environment (2000 – 2003)

8. OTHER TRAINING:

9. COUNTRIES OF WORK EXPERIENCE:

10. LANGUAGE AND DEGREE OF PROFICIENCY:

English – Excellent
Dhivehi - Excellent

11. EMPLOYMENT RECORD:

Director
Land & Marine Environmental Resource Group-Maldives
March 2012 to present

Minister of Housing & Environment
Ministry of Housing & Environment
July 2010 – February 2012

Minister of Housing, Transport & Environment
Ministry of Housing, Transport & Environment
November 2008 – July 2010

Land & Marine Environmental Resource Group-Maldives, (2006 to 2008)
Director
Founding Partner and Director of Lamer Group

Director
Male',Maldives (12/05-03/06)
Ministry of Construction and Public Infrastructure,
Coastal and Civil Engineering Section

Deputy Director
Male',Maldives (07/05-12/05)
Ministry of Construction and Public Infrastructure

Deputy Director
Male',Maldives (01/05-07/05)
Ministry of Construction and Public Works

Oceanographer
Male',Maldives (09/97-08/03)
Ministry of Construction and Public Works

Secretary
Male',Maldives (07/90-09/92)
Ministry of Public Works and Labour

Private
Male',Maldives (10/89-07/90)
National Security Services

12. DETAILED TASKS ASSIGNED:

WORK UNDERTAKEN THAT BEST ILLUSTRATES CAPABILITY TO HANDLE TASKS:

- Lead the climate change negotiation and mitigation level in COP 15, COP16 & COP 17 an head of delegation of Maldives

- Deputy chair of the climate change council, the national body who advised the president on policy matter relating to climate negotiation and Environmental conservation, protection in the Maldives

- Founding Member of Regional task force on renewable energy, an ADB body that was forced in 2010

Topographic and Hydrographic Surveys for JBIC, Japan
Location: Maldives,
Year: 2008,
Time Spent: 5months,
Position: Project Director

The Topographic and Hydrographic Surveys were carried out to prepare topographic maps and bathymetric maps for the Tsunami Reconstruction project in the Maldives, and to analyze the characteristics of the Tide of the project areas through the field observation and analysis of the records.
The Service consists of the following surveys.
Topographic and Bathymetric Surveys at Sh. Funadhoo Harbor

Tide Observation and Establishment of MSL at the harbor project sites
Topographic Survey of the sewerage project islands
Inventory Survey of Septic Tanks in the sewerage project islands

The Surveys were carried out at the following islands:

- *Ga Dhaandhoo (Tide)*
- *L Isdhu (Tide)*
- *L Fonadhoo (Tide)*
- *Th. Dhiyamigili (Tide)*
- *M Muli (Topography)*
- *K Mafushi (Tide)*
- *B Eydhafushi (Topography)*
- *Sh Funadhoo (Topography, Hydrographic, Tide)*

Topographic Surveys of Tsunami rehabilitation project, sewer system designing for American Red Cross
Location: Maldives,
Year: 2007,
Time Spent: 2months,
Position: Project Director

The Topographic Surveys were carried out to prepare topographic and as-built maps for the Tsunami Reconstruction project in the Maldives
The topographic Surveys were carried out at the following islands:

- *GDh Gadhoo*
- *Ga Villigili*
- *Ga Dhaandhoo*

Topographic Surveys of Tsunami rehabilitation project, sewer system designing for UNOPS
Location: Maldives,
Year: 2007,
Time Spent: 2months,
Position: Project Director

The Topographic Surveys were carried out to prepare topographic and as-built maps for the Tsunami Reconstruction project in the Maldives
The topographic Surveys were carried out at the following islands:

- *Dh Meedhoo*
- *F Nilandhoo,*
- *R Ungoofaaru*

Lh Madivary Airport Development Topographic and Bathymetric Surveys for IAS, Maldives
Location: Maldives,
Year: 2007,
Time Spent: 2months,
Position: Project Director/Surveyor

The Topographic and Bathyetric Surveys were carried out to prepare topographic maps and bathymetric maps for the Island for the design of the runway and harbour facilities of the airport

Fuahmulaku Harbour Project
Location: Maldives,
Year: 1999 - 2003,
Time Spent: 4 years,
Position(s): Environmental Analyst (1999 – 2001)
then Project Manager (2001 – 2003)

Responsibilities:
The project involved dredging of a 2000sqm harbour basin with a sheet piled quay wall of length 650m and a rubble mound breakwater of 540m. The environmental analyst assisted the design consultant (Niras/Portconsult, Denmark) for the project to understand the specific environmental conditions of the project site and also carried out the bathymetric surveys required for the physical modelling of the harbour design.

As the project manager, duties included managerial review of all project components and making timely decisions on all matters to be dealt by the client for the effective implementation of the project.

Hulhumale Land Reclamation and Coastal Structures Development Project
Location: Maldives, *Year:* 2001 - 2002, *Time Spent:* 1 year,
Position: Project Engineer

Responsibilities:
The project involved reclamation of a land area of approximately 2sqkm that required approximately 3million cum of dredged material. This fill material was dredged from the deeper lagoon of Hulhule Lagoon. The coastal protection works included construction of a revetment and a sheet pile quay wall. As the project engineer, duties included overall supervision of the quality of works carried out by the contractor (Dredging International, Belgium) and making assessment of technical issues in the implementation of the project.

Environmental/Technical Study for Dredging and Reclamation Works Under the Hulhumale Project
Location: Maldives, *Year:* April 2002- June 2002, *Time Spent:* 3 months,
Position: Counterpart Environmental Specialist
Responsibilities:

This was study conducted to assess the technical feasibility of the reclamation works under the Hulhumale' project and to assess the environmental impacts associated with the dredging and reclamation works. The counterpart environmental specialist was responsible for carrying out the environmental data collection program. Some of the specific environmental data collected by the counterpart environmental specialist included current measurements at the site and a detailed bathymetric survey of the site. Preliminary assessment of the current data and processing and plotting of bathymetric data were also performed by the counterpart environmental specialist.

List of Some Technical Studies and Papers

EIA Ha Berimadhoo Resort Development
Location: Maldives, *Year:* February – March 2008, *Time Spent:* 2

month,

Position: Consultant

EIA Ga Kondeymathilabadhoo Resort Development
Location: Maldives, *Year:* January –February 2008, *Time Spent:* 2 month,

Position: Consultant

EIA Ga Munandhua Resort Development
Location: Maldives, *Year:* January 2008, *Time Spent:* 1 month,

Position: Consultant

EIA for Coastal Protection Works at Gdh. Lonudhuhutta

Location: Maldives, *Year:* 2006-2008, *Time Spent:* 2 years,

Position: Leading Consultant for Coastal Monitoring for 2 years and for the design of the coastal protection works

EIA GDh Vattavareha Resort Development
Location: Maldives, *Year:* July 2006, *Time Spent:* 1 month,

Position: Consultant

Beach Replenishment Technical Study. WhiteSands Resort and Spa, South Ari Atoll, Maldives
Location: Maldives, *Year:* March 2006, *Time Spent:* 1 month,

Position: Leading Consultant

Geological effects of tsunami on mid-ocean atoll islands: The Maldives before and after the Sumatran tsunami.
Paul S. Kench, Roger F. McLean, Robert W. Brander, Scott L. Nichol, Scott G. Smithers, Murray R. Ford, Kevin E. Parnell and **Mohamed Aslam** (2006). Geology: Vol. 34, No. 3, pp. 177–180.

Shore Protection Technical Study for Dhonveli Beach & Spa Resort, Maldives
Location: Maldives, *Year:* February 2006, *Time Spent:* 1 month,
Position: Leading Consultant

Environmental Impact Assessment Report for the Proposed Remodelling of the Coastal Environment of FunIsland Resort.
Location: Maldives, *Year:* September 2005, *Time Spent:* 2 month,
Position: Consultant (Coastal Environmental Specialist)

Environmental Impact Assessments (EIA) Report, Domestic Maritime Transport Study (ADB TA 4394-MLD)
Location: Maldives, *Year:* March 2005, *Time Spent:* 5 ½ month,
Position: Consultant (Environmental Specialist)

Environmental Impact Assessment Report Redevelopment of Reethi Rah as a Premium Nature Resort
Location: Maldives, *Year:* May 2005, *Time Spent:* 1 ½ months,
Position: Consultant (Coastal Environmental Specialist)

Regional Technical Assistance for Coastal and Marine Resources Management and Poverty Reduction in South Asia (ADB RETA 5974)
Location: Maldives, *Year:* April 2003, *Time Spent:* 3 months,
Position: Consultant (Coastal Environmental Specialist to assess the coastal zone issues in Faaf atoll, Maldives and formulation of an Integrated Coastal Zone Management Strategy and An Action Plan.

Proposed Shore Protection works at Hakuraahuraa – An Assessment of Environmental Design Parameters
Location: Maldives, *Year:* Sep 2001, *Time Spent:* 4 months,

Position: Leading Consultant
The study involved examination of the beach characteristics, nearshore current and wave patterns and how they affect the beach of the island. Based on these examinations a shore protection structure suitable for the island was proposed.

Environmental Study on the Proposed Beach Fill Project at K. Hudhuveli – An Assessment of Beach Fill Design Parameters
Location: K. Hudhuveli, *Time Spent:* September 2000 (1 ½ months),
Position: Leading Consultant

The study involved examination of the beach characteristics including the sediment properties, beach profiles. Identification of a borrow site by comparing the borrow sediment characteristics of the borrow site and the native beach sand.

Environmental Impact Assessment Study for the Resort Development at Baa. Landaagiraavaru
Location: Maldives, *Year:* June 2000, *Time Spent:* 2 months,
Position: Consultant (Coastal Environmental Specialist)

The EIA study involved collection of oceanographic data, study of the beach environment, vegetation, reef quality and groundwater/seawater quality. The study examined the impacts of the development on the island and mitigation measures where appropriate. The EIA study also recorded the baseline data for future monitoring of the environmental changes due to the resort development.

Proposed Beach Nourishment at M. Medhufushi. An assessment of Environmental Design Parameters
Location: M. Medhufushi, *Time Spent*: April 2000,
Position: Leading Consultant

The study involved examination of the beach characteristics including the sediment properties, beach profiles. Identification of a borrow site by comparing the borrow sediment characteristics of the borrow site and the native beach sand.

Environmental Evaluation of Small Bore Sewer System (SBS) in Lh. Hinnavaru and K. Gulhi (A study carried out for Maldives Water and Sanitation Authority, Maldives).
Location: Maldives, *Year:* 1999, *Time Spent:* 3 months,
Position: Consultant

The study involved groundwater / seawater analysis for sewage pollution, reef surveys hydrographic / oceanographic surveys and survey of the slopes of the sewage lines.

Assessment of Oil Contamination in Male groundwater from vehicle garages and petrol stations. . (A study carried out for Maldives Water and Sanitation Authority, Maldives).
Location: Maldives, *Year:* 1999, *Time Spent:* 3 months,
Position: Consultant

The study involved groundwater analysis for oil contamination and assessment of general working conditions and practices in the Vehicle Garages and Petrol Stations in Male.

Environmental Impact Assessment for R. Meedhupparu Resort Development
Location: Maldives, *Year:* 1998, *Time Spent:* 2 ½ months,
Position: Consultant

Environmental Impact Assessment for F. Filitheyo Resort Development
Location: Maldives, *Year:* 1998, *Time Spent:* 2 ½ months,
Position: Consultant

Environmental Impact Assessment for Alif Maamigili Airstrip Development
Location: Maldives, *Year:* 1997, *Time Spent:* 3 ½ months,
Position: Consultant

Environmental Impact Assessment for Lh Madhiriguraidhoo Resort Development
Location: Maldives, *Year:* 1997, *Time Spent:* 2 ½ months,
Position: Consultant

11.Certification:

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes myself, my qualifications, and my experience. I understand that any wilful misstatement described herein may lead to my disqualification or dismissal, if engaged.

[*Signature of staff member or authorized representative of the staff]*
Mohamed Aslam

Shahaama Abdul Sattar

Personal Information

Date of birth:	30 September 1980
Address:	G. Helengeli Aage, Apt 2 B Rahdhebai Magu Male' Republic of Maldives
Contact No:	+ 960 7904985 (m)
Email:	shahaama@lamer.com.mv (LaMer Pvt Ltd) shahaama.sattar@gmail.com
Work Address:	Currently working independently

Education

Graduate and Postgraduate

Aug 2004 - Jun 2006	Master of Science in Fisheries Biology and Fisheries Management University of Bergen Department of Biology Postbox 7800 N-5020 Bergen, Norway
Feb 1999 - Dec 2001	Bachelor of Science The Flinders University of South Australia GPO Box 2100 Adelaide 5001, South Australia

Secondary

Apr 1997 – Jul 1998	G.C.E A'Level (London) Kolej Damansara Utama Damansara Jaya Selangor, Malaysia
Jan 1994 – Dec 1996	G.C.E O'Level (London) Aminiya School Male', Republic of Maldives

Work experience

Feb 2002	Volunteer work at Seal Bay, Kangaroo Island, South Australia. Work involved helping researchers with catching seals and removing tracking devices from the seals.

Dec 2001 – Feb 2002 Work experience at the South Australian Aquatic Sciences Centre
Work involved dealing with sea urchins, mainly cleaning their tanks, doing dissections on sea urchins and helping researchers with different aspects of the research.

May 2008 Participated in the Biodiversity Valuation survey of Baa Atoll Maldives carried out by AEC project and IUCN

Employment Record

May 2011 - Present Consultant, Darwin Reef Fish Project
Marine Research Centre, Maldives / Marine Conservation Society, UK

- Consultant to the Darwin Reef Fish Project (4 year joint collaboration between MRC and MCS, UK), which assesses the various reef fisheries (grouper, aquarium and food fisheries) of the Maldives and aims to establish management plans for these fisheries. Provision of technical support and assistance to the project staff and MRC in implementing the project and formulation of the management plans.

June 2011 – Present LaMer Pvt Ltd

- Work part time in report writing for the various Environmental Impact Assessment projects conducted by the group.

July 2011 – Present BOBLME Sharks Working Group Coordinator, Bay of Bengal Large Marine Ecosystem Project

- Coordinator for the Sharks WG of BOBLME project, and work with the focal points in the member countries, to assist in the formulation and implementation of their National Plans of Action for Sharks.

June 2002 – May 2011 Fisheries Biologist (At time of resignation)
Marine Research Centre
Ministry of Fisheries and Agriculture
Male', Republic of Maldives

Line of work at MRC included:

- Conduct field surveys to monitor the reef fishery and fish species behaviour
- Compilation and analyses of the reef fisheries data, in particular the grouper and food fishery data
- Write reports and regular reviews on the status of fisheries including recommendations for management.
- Focal point for the IUCN funded project on identification of reef fish spawning aggregations in the Maldives through fishermen interviews (2007)
- Secretariat – Indian Ocean Cetacean Symposium 2009
- Project Partner for Maldives for the Darwin Initiative Coral Reef Fish Project, Maldives
- MRC Focal point for the Atoll Ecosystem Conservation Programme, Ministry of Housing and Environment (2009 – 2011)

Workshops/Seminars Participated

15-21 March 2003 - Training Workshop on the Implementation of Multilateral Agreements in the Conservation of Biodiversity with special focus on Marine Biodiversity. Kushiro, Japan

14-16 November 2006 – Sixth William R. and Lenore Mote International Symposium – Life history in Fisheries Ecology and Management. Sarasota, Florida

03-05 March 2008 – Olhugiri and Dhigalihaa Protected Areas Management Planning Workshop. Eydhafushi, Maldives

11 March 2008 – Applying the Ecosystem Approach to managing Atoll Ecosystems in the Maldives. Hulhule Island Hotel, Maldives

24-26 March 2008 – Regional Consultation on Preparation of Management Plans for Shark Fisheries. Beruwela, Sri Lanka

17-19 June 2008 – Workshop on Assessment and Management of the Offshore Resources of South and Southeast Asia. Bangkok, Thailand

22-23 March 2009 – BOBP-IGO National Workshop on Monitoring, Control and Surveillance in Marine Fisheries. Male', Maldives

18 – 20 July 2009 – Indian Ocean Cetacean Symposium 2009. Paradise Island Resort and Spa, Maldives.

09-11 August 2009 – Second Regional Consultation on Preparation of Management Plans for Shark Fisheries. Kulhudhuffushi, Maldives

24-25 February 2010 – BOBLME Project – National Inception Workshop, Male', Maldives

2-3 June 2010 – BOBP-IGO Technical Advisory Committee – 5th Meeting, Male', Maldives

13-14 September 2010 – BOBLME Fisheries Assessment Working Group – 1st Meeting, Bangkok, Thailand

14-16 December 2010 – EWS-WWF 2nd Marine Conservation Forum for the Gulf Region In partnership with the Pew Environment Group – Local Actions for Global Challenges, Abu Dhabi, United Arab Emirates

18-19 January 2011 – Bay of Bengal Large Marine Ecosystem Project – Workshop on the Status of Marine Managed Areas in the Bay of Bengal, Penang, Malaysia

5-7 July 2011 –Bay of Bengal Large Marine Ecosystem Project – First meeting of the BOBLME Sharks Working Group, Male', Maldives

7-8 September 2011 – Workshop to formulate the Grouper Fisheries Management Plan, DRFP/MRC, Male', Maldives

15-17 September 2011 – SEAFDEC Special Meeting on Sharks Information Collection in Southeast Asia, Bangkok, Thailand

Publications

Sattar, S. A., Amir, H. and Adam, M. S. (2011) Reef fish tagging programme – Baa Atoll Pilot project (in press)

Sattar, S. A., Andréfouët, S., Ahsan, M., Adam, M. S., Anderson, R. C. and Scott, L (2011) Status of the Coral Reef Fishery in an Atoll under tourism development: the case of Central Maldives (in press)

Saleem, M., Sattar, S. A. (2009) Study on post-tsunami restoration and conservation projects in Maldives, *Prepared for the International Union for Conservation of Nature.*

Tamelander, J., Sattar, S., Campbell, S., Hoon, V., Arthur, R., Patterson E. J.K., Satapoomin, U., Chandi, M., Rajasuriya, A. and Samoilys, M. (2009) Reef fish spawning aggregation in the Bay of Bengal: Awareness and Occurrence, *Proceedings of the 11th International Coral Reef Symposium, Ft. Lauderdale, Florida, 7-11 July 2008,* Session 22

Sattar, S. A., Jørgensen, C., Fiksen, Ø. (2008) Fisheries Induced Evolution of Energy and Sex Allocation. *Bulletin of Marine Science*, 83(1): 235-250

Sattar, S. A. (2008) Review of the Reef fishery of the Maldives, Marine Research Centre, Male', Maldives. 62 pp

Sattar, S. A. and M. S. Adam (2005) Review of the Grouper fishery of the Maldives with additional notes on the Faafu Atoll fishery. Marine Research Centre, Male', Maldives. 54 pp

Referees

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CURRICULUM VITAE

1.	**PROPOSED POSITION:**	Environmental Planner
2.	**FIRM:**	LaMer Pvt. Ltd
3.	**NAME:**	Aishath Abdulla
4.	**DATE OF BIRTH:**	10th September 1986
5.	**NATIONALITY:**	Maldivian
6.	**PERSONAL ADDRESS:**	H.Regalge, MajeedheeMagu Male' Rep. of Maldives
7.	**EDUCATION:**	2012 M. Environment, Australia 2010 BA (Hons) in Urban and Regional Planning, Malaysia
8.	**OTHER TRAINING:**	
9.	**LANGUAGE AND DEGREE OF PROFICIENCY:**	English – Fluent Dhivehi – Mother tongue
10.	**MEMBERSHIP OF PROFESSIONAL SOCIETIES:**	
11.	**COUNTRIES OF WORK EXPERIENCE:**	Maldives, Malaysia
12.	**EMPLOYMENT RECORD:**	

February 2013- Present	Senior Planner LAMER Group Pte Ltd Male' Maldives
November 2010 – January 2011	Planner/ Acting business development Manager Riyan Pte.Ltd Male' Maldives
May 2009 - July 2009	Trainee ANZ PLANNERS SDN. BHD Selangor Malaysia
August 2005 - October 2005	Surveyor Ministry of Fisheries and Agriculture Male' Maldives

	December 2003	Surveyor Ministry of Planning and National Development Male' Maldives
	May 2003-August 2003	Volunteer UNICEF Male' Maldives

13 DETAILED TASKS ASSIGNED:

WORK UNDERTAKEN THAT BEST ILLUSTRATES CAPABILITY TO HANDLE THE TASKS ASSIGNED:

Review and Update the Detailed Island Risk Assessment in the Maldives prepared for HDh. Kulhudhufushi and GDh. Thinadhoo
Year: 2013
Client: Ministry of Environment and Energy
Position Held: Social Planner/Project Coordinator
Duties Rendered: Review all relevant documents related to DIRAM study, study the social aspects impacting the risks of the islands and overall management of the project.

Preparation of Heritage Action Plan and Preliminary Inventory
Year: 2011
Client: Department of National Heritage
Position Held: Team Leader
Duties Rendered: Proposed action plan for the protection and safeguarding of national heritage. Prepared a preliminary inventory of the existing tangible and intangible heritage of Maldives

Preparation of Atoll and Island Development Plans for AA. Atoll
Year: 2011
Client: Secretariat of AA Atoll council
Position Held: Planner/ Project Manager
Duties: Manage and prepare the development plans

Reviewing the Third Tourism Master Plan 2005-2011
Year : 2011
Client: Ministry of Tourism Arts and Culture
Position Held: Planner/Project Coordinator
Duties Rendered: Provide input in planning perspective and also over all coordination of the project inclusive of conducting a workshop to present the findings

Integration of Climate Change Risk Resilience into Land Use Planning
Location: Maldives
Year: 2011

Client: Ministry of Housing and Environment
Position Held: Planner/Project Coordinator
Duties Rendered: Provide input in planning perspective and also over all coordination of the project inclusive of conducting a workshop to present the findings

Preparation of a detailed Layout Plan for Tourism Zone (Asseyri Project)
Year :2011
Client: Ministry of Tourism Arts and Culture
Position Held: Planner/Project Coordinator
Duties Rendered: Provide input in planning perspective through preparing the layout plan and also over all coordination of the project inclusive of conducting a workshop to present the findings

Appraisal of Hithadhoo Regional Hospital Development
Location: S. Hithadhoo, Maldives
Year :2010
Client:OPEC Fund for International Development (OFID)
Position Held: Socio Assessment Specialist/Project Coordinator
Duties Rendered: Overall Coordination of the project and carry out social Impact assessment study.

Mapping study of infrastructure and resources for Youth
Location:
Year :2010
Client:UNDP
Position Held: Assistant project coordinator
Duties Rendered: Assisting in overall coordination of the project

***Draf RancanganTempatan* DAERAH KUALA LANGAT (*Draft Local Plan* for Kuala Langat District)**
Location: Kuala Langat, Selangor, Malaysia
Year :2009
Client:JPBD (Town and country planning department, Selangor)
Position Held: Support consultant
Duties Rendered: Assisting in the planning process including the report writing, consultations, preparing layout plans and 3D sketch-up models

Reviewing the Master Plan
Location: Badra and Sweirra, Iraq
Year :2009
Client: City council, Badra and Sweirra
Position Held: Support consultant
Duties Rendered:providing consultancy on the master plan. Reviewing the EIA and preparing SIA for the master plan of Badra and Sweirra

HELIPAD Development; PRINCE COURT Hospital
Location: Ampang, Kuala Lumpur, Malaysia
Year :2009
Client:
Position Held: Support Consultant
Duties Rendered: Reviewing the guidelines for HELIPAD development, preparing proposal presentations for the development.

CERTIFICATION

I, the undersigned, certify that to the best of my knowledge and belief, this CV correctly describes me, my qualifications, and my experience. I understand that any willful misstatement described herein may lead to my disqualification or dismissal, if engaged.

Aishath Abdulla Date: 10 December 2013

Address: LaMER Group Pvt Ltd
3rd Floor, Azum, Ameenee Magu
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References

Allison, W.R., 1996. *Methods for surveying coral reef benthos*. Prepared for IMS, Zanzibar, 18 pp.

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Josimovic, B., Petric, J. and Milijic, S., 2014. The use of the Leopold Matrix in carrying out the EIA for windfarms in Serbia, Energy and Environment Research, 4(1), pp 43 - 54

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MHAHE, 2002. National Biodiversity Strategy and Action Plan of the Maldives. pp 110

MHTE, 2009. Third National Environment Action Plan. pp. 25

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Naseer, A. and Hatcher, B. G., 2004. Inventory of the Maldives coral reefs using morphometrics generated from Landsat ETM+ imagery. Coral Reefs 23(1),pp 161-168.

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Schott, F. A. and McCreary, J. P. Jr., 2001. The monsoon circulation of the Indian Ocean. *Progress in Oceanography*, 51 (1): pp. 1 – 123.

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Young I (1999). Seasonal variability of the global ocean wind and wave climate. International Journal on Climatology 19:931-950.

Appendices

Appendix 1 List of abbreviations

CBD – Convention on Biological Diversity
EIA – Environmental Impact Assessment
EPA – Environmental Protection Agency
IFAD - International Fund for Agricultural Development
MACL- Maldives Airports Company Limited
MEDeP - Mariculture Enterprise Development Project
MHAHE – Ministry of Home Affairs, Housing and Environment
MEE – Ministry of Environment and Energy
MHI – Ministry of Housing and Infrastructure
MHUD – Ministry of Housing and Urban Development
MoFA – Ministry of Fisheries and Agriculture
NBSAP - National Biodiversity Strategy and Action Plan
NEAP III – Third National Environment Action Plan
SOP – Standard Operating Procedure
ToR – Terms of Reference

Appendix 2 Terms of Reference (ToR)

بسم الله الرحمن الرحيم

TOR Number: 203-EIARES/30/2016/6

Terms of Reference for Environmental Impact Assessment for Development of Aquatic Animal Quarantine Facility at Ibrahim Nasir International Airport

The following is the Terms of Reference (ToR) following the scoping meeting held on 26/5/2016 for undertaking the EIA for the proposed *Development of Aquatic Animal Quarantine Facility at Ibrahim Nasir International Airport . The proponent of this project is Ministry of Fisheries and Agriculture.*

While every attempt has been made to ensure that this TOR addresses all of the major issues associated with the developmental proposal, they are not necessarily exhaustive. They should not be interpreted as excluding from consideration matters deemed to be significant but not incorporated in them, or matters currently unforeseen, that emerge as important or significant from environmental studies, or otherwise, during the course of preparation of the EIA report.

1. **Introduction and rationale** – Describe the purpose of the project and, if applicable, the background information of the project/activity and the tasks already completed. Objectives of the development activities should be specific and if possible quantified. Define the arrangements required for the environmental assessment including how work carried out under this project is link other activities that are carried out or that is being carried out within the project boundary. Identify the project financing and institutional arrangements relevant to the project.

2. **Study area** – Submit a minimumA3 size scaled plan with location of proposed facility. Specify the agreed boundaries of the study area for the environmental impact assessment highlighting the proposed development location and size.

3. **Scope of work** – Identify and number tasks of the project including preparation, construction and decommissioning phases.

Task 1. Description of the proposed project – Provide a full description and justification of development:

- General building layout
- Seawater pump station and discharge water pipeline location
- Construction method of pump station and main building (dewatering requirement)
- Quarantine Facility Operational Process
- Project duration and schedule
- Waste Management and Disposal Mechanism operational phase
- Contingency plans
- Disposal of dead animals/plants
- Water and Power generation for operational phase
- Wastewater management and disposal mechanism for operational phase

Temporary facilities

Describe construction methods, scheduling and operation of temporary facilities including power generation, oil storage, water supply, waste water treatment, accommodation facilities, waste management and decommissioning.

Project management: Include communication of construction details, progress, target dates and duration of works, construction/operation/closure of labor camps, access to site, safety, equipment and material storage, water supply, waste management from construction operations (mainly dredged materials), power and fuel supply temporary site setup;

Task 2. Descriptions of the environment – Assemble, evaluate and present the environmental baseline study/data regarding the study area and timing of the project (e.g. monsoon season). Identify baseline data gaps and identify studies and the level of detail to be carried out by consultant. Consideration of likely monitoring requirements should be borne in mind during survey planning, so that data collected is suitable for use as a baseline. As such all baseline data must be presented in such a way that they will be usefully applied to future monitoring. The report should outline detailed methodology of data collection utilized.

The baseline data will be collected before construction and from at least two benchmarks.

All data must be collected as per the requirements of the EPA Data Collection Guidelines (published on www.epa.gov.mv). The report should outline detailed methodology of data collection utilized.

All survey locations shall be referenced with Geographic Positioning System (GPS) including water sampling points, reef transects, vegetation transects and manta tows sites for posterior data comparison. Information should be divided into the categories shown below:

Geology and geomorphology

- General description of proposed building location (ground condition and vegetation pattern)
- Ground Water (Salinity,Conductivity)

Marine environment

- General description of marine environment at the proposed intake pump station and discharge water pipeline location
- Seawater quality at the discharge water pipeline location (temperature, pH, salinity, turbidity, Total Dissolved Solids and Dissolved Oxygen)

Absence of facilities in the country to carry out the water quality tests will not exempt the proponent from the obligation to provide necessary data. The report should outline the detailed methodology of data collection utilized to describe the existing environment.

Absence of facilities in the country to carry out the water quality tests will not exempt the proponent from the obligation to provide necessary data. The report should outline the detailed methodology of data collection utilized to describe the existing environment.

Task 3. Legislative and regulatory considerations – Identify the pertinent legislation, regulations and standards, and environmental policies that are relevant and applicable to the proposed project, and identify the appropriate authority jurisdictions that will specifically apply to the project.

Task 4. Potential impacts (environmental and socio-cultural) of proposed project, incl. all stages – The EIA report should identify all the impacts, direct and indirect, during and after construction, and evaluate the magnitude and significance of each. Particular attention shall be given to impacts associated with the following:

The EIA report should identify all the impacts, direct and indirect, during and after construction, and evaluate the magnitude and significance of each. Particular attention shall be given to impacts associated with the following:

Task 4. Potential impacts (environmental and socio-cultural) of proposed project– The EIA report should identify all the impacts, direct and indirect, during and after construction, and evaluate the magnitude and significance of each. Particular attention shall be given to impacts associated with the following:

Impacts on the natural environment

- Impact on ground water
- Impact on seawater
- Impacts on marine environment

Construction related hazards and risks

- Pollution of the natural environment (e.g. spills, pollution from construction related waste);
- Risk of accidents and pollution on workers and local community,

The methods used to identify the significance of the impacts shall be outlined. One or more of the following methods must be utilized in determining impacts; checklists, matrices, overlays, networks, expert systems and professional judgment. Justification must be provided to the selected methodologies. The report should outline the uncertainties in impact prediction and also outline all positive and negative/short and long-term impacts. Identify impacts that are cumulative and unavoidable.

Task 5. Alternatives to proposed project – Describe alternatives including the *"no action option"* should be presented. Determine the best practical environmental options. Alternatives examined for the proposed project that would achieve the same objective including the "no action alternative". This should include alternative location, construction technologies, taking into account environmental, social and economic factors. The report should highlight how the location was determined. All alternatives must be compared according to international standards and commonly accepted standards as much as possible. The comparison should yield the preferred alternative for implementation. Mitigation options should be specified for each component of the proposed project.

Task 6. Mitigation and management of negative impacts – Identify possible measures to prevent or reduce significant negative impacts to acceptable levels. These will include both environmental and socio-economic mitigation measures. Measures for both construction and operation phase shall be identified. Cost the mitigation measures, equipment and resources required to implement those measures. The confirmation of commitment of the developer to implement the proposed mitigation measures shall also be included. An Environmental management plan for the proposed project, identifying responsible persons, their duties and commitments shall also be given. In cases where impacts are unavoidable arrangements to compensate for the environmental effect shall be given.

Task 7. Development of monitoring plan – Identify the critical issues requiring monitoring to ensure compliance to mitigation measures and present impact management and monitoring plan for ground water and sea water quality. Ecological monitoring will be submitted to the EPA to evaluate the damages during construction, after project completion and every three months thereafter, up to one year and then on a yearly basis for five years after. The baseline study described in task 2 of section 2 of this document is required for data comparison. Detail of the monitoring program including the physical and biological parameters for monitoring, financial commitment from responsible person to conduct monitoring in the form of a commitment letter, detailed reporting scheduling, costs and methods of undertaking the monitoring program must be provided.

Task 8. Stakeholder consultation, Inter-Agency coordination and public/NGO participation) –
Identify appropriate mechanisms for providing information on the development proposal and its progress to all stakeholders, government authorities, NGOs, engineers/designers, development managers, staff and members of the general public. The

EIA report should include a list of people/groups consulted and summary of the major outcomes. The following parties should be consulted

a) HPA
b) MACL

Presentation- The environmental impact assessment report, to be presented in digital format, will be concise and focus on significant environmental issues. It will contain the findings, conclusions and recommended actions supported by summaries of the data collected and citations f or any references used in interpreting those data. The environmental assessment report will be organized according to, but not necessarily limited by, the outline given in the Environmental Impact Assessment Regulations, 2012 and subsequent amendments.

Timeframe for submitting the EIA report – The developer must submit the completed EIA report within 6 months from the date of this Term of Reference.

26 May 2016

ENVIRONMENTAL PROTECTION AGENCY
Male', Rep of Maldives

Appendix 3 Site Plan

بسم الله الرحمن الرحيم

މޯލްޑިވްސް އެއާޕޯޓްސް ކޮމްޕެނީ ލިމިޓެޑް
ދިވެހިރާއްޖޭގެ ދޮރުފަތް: އެއާޕޯޓްތަކުގެ ތަރައްގީ

ދިވެހިރާއްޖޭގެ ފަޚުރު. 50 އަހަރު ޚިދުމަތުގައި

ނަންބަރު: 116-H5/OTH/2016/195

މެރިން ރިސަރޗް ސެންޓަރގެ ޑިރެކްޓަރ ޖެނެރަލް ޑރ. މުޙައްމަދު ޝިހާމް އާދަމް އަށް
ވުދުން ސަލާމަށްފަހު ދަންނަވަމެވެ.

ތިޔަ އޮފީހުގެ ނަންބަރު: 30-MRC-ADM/116/2016/1 (12 އޭޕްރީލް 2016) ސިޓީއަށް ހަވާލާދީ
ދަންނަވަމެވެ.

ހަވާލާދީފައިވާ ސިޓީއާއެކު ތިޔަ ފަރާތުން ހުށަހަޅުއްވާފައިވާ އެކުއެޓިކް އެނިމަލް ކަރަންޓީން ފެސިލިޓީގެ ކަރުދާހާއި އެއްގޮތަށް އަ ކަރުދާހުގައި ދައްކާފައިވާ ބިމުގައި އަ އިމާރާތް އެޅުމުގައާއި ކަރުދާހުގައިވާ ގޮތަށް އިންޓޭކް އަދި އައުޓްލެޓް ޕައިޕްލައިން އެޅުމުގައި މި ކުންފުނީގެ އިޢުތިރާޟެއް ނެތްކަމަށް ދަންނަވައިލަމެވެ.

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ވީމާ، މި ސިޓީއާއެކު ފޮނުވާފައިވާ ކަރުދާހާއި އެއްގޮތަށް އެކުއެޓިކް އެނިމަލް ކަރަންޓީން ފެސިލިޓީގެ އިމާރާތާއި ޕަމްޕު ސްޓޭޝަންގެ ޑިޒައިން ކަރުދާސްތައް ތައްޔާރުކުރައްވާ ފޮނުއްވުން އެދި ދަންނަވަމެވެ. އަދި ކަރުދާހުގެ ބިމާއި މުސްތަޤްބަލުގައި ޖާގައިގެ ގޮތުން ވަރަށް ދަތި ބައްޓަންކުރުމަށް ވާތީ މި ހުރިހާ ބަޔަކާ 03 ހަފްތާގެ ތެރޭގައި ހުށަހަޅުއްވުން މުހިންމު ކަމުގައި މި ކުންފުނިން ދެކެމެވެ.

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10 ޝަޢުބާން 1437

17 މޭ 2016

ޚާދިމުކުމް

ޢިއްޒާނު މަލީސް

ޗީފް ޑިވެލޮޕްމަންޓް އޮފިސަރ

މެރިން ރިސަރޗް ސެންޓަރ،
މިނިސްޓްރީ އޮފް ފިޝަރީޒް އެންޑް އެގްރިކަލްޗަރ،
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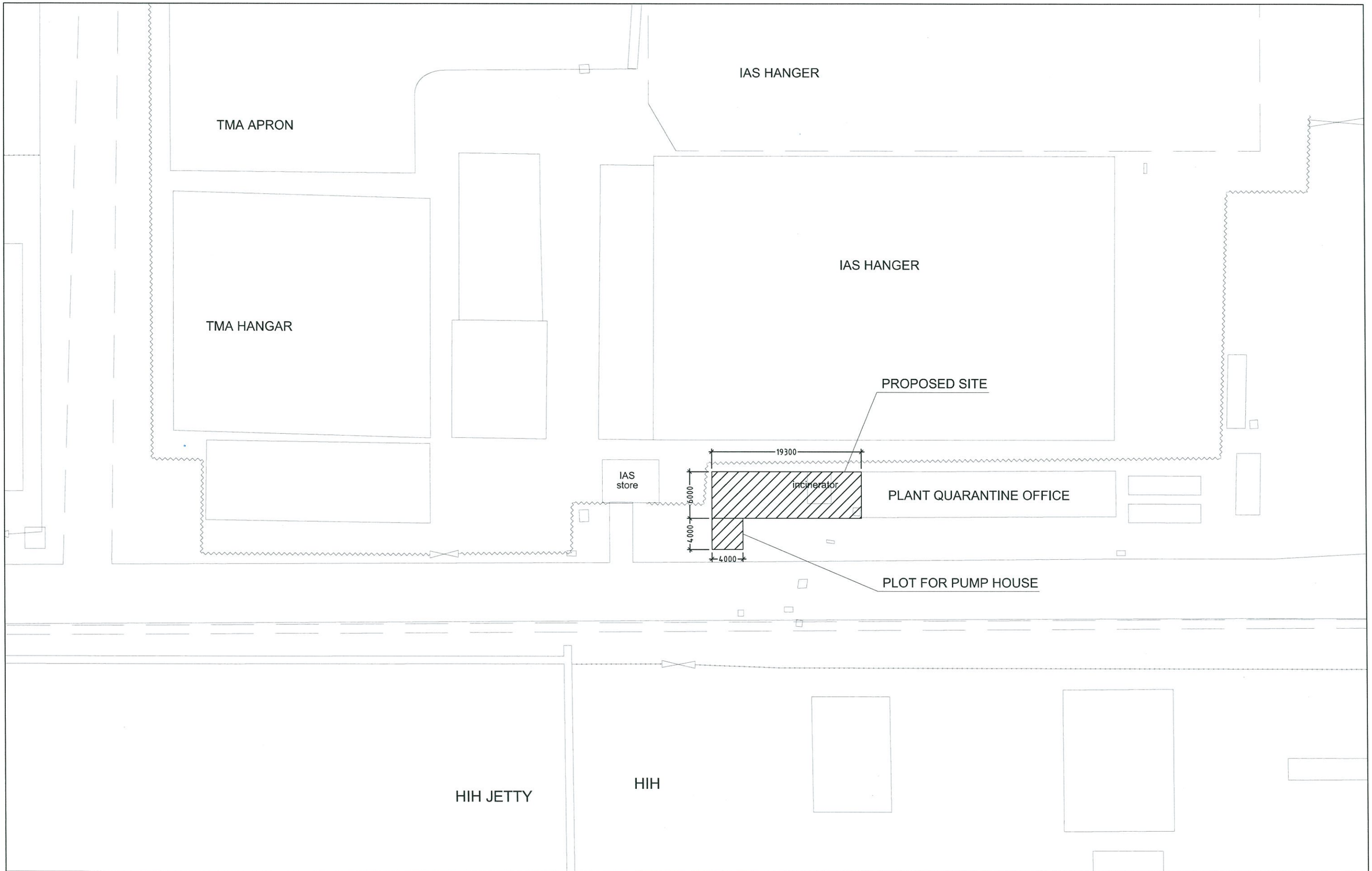


MALDIVES AIRPORTS Co
your journey : our business

PROJECTS & PLANING SECTION
Maldives Airports Company Limited,
Ibrahim Nasir International Airport, Tel: 333 7213

Project: PROPOSED SITE FOR AQUATIC ANIMAL QUARANTINE FACILITY UNIT

Title: LOCATION PLAN

NOTE: ALL DIMENSIONS TO BE CHECKED ONSITE BEFORE CONSTRUCTION

CHECKED BY:	APPROVED BY:	APPROVED BY:	DRAWN BY:
MOHAMED AMIR (PPS)	LIONNEL MAUGIS (CDO)	HUSSAIN FAZYL (GM - COMMERCIAL)	MAADHIH
DATE: 17 May 2016	DATE:	DATE: 17/05/2016	

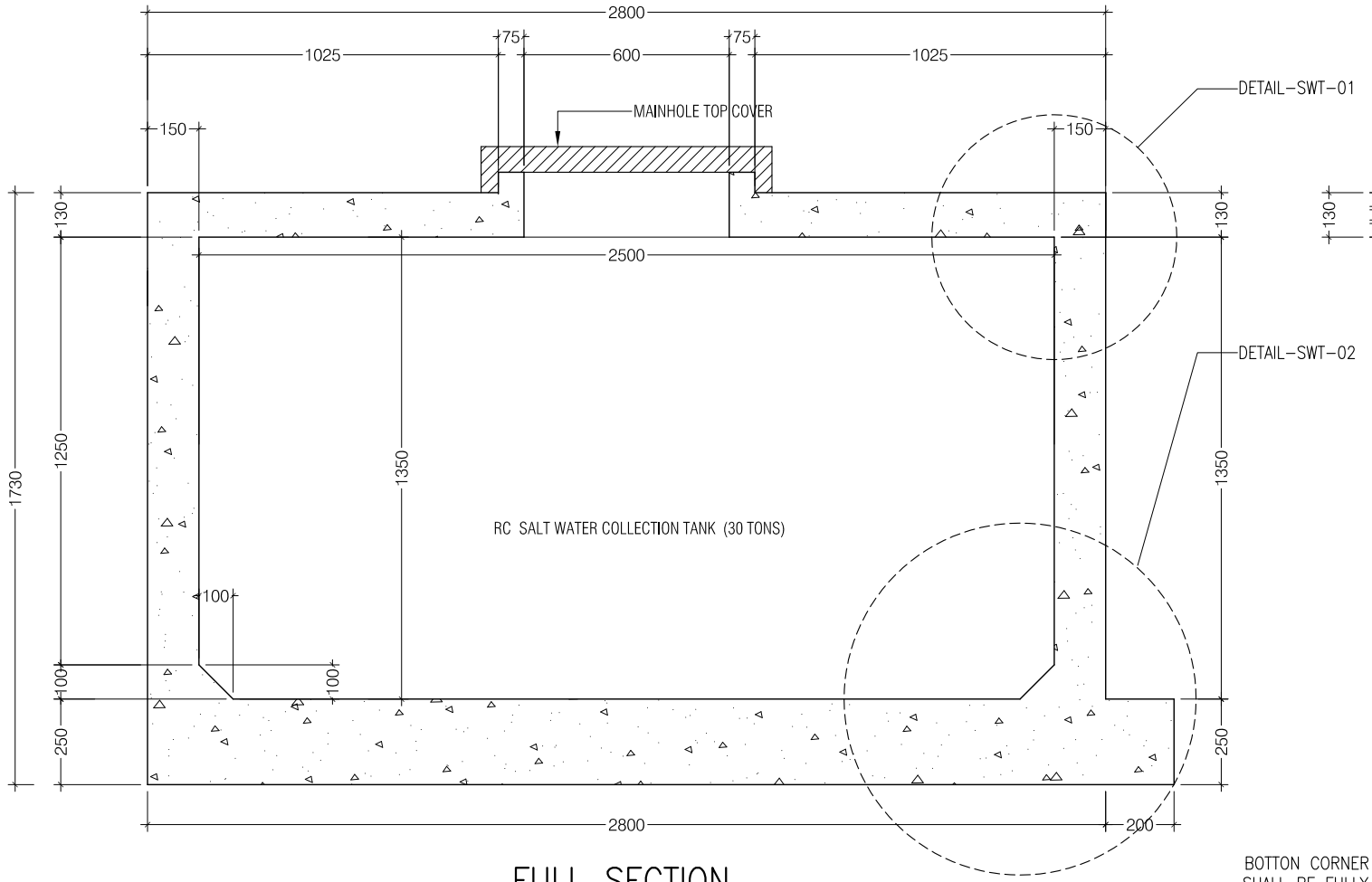
SCALE: NTS	REVISION:
DATE: 16th May 2016	01
DRAWING NUMBER:	02
	03
	04
FILE LOCATION: CSPD MASTER/AP/PLANNING DRAWINGS/ONGOING.....	05
	06
	07

Plot Date: 16 May, 2016 - 4:19 PM

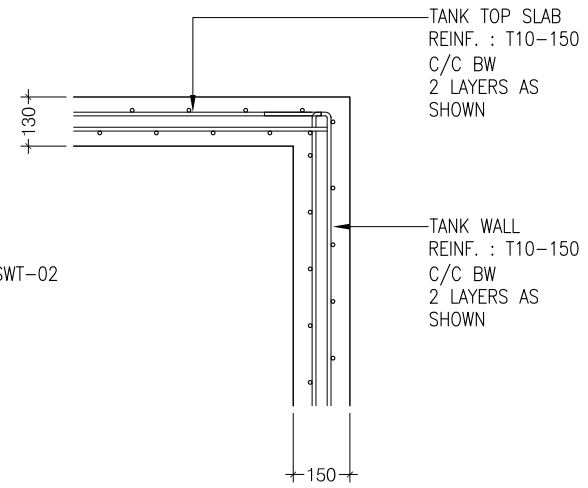
Cad File Path: C:\Users\A-4352\Desktop\15 may 2016 proposed site for AQUATIC ANIMAL QUARANTINE FACILITY UNIT.dwg


Clean seawater intake pipe
Seawater intake well
Proposed Aquatic Animal Quarantine Facility
Existing Plant & Animal Quarantine Facility
Outlet pipe for treated seawater discharge
Image © 2016 DigitalGlobe

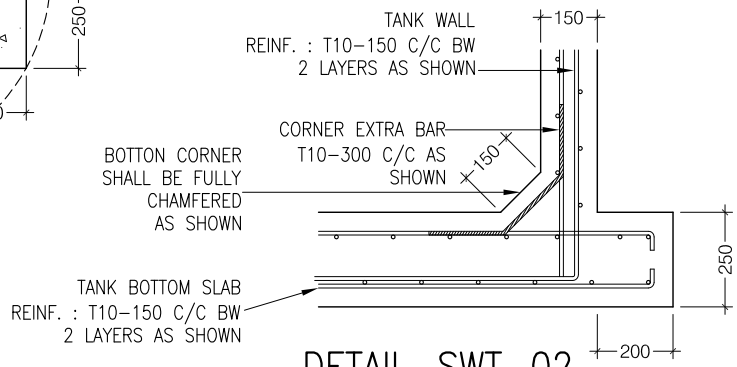
Appendix 4 Floor plans of Quarantine facility and pump station



FULL SECTION
SECTION A-A



DETAIL-SWT-01
PROVIDE 40MM COVER



DETAIL-SWT-02
PROVIDE 40MM COVER

SEAWATER INTAKE TANK DETAILS

SCALE 1:20

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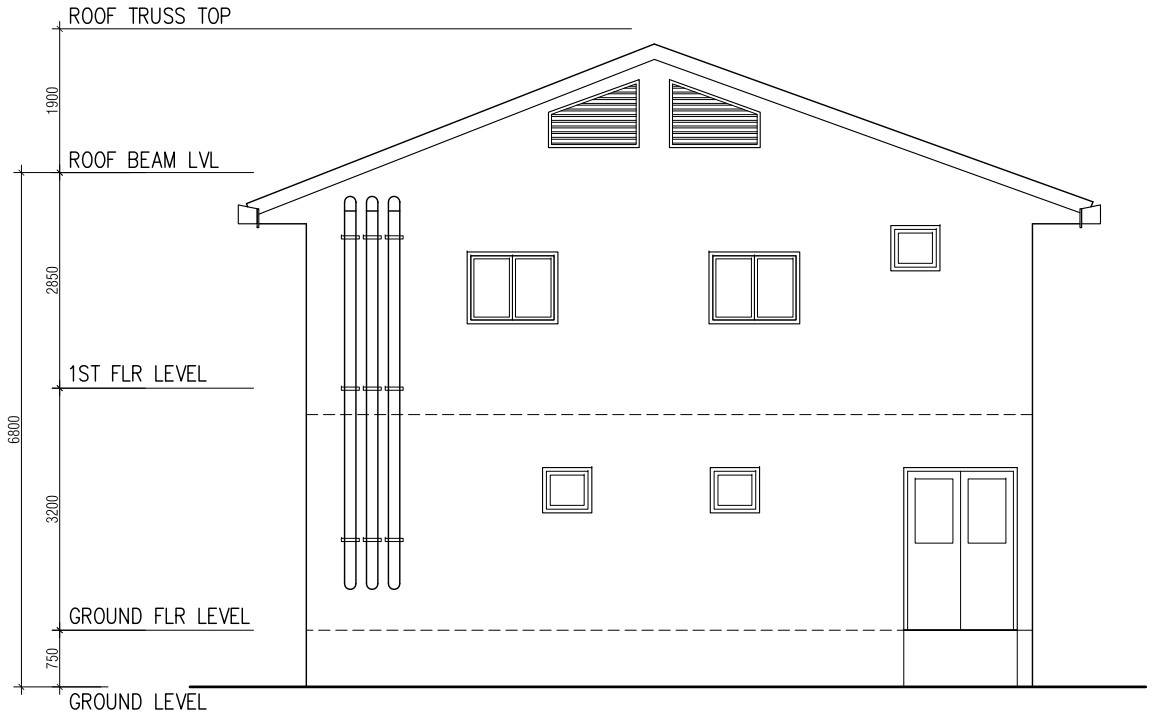

ELEVATION - A

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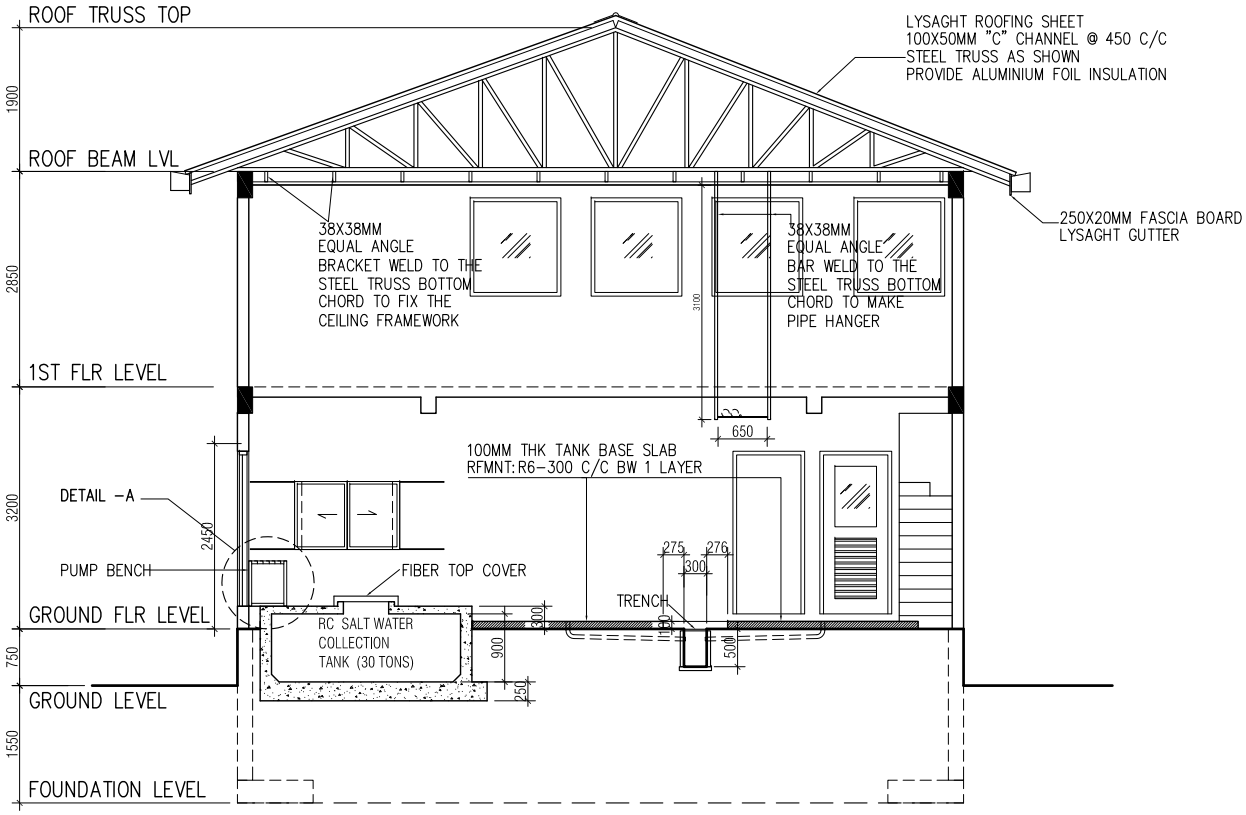

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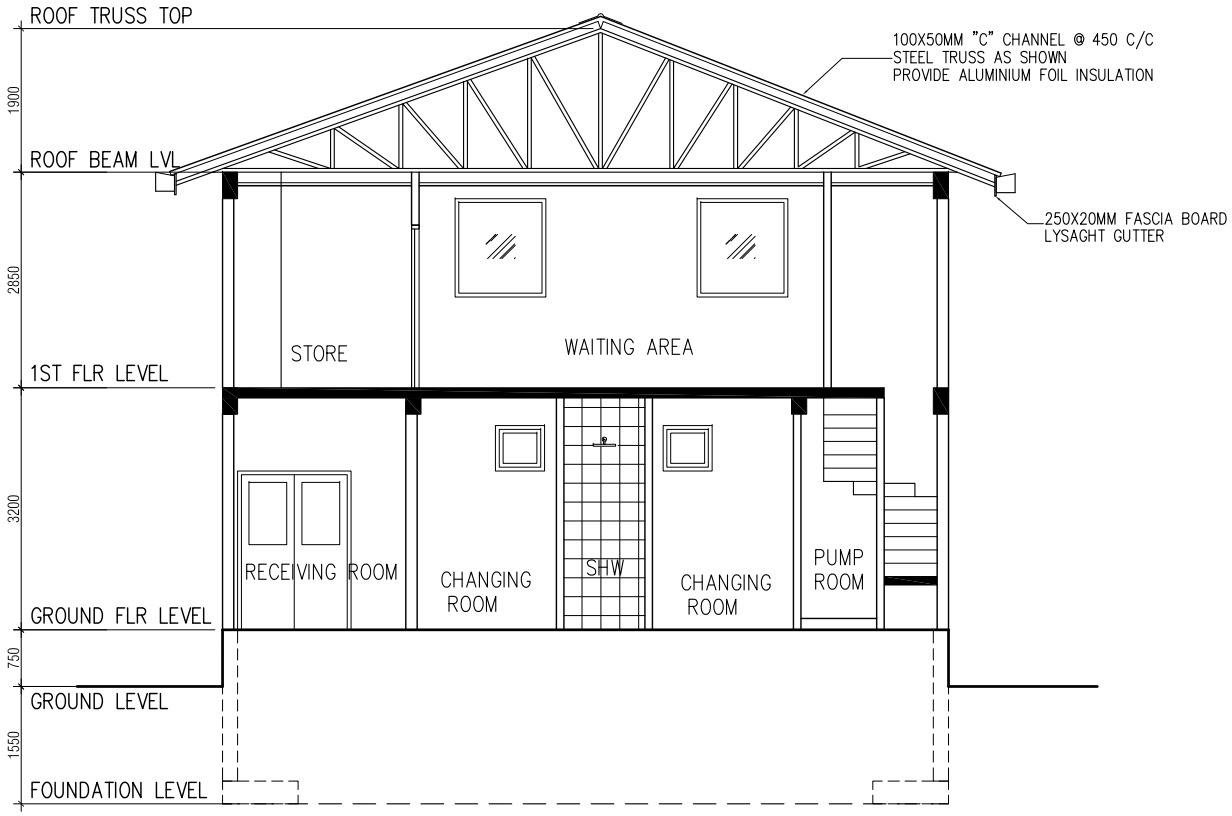

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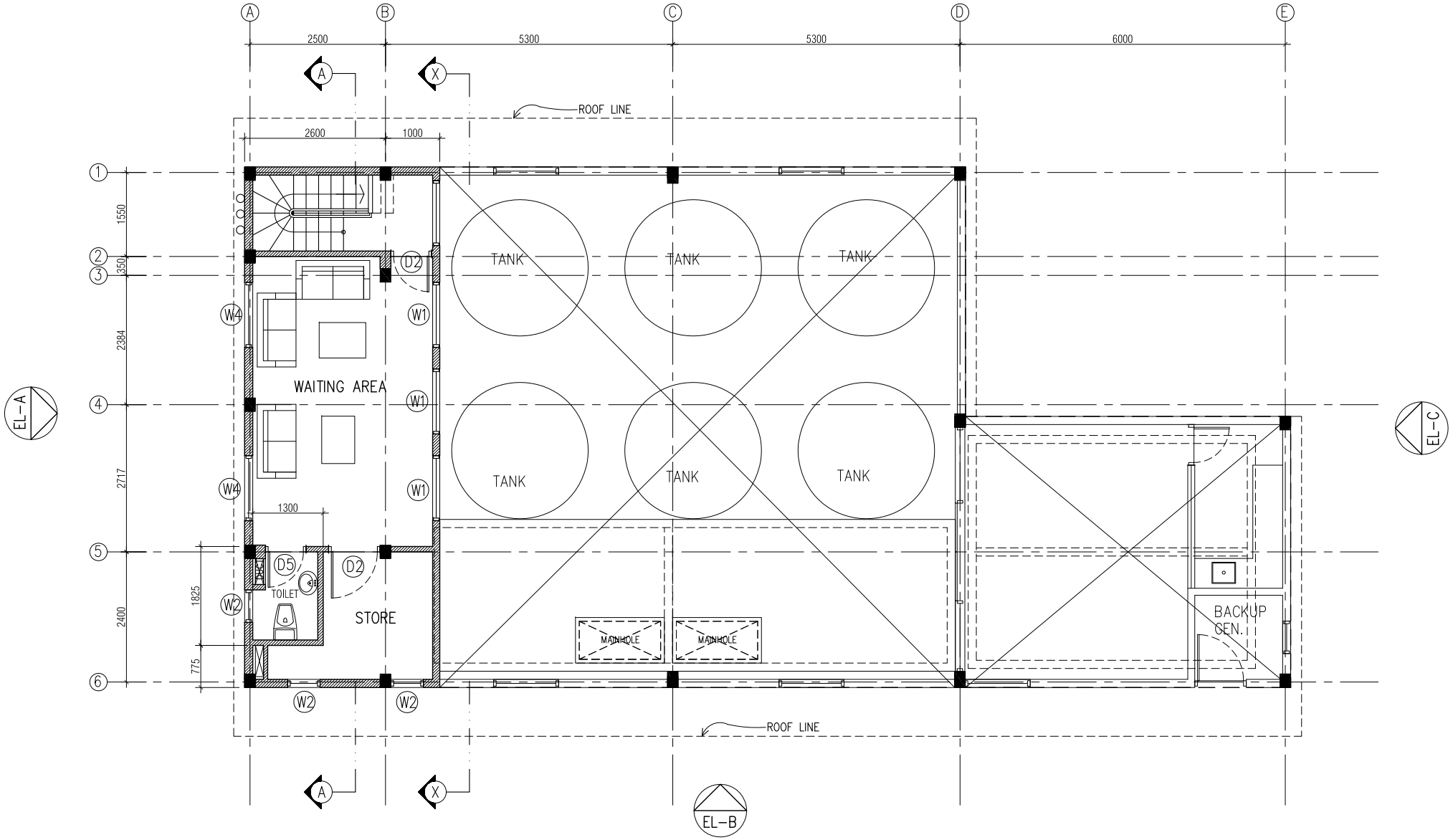

1ST FLOOR PLAN

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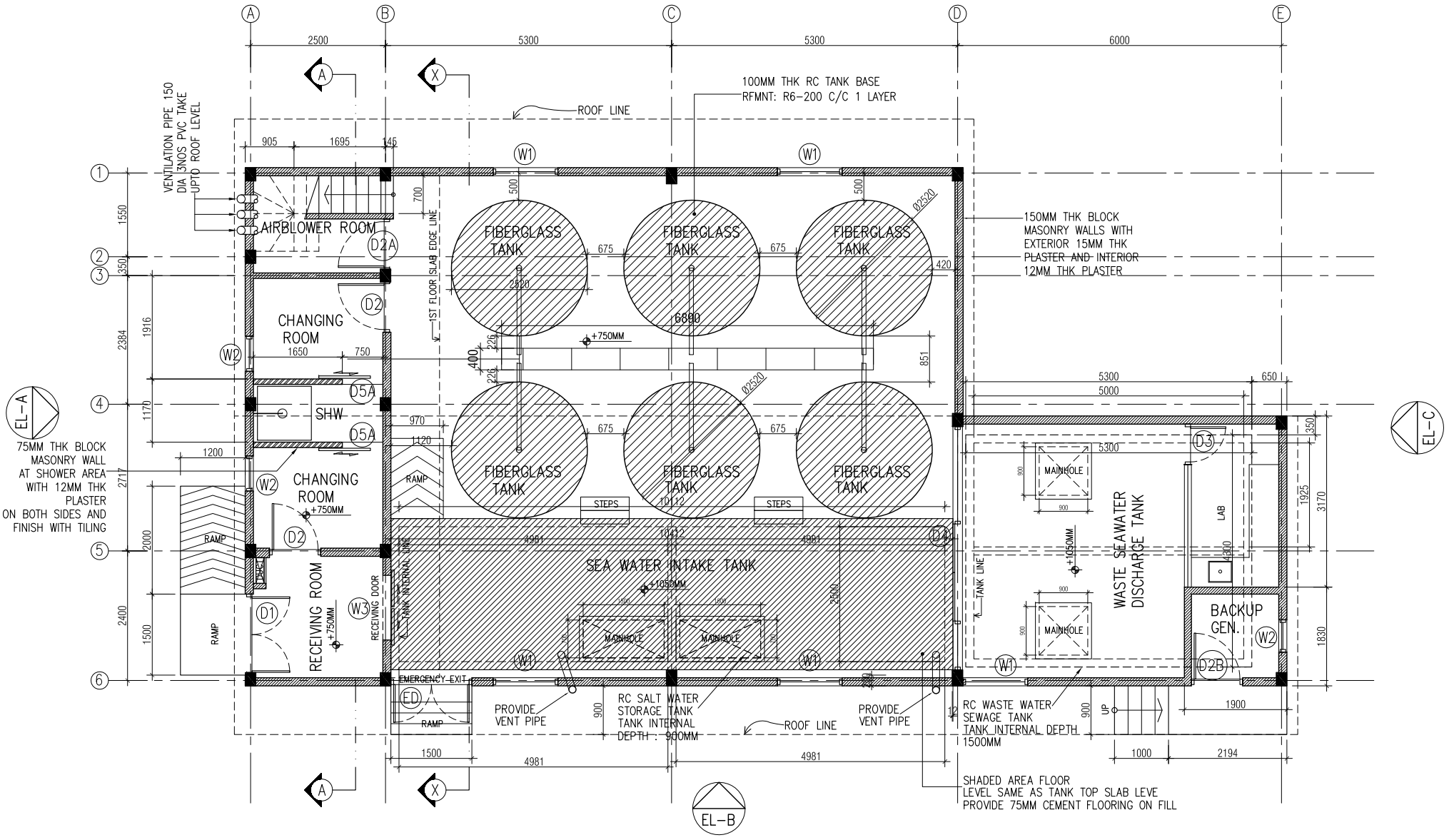

GROUND FLOOR PLAN

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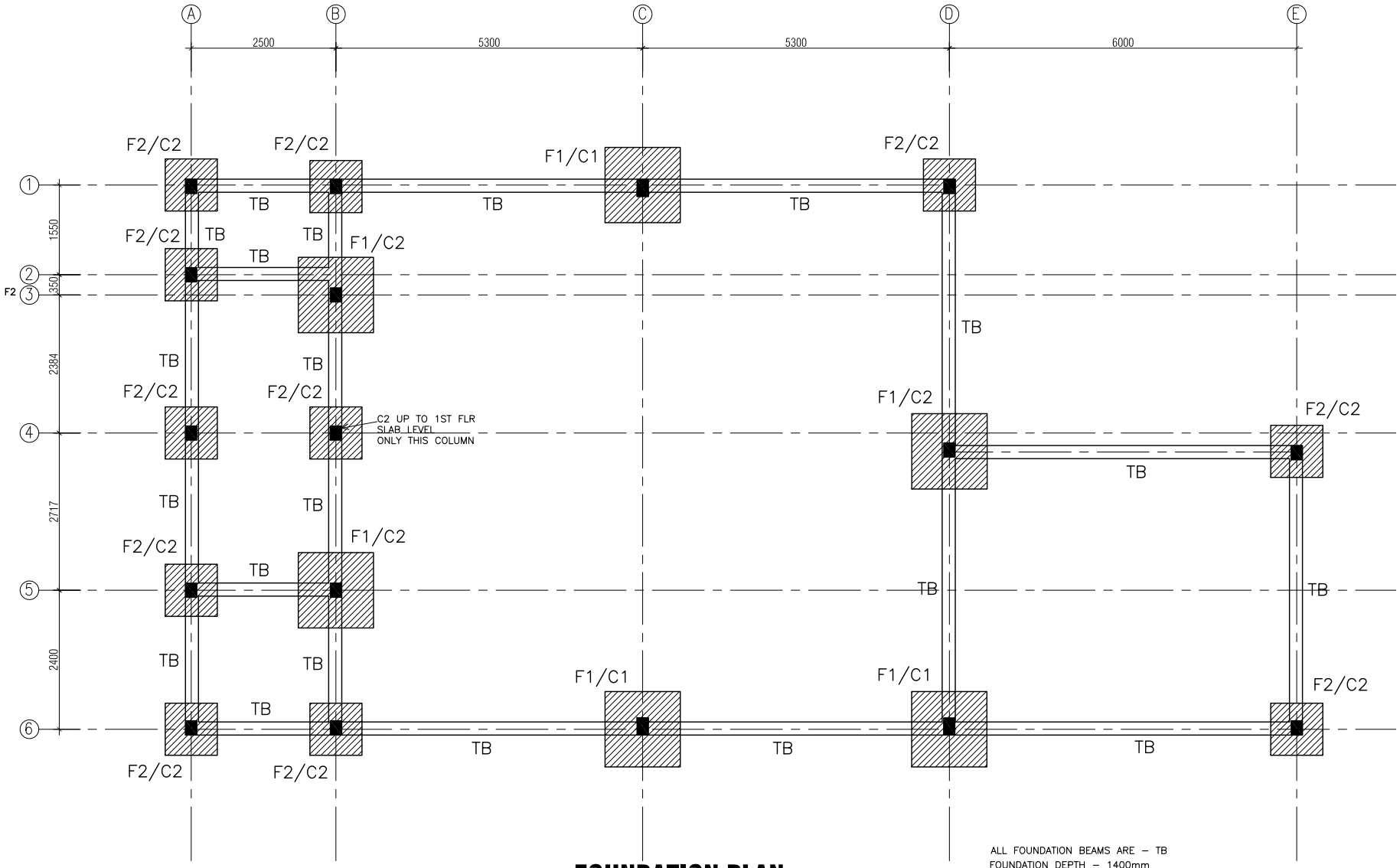

FOUNDATION PLAN

SCALE 1:100

ALL FOUNDATION BEAMS ARE – TB
FOUNDATION DEPTH – 1400mm

F1 – 1200x1200x300 – T10@150C/C B/W (B)
F2 – 900x900x300 – T10@150C/C B/W (B)

REVISION :
Revised: 16 August 2015

PROJECT :
PROPOSED TWO BUILDING
QUARANTINE UNIT HULHULE
IBRAHIM NASIR INTERNATIONAL AIRPORT

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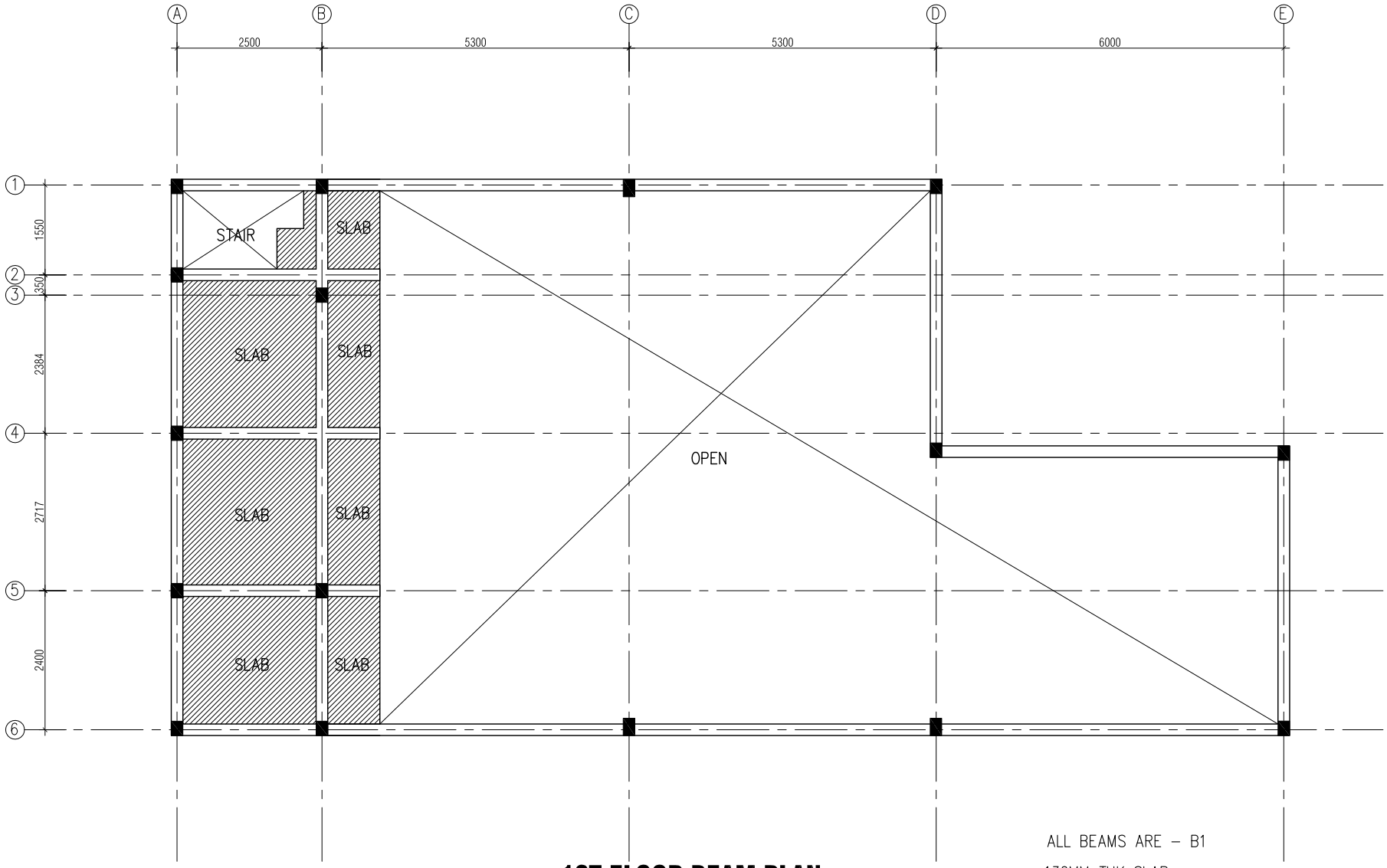

1ST FLOOR BEAM PLAN

SCALE 1:100

ALL BEAMS ARE – B1

130MM THK SLAB

REINF. – T10@150C/C B/W T&B

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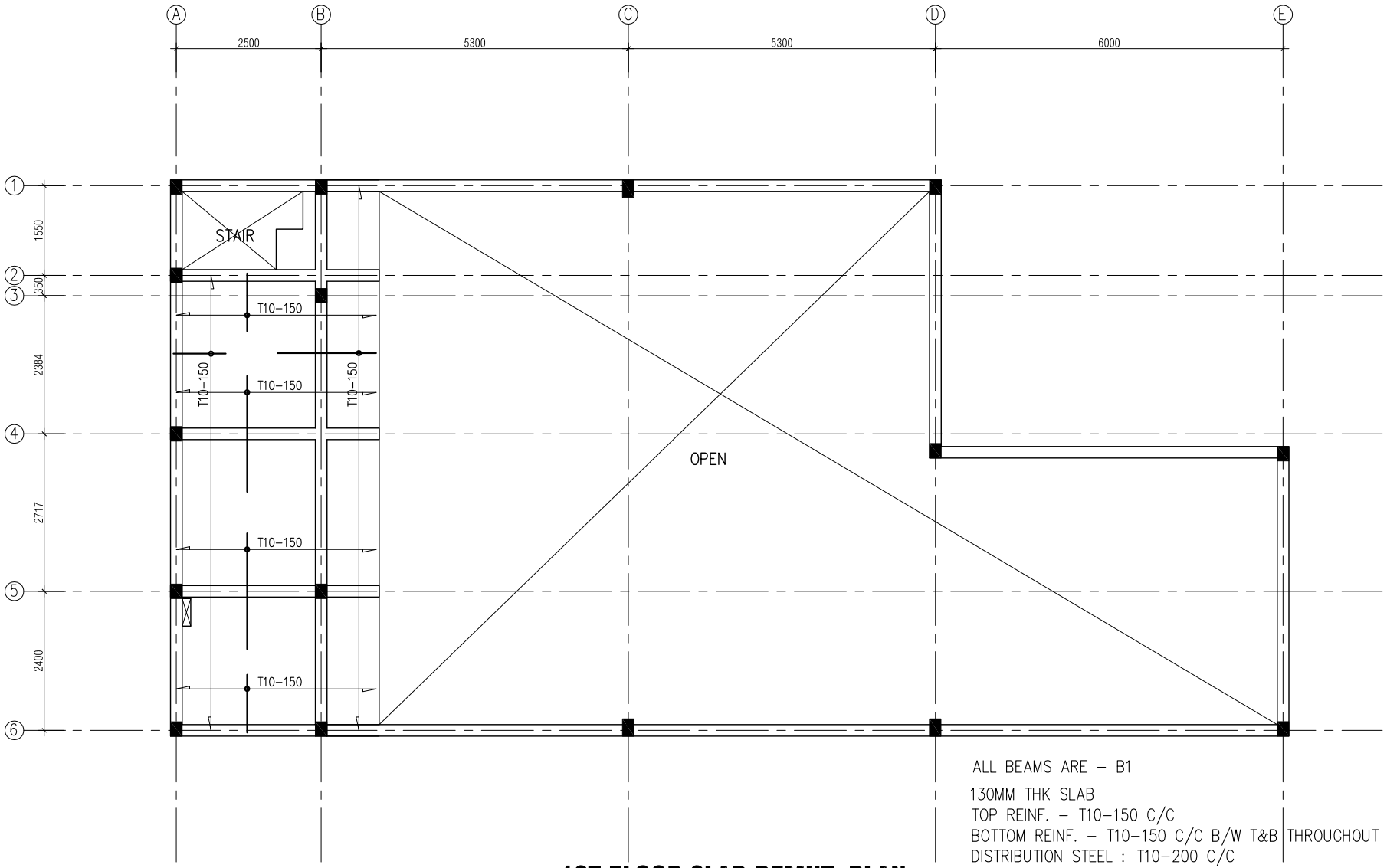

ALL BEAMS ARE – B1

130MM THK SLAB
TOP REINF. – T10–150 C/C
BOTTOM REINF. – T10–150 C/C B/W T&B THROUGHOUT
DISTRIBUTION STEEL : T10–200 C/C
PROVIDE 30–35MM CLEAR COVER

1ST FLOOR SLAB RFMNT. PLAN

SCALE 1:100

REVISION :
Revised: 16 August 2015

PROJECT :
PROPOSED TWO BUILDING
QUARANTINE UNIT HULHULE
IBRAHIM NASIR INTERNATIONAL AIRPORT

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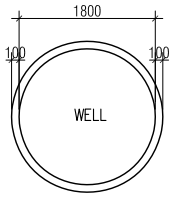
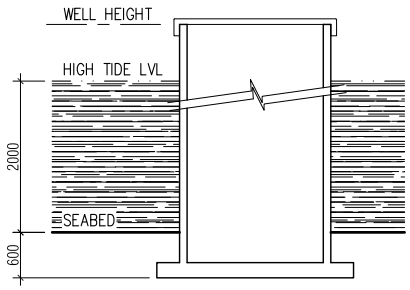


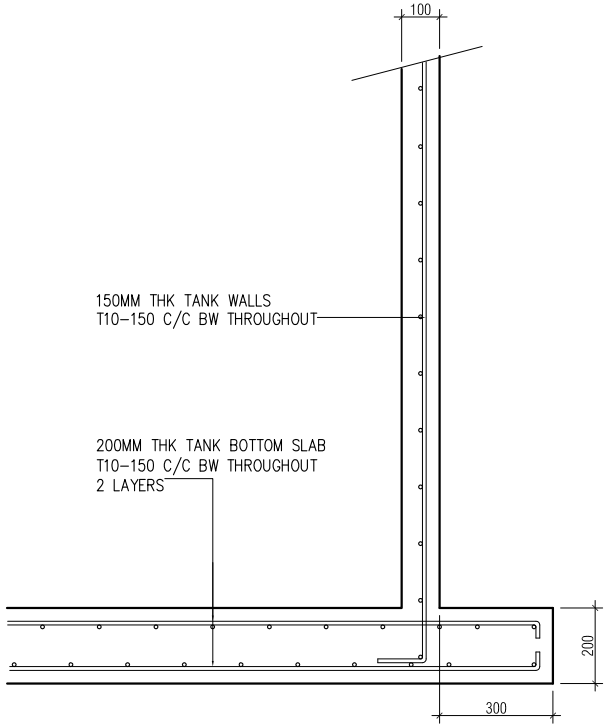
SEA TANK PLAN



SEA TANK SECTION

SEA TANK

SCALE 1:100



TANK SECTION DETAILS

SCALE 1:100

REVISION :

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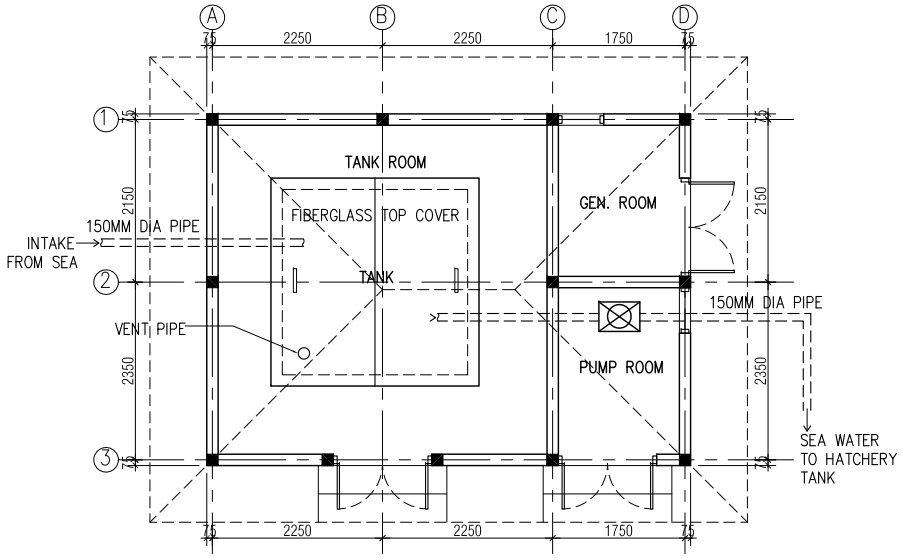
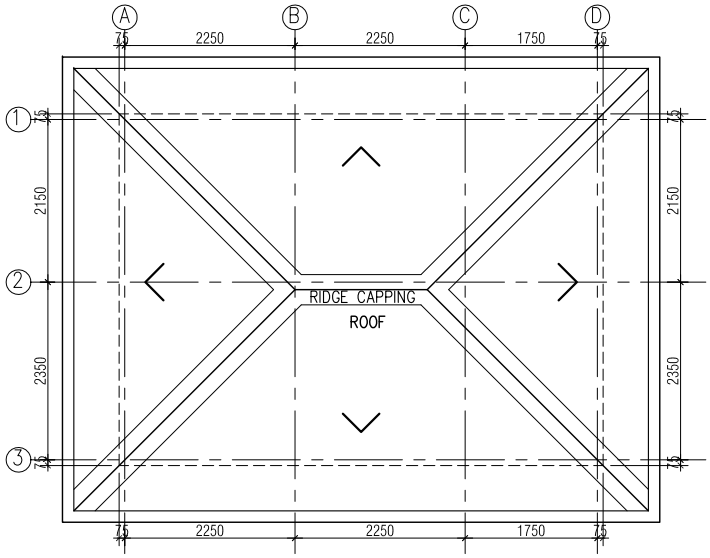


GROUND FLOOR PLAN

SCALE 1:100



ROOF PLAN

SCALE 1:100

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Revised: 16 August 2015	PROPOSED TWO BUILDING			ARCH. CHECKER :	AA
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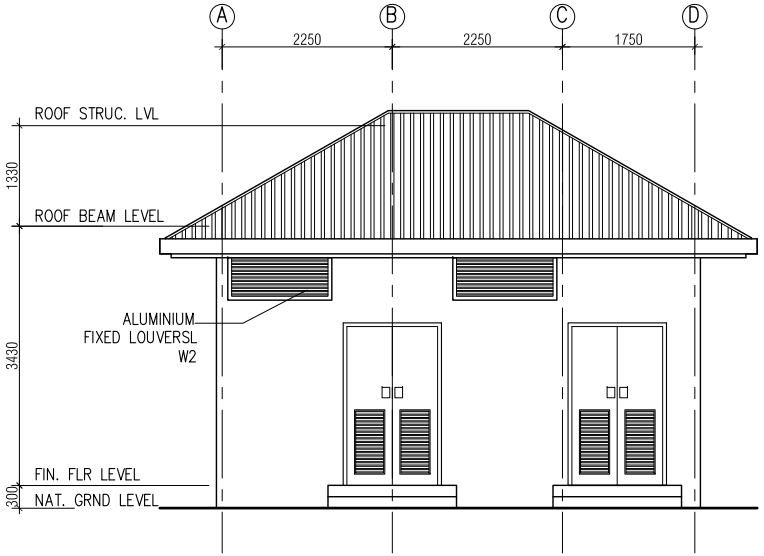
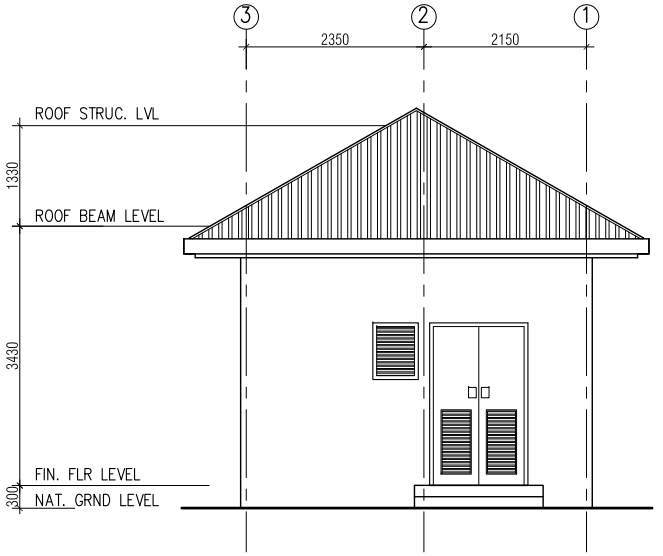


ELEVATION -A

SCALE 1:100



ELEVATION -B

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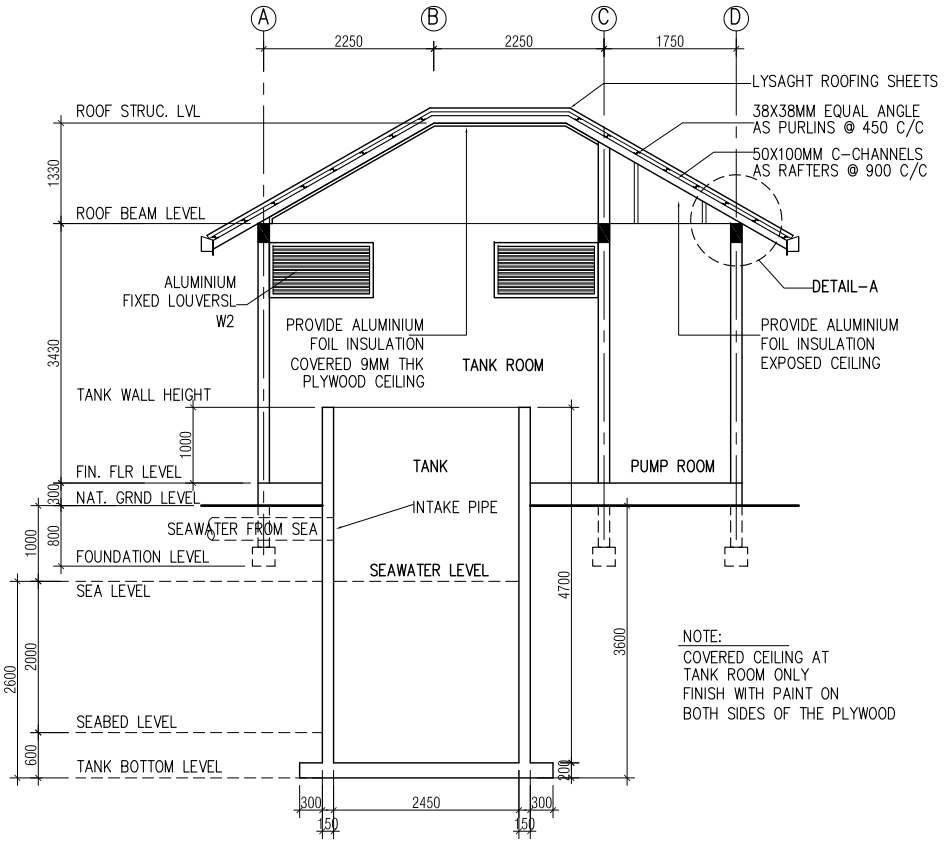
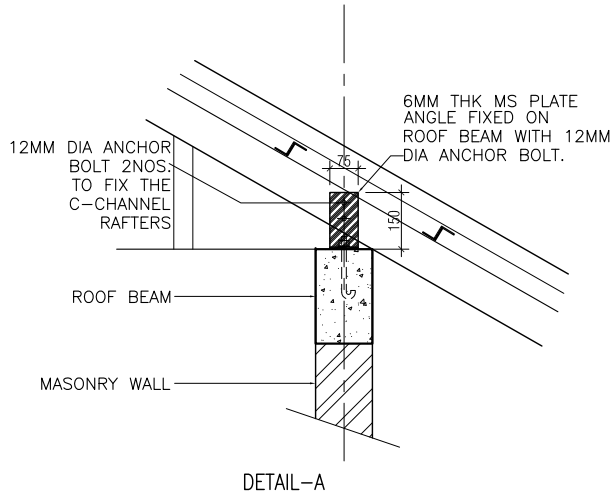
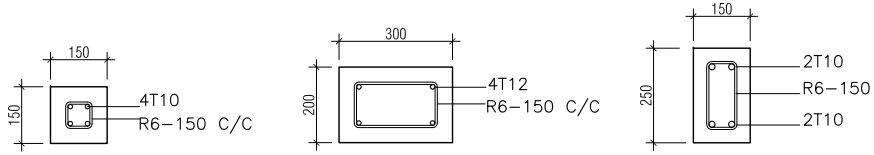


SECTION X-X

SCALE 1:100



DETAIL-A



Note:	
Covers:	Beams bend-up bars = 12xØ
Foundation Level = 50mm	Anchor bars = 45xØ
Floor Slab = 30mm	Lapping bars = 45xØ
Beam = 30-35mm	Mid bars = 0.85 x span
Column = 35-40mm	Support bars = $\frac{1}{3}$ x span

STRUCTURE DETAILS

SCALE 1:20

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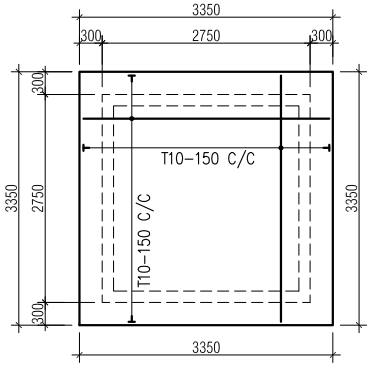
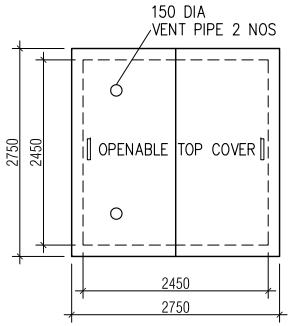


BOTTOM SLAB THICKNESS: 200MM
RFMNT. T10–150 C/C BW THROUGHOUT
TOP & BOTTOM AS SHOWN

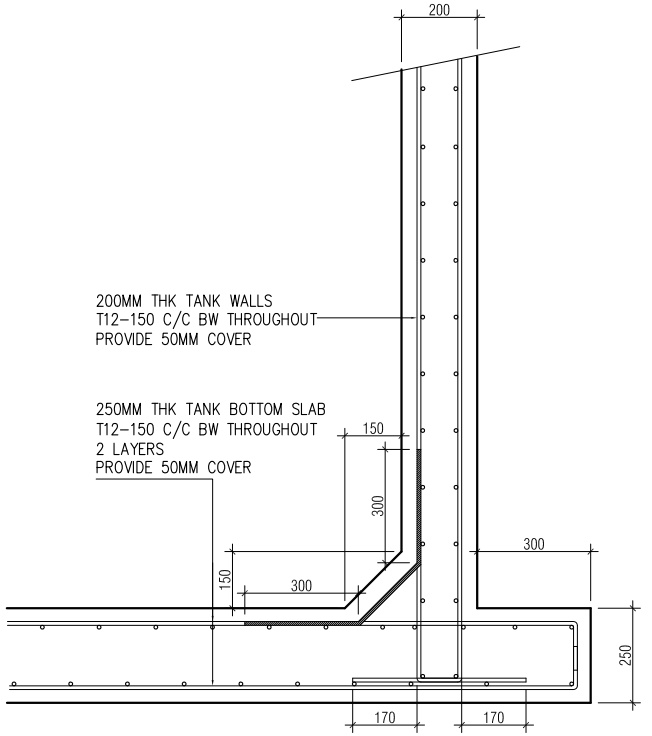
TANK BOTTOM SLAB PLAN

SCALE 1:100



TANK PLAN

SCALE 1:100



TANK SECTION DETAILS

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Appendix 5 Standard Operating Procedure for the facility

Standard Operating Procedure for Sandfish Quarantine

Draft

April 2016

Ministry of Fisheries and Agriculture

Male', Maldives

Table of Contents

1. INTRODUCTION

Development of mariculture is a high priority of the government, as this industry creates jobs in the outer atolls, brings export revenue to the country. Government is currently implementing Mariculture Enterprise Development Project (MEDeP) with the goal of expanding livelihood opportunities and reducing vulnerability of island communities.

The livelihoods of the communities have been dependent on tuna fishery for centuries. Sea cucumber fishery and other reef fisheries have become an additional or alternative source of income to tuna and other fishermen. Promotion of alternative livelihoods such as sea cucumber culture has become very important today as the income of the communities from tuna and sea cucumber fisheries are declining.

MEDeP is promoting Sandfish, *Holothuria scabra*, culture. This species, which is not native to Maldives, has been successfully cultured in the country for some years. Culture of this high valued species has become very popular in the country. The species is now spreading to different parts of the country. There is a need to manage the culture of this species. To continue the culture of this species broodstock needs to be imported. The importation requires quarantine of the species to minimise introduction of diseases and other negative impacts.

As the importation of aquatic animals may be needed in mariculture development MEDeP has planned capacity building in aquatic animal quarantine under its institutional strengthening component. Capacity building includes construction of a quarantine facility at International Airport in Hulhule, training, and development of regulations and Standard operating procedure (SOP) for quarantine of aquatic animals. Current SOP is developed by MEDeP for quarantining Sandfish in the facility.

2. OVERVIEW

Development of mariculture is a high priority of the government. Mariculture Enterprise Development Project (MEDeP) is currently being implemented to introduce and develop mariculture in the country. Sandfish a priority culture species of the project. This species, which is not native to Maldives, has been successfully cultured in the country for some years. To continue the culture of this species broodstock needs to be imported. The importation requires quarantine of the species to minimise introduction of diseases and other negative impacts.

The purpose of this Sandfish quarantine SOP is to run the Sandfish quarantine facility smoothly according to predefined standards and procedures to minimize negative impacts of sandfish importation.

The quarantine facility will be operated by a Head, Quarantine Officers and an Administrator, who have relevant qualification and experience.

Quarantine facility is operated and its SOP is carried out under mariculture development policy of MoFA. Aquatic animal quarantine is currently carried out under the Plant and Animal Quarantine Regulation of MoFA.

This SOP is involved with the processes of:

a) conducting quarantine,
b) cleaning and disinfecting the quarantine facility and its equipment,
c) water intake and circulation,
d) water filtration, disinfection and discharge,
e) dead animal and packing material disposal,
f) water quality management; animal health observation and assessment, and
g) health and safety of the staff operating the facility

Equipment and materials are identified for each process as well as for the health and safety measures related with it. Trouble shooting is also given for the processes.

3. GENERAL ASPECTS

This section explains scope and purpose of the SOP. It documents the history and the development of the SOP, gives the policy and legal framework within which the SOP operates, defines the qualification of the staff implementing the SOP, and shows arrangements for implementing the SOP...

3.1. History and Development

This is the first SOP for the quarantine facility, which has been prepared as an activity of the institutional strengthening component of MEDeP. This is a living document. It needs to be improved and revised as experience and knowledge are gained in operating the quarantine facility and keeping Sandfish in captivity. The history and development of the SOP needs to be documented as it evolves.

3.2. Purpose

The purpose of this SOP is to run the quarantine facility smoothly according to predefined standards and procedures to minimize negative impacts of sandfish importation.

3.3. Scope

This SOP is applicable to the quarantine facility established at the international airport in Hulhule. It deals with the quarantine of i Sandfish, *Holothuria scabra*, which are expected to be imported in batches of 250 individuals.

3.4. Pre-requisites and Qualifications

3.4.1. Head of the Quarantine Facility

This staff is required to have a M.Sc. degree in aquatic animal health or aquatic veterinary science with minimum five years of practical experience in these fields. Number required 1.

3.4.2. Quarantine Officers

These staff are required to have B.Sc. degree in aquaculture with minimum five years of practical experience in this field. Number required 6.

3.4.3. Administrator

This staff is required to have a diploma in office administration with minimum five years of practical experience in this field. Number required 1.

3.5. Responsibilities

3.5.1. Head of the Quarantine Facility (HOCF)

a) Coordinate the work of the quarantine facility
b) Supervise the work of other quarantine aquatic laboratory staff
c) Ensure quarantine work proceeds according the set procedures, standards and policies
d) Carry out aquatic disease diagnostic work
e) Issue quarantine reports

3.5.2. Quarantine Officers (QO)

a) Observe animals under quarantine
b) Collect and analyze data on quarantine animals and procedures
c) Maintain records of quarantine data
d) Prepare quarantine reports
e) Maintain quarantine facility equipment in working conditions

3.5.3. Administrator

a) Carry out day-to-day administrative work of the quarantine facility
b) Process quarantine applications
c) Ensure adequacy and completeness of documents needed for each batch of quarantine animals
d) Check if the quarantine facility has enough material and supplies for quarantine work

3.6. Coordination

The work of aquatic animal quarantine is coordinated by the Head of the quarantine facility. Coordination is needed among MoFA, plant Quarantine Department, staff of the quarantine facility and quarantine applicants. As aquatic and terrestrial animal quarantine work is done under one administration and one complex, coordination between these two divisions is very important.

3.7. Policies, Standards and Regulations

Quarantine facility is operated and its SOP is carried out under mariculture development policy of MoFA. Standards for operating the quarantine facility are set by the Technical Committee of MoFA. Aquatic animal quarantine is currently carried out under the Plant and Animal Quarantine Regulation of MoFA. This arrangement will continue until new fisheries bill and aquaculture regulations come into effect.

4. ABBREVIATIONS, ACRONYMS AND TERMINOLOGY

4.1. Abbreviations and Acronyms

SOP: Standard Operating Procedure

CO: Quarantine Officer

HOCF: Head of quarantine facility

4.2. Terminology

FAO definitions

Quarantine – maintaining a group of aquatic animals in isolation with no direct or indirect contact with other aquatic animals, in order to undergo observation for a specified length of time and, if appropriate, testing and treatment, including proper treatment of the effluent waters (OIE, 2006a).

Quarantine facility (also referred to as a "quarantine premise" or a "transitional facility") – any place approved for the quarantine of live aquatic animals.

Quarantine officer – a technically competent person authorized by the Competent Authority for purposes of inspecting and certifying compliance with the health requirements of the Competent Authority concerning the import and export of live aquatic animals.

Quarantine period – a minimum period of quarantine, typically as specified in an aquatic animal import health standard or other legally binding document (e.g. national or state regulations).

Standard operating procedures (SOPs) – a set of instructions having the force of a directive, covering those features of operations that lend themselves to a definite or standardized procedure without loss of effectiveness - *http:// en.wikipedia.org/wiki/Standing_operating_procedure.*

5. METHODOLOGIES AND PROCEDURES

This section examines the SOP in detail while the previous sections have set the stage for it. Quarantine facility staff have to be thorough with this section for the smooth implementation of the SOP.

The following processes are involved with the SOP.

a) Getting in and out of the quarantine facility
b) Maintaining the facility when no animals are under quarantine
c) Getting documentation ready to receive a batch of quarantine animals
d) Facility cleaning and disinfection for receiving a batch of quarantine animals
e) Tank preparation
f) Water Intake, storage, filtration, disinfection and pumping into holding tanks
g) Waste water collection, filtration, disinfection and discharge into the Sea
h) Water quality management
i) Animal health observation and assessment
j) Dead animal disposal
k) Packing material Disposal
l) Facility cleaning and disinfection after quarantining a batch animals
m) Health and safety restated

Each of the above process is described and explained in Section 5. For each processes, where relevant, the following information is also supplied:

a) Equipment and Materials
b) Records and Checklists
c) Health and Safety
d) Cautions and Interferences

Health and Safety, while discussed under each process, they are also compiled in one place under the heading “Health and Safety Restated” for ease of reference.

5.1. Getting In and Out of the Quarantine Facility

5.1.1. Procedure

When getting into the facility:

a) Enter the outer changing room
b) Keep your outdoor clothes and footwear in the outer changing room
c) Take a shower
d) Enter the inner changing room
e) Wear your in-facility clothes and footwear
f) Enter the quarantine areas (Fig. x)

When getting out of the facility:

a) Enter the inner changing room
b) Keep your in-facility clothes and footwear in the inner changing room
c) Take a shower
d) Enter the outer changing room
e) Wear your outdoor clothes and footwear
f) Get out of the facility

5.1.2. Fire Safety

a) Get familiarize with evacuation plan in case of fire, which is found in every workstation
b) Know where you are in the building
c) Follow the evacuation plan in case of fire

5.2. Getting Documentation Ready to Receive a Batch of Quarantine Animals

5.2.1. Records and Checklists

Application for the import

a) Import permit
b) Notice of the arrival date of the shipment
c) Health certificates for the import batch

5.2.2. Procedure

Check if the quarantine facility has received the following documents:

a) Application for the import
b) Import permit
c) Notice of the arrival date of the shipment
d) Health certificates for the import batch

5.2.3. Cautions and Interferences

a) Ensure that the conditions of the permit that need to be fulfilled to date have been met. If not contact MOFA.

5.3. Maintaining the Facility When no Animals are Under Quarantine

5.3.1. Records and Checklists

a) Pump logbook

5.3.2. Procedure

Animals are quarantined in batches. When quarantining of one batch is complete the next batch starts. In between two quarantine process the facility should be maintained as follows:

a) Keep the facility completely dry
b) Clean the floor and surfaces of pipes and tanks in every two weeks
c) Pump some seawater from the lagoon well into the reservoir tanks and discharge it into the sea through the bypass pipeline in every two weeks to prevent water stagnation in the well
d) Fill pump logbook

5.3.3. Health and Safety

a) Follow safety measures in operating pumps.

5.3.4. Cautions and Interferences

a) Follow Caution and Interferences in Section: Water Intake, storage, filtration, disinfection and pumping into holding tanks

5.4. Facility Cleaning and Disinfection for Receiving a Batch of Quarantine Animals

5.4.1. Equipment and materials

a) Hypochlorite
b) Iodophore solution
c) Sodium thiosulphate
d) Face mask
e) Gloves

5.4.2. Records and Checklists

a) Facility cleaning and disinfection record sheet

5.4.3. Procedure

a) Make solution of hypochlorite
b) Make iodophore solution of required strength
c) Make solution of Sodium thiosulphate
d) Thoroughly clean floor, tanks and pipe surfaces
e) Disinfect tanks and pipe surfaces with hypochlorite solution at 200 ppm concentration
f) for 5 minutes or with an approved iodophore solution containing iodine at
g) 0.5 percent available iodine for 5 minutes
a) Disinfect floor with hypochlorite solution
b) Neutralize discharge hypochlorite solution with Sodium thiosulphate

5.4.4. Health and Safety

a) Observe safety measures in using hypochlorite, iodine and sodium thiosulphate

5.5. Tank Preparation

5.5.1. Equipment and Materials

a) Disinfected (autoclaved) carbonate sand
b) Aeration tubes
c) Aeration valves
d) Aeration joints
e) Airstones

5.5.2. Records and Checklists

a) Tank record sheet

5.5.3. Procedure

a) Connect aeration tubes with valves and air stones to the main aeration line
b) Spread thin layer of sand on the bottom of the tank
c) Fill the tank with seawater
d) Adjust aeration intensity
e) Adjust water flow into the tank
f) Put on tank lids

5.6. Water Intake, Storage, Filtration, Disinfection and Pumping into Holding Tanks

5.6.1. Equipment and Materials

a) Multi-stage electrical pump connected with the water intake system
b) Sand filter connected with the water intake system
c) Cartridge filter connected with the water intake system
d) UV sterilizer connected with the water intake system

5.6.2. Records and Checklists

a) Pump logbook
b) UV sterilizer logbook

5.6.3. Procedure

a) Put on the electrical pump
b) Check if water is flowing in the filters and getting into the reservoir tank
c) Check water flow rate
d) Fill pump logbook
c) Fill UV sterilizer logbook
d) Backwash sand pump every three days when water intake is continuous
e) Change cartridge filter every three days when water intake is continuous

5.6.4. Health and Safety

a) Observe safety measures in using hypochlorite, iodine and sodium thiosulphate and UV steriliser

5.6.5. Cautions and Interferences

a) If water is not flowing prime the pump
b) Check if priming water is maintained in the pump
c) If priming water is not maintained in the pump check foot valve for leaks
d) If foot valve is leaking replace the foot valve and start the pump again

5.7. Waste Water Collection, Filtration, Disinfection and Discharge into the Sea

5.7.1. Equipment and Materials

a) Multi-stage electrical pump connected with the water intake system
b) Sand filter connected with the water intake system
c) Cartridge filter connected with the water intake system
d) UV sterilizer connected with the water intake system
e) Hypochlorite
f) Iodine
g) Sodium thiosulphate
h) Face masks
i) Gloves

5.7.2. Records and Checklists

a) Pump logbook
b) UV sterilizer logbook
c) Chlorination record sheet

5.7.3. Procedure

a) Add hypochlorite to wastewater collection tank to achieve a minimum chlorine concentration of 200 parts per million (ppm) (200 mg/litre) at 1 hr post-treatment.
b) Following addition of hypochlorite agitate the tank water for 1 hour
c) Test the water for chlorine if the concentration of 200 parts per million (ppm) (200 mg/litre)
d) If the chlorine concentration is less than the standard rechlorinate the tank water

e) Make solution of Sodium thiosulphate
f) Neutralize the chlorine in the wastewater adding sodium thiosulphate at a rate of 1.25 g (2.5 ml of 50 percent sodium thiosulphate solution) per l of treated wastewater,
g) Agitate the waste water for not less than 10 minutes
h) Pass the wastewater through sand filter, cartridge filter and UV steriliser and discharge it into the sea

5.7.4. Health and Safety

a) Observe safety measures in using hypochlorite, iodine and sodium thiosulphate and UV steriliser

5.8. Water Quality Management

5.8.1. Equipment and Materials

a) Water quality test kits
b) Water quality test manual

5.8.2. Records and Checklists

a) Water quality record sheet

5.8.3. Procedure

Test and check holding tank intake water, holding take water and discharge tank water for

a) Nitrites
b) Nitrates
c) Phosphates
d) Dissolved oxygen
e) Salinity, and
f) pH

5.8.4. Health and Safety

a) Observe general safety measures for using chemicals

5.9. Animal Health Observation and Assessment

5.9.1. Equipment and Materials

a) Tongs
b) Gloves
c) Designated refrigerator
d) Designated freezer

5.9.2. Records and Checklists

a) Health record sheet
b) Mortality record sheet

5.9.3. Procedure

Observe the sea cucumber in tanks for

a) movement from place to place
b) burying behavior (time of burying, time of surfacing)
c) extending, shortening, curving and straightening the body
d) luster and mucus on the body
e) any sign of ulceration and body infection
f) mortality, and
g) record the observations in the Health record sheet

With the authorization of the HOCF:

h) preserve the dead animals in the freezer, refrigerator or by any other method

5.10. Dead Animal Disposal

5.10.1. Equipment and Materials

a) Tongs
b) Gloves
c) Face masks
d) Autoclave
e) Incinerator
f) Designated refrigerator
g) Designated freezer

5.10.2. Records and Checklists

a) Mortality record sheet
b) Authorization sheet for dead body removal (for disposal or laboratory examination)
c) Incineration record sheet

5.10.3. Procedure

a) Get authorization of HOCF for removing the dead bodies for disposal or laboratory examination
b) If the decision was to dispose the dead bodies:
c) Sterilize the dead bodies in autoclave
d) After sterilization incinerate the dead bodies

5.11. Packing Material Disposal

5.11.1. Equipment and Materials

a) Tongs
b) Gloves
c) Face masks
d) Incinerator
e) Hypochlorite
f) Iodophore solution

5.11.2. Records and Checklists

a) Incineration record sheet

5.11.3. Procedure

a) Disinfect the material with hypochlorite solution at 200 ppm concentration for 5 minutes or with an approved iodophore solution containing iodine at 0.5 percent available iodine for 5 min
b) Incinerate the materials

5.12. Facility Cleaning and Disinfection After Quarantining a Batch of Animals

5.12.1. Equipment and Materials

a) Hypochlorite
b) Iodophore solution
c) Sodium thiosulphate
d) Face mask
e) Gloves

5.12.2. Records and Checklists

a) Facility cleaning and disinfection record sheet

5.12.3. Procedure

h) Make solution of hypochlorite
i) Make iodophore solution of required strength
j) Make solution of Sodium thiosulphate
k) Thoroughly clean floor, tanks and pipe surfaces
l) Disinfect tanks and pipe surfaces with hypochlorite solution at 200 ppm concentration
m) for 5 minutes or with an approved iodophore solution containing iodine at
n) 0.5 percent available iodine for 5 minutes
c) Disinfect floor with hypochlorite solution
d) Neutralize discharge hypochlorite solution with Sodium thiosulphate

5.12.4. Health and Safety

a) Observe safety measures in using hypochlorite, iodine and sodium thiosulphate

6. HEALTH AND SAFETY RESTATED

6.1. Fire Safety

a) Get familiarize with evacuation plan in case of fire, which is found in every workstation
b) Know where you are in the building
c) Follow the evacuation plan in case of fire

6.2. Seawater Intake and Discharge

6.2.1. Measures

a) Follow safety measures in operating pumps

6.3. Cleaning and Disinfection

6.3.1. Equipment and Materials

a) Face mask
b) Gloves

6.3.2. Measures

a) Observe safety measures in using hypochlorite, iodine and sodium thiosulphate and UV steriliser
b) Observe general safety measures for using chemicals

7. REFERENCES

J. Richard Arthur, Melba G. Bondad-Reantaso, Rohana P. Subasinghe. Procedures for the quarantine of live aquatic animals: a manual. Food and Agriculture Organization of the United Nations, Rome 2008.

Appendix 6 List of Stakeholders consulted

Name	Designation	Contact No.
Mohamed Anees	Manager, Terrestrial Plant and Animal Quarantine Facility	7901330
Aishath Abdul Rahman	Engineer / (Expansion Projects) Maldives Airports Company Ltd	3315366
Mohamed Nizam Ahmed	Manager / Waste Management Section (MACL)	3315366
Abdul Fahthah	Water Supply Dept. (MACL)	7775805
Nishan Ahmed	Senior Public Health Program Officer Health Protection Agency	7512240
Aminath Shaufa	Public Health Program Coordinator Health Protection Agency	3014496