Building Climate Resilient Safer Islands in Maldives

Environmental and Social Management Framework (ESMF)

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Abbreviation

AE	Accredited Entity
BOD	Biochemical Oxygen Demand
COD	Chemical Oxygen Demand
dBA	A-weighted decibels
DO	Dissolved Oxygen
EE	Executing Entity
EPA	Environmental Protection Agency
EPPA	Environmental Protection and Preservation Act
EIA	Environmental Impact Assessment
EMP	Environmental Monitoring Plan
EPZ	Environment Protected Zone
ESIA	Environmental and Social Impact Assessment
ESMF	Environmental and Social Management Framework
ESS	Environmental and Social Safeguards
EWBS	Early Warning Broadcast System
GBRMPA	Great Barrier Reef Marine Park Authority
GBV	Gender-based Violence
GCF	Green Climate Fund
GOM	Government of Maldives
ICZM	Integrated Coastal Zone Management
IEE	Initial Environmental Examination
IFC	International Finance Corporation
ILO	International Labour Organization
IP	Indigenous People
IPCC	Inter-governmental Panel on Climate Change
ISDB-T	Integrated Services Digital Broadcasting-Terrestrial
JICA	Japan International Cooperation Agency
ME/MEE	Ministry of Environment, Climate Change and Technology / Ministry of Environment and Energy
MMS	Maldives Meteorological Service
MNPI / MPI	Ministry of National Planning and Infrastructure / Ministry of Planning and Infrastructure
MPA	Marine Protected Areas
MSL	Mean Sea Level
NBSAP	National Biodiversity Strategy and Action Plan
NCPE	National Commission for the Protection of the Environment
NEAP	National Environmental Action Plan
OJT	On the Job Training
OSH	Occupational Safety and Health
PMU	Project Management Unit

PPE	Personal Protective Equipment
PSC	Project Steering Committee
PSM	Public Service Media
SAP	Strategic Action Plan
SLR	Sea Level Rise
TSDH	Trailer Sanction Hopper Dredger
UAV	Unmanned Aerial Vehicle
UN	United Nations
UNCBD	United Nations Convention on Biological Diversity
UNCCD	United Nations Convention to Combat Desertification
UNCLOS	United Nations Convention on the Law of the Sea
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
WHO	World Health Organization

1. Introduction

This Environmental and Social Management Framework (ESMF) has been prepared in support of a project proposal for "Building Climate Resilient Safer Islands in the Maldives" by the Government of the Maldives to the Green Climate Fund (GCF). As this project is supported by the Japan International Cooperation Agency (JICA) in its role as a GCF Accredited Entity (AE), the project has been considered a Category B project under JICA's Social and Environmental Standards Procedure (medium risk in the GCF/ World Bank/ International Finance Corporation Category). As such, an Environmental and Social Management Framework has been prepared for the project.

1.1 Background

The Republic of Maldives consists of 26 atolls and 1,192 islands in the range of around 90,000 km^2 in the Indian Ocean, southwest of Sri Lanka. The Maldives is one of the world's most geographically dispersed sovereign states as well as the smallest Asian country by land area and population. The total area of the national land is 298 km^2, where the length of the coastline is 644 km. The population of the country is 451,738 people with a population density of 1,506 people/km^2.The islands of the Maldives are classified into 1) inhabited islands, 2) resort islands, and 3) industrial islands. The number of these inhabited islands is 188. Around 44% of the residential areas and 47% of infrastructure facilities are located within 100 m of the coastline. As of 2017, there were 135 resort islands out of the 1,192 islands[1].

Under such circumstances, the Maldives is one of the most vulnerable countries in the world, and the issues on climate change in the Maldives are i) the increase in coastal disaster risk and land loss due to acceleration of coastal erosion influenced by climate change, ii) the acceleration of coastal erosion by artificial change in the coastal areas, iii) the loss of natural beaches due to coastal protection measures by hard facilities and the deterioration of coast/reef environment due to the decrease of people's interaction with the coast, and iv) the insufficient understanding, analysis, and impact assessment regarding coast and reef environment data as well as the lack of information sharing among concerned stakeholders.

As of 2014, 116 islands out of the 188 inhabited islands have coastal erosion and 38% of which were in serious coastal erosion situations[2]. Under the RCP8.5 scenario, the smaller the island area, the greater the rate of area loss is. For example, Maamendhoo Island of Laamu Atoll, with a land area of 0.2 km^2, will lose 36% of land in the year 2100. According to the tide level observation records over the past 33 years on Gan Island in Laamu Atoll, a mean sea level (MSL) of + 0.84 m was observed as the highest tide level and an average tide level of 3.2 mm/year was recorded. This is higher than the average sea level rise (1.7 mm/year, 1901-2010) in the world[3]. A high tide level will frequently occur due to the sea level rise caused by climate change in the future and inundation damage by high waves will occur on a daily basis.

1.2 Overview of the Project

1.2.1 Summary of Activities

The proposed project is composed of four (4) components as shown below:

[1] Ministry of Tourism, 2017: Tourism Yearbook 2018
[2] Ministry of Environment and Energy, 2016: Second National Communication of Maldives
[3] 5th IPCC (Inter-governmental Panel on Climate Change) Assessment Report

Table 1.1 Project Components

Component		Funded by
Component 1: Establishment of Integrated Coastal Zone Management (ICZM)		
Activity 1.1:	Inventory study and risk assessment on present coastal and coral reef conditions	JICA
Activity 1.2:	Preparation of basic policy of ICZM at the national level	JICA
Activity 1.3:	Preparation of concrete ICZM Plan at representative Inhabitant Island as case study	JICA
Activity 1.4:	Capacity development and information sharing of the relevant organizations for establishment of the ICZM	JICA
Component 2: Implementation of coastal conservation/protection measures against coastal disasters		
Activity 2.1:	Detailed design of coastal conservation measures and capacity development of stakeholders	GCF, JICA
Activity 2.2:	Implementation of coastal conservation/ protection measures	GCF, Maldives's co-finance
Activity 2.3:	Implementation of beach maintenance, establishment of structure and capacity development of stakeholders	GCF, JICA
Component 3: Development of disaster warning and information dissemination		
Activity 3.1:	Installment of terrestrial digital broadcasting system	JICA
Activity 3.2:	Establishment of disaster early warning and information broadcasting system	JICA
Component 4: Development of basic data collection and sharing system related to climate change		
Activity 4.1:	Development of wave and sea level monitoring system	JICA
Activity 4.2:	Development of beach, coral reef, and land use monitoring system	JICA

Source: JICA (2019)

(1) Summary of proposed activities under Component 1

This component, as a sub-set of activity financed by JICA, aims to establish ICZM along with the capacity development of government officials responsible for the enforcement of the ICZM:

- Activity 1.1: Inventory study for risk assessment on present coastal and coral reef conditions

  Some 200 inhabited islands are categorized by different topographical characteristics, hazard characteristics, socio-economic characteristics and living environment. Several islands are then selected from each categorized island for a field survey. The current problems, issues, and climate change risks in the different types of islands are sorted out.

- Activity 1.2: Preparation of basic policy of ICZM at the national level

  The basic policy for Integrated Coastal Zone Management (ICZM) at the national level will be examined, based on the current problems, issues, and climate change risks in the different types of islands, which are exposed as the results of Activity 1.1. For the purpose of realization of coastal management based on the ICZM policy, basic plans for strengthening governance of coastal administration of the GoM and coastal management on each inhabited island will also be developed. Regulations and legal systems necessary for realization of ICZM are also examined, and the support for their enforcement is provided. The ICZM Guideline (Policy phase) will be prepared as the result of this activity.

- Activity 1.3: Preparation of concrete ICZM Plan at representative Inhabitant Island as case study

  To promote such concrete efforts based on the national ICZM concepts and plans, the concrete action for the island level of the ICZM will be examined based on the national level of the ICZM as a case study. The activity is included 1) Establishment of coastal and reef

conservation plan, 2) Establishment and implementation of sediment budget control plan, 3) Study for strengthening measures on land use planning, 4) Study on coastal management system and its implementation, and 5) Study on regulation and law at island level. Gan and Fonadhoo islands in Laamu Atoll are assumed as the example of representative inhabited islands for case study. The ICZM Guideline (Practice phase) will be prepared as the result of this activity.

- Activity 1.4: Capacity development and information sharing of the relevant organizations for the establishment of the ICZM

  For basic common understanding between the relevant agencies at the central and island levels on the above activities, as well as cooperation between the island councils and residents who are the main users of the coastal area. This activity will carry out capacity building, education and public relation programs for the practitioners of the relevant organizations of the central ministries and agencies and island councils, island community, NGO, schools and educational institutions, etc.

  Capacity development at the relevant agencies will be conducted mainly through the on the job training (OJT) during the implementation period. To share and expand the understanding and knowledge to other inhabited islands, ICZM Guidelines, which are prepared as the results of Activity 1.2 and 1.3, will be utilized through conducting seminar and workshop in several times at other inhabited islands.

The proposed activities at each target area in the Component 1 are shown below:

Table 1.2 Project Components at Each Island under Component 1

Atoll	Island	Project Component	Funding Source	Abbreviation
All	For all inhabited islands	Categorization into pattern by existing information and extraction of issues (Activity 1.1) Formulation of national-level ICZM (Activity 1.2)	JICA's co-finance	-
	6-9 islands (2-3 islands per pattern x 2-3 patterns)	Field surveys to grasp and confirm the current situations (Activity 1.1)	JICA's co-finance	-
Laamu	Fonadhoo	Formulation of island-level ICZM as the case study (Activity 1.3)	JICA's co-finance	L-FND
	Gan	ditto	JICA's co-finance	L-GAN

Source: JICA (2019)

(2) Summary of proposed activities under Component 2

This component, as a sub-set of activity financed by GCF, partially by GoM in Activity 2.2 and by JICA in Activity 2.1 and 2.3, aims to implement the coastal conservation/protection measures and to maintain sustainably in order to protect the communities and infrastructures at hinterland exposed to coastal erosion.

- Activity 2.1: Detailed design of coastal conservation measures and capacity development of stakeholders

  This activity consists of two sub-activities, which are detailed design of coastal conservation/ protection measures as described in Activity 2.2 (sub-activity 2.1.1) and capacity development of related officials on survey, planning and design of coastal project (sub-activity 2.1.2).

The detailed design includes the coastal conservation measures at two target islands in Laamu Atoll, namely, Maamendhoo and Fonadhoo islands, which are funded by GCF, as well as coastal conservation measures at Meedhoo Island in Addu Atoll, which are implemented as a sub-set of activity financed by GoM. It also includes the detailed design of coastal protection measures at Gan and Isdhoo islands in Laamu Atoll financed by GoM. The study items for this activity is as follows:

i) Conducting detailed survey

ii) Conducting detailed design (including construction plan and cost estimate)

iii) ESIA support

iv) Preparation of bid document and support for bidding

Capacity development for the related officers in the Maldives to obtain knowledge of coastal engineering, planning and design skills are required for the planning and design of appropriate coastal measures autonomously against future climate risks. The most effective way for the capacity development is for the related officers in the Maldives to work together with the consultant team under OJT.

- Activity 2.2: Implementation of coastal conservation/protection measures

  Under this activity, the coastal conservation measures at the two target islands of Maamendhoo and Fonadhoo islands in Laamu Atoll funded by GCF, and the coastal conservation measures at Meedhoo Island in Addu Atoll and the coastal protection measures at Gan and Isdhoo islands in Laamu Atoll funded by the GoM will be implemented.

  GoM will also make in-kind contribution for procurement of sand to be used for beach nourishment at three sites and for reclamation material in both GCF- and GoM-funded construction sites.

- Activity 2.3: Implementation of beach maintenance, establishment of structure and capacity development of stakeholders

  Appropriate coastal maintenance in accordance with actual changes in coastal conditions is essential in order to sustainably maintain the project beaches after the beach nourishment carried out in Activity 2.2. The required coastal maintenance after the beach nourishment is mainly divided into two items, which are 1) adaptive management aimed to maintain the beaches in accordance with the change of beach profile due to wave action, and 2) daily maintenance aimed to maintain the good condition of the beach for the beach use and environment. As cooperation between the island governments and communities in cooperate with NGOs is essential for the sustainable maintenance of the beach, Activity 2.3 is aimed to establish the beach maintenance system and develop the capacity of both island government officers and residents for beach maintenance by conducting the actual activities after the implementation of beach nourishment in Activity 2.2 in collaboration with the island government and residents.

The proposed activities at each target area in the Component 2 are shown below:

Table 1.3 Project Components at Each Island under Component 2

Atoll/ City	Island	Project Component	Funding Source	Abbreviation
Laamu	Fonadhoo	Beach nourishment and groins for the eastern coast (ocean side)	GCF fund	L-FND
	Maamendhoo	Beach nourishment and groins for the eastern and western side coast, and reclamation for evacuation place at the north-western top	GCF fund	L-MMD
	Ishdhoo	Sea walls to protect historical sites at the ocean side coast at the north top	Maldives's co-finance	L-ISD
	Gan	Sea walls to protect the historical sites at the ocean side at the middle of the island	Maldives's co-finance	L-GAN
Addu	Meedhoo	Beach nourishment and groins for the eastern coast (northern coast)	Maldives's co-finance	S-MED
-	Above 5 islands	Beach maintenance, establishment of structure and the capacity development of stakeholders (Activity 2.3)	JICA's co-finance	

Source: JICA (2019)

(3) Summary of proposed activities under Component 3

This component, co-financed by JICA, will build a system dissemination of disaster warning/ information covering nationwide, and support capacity development of government officials responsible for operating the system, aiming at protecting residents' lives through appropriate evacuation activities to be taken by the residents themselves.

- Activity 3.1: Installment of terrestrial digital broadcasting system

  Integrated Services Digital Broadcasting-Terrestrial (ISDB-T) television network will be installed, with network operation center (in Male) and transmitting station equipment (in nationwide level), to allow broadcasting digital television broadcasts throughout the Maldives. Target atolls for installment of transmitting station can be referred below (Section 1.2.2) and Annex 2. This system, implemented through a co-financed grant aid project by JICA, will serve as a platform of Early Warning Broadcast System (EWBS).

- Activity 3.2: Establishment of Disaster Early Warning and Information Broadcasting System

  EWBS, the nationwide disaster warning and information broadcasting services, will be established through a co-financed technical cooperation project by JICA. Public Service Media (PSM), responsible for operation of public broadcasting services in the country, will develop operation manual for EWBS and implement operation training in collaboration with related organizations. Due to these activities, it is expected that PSM will obtain necessary techniques and equipment (such as digital signages) for operation and maintenance of EWBS.

  Pilot evacuation drills with test transmission of EWBS will be organized in selected towns, with participation of municipalities and local residents so that they familiarize themselves with, as well as raise awareness of, the categories and contents of warning/information and appropriate responsive actions. When issuing an alarm through EWBS, real-time wave information obtained from wave observation system proposed in the Component 4 will be utilized.

The proposed activities at each target area in the Component 3 are shown below:

Table 1.4 Project Components at Each Island under Component 3

Activity / Facility	Quantity	Island / Atoll
Network operation center	1 atoll	Villingili (Male) (K)
Microwave relay stations	3 atolls	Maafushi (K), Feeali (F), Fiyoari (GDh)
Digital transmitting stations	18 atolls	Dhidhdhoo (Ha), Kulhudhuffushi (HDH), Funadhoo (Sh)*1, Manadhoo (N), Ungoofaaru (R), Eydhafushi (B), Naifaru (Lh)*2, Villingili (Male) (K), Felidhoo (V), Dhangethi (ADh), Nilandhoo (F), Gan (L), Guraidhoo (Th), Gadhadhoo (GDh), Thinadhoo (GDh)*3, Villigili (Ga), Fovammulah (Gn), Hithadhoo (S) *Note: *1: Funadhoo (Sh) was replaced with Maaungdhoo (Sh), *2: Naifaru (Lh) was replaced with Hinnavaru (Lh), *3: Thinadhoo (GDh) was cancelled.*

Source: JICA (2019)

(4) Summary of proposed activities under Component 4

This component, financed by JICA, assists GoM with a system for obtaining and sharing basic data related to climate change, and capacity development of the government officials responsible for operating the system by transferring technical skills. The government agencies to sufficiently and commonly share the understanding of actual situation and impact of climate change and thereby to implement most appropriate measures" by implementing the following two Activities

- Activity 4.1: Development of wave and sea level monitoring system

  A long-term wave and sea level monitoring system will be developed and necessary technical transfer will be provided in order to obtain the long-term external forces related to climate change. Three representative sites, Hanimadhoo, Male, and Gan in Addu Atoll, are assumed as a fixed observation points, where Maldives Meteorological Service (MMS) executes sea level observation.

- Activity 4.2: Development of beach, coral reef and land use monitoring system

  This component is divided into two types of monitoring systems: long-term monitoring for coastline, coral reef and land use for a wide area; and detailed monitoring for change in beach profile and coral reefs at a specific area. The monitoring system applying satellite images and GIS system will be developed in order to monitor the long-term change in coastline, coral reefs, and land use for wide areas. UAV technology will be applied in the examining visual changes of beach profile and coral reefs at specific areas which required detailed monitoring.

The proposed activities at each target area in the Component 4 are shown below:

Table 1.5 Project Components at Each Island under Component 4

Atoll	Island	Project Component	Funding Source	Abbreviation
Haa Dhaalu	Hanimaadhoo	Installation of long-term monitoring and observation system of for waves and sea level	JICA's co-finance	-
Male	Male			-
Addu	Gan			S-GAN
-	Main inhabited islands	Introduction of beach profile, coral reef, and land use system (Activity 4.2)	JICA's co-finance	-

Source: JICA (2019)

1.2.2 Proposed Activities that have potential Environmental and Social Impacts

(1) Proposed activities under Component 1

This component, as a sub-set of activity financed by JICA, aims to establish ICZM along with the capacity development of government officials responsible for the enforcement of the ICZM. The following considerations are examined for the proposed measures under Component 1:

a) The proposed adaptation measures do not include the physical development but include the formulation and development of ICZM Plan and capacity development of relevant organizations, therefore, there are no adverse impacts for the natural environment.

b) The concrete action for the island level of the ICZM will be examined based on the national level of the ICZM as a case study at two islands in Laamu Atoll.

c) The to-be-developed ICZM Plan as case studies may include 1) establishment of coastal and reef conservation plan, 2) establishment and implementation of sediment budget control plan, 3) review of EPZ (Environment Protected Zone), 4) examination of the island government's approach to coastal management, and 5) examination of the island-level systems and regulations necessary for implementing the activities above as well as support for their implementation. However, the details of coastal and reef conservation plan have not yet decided.

More detail information of measures are shown in another Annex (Annex-2) under this Funding Proposal.

(2) Proposed activities under Component 2

Among all the activities under four components, the Component 2 has the physical measures. The following considerations are examined for the proposed adaptation measures under Component 2:

a) The proposed adaptation measure is to enforce the protection function and to maintain the relationship between the local people and coasts.

b) In order to provide a sustainable coast management, the proposed measures are to maintain the sand supply for the reef coast and to keep the natural protection function as much as possible.

c) By referring the uncertainty of the climate change scenario, the proposed adaptation measures are to be flexible against the future climate change.

The proposed adaptation measures under Component 2, which are funded by the GCF fund and co-financed by GOM, and the proposed layout plans and typical cross sections of the proposed adaptation measures are shown below. More detail specifications and information of proposed adaptation measures are shown in another Annex (Annex-2) under this Funding Proposal.

Table 1.6 Adaptation Measures in Target Coasts under Component 2

a) Adaptation measures to be funded by GCF fund

Atoll	Target Islands	Location	Coastal Adaptation Measure
Laamu	Maamendhoo	East coast (300 m)	Beach nourishment + Groin
		West coast (600 m)	Beach nourishment + Groin
		North coast	Reclamation + Perimeter revetment
	Fonadhoo	East coast (850 m)	Beach nourishment + Groin

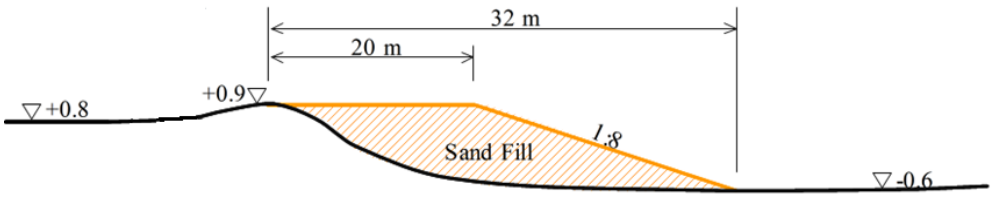
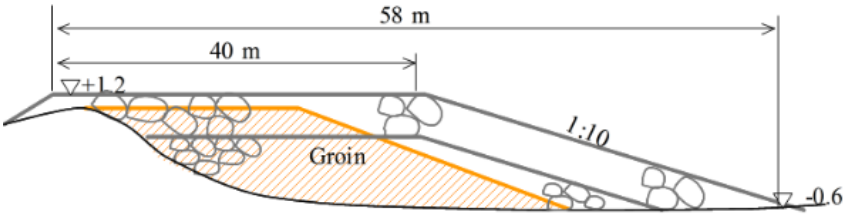
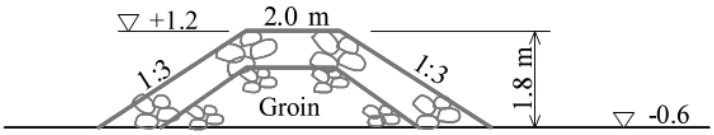
b) Adaptation measures to be co-financed by GOM

Atoll	Target Islands	Location	Coastal Adaptation Measure
Laamu	Gan	East coast (270 m)	Rubble type revetment
	Ishdhoo	Northern coast (270 m)	Rubble type revetment
Addu	Meedhoo	North coast (1,500 m)	Beach nourishment + Groin

Source: JICA (2019)

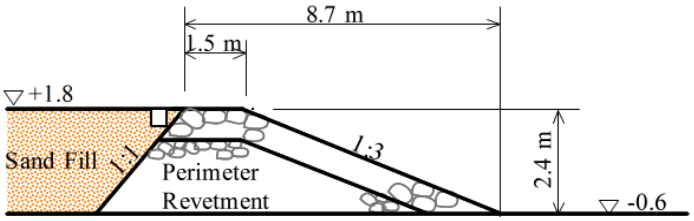
Source: JICA (2019)

Figure 1.1 Layout plan at Maamendhoo Island, Laamu Atoll under Component 2

Location	Typical Cross Section
Typical Cross Section View of the Beach	
Typical Cross Section View of the Groin	
Standard Profile of the Groin	

Source: JICA (2019)

Figure 1.2 Cross Section View of Beach and Groin at the Maamendhoo East Coast, Laamu Atoll under Component 2

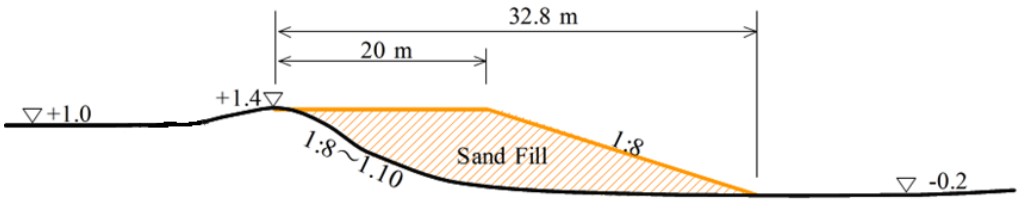
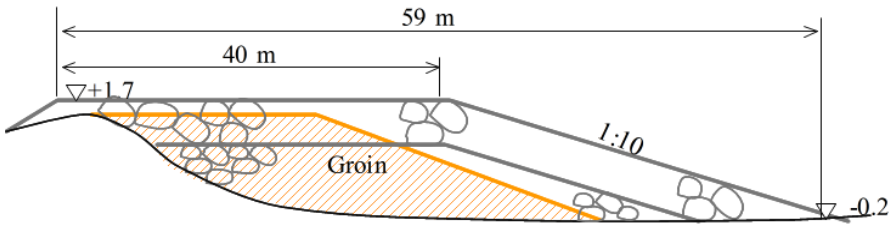
Location	Typical Cross Section
Typical Cross Section View of the Revetment	

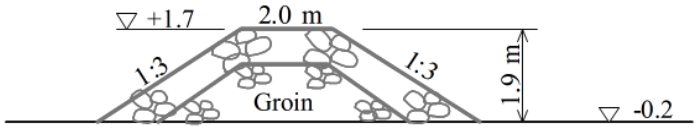
Source: JICA (2019)

Figure 1.3 Cross Section View of Perimeter Revetment at the Maamendhoo North Coast, Laamu Atoll under Component 2

Source: JICA (2019)

Figure 1.4 Layout plan at Fonadhoo Island, Laamu Atoll under Component 2

Location	Typical Cross Section
Typical Cross Section View of the Beach	
Typical Cross Section View of the Groin	

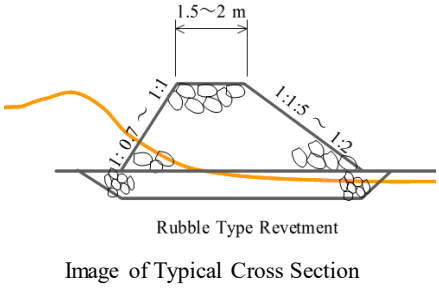
Location	Typical Cross Section
Standard Profile of the Groin	

Source: JICA (2019)

Figure 1.5 Cross Section View of Beach and Groin at the Fonadhoo East Coast, Laamu Atoll under Component 2

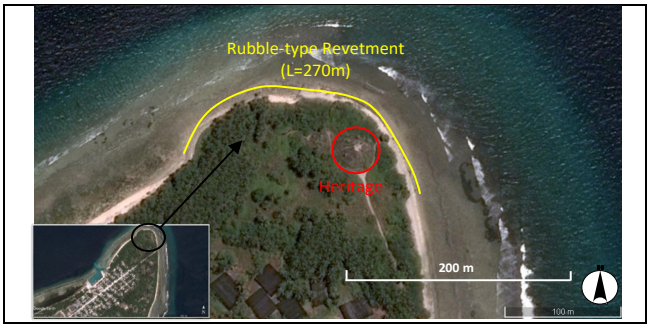
Source: JICA (2019)

Figure 1.6 Layout plan at Gan Island, Laamu Atoll under Component 2

Location	Typical Cross Section
Typical Cross Section View of the Revetment	

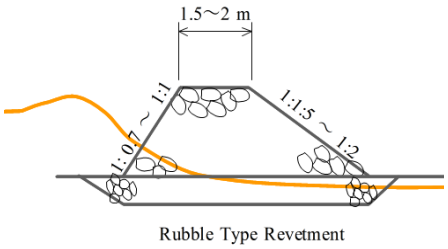
Source: JICA (2019)

Figure 1.7 Cross Section View of Coastal Protection Measure at Gan Island in Laamu Atoll under Component 2 (Maldives's co-finance)



Source: JICA (2019)

Figure 1.8 Layout plan at Ishdhoo Island, Laamu Atoll under Component 2

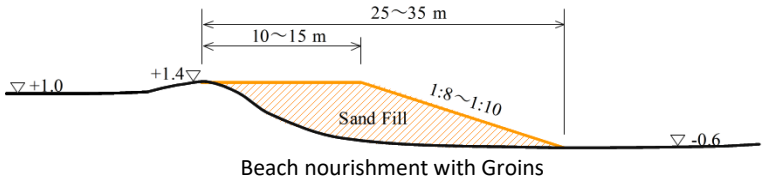
Location	Typical Cross Section
Typical Cross Section View of the Revetment	 Image of Typical Cross Section

Source: JICA (2019)

Figure 1.9 Cross Section View of Coastal Protection Measure at Ishdhoo Island in Laamu Atoll under Component 2 (Maldives's co-finance)

Source: JICA (2019)

Figure 1.10 Layout plan at Meedhoo Island, Addu Atoll under Component 2

Location	Typical Cross Section
Typical Cross Section View of the beach conservation measure	 Image of Proposed Beach Conservation Measure (Just Image)

Source: JICA (2019)

Figure 1.11 Cross Section View of Coastal Conservation Measure at Meedhoo Island in Addu Atoll under Component 2 (Maldives's co-finance)

(3) Proposed measures under Component 3

The objective of the Component 3 is to enhance the accessibility to information and to alleviate information disparities among islands in the Maldives through the development of the digital terrestrial television broadcasting network, thereby contributing to the mitigation of vulnerability and further social-economic development in Maldives. The following considerations are examined for the proposed measures under Component 3:

a) The proposed measures are not located in sensitive areas in the Maldives.

b) The proposed measures do not have sensitive characteristics nor fail into sensitive sectors.

The proposed measures under Component 3, which are co-financed by JICA are shown in the following tables. More detail specifications and information of proposed adaptation measures are shown in another Annex (Annex-2) under this Funding Proposal.

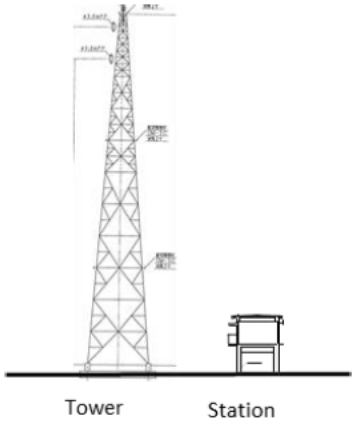
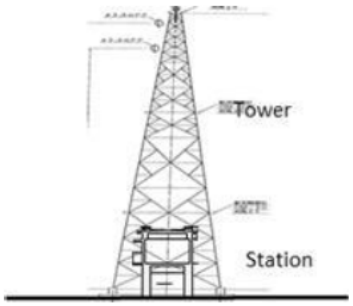
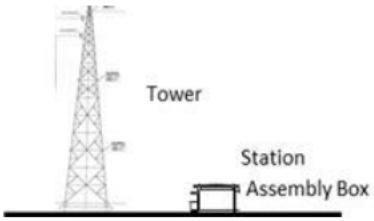
Table 1.7 Measures on establishment of disaster warning and information dissemination system, which will be co-financed by JICA under Component 3

No	Island	Atoll	Type of building			Remarks
			T1	T2	T3	
1	Dhidhdhoo	Ha	A			
2	Kulhudhuffushi	HDH	A			
3	Funadhoo	Sh	A			Cancelled, and replaced with Maaungdhoo (Sh).
4	Manadhoo	N	A			
5	Ungoofaaru	R	B			
6	Eydhafushi	B	A			
7	Naifaru	Lh	A			Cancelled, and replaced with Hinnavaru (Lh).
8	Villingili (Male)	K	A		X	
9	Maafushi	K	C	X		
10	Felidhoo	V	A			
11	Dhangethi	ADh	A			
12	Feeali	F	C	X		
13	Nilandhoo	F	A			
14	Gan	L	A			
15	Guraidhoo	Th	A			
16	Villigili	Ga	A			
17	Gadhadhoo	GDh	A			
18	Fiyoari	GDh	C	X		
19	Thinadhoo	GDh	A			
20	Fovammulah	Gn	A			
21	Hithadhoo	S	A			

Source: JICA (2019)

Note:

1) *Type of building*
   T1: Construction of a tower and a digital transmitting station
   T2: Construction of a tower and a microwave relay station
   T3: Construction of the network operation centre
2) *Combination type under T1*
   A: A tower and a digital transmitting station will be constructed separately.
   B: A digital transmitting station house will be constructed below the tower
   C: A tower and a digital transmitting station/ microwave relay station house will be constructed separately

Type	Typical Cross Section	Tentative Location	
A		1 2 3 4 6 7 8 10 11 13 14 15 16 17 19 20 21	Ha. Dhidhdhoo HDh. Kulhudhufushi Sh. Funadhoo N. Manadhoo B. Eydhafushi Lh. Naifaru K. Vilingili (Male) V. Felidhoo ADh. Dhangethi Nilandhoo L. Gan Th. Guraidhoo Ga. Viligili GDh. Gadhdhoo GDh. Thinadhoo Gn. Foammulah S. Hithadhoo
B		5	R. Ungoofaaho
C		11 12 18	K. Maafushi F. Feeali GDh. Fiyoari

Source: EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project, Energy Consultancy Pvt. Ltd. (2018)

Figure 1.12 Combination type tower and station for Component 3

Table 1.8 Planned number of antenna towers, which will be co-financed by JICA under Component 3

	Facilities to be constructed	Quantities
(1)	90-meter antenna tower	1 set
(2)	80-meter antenna tower	7 sets
(3)	70-meter antenna tower	5 sets
(4)	60-meter antenna tower	3 sets
(5)	50-meter antenna tower	3 sets
(6)	30-meter antenna pole	1 set
(7)	20-meter antenna pole	1 set
	Total	21 sets

Source: JICA (2017)

(4) Proposed measures under Component 4

The proposed measures under Component 4, which are co-financed by JICA, are the technical cooperation, and the main objectives for Component 4 are observation of ocean characteristics, such as waves and sea level, by installing the observation equipment, and trainings to monitor and analyze the obtained data. There are no considerations to be examined for Component 4.

1.2.3 Need and Justification for the Project

The coastal protection measures, which are implemented in the Maldives, are mainly the physical measures, such as stone revetment and land reclamation. The issues to be solved by physical measures are as follows:

- Most of the islands in the Maldives have been formed by sediment of coral sand and rock, which are supplied from the reef areas. The supply of the coral sand and rock from the reef and formation processes of the islands are not considered by the present physical measures.
- Most of coastal erosion in the Maldives are due to the unbalanced sand movement to and from the coasts, derived from the decrease of supply of coral sand to the coastal areas by constructed facilities and/or human interventions. The present physical measures are just protecting the specific parts of the coasts. These become one of the causes of coastal erosion.
- The target sites in the islands for Component 2 are suffering from coastal erosions, whilst there exist the natural coasts. The present physical measures prevent the local residents in nearby coasts to utilize the coastal areas. When the natural coasts would be changed to accommodate the physical measures, it will be difficult to recover the natural coast.

1.2.4 Construction Material and Equipment

As for the construction materials for Component 2, there are two main construction materials: 1) rock and 2) sand. The rocks/stones will be imported mainly from India, as there are no rock mining in the Maldives. Those rocks/stones will be utilized for rock revetment and groins.

For beach nourishment, the sand will be collected from the bottom of the sea, far from the coasts and from the areas, which will not affect the existing corals. It is planned to dredge sand from the bottom of the sea, about a few kilometers far from the coasts inside the lagoon sides of the Laamu Atoll.

Table 1.9 Design Volumes of Coral Sand to be used for the Component 2

Atoll/ City	Island	Construction Work	Design Volume (m^3)	Remarks
Lammu	Fonadhoo	Beach fill	27,200	
		Sand stock pile for beach fill	30,000	Planned to be stocked on the land
	Maamendhoo	Beach fill	27,000	
		Sand stock pile for beach fill	30,000	Planned to be stocked on the to-be-reclaimed area
		Reclamation	80,000	
Addu	Meedhoo	Beach fill	36,000	Maldivian co-financed project
		Stock pile for beach fill	40,000	

Source: JICA (2019)

In order to dredge the coral sand from the sea bottom, the Trailer Sanction Hopper Dredger (TSHD) with 10,000 m^3 level will be utilized. This TSHD is planned to be transported from India. Apart from the TSDH, heavy machineries, such as backhoe, trucks, and operation boats will

also be used. The coral sand and gravel dredged from the sand borrow sites in the lagoon by TSHD will be transported to the sites by the TSHD and will be discharged to the target areas for beach nourishment and land reclamation directly through the sand discharge pipe.

In order to select the borrow areas, Dredging and Reclamation regulation (2013/R-15) and its Amendment (2014) shall be followed to protect and preserve the natural environment, biodiversity, resources and beauty of the country, and necessary measures to avoid and mitigate such adverse impacts shall be taken.

As for the construction materials for Component 3, all the materials and equipment will be exported from outside of Maldives; i.e. Japan and other third countries.

1.3 Environmental and Social Risk Assessment

1.3.1 Evaluation Results

(1) General

As this project is supported by JICA in its role as a GCF Accredited Entity, the project has been screened against JICA's Environmental and Social Consideration Procedure [4]. The Environmental and Social Screening Template was prepared and the project deemed to be a Category B (medium risk) project, as their potential adverse impacts on the environment and society are less adverse than those of Category A (high risk) projects. Discussions on the impact assessment are provided in the Environmental and Social Screening Template, which provided the rationale for the project being classified as a moderate risk. The results of evaluation of each component are shown in the following table, and this ESMF provides further discussion below, especially for the Component 2.

Table 1.10 Evaluation results per Component

Component	Evaluation	Remarks
Component 1	Category B	Planning of ICZM will be conducted as the case study, and no actual (physical) implementation will be included.
Component 2	Category B	Dredging sand for beach nourishment shall be considered.
Component 3	Category B	JICA has conducted screening and GoM has conducted screening and EIA
Component 4	Category C	

Source: JICA (2019)

An impact risk assessment was undertaken using JICA's Environmental and Social Screening Procedure to assess the impact of the risk (critical, severe, moderate, minor, and negligible). From this, a significance value was attributed to the potential impact (negligible, low, medium, high, and extreme).

(2) Evaluation results of Component 1

All the activities under Component 1 are implemented by JICA as the co-financed project, and the activities will be screened against JICA's Environmental and Social Consideration Procedure. The Environmental and Social Screening Template is tentatively prepared and the activities deem to be a Category B (medium risk) project, as all the project sites are not located in sensitive areas, nor sensitive characteristics, nor fall into sensitive sectors under the JICA guidelines for Environmental and Social Considerations, and potential adverse impacts on the environment are not likely to be significant.

[4] JICA (2010): JICA Guidelines for Environmental and Social Considerations

Table 1.11 Impacts and Mitigation Measures per Environmental Item for Component 1

1) Pollution Control

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
1	Air Quality	No adverse effects to the air quality at the target sites would be occurred, as there are no sources by the activities.		D	D	
2	Water Pollution	For the implementation of sediment budget control plan, the water quality may be affected in some extent, due to the improper implementation.	Proper implementation of sediment budget control plan and adequate management of the sediment may be necessary.	C	C	
3	Soil Pollution	No adverse effects to the soil pollution at the target sites would be occurred, as there are no sources by the activities.		D	D	
4	Waste Management	No adverse effects to the waste management at the target sites would be occurred, as there are no sources by the activities.		D	D	
5	Noise and Vibration	No adverse effects to the noise and vibration at the target sites would be occurred, as there are no sources by the activities.		D	D	
6	Subsidence	No adverse effects to the subsidence at the target sites would be occurred, as there are no sources by the activities.		D	D	-
7	Odor	No adverse effects to the odor at the target sites would be occurred, as there are no odor sources by the activities		D	D	-
8	Sediment	For the implementation of sediment budget control plan, the sediment may occur in some extent, due to the improper implementation.	Proper implementation of sediment budget control plan and adequate management of the sediment may be necessary.	C	C	
9	Accidents	No adverse effects to the accidents at the target sites would be occurred, as there are no sources by the activities.		D-	D	

2) Natural Environment

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
1	Protected Areas	There are no protected areas and Marine Protected Areas (MPA) around the proposed project sites.		D	D	-
2	Ecosystem and Fauna/Flora	No adverse effects to the ecosystem and fauna/ flora at the target sites would be occurred, as there are no activities which affect to ecosystem and fauna/ flora.		D	D	
3	Geology and Geomorphology	No adverse effects to the accidents at the target sites would be occurred, as there are no activities which affect to geology and geomorphology.		D	D	
4	Soil Erosion	For the implementation of sediment budget control plan, the sand discharge may occur in some extent, due to the improper implementation.	Proper implementation of sediment budget control plan and adequate management of the sediment may be necessary.	C-	C	
5	Groundwater	No adverse effects to the groundwater at the target sites would be occurred, as there are no extraction of a large volume of groundwater by the activities.		D	D	-
6	Hydrology	No adverse effects to the hydrology at the target sites would be occurred, as there are no activities which affect to the hydrology.		D	D	
7	Coastal Areas	For the establishment of coastal and reef conservation plan and implementation of	Proper establishment coastal and reef conservation plan, implementation of sediment	C	C	

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
		sediment budget control plan, the marine system in the coastal areas may be affected in some extent, due to the improper implementation.	budget control plan and adequate management of the sediment may be necessary.			
8	Climate	No adverse effects to the climate at the target sites would be occurred, as there are no activities which affect to the climate.		D	D	-
9	Climate Change	No adverse effects to the climate change at the target sites would be occurred, as there are no activities which affect to the climate.		D	D	-

3) Social Environment

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
1	Resettlement	No involuntary resettlement will be occurred by implementing any proposed projects, as there are no residents and residential areas at all the project sites.		D	D	
2	Living and Livelihood	If the target areas are used by the local people regularly, there will be possibilities for the local people not to be able to use the areas for their livelihood activities due to the coastal and reef conservation plan.	Proper arrangement and management of the areas under the coastal and reef conservation plan is necessary to mitigate and reduce unfairness to their livelihood activities.	C	C	
3	Heritage	As there is the heritage site along the coast in one target island (L-GAN), there would be a risk that the future ICZM Plan may raise any impacts to the existing heritage site, if not properly planned.	The ICZM Plan should be examined and planned properly and adequately in order for the heritage site not to be suffered from any adverse impacts from the planned activities of the future ICZM	C	C	
4	Landscape	No adverse effects to the landscapes at the target sites would be occurred, as all the projects are in small scale.		D	D	
5	Ethnic Minorities and Indigenous Peoples	If the target areas are used by the local people regularly, there will be possibilities for the local people not to be able to use the areas for their livelihood activities due to the coastal and reed conservation plan.	Proper arrangement and management of the areas under the coastal and reed conservation plan is necessary to mitigate and reduce unfairness to their livelihood activities.	C	C	

Source: JICA (2019)

A+/-: Significant positive/negative impact is expected, B+/-: Positive/negative impact is expected to some extent, C: Extent of impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses) and D: No impact is expected.
Note: BC: Before Construction, DC: During Construction, OP: Operation Phase

(3) Evaluation results of Component 2

Detailed design of coastal conservation measures and capacity development of stakeholders (Activity 2.1) and implementation of beach maintenance, establishment of structure and capacity development of stakeholders (Activity 2.3) will be implemented by JICA as the co-

financed project, and implementation of coastal conservation/protection measures (Activity 2.2) will be implemented by GoM as GCF-funded project and Maldives' co-financed projects.

The activities have been screened against JICA's Environmental and Social Consideration Procedure. The Environmental and Social Screening Template was prepared and the project deemed to be a Category B (medium risk) project, as all the project sites are not located in sensitive areas, nor sensitive characteristics, nor fall into sensitive sectors under the JICA guidelines for Environmental and Social Considerations , and potential adverse impacts on the environment are not likely to be significant.

Table 1.12 Impacts and Mitigation Measures per Environmental Item for Component 2

1) Pollution Control

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
1	Air Quality	During the construction stage, the adverse effects would be occurred to the air quality by using the large machineries, i.e. dredging machine.	Large machineries to be used shall be maintained properly, in order not to emit the unnecessary exhaust gas.	C	C	L-FND, L-MMD, S-MED
2	Water Pollution	During the construction stage, the adverse effects would be occurred to the water quality by using the large machineries, i.e. dredging machine, backhoes, etc.	Large machineries to be used shall be maintained properly, in order to prevent the water pollution.	B-	C	L-FND, L-MMD, L-ISD, L-GAN, S-MED
		During the construction stage, the adverse effects would be occurred to the water quality by inadequate water drainage and soil spill into the sea.	During the construction stage, the adequate drainage water treatment shall be done, i.e. installing silt protectors and sand bunds.	B-	C	L-FND, L-MMD, L-ISD, L-GAN, S-MED
		For the beach nourishment and land reclamation, the adverse effects would be occurred to the water quality by inadequate soil spill into the sea, during the operation stage.	During the operation stage, the community-based maintenance and monitoring will be done through the project.	B-	C	L-FND, L-MMD, L-ISD, L-GAN, S-MED
3	Soil Pollution	During the construction stage, the adverse effects would be occurred to the soil quality, by oil leaking from the large machineries.	During the construction stage, such measures as preparation of the construction accident prevention manual, installation of oil treatment mat, shall be conducted.	C	C	L-FND, L-MMD, L-ISD, L-GAN, S-MED
4	Waste Management	During the construction stage, there will be possibility to appear garbage and harmful waste.	During the construction stage, the adequate waste management shall be conducted.	C	C	L-FND, L-MMD, L-ISD, L-GAN, S-MED
5	Noise and Vibration	During the construction stage, the noise and vibration would be occurred by using the large machineries, i.e. dredging machine, backhoes, etc.	During the construction stage, the noise-cut large machineries and generators shall be used. During the construction stage, the large machineries shall not	C	C	L-FND, L-MMD, L-ISD, L-GAN, S-MED

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
			be used during the night time nearby the residential areas.			
6	Subsidence	No adverse effects to the subsidence at the target sites would be occurred, as there are no extraction of a large volume of groundwater by the project.		D	D	-
7	Odor	No adverse effects to the odor at the target sites would be occurred, as there are no odor sources by the projects.		D	D	-
8	Sediment	For the beach nourishment and land reclamation, the adverse impact may occur for the subsistence (sea bed) during the construction and operation.	For the beach nourishment and land reclamation, the existing situations/ conditions of the sediment shall be confirmed before construction. During the construction stage, such measures to prevent from the adverse effects, shall be considered, i.e. installing silt protectors and sand bunds.	B-	B-	L-FND, L-MMD, S-MED
			During the operation stage, the community-based maintenance and monitoring will be done through the project.	C	C	L-FND, L-MMD, S-MED
9	Accidents	There will be possibilities that accidents would occur during the construction.	The accident prevention manual shall be prepared and danger forecast shall be considered.	B-	D	L-FND, L-MMD, L-ISD, L-GAN, S-MED
		Accidents may occur during dredging the construction materials.	The accident prevention manual shall be prepared and danger forecast shall be considered. During the dredging the sand, special attentions shall be taken in order not to suffer from the accidents.	B-	D	L-FND, L-MMD, S-MED

2) Natural Environment

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
1	Protected Areas	There are no protected areas and Marine Protected Areas (MPA) around the proposed project sites.		D	D	-
2	Ecosystem and Fauna/Flora	During the construction and/or operation stages, there will be possibilities for the marine ecosystem to be suffered from the adverse effects.	Adequate measures to be taken for the marine ecosystems, especially for the corals inhabiting areas, and migrant birds utilizing. During the construction stage, adequate measures to be taken for the coastal vegetation not to be suffered from the construction, and if any adverse effects, necessary measures to be taken to recover the coastal vegetation.	B-	B-	L-FND, L-MMD, L-ISD, L-GAN, S-MED

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
			During construction stage, the sand borrow sites shall be carefully selected in order to avoid damages/ disturbances to the marine ecosystem.			
3	Geology and Geomorphology	For the construction of beach nourishment and land reclamation, there will be possibilities that the nearshore currents and waves would be changed after the construction.	Necessary considerations and measures to be taken about changes of nearshore currents and waves after the construction for the beach nourishment and land reclamation.	C	C	L-FND, L-MMD, S-MED
4	Soil Erosion	For the construction of beach nourishment and land reclamation, there will be possibilities that coastal sand discharge would be occurred by the normal waves and high surges.	For the beach nourishment and land reclamation, necessary measures to be taken for the constructed facilities not to be eroded by the ordinal waves and high surges after the construction. In case of erosion occurrence, necessary measures to be considered.	B-	C	L-FND, L-MMD, S-MED
5	Groundwater	No adverse effects to the groundwater at the target sites would be occurred, as there are no extraction of a large volume of groundwater by the projects.		D	D	-
6	Hydrology	For the construction of beach nourishment and land reclamation, there will be possibilities that the nearshore currents and waves would be changed after the construction.	Necessary considerations and measures to be taken about changes of nearshore currents and waves after the construction for the beach nourishment and land reclamation.	C	C	L-FND、L-MMD, S-MED
7	Coastal Areas	During the construction and/or operation stages, there will be possibilities for the marine ecosystem and coastal areas to be suffered from the adverse effects.	Adequate measures to be taken for the marine ecosystems, especially for the corals inhabiting areas, and migrant birds utilizing.	C	C	L-FND, L-MMD, L-ISD, L-GAN, S-MED
8	Climate	No adverse effects to the groundwater at the target sites would be occurred, as all the projects are in small scale.		D	D	-
9	Climate Change	No adverse effects to the groundwater at the target sites would be occurred, as all the projects are in small scale.		D	D	-

3) Social Environment

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
1	Resettlement	No involuntary resettlement will be occurred by implementing any proposed projects, as there are no residents and residential areas at all the project sites.		D	D	-
2	Living and Livelihood	If the target areas are used by the local people regularly, there will be possibilities for the local people not to be able to use the areas during	Dissemination of the objectives and contents of the proposed projects to the local people shall be done before commencement of the	C	C	L-FND, L-MMD, S-MED

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
		construction.	construction, and their understandings shall be secured.			
3	Heritage	There will be no adverse effects for the heritage sits, as there are no heritages at all the project sites and all the concerned projects (L-ISD and L-GAN) would be the facilities to protect such heritage sites nearby the project sites.		D	B+	L-GAN, L-ISD
4	Landscape	No adverse effects to the landscapes at the target sites would be occurred, as all the projects are in small scale.		D	D	-
5	Ethnic Minorities and Indigenous Peoples	If the target areas are used by the local people regularly, there will be possibilities for the local people not to be able to use the areas during construction.	Dissemination of the objectives and contents of the proposed projects to the local people shall be done before commencement of the construction, and their understandings shall be secured.	C	C	L-FND、L-MMD, S-MED

Source: JICA (2019)

A+/-: Significant positive/negative impact is expected, B+/-: Positive/negative impact is expected to some extent, C: Extent of impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses) and D: No impact is expected.
Note: BC: Before Construction, DC: During Construction, OP: Operation Phase

(4) Evaluation results of Component 3

The Installment of terrestrial digital broadcasting system (Activity 3.1) is implemented by JICA as the co-financed project, the project has been screened against JICA's Environmental and Social Consideration Procedure. The Environmental and Social Screening Template was prepared and the project deemed to be a Category B (medium risk) project, as all the project sites are not located in sensitive areas, nor sensitive characteristics, nor fall into sensitive sectors under the JICA guidelines for Environmental and Social Considerations , and potential adverse impacts on the environment are not likely to be significant.

The establishment of Disaster Early Warning and Information Broadcasting System (Activity 3.2) are also implemented by JICA as the co-financed project. The activities deem to be a Category C (low risk) activity, as all the proposed activities include the trainings and capacity development for the stakeholders.

Table 1.13 Impacts and Mitigation Measures per Environmental Item for Component 3

1) Pollution Control

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
1	Air Quality	During the construction stage, using heavy machinery for the construction work will raise extensive amount of emission from the vents of heavy machineries. It	Large machineries to be used shall be maintained properly, in order not to emit the unnecessary exhaust gas.	B	D	
2	Water Pollution	During the construction stage, the adverse effects would be occurred to the water quality by using the	Large machineries to be used shall be maintained properly, in order to prevent the water pollution.	B-	D	

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
		large machineries, i.e. backhoes, etc.				
3	Soil Pollution	During the construction stage, heavy machinery uses heavy and dense fuel which may become a pollutant and may cause a disaster.	The hazardous material such as heavy oil and any flammable material shall be stored safely in barrels or appropriate containers with appropriate label and sign place outside of it.	B	D	
4	Waste Management	During the construction stage, most of the green waste would be produce.	Any solid waste and the green waste from removal of grass shall be properly disposed at island waste management center. Any used oil or leftover paints and other chemical shall be leak proof packed and stored till it is transported to Thilafushi or any other such designated area.	B	D	
5	Noise and Vibration	During the construction stage, noise and vibration could be prone to be occurred.	In order to reduce the noise pollution, the work on site may not commence during the night. All the heavy vehicles and equipment's shall be well serviced and maintained to reduce the unnecessary emission and incomplete combustion of the fuel.	B	C	
6	Subsidence	During the construction stage, the dewatering would accelerate the horizontal flow of the groundwater. This will have an impact on the groundwater depletion and subsidence of the ground.	In case surface soil subsiding occurs, the depth of the steal pile needed to be adjusted before commencing the dewatering.	B	D	
7	Odor	No adverse effects to the odor at the target sites would be occurred, as there are no odor sources by the projects.		D	D	
8	Sediment	No adverse effects to the sediment at the target sites would be occurred, as there are no sediment sources by the projects.		D	D	
9	Accidents	There will be possibilities that accidents would occur during the construction.	The accident prevention manual shall be prepared and danger forecast shall be considered. When the workers present at the construction site, the safety helmet and safety shoes needed to be worn at all time.	B-	D	

2) Natural Environment

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
1	Protected Areas	There are no protected areas and Marine Protected Areas (MPA) around the proposed project sites.		D	D	-
2	Ecosystem and Fauna/Flora	During the construction stage, most of the vegetation would be cleared and an immediate and most adverse environmental impact on the vegetation will arise.	Adequate measures to be taken for the ecosystem and fauna/ flora; i.e. any tree that could be replanted, shall be replanted in a different location, try to avoid cutting down of or uprooting of unnecessary vegetation.	B-	D-	
		During the operation stage, birds may be suffered from the antennas and indicator lights on the posts/ antennas.	The indicator light on all the tower shall be red light and the light shall be lit continuously throughout the night. This will reduce the confusion arise in the bird community.	D	B	
3	Geology and Geomorphology	No adverse effects to the geology and geomorphology at the target sites would be occurred, as all the projects are in small scale.		D	D	
4	Soil Erosion	During the construction stage, with extensive dewatering, it may collapse the adjoining ground. If the dewatering is taking place near any existing facilities, this collapsing of ground may lead to physical damage to the existing facility.	It is impossible to completely cutoff the horizontal flow, therefore great care need to be taken on monitoring the surrounding soil. If subsiding occurs in the vicinity, the dewatering needed to be stop immediately.	B-	C	
5	Groundwater	In the construction stage, the reversible short-term impact of dewatering would be a significant impact. The dewatering would accelerate the horizontal flow of the groundwater. This will have an impact on the groundwater depletion.	In order to address the adverse impacts arise by extensively draining water from groundwater lens by dewatering, steal piling would be used to enclose excavation area.	B	D	
6	Hydrology	No adverse effects to the hydrology at the target sites would be occurred, as all the projects are in small scale.		D	D	
7	Coastal Areas	No adverse effects to the coastal areas at the target sites would be occurred, as all the projects are not located along the coast.		D	D	
8	Climate	No adverse effects to the groundwater at the target sites would be occurred, as all the projects are in small scale.		D	D	
9	Climate Change	No adverse effects to the groundwater at the target sites would be occurred, as all the projects are in small scale.		D	D	

3) Social Environment

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
1	Resettlement	No involuntary resettlement will be occurred by implementing		D	D	

	Environmental Item	Issues	Measures	Evaluation		Objective projects
				BC/DC	OP	
		any proposed projects, as there are no residents and residential areas at all the project sites.				
2	Living and Livelihood	No adverse effects to the living and livelihood at the target sites would be occurred, as all the projects are in small scale.		D	D	
3	Heritage	There will be no adverse effects for the heritage sites, as there are no heritages at all the project sites		D	D	
4	Landscape	No adverse effects to the landscapes at the target sites would be occurred, as all the projects are in small scale.		D	D	
5	Ethnic Minorities and Indigenous Peoples	No adverse effects to the ethnic minorities and indigenous peoples at the target sites would be occurred, as all the projects are in small scale.		D	D	

Source: EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project, Energy Consultancy Pvt. Ltd. (2018a, 2018b), compiled by JICA (2020)

A+/-: Significant positive/negative impact is expected, B+/-: Positive/negative impact is expected to some extent, C: Extent of impact is unknown. (A further examination is needed, and the impact could be clarified as the study progresses) and D: No impact is expected.
Note: BC: Before Construction, DC: During Construction, OP: Operation Phase

(5) Evaluation results of Component 4

All the activities under Component 4 are implemented by JICA as the co-financed project, and the activities will be screened against JICA's Environmental and Social Consideration Procedure. The Environmental and Social Screening Template is tentatively prepared and the activities deem to be a Category C (low risk) project, as the proposed activities include the observation of the environmental data and information, and information sharing.

1.3.2 Assumptions Underpinning the Development of the Environmental and Social Management Framework

The following assumptions have been made in the preparation of this ESMF:

a. None of the facilities and activities will require the displacement of people (including economic), either temporary or permanent;

b. There will be no resettlement or land acquisition;

c. The facilities and activities that are to be conducted in the protected areas or sensitive locations will be undertaken in full consideration of the need to ensure full protection, if any;

d. Appropriate erosion and sediment control will be undertaken during all stages of the projects;

e. There will be no release of pollution and/or chemicals as a result of the projects; and

f. No unnecessary dredging for securing sand materials for beach nourishment will be undertaken.

1.3.3 Purpose and Objectives of the Environmental and Social Management Framework

An ESMF is a management tool used to assist in minimizing social and environmental impacts and establish a set of environmental and social objectives. To ensure the environmental and social objectives of the projects are met, this ESMF will be used by the project implementers to

structure and control the environmental and social management safeguards that are required to avoid or mitigate adverse effects on the environment and affected communities.

The environmental and social objectives of the projects are:

a. To mitigate coastal flooding risks in the target areas in each island in Laamu Atoll and Addu City;
b. To address the broader climate change adaptation challenges impacting in the area through the introduction of an integrated coastal zone management planning process;
c. To encourage good management practices through planning, commitment, and continuous improvement of environmental practices and the impacts of climate change; and
d. To strengthen the capacity of the Maldivian government and communities to manage the flooding impacts of climate change-induced SLR on coastal communities;

The environmental and social objectives of the ESMF are:

a. To encourage good management practices through planning, commitment and continuous improvement of environmental practices;
b. To minimize or prevent the pollution of land, air, and water;
c. To protect existing flora, fauna, and important ecosystems from additional impacts;
d. To provide for the development of monitoring programs to assess any changes in environmental and social matters including protected areas, water quality, etc.;
e. To comply with applicable laws, regulations, and standards for the protection of the environment;
f. To adopt the best practicable means available to prevent or minimize environmental impact;
g. To identify key environmental and social indicators;
h. To engage with relevant stakeholders to manage their concerns;
i. To describe monitoring procedures required to identify impacts on the environment;
j. To provide an overview of the obligations of the project implementers; and
k. To provide a grievance system to manage potential complaints and/or grievances.

The ESMF will be updated from time to time by the implementing Project Management Unit (PMU)/ JICA/ contractor(s) in consultation with the project board to incorporate changes in the detailed design phase of the projects.

1.3.4 Economic Displacement and Livelihood Restoration

No economic displacement, either temporary or permanent, is expected during the implementation of the project.

1.3.5 Land Issues

The lands, which are planned to be the project areas, are along the coasts. For the adjacent areas from the target sites, the residential houses are constructed even within the setback areas. However, there are no residential houses within the setback areas, which are stipulated by regulation for the target areas. As such, there is no requirement for any compulsory land

acquisition and/or compensation to be paid. Current uses of the lands are mainly for recreational activities by residents, traditional medical treatment, and the collection of natural resources.

1.3.6 Indigenous Peoples

As part of due diligence, analysis and consultation are undertaken as to the probability of any of the project's activities involving indigenous people and/or ethnic minorities. No indigenous people and/or ethnic minorities such as Giraavaru are known to live in any of the proposed locations as identified and discussed in Table 3.25.

1.4 Overview of Institutional Arrangements for the Environmental and Social Management Framework Plan

The ESMF will be assessed by the ME and JICA prior to any works being undertaken. The ESMF identifies potential risks to the environment and social matters from the projects and outlines strategies for managing those risks and minimizing undesirable environmental and social impacts.

The ME, together with EPA, will be responsible for the supervision of the ESMF. JICA will gain the endorsement of the ME and will ensure the ESMF is adequate and followed. The PMU will ensure that timely remedial actions are taken by the contractor when necessary.

1.4.1 Administration

The ME will be responsible for the revision or updates of this document during the course of the work. It is the responsibility of the person to whom the document is issued to ensure it is updated.

The Safeguard Officer in the GCF-PMU will be responsible for the regular environmental inspections of the construction site.

The contractor will maintain and keep all administrative and environmental records which would include a log of complaints together with records of any measures taken to mitigate the cause of the complaints. The contractor will be responsible for the day to day compliance of the ESMF.

2. Legal and Institutional Framework for Environmental and Social Matters

2.1 Relevant Environmental Legislation

2.1.1 Environmental Protection and Preservation Act (Act No. 4/93)

The Environmental Protection and Preservation Act of the Maldives, EPPA (Law No. 4/93), provides the basic framework for environmental management including the Environmental Impact Assessment (EIA) process in the Maldives, which is currently being implemented by the Environmental Protection Agency (EPA) on behalf of the Ministry of Environment and Energy (MEE).

The project conforms to the requirements of EPPA. The EIA should be undertaken in accordance with the EIA Regulation 2012 of Maldives, together with the succeeding amendments, by registered consultants. Furthermore, it adheres to the principles underlined in the regulations, action plans, programmes, and policies of the Ministry of Environment and Energy (MEE), Ministry of Planning and Infrastructure (MPI), and relevant local councils.

Articles 2, 4, 5, 6, 7, and 8 of the law are relevant to the coastal protection projects in Addu City and Laamu Atoll.

Clause 2 of the EPPA mandates the Ministry of Environment and Energy to formulate policies, rules, and regulations regarding the environment.

Clause 5 of the EPPA specifically provides for an environmental impact assessment (EIA), a tool implemented to attempt to integrate environmental issues into development decisions. According to Clause 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. According to Clause 5 (b), the Ministry of Environment shall formulate the guidelines for the EIA and shall determine the projects that need such assessment as mentioned in paragraph (a) of this clause.

Clause 6 of the EPPA gives the Ministry of Environment and Energy the authority to terminate any project that has an undesirable impact on the environment.

Clause 7 of the EPPA refers to the disposal of oil, waste, and poisonous substances in the Maldivian territory. According to this clause, any type of waste, oil, toxic gas, or any substance that may have harmful effects on the environment should not be disposed within the Maldivian territory. If, however, the disposals of such substances become absolutely necessary, the clause states that they should be disposed only within the areas designated for that purpose and if incinerated, appropriate precautions should be taken to avoid harm on the health of the population.

Clause 8 of the EPPA (4/93) states that Hazardous, Toxic, or Nuclear Waste that is harmful to human health and the environment shall not be disposed anywhere within the territory of the country.

Furthermore, Clause 9 sets a fine form MVR 5 to MVR 500 for minor offenses in breach of this law and a fine of not more than MVR 100 million for major offenses. The fine shall be levied by the Ministry of Environment and Energy or by other government authorities designated by that ministry in case of minor offenses.

Finally, Clause 10 of the EPPA gives the Government of the Maldives the right to claim compensation for all damages caused by activities that are detrimental to the environment. The Clause 3 of the Environment Act has been amended by Law No. 12/2014, which now states that environmental protection, including conservation of biological diversity, protection of groundwater resources and related environments including mangroves, swamps found in the islands, protection of the environment from waste and hazardous gases as well as to formulate

relevant policies, regulations, standards, and implementation of such in consultation with other government agencies shall be a responsibility of the ministry assigned for implementing environmental policies.

The proposed project will fully abide to the Environmental Preservation and Protection Act. All mitigation measures will be implemented in the interest of the environment

2.1.2 Employment Act (Act No. 2/2008)

The Employment Act, the legal framework to govern the rights and responsibilities of the migrant workers in the Maldives, is included in the Employment Act (2/2008). The Employment Act provides for the creation of a Labour Relations Authority, an Employment Tribunal and an Advisory Board on wages. To date, four amendments have been brought to the Employment Act (2/2008). All contractors shall be required to undertake ethical recruitment and responsible employment of workers during the construction stage of the project. During the operation stage, an ethical recruitment and responsible employment policy and system will be developed and implemented and amendments were made through the following Acts: 14/2008; 12/2010; 3/2014; 14/2015.

2.2 Relevant Regulations and Guidelines

2.2.1 Protected Areas and Sensitive Areas

Under Article 4 of the Environment Protection and Preservation Act, the Ministry of Environment, Climate Change and Technology is vested with the responsibility of identifying and registering protected areas and natural reserves and drawing up of rules and regulations for their protection and preservation. For the target areas for Component 2 in Addu City and Laamu Atoll, there are no protected areas nearby the target areas. For Component 3, all the target areas are not located in the sensitive areas.

As part of the Environmental Regulation, EPA has established a list of ‘sensitive sites’ in the Maldives. Although not formalized as a regulation, the sensitive list is mentioned in the recent Regulation on Dredging and Reclamation (Regulation number 2014/R-13). The sensitive sites, according to EPA are sites in the Maldives (islands, reefs, mangroves, inter-tidal areas) where developments ought to be restricted, regulated, or controlled. Some view those sites mentioned in the sensitive list have no meaning because there is no evidence to show any ‘sensitive features’ of the areas.

2.2.2 Environmental Impact Assessment Regulation 2012

The Ministry of Environment and Energy issued the EIA regulation in May 2012, which guides the process of undertaking the Environmental Impact Assessment in the Maldives. This guideline also provides a comprehensive outline of the EIA process, including the roles and responsibilities of the consultants and the proponents. This regulation outlines every step of the EIA process beginning from the application to undertake an EIA, details on the contents, minimum requirements for consultants undertaking the EIA, format of the EIA/IEE report, and many more. The guidance provided in this Regulation was followed in the preparation of this EIA report. The EIA has also been prepared by registered consultants.

(1) First Addendum to the Environmental Impact Assessment Regulation 2012 (Regulation 2013/ R-18)

This first addendum was gazetted on 9th April 2013. This amendment stipulates that the responsible authority has to check the submitted EIA report for everything mentioned in the Regulation's article (Kaafu) and inform the proponent whether the EIA Report has been accepted or rejected within two working days. The penalty for repetitive offenses has also been updated in this amendment of the regulation.

(2) Second Addendum to Environmental Impact Assessment Regulation 2012 (Regulation 2015/R-174)

The second amendment gazetted on 30th August 2015 includes the following important points:

- Some procedural changes have been made to the EIA process: e.g., shifting the tourism related developmental project EIAs to the Ministry of Tourism, ii) changes in the process like finalization of the Terms of Reference during the scoping meeting, and iii) changes in the fees structure for the review process have been made to include three different categories.
- Article 8 (a) of the amendment of the decision for the screening form is as follows:
    1) Environmental Management Plan
    2) Initial Environmental Examination
    3) Environmental Impact Assessment
    4) Approval to go forward with the screened project
    5) Approval to go forward with the project with as per the mitigation measures proposed by EPA.
- Article 9(b) of the amendment for the decision for IEE is as follows:
    1) Environmental Impact Assessment Report if the project anticipated to have major environmental impacts
    2) Environmental Management Plan
    3) Approval to go forward with the project if the project is not anticipated to occur major environmental impacts

(3) Third Addendum to the Environmental Impact Assessment Regulation 2012 (Regulation 2016/R-66)

The third amendment gazetted on 11th August 2016 includes the following important points:

- The point system for consultants, categories of the consultants, and amendment of the penalties to consultants and proponents who fail to follow the regulation. This EIA report was prepared by a Category A registered EIA consultant

(4) Fourth Addendum to the Environmental Impact Assessment Regulation 2012 (Regulation 2017/R-7)

The fourth Amendment gazetted on 19th January 2017 includes the following points:

- The projects that can be preceded without an Environmental Impact Assessment when the proponent requests to the Ministry of Environment and Energy in writing along with commitments or guarantee that the Proponent will carry out the mitigation measures that may impact the Environment due to such projects. A list of such projects given in the amendment is as follows:
    1) Removal of deposited sand inside the harbor

2) Trees and palms present on lands left for the purpose of building houses need to be taken by the owner of the land.

3) If trees/palms present on lands left for building purposes obstruct the roads need to be removed. (Such cases will be handled by the council of the island).

4) Creating boreholes on land for the uptake of water.

5) On lands, which are connected to naturally formed islands, projects that are carried out before three years since the reclamation of land.

6) On lands, which are newly reclaimed in the middle of a lagoon, projects which are carried out for before five years since the reclamation.

Even on the lands mentioned in numbers 5 and 6 of clause a) of this regulation, if people habituate, development projects should be carried out under EIA regulation (2012). It can only be carried out after submitting an EIA and with the permission of the Ministry of Environment and Energy.

- Even on the lands mentioned in numbers 5 and 6 of clause a) of this regulation, the projects listed down below can only be carried out under the EIA regulation (2012) with the approval of the ministry.

1) Projects involving hazardous/toxic chemicals

2) Projects involving the storage of oil

3) Projects involving the usage of incinerators

4) Projects which would release any kind of toxic fumes into the atmosphere

(5) Fifth Addendum to Environmental Impact Assessment Regulation 2012 (Regulation 2018/R-131)

The fifth amendment gazetted in 2018 includes the following points:

- Some procedural changes have been made to the EIA process. The main change is the re-inclusion of the tourism related developmental project EIAs to the Ministry of Environment from the Ministry of Tourism: i.e., 36) Development of tourist resorts, and 37) development of tourist guesthouse. Accordingly, the following projects are those which need EIAs:

Table 2.1 List of Projects which Need EIA in the Maldives

No.	Projects which Need EIA
1	Commercial aquaculture projects
2	Fish processing facilities
3	Artificial reefs
4	Agriculture projects
5	Livestock and animal husbandry
6	Large-scale deforestation
7	Construction and dredging of harbours
8	Cutting, dredging and maintenance of channels
9	Construction of jetties (without water channel)
10	Development of yacht marinas
11	Land reclamation projects
12	Sea defense structures (such as seawalls, revetments, marine installation, offshore breakwaters, groines)
13	Beach nourishment
14	Sand mining using machinery
15	Construction of major roads
16	Development of airports

No.	Projects which Need EIA
17	Helipads and seaplane hubs
18	Major housing projects
19	Building structures, with more than 10 storeys (excluding the foundation raft) or higher than 31 meters.
20	Buildings with foundation structures that cater for more than 10 storeys
21	Buildings with basements
22	Buildings with foundations deeper than five feet or a foundation of a unique structure
23	Development of factories (with initial investments of more than MVR 100,000, and those registered with the relevant government authorities)
24	Waste incinerators
25	Landfills
26	Unofficial translation
27	Large-scale waste storage and separation facilities
28	Bottling plants
29	Drinking water supply network systems
30	Sewerage projects
31	Marine outfall pipes
32	Power plants
33	Oil, fuel and gas storage, handling and refining facilities
34	Desalination plants of capacity larger than 150 tonnes
35	Hospitals
36	Development of new tourist hotel or resort
37	Additions and large-scale developments to tourist hotels and resorts

Sources: Modified by the JICA, based on the Environmental Impact Assessment Regulation (2012), the Second Amendment (2015) and the Fifth Amendment (2018)

Note: The tourism related developmental projects: i.e., No. 36 and No. 37 in the above table, were listed as target projects No. 1 and No. 2 in the Environmental Impact Assessment Regulation in 2012, however, those two projects were shifted to the Ministry of Tourism through the Second Amendment (2015). Through the Fifth Amendment (2018), those two tourism related projects have been re-added to the projects under managing of EPA.

2.2.3 Dredging and Reclamation Regulation (Regulation 2013/R-15)

The regulation of Dredging and Land Reclamation was published on 2 April 2013 with the aim of minimizing environmental impacts associated with dredging activities in islands and reefs across the Maldives. This regulation explains in detail about the situation of dredging and reclamation. The followings are the outlines of the regulation:

- The regulation defines the rationales acceptable for dredging as those related to the approved development activities on inhabited islands and economic islands. It defines that those activities should be of utmost necessity for dredging to be considered.
- All dredging and reclamation activities must be approved by EPA in writing. The process includes the submission of project information to EPA along with a scaled before and after map. The regulation defines rationales for reclamation as those absolutely necessary for social, economic, or safety purposes.
- Dredging is restricted in the following areas:
    a) 500 m from the ocean side reef edge;
    b) 50 m from any island vegetation line;
    c) An environmentally sensitive site;

d) Land reclamation is restricted within 200 m of a sensitive area; and

e) Land reclamation cannot exceed 30% of the house reef area.

- The regulation requires producing scaled-maps of the island before and after the proposed intervention. Land use plan and the details of essential requirement should be submitted to the Implementation Agency. Along with these details, a geo-referenced scale map (1:10,000) should be submitted and permission should be obtained from the Implementation Agency.
- Special provisions have been made on protected and sensitive area restricting changes to the environment of the islands.

(6) First Amendment to the Dredging and Reclamation Regulation

This amendment to the regulation came into force on 9 February 2014 and has brought changes to Clause 13 (d) of the Dredging Regulation. The amendment explains that the developmental projects planned under the cabinet decision or run under government developmental projects can be preceded even after it falls under Clause 13 (d) number 4 along with the conditions given in the First Amendment. The proponent shall apply to the Implementation Agency for such activities like sand mining, while dredging and reclamation and shall be carried out only after obtaining permission from the Implementation Agency. The conditions given in the amendment are as follows:

a) Carry out a study on the existence of living flora, fauna, and threatened species.

b) Submit a plan and obtain permission for such plans on how to transfer, shift, and farm the threatened species.

c) Develop a natural area not smaller than the existing area with the existing characteristics or develop an area with such characteristics that are instructed by the Implementation Agency as per the policy, regulation, and standards and set arrangements to protect, manage, and monitor such areas.

d) Carry out a study to monitor the impact on the existing aquifer and to take mitigation measures to prevent the occurrence of likely impacts. Additionally, these activities should be monitored by the implementation Agency.

e) Carry out a study on possible flooding and implement a suitable drainage system as a mitigation measure. This project can be preceded as per the regulations and its amendments where mitigation and monitoring are explained in relevant sections.

2.2.4 Cultural and Historical Places and Objects Act (Act No.27/79)

The Law on Cultural and Historical Places and Objects of the Maldives (27/79) prohibits destroying or damaging any historical and cultural places, sites, objects, and artifacts belonging to the sovereign area of the Maldives.

a) The cultural sites mentioned in this regulation are things or places used by locals or foreign ancestors who had resided in the Maldives. These things reflect the lifestyles of the ancestors of the locals.

b) Monuments or idols, which have been created in honor of certain personalities or idols that people used to worship in the past, are also protected under this regulation.

c) However, with the permission from the relevant authorities of the government, cultural sites are allowed to be touched and studied in such a way that their original identity is not lost.

2.2.5 Regulation on Cutting Down and Export of Trees and Coconut Palms (Regulation No. 7-R/2014)

The Regulation on Cutting Down and Export of Trees and Palms (Regulation No. 7-R/2014) specifies that the cutting 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 if 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 regulation prohibits the removal of the following tree types;

- The coastal vegetation growing around the islands extending to about 15 meters into the island;
- All the trees and palms growing in mangrove and wetlands spreading to 15 meters of land area;
- All the trees that are in a government designated protected areas;
- 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 abnormal in structure.

2.2.6 Coral and Sand Mining Regulation

Coral mining from house reef and atoll rim has been banned through a directive from the President's Office dated 26 September 1990. Additionally, the Regulation on Sand and Coral Mining was issued by the Ministry of Fisheries, Agriculture, and Marine Resources (MOFA) on 13 March 2000.

This regulation covers sand mining from uninhabited islands that have been leased; sand mining from the coastal zone of other uninhabited islands; and aggregate mining from uninhabited islands that have been leased and from the coastal zone of other uninhabited islands. Sand should not be mined from any parts of the existing island, beach, or the newly reclaimed island beach. Sand should also not be mined from within 100 feet of the shoreline.

2.3 Environmental Impact Assessment in the Maldives

2.3.1 Environmental Impact Assessment Process

(1) EIA Process

Under Article 5 (a) of the EPPA, an Environmental Impact Assessment (EIA) has to be submitted by the developer of a project, which may have potential impacts on the environment, to ME for approval before the commencement of the project. The EIA process is coordinated by the Environment Protection Agency of MEE in consultation with other relevant government agencies and the National Commission for the Protection of the Environment (NCPE).

The EIA process is initiated when the proponent submits a Screening Form to the ministry. This stage identifies if the project requires an Initial Environmental Examination (IEE) or a full Environmental Impact Assessment (EIA). Subsequently, the scope of the EIA will be discussed in a Scoping Meeting attended by representatives from the ministry and the proponent. Once the scope is identified, baseline surveys will be carried out and a report submitted to the ministry according to the guidelines provided in the EIA Regulation. The main components of the report

are project description, existing environment, public consultation, impact assessment, alternatives, mitigation, and monitoring. A decision statement is then issued by the ministry stating whether the project is approved, needs further information, or is rejected. The EIA process is schematically shown on Figure 2.1. The proposed activities under this Funding Proposal: i.e., land reclamation, sea wall construction projects, beach nourishment projects, and sand mining using machinery are included in the list of activities requiring an EIA (Schedule D) of the EIA Regulations).

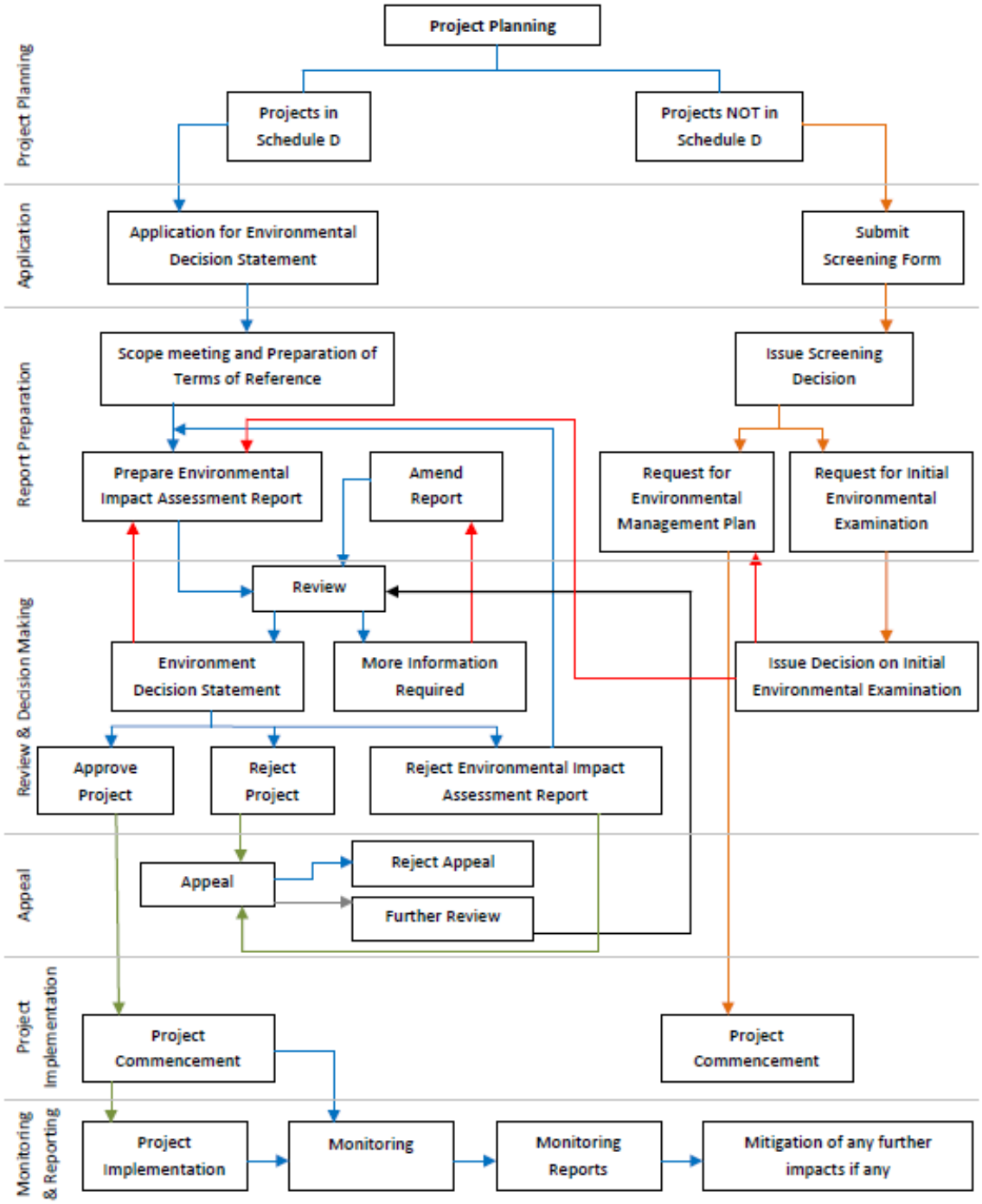


Figure 2.1 EIA Process in the Maldives
Source: Environmental Impact Assessment Regulation 2012

2.4 Guiding Policies and Documents

2.4.1 National Biodiversity Strategy and Action Plan (2016-2025)

One of the most recent policy documents, which are connected with the proposed projects, is the National Biodiversity and Strategy and Action Plan (NBSAP 2016-2025). This seeks to ensure that threats to biodiversity are addressed, biodiversity is conserved, sustainably used and benefits arising from them are shared equitably. It also encompasses ways of addressing gaps, challenges, and constraints highlighted in earlier sections. The proponent has committed on conservation and protection of the environment while undertaking this proposed project.

2.4.2 National Framework for Development 2009-2013/ 2014-2020

The National Framework for Development 2009-2013 consists of ten policies. It is the important environmental policy guidance given in the Strategic Action Plan (SAP). The environmental policies outlined in the SAP include the following:

- Policy 1: Strengthen EIA process with an emphasis on EIA monitoring.
- Policy 2: Conserve and sustainably use biological diversity and ensure maximum ecosystem benefits.
- Policy 3: Develop resilient communities addressing impacts of climate change, disaster mitigation and coastal protection.
- Policy 4: Strengthen adaptation and mitigation responses for beach erosion and develop a system to assist communities where livelihood and property are affected by beach erosion.
- Policy 5: Ensure management of solid waste to prevent impact on human health and environment through approaches that are economically viable and locally appropriate.
- Policy 6: Ensure protection of people and the environment from hazardous waste and chemicals.
- Policy 7: Improve air quality to safeguard human health.
- Policy 8: Enable a fully functional decentralized environmental governance system.
- Policy 9: Develop a low carbon economy to achieve carbon neutrality by 2019.
- Policy 10: Inculcate environmental values in the society and enable environmentally friendly lifestyle.

This policy encourages strengthening EIA process and EIA monitoring including conservation and sustainability of biological diversity. Based on this plan, relevant laws, regulations, and amendments to such regulations have been done to improve the processes and the relevant laws and regulations are covered under the Policy, Legal, and Administrative Framework of this report.

2.4.3 3rd National Environmental Action Plan, 2009-2013

The 3rd National Environmental Action Plan (NEAP 3) sets out the agenda for environmental protection and management in the Maldives for the five-year period of 2009 – 2013. This plan is targeted to achieve measurable environmental results that matter to the people of the Maldives. The aim of developing NEAP 3 is to protect and preserve country's environment and properly manage natural resources for the sustainable development of the country. This should

encompass the ten principles with six strategic results with targeted goals to be achieved under each result. The key principles of the NEAP 3 are as follows:

- Principle 1: Environmental protection is the responsibility of every individual
- Principle 2: Achieve results
- Principle 3: Promote and practice sustainable development
- Principle 4: Ensure local democracy
- Principle 5: Inter-sectoral coordination and cooperation
- Principle 6: Informed decision making
- Principle 7: Precaution first
- Principle 8: Continuous learning and improvement
- Principle 9: Right to information and participation
- Principle 10: Environmental protection complements development

2.4.4 National Solid Waste Management Policy, 2007

As waste management has been identified as a key environmental issue in the Maldives, a National Solid Waste Management for the Republic of Maldives was developed in 2007 as an important step towards mainstreaming waste management in the country. The aim of the waste management policy is to formulate and implement guidelines and means for solid waste management in order to maintain a healthy environment. Accordingly, the key elements of the policy include: i) ensuring a safe disposal of solid waste and encouraging the recycling and reduction of waste generated; ii) developing guidelines on waste management and disposal and advocating to enforce such guidelines through inter-sectorial collaboration; and iii) ensuring the safe disposal of chemical, hazardous, and industrial waste.

The proponents of this project must be aware of the policy and all solid and hazardous waste produced in this project should be disposed according to the Environmental Management Plan for the project, which reflects the principles of the Waste Management Policy.

2.4.5 Waste Management Regulations

Waste Management Regulation (No. 2013/R-58) put on gazette in August 2013 came into force in February 2014. The regulation provides a set of comprehensive guidelines on collecting, storing, transporting, and managing waste as well as the management of hazardous waste. The aim of Waste Management Regulation is to implement the national waste policy that 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 minimization, reuse, and recycling (e) implement Polluter Pays Principle; and (f) introduce Extended Producer Responsibility.

The Waste Management Regulation identifies the areas prohibited from the dumping of waste; protected areas under the Environmental Protection and Preservation Act, mangroves, lagoons of islands, coral reefs, sand banks, beaches of islands, coastal vegetated areas of islands, harbors, parks, and roads. Additionally, the Waste Management Regulation states that those involved in waste management must be permitted by the Environmental Protection Agency.

2.4.6 Decentralization Act

The main objectives of decentralizing the Administrative Divisions of the Maldives is to allow the island communities to make their own decisions in a democratic and accountable manner. These include the improvement of people's living standards through social, economic, and cultural development, the emancipation of the people, the increase in scope that will bring the services closer to the people, and the creation of an environment conducive for peace and prosperity.

In order to provide for decentralized administration, Atoll Councils, Island Councils, and City Councils are established. This project will be monitored and overlooked by PMU, in close relationship with the representatives of councils in Addu City and Laamu Atoll. The project was also formulated and finalized together with inputs from the local councils.

2.5 Multilateral Agreements and Biodiversity Protocols

2.5.1 United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol

The Maldives is a party to the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol to the UNFCCC. The objective of the convention is to achieve, in accordance with the relevant provisions of the convention, the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened and to enable economic development to proceed in a sustainable manner.

The IPCC defines mitigation "as an anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases." The greenhouse gas inventory of the Maldives forms an integral part of the First National Communication of the Maldives to the UNFCCC. In March 2009, the President of the Maldives announced the target to make Maldives carbon neutral by 2020. Hence, in the implementation of the project, careful attention needs to be given to ensure energy efficiency and reduce transport related fuel consumption. Furthermore, planting of beach vegetation would help in mitigation of greenhouse gas emissions from the project.

The IPCC defines adaptation "as an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects." Various types of adaptation include anticipatory and reactive adaptation, private and public adaptation, and autonomous and planned adaptation. The adaptation policies and strategies of the Maldives are given in the Maldives National Adaptation Programme of Action (NAPA). The replenishment of the beach can be considered as a long-term adaptation measure against beach erosion caused by rising sea levels.

2.5.2 United Nations Convention on Biological Diversity (UNCBD)

The Maldives is a party to the United Nations Convention on Biological Diversity and has prepared the National Biodiversity Strategy and Action Plan in 2002. The objectives of the UNCBD are "the conservation of biological diversity, the sustainable use of its components, and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources." The Convention entered into force on 29 December 1993.

The proposed projects in this funding proposal do not fall on any areas recognized for its ecological value, even when there are some coral inhabiting areas. However, it is unlikely that

there will be a significant loss of biodiversity. Therefore, it is recommended that the project ensures that mitigation measures are followed while executing works on land and in the marine environment to protect the marine biodiversity.

2.5.3 United Nations Convention to Combat Desertification (UNCCD)

The objective of the UNCCD is to "combat desertification and mitigate the effects of drought in countries experiencing serious drought and/or desertification, particularly in Africa, through effective action at all levels, supported by international cooperation and partnership arrangements, in the framework of an integrated approach, which is consistent with Agenda 21, with a view to contributing to the achievement of sustainable development in affected areas (Article 2)." To achieve this goal, the Convention focuses on improving land productivity, rehabilitation of land, and the conservation and sustainable management of land and water resources. The Convention was adopted in Paris on 17 June 1994 and entered into force on 26 December 1996. The Maldives has acceded to the Convention in 2002.

2.5.4 United Nations Convention on the Law of the Sea (UNCLOS)

UNCLOS refers to several United Nations events and one treaty. This treaty provided new universal legal controls for the management of marine natural resources and the control of marine pollution. UNCLOS provides a legal order for the seas and oceans that will facilitate international communication, and will promote the peaceful uses of the seas and oceans, the equitable and efficient utilization of their resources, the conservation of their living resources, and the study, protection, and preservation of the marine environment

2.6 Institutional Framework

2.6.1 Ministry of Environment, Climate Change and Technology (ME)

The Ministry of Environment, Climate Change and Technology (ME) is the primary environmental institution in the Maldives. ME is mandated with formulating policies, strategies, laws, and regulations concerning environmental management, protection, conservation, and sustainable development for the effective implementation of the Environmental Protection Act of the Maldives and has the statutory power over issues related to the environment. MEE is also responsible for formulating relevant laws and regulations, policies, and strategies concerning energy, water, sanitation, and waste management. It has the central control over environmental protection, management, conservation, and environmental emergencies. The ministry operates mainly at a policy level and the more regulatory and technical assessment activities are mandated to the Environmental Protection Agency (EPA). In this respect EPA has now been mandated to manage all issues relating to the Environmental Impact Assessment of individual projects.

2.6.2 Environmental Protection Agency (EPA)

The Environment Protection Agency (EPA) of the Ministry of Environment, Climate Change and Technology has responsibilities for the efficient operation of the EIA process. This encompasses a number of tasks, including screening of projects and provision of general procedural advice to the project EIA for any kind of development projects in the Maldives. The EPA manages the review of the EIA report and is responsible for any approvals or recommendations associated with the EIA. It is also responsible for verifying that environmental protection measures are

properly implemented by undertaking environmental audits in collaboration with other governments as well as non-government agencies with a role for environmental protection and preservation.

2.6.3 Addu City Council and Laamu Atoll Council

Under the Decentralization Act, the Maldives is grouped into 20 administrative areas under a new local governance system. In line with this, Addu Atoll has an elected City Council located on Hithadhoo Island, while Laamu Atoll has an elected Atoll Council located in Fonadhoo Island. The Council Offices are the main focal point of the Government Ministries and they coordinate and liaises with the Government Ministries and elected island councils on all issues relating to the atoll.

3. Environmental and Social Assessment

3.1 Environmental Profile of the Project Area

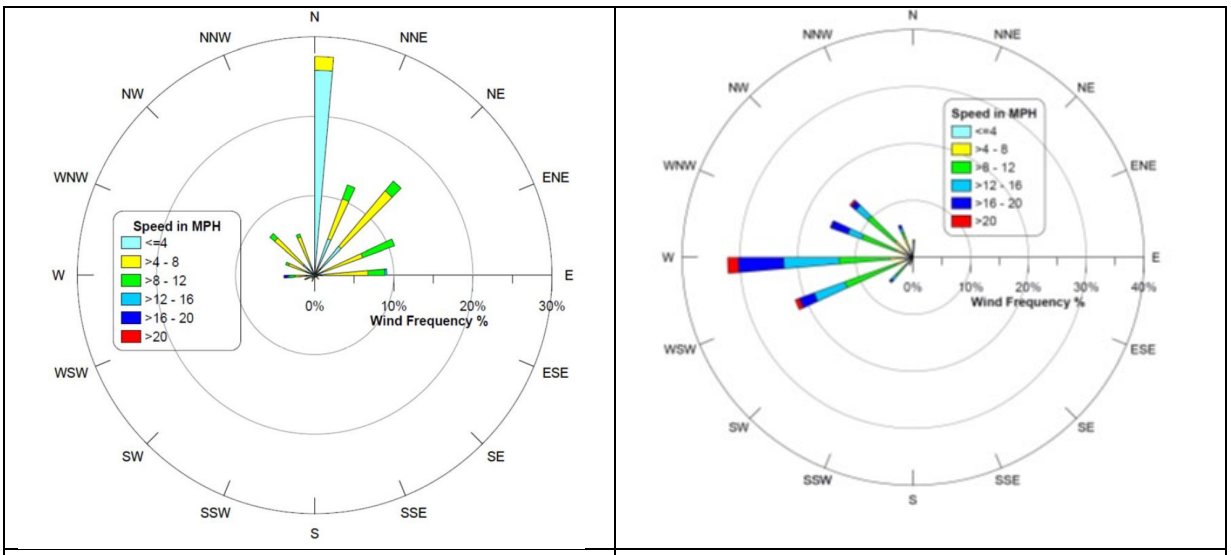
3.1.1 Climate

The Maldives has a warm and humid tropical climate. The weather is dominated by two monsoon periods: the South-West (SW) monsoon from May to September (rainy period) and the North-East (NE) monsoon from December to April (dry period), when winds blow predominantly from either of these two directions.

The relative humidity ranges from 73% to 85%. Daily temperatures in the country vary very little throughout the year with a mean annual temperature of 28°C.

3.1.1.1 Wind Conditions

Water Solutions (2014) explains that wind directions are connected to the monsoons regime. Winds from the NE and ENE are predominant during December to February. During March and April, the direction varies with the general direction being westerly. But strong winds are associated with the SW monsoon season, as shown in the following figure. During the dry season, winds from N and NE are dominant with less than 4 MPH, whilst winds from W and SSW are dominant in the rainy season with 12-20 MPH at Gan Island, Laamu Atoll.



February 2017 (Dry Season)	August 2017 (Rainy Season)

Figure 3.1 Wind Direction at Gan Island, Laamu Atoll

Source: MMS Weather Report (2017)

3.1.1.2 Precipitation

Precipitation varies from the two different monsoon seasons, with high precipitation during the south-west monsoon in May to September. Precipitation increases from the northern area to the southern area, with an average precipitation (during 1992 and 2012) of 1,779 mm in the northern area and 2,218 mm in the southern area[5].

3.1.1.3 Cyclones in the Maldives

The islands of Maldives are less prone to tropical cyclones. The northern islands of the country are affected by weak cyclones that form in the southern part of the Bay of Bengal and the

[5] Second National Communication of Maldives (2016)

Arabian Sea. The number of cyclones directly crossing Maldives is small. Only 11 cyclones, which were formed during the months of October to January, crossed the islands in a span of 128 years from 1877 to 2004 and only one event over the central Maldives. All of these events were of category-1 cyclones. There have been no cyclonic events since 1993. Fonadhoo Island in Laamu Atoll is located in a second least cyclonic hazard zone with a probable maximum cyclone wind speed of 55.9 knots (UNDP, 2006). The Maldives has not been affected by cyclones since 1993.

3.1.1.4 Currents

CDE (2018)[6] explains that in general, currents that affect the sea areas around the reef system of the islands can be the result of one or more of tidal currents, wind-induced currents, and wave-induced currents. It is presumed that the dominating two monsoon season winds have a greater effect on both oceanic currents and lagoon currents around the Maldives. Westward flowing currents are dominated from January to March and eastwardly from May to November. During the transition months, the currents are variable. Ocean currents flowing through channels between the atolls are driven by the monsoon winds. Current speeds from 1 to 1.5 knots are reported in the Admiralty pilot. However, the current in the E/W channels of the Maldives may attain up to 5 knots.

3.1.1.5 Offshore Wave Conditions (in deep water)

The swells and wind waves experienced by the Maldives are conditioned by the prevailing biannual monsoon and are typically strongest during April and July in the SW monsoon period. During this season, swells generated north of the equator with heights of 2 to 3 meters and periods of 18 to 20 seconds have been reported in the region[7].

JICA (2019) conducted the wave and swell height surveys from February 2019 at Hithadhoo Island and from December 2019 at Meedhoo Island, Addu City and at Fonadhoo and Maamendhoo islands from August 2019. The wave and swell height data will be updated after the analyses.

3.1.1.6 Tidal Datum

Tide data is an important information in any costal development project as it determines the elevation of the structures relative to a datum. Water Solutions (2014)[8] explains that a permanent tidal record station has been established at Ibrahim Nasir International Airport by Maldives Meteorological Services. The maximum tidal range recorded at this tide station is 1.20 m. The highest astronomical tide level is +0.64 m (MSL) and the lowest astronomical tide level is -0.56 m (MSL).

3.1.1.7 Tidal Levels

Water Solutions (2014)[9] the tidal regime is semi-diurnal with diurnal inequalities (twice daily). That means two high tides and two low tides per day, both with different heights. Typical spring and neap tidal ranges are approximately 1.0 m and 0.3 m, respectively.

[6] CDE, 2018: Environment Impact Assessment for the Proposed Harbour Redevelopment at Fonadhoo, Laamu Atoll
[7] Water Solutions, 2014: Environmental Impact Assessment - L. Gan – L. Fonnadhoo, Link Road Development Project
[8] Water Solutions, 2014: Environmental Impact Assessment - L. Gan – L. Fonnadhoo, Link Road Development Project
[9] Water Solutions, 2014: Environmental Impact Assessment - L. Gan – L. Fonnadhoo, Link Road Development Project

According to the tide level observation records over the past 33 years on Gan Island of the Maldives, the mean sea level (MSL) of + 0.84 m was observed as the highest tide level and an average tide level of 3.2 mm/year was observed. It is higher than the average sea level rise (1.7 mm/year, 1901-2010) in the world, which is shown in the 5th IPCC (Inter-governmental Panel on Climate Change) Assessment Report.

3.1.2 Ecology

3.1.2.1 Background

The Activities under Component 2 are located in the four islands in Laamu Atoll and one island in Addu Atoll as shown in the following table. Most of them are located at the ocean sides of each island. As the ocean sides of the islands, the widths of the reefs are not so wide compared with the lagoon sides. Most of the sites contain sparse vegetation due to the continuous erosion.

Table 3.1 Project Components at Each Island for Component 2

Atoll/ City	Island	Project Component	Funding Source	Abb.
Laamu	Fonadhoo	Beach nourishment and groins for the ocean side coast	GCF	L-FND
	Maamendhoo	Beach nourishment and groins for the south-western side coast and reclamation for a place for evacuation at the north-western top	GCF	L-MMD
	Ishdhoo	Sea walls to protect historical sites at the ocean side coast at the north top	Co-finance by Maldives	L-ISD
	Gan	Sea walls to protect the historical sites at the ocean side at the middle of the island	Co-finance by Maldives	L-GAN
Addu	Meedhoo	Beach nourishment and groins for the northern coast (ocean side)	Co-finance by Maldives	S-MED

Source: JICA (2019)

The Activities under Component 3 are not located along the coasts, but inland areas, and most of them are to be constructed at the same places of existing facilities as the replacement.

The following sections present a description of the ecological characteristics of the wider areas in relation to the five project sites for Component 2 and in proximity to the areas where construction material might be obtained. The common habitats in proximity to the project sites for Component 2 are presented in the following table.

Table 3.2 Natural Habitats of the Four Project Sites for Component 2

Atoll/ City	Island	Reef	Sandy Beach	Sand Dunes	Salt Marshes
Laamu	Fonadhoo	X	X		
	Maamendhoo	X	X		
	Ishdhoo	X			X
	Gan	X			X
Addu	Meedhoo	X	X		

Source: JICA (2019)

3.1.2.2 Terrestrial flora

The coastal areas of each target island for Component 2 consist primarily of sandy beaches, rock beaches, and salt marshes with a sparse vegetation cover composed mostly of coastal

shrubs. This shrub-vegetation-cover traps wind-drifting sand and acts as a barrier. According to the existing EIA reports for other projects implemented at targeted islands, the periphery of the site includes mainly Ruh and coconuts (*Cocos nucifera*). The projects sites at Ishdhoo and Gan islands have significant vegetation cover compared with other islands.

Most of the sites for Component 3 are cleared for the existing facilities, and some sites are cleared for the existing vegetation to install at the new sites.

3.1.2.3 Avian Fauna

CDE (2018)[10] explains that there are not so many birds recorded, except for the common crow (*Corvus linnaeus*).

3.1.2.4 Terrestrial Mammals

CDE (2018)[11] explains that some other common species such as the Rat (*Rattus* sp.), the common garden lizard (*Calotes versicolor*), Fruit Bats (*Pteropus giganteus ariel*), and other small fauna are found in Fonadhoo Island, Laamu Atoll.

3.1.2.5 Marine Ecology

Line transect surveys were carried out at around the proposed project sites of target islands in Laamu Atoll and Addu City. The general status of the sea bottom conditions was recorded along the lines and special attention was given to different types of corals. In addition, environmental conditions that may affect marine life was also recorded.

The survey results for four islands in Laamu Atoll and one island in Addu City are shown in the following tables. The live corals are observed only in three lines in Maamendhoo island, Laamu Atoll, with 19% coverage areas, and two lines in Meedhoo island, Addu City, with 13% coverage areas, while 10% to 79% areas are covered by coral rock and coral pebbles, 21% to 77% by seaweed (with coral rock/ sand). Massive-type and plate-type corals are inhabiting along three lines in Maamendhoo island.

Table 3.3 Sediment Conditions in the Target Islands in Laamu and Addu Atolls

		Laamu		Laamu		Laamu	
	Sediment condition	Maamendhoo		Fonadhoo		Ishdhoo	
		Survey lines: 9		Survey lines: 9		Survey lines: 3	
		Total Length (m)*	%	Total Length (m)*	%	Total Length (m)*	%
1	Coral	130	19%	0	0%	0	0%
2	Coral rock	162	23%	180	21%	99	79%
3	Sand + Seaweed	240	35%	344	40%	0	0%
4	Coral rock + Seaweed	0	0%	0	0%	26	21%
5	Seaweed	58	8%	0	0%	0	0%
6	Sand	103	15%	326	38%	0	0%
7	Rock	0	0%	0	0%	0	0%
	Total	693	100%	850	100%	125	100%

[10] CDE, 2018: Environment Impact Assessment for the Proposed Harbour Redevelopment at Fonadhoo, Laamu Atoll
[11] CDE, 2018: Environment Impact Assessment for the Proposed Harbour Redevelopment at Fonadhoo, Laamu Atoll

		Laamu		Addu	
	Sediment condition	Gan		Meedhoo	
		Survey lines: 2		Survey lines: 4	
		Total Length (m)*	%	Total Length (m)*	%
1	Coral	0	0%	50	13%
2	Coral rock	155	72%	40	10%
3	Sand + Seaweed	60	28%	165	41%
4	Coral rock + Seaweed	0	0%	145	36%
5	Seaweed	0	0%	0	0%
6	Sand	0	0%	0	0%
7	Rock	0	0%	0	0%
	Total	215	100%	400	100%

Note: * Total length of each conditions in line with the surveyed line transect.
Source: JICA

CDE (2018-1)[12] explains that massive- and plate-type corals, such as Favites and Platygyra species, are inhabiting the Maradhoo Islands, near Hithadhoo Island, and CDE (2018-2)[13] explains that there exist several coral species, such as the *Acroporidae*, *Faviidae*, *Poritidae*, etc., inside the reef at the southwestern part of Fonadhoo Harbor at Laamu Atoll.

Corals of Addu City were tremendously affected by the coral bleaching of 1998 where the coral cover at the lagoon side of Gan Island decreased to only a few percentage. After the coral bleaching of 1998, the coral covers have increased to 20% in 2009[14], even after the coral bleaching of 2016. The coral cover data of Meedhoo Island, Addu City, assume the recovery of coral growth in the area has not been seen.

There are no mangrove vegetation inside and around the project sites in Laamu and Addu atoll.

3.1.2.6 Protected areas

For Component 2, there are no protected areas and Marine Protected Areas (MPA) in Laamu Atoll. In Addu City, there is one protected area in Hithadhoo Island, Addu City, which is located about 13 km west of the proposed project site in Meedhoo Island.

All the target sites for Component 3 are nor in sensitive areas nor in protected areas.

3.1.2.7 Endangered species

According to the existing EIA reports for other projects implemented at targeted islands, there are no description on the existence of endangered species.

3.1.3 Marine and Surface Water Quality

3.1.3.1 Background

The five project locations that lie within the setback distance (up to 20 m) from the coastline, and within 40 m towards the reef for the beach nourishment areas and land reclamation site.

[12] CDE (2018-1): Environment Impact Assessment for the Proposed harbour Redevelopment at Maradhoo Island, Addu City
[13] CDE (2018-2): EIA for the proposed Harbour Redevelopment Project at Laamu Fonadhoo

[15] Great Barrier Reef Marine Park Authority (GBRMPA) (2009). Water quality guidelines for the Great Barrier Reef Marine Park, Great Barrier Reef Marine Park Authority, Townsville.Australia.

For the project locations targeting beach nourishment and land reclamation, the project activities may affect marine water quality at Fonadhoo, Maamendhoo, and Ishdhoo islands in Laamu Atoll and Meedhoo Island in Addu City.

The optimum conditions of water quality parameters for the coral growth stipulated by EPA and the monitoring parameters for water and sediment quality of International Finance Corporation (IFC) are shown in the following tables.

Table 3.4 Optimum Conditions of Water Quality Parameters for the Coral Growth

	Parameter	Optimum Range	Remarks
1	Temperature	18 °C ~ 32 °C	GBRMPA (2009)[15]
2	Salinity	3.2% ~ 4.2%	GBRMPA (2009)
3	pH	8.0 ~ 8.3	Levels below 7.4 pH cause stress for the coral growth
4	Turbidity	3 ~ 5 NTU	>5NTU cause stress for the coral growth Cooper *et al.* (2008)[16]
5	Sedimentation	Max. mean annual rate: 3mg/cm^2/day Daily max rate: 15mg/cm^2/day	
6	Nitrates	< 5mg/l NO_3N	UNESCO/WHO/UNEP (1996)[17]
7	Ammonia	Max. 2-3 mg/l N	UNESCO/WHO/UNEP (1996)
8	Phosphate	0.005-0.020 mg/l PO_4P	UNESCO/WHO/UNEP (1996)
9	Sulphate	2-80 mg/l	UNESCO/WHO/UNEP (1996)
10	BOD	<2 mg/l O_3	UNESCO/WHO/UNEP (1996)
11	COD	<20 mg/l O_2	UNESCO/WHO/UNEP (1996)

Source: EIA Data Collection Guidelines

Table 3.5 Water and Sediment Quality Monitoring Parameters

	Parameter	Units	Guideline Value	Source
1	Temperature		-	
2	Salinity		0.5-10	2 (*2)
3	pH	pH	6-9	1
4	Turbidity	NTU	1-20	2
5	Sedimentation		-	-
6	Total nitrogen	mg/l	10	1
7	Ammonia	µg N/l	1-10	2 (*1)
8	Total phosphorous	mg/l	2	1
9	Sulphate		-	-
10	DO	mg/l	>5	2 (*3)
11	BOD	mg/l	30	1
12	COD	mg/l	125	1
13	Total suspended solids (TSS)	mg/l	50	1

Source:
1: Table 1.3.1 of Environmental, Health, and Safety General Guidelines (2007)
2: Table 1 of Environmental, Health, and Safety Guidelines for Ports, Harbors, and Terminals (2017) and The Australian and New Zealand Guidelines for Fresh and Marine Water Quality (Chapter 3 Aquatic Ecosystems) (2000).
- 2(*1) Table 3.3.4 and Table 3.3.5 for the Tropical Australia
- 2(*2): Table 3.3.9 for South central Australia - low rainfall area
- 2(*3): Table 4.4.2

[15] Great Barrier Reef Marine Park Authority (GBRMPA) (2009). Water quality guidelines for the Great Barrier Reef Marine Park, Great Barrier Reef Marine Park Authority, Townsville.Australia.
[16] Cooper, T.F, Ridd, P.V., Ulstrup, K.E., Humphrey, C., Slivkoff, M. and Fabricius, K.E. (2008). Temporal dynamics in coral bioindicators for water quality on coastal coral reefs of the Great Barrier Reef, Marine and Freshwater Research, 59 (8), 703–716.
[17] Water Quality Assessments - A Guide to Use of Biota, Sediments and Water in Environmental Monitoring, 2nd Ed.,

3.1.3.2 Water Quality at the Coasts of Lagoon Sides and Ocean Sides

According to the water quality surveys done by JICA in 2019, the water quality of the marine water at the project locations are as follows:

a. The mean pH ranges between 5.47–5.92 along the coast of lagoon side of Addu City, and 6.16-6.25 along the coast of the lagoon side of Laamu Atoll, which indicate that the water is at a very acidic level to cause stress for the coral growth;

b. The mean salinity ranges from 27-35%, along the coast of the lagoon side of Addu City, and 35 -26% along the coast of the lagoon side of Laamu Atoll, showing close to the standard levels;

c. The mean turbidity is relatively high due to sediment transport from the freshwater outlets; and

d. The mean dissolved oxygen (DO) recorded level is 2.26–6.63 along the coast of the lagoon side of Addu City, and 6.17–6.25 along the coast of the lagoon side of Laamu Atoll, showing most of them within the optimum ranges.

3.1.3.3 Surface Waters at Construction Locations

According to the water quality surveys done by the JICA in 2019, the water quality of the surface water at the project locations are as follows:

a. The mean pH ranges between 5.44–5.83 for the groundwater at Addu City, and 5.28-6.25 for the groundwater at Laamu Atoll, which indicate that the water is at a very acidic level to cause stress for the coral growth; and

b. The mean salinity ranges between 0.01–0.05%, for the groundwater at Addu City, and 0.15-0.23% for the groundwater at Laamu Atoll, showing close to the standard levels.

3.1.4 Air Quality

3.1.4.1 Background

The two project locations, which will be funded by GCF, and one location, which will be planned to be funded by the Maldivian co-finance, for Component 2, include the beach nourishment and land reclamation to which the coral sand will be filled by using the TSDH and such coral sand will be dredged from the lagoon by TSDH For the project locations targeting beach nourishment and land reclamation, the project activities may affect air quality at Fonadhoo, Maamendhoo, and Ishdhoo islands in Laamu Atoll and Meedhoo Island in Addu City.

The Maldives lacks the necessary environmental standards for the measurement of ambient air and noise quality. Therefore, for these quality standards, typically IFC/ WHO standards or international standards or standards of developed countries are referred, as shown in the following tables.

Table 3.6 WHO Ambient Air Quality Guidelines

	Parameter	Averaging Period	Guideline value in mg/m^3	Remarks
1	Sulfur dioxide (SO_2)	24-hour mean 10-minute mean	20 $\mu g/m^3$ 500 $\mu g/m^3$	
2	Nitrogen dioxide (NO_2)	1-year mean 1-hour mean	40 $\mu g/m^3$ 200 $\mu g/m^3$	
3	Particulate Matter (PM10)	1-year mean 24-hour mean	20 $\mu g/m^3$ 50 $\mu g/m^3$	
4	Particular Matter (PM2.5)	1-year mean 24-hour mean	10 $\mu g/m^3$ 25 $\mu g/m^3$	
5	Ozone	8-hour mean	100 $\mu g/m^3$	

Source: World Health Organization (WHO) (2005) Air Quality Guidelines Global Update
IFC (2007) Environmental, Health, and Safety General Guidelines

3.1.4.2 Air quality impacts

All construction activities have the potential to cause air quality impacts. The expected adverse air quality levels at the two target atolls are:

a. Fonadhoo Island, Laamu Atoll: expected to have the lowest adverse air quality level since the project location is a bit far from the main link road.

b. Maamendhoo Island, Laamu Atoll: adverse air quality sources impacting the ambient levels at this area include the Maamendhoo Harbour and the coastal road.

c. Gan Island, Laamu Atoll: expected to have the lowest adverse air quality level since the project location is a bit far from the main link road.

d. Ishdhoo Island, Laamu Atoll: expected to have the lowest adverse air quality level since the project location is a bit far from the main roads.

e. Meedhoo Island, Addu City: adverse air quality sources impacting the ambient levels at this area include the Meedhoo Harbour and the coastal road.

Workers involved in construction and operation activities should be familiar with the methods for minimizing the impacts of deleterious air quality and alternative construction procedures.

3.1.5 Noise and Vibration

3.1.5.1 Background

There is no available data for continuous noise and vibration monitoring in the target islands in Laamu Atoll and Addu City. Existing sources of ambient noise may include: roads, harbors, power stations, general urban noise. The expected ambient noise levels at the two target atolls for Component 2 are:

a. Fonadhoo island, Laamu Atoll: Noise sources impacting the ambient levels at this area include the Trailer Sanction Hopper Dredger for beach nourishment.

b. Maamendhoo island, Laamu Atoll: Noise sources impacting the ambient levels at this area include the Maamendhoo harbour and the Trailer Sanction Hopper Dredger for beach nourishment.

c. Gan Island, Laamu Atoll: expected to have the lowest ambient noise level since the only noise source close to the project location is a bit far from the main link road.

d. Ishdhoo Island, Laamu Atoll: expected to have the lowest ambient noise level since the only noise source close to the project location is a bit far from the main roads.

e. Meedhoo Island, Addu City: Noise sources impacting the ambient levels at this area include the Meedhoo Harbour and the Trailer Sanction Hopper Dredger for beach nourishment. CDE (2016)[18] explains that noises were measured at the levels of 60-80 dB (A) along the coast and near Meedhoo Harbour.

The use of heavy machinery or introduction of noise/vibration generating facilities could have adverse effects on the environment and residents if not appropriately managed.

Contractors involved in construction activities should be familiar with the methods of controlling noisy machines and alternative construction procedures as contained within specific Maldivian legislation. Potential noise sources during construction may include:

a. Heavy construction machinery/vehicles including the backhoe;

b. Power tools, generators, and pumps; and

c. Dredges and trucks when collecting and unloading construction materials.

The Maldives lacks the necessary environmental standards for the measurement of noise quality. Therefore, for these quality standards, typically IFC/ WHO standards or international standards or standards of developed countries are referred, as shown in the following tables. Noise impacts should not exceed the levels presented in the following table or result in a maximum increase in background levels of 3 dB at the nearest receptor location off-site.

Table 3.7 Noise Level Guidelines

	Receptor	One Hour L_{Aeq} (dBA)		Remarks
		Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00	
1	Residential; institutional; educational	55	45	
2	Industrial; commercial	70	70	

Source: IFC (2017) Environmental, Health, and Safety Guidelines for Ports, Harbors, and Terminals

3.1.6 Bathymetry

3.1.6.1 Background

The topographic surveys and water depth surveys were conducted by JICA in 2019 in order to know typical vertical topography from the land area to the sea area for some lines at Fonadhoo, Gan and Maamendhoo islands in Laamu Atoll.

In case of Gan Island, Laamu Atoll, the ridge on the ocean side is higher than the ridge on the lagoon side, but this is due to the fact that the wave on the ocean side and the wave run up height are larger than those on the lagoon side. From the coastal area to the reef area of the sea, it is a typical terrain found on the coral reef coast that leads from the back beach to a flat reef flat, reef edge, steep reef slope with several hundred mails.

The detail analysis of the topographic profiles for Fonadhoo and Maamendhoo islands are shown in the Annex 2 of the Funding Proposal.

However, in order for the detail design of the beach nourishment, the detail bathymetry surveys will be conducted during the Detail Design.

[18] CDE (2016): First Addendum to the Environmental Impact Assessment of Oceanside Channel Dredging Project in Meedhoo Island, Addu City

For the sand borrow areas for dredging the sands for the beach nourishment, the detail surveys for the candidate borrow sites will also be conducted during the Detail Design survey.

3.1.7 Erosion and Sediment Control

3.1.7.1 Erosion

The Maldives is inherently vulnerable to coastal disasters such as high waves, flooding, and tsunami. In recent years, the coastal erosion problem has become serious, mainly in inhabited islands. As of 2014, 116 islands out of the 188 inhabited islands have coastal erosion and 38% of which were in serious coastal erosion situations[19]. Along the coast in the Maldives surrounded by coral reefs, the wave reaching the coast increases in proportion to the water depth along with sea level rising due to climate change. Further acceleration of coastal erosion resulted from two factors: sea level rising due to climate change and increase of wave.

3.1.7.2 Flooding and Saltwater Intrusion

The sea level rise and the accompanying acceleration of coastal erosion contribute to the damage caused by high waves and the inundation in hinter land. They also impede the safety and security of the island residents and damage critical infrastructure. The Maldives with low land has frequently suffered high waves and inundation damage. The frequency of high waves and inundation will increase significantly due to sea level rise because of climate change.

3.1.7.3 Sediment

The distribution of sediment composition depends on the equilibrium between gravity of sediments and water forces. Among the proposed activities under Component 2, coral sand will be deposited along the coasts off to about 20 m for beach nourishment at Fonadhoo and Maamendhoo islands, Laamu Atoll as GCF-funded project and Meedhoo Island, Addu City, as the Maldives co-financing project. Due to the deposition of the coral sand, sediment situations will change from the current situations. JICA (2019) conducted soil texture analyses for the sediments of offshore areas nearby the target sites. The sediment texture analyses data will be updated after the analyses.

Around half volumes of the dredged coral sands will be utilized to fill the beaches for beach nourishment and land reclamation, as mentioned in the Section 1.2.4, and around half of them will be stocked at stock piles for supplemental beach filling during operation stage. After excavation to install groins and revetment walls, those excavated soils and rocks will be utilized to fill into the backfilling, so that there would be less soils unused.

3.1.8 Waste Management

3.1.8.1 Background

Based on the strategy and plan in the Maldives, the Waste Management Centers have been constructed in most of the target islands in Maldives, including Laamu Atoll and Addu City for Component 2.

[19] Ministry of Environment and Energy, 2017: State of Environment 2016

3.1.8.2 Industrial waste during the construction stage

For Component 2, as there are no construction works to use cement, except for drainage works for reclamation works, much amount of the industrial wastes from formworks and concrete works will not occur. For revetment works at existing sea walls areas, after demolishing the existing old sea walls, those materials will be used as the core materials to install the new revetment works, so that there would be quite less waste from the construction.

3.1.9 Presence of Endemic Vector-borne disease

The most common and endemic vector-borne diseases in the Maldives are Zika fever, dengue fever and chikugunya fever, which are transmittable from mosquitos. Risk of Chikungunya transmission is present throughout the Maldives, especially in North Central, South Central, and Upper South Provinces. Risk of Dengue transmission is present throughout the Maldives, with peak transmission occurring during the rainy season, from April to September. The Maldives have a history of previous Zika Virus transmission. There is currently no evidence of an ongoing Zika Virus outbreak. However, there is limited information available and there may be delays in detecting and reporting new cases. [20]

3.2 Social Profile of the Project Area

3.2.1 Demography

3.2.1.1 Demography

Residential population of Laamu Atoll in 2014 was 12,676 (male: 6,648 and female: 6,028), of which 11,795 Maldivians (male: 5,859 and female: 5,936) and 881 foreigners (male: 789 and female: 92). Annual population growth rate is 0.10. Population data of each island in Laamu Atoll are shown in the following table. Gan Island has the highest population but the population density is quite low.

Table 3.8 Residential Population of Administrative Islands in Laamu Atoll

Island/Locality	Resident (person)	Area (ha)	Density (person/ha)	Annual Population Growth Rate
Dhabidhoo	647	53.2	12.2	1.73
Fonadhoo	2,266	162.6	13.9	2.07
Gaadhoo	178	69.1	2.6	-3.33
Gan	3,080	663.0	4.6	1.36
Hithadhoo	1,007	112.6	8.9	1.99
Isdhoo	958	145.5	6.6	-6.35
Kunahandhoo	650	91.7	7.1	0.50
Maabaidhoo	649	59.2	11.0	-1.49
Maamendhoo	896	18.7	47.9	-0.27
Maavah	1,530	38.4	39.9	0.23
Mundoo	236	23.6	10.0	-6.07
Kalaidhoo	579	27.1	21.3	-
Total	12,676	1,464.8	8.7	0.10

Source: Population & Housing Census 2014

Residential population of Addu City in 2014 was 19,829 (male: 9,441 and female:10,388), of which19,319 Maldivians (male: 9,195 and female: 10,124) and 1,956 foreigners (male: 1,780 and female: 176). Annual population growth rate is 1.23. Population data of each island in Addu

[20] International Association for Medical Assistance to Travellers: https://www.iamat.org/country/maldives

City are shown in the following table. Hithadhoo Island has the highest population but the Feydhoo island has high density.

Table 3.9 Residential Population Data of Administrative Islands in Addu City

Island/Locality	Resident (person)	Area (ha)	Density (person/ha)	Annual Population Growth Rate
Meedho	1,871	184.3	17.3	2.33
Feydhoo	3,431	63.9	53.7	1.87
Hithadhoo	11,129	548.0	20.3	1.11
Maradhoo	2,374	57.9	41.0	0.84
Maradhoofeydhoo	1,228	33.6	36.6	1.44
Hulhudhoo	1,242	122.2	10.2	-0.41
Total	21,275	1,009.9	21.1	**1.23**

Source: Population & Housing Census 2014

Residential population of the target islands for Component 3 is shown in the following table.

Table 3.10 Residential Population Data of Target Islands for Component 3

	Island/Locality	Resident (person)	Area (ha)	Density (person/ha)	Annual Population Growth Rate
1	Ha. Dhidhdhoo	2,854	57.1	50.0	0.63
2	HDh. Kulhudhufushi	8,440	234.9	35.9	1.90
3	Sh. Funadhoo	2,104	88.9	23.7	2.74
4	N. Manadhoo	1,397	106.5	13.1	1.03
5	R. Ungoofaaho	1,501	33.1	45.4	-9.02
6	B. Eydhafushi	2,658	31.0	85.6	0.69
7	Lh. Naifaru	4,103	54.3	75.5	0.56
8	K. Vilingili (Male)	7,988	31.7	252.0	0.91
9	K. Maafushi	3,025	36.5	82.9	3.23
10	V. Felidhoo	506	14.2	35.6	-0.25
11	ADh. Dhangethi	824	24.2	34.1	1.57
12	F. Feeali	839	15.3	54.8	1.05
13	Ga. Nilandhoo	600	59.8	10.0	-0.75
14	L. Gan	3,080	663.0	4.6	1.36
15	Th. Guraidhoo	1,280	37.4	34.1	0.75
16	Ga. Viligili	2,837	102.9	27.6	3.02
17	GDh. Gadhdhoo	1,502	60.0	25.0	-0.37
18	GDh. Fiyoari	737	79.1	9.3	0.28
19	GDh. Thinadhoo	5,230	118.9	44.0	0.59
20	Gn. Foammulah	8,510	493.0	17.3	0.69
21	S. Hithadhoo	11,129	548.0	20.3	1.11

Source: Population & Housing Census 2014

3.2.2 Land Use

3.2.2.1 Land use

The main land uses of each island are residential area, commercial area, agricultural area, and natural forests. There is one large-size fish processing plant in Meedhoo Island and there are a few fish dry factories in other islands.

For the high density islands, such as Fonadhoo and Maamendhoo islands, there are some areas of which the setback is less than 20 m. On the other hand, in the other islands, the setback

from the coast lines is wider than 20 m. Most of setback areas are designated as the protection areas.

Large scale industry in Laamu Atoll is a fishery processing factory in Maandhoo. Small scale bonito flakes factories can be seen at coastal area of the other inhabited islands, but the impact of the bonito flakes factories to living environment at residential areas is not significant.

Along the coast areas, there is one sea cucumber cultivation pond, operated by the local people, in Fonadhoo island, Laamu Atoll, and coastal beaches and reef areas are used as the recreation areas by the local people in most of the islands.

3.2.2.2 Settlement within the proposed project sites

Setback from the coastal line is less than 20 m at the ocean side of Fonadhoo and the western part of Maamendhoo. These islands have fairly higher population density and residential areas have expanded from land side to sea side. The other islands such as Gan and Isdhoo secure set back more than 20 m.

There are no settlement within the proposed project sites in Fonadhoo and Maamendhoo islands of Laamu Atoll and Meedhoo island of Addu City for beach nourishment, and Gan and Ishdhoo islands for seawall (revetment).

3.2.2.3 Ownership status of the lands where the seawalls will be constructed and at the quarry sites.

The ownership status of the lands where the seawalls will be constructed at Gan and Ishdhoo islands of Laamu Atoll are national land, and there are no quarry sites for .seawall construction, as all the materials for seawall will be imported from India or other countries.

3.2.3 Archaeological and Cultural Heritage

3.2.3.1 Background

For Component 2, there are archaeological and cultural heritages in Gan and Ishdhoo islands in Laamu Atoll and the proposed activities, which will be funded by the Maldivian governments, are to protect those cultural heritages. All of them are the artificial mounds by the coral stones to bury the ancient Buddhist statues and temples. As these artificial mounds are located around 10-15m inland from the coastal lines, to which the interventions will be done, there are no adverse impacts to these areas from the interventions.

For Component 3, such cultural heritages have not been reported in the EIA reports for the selected target islands[21][22]

3.2.4 Livelihood activities

3.2.4.1 Background

Based on the secondary data, the following livelihood activities are confirmed for the three islands in Laamu and Addu Atolls, to which the beach nourishment is to be planned under the Component 2.

[21] Energy Consultancy Pvt. Ltd. (2018a): EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project (for 9 sites)
[22] Energy Consultancy Pvt. Ltd. (2018b): EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project (for 3 sites)

CDE (2018)[23] reported that there are 50 shops, 9 cafés and 7 workshops in the island. The main use of land resources is for agriculture (40 farmers) and the main use of marine resources is for fisheries with Fonadhoo island of Laamu Atoll, accommodating 30 fishermen and 5 fish processing units. The total working population of Fonadhoo is 946 according to census 2014. The main employment sector of Fonadhoo is the Civil Service (198 locals working) and transportation sector (158 locals working).

CDE (2017)[24] reported that the total number of employed population in Maamendhoo of Laamu Atoll in 2014 was 381. Amongst them 86 are employed in fishing, 75 in manufacturing, 43 in trade, 42 in education, and 40 in accommodation and food services.

CDE (2019)[25] reported that the 4 main employment sectors in Meedhoo island of Addu City according to census 2014 are tourism & food services (16%) manufacturing (16%), construction (14%) and education (10%). Other main economic sectors include wholesale and retail trade, public administration and construction.

Along the coast areas, there is one sea cucumber cultivation pond, operated by the local people, in Fonadhoo island, Laamu Atoll. There are several small fish factories along the coasts in Fonadhoo island, Laamu Atoll and there is one large fish can company at Maandhoo island, Laamu Atoll.

The further information on livelihood activities will be collected during the Detailed Design survey in the future.

3.2.5 Labor issues, occupational health and safety

3.2.5.1 Background

The ministry responsible for labour administrations does not collect or publish national labour statistics and it mainly keeps the statistics and records of foreign workers since Maldives is such a country where a huge number of foreigners work in different fields like construction, agriculture and fishing. Up to 2019, “A guide to health and safety at construction site” published by MACI (Maldives association of construction industry) was the sole guideline to assist all employers, workers and clients in the construction industry in the Maldives, since there were not any specific act towards Occupational Health and Safety (OHS) in Maldives.

In 2019, the specific regulation related to OHS was enacted; namely Health and Safety Regulation for Construction Industry (2019/R-156). The aim and objective of this regulation is to provide minimum standard for safety and security of the community and labour force[26].

3.2.6 Indigenous peoples and vulnerable groups in the project site

3.2.6.1 Background

There are no indigenous peoples living in and around the proposed project sites.

There are some vulnerable groups, such as people with disability, elders and children living in the islands, however, there are no people living inside the vicinity of the proposed project sites.

[23] CDE (2018): Environment IMPACT Assessment for the Proposed Harbour Redevelopment at Fonadhoo, Laamu Atoll
[24] CDE (2017): Maamendhoo Island Waste Management Center Environmental Management Plan
[25] CDE (2019): Environment Impact Assessment for the Proposed Harbour Redevelopment at Meedhoo, Addu City
[26] Ministry of Environment (2020): Labour Management Procedures (for the Accelerating Renewable Energy Integration and Sustainable Energy (ARISE) Project)

As identified and discussed in Table 3.24, 3.28, and 3.32, there may be a restriction however on the use of the area for their livelihood activities during construction and due to the coastal and reef conservation plan.

3.3 Environmental Risks and Impacts and Mitigation Options

Environmental risks and potential impacts relating to GCF's Environmental and social safeguards (ESS) standards: i.e. ESS1, ESS3, ESS4, and ESS6 are assessed and discussed below.

3.3.1 Environmental Risks and Impacts and Mitigation Options for Component 1

3.3.1.1 ESS1: Environmental and Social Risks and Impact

Table 3.11 Assessment of risks and potential impacts related to ESS1 for Component 1

	Item	Risks and Potential impact	Mitigation options
1	Climate	No adverse effects to the climate at the target sites would be occurred, as there are no activities which affect to the climate.	
2	Climate Change	No adverse effects to the climate change at the target sites would be occurred, as there are no activities which affect to the climate.	
3	Management of ES risks in the pilot/case study implementation of ICZM Plans.	ICZM Plan is unable to address key drivers of coastal resource degradation Loss of access to livelihood and restriction of traditional economic activities	The formulation of ICZM shall be based on a detailed and comprehensive study of coastal ecosystem and economic activities and the main drivers of resource degradation (e.g. overfishing, over abstraction of freshwater, coral harvesting, sand mining, natural cycles, etc. in addition to climate change). The ICZM Plan should include management measures for potential adverse risks and impacts of the implementation of the ICZM Plan to the coastal communities such as restriction of access, loss of livelihood, etc.). Management measures may be in the form of alternative livelihood development (See also Table 3.24)

Source: JICA (2020)

3.3.1.2 ESS3: Resource Efficiency and Pollution Preventions.

Table 3.12 Assessment of risks and potential impacts related to ESS3 for Component 1

	Item	Risks and Potential impact	Mitigation options
1	Air Quality	No adverse effects to the air quality at the target sites would be occurred, as there are no sources by the activities.	
2	Water Pollution	For the implementation of sediment budget control plan, the water quality may be affected in some extent, due to the improper implementation.	Proper implementation of sediment budget control plan and adequate management of the sediment may be necessary.
3	Soil Pollution	No adverse effects to the soil pollution at the target sites would be occurred, as there are no sources by the activities.	
4	Waste Management	No adverse effects to the waste management at the target sites would be occurred, as there are no sources by the activities.	
5	Noise and Vibration	No adverse effects to the noise and vibration at the target sites would be occurred, as there are no sources by the activities.	
6	Subsidence	No adverse effects to the subsidence at the target sites would be occurred, as there are no sources by the activities.	
7	Odor	No adverse effects to the odor at the target sites would be occurred, as there are no odor sources by the activities	

	Item	Risks and Potential impact	Mitigation options
8	Sediment	For the implementation of sediment budget control plan, the sediment may occur in some extent, due to the improper implementation.	Proper implementation of sediment budget control plan and adequate management of the sediment may be necessary.
9	Groundwater	No adverse effects to the groundwater at the target sites would be occurred, as there are no extraction of a large volume of groundwater by the activities.	
10	Hydrology	No adverse effects to the hydrology at the target sites would be occurred, as there are no activities which affect to the hydrology.	
11	Coastal Areas	For the establishment of coastal and reef conservation plan and implementation of sediment budget control plan, the marine system in the coastal areas may be affected in some extent, due to the improper implementation.	Proper establishment coastal and reef conservation plan, implementation of sediment budget control plan and adequate management of the sediment may be necessary.
12	Soil Erosion	For the implementation of sediment budget control plan, the soil erosion may occur in some extent, due to the improper implementation.	Proper implementation of sediment budget control plan and adequate management of the sediment may be necessary.

Source: JICA (2020)

3.3.1.3 ESS4: Community Health, Safety and Security.

Table 3.13 Assessment of risks and potential impacts related to ESS4 for Component 1

	Item	Risks and Potential impact	Mitigation options
1	Gender discrimination and GBV	Discrimination based on gender, marital status, age, or any other physical or mental attribute.	Staff will be made aware of the avenues available at the Ministry for victims of sexual harassment. Staff will be able to lodge complaints to the Sexual Harassment Prevention Committee at the Ministry, established under Prevention of Sexual Harassment Act (16/2014).
		Sexual harassment. Many such cases have come to light in the Maldives and across the world recently.	
		Physical and verbal harassment and workplace bullying.	
		Discrimination in relation to opportunity/access for training and self-development.	Equal training opportunity will be available to all staff working in the project without discrimination, based on gender or otherwise, as specified in the Employment Act. It is responsibility of the Project Manager and the Project Director to ensure that such discrimination does not exist.
		Lack of availability of incentives available to staff at other organizations employed at similar capacity can lead to demotivation and ultimately poor staff retention.	All staff will be made aware of grievance redress mechanism. Provide health insurance packages to all project staff, equivalent to that given by other government companies and institutions working in similar capacities.

Source: JICA (2020)

3.3.1.4 ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

Table 3.14 Assessment of risks and potential impacts related to ESS6 for Component 1

	Item	Risks and Potential impact	Mitigation options
1	Protected Areas	There are no protected areas and Marine Protected Areas (MPA) around the proposed project sites.	

	Item	Risks and Potential impact	Mitigation options
2	Ecosystem and Fauna/Flora	No adverse effects to the ecosystem and fauna/ flora at the target sites would be occurred, as there are no activities which affect to ecosystem and fauna/ flora.	
3	Geology and Geomorphology	No adverse effects to the accidents at the target sites would be occurred, as there are no activities which affect to geology and geomorphology.	

Source: JICA (2020)

3.3.2 Environmental Risks and Impacts and Mitigation Options for Component 2

3.3.2.1 ESS1: Environmental and Social Risks and Impact

Table 3.15 Assessment of risks and potential impacts related to ESS1 for Component 2

	Item	Risks and Potential impact	Mitigation options
1	Climate	No adverse effects to the groundwater at the target sites would be occurred, as all the projects are in small scale.	
2	Climate Change	No adverse effects to the groundwater at the target sites would be occurred, as all the projects are in small scale.	
3	Site-specific assessment and management	All site development activities will be subject to ES Screening and the government's environmental clearance and permitting process. This would involve a more detailed ES assessment and formulation of site-specific management plans. The scope of the assessment and plans will cover all issues relating to the GCF ESSs (ESS2-8).	

Source: JICA (2020)

3.3.2.2 ESS3: Resource Efficiency and Pollution Preventions.

Table 3.16 Assessment of risks and potential impacts related to ESS3 for Component 2

	Item	Risks and Potential impact	Mitigation options
1	Air Quality	During the construction stage, the adverse effects would be occurred to the air quality by using the large machineries, i.e. dredging machine.	Large machineries to be used shall be maintained properly, in order not to emit the unnecessary exhaust gas.
2	Water Pollution	During the construction stage, the adverse effects would be occurred to the water quality by using the large machineries, i.e. dredging machine, backhoes, etc.	Large machineries to be used shall be maintained properly, in order to prevent the water pollution.
		During the construction stage, the adverse effects would be occurred to the water quality by inadequate water drainage and soil spill into the sea.	During the construction stage, the adequate drainage water treatment shall be done, i.e. installing silt protectors and sand bunds.
		For the beach nourishment and land reclamation, the adverse effects would be occurred to the water quality by inadequate soil spill into the sea, during the operation stage.	During the operation stage, the community-based maintenance and monitoring will be done through the project.
3	Soil Pollution	During the construction stage, the adverse effects would be occurred to the soil quality, by oil leaking from the large machineries.	During the construction stage, such measures as preparation of the construction accident prevention manual, installation of oil treatment mat, shall be conducted.
4	Waste Management	During the construction stage, there will be possibility to appear garbage and harmful waste.	During the construction stage, all the waste materials produced from the construction shall be disposed at Island Waste Management Centers. The

	Item	Risks and Potential impact	Mitigation options
			harmful wastes shall be disposed to Thilafushi island. These materials shall not be disposed to any costal area or any eroded area without prior consent of Environmental Protections Agency (EPA).
5	Noise and Vibration	During the construction stage, the noise and vibration would be occurred by using the large machineries, i.e. dredging machine, backhoes, etc.	During the construction stage, the noise-cut large machineries and generators shall be used. During the construction stage, the large machineries shall not be used during the night time nearby the residential areas.
6	Subsidence	No adverse effects to the subsidence at the target sites would be occurred, as there are no extraction of a large volume of groundwater by the project.	
7	Odor	No adverse effects to the odor at the target sites would be occurred, as there are no odor sources by the projects.	
8	Sediment	For the beach nourishment and land reclamation, the adverse impact may occur for the subsistence (sea bed) during the construction and operation.	For the beach nourishment and land reclamation, the existing situations/ conditions of the sediment shall be confirmed before construction. During the construction stage, such measures to prevent from the adverse effects, shall be considered, i.e. installing silt protectors and sand bunds.
			During the operation stage, the community-based maintenance and monitoring will be done through the project.
9	Land and General Landscape	Land degradation, landscape/beach deformation, landslip and erosion	Proper siting of quarry/borrow sites and compliance with regulation. Alternative sites should be considered and assessed in terms of least ES impacts. The detailed ESIA should develop siting criteria for borrow sites.
10	Soil Erosion	For the construction of beach nourishment, there will be possibilities that sand discharge would be occurred, and sands stocked at stockpiles for the supplementary beach filling would be eroded by the rains and normal waves.	Detailed simulation and calculation should be taken in order to reduce sand discharge by installing the groins for the beach nourishment at the planning stage. For the beach nourishment, regular monitoring should be conducted to check the situations of the nourished beaches, and if sand discharge would be occurred, supplementary sand filling should be conducted, if necessary. in order for the sands stocked at stockpiles for the supplementary beach filling not to flow into the sea due to the rain and waves, such sand stockpile should be installed inland from the coastal area, and surrounded by the fences, if necessary.
11	Groundwater	No adverse effects to the groundwater at the target sites would be occurred, as there are no extraction of a large volume of groundwater by the projects.	

	Item	Risks and Potential impact	Mitigation options
12	Hydrology	For the construction of beach nourishment, there will be possibilities that the nearshore currents and waves would be changed after the construction.	Detailed simulation and calculation should be taken in order to reduce changes of nearshore currents and waves by installing the groins for the beach nourishment at the planning stage.
13	Coastal Areas	During the construction and/or operation stages, there will be possibilities for the marine ecosystem and coastal areas to be suffered from the adverse effects.	Adequate measures e.g. installing silt protectors and sand bunds, to reduce the turbidity, to be taken for the marine ecosystems, especially for the corals inhabiting areas, and migrant birds utilizing.
14	Geology and Geomorphology	For the construction of beach nourishment, sand discharge would be occurred by the normal waves. .	**Planning stage:** Detailed simulation and calculation should be taken in order to reduce sand discharge by installing the groins for the beach nourishment at the planning stage. For the beach nourishment, regular monitoring should be conducted to check the situations of the nourished beaches, and if sand discharge would be occurred, supplementary sand filling should be conducted, if necessary..

Source: JICA (2020)

3.3.2.3 ESS4: Community Health, Safety and Security.

Table 3.17 Assessment of risks and potential impacts related to ESS4 for Component 2

	Item	Risks and Potential impact	Mitigation options
1	Construction safety hazard	Exposure of residents to construction health and safety hazards, including equipment traffic hazards.	Provisions of adequate warning signages in dangerous areas at the construction sites Information and awareness campaigns among residents of the hazards Fencing of deep excavations
2	Health Hazard	Potential increase incidence or outbreak of diseases due to presence of migrant workers Exposure of residents to dusts and noise	Medical screening of workers Information and awareness campaigns about disease hazards such as HIV/AIDs Dust suppression and avoidance of work during nighttime
3	Security	Potential increase in criminality and vices, including GBV Possible conflict between contractor workers with local communities	Project to require contractors to adopt a Code of Conduct for workers

Source: JICA (2020)

3.3.2.4 ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

Table 3.18 Assessment of risks and potential impacts related to ESS6 for Component 2

	Item	Risks and Potential impact	Mitigation options
1	Protected Areas	There are no protected areas and Marine Protected Areas (MPA) around the proposed project sites.	
2	Ecosystem and Fauna/Flora	During the construction and/or operation stages, there will be possibilities for the marine	Adequate measures; e.g. installing silt protectors and sand bunds, to reduce the turbidity, to be taken for the marine ecosystems, especially for the corals

	Item	Risks and Potential impact	Mitigation options
		ecosystem to be suffered from the adverse effects.	inhabiting areas, and migrant birds utilizing. During the construction stage, adequate measures to be taken for the coastal vegetation; i.e. any tree that could be replanted, shall be replanted in a different location, try to avoid cutting down of or uprooting of unnecessary vegetation. During construction stage, the sand borrow sites shall be carefully selected in order to avoid damages/ disturbances to the marine ecosystem.

Source: JICA (2020)

3.3.3 Environmental Risks and Impacts and Mitigation Options for Component 3

3.3.3.1 ESS1: Environmental and Social Risks and Impact

Table 3.19 Assessment of risks and potential impacts related to ESS1 for Component 3

	Item	Risks and Potential impact	Mitigation options
1	Climate	No adverse effects to the groundwater at the target sites would be occurred, as all the projects are in small scale.	
2	Climate Change	No adverse effects to the groundwater at the target sites would be occurred, as all the projects are in small scale.	
3	Assessment	Inadequate assessment and management of impacts and risk	Conduct of site-specific ESIAs or other forms of assessment Updating of existing ESIAs based on latest engineering design and filling in gaps vis-a-vis issues relating to GCFs ESS2-8.

Source: JICA (2020)

3.3.3.2 ESS3: Resource Efficiency and Pollution Preventions

Table 3.20 Assessment of risks and potential impacts related to ESS3 for Component 3

	Item	Risks and Potential impact	Mitigation options
1	Air Quality	During the construction stage, using heavy machinery for the construction work will raise extensive amount of emission from the vents of heavy machineries. It	Large machineries to be used shall be maintained properly, in order not to emit the unnecessary exhaust gas.
2	Water Pollution	During the construction stage, the adverse effects would be occurred to the water quality by using the large machineries, i.e. backhoes, etc.	Large machineries to be used shall be maintained properly, in order to prevent the water pollution.
3	Soil Pollution	During the construction stage, heavy machinery uses heavy and dense fuel which may become a pollutant and may cause a disaster.	The hazardous material such as heavy oil and any flammable material shall be stored safely in barrels or appropriate containers with appropriate label and sign place outside of it.
4	Waste Management	During the construction stage, most of the green waste would be produce.	Any solid waste and the green waste from removal of grass shall be properly disposed at island waste management center. Any used oil or leftover paints and other chemical shall be leak proof packed and stored till it is transported to

	Item	Risks and Potential impact	Mitigation options
			Thilafushi or any other such designated area.
5	Noise and Vibration	During the construction stage, noise and vibration could be prone to be occurred.	In order to reduce the noise pollution, the work on site may not commence during the night. All the heavy vehicles and equipment's shall be well serviced and maintained to reduce the unnecessary emission and incomplete combustion of the fuel.
6	Subsidence	During the construction stage, the dewatering would accelerate the horizontal flow of the groundwater. This will have an impact on the groundwater depletion and subsidence of the ground.	In case surface soil subsiding occurs, the depth of the steal pile needed to be adjusted before commencing the dewatering.
7	Odor	No adverse effects to the odor at the target sites would be occurred, as there are no odor sources by the projects.	
8	Sediment	No adverse effects to the sediment at the target sites would be occurred, as there are no sediment sources by the projects.	
9	Soil Erosion	During the construction stage, with extensive dewatering, it may collapse the adjoining ground. If the dewatering is taking place near any existing facilities, this collapsing of ground may lead to physical damage to the existing facility.	It is impossible to completely cutoff the horizontal flow, therefore great care need to be taken on monitoring the surrounding soil. If subsiding occurs in the vicinity, the dewatering needed to be stop immediately.
10	Groundwater	In the construction stage, the reversible short-term impact of dewatering would be a significant impact. The dewatering would accelerate the horizontal flow of the groundwater. This will have an impact on the groundwater depletion.	In order to address the adverse impacts arise by extensively draining water from groundwater lens by dewatering, steal piling would be used to enclose excavation area.
11	Hydrology	No adverse effects to the hydrology at the target sites would be occurred, as all the projects are in small scale.	
12	Coastal Areas	No adverse effects to the coastal areas at the target sites would be occurred, as all the projects are not located along the coast.	

Source: JICA (2020)

3.3.3.3 ESS4: Community Health, Safety and Security.

Table 3.21 Assessment of risks and potential impacts related to ESS4 for Component 3

	Item	Risks and Potential impact	Mitigation options
1	Construction safety hazard	Exposure of residents to construction health and safety hazards, including equipment traffic hazards.	Provisions of adequate warning signages in dangerous areas at the construction sites Information and awareness campaigns among residents of the hazards Fencing of deep excavations
2	Health Hazard	Potential increase incidence or outbreak of diseases due to presence of migrant workers Exposure of residents to dusts and noise	Medical screening of workers Information and awareness campaigns about disease hazards such as HIV/AIDs Dust suppression and avoidance of work during nighttime

	Item	Risks and Potential impact	Mitigation options
3	Security	Potential increase in criminality and vices, including GBV Possible conflict between contractor workers with local communities	Project to require contractors to adopt a Code of Conduct for workers

Source: JICA (2020)

3.3.3.4 ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

Table 3.22 Assessment of risks and potential impacts related to ESS6 for Component 3

	Item	Risks and Potential impact	Mitigation options
1	Protected Areas	There are no protected areas and Marine Protected Areas (MPA) around the proposed project sites.	
2	Ecosystem and Fauna/Flora	During the construction stage, most of the vegetation would be cleared and an immediate and most adverse environmental impact on the vegetation will arise.	Adequate measures to be taken for the ecosystem and fauna/ flora; i.e. any tree that could be replanted, shall be replanted in a different location, try to avoid cutting down of or uprooting of unnecessary vegetation.
		During the operation stage, birds may be suffered from the antennas and indicator lights on the posts/ antennas.	The indicator light on all the tower shall be red light and the light shall be lit continuously throughout the night. This will reduce the confusion arise in the bird community.
3	Geology and Geomorphology	No adverse effects to the geology and geomorphology at the target sites would be occurred, as all the projects are in small scale.	

Source: JICA (2020)

3.3.4 Environmental Risks and Impacts and Mitigation Options for Component 4

There are no environmental risks and impacts for Component 4.

3.4 Social Risks and Impacts and Mitigation Options

Social risks and potential impacts relating to GCF's ESS2, ESS5, ESS7 and ESS8 are assessed and discussed below, especially impacts to, and benefits accruing to, vulnerable groups.

3.4.1 Social Risks and Impacts and Mitigation Options for Component 1

3.4.1.1 ESS2: Labor and Working Conditions.

Table 3.23 Assessment of risks and potential impacts related to ESS2 for Component 1

	Item	Risks and Potential impact	Mitigation options
1	Accidents	No adverse effects to the accidents at the target sites would be occurred, as there are no sources by the activities.	

Source: JICA (2020)

3.4.1.2 ESS5: Land Acquisition and Resettlement.

Table 3.24 Assessment of risks and potential impacts related to ESS5 for Component 1

	Item	Risks and Potential impact	Mitigation options
1	Resettlement	No involuntary resettlement will be occurred by implementing any proposed projects, as there are no residents and residential areas at all the project sites.	
2	Living and Livelihood	If the target areas are used by the local people regularly, there may be	Proper arrangement and management of the areas under the coastal and reef

	Item	Risks and Potential impact	Mitigation options
		possibilities of restrictions for the local peoples' livelihood, such that people cannot collect natural resources temporarily or be able to use the areas for their livelihood activities temporarily, etc. due to the coastal and reef conservation plan.	conservation plan, such as collection and resolution of options, intentions and complaints of the local people and ensuring mutual understandings among them, is necessary to mitigate and reduce unfairness to their livelihood activities.

Source: JICA (2020)

3.4.1.3 ESS7: Indigenous people

Table 3.25 Assessment of risks and potential impacts related to ESS7 for Component 1

	Item	Risks and Potential impact	Mitigation options
1	Ethnic Minorities and Indigenous Peoples	There will be no impacts on Indigenous People as there are no IP communities/ groups in the project areas.	

Source: JICA (2020)

3.4.1.4 ESS8: Cultural Heritage

Table 3.26 Assessment of risks and potential impacts related to ESS8 for Component 1

	Item	Risks and Potential impact	Mitigation options
1	Heritage	There is the heritage site along the coast in Gan island, Laamu Atoll, which is one of the targeted islands for implementation of ICZM Plan, and for which the protection measures will be implemented through the Component 2. Therefore, there would be a risk that the future ICZM Plan may raise any impacts to the existing heritage site, if not properly planned.	The ICZM Plan should be examined and planned properly and adequately in order for the heritage site not to be suffered from any adverse impacts from the planned activities of the future ICZM; e.g. regular monitoring, proper maintenance, etc.
2	Landscape	No adverse effects to the landscapes at the target sites would occur, as Component 1 does not involve any civil work or construction of structure.	

Source: JICA (2020)

3.4.2 Social Risks and Impacts and Mitigation Options for Component 2

3.4.2.1 ESS2: Labor and Working Conditions.

Table 3.27 Assessment of risks and potential impacts related to ESS2 for Component 2

	Item	Risks and Potential impact	Mitigation options
1	Worker's rights	Denial of basic rights by the project or its contractors to all workers or to some category of workers	Project should adopt the ILO standard for granting workers rights; Contractors should be bound by as part of the contract to abide by the same standard.
2	Gender discrimination and GBV	Potential gender discrimination in hiring of workers by the project and contractors Potential occurrence of gender-based violence in the workplace (GBV)	Project must adopt and implement a policy of non-discrimination on the basis of gender in hiring of workers; Contractors shall also be required to adopt the same policy.

	Item	Risks and Potential impact	Mitigation options
			Project and contractors shall conduct awareness campaign against GBV among their workers.
		Discrimination based on gender, marital status, age, or any other physical or mental attribute. Sexual harassment. Many such cases have come to light in the Maldives and across the world recently. Physical and verbal harassment and workplace bullying.	Staff will be made aware of the avenues available at the Ministry for victims of sexual harassment. Staff will be able to lodge complaints to the Sexual Harassment Prevention Committee at the Ministry, established under Prevention of Sexual Harassment Act (16/2014).
3	Occupational Health and Safety	Exposure of workers to occupational health and safety hazards during construction	The project and contractors shall adopt OSH standards of the government as well as the IFC or the World Bank group. Workers should be provided with PPEs where required. Construction sites shall be subject to periodic OSH audit by the Implementing Entity, and/or the AE.
		Discrimination in relation to opportunity/access for training and self-development.	Equal training opportunity will be available to all staff working in the project without discrimination, based on gender or otherwise, as specified in the Employment Act. It is responsibility of the Project Manager and the Project Director to ensure that such discrimination does not exist.

Source: JICA (2020)

3.4.2.2 ESS5: Land Acquisition and Resettlement.

Table 3.28 Assessment of risks and potential impacts related to ESS5 for Component 2

	Item	Risks and Potential impact	Mitigation options
1	Resettlement	No involuntary resettlement will be occurred by implementing any proposed projects, as there are no residents and residential areas at all the project sites.	
2	Damage to Private Properties	Potential damage to private properties during construction	Damages to private properties/assets shall be restored and/or compensated at replacement cost. Damages incurred by contractors during construction that are not anticipated in the project design shall be the responsibility of the contractor. Damages that are identified in the project design shall be the responsibility of the Maldives government.
3	Livelihood activities of local communities	Temporary disruption of economic activities of local communities due to loss of access to the site during construction period.	Identify and consult the affected communities/ groups. Provide assistance based on the consultation.

Source: JICA (2020)

3.4.2.3 ESS7: Indigenous people

Table 3.29 Assessment of risks and potential impacts related to ESS7 for Component 2

	Item	Risks and Potential impact	Mitigation options
1	Ethnic Minorities and Indigenous Peoples	There will be no impacts on Indigenous People as there are no IP communities/groups in the project areas.	

Source: JICA (2020)

3.4.2.4 ESS8: Cultural Heritage

Table 3.30 Assessment of risks and potential impacts related to ESS8 for Component 2

	Item	Risks and Potential impact	Mitigation options
1	Cultural Heritage	The sea walls to be constructed in Gan and Ishdhoo islands are intended to protect historical sites. However, there is a risk that the structure, if not designed properly, may alter the original landscape of the historical sites and/or render them inaccessible to public.	The design of the wall should be cleared by proper authorities and experts in the government. Local communities using or visiting the sites should be consulted before the design is approved and finalized.

Source: JICA (2020)

3.4.3 Social Risks and Impacts and Mitigation Options for Component 3

3.4.3.1 ESS2: Labor and Working Conditions.

Table 3.31 Assessment of risks and potential impacts related to ESS2 for Component 3

	Item	Risks and Potential impact	Mitigation options
1	Worker's rights	Denial of basic rights by the project or its contractors to all workers or to some category of workers	Project should adopt the ILO standard for granting workers rights; Contractors should be bound by as part of the contract to abide by the same standard.
2	Gender discrimination and GBV	Potential gender discrimination in hiring of workers by the project and contractors Potential occurrence of gender-based violence in the workplace (GBV)	Project must adopt and implement a policy of non-discrimination on the basis of gender in hiring of workers; Contractors shall also be required to adopt the same policy. Project and contractors shall conduct awareness campaign against GBV among their workers.
3	Child Labor	The project and/or its contractors may exploit children especially in the local communities by hiring them in the project.	The project and/its contractors must adopt the ILO/UN standards for hiring of underage population. That is, no person below the age of 14 should be hired in the project. If persons below the age of 18 is hired, he/she should not be assigned hazardous and/or heavy tasks.
4	Occupational Health and Safety Risk	Exposure of workers to occupational health and safety hazards during construction	The project and contractors shall adopt OSH standards of the government as well as the IFC or the World Bank group. Construction sites shall be subject to periodic OSH audit by the Implementing Entity, and/or the AE.

Source: JICA (2020)

3.4.3.2 ESS5: Land Acquisition and Resettlement.

Table 3.32 Assessment of risks and potential impacts related to ESS5 for Component 3

	Item	Risks and Potential impact	Mitigation options
1	Land Acquisition	Construction/Installation of Component 3 Facilities may displace or damage private dwellings, other structures, crops and other private assets.	All Component 3 facilities shall be constructed on existing government lands
2	Involuntary Resettlement		

Source: JICA (2020)

3.4.3.3 ESS7: Indigenous people

Table 3.33 Assessment of risks and potential impacts related to ESS7 for Component 3

	Item	Risks and Potential impact	Mitigation options
1	Ethnic Minorities and Indigenous Peoples	No adverse effects to the ethnic minorities and indigenous peoples at the target sites would be occurred, as there are no indigenous people communities or groups in the project areas.	

Source: JICA (2020)

3.4.3.4 ESS8: Cultural Heritage

Table 3.34 Assessment of risks and potential impacts related to ESS8 for Component 3

	Item	Risks and Potential impact	Mitigation options
1	Heritage	The transmission tower and other facilities to be constructed under Component 3 may displace, destroy, damage or render inaccessible cultural heritage sites; there is also a possibility that excavations during construction of these facilities may uncover archeological artefacts or paleontological objects.	No transmission facilities shall be constructed within or near any cultural, religious or historical sites such that it will affect displace, damage, destroy or alter such sites. The project shall adopt a simple procedure for chance archaeological/ paleontological finds during construction.

Source: JICA (2020)

3.4.4 Social Risks and Impacts and Mitigation Options for Component 4

There are no social risks and impacts for Component 4.

4. Generic Environmental and Social Management Plan (ESMP)

Based on the preliminary assessments of environmental and social risks and potential impacts relating to GCF's ESS from ESS1 to ESS8, the Generic Environmental and Social Management Plan is examined as follows:

4.1 ESS1: Environmental and Social Risks and Impact

(1) Performance Criteria

The following performance criteria are set for the construction of the projects:

a) There will be no adverse impacts on climate and climate change.

b) All site-specific activities undergo further ES screening and/or assessments and mitigation planning in a form of ESIA, depending upon the requirements of the Maldives EPA and this ESMF as outlined in Section 4 below; The assessments cover all GCF ESSs

c) Each activity shall comply with government regulations and international good practice

d) Each major physical activity has a site-specific Environmental and Social Management Plan (ESMP) which is prepared based on this generic ESMP and the findings of the detailed site-specific ES assessments.

e) Each activity shall be monitored for compliance with their respective site-specific ESMPs

4.2 ESS2: Labor and Working Conditions.

(1) Performance Criteria

a) The following performance criteria are set for the project: Compliance with ILO's labor standards by the project organization and contractors

b) Absence of unresolved labor-related complaints

c) Compliance with the World Bank Group's Health and Safety Standards

d) OSH audit performance of contractors and other project entities at construction sites

(2) Monitoring and Reporting

ME shall conduct periodic compliance monitoring on Labor and Working Conditions standards, including OSH audit of construction sites. A report on the monitoring and audit shall be prepared by the ministry and submitted to JICA. The specific situations and actions related to gender are described in Annex 8a (Gender Assessment) and 8b (Gender Action Plan) of the Funding Proposal, respectively.

Table 4.1 Labor and Working Conditions Management Measures

Issue	Control Activity (and source)	Action Timing	Responsibility	Frequency
M2.1: Worker's rights	M2.1.1: Monitor the working conditions to be compliance with ILO standard.	During construction	PMU/ Atoll Council/ contractor	Maintain records
	M2.1.2: Ensure compliance with the Grievance Redress Mechanism	During construction	PMU/ Atoll Council/ contractor	Maintain records
M2.2: Gender discrimination and GBV	M2.2.1: Monitor whether equal opportunities granted regardless of gender	During construction	PMU/ Atoll Council/ contractor	Maintain records

Issue	Control Activity (and source)	Action Timing	Responsibility	Frequency
	M2.2.2: Ensure compliance with the Grievance Redress Mechanism	During construction	PMU/ Atoll Council/ contractor	Maintain records
M2.3: Occupational Health and Safety	M2.3.1: Ensure the implementation of security measures and fair and healthy working conditions	During construction	PMU/ Atoll Council/ contractor	Maintain records
	M2.3.2: Ensure compliance with the Grievance Redress Mechanism	During construction	PMU/ Atoll Council/ contractor	Maintain records

Source: JICA (2019)

4.3 ESS3: Resource Efficiency and Pollution Preventions.

4.3.1 Marine and Surface Water Quality

(1) Performance Criteria

The following performance criteria are set for the construction of the projects:

a) No significant decrease in water quality as a result of construction activities;

b) No significant decrease in water quality as a result of dredging activities;

c) No overflow during dredging activities;

d) No significant decrease in the quality and quantity of surface water as a result of construction activities in proximity to the projects; and

e) No offsite impact will occur through the release of sand for nourishment into the marine environment.

(2) Monitoring

Marine and surface water samples will be collected from a range of locations for analysis of pH, turbidity, salinity, dissolved oxygen (DO), and other relevant parameters. A water quality sampling and analysis program will be prepared prior to the construction activities during the Detailed Design stage. The monitoring will be implemented by the Detailed Design before and after construction, and also by the contractor(s) during construction, at the target sites and sand borrow sites.

(3) Reporting

All water quality monitoring results and/or incidents will be tabulated and reported as outlined in the ESMP. The PMU must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to water quality is exceeded.

Table 4.2 Marine and Surface Water Quality Management Measures

Issue	Control Activity	Action Timing	Responsibility	Frequency
M3.1: Adverse effects to the water quality of marine and surface water	M3.1.1: Designated areas for storage of fuels, oils, chemicals or other hazardous liquids should have compacted impermeable bases and be	During construction	All Personnel	Weekly with reporting to PMU

Issue	Control Activity	Action Timing	Responsibility	Frequency
	surrounded by a bund to contain any spillage.			
	M3.1.2: All machineries shall be well maintained for the prevention of the spillage of oil, chemicals, and other hazardous liquids into the sea.	During construction	Contractor, PMU/ Atoll Council	Maintain daily records
	M3.1.3: Conduct regular surface water quality monitoring in locations where the surface water is likely to be affected. This includes the assessment of the changes in surface water quality.	During construction	PMU/ Atoll Council	Weekly and as required with reporting to PMU
	M3.1.4: Construction materials will not be stockpiled in proximity to the aquatic environment that may allow release into the environment.	During construction	Contractor, PMU/ Atoll Council	Maintain daily records
	M3.1.5: Ensure all residual contaminated sediments are not released into the environment.	During construction	Contractor, PMU/ Atoll Council	Maintain daily records
	M3.1.6: Install the silt protectors for beach nourishment.	During construction	Contractor, PMU/ Atoll Council	Maintain daily records
	M3.1.7: Implement adequate management and monitoring for the beach nourishment and land reclamation project.	During operation	PMU/ Atoll Council, community	Monthly and as required with reporting to PMU

Source: JICA (2019)

4.3.2 Air Quality Impacts and Management Measures

(1) Performance Criteria

The following performance criteria are set for the construction of the projects:

a) Corrective action to respond to complaints and/or grievances is to occur;

b) Inspect and approve efficient equipment only;

c) Minimize equipment movements through proper planning of activities;

d) Apply dust suppression; and

e) Apply vehicle speed limit, particularly on unpaved roads.

(2) Monitoring

An air quality will be measured through the Detailed Design and also by the contractor(s) during the construction stage. This shall include vehicles and machinery emissions – visual monitoring, measurements to be carried out when deemed excessive.

(3) Reporting

Air quality monitoring results and/or incidents will be tabulated and reported as outlined in the ESMF. The PMU must be notified immediately in the event of any suspected instances of material or serious environmental harm or if a determined level with respect to air quality is exceeded.

Table 4.3 Air Quality Management Measures

Issue	Control Activity	Action Timing	Responsibility	Frequency
M3.2: Increase in vehicle/ machinery emissions	M3.2.1: Ensure vehicles/ machines are maintained, switched off when not in use and that only required vehicles are operated onsite.	During construction	Contractor, PMU/ Atoll Council	Daily and maintain records
	M3.2.2: Ensure that construction vehicles and machinery are properly maintained and operated in accordance with the design standards and the manufacturers' maintenance manuals.	During construction	Contractor, PMU/ Atoll Council	Daily and maintain records
	M3.2.3: Develop and implement an induction program for all site personnel, which include as a minimum an outline of the minimum requirements for environmental management relating to the site.	Before and during construction	Contractor, PMU/ Atoll Council	Daily and maintain records

Source: JICA (2019)

4.3.3 Noise and Vibration Management Measures

Performance Criteria

The following performance criteria are set for the construction of the projects:

a) Selection of efficient equipment and maintenance in accordance with manufacturers manuals;

b) As much as possible, small compactor units shall be used instead of heavy compactors;

c) Proper Personal Protective Equipment (PPE), such as ear plugs, are to be used by workers near noise/vibration generating equipment;

d) No noisy equipment or machines are to be used during night hours; and

e) Corrective action to respond to complaints and/or grievances is to occur within 48 hours.

(2) Monitoring

Ambient noise levels will be measured at the nearest residential areas from each project site. The baseline data will be measured during the Detailed Design stage and measurement will be continued by the contractor(s) during the construction stage.

(3) Reporting

All noise monitoring results and/or incidents will be tabulated and reported as outlined in the ESMF. The PMU must be notified immediately in the event of any suspected instances of material or serious environmental harm or if a determined level with respect to noise is exceeded.

Table 4.4 Noise and Vibration Management Measures

Issue	Control Activity	Action Timing	Responsibility	Frequency
M3.3.1: Increased noise levels	M3.3.1.1: Select equipment and machinery to ensure that noise emissions are minimized during construction including all compaction and pumping equipment.	Pre and during construction	Contractor	Maintain records
	M3.3.1.2: Utilize specific noise reduction devices such as silencers and mufflers.	During construction	Contractor	Maintain records
	M3.3.1.3: Restrict noise generating activities to daytime hours near the residential areas, as much as possible.	During construction	Contractor	Maintain Records
	M3.3.1.4: Consultation with nearby residents in advance of construction activities particularly if noise generating construction activities are to be carried out outside of 'daytime' hours.	During construction	Contractor	Daily and maintain records
	M3.3.1.5 All incident complaints and non-compliances related to noise shall be reported in accordance with the site incident reporting procedures and summarized in the register.	During construction	Contractor	Maintain records
	M3.3.1.6: The contractor shall conduct employee and operator training to improve awareness of the need to minimize excessive noise in work practices.	During construction	Contractor	Maintain Records
M3.3.2: Vibration due to construction	M3.3.2.1: Identify properties, structures, underground services, and habitat locations that will be sensitive to vibration impacts resulting from the construction and operation of the project.	Pre and during construction	Contractor	Maintain records
	M3.3.2.2: Design to give due regard to temporary and permanent mitigation measures for noise and vibration from construction vibration impacts.	Pre-construction	Contractor	Maintain records

Issue	Control Activity	Action Timing	Responsibility	Frequency
	M3.3.2.3: All incidents, complaints, and non-compliances related to vibration shall be reported in accordance with the site incident reporting procedures and summarized in the register.	During construction	Contractor	Maintain records

Source: JICA (2019)

4.3.4 Erosion and Sediment Control

(1) Performance Criteria

The following performance criteria are set for the project:

a) No build-up of sediment in the aquatic environments as a result of construction activities;

b) No erosion from the beach nourishment areas and land reclamation areas as a result of the construction activities; and

c) No contaminated sediment will be used in the construction works.

(2) Monitoring

A sediment control monitoring program will be developed for the projects. The program is subject to review and update at least every two months from the date of issue. The PMU will be required to conduct site inspections on a monthly basis or after heavy rainfall events.

(3) Reporting

All sediment and erosion control monitoring results and/or incidents will be tabulated and reported as outlined in the ESMF. The PMU must be notified immediately in the event of any suspected instances of material or serious environmental harm, or if a determined level with respect to erosion and sediment control is exceeded.

Table 4.5 Erosion Control Management Measures

Issue	Control Activity (and source)	Action Timing	Responsibility	Frequency
M3.4.1: Loss of soil material and sedimentation to the surface water systems from the site due to earthwork activities	M3.4.1.1: Existing situations/ conditions of the sediment shall be confirmed before construction	Pre-construction	Contractor, PMU/ Atoll Council	Maintain records
	M3.4.1.2: Planning of adequate specification of groins (intervals/ numbers, length, etc.) shall be considered to mitigate the filled sand for beach nourishment.	Before construction	Consultant	Detailed Design
	M3.4.1.3: Avoid sand flow into the sea or onto the roads from the planned soil stock piles for beach nourishment	During construction and operation	Contractor, PMU/ Atoll Council	Maintain records
M3.4.2: Soil contamination	M3.4.2.1: Drainage control measures to ensure runoff does not contact contaminated areas	Entire construction stage	All Personnel	Daily and maintain records

Issue	Control Activity (and source)	Action Timing	Responsibility	Frequency
	and is directed/diverted to stable areas for release.			
	M3.4.2.2: Avoid importing fill that may result in site contamination and lacks accompanying certification/documentation.	Entire construction stage	All Personnel	Daily and maintain records
	M3.4.2.3: Install the silt protectors for beach nourishment and land reclamation.	During construction	Contractor, PMU/ Atoll Council	Maintain daily records
	M3.4.2.4: Implement adequate management and monitoring for the beach nourishment and land reclamation project.	During operation	PMU/ Atoll Council, community	Monthly and as required with reporting to PMU

Source: JICA (2019)

4.3.5 Waste Management

(1) Performance Criteria

The following performance criteria are set for the construction of the projects:

a) Waste generation is minimized through the implementation of the waste hierarchy (avoidance, reduce, reuse, recycle);

b) No litter will be observed within the project areas or its surroundings as a result of activities by site personnel;

c) No complaints received regarding waste generation and management;

d) Any waste from on-site portable sanitary facilities will be sent off site for disposal by a waste licensed contractor;

e) Waste oils will be collected and disposed through the Waste Management Centers for recycling at each island;

f) Immediate response and reporting for any spill or leakage;

g) Wastes of hazardous nature to be disposed of through licensed contractors under a complete chain-of-custody system;

h) Prepare waste and hazardous waste registers for all project activities, in accordance with the requirements of Law 4 for 1993 on Environment Protection and Preservation Act; and

i) Prepare and maintain a waste management plan that takes into consideration all the points mentioned above.

(2) Monitoring

Monitoring of waste volumes and ensuring that they match the chain-of-custody, particularly for wastes of hazardous nature. Monitoring/patrolling waste storage and handling on site.

(3) Reporting

The PMU must be notified immediately and PMU will take action in the event of any serious environmental harm due to improper waste management.

Table 4.6 Waste Management Measures

Issue	Control Activity (and source)	Action Timing	Responsibility	Frequency
M3.5: Production of wastes and excessive use of resources	M3.5.1: The use of construction materials shall be optimized and where possible a recycling policy adopted.	During construction	Contractor, PMU/ Atoll Council	Weekly and maintain records
	M3.5.2: Separate waste streams shall be maintained at all times i.e., general domestic waste, construction, and contaminated waste.	During construction	Contractor, PMU/ Atoll Council	Weekly and maintain records
	M3.5.3: Any contaminated waste shall be disposed of at an approved facility.	During construction	Contractor, PMU/ Atoll Council	Weekly and maintain records
	M3.5.4: Recyclable waste (including oil and some construction wastes) shall be collected separately and disposed of correctly.	During construction	Contractor, PMU/ Atoll Council	Weekly and maintain records
	M3.5.5: Disposal of waste shall be carried out in accordance with the Government of the Maldives's requirements.	During construction	Contractor, PMU/ Atoll Council	Weekly and maintain records
	M3.5.6: Fuel and lubricant leakages from vehicles and machinery shall be immediately rectified.	During construction	Contractor, PMU/ Atoll Council	Daily and maintain records
	M3.5.7: Major maintenance and repairs shall be carried out off-site whenever practicable.	During construction	Contractor, PMU/ Atoll Council	Weekly and maintain records

Source: JICA (2019)

4.4 ESS4: Community Health, Safety and Security.

(1) Performance Criteria

The following performance criteria are set for the project:

a) Coordinate project implementation schedule with communities.

b) Long-term social benefits are achieved.

c) Complaint and grievance mechanisms are put in place and proactively managed.

d) Local stakeholders and community members have a key role to play in the implementation and monitoring of the project.

e) Consultation with stakeholders will continue.

PMU will be responsible for advisory support and extensions services to local beneficiaries along with being responsible for distributing material inputs and providing technical training in the implementation of project activities

(2) Monitoring and Reporting

ME shall conduct periodic compliance monitoring on Labor and Working Conditions standards., including OSH audit of construction sites. A report on the monitoring and audit shall be prepared by the ministry and submitted to JICA.

Records of all consultations are to be kept and reported on a monthly basis.

PMU must be notified in the event of any individual or community complaint or dissatisfaction and ensure the Grievance Redress Mechanism is complied with.

Table 4.7 Community Health and Safety Management Measures

Issue	Control Activity (and source)	Action Timing	Responsibility	Frequency
M4: Public nuisance caused by construction/ operation activities (e.g., noise and dust)	M4.1: Carry out community consultation on the purpose and benefits of making changes to land use	Before and during construction	PMU/ Atoll Council	Maintain records
	M4.2: Ensure compliance with the Grievance Redress Mechanism process	Before and during construction	PMU/ Atoll Council	Maintain records
	M4.3: Implement appropriate management plans (refer to other sections of the ESMF)	Before and during construction	PMU/ Atoll Council	Monthly and maintain records

Source: JICA (2019)

4.5 ESS5: Land Acquisition and Resettlement.

(1) Performance Criteria

The following performance criteria are set for land acquisition and involuntary resettlement related to the project:

a) The project will not involve any land acquisition as construction sites are already government owned.

b) All activities shall be assessed, as part of the site-specific ESIA or ES Screening, for potential land acquisition and displacement issues and damage to private properties.

c) Any damage to private properties whether planned or unintentional shall be properly and fairly compensated.

d) No activity involving displacement of entire private dwellings and business establishments shall be pursued.

e) People whose livelihoods become restricted or disrupted during the project implementation shall be consulted and compensated and/or provided assistance

4.6 ESS6: Biodiversity Conservation and Sustainable Management of Living Natural Resources.

(1) Performance Criteria

The following performance criteria are set for the construction of the projects:

a) Locations will be surveyed for sensitive or critical habitats prior to the works, if any;

b) No clearance of vegetation outside of the designated clearing boundaries;

c) No death to native fauna as a result of clearing activities;

d) No deleterious impacts on marine environments and terrestrial habitats;

e) No impacts on migrant bird species which utilize reefs;

f) No introduction of new weed species as a result of construction activities;

g) Fill material from all locations will be chemically and biologically analyzed to minimize introduction of alien species; and

h) A flora and fauna management program will be implemented.

(2) Monitoring

Seasonal checks of coral environment, if identified in the pre-construction survey, will be conducted for comparison with baseline conditions.

Seasonal monitoring of existing surrounding flora and fauna (birds, reptiles, mammals and marine life) for identification of any trends that may be related to introduction of the project structures.

The delivery organization will, when undertaking works, compile a monthly report to the PMU:

a) Any non-conformances to this ESMF; and

b) Details of the corrective action undertaken.

(3) Reporting

All monitoring results of flora and fauna, including coral environment, and/or incidents will be tabulated and reported as outlined in the ESMF. The PMU must be notified in the event of any suspected instances of death to native fauna and where vegetation is detrimentally impacted.

Table 4.8 Flora and Fauna Management Measures

Issue	Control Activity	Action Timing	Responsibility	Frequency
M6: Habitat loss and disturbance of marine ecosystem including terrestrial flora and fauna	M6.1: Survey the target areas for critical habitats	Before construction	PMU/ Council Atoll Council / JICA	Once, prior to construction
	M6.2: Limit vegetation clearing and minimize habitat disturbance through adequate protection and management of retained vegetation.	During construction	Contractor/ PMU/ Atoll Council	Weekly and shall maintain records
	M6.3: Ensure that all site personnel are made aware of the sensitive fauna/habitat areas and the requirements for the protection of these areas.	During construction	Contractor/ PMU/ Atoll Council	Weekly and shall maintain records
	M6.4: Monitoring of existing surrounding flora and fauna (birds, reptiles, mammals and marine life) for identification of any trends that may be related to introduction of the project structures	During construction	Contractor/ PMU/ Atoll Council	Weekly and shall maintain records and reports

Source: JICA (2019)

4.7 ESS7: Indigenous people and vulnerable groups

(1) Performance Criteria

There are no indigenous communities in the project area and hence the project is not expected to affect indigenous people. The following performance criteria are set for issues relating to indigenous people and vulnerable group:

a) There will be no adverse impacts on Indigenous people

b) All site-specific activities shall be assessed as part of the site-specific ESIA or ES Screening, for impacts to vulnerable groups; vulnerable groups in the project sites should be identified and consulted; and given special attention in terms of mitigation measures.

4.8 ESS8: Cultural Heritage

(1) Performance Criteria

The following performance criteria are set for cultural heritage issues related to the project:

a) Activities that cause adverse impacts on important archaeological, indigenous, and/or cultural heritage sites shall not be pursued unless protection/conservation measures are developed and/or approved by competent authorities/experts with consultation of the communities are included in the provided as part of the project.

b) For the proposed sea walls intended to protect the historical sites, the walls should not degrade the sites, block or render them inaccessible. Design of the walls should be consulted upon with the local communities.

c) Chance archaelogical finds shall follow the procedures provided in the Table below.

(2) Monitoring

Observation of the existing cultural heritages during pre-construction and construction activities.

Local stakeholders and community members have a key role to play in the implementation and monitoring of the project.

Consultation with stakeholders will continue. This will help ensure that stakeholders continue to be aware of the project, its progress, and any changes in the project. It will also assist in identifying any issues as they arise.

PMU will be responsible for advisory support and extensions services to local beneficiaries along with being responsible for distributing material inputs and providing technical training and backstopping in the implementation of project activities.

(3) Reporting

Records of all consultations are to be kept and reported on a monthly basis.

The PMU must be notified immediately and the PMU will take action in the event of any serious damage due to improper construction.

Table 4.9 Archaeological Management Measures

Issue	Control Activity (and source)	Action Timing	Responsibility	Frequency
M8: Damage or disturbance to significant	M8.1: Should any important archaeological/indigenous and/or cultural heritage sites	Before and during construction	Contractor, PMU/ Laamu Atoll	Weekly, maintain records and

Issue	Control Activity (and source)	Action Timing	Responsibility	Frequency
important archaeological, indigenous and/or cultural heritage during the earth disturbances and land clearing activities	be damaged, immediately cease work within the area that the site has been observed and consult with the Maldivian government and PMU/JICA.			immediately notify PMU, JICA of any findings
	M8.2: Should any important archaeological, indigenous and/or cultural heritage sites be found, immediately cease work within the area that the site has been observed and consult with the Maldivian government and PMU/JICA.	Before and during construction	Contractor, PMU/ Laamu Atoll	Weekly, maintain records and immediately notify PMU, JICA of any findings

Source: JICA (2019)

5. Activity/Site-Specific Assessments, Mitigation Planning and Implementation

5.1 Component 1: Establishment of Integrated Coastal Zone Management (ICZM)

5.1.1 Project activities that will be subject to assessments

For the sub-activities under Component 1, there are no activities, that will be subject to assessments.

Table 5.1 Necessary assessments for activities under Component 1

Activity		Necessary Assessment
Activity 1.1	Inventory study for risk assessment on present coastal and coral reef conditions	No need
Activity 1.2	Preparation of basic policy of ICZM at the national level	No need
Activity 1.3	Preparation of concrete ICZM Plan at representative inhabitant island as case study	IEE (including screening)
Activity 1.4	Capacity development and information sharing of the relevant organizations for establishment of the ICZM	No need

Source: JICA (2020)

5.1.2 Government Permitting requirements

There are no government permitting requirements required for all the activities under Component 1.

5.1.3 The scope of the assessments

According to the Environmental and Social Management Plan (ESMP) in the Section 3.5, the necessary actions should be arranged and conducted for GCF's ESS 3 under environmental profiles, and ESS 5 under social profiles.

The Component 1 activities and target areas to be assessed are as follows:

Table 5.2 Component 1 activities that will be subject to an ESIA

Atoll/ City	Island	Component 1 Activity	Funding Source
Laamu	Fonadhoo	Preparation of concrete ICZM plan as case study for ICZM plan under Activity 1.3	JICA co-finance
	Gan	Preparation of concrete ICZM plan as Case study for ICZM plan under Activity 1.3	JICA co-finance

Source: JICA (2020)

5.1.4 Institutional Arrangements for the preparation of the ESIA and for implementing and monitoring the site-specific mitigation/management plans

The necessary institutional arrangement for the preparation of the ESIA shall be arranged as below, and the site-specific mitigation/ management plans shall be implemented and monitored according to the following table.

Table 5.3 Institutional arrangements for preparation of the ESIA for Component 1

Item	Maldives side	Japan side
Proponent	MPI	JICA (AE)
Environmental assessment (IEE/ ESIA)	Will be conducted by MPI/ME through consulting company.	Will be reviewed by JICA (AE), and necessary assistances will be done by JICA (AE), if necessary.
Approval of ESIA	Will be approved by EPA, and EIA Decision Statement will be issued by EPA.	Necessary assistances will be done by JICA (AE).

Item	Maldives side	Japan side
Monitoring	Monitoring will be conducted by PMU.	Monitoring will be assisted and monitored by JICA (AE).

Source: JICA (2020)

5.1.5 Activity/Site-Specific Assessments and Mitigation Planning

According to the consideration through the analysis in the above table, the impacts and mitigation measures for each proposed activity are summarized in the following table. The Chapter 3 of the ESMF provides more detail impacts and mitigation measures.

Table 5.4 Summary of the Impacts and Mitigation Measures for Component 1

Proposed Activity	Impact	Mitigation Measures	Rank
(1) Case study for establishment of coastal and reef conservation plan at Gan and Fonadhoo Islands, Laamu Atoll (Activity 1.3)	Inadequate arrangement and management of coastal and reef conservation plan may facilitate the unfairness on utilization of the coastal and reef areas for the livelihood activities by the local people.	In order to prevent/ mitigate such adverse effects on the livelihood, adequate measures should be done to reduce assumed unfairness on utilization.	Rank: B
(2) Establishment and implementation of sediment budget control plan at Gan and Fonadhoo Islands, Laamu Atoll (Activity 1.3)	Inadequate arrangement and management of sediment budget control plan may facilitate inadequate sand quarry and sediment, decrease in water quality, and adverse effect to marine ecosystem and coastal areas.	In order to prevent/ mitigate such adverse effects on the water quality and marine ecosystem and coastal areas, adequate measures, such as establishment of regulations and management structures, examination of alternative quarry sites, etc., should be done to reduce inadequate sediment control.	Rank: B

Source: JICA (2020)

5.2 Component 2: Implementation of coastal conservation/protection measures against coastal disasters

5.2.1 Project activities that will be subject to assessments

For the activities under Component 2, those activities will be subject to assessments.

Table 5.5 Project Components required for ESS under Component 2

Atoll/ City	Island	Project Component	Funding Source
Laamu	Fonadhoo	Beach nourishment and groins for the eastern coast (ocean side)	GCF fund
	Maamendhoo	Beach nourishment and groins for the eastern and western side coast, and reclamation for evacuation place at the north-western top	GCF fund
	Ishdhoo	Sea walls to protect historical sites at the ocean side coast at the north top	Maldives's co-finance
	Gan	Sea walls to protect the historical sites at the ocean side at the middle of the island	Maldives's co-finance
Addu	Meedhoo	Beach nourishment and groins for the eastern coast (northern coast)	Maldives's co-finance

Source: JICA (2020)

In addition to the physical intervention, the sand borrowing sites have not yet been decided for collecting sand for the beach nourishment, and it is planned to be assessed and decided during

the detail design and/or the construction stage. Therefore, the necessary environmental procedures should be arranged and proceeded at that time.

5.2.2 Environmental Permits Required for the Project

5.2.2.1 Concept Approval

The proposed beach nourishment and coastal protection concept (Activities 2.1 and 2.2) has been approved by ME, Addu City Council and Laamu Atoll Council on 4 September 2019, and the Minister of ME on January 2020.

5.2.2.2 Dredging and Land Reclamation Approval

Prior to any coastal works that require dredging or reclamation, a special permit has to be taken from EPA. A specific form published by EPA has to be completed and submitted for the approval. EIA application form will only be accepted when the form is submitted with the costal modification approval given by EPA in writing. Dredging and reclamation approval for this project will be issued by EPA at the time of issuing. This will be done by either the consultants or the contractor(s).

5.2.2.3 EIA Decision Statement

The most important environmental permit to initiate the project works would be a decision regarding the EIAs, which will be conducted based on this ESMP by ME and JICA. The EIA Decision Note, as it is referred to, shall govern the manner in which the project activities must be undertaken. The EIA reports will assist decision makers in understanding the existing environment and potential impacts of the project. Therefore, the Decision Note may only be given to the Proponent after a review of these documents from which the ministry may request for further information or provide a decision if further information is not required.

5.2.3 The scope of the assessments

The assessment will comply with the government regulations on EIA/ESIA. In addition, the assessment will cover all the GCF Environmental and Social Safeguards (ESS) Standards, particularly the following issues and requirements:

ESS1 (Assessment and Management of Environmental and Social Risks and Impacts):

- Consultations/ stakeholder engagements/ grievance mechanism
- Presence of vulnerable group within the project communities and impacts of the activities on these groups
- Environmental and Social Management Plan

ESS2 (Labor and Working Conditions):

- Worker rights issues
- Child labor issues/Employment of minors
- Worker discrimination issues
- Occupation health and safety issues

ESS3 (Resource Efficiency and Pollution Control):

- Air and water quality impacts
- Soil/sand/sediment erosion
- Construction waste management/disposal

ESS4 (Community Health and Safety)

- Exposure of residents to construction site and traffic safety and health hazards
- Disease outbreak/Spread of diseases due to influx of migrant labor
- Crime and violence including GBV

ESS5 (Land Acquisition and Resettlement)

- Land requirements/need to acquire private land
- Displacement of/damage to private dwellings, structures and/or crops
- Disruption/loss/restriction of livelihood

ESS6 (Biodiversity Conservation and Sustainable Management of Living Natural Resources)

- Presence of sensitive natural habitat at site and impacts of the activities on the habitat
- Presence of sensitive species and impact of the activities on the species

ESS7 (Indigenous People):

- Presence of indigenous communities within the influence area of the activity
- Impacts of the activity to these communities

ESS8 (Cultural Heritage)

- Impact of the activities on cultural heritage/historical/religious sites

5.2.4 Institutional Arrangements for the preparation of the ESIA and for implementing and monitoring the site-specific mitigation/management plans

The necessary institutional arrangement for the preparation of the ESIA shall be arranged as below, and the site-specific mitigation/ management plans shall be implemented and monitored according to the following table.

Table 5.6 Institutional arrangements for preparation of the ESIA for Component 2

- GCF funded project

Item	Maldives side	Japan side
Proponent	ME	JICA (AE)
Environmental assessment (IEE/ ESIA	Will be conducted by ME through consulting company.	Will be reviewed by JICA (AE), and necessary assistances will be done by JICA (AE), if necessary.
Approval of ESIA	Will be approved by EPA, and EIA Decision Statement will be issued by EPA.	Necessary assistances will be done by JICA (AE).
Monitoring	Monitoring will be conducted by PMU.	Monitoring will be assisted and monitored by JICA (AE).

Source: JICA (2020)

- Maldives co-financed project

Item	Maldives side	Japan side
Proponent	MPI	JICA (AE)

Item	Maldives side	Japan side
ESIA	Will be conducted by MPI/ME through consulting company.	Will be reviewed by JICA (AE), and necessary assistances will be done by JICA (AE), if necessary.
Approval of ESIA	Will be approved by EPA, and EIA Decision Statement will be issued by EPA.	Necessary assistances will be done by JICA (AE).
Monitoring	Monitoring will be conducted by PMU.	Monitoring will be assisted and monitored by JICA (AE).

Source: JICA (2020)

5.2.5 Activity/Site-Specific Assessments and Mitigation Planning

According to the consideration through the analysis in the above table, the impacts and mitigation measures for each proposed activity are summarized, based on the general assessment in Section 3 of this document, in the following table. The Chapter 3 of the ESMF provides more detail impacts and mitigation measures. More detailed and site-specific impacts and mitigation measures will be prepared during the conduct of ESIAs for each of the activities.

Table 5.7 Summary of the Impacts and Mitigation Measures for Component 2

Proposed Activity	Impact	Mitigation Measures	Rank
(1) Beach nourishment and groins for the ocean side coast at Fonadhoo Island, Laamu Atoll	The construction of coastal protection measures can have numerous environmental and social impacts. This site has been suffering from the coast erosion naturally and unnaturally in the past. Environmentally, construction includes the movement of sediment into the marine environment which could result in smothering of any corals and seagrasses. Socially, construction is likely to hamper the accessibility to the beach for the ordinal users during the construction.	In order to prevent/mitigate such adverse effects on the water quality and marine ecosystem and flora/fauna, adequate measures should be done to reduce spilling the uncontrolled waste water into the sea, conduct proper management of the construction materials (sands for nourishment). Socially and regarding pollution, proper management and arrangement of wastes derived from the construction should be properly implemented.	Rank: B
(2) Beach nourishment and groins for the south-western side coast, and reclamation for evacuation place at the north-western top at Maamendhoo Island, Laamu Atoll			Rank: B
(3) Sea walls to protect historical sites at the ocean side coast at the north top at Ishdhoo Island, Laamu Atoll	The construction of coastal protection measures can have some environmental and social impacts. These sites have been suffering from the coast erosion naturally and unnaturally in the past. Environmentally, construction includes the revetment wall along the coasts, which could result in changing the marine and coastal ecosystem.	In order to prevent/mitigate such adverse effects on the ecosystem and flora/fauna, adequate measures should be done to decrease such damages through the proper management of the construction.	Rank: C
(4) Sea walls to protect the historical sites at the ocean side at the middle of the island at Gan Island, Laamu Atoll			Rank: C
(5) Beach nourishment and groins for the norther coast at Meedhoo Island, Addu City	The construction of coastal protection measures can have numerous environmental and social impacts. This site has been suffering from the coast erosion naturally and unnaturally in the past.	In order to prevent/mitigate such adverse effects on the water quality and marine ecosystem and flora/fauna, adequate measures should be done to reduce spilling the uncontrolled waste water into	Rank: B

Proposed Activity	Impact	Mitigation Measures	Rank
	Environmentally, construction includes the movement of sediment into the marine environment which could result in smothering of any corals and seagrasses. Socially, construction is likely to hamper the accessibility to the beach for the ordinal users during the construction.	the sea, conduct proper management of the construction materials (sands for nourishment). Socially and regarding pollution, proper management and arrangement of wastes derived from the construction should be properly implemented.	

Source: JICA (2019)

5.3 Component 3: Development of disaster warning and information dissemination

5.3.1 Project activities that will be subject to assessments

For the activities under Component 3, those activities will be subject to assessments.

Table 5.8 Necessary assessments for activities under Component 3

Activity		Necessary Assessment
Activity 3.1	Installment of terrestrial digital broadcasting system	ESIA
Activity 3.2	Establishment of disaster early warning and information broadcasting system	IEE

Source: JICA (2020)

5.3.2 Environmental Permits Required for the Project

5.3.2.1 Environmental screening procedures conducted by JICA (EE)

The facilities under Component 3 are constructed by JICA through its Grant Aid as the co-financed project. The project has been screened against JICA's Environmental and Social Consideration Procedure. The Environmental and Social Screening Template was prepared and the project deemed to be a Category B (medium risk) project, as all the project sites are not located in sensitive areas, nor sensitive characteristics, nor fall into sensitive sectors under the JICA guidelines for Environmental and Social Considerations (April 10), and potential adverse impacts on the environment are not likely to be significant. The result of the screening has been disclosed in the website of JICA[27].

5.3.2.2 ESIAs conducted by the proponent

Based on the results of JICA's Environmental screening, GoM conducted the Screening procedures in 2015 to 2017, and nine (9) sites, out of 21 candidate sites, were screened out for the further procedure: i.e. conducting EIA, on November 2015, and two (2) and one (1) sites were screened out for conducting EIA on April 2016 and September 2017, respectively. And as two (2) sites (Maaungdhoo (Sh), Hinnavaru (Lh)) are replaced from the existing sites, those sites were also screened out.

Table 5.9 Screening results on the sites for Component 3 by GoM

Document #	Issued date	Results	Concerned Islands/ Atolls
203-ADMIN/ PSM/2015/#	2015/11/16	EIA is necessary	Dhidhdhoo (Ha), Kulhudhuffushi (HDH), Funadhoo (Sh), Manadhoo (N), Felidhoo (V), Dhangethi (ADh), Gan (L), Guraidhoo (Th), Fiyoari (GDh)

27 https://www.jica.go.jp/english/our_work/social_environmental/id/asia/south/maldives/c8h0vm000096mxo9.html

Document #	Issued date	Results	Concerned Islands/ Atolls
		No need to do EIA	Ungoofaaru (R), Eydhafushi (B), Naifaru (Lh), Villingili (Male) (K), Maafushi (K), Feeali (F), Nilandhoo (F), Villigili (Ga), Gadhadhoo (GDh), Fovammulah (Gn)
203-EIARES/ PSM/2016/#	2016/4/5	EIA is necessary	Thinadhoo (GDh), Hithadhoo (S)
203-EIARES/ PSM/2017/#	2017/9/20	EIA is necessary	Nilandhoo (GA)
N/A	N/A	EIA is necessary	Maaungdhoo (Sh), Hinnavaru (Lh)

Source: JICA (2020)

Based on the results of the screening by GoM, the EIAs were conducted by the EIA consultant in 2018. In addition, three (3) sites are additionally selected for further procedures.

Table 5.10 List of Islands for which EIAs were conducted for Component 3

	Atoll	Island	Remarks
1	Ha	Dhidhdhoo	Screening: 203-ADMIN/PSM/2015/# on November 2015 EIA: Energy Consultancy Pvt. Ltd. (2018a[28]) Decision Statement (Approval of Environmental Impact Assessment): No. 203-EIARES/PSM/2018/3 (date of issue: 9 May 2018) *1 Funadhoo was cancelled and replaced to Maaungdhoo (Sh).
2	HDH	Kulhudhuffushi	
3	Sh	Funadhoo *1	
4	N	Manadhoo	
10	V	Felidhoo	
11	ADh	Dhangethi	
14	L	Gan	
15	Th	Guraidhoo	
17	GDh	Fiyoari	
18	GDh	Thinadhoo *2	Additionally selected. Screening: 203-EIARES/PSM/2016/# on April 2016 and 203-EIARES/PSM/2017/# on September 2017 EIA: Energy Consultancy Pvt. Ltd. (2018b[29]) Decision Statement (Approval of Environmental Impact Assessment): No. 203-EIARES/PSM/2018/4 (date of issue: 4 June 2018) *2 Thinadhoo (GDh) was cancelled.
21	S	Hithadhoo	
	Ga	Nilandhoo	
	Sh	Maaungdhoo	Maaungdhoo has been replaced from Funadhoo (above), and Hinnavaru has been replaced from Naifaru, which was not subject to EIA. As of April 2021, the additional EIA is being conducted for these two sites.
	Lh	Hinnavaru	

Source: JICA (2020)

5.3.3 The scope of the assessments (GCF's ESS2 to ESS8)

In the existing EIAs for Component 3, the following issues and mitigation measures are planned during construction and operation stages.

Table 5.11 List of issues/ impacts and mitigation measures, planned in the existing EIAs for Component 3

(1) Mobilization and site clearance

Item	Issues/ Impacts	Mitigation
Vegetation	Most of the vegetation would be cleared and an immediate and most adverse	Any tree that could be replanted, shall be replanted in a different location.

[28] Energy Consultancy Pvt. Ltd. (2018a): EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project (for 9 sites)
[29] Energy Consultancy Pvt. Ltd. (2018b): EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project (for 3 sites)

Item	Issues/ Impacts	Mitigation
	environmental impact on the vegetation will arise during the construction stage.	
Green waste	During this stage most of the green waste would be produced. If it is not properly handled, due to these wastes the following adverse impacts may occur. - Nuisance to the community - Loss of land due to the waste dump - Increase of biological growth (such as fungi)	If any tree is cut and disposed as green waste, then the parts of the tree such as bark of it needed to be chopped down to smaller pieces and disposed it. Try to avoid cutting down of or uprooting of unnecessary vegetation.

(2) Construction of the facility

Item	Issues/ Impacts	Mitigation
Dewatering	The reversible short-term impact of dewatering would be a significant impact, which would accelerate the horizontal flow of the groundwater. This will have an impact on the groundwater depletion. However, with extensive dewatering, it may collapse the adjoining ground. If the dewatering is taking place near any existing facilities, this collapsing of ground may lead to physical damage to the existing facility.	To address the adverse impacts arise by extensively draining water from groundwater lens by dewatering, steal piling would be used to enclose excavation area. As it is impossible to complete cutoff the horizontal flow, grate care needed to be taken on monitoring the surrounding soil. If subsiding occurs in the vicinity, the dewatering needed to be stop immediately. In case surface soil subsiding occurs, the depth of the steal pile needed to be adjusted before commencing the dewatering.
Hazardous material	Using heavy machinery for the construction work will raise extensive amount of emission from the vents of heavy machineries. It also uses heavy and dense fuel which may become a pollutant and may cause a disaster.	The hazardous material such as heavy oil and any flammable material shall be stored safely in barrels or appropriate containers with appropriate label and sign place outside of it. The used oil and other such material must be contained in appropriate containers with leakage proof, till it can be safely transported to Thilafushi island for disposal.
Noise pollution	Sound pollution could be prone during the construction phase.	No work during the night. All the heavy machineries should be well serviced and maintained to reduce the unnecessary emission and incomplete combustion of the fuel.
Work safety	Accidents could be prone during the construction phase.	When the workers and visitors present at the construction site, the safety helmet and safety shoo needed to be wear at all time. No personal shall climb a height no more than 12 feet without a safety belt. Sign boards, information boards and warning shall be displayed on the construction site in a way that people can see it easily. It shall be the responsibility of the site supervisor to supervise the safety of

Item	Issues/ Impacts	Mitigation
		the workers and stored oil and chemical at the site on daily basis.
Waste material	Waste disposal and accidental spills could be prone during the construction phase.	All the waste material produced during construction shall be disposed at Island Waste Management Center. After backfilling the foundations, the excess excavated material shall be disposed to the Thilafushi island. These materials shall not be disposed to any costal area or any eroded area without prior consent of Environmental Protections Agency (EPA)

(3) Operation of the facility

Item	Issues/ Impacts	Mitigation
Radio wave signal with low frequency.	During the operation of Digital Terrestrial Television Broadcasting Network, its function is sending, receiving and relaying a radio wave signal with low frequency. This band of the frequency cannot be detected by human. For the biodiversity present in these islands, these waves will not have any significant impact.	
Light impact to bird community	Each antenna will be equipped with indicator lights may have direct impact on bird community. Birds that are attracted to tower lights and aggregate in the lighting zone, circle the tower and collide with the tower, other birds, or fall to the ground from exhaustion	The indicator light on all the tower shall be red light and the light shell be lit continuously throughout the night. This will reduce the confusion arise in the bird community.

Source: Energy Consultancy Pvt. Ltd. (2018a[30] and 2018b[31])

The Environmental Monitoring Plan (EMP) is planned in the existing EIAs for Component 3 to monitor or control environmental effects. Environmental items to be monitored during construction and operation stages are planned. The concerned sections of the Environmental Monitoring Plan (EMP) in the existing EIAs for Component 3 are attached herewith as Attachments.

According to the Section 4 in the Environmental and Social Management Plan (ESMP), the necessary actions should be arranged and conducted for GCF's ESS Standards 1 to 8, and the ESMPs for these sites will be updated during the construction stage based on the detailed engineering design of the facilities, and to fill in the gaps with respect to the issues relating to ESS Standards 1 to 8.

[30] Energy Consultancy Pvt. Ltd. (2018a): EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project (for 9 sites)
[31] Energy Consultancy Pvt. Ltd. (2018b): EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project (for 3 sites)

5.3.4 Institutional Arrangements for the preparation of the ESIA and for implementing and monitoring the site-specific mitigation/management plans

The necessary institutional arrangement for the preparation of the ESIA shall be arranged as below, and the site-specific mitigation/ management plans shall be implemented and monitored according to the following table.

Table 5.12 Institutional arrangements for preparation of the ESIA for Component 3

Item	Maldives side	Japan side
Proponent	PMS	JICA (EE)
Environmental assessment (IEE/ ESIA	Have been conducted by PMS through consulting company. During project implementation, the PMU will update the ESMPs of the various facilities will be updated based on the approved detailed engineering design and to fill in the gaps in terms of issues relating to the GCF ESS Standards 1-8.	Have been reviewed by JICA (EE). The JICA ensure that ESMPs will be updated and will review the updated ESMPs.
Approval of ESIA	Have been approved by EPA, and EIA Decision Statements have been issued by EPA.	JICA will give clearance to the updated ESMPs.
Monitoring	Monitoring will be conducted by PMS.	Monitoring will be assisted and monitored by JICA (EE).

Source: JICA (2020)

5.4 Component 4: Development of basic data collection and sharing system related to climate change

5.4.1 Project activities that will be subject to assessments

For the sub-activities under Component 4, there are no activities, that will be subject to assessments.

Table 5.13 Necessary assessments for activities under Component 4

Activity		Necessary Assessment
Activity 4.1	Development of wave and sea level monitoring system	No need
Activity 4.2	Development of beach, coral reef, and land use monitoring system	No need

Source: JICA (2020)

5.4.2 Government Permitting requirements

There are no government permitting requirements required for all the activities under Component 4.

5.4.3 The scope of the assessments

There are no assessments required for all the activities under Component 4.

5.4.4 Institutional Arrangements for the preparation of the ESIA and for implementing and monitoring the site-specific mitigation/management plans

There are no institutional arrangement required for all the activities under Component 4.

5.5 Capacity building and training

In the Component 2, the consultant for the detailed design/construction supervision, procured by PMU, will play an important role for the capacity development of the human resources of the Maldives. Those national consultants are to be trained through on-the-job trainings, while working with technical international consultants.

If the human resources in the government agencies in the Maldives are sufficient, it is desirable to target the officials of ME, MNPI and the local council being dispatched to the Project as full-time PMU members, however, the government agencies are constantly understaffed, they may be dispatched as part-time basis. So that,

In order for that purpose, all project staff, especially the PMU, and members of the Project Board will be required to attend an induction training that: (i) covers substantive matters relevant to the ESMF requirements, (ii) explains the responsibilities of all the relevant parties for matters of monitoring, reporting and assurance related to social and environmental impacts and mitigation measures; and (iii) covers the operational mechanisms related to public transparency and accountability as well as those mechanisms to be used for ensuring coordination and information sharing among ME, JICA and GCF as well as with local councils, private sector actors and other partners with contract responsibilities

6. Budget for ESMF Implementation

A budget has been prepared for the implementation of the ESMF as follows:

Table 6.1 List of Tentative Budget for the ESMF

Item	Component	Sub item	Q'ty	Unit	Unit Cost (USD)	Amount (USD)	Remarks
Capacity building							
	1,2,3,4	Capacity building of project staff on E&S safeguards	1	L.S	10,000	10,000	Cost for PMU and Detailed Design.
Sub-total						10,000	
E&S Screening and Assessment							
	1,2,4	ESMF Updating and Auditing	1	L.S	20,000	20,000	Cost for PMU and Detailed Design.
	2	Conduct of ESIA	1	L.S	30,000	30,000	Maldives
		EIA support	1	L.S	30,000	30,000	Cost for Detailed Design (JICA)
		Assessment for sand borrowing sites	1	set	30,900	30,900	Cost for Detailed design
			1	set	20,000	20,000	Cost for Construction
	3	Conduct of ESIA	1	L.S		already done	
Sub-total						130,900	
Monitoring and Reporting							
	2	Water Quality Monitoring	20	set	4,000	80,000	Cost for Construction
	2	Sediment Sample Field Testing					
	2	Erosion and Sediment Control					
	2	Biodiversity					
	3	Groundwater monitoring	10	Set	500	5,000	Cost for Construction
	3	Vegetation monitoring	10	Set	500	5,000	
	3	Noise level monitoring	10	set	500	5,000	
Sub-total						95,000	
General ESMF Expenses							
	1,2,4	Hiring ES staff (PMU)	17	month	1,800	30,600	Cost for PMU
	1,2,4	Hiring ES staff (Pro A)	5	month	28,000	140,000	Cost for Detailed design
	1,2,4	Hiring ES staff (Pro B/ Environment)	15	month	1,800	27,000	Cost for Detailed design
	1,2,4	Hiring ES staff (Pro B: Social consideration)	18	month	1,800	32,400	Cost for Detailed design
Sub-total						230,000	
Stakeholder engagement							
	1,2,3,4	Consultation meetings	15	times	1,000	15,000	Cost for PMU
	1,2,3,4	Stakeholder meetings	7	times	1,000	7,000	Cost for PMU
Sub-total						22,000	
Total						487,900	

Source: JICA (2020)

Attachment

Attachment 1 Environmental Monitoring Plan in the EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project (for 9 sites)

EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project

Prepared by:

Energy Consultancy Pvt Ltd

Prepared for:

Public Service Media

13. Environmental Monitoring

The purpose of environmental monitoring plan (EMP) is to monitor or control the environmental effects of the proposed project. It is very vital to carryout proper Environmental Monitoring. Through the monitoring plane the potential negative impacts would be minimized. The unanticipated impacts that may occur during the construction period would also be mitigated through the monitoring. The purpose of the monitoring is to provide information that will aid impact management, and secondarily to achieve a better understanding of cause-effect relationship and to improve impact prediction and mitigation methods. The monitoring plane include noise level and groundwater.

During construction period, the following monitoring is conducted as shown in *Table 13.1*

Table 13.1: Monitoring Plan for Construction Period

Environmental Item	Major contents to be conducted or inspected)
Air quality	Measurement and Control of SPM, CO, No2, SO2
Waste	Ensuring of disposal to the designated landfill
Soil contamination	Inspection of oil leakage maintenance, Collection and disposal of soil contaminated
Noise, Vibration	Measurement and Control of noise and vibration
Protected area	-
Ecosystem	Management of dewatering and emission from construction equipment and machines
Livelihood	Management of interference of residents path
Working condition	Instruction of occupational safety and wearing of safety tools
Accident	Formulation and instruction of safety role, implementation of safety measures for residents

Apart from the parameters in *Table 13.1*, the *Table 13.2* shows the monitoring plan for both construction and operational phase of the project

Table 13.2: Monitoring Plan

Parameter	Indicators	Baseline	Method	Responsible / cost in USD	Reporting
Groundwater	Changes in Electrical Conductivity and Salinity	Baseline to be reestablished immediately after construction is complete	In-situ and laboratory measurement	Born by the constructor 500 dollars per trip	• Monitoring Report 1 – at the start of the project • Monitoring Report 2 –
Vegetation	Changes in the height of	Baseline to be reestablished	Onsite observation	Born by the proponent /	

	grass	immediately after construction is complete		operator 500 dollars per trip	during the project implementation
Noise level	Noise level at monitoring locations	Baseline to be reestablished immediately after construction is complete	Measuring noise levels using noise meter	Contractor/MHI 500 dollars per trip	• Monitoring Report 3 – 6 months after completion of the project

13.1. Monitoring Report

An environmental monitoring report would be compiled and submitted to the EPA six months after the completion of the project, based on the data collected for the monitoring the parameters included in the monitoring plan given in the EIA. The annual environmental monitoring report will include details of the site, strategy of data collection and analysis, quality control measures, sampling frequency and monitoring analysis and details of methodologies and protocols followed.

13.2. Cost of monitoring

It is estimated that during the project implementation phase, the monitoring cost would be US$ 15,000

Attachment 2 Environmental Monitoring Plan in the EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project (for 3 sites)

EIA for the Proposed Digital Terrestrial Television Broadcasting Network Development Project

Prepared by:

Energy Consultancy Pvt Ltd

Prepared for:

Public Service Media

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13. Environmental Monitoring

The purpose of environmental monitoring plan (EMP) is to monitor or control environmental effects of the proposed project. It is very vital to carryout proper Environmental Monitoring. Through the monitoring plane the potential negative impacts would be minimized. The unanticipated impacts that may occur during the construction period would also be mitigated through the monitoring. The purpose of the monitoring is to provide information that will aid impact management, and secondarily to achieve a better understanding of cause-effect relationship and to improve impact prediction and mitigation methods. The monitoring plane include noise level and groundwater.

During construction period, the following monitoring is conducted as shown in *Table 13.1*

Table 13.1: Monitoring Plan for Construction Period

Environmental Item	Major contents to be conducted or inspected)
Air quality	Measurement and Control of SPM, CO, No2, SO2
Waste	Ensuring of disposal to the designated landfill
Soil contamination	Inspection of oil leakage maintenance, Collection and disposal of soil contaminated
Noise, Vibration	Measurement and Control of noise and vibration
Protected area	-
Ecosystem	Management of dewatering and emission from construction equipment and machines
Livelihood	Management of interference of residents path
Working condition	Instruction of occupational safety and wearing of safety tools
Accident	Formulation and instruction of safety role, implementation of safety measures for residents

Apart from the parameters in *Table 13.1*, the *Table 13.2* shows the monitoring plan for both construction and operational phase of the project

Table 13.2: Monitoring Plan

Parameter	Indicators	Baseline	Method	Responsible / cost in USD	Reporting
Groundwater	Changes in Electrical Conductivity and Salinity	Baseline to be reestablished immediately after construction is complete	In-situ and laboratory measurement	Born by the constructor 500 dollars per trip	• Monitoring Report 1 – at the start of the project • Monitoring Report 2 –
Vegetation	Changes in the height of grass	Baseline to be reestablished immediately after	Onsite observation	Born by the proponent / operator	

		construction is complete		500 dollars per trip	during the project implementation
Noise level	Noise level at monitoring locations	Baseline to be reestablished immediately after construction is complete	Measuring noise levels using noise meter	Contractor/MHI 500 dollars per trip	• Monitoring Report 3 – 6 months after completion of the project

13.1. Monitoring Report

An environmental monitoring report would be compiled and submitted to the EPA six months after the completion of the project, based on the data collected for the monitoring parameters included in the monitoring plan given in the EIA. The annual environmental monitoring report will include details of the site, strategy of data collection and analysis, quality control measures, sampling frequency and monitoring analysis and details of methodologies and protocols followed.

13.2. Cost of monitoring

It is estimated that during the project implementation phase, the monitoring cost would be US$ 15,000