ENVIRONMENTAL AND SOCIAL MANAGEMENT PLAN

Upgrading of Island Waste Resource Management Centre with Anaerobic technology at Fonadhoo, Laamu Atoll

Report Prepared by LAMER Group Pvt Ltd
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Consultants Declaration

I certify that to best of my knowledge the statements made in this Environmental and Social Management Plan for the upgrading of Island Waste Resource Management Centre with Anaerobic Digestion Technology at Fonadhoo, Laamu Atoll, are true, complete and correct.

Name: Hussein Zahir

Consultant Registration Number: EIA P04-07

Signature:

Company Name: Land and Marine Environmental Resource Group Pvt Ltd

Date: 9th February 2021

Proponent's Declaration

بسم الله الرحمن الرحيم

PREVENT DOMESTIC VIOLENCE

Ministry of Environment
Male', Republic of Maldives.

ފަރުވާތެރިކަމާ ގުޅޭ ވަޒާރާތް
ދަތުރު، ތަރައްޤީ

Date: 8 February 2021 No: 438-MCEP/INDIV/2021/17

To Whom It May Concern

Sub: Commitment to undertake Mitigation and Environmental Monitoring

The Environmental and Social Management Plan (ESMP) prepared for the proposed establishment of the Island Waste and Resource Management Centre (IWRMC) in L. Fonadhoo has been prepared in accordance with the Environmental and Social Assessment and Management Framework (ESAMF) of the Maldives Clean Environment Project (MCEP) and the safeguards requirements of the World Bank.

We would like to confirm our commitment to the proposed mitigation measures and the monitoring programme that has been highlighted in the ESMP report prepared for the above referenced project.

Sincerely,

MINISTRY OF ENVIRONMENT * REPUBLIC OF MALDIVES *

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1 Executive Summary

Background

Fonadhoo is one of the 11 inhabited islands in Hahdhunmathi (Laamu atoll) in the southern Maldives. Similar to almost all island of Maldives, the island is vulnerable to environmental and economic development variables such as rising sea level, coastal erosion, pollution/depletion of groundwater and unmanaged waste. The existing IWRMC was initially constructed by the Island Council and later upgraded through the UNDP funded Low Emission Climate Resilient Development (LECReD) project. However, the IWRMC is at present temporarily closed as waste is not managed properly. Hence, the Ministry of Environment, being the proponent of the project, through the World Bank funded Maldives Clean Environment Project (MCEP), intends to establish a full-fledged Island Waste Resource Management Centre (IWRMC) and facilitate piloting of Anaerobic digestion (AD) as a means of treating organic waste generated in L. Fonadhoo based on the findings of the technical and financial feasibility study for establishing a regional solid waste management system in Zone 4 & 5, phase 1 of which was completed in the last quarter of 2019. At present waste disposal is at the empty land area in front of the IWRMC.

The project will include construction of new infrastructure inclusive of an organic waste processing area. Once the infrastructure is in place, an anaerobic digestor plant will be set up at the facility to facilitate treatment of the organic waste. Upon completion of the project, the operations of the facility will be handed over to the Island Council. Training needs for the proper operation of the facility will be identified through the assessment and will also be incorporated into the report.

Key impacts

Impacts on the environment during construction and operation of the facility have been identified through interviews with the project management team, field data collection and surveys. Assessment of the environmental impacts associated with project components has been carried out using the Rapid Impact Assessment Matrix (RIAM) which allows both subjective and quantitative assessment of the project components and natural environment to understand various impacts that may arise from the project. The environmental components of the project are categorized into physical/chemical, biological/ecological, social/cultural and economic including operational aspects. The outcome of the matrix based on the project components against environmental components showed positive and negative outcomes. Significant negative impacts of the project are:

- Impacts due to sorting and storage of hazardous waste
- Health and safety risks to the workers during construction and operational work

- Air pollution due to emissions associated with construction machinery
- Potential impacts due to discharge or excess digestor liquid to the ground

Lesser negative impacts from the project includes impacts on the environment due to accidental spills during transfers and material handling.

Significant positive impacts and benefits of the project are:

- Benefits to the island community (both social and economic) due to improved waste management practices and operation of the facility,
- Changes to the environment due to improved waste processing methods

Mitigation measures, monitoring and alternatives

The ESMP identified in this document gives mitigation measures for all significant impacts due to the project. Mitigation measures such as the following have been identified in the ESMP:

- Provision of adequate training in proper method of handling of machinery and materials during both construction and operational phase.
- Provision of adequate training in proper method of handling of waste during collection and disposal during operational phase.
- Provision of all protective gear to workers during both construction and operations.
- Implementation of the Grievance Redress Mechanism which has been formulated by the proponent, both during construction and operations.
- Care should be taken to maintain the flaring vent and the flame so as to have controlled burning (to prevent CH_4 emissions).

Monitoring programme identified in the report will enable the proponent to assess whether the mitigation measures which have been identified in the report are effective. Early identification of negative impacts will enable the proponent to rectify the issue.

Alternatives have also been discussed for the method of organic waste treatment and source of power generation. After consideration of all alternatives, the proposed components have been selected for both.

To conclude, with due consideration to the environmental components identified and the extent of the project activities and their likely and predicted impacts identified, with proposed mitigation measures and monitoring followed, it is concluded that the project is feasible and justified. Furthermore, the positive benefits due to the project, both to the environment and island community overweigh the negative effects on the environment during the project. The Consultant further recommends the following:

1. Adherence to all relevant legislations, regulations, guidelines and standards during construction and operation of the IWRMC;
2. Establish environmental and occupational health and safety procedures for all relevant components;
3. Installation of renewable energy sources at IWRMC, such as solar panels to source power for operations;
4. Utilise the biogas produced to generate electricity which can be used to power the IWRMC operations
5. Ensure that measures are in place to address the issue of excessive digestor liquid (liquid fertilizer), so as to enable its utilization or disposal in an environmentally friendly manner
6. Carryout awareness raising campaigns to increase awareness of the public regarding proposed work;
7. Ensure all trainings identified under the Training programme of this report are properly implemented to ensure proper implementation of the project at all phases;
8. Encourage greater participation of women, especially during operational stage;
9. Ensure proper supervision and inspection of the IWRMC at regular intervals.

1. ޚުލާޞާ

ތައާރަފު

ފޮނަދޫއަކީ ރާއްޖޭގެ ދެކުނުގައި އޮންނަ ލ. އަތޮޅުގައި ހިމެނޭ މީހުން ދިރިއުޅޭ 11 ރަށުގެ ތެރެއިން އެއްރަށެވެ. ރާއްޖޭގެ ގިނަރަށްރަށާ އެއްފަދައިން މިރަށަކީވެސް ރަށްގިރުމާއި، މޫދުގެ ފެންގަނޑު އުސްވުމާއި، ރަށުގެ މީރުފެންފަދަ ތަޣައްޔަރުވެސް އަދި ރަގަޅުގޮތުގައި ކުނިނައްތާލެވޭނެ ނިޒާމެއް ނެތުމުގެ ސަބަބުން ތިމާވެށްޓަށާއި ރަށުގެ ތަރައްޤީއަށް އެކިކަހަލަ ގޮންޖެހުންތަކާއި ކުރިމަތިވަމުންދާ ރަށެކެވެ. ފޮނަދޫގައި މިހާރު އެޅިފައި ހުރި ކުނިކޮށި އެޅުމުގެ މަސައްކަތަކީ އެންމެ ފުރަތަމަ ކުރެވިފައިވާ ކައުންސިލުގެ ފަރާތުންނެވެ. އަދި އޭގެ ފަހުން ޔޫ.އެން.ޑީ.ޕީގެ ޓްރެކް ޕްރޮޖެކްޓްގެ ދަށުން މިސިސްޓަމުވެސް އިމާރާތްކޮށް ތަރައްޤީކުރެވިފައެވެ. މިސިސްޓަމު އަކީ އެންވަޔަރަންމަންޓްގެ ޑިޒައިންވެސް ކޮލިޓީ އެންވަޔަރަންމަންޓަލް ޕްލޭނިންގ ބެލުމަށްޓަކައި ޕްރޮސެސް ކުރެވިފައިވާ ފުރިހަމަ ކުނިކޮށްޓެއް ގާއިމުކުރުމަށެވެ. އަދި މިތަނުގައި، އެނެރޯބިކް ޑައިޖެސްޓަރގެ އެހީގައި ބަޔޮގޭސް އުފައްދާ ގޭސްކާނާ ކުނިބަނޑުކޮށްގެން ވިޔަފާރިކުރުމަށް އުފެއްދުމުގެ ގޮތުން ހުސްބިމަށެވެ.

މިމަޝްރޫޢު ކުރިއަށްގެންދެވުނީ ކުރިންވެސް ކުނިކޮށި އެޅިފައިވާ ސަރަހައްދުގައެވެ. މިތަންގައި ކުނިކޮށި ގާއިމުކުރުމުގެ ގޮތުން އިމާރާތްކުރުމާއި، ފެނާއި ބިމުގެ ކުނިން ގޯސްކަމާ އުފެއްދުމުން އެނެރޯބިކް ޑައިޖެސްޓަރ ޕްލާންޓެއް ހަރުކުރެވުނެވެ. މިމަސައްކަތް ނިމުމުން މިސިސްޓަމު ހިންގުމަށް ހަވާލުކުރެވުނީ ރަށު ކައުންސިލަށެވެ. މިތަން ރަގަޅަށް ހިންގާ ބެލެހެއްޓުމަށްޓަކައި އެކައުންސިލުގެ މުވައްޒަފުންނަށް ބޭނުންވާ ހުނަރު ތަމްރީނުތަކެއް ދިނުމަށް ވަނީ ހަމަޖެހިފައެވެ.

ތިމާވެއްޓަށް ކޮށްފާނެ އަސަރު

މިމަޝްރޫޢުގެ ސަބަބުން ތިމާވެއްޓަށް ކޮށްފާނެ އަސަރާއި ބެހޭގޮތުން މަޢުލޫމާތު ހޯދުމަށްވެސް މަޝްރޫޢު ހިންގާ ފަރާތްތަކާއި ވާހަކަ ދެކެވިގެންނާއި، ޑޭޓާ މަސައްކަތުން އެއްކުރެވުނު މަޢުލޫމާތުގެ މައްޗަށް ބިނާކުރެވިގެންނެވެ. މިމަޝްރޫޢުގެ ސަބަބުން ތިމާވެއްޓަށް ކުރާނެ އަސަރުތަކާއި އެއަސަރުކުރާނެ މިންވަރު ދެނެގަތުމަށްވެސް ކުރީގެ އިމްޕެކްޓް އެސެސްމަންޓް މެޓްރިކްސް (ރިއަމް)ގެ އެހީގައެވެ. މިގޮތުން އަސަރުތައް ދެނެގަނެވިފައިވާއިރު، ތިމާވެށީގެ އެކި ބައިތަކަށް ބަހާލެވިފައިވާ ފިޒިކަލް/ކެމިކަލް، ބަޔޮލޮޖިކަލް/އިކޮލޮޖިކަލް، ސޯޝަލް/ކަލްޗަރަލް އަދި އިކޮނޮމިކް/އޮޕަރޭޝަނަލް ބައިތަކަށެވެ. އަސަރުތައް ދެނެގަތުމަށް ކުރެވުން މަސައްކަތުން މިމަޝްރޫޢުގެ ސަބަބުން ކުރާނެ ނޭދެވޭ އަސަރުތަކާއި ފައިދާހުރި އަސަރުތައް ފާހަގަކުރެވުނެވެ. މިގޮތުން މިމަޝްރޫޢުގެ ސަބަބުން ކުރާ މައިގަނޑު (ބޮޑެތި) ނޭދެވޭ އަސަރުތަކަކީ:

- ނުރައްކާ ހިމެނޭ ކުނި މެނޭޖްކޮށް ގެންދަނުކުރުމުގެ ސަބަބުން ކުރާ ނޭދެވޭ އަސަރު
- މަޝްރޫޢު ކުރިއަށް ދާއިރުގައި މަޝްރޫޢު ހިންގުމުގެ މަރުހަލާތަކުގައި މަސައްކަތްތެރިންގެ ސިއްހަތާއި ސަލާމަތަށް ކުރާ ނުރައްކާ

- ދަށުވެދާނެ ތިމާގައިގެ ކުރިން ދަށުވާ ފަރާތަށް ހަވާލުކުރުމުގެ ކުރިން ދަށުވާ ފަރާތުގެ ދިރިއުޅުން ބަލައި ހޯދުން
- ކަނޑައަޅާފައިވާ ގޮތަށް ކަނޑައަޅާފައިވާ ދުވަހުގައި ދަށުވާ ފަރާތަށް ދަށުވާ ފަރާތުގެ ތިމާގައިގެ ކުރިން ހުށަހެޅުން

ދީފި ތިރީގައިވާ ކަންތައްތަކުގައި ދަށުވާ ފަރާތުގެ ކުރީގައި ހުށަހެޅުނު ދަށުވާ ފަރާތުގެ ތިމާގައިގެ ކުރިން ހުށަހެޅުން ކަށަވަރުކުރަން ބޭނުންވާ ކަންތައްތަކުގެ ލިސްޓެއް ތިރީގައި ދީފައިވާ ގޮތަށް ހުށަހަޅާ ކަށަވަރުކުރަންވާނެ.

ދިވެހިރާއްޖެ ދަށުވާ ފަރާތެއް ކަނޑައަޅާ ގެންދާ ގޮތަށް:

- ކަނޑައެޅިފައިވާ ދުވަހުގެ ކުރިން ދަށުވާ ފަރާތުގެ ކައިވެނި ކަނޑައެޅުން (ތިމާގައިގެ ތަކެތި ބަހާ ހިންގާފައި)
- ކަނޑައެޅިފައިވާ ދުވަހުގެ ކުރިން ދަށުވާ ފަރާތުގެ ތިމާގައިގެ ކުރިން

ތިމާގައިގެ ކުރިން ބަހާ ހުށަހެޅުން ދީފައިވާ ފާސްކުރުން ފާސްކުރުމަށާ ބެހޭގޮތުން ކަނޑައަޅާ ގެންދާ ގޮތް

ދިވެހިރާއްޖެ ކުރީގައި ކުރިން ކަށަވަރު ކުރެއްވި ކަންތައްތަކުގެ ތެރެއިން ފާސްކުރުން ފާސްކުރުމުގެ ދިރިއުޅުމުގައި ހިނގާ ބަދަލުތަކާ ގުޅިގެން ތިރީގައި ދީފައިވާ ގޮތަށް ކަނޑައަޅާ ގެންދާނެ. ދީފި ގޮތަށް ހިނގާ:

- ދަށުވާ ފަރާތުގެ ތިމާގައިގެ ކުރީގައި ތިމާ ދަށުވާ ފަރާތުގެ ކައިވެނި ކުރިން ދަށުވާ ފަރާތުގެ ތިމާގައިގެ ކުރިން ހުށަހެޅުން
- ދަށުވާ ފަރާތުގެ ތިމާ ދަށުވާ ފަރާތުގެ ކައިވެނި ކުރިން ދަށުވާ ފަރާތުގެ ތިމާގައިގެ ކުރިން ހުށަހެޅުން
- ދަށުވާ ފަރާތުގެ ކައިވެނި ކުރިން ދަށުވާ ފަރާތުގެ ތިމާ ދަށުވާ ފަރާތުގެ ތިމާގައިގެ ކުރިން ހުށަހެޅުން
- ދަށުވާ ފަރާތުގެ ކައިވެނި ކުރިން ދަށުވާ ފަރާތުގެ ތިމާ ދަށުވާ ފަރާތުގެ ތިމާގައިގެ ކުރިން ހުށަހެޅުން

ދީފި ގޮތަށް ކަނޑައަޅާ ގެންދާ ގޮތަށް ކަށަވަރުކުރުމަށް ދަށުވާ ފަރާތުގެ ތިމާ ދަށުވާ ފަރާތުގެ ތިމާގައިގެ ކުރިން ހުށަހެޅުނު ދަށުވާ ފަރާތުގެ ތިމާ ދަށުވާ ފަރާތުގެ ތިމާގައިގެ ކުރިން ހުށަހެޅުން ކަށަވަރުކުރަންވާނެ.

ދިވެހިރާއްޖެ ކުރިން ހުރި ދަށުގެ ދަށުގައި ހުންނަ ބަދަލުތަކާ ގުޅިގެން ދަތުރުކުރާ ފަރާތްތަކަށް ދެވޭ ސާވިސްތަކާ ގުޅިގެން ކަންކަން ކުރުމަށް ދިވެހިރާއްޖެ ސިވިލް ސަރވިސް ގައި ހުންނަ ކަންކަމުގެ ދަށު

2 Introduction

2.1 Background and justification

Fonadhoo is one of the 11 inhabited islands in Hahdhunmathi (Laamu atoll) in the southern Maldives. Fonadhoo is located at geographic coordinates N 01°50'3.06"N; E 73°30'9.93". The length and width of the Fonadhoo is approximately 3.9km and 0.48km respectively with a land area of approximately 159.2 hectares (ha). The resident population of the island was estimated at 2,078 (National Population Census 2014 (NBS 2015)), which has increased to 3,500 at present (Secretariat of the Fonadhoo Council, 2021).

Similar to almost all island of Maldives, the island is vulnerable to environmental and economic development variables such as rising sea level, coastal erosion, pollution/depletion of groundwater and unmanaged waste. The existing IWRMC was initially constructed by the Island Council and later upgraded through the UNDP funded Low Emission Climate Resilient Development (LECReD) project. The upgrade included renewal of the Boundary fence, and provision of equipment such as plastic scrappers, glass crusher and a woodchip machine. However, the IWRMC is at present temporarily closed as waste is not managed properly. Waste management is at present through disposal at a site outside the existing IWRMC on the island. Waste is segregated at household level and waste collection is undertaken by the Council for a fee, although not all households have registered for the programme. The waste at the site is cleared on occasion through transfer to Thilafushi, while the kitchen waste is separated and disposed at sea. However, since waste management centre is closed and waste disposed not segregated properly and a mix of different types were observed at the dumping during the field surveys. These details are further discussed in Chapter 5 of this report.

The Ministry of Environment, being the proponent of the project, through the Maldives Clean Environment Project (MCEP) intends to establish a full-fledged IWRMC and facilitate piloting of Anaerobic digestion (AD) as a means of treating organic waste generated in L. Fonadhoo, based on the findings of the technical and financial feasibility study for the establishment of a regional solid waste management system in Zone 4 & 5. The project involves construction of a 1.5-ton AD plant within the boundary of the existing IWRMC and undertaking additional civil work to upgrade the IWRMC.

Many of the existing infrastructure and corresponding facilities of the IWRMC will be retained, while some will be converted into other infrastructure. New infrastructure to be constructed as part of the project will be constructed inside the 1000m^2 area allocated for the IWRMC. Additional details of these structures as well as the detailed description of the technology to be used for organic waste treatment are given in Chapter 4 of this ESMP.

The proponent of this project is the Ministry of Environment through the World Bank funded Maldives Clean Environment Project. Upon completion of the project, the operations of the facility will be handed over to the Island Council. Training needs for the proper operation of the facility will be identified through the assessment and will also be incorporated into the report.

The Island Council has formulated and published in the government gazette a Regulation on waste management and disposal for the island (2013/R-1809). As per the Regulation, waste management and disposal areas have to be demarcated, based on the Land use plan of the island and within 3 months of the implementation of the Regulation. Furthermore, all plans and guidelines to ensure proper implementation of the Regulation should be formulated and publicized within 3 months of the implementation of the Regulation. In this aspect an Island Waste Management Plan (IWMP) has also been formulated by the Council. Major components of the IWMP are as given below.

2.1.1 Island Waste Management Plan (IWMP) of L. Fonadhoo

The document shared by the Island Council as the waste management plan of Fonadhoo is attached in Appendix 2 of this report. While the document is not a detailed plan with activities to be carried out to achieve the targets, it does identify the key objective of waste management and the targets to be achieved.

The main objectives of the IWMP is to establish a system to manage the waste generated on the island in an environmentally friendly and sustainable manner.

The plan was prepared after carrying out numerous consultations with relevant stakeholders of the island such as the Project Implementation Unit and various committees of the island

The 4 targets of the IWMP are as below:

- *Target 1: Reduce waste generation quantities*
- *Target 2: Reuse and recycle waste*
- *Target 3: Implement waste-to-energy systems*
- *Target 4: Establish and implement a sustainable waste management system on the island, through the use of new technology and equipment*

The plan does not identify the fees which are being charged for waste management, although during consultations with the council, it was identified that the island council at present has a waste collection and disposal scheme, for which all registered households have to pay a monthly fee of MRF 150. However, only about 70% of households have registered in the scheme so far, as it is not mandatory.

2.2 Purpose of the report and need for the ESMP

The Environmental Impact Assessment (EIA) Regulation of Maldives (2012/R-27) and amendments gives a list of development projects for which an EIA is required (Schedule Raa of the Regulation). With respect to waste management, EIA is required for three types of projects; installation of incinerators with a capacity of 10 or more tonnes/day, development of landfill using waste and development of large-scale waste management centres (capacity of treating 10 tonnes/day).

As per due process for projects not listed in this Schedule, a screening form for the project was submitted to the Environmental Protection Agency, to assess the level of impact due to the project. Based on this project description and areas of impact, EPA has stated that the project is unlikely to have a significant negative impact on the environment and hence the proponent could proceed with the project. At the same time, World Bank (WB), as the funding agency has also carried out screening of the project and stated that an Environmental and Social Management Plan should be prepared, based on the TOR issued by WB. As EPA does not issue a TOR for formulation of EMPs, the TOR issued by WB will be followed (see Appendix 3).

2.3 Terms of Reference (TOR)

As stated above, the Terms of Reference issued by World Bank for the project titled "ESMP or ESIA for the establishment or upgrading of IWRMC with Anaerobic Digestion (AD) Technology", will be followed for the formulation of this ESMP. The chapters of this report are as per the structure given in the TOR and are as follows:

1. Executive summary
2. Introduction
3. Legislative and Regulatory considerations
4. Project Description and study area
5. Existing environment
6. Environmental impacts
7. Alternatives
8. Mitigation Plan
9. Environmental management and monitoring plan inclusive of Grievance redress mechanism
10. Training recommendations
11. Contingency plans
12. Stakeholder consultations
13. Gender empowerment / Preparation of Gender Action plan
14. Conclusion

2.4 Literature review

The following documents have been reviewed to get a better understanding of the project and formulation of ESMPs for similar projects.

- Environmental and Social Assessment and Management Framework (ESAMF) & Resettlement Policy Framework (RPF) - Maldives Clean Environment Project (Ministry of Environment and Energy, 2016)
- Environmental Management plan for the upgrading of Island Waste Management Centre in N. Holhudhoo. Prepared for Ministry of Environment (Ahmed Hassaan Zuhair, October 2019)
- Environmental and Social Management plan for the proposed establishment of Island Waste and Resource Management Centre in Th. Madifushi. Prepared for Ministry of Environment and Energy (Ahmed Hassaan Zuhair, January 2021)
- Feasibility Study for a Regional Solid Waste Management System in Zone IV and V, Maldives - Report Phase 2 – Draft 1 Final Version. Prepared for Maldives Clean Environment Project - Ministry of Environment (CITRES and MEECO, November 2019)
- Waste Management Regulation (R-58/2013) and amendments
- Island Waste Management Regulation – L. Fonadhoo (2013/R-1959)
- Regulation on protection of the environment – L. Fonadhoo (2013/R-1963)
- Island Waste Management Plan – L. Fonadhoo
- Biogas Handbooks (Al Seadi, T., Rutz, D., Prassl, H., Köttner, M., Finsterwalder, T., Volk, S., Janssen, R. 2008.)
- How to comply with your environmental permit. Additional guidance for: Anaerobic Digestion (Reference LIT 8737) (Environment Agency, 2013).
- Environmental, Health, and Safety Guidelines for Waste Management Facilities. (World Bank Group , 2007. Washington, D.C., United States)
- AgStar Project Development Handbook – A Handbook for developing Anaerobic Digestion / Biogas Systems on Farms in the United States. 3rd ed. (USEPA, n.d.)

3 Legislative and Regulatory considerations

This chapter describes national relevant laws and regulations, as well as international agreements that are pertinent to the construction and operation of the project. The Environmental Protection and Preservation Act of the Maldives (Law No. 4/93) is the governing legislation for the protection of the environment. Several regulations have been implemented pertaining to this legislation and those of relevance to the project are given in Table 1. The Government agencies that are specifically related to the project are;

- Ministry of Environment (ME)
- Environmental Protection Agency (EPA)
- L. Fonadhoo Island Council

The national laws and regulations and the international conventions relevant to the proposed project are outlined in the following table (Table 1) with specific relevance and level of compliance.

Table 1. Legislation relevant to the project

Legislation	Description	Relevance to the project
National Laws and Regulations		
Environmental Protection and Preservation Act (Law 4/93)	This is a framework law related to overall aspects of environmental protection in the Maldives. The Environmental Protection and Preservation Act (EPPA) states that any developmental project which has a potential impact on the environment should have an EIA carried out prior to commencement of the project. List of such projects are given in the EIA Regulations 2012. Those developmental projects which do not require an EIA undergo screening to assess level of impact based on which EPA issues a decision. Article 2: Government Authorities shall provide necessary guidelines on environmental protection and all concerned parties shall take due consideration to these guidelines, Article 7: Any type of waste, oil, gas or any substance that may be harmful (e.g. toxic/hazardous or nuclear) to the environment shall not be disposed within the territory of Maldives.	The proponent (developer) shall be aware of these requirements and inform the contractor. It is advised to the proponent that the contractor is appropriately informed.
Environmental Impact Assessment Regulation (2012/R27) and amendments (5)	The regulation details out the screening process for environmental assessments, and the contents that need to be covered in the different types of assessments. It includes Initial Environmental Examination, Environmental Impact Assessment and Environmental Management Plans. The regulation also provides a list of the types of development projects that have a socioeconomic environmental relevance in Appendix Raa (D) of the regulation that would require to carry out a detailed Environmental Impact Assessment. The amendments included • Revision of EIA review period and associated costs, qualification required for monitoring the Environmental Management Plan, • Revision to the list of projects that requires EIAs, projects that can be undertaken by simply applying mitigation measures for projects such as for maintenance	The project has been screened by EPA for environmental compliance level categorization and screening decision by EPA was that the project is unlikely to have a significant negative impact on the environment and hence the proponent could proceed with the project

	dredging of harbors, clearance of vegetation within allocated plots for households and for roads, • Transferring of Tourism related EIA decision making to Minister of Tourism for tourism related activities and subsequent reversal of decision making to EPA • Categorization of EIA consultants, point system for consultants to assess performance and license suspension, a code of conduct for consultants, and increment to the fine for non-compliance of regulation and violations.	
Regulation on Environmental Liabilities (2011/R-9)	The main objective if this regulation is to ensure prevention of actions violating the EPPA 4/93. The regulation also aims to ensure compensations for all the damages that are caused by environmentally detrimental activities. The regulation sets measures and standards for different types of environmental liabilities and equal standards that shall be followed by the implementing agencies while implementing the regulation. According to this regulation the Government of Maldives reserves the right to claim compensation for all the activities which have breached the EPPA 4/93.	The proponent, developer and operators of the proposed project will be liable to any environmental damage caused during both construction and operation phase of the project. All parties should be well informed of such requirements. The project should ensure proper mitigation measures are in place to avoid any such damage.
Utility Regulation Authority Act (2020):	The Utility Regulatory Act establishes the powers and responsibilities of the Authority formed to plan and implement the activities with respect to utility service provision. The Act also identifies the policies and guidelines to be followed in planning such service provision. In this act Utility services are referred to provision of freshwater, sewerage, power and waste management services for a fee or as a business. The Act has 7 key objectives, which are as follows: • Ensure that utility services are available to the whole population at a reasonable price, and in a trustworthy, robust and sustainable manner; • Ensure that utility services are planned in an efficient and environmentally friendly manner • Ensure that the utility service provision is successful, of good quality and are able to meet the needs of the population	Operator of the IWRMC shall abide by all requirements under the Act

	• Ensure that utility service provision is done in a just manner, and that there is continued development of the services through a competitive market • Formulate and implement policies and guidelines to be followed in utility service provision • Ensure utility service providers abide by this Act and all other relevant acts and regulations and establish a penalization system for those who break the law • Increase awareness about the rights provided to those who receive the services and the service providers The regulatory works for waste management has been transferred to newly established Utility Regulation Authority (URA).	
Decentralization of Administrative Areas Act (Law 6/2010)	The Decentralisation Act (2010) (D Act) formalised the roles and responsibilities of Atoll and Island Councils and required that they be democratically elected. The Constitution mandates Councils to provide democratic and accountable governance; foster the social and economic well-being and development of the community; and establish safe, healthy and ecologically diverse environment. The Decentralisation Act requires Island and City Councils to provide and maintain basic public services such as water, electricity, and sewage systems; to organise to sweep and clean the roads, maintain cleanliness of the island and its beauty and to build and maintain roads. Hence establishment of a proper waste management system with a waste management plan for the island is one of the many responsibilities of the island council. According to the act, the island council are required to prepare their own regulations to provide waste management services. This regulation may include the grievance redress mechanism proposed in the monitoring plan to this report.	Island waste management regulation has been formed as per the Act and IWRMC has been set up on the island. Proposed project aims to further upgrade the IWRMC
Waste Management Regulation (R-58/2013)	The Waste Management Regulation of the Maldives was gazetted on the 5th of August 2013 and came into effect 6 months from the date, on 5th of February 2014. The Regulation was enacted through the powers given to the Ministry through Law 4/93. The main objective of this regulation is to implement the national policy on waste management and through its implementation, facilitate the following so as to preserve the environment:	The development of the Waste management centre on the island will follow all guidelines and protocols set under this regulation. The operations will commence after

	• Minimise both direct and indirect impacts due to waste on environment and human health. • Establish standards for waste management • Formulate an integrated framework for waste management, and establish environmentally sound and sustainable means for waste management • Encourage waste minimisation, reuse, recycling and recovery • Implement "Polluter Pay" principle • Introduce "Extended Producer Responsibility" The regulation has five focus areas: • Waste Management Standards; defines standards for waste collection, transfer, treatment, storage, site management, landfills and managing of hazardous waste • Procedure for approval of Waste management permits (for waste management sites) • Standards and permits required for transport of waste (land and sea) • Monitoring and reporting requirements • Enforcement and implementation procedures and penalties	obtaining all the required licenses and permits.
Environmental Guidelines for site selection of waste management centers	This set of guidelines formulated by EPA provides guidance in selecting an environmentally suitable site for the waste management centers in inhabited islands. It also aims to provide guidance in ways to minimize and mitigate potential environmental and social impacts from the activities that shall be carried out in the waste management center	Project carried out at existing IWRMC for which land clearance has been given by MLSA
Island Waste Management Regulation – L. Fonadhoo (2013/R-1959)	This regulation states that waste management and disposal areas have to be demarcated, based on the Land use plan of the island and within 3 months of the implementation of the Regulation. Furthermore, all plans and guidelines to ensure proper implementation of the Regulation should be formulated and publicized within 3 months of the implementation of the Regulation. The regulation also outlines the measures the Council should consider when allocating a waste disposal site, guidelines to follow when carrying waste from one place to another, during disposal of waste and burning, both at the disposal site and within own plot.	The land area allocated is in conformance to the regulation

Regulation on protection of the environment – L. Fonadhoo (2013/R-1963)	This regulation was formulated to enable the Island Council to protect the environment of the island and identify the measures to be taken against those who harm the environment of the islands under the Council jurisdiction. With respect to waste, the regulation states: a) Disposal of hazardous/ dangerous waste, fuel or oils should not be carried out in a manner which is harmful to the environment, at any area under the Council jurisdiction b) The council should designate a specific area for disposal of such material if required c) Disposal of such waste through burning can only be carried out by the Council or through Council authorization d) If the Council does undertake disposal of such waste through burning it should be done so in a manner which is not harmful to the health and wellbeing of the personnel involved as well as the community e) The regulation does not impede the Council from taking a fee for such service provision	Disposal of hazardous waste through this project will follow this regulation as well as the Waste Management Regulation
Maldives Land Act	The act governs allocation of Maldivian land for different purposes and uses and other issues regarding the issuing of land, issuing of state dwellings or private dwellings constructed for residential purposes and the sale, transfer and lease of Maldivian Land. Under article 2, all transactions concerning issuing, receiving, owning, selling, lease, utilizing and using Maldivian land shall be conducted in compliance with this Act.	Land allocation for development of IWRMC has been approved by the Maldives Land and Survey Authority (Letter from MLSA in Appendix 4)
Land Use Planning regulation (2002)	Land Use Planning (LUP) regulations were first issued in 2002 by the former Maldives Housing and Urban Development Board (MHUD) to provide the necessary policy framework and guidelines to improve land use and development activities nationally, with an emphasis on optimising the use of the limited land available. It sets out a broad framework for land use activities in planning policies and processes including planning procedures and categories, plan preparation, consultation and approval processes and implementing strategies Clauses specific to waste management in the LUP regulation states that:	The site proposed for development of the IWRMC has been allocated with due consideration to the guidance given in this regulation.

	a) Consideration shall be given to allocation of a waste management site. The waste management site shall be located away from the population and consideration given to wind direction, smell, smoke, flies and other nuisances that impact on local amenities. b) There shall be a buffer zone between the waste management site and the population. The buffer zone can be used to accommodate industrial activities or may consist of vegetation. c) The exact details and stages of how the waste is managed need not be given on the land use plan. However, the land use plan should be prepared in such a way, that it would accommodate a sustainable waste management practice. d) The rules and regulations of the Government agencies on waste management should be followed in terms waste management.	
By-law on cutting down, uprooting, digging out and export of trees and palms from one island to another	The bylaw states 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 there is no other alternative. It further states that for every tree or palm removed in the Maldives two more should be planted and grown in the island. The bylaw prohibits the removal of the following tree types; • The coastal vegetation growing around the islands extending to about 15 meters into the island are protected by this bylaw; • All the trees and palms growing in mangrove and wetlands spreading to 15 meters of land area are protected under this bylaw; • All the trees that are in a designated protected area; • Trees that are being protected by the Government in order to protect species of animal/organisms that live in such trees • Trees/palms that are unusual in structure	The proposed work does not require any vegetation clearance, as work will be carried out at site which was allocated for IWRMC in 2017 and where development work had already commenced
Protected Areas Regulation on Protected Areas Regulation (2018/R-78)	This regulation was published in 2018 under the EPPA 4/93 pursuant to Article 4. The objectives of this Regulation are; (a) to establish effective guidelines for declaration and management of protected areas; (b) to ensure that the process of protected area declaration is consultative transparent;	There are no protected sites within vicinity of project site or even within the Atoll

	(c) to enlist environmentally significant areas in the Maldives; (d) to establish and sustainably a mechanism to maintain a framework for protected areas; (e) to enhance awareness and participation of community in protected area designation and management; (f) to ensure future generations benefit from natural resources, ecosystem services and biodiversity richness of the country. 61 sites as of July 2019 has been declared as protected areas in the Maldives. These include dive sites, mangroves and some ecologically significant islands.	
Environmentally Sensitive Areas (ESAs)	ESAs include possible fish breeding areas, bird sanctuaries, micro atolls, islands, mangroves and marine areas. A total of 274 ESAs has been designated as of 2017. Ministry of Environment has designated these areas as Environmentally Sensitive Areas (ESAs) with regards to the richness of its biodiversity and significance to the ecosystem. These areas are given careful consideration before approval of any type of development to ensure sustainable development which mitigates any negative impact to the environment.	There is no environmentally sensitive areas on the island
Regulation of Health and Safety measures specific for the Construction industry (2019/R-156)	The Regulation on Health and Safety measures specific for the Construction industry was published in the government gazette on 30th January 2019 and came into effect on the same day. The implementing agency for the regulation is the Ministry which is mandated with enforcing the legislations relevant to the Construction industry at any given time (at present MNPHI). The main purpose of the Regulation is twofold: 1. Identify and specify the minimum measures which need to be in place to ensure safety of the workers and the general public 2. Identify the penalties which will be given and personnel responsible for this action, in instances where construction projects do not abide by the Regulation Second chapter of the Regulation identifies the roles and responsibilities of the Contractors and Construction companies/workers. Key points include:	The proposed project will have to adhere to this regulation taking all precautionary measures identified in the regulation during the construction phase of the project.

	• Formulation of a Health and Safety operations manual for projects exceeding MVR 1.5million in cost. These manuals will be used to train the workforce in this aspect • Formulation of an Emergency response plan • Appointment of a Site Safety Supervisor and details of their roles and responsibilities • Insurance scheme (to ensure compensation of workforce and/or neighboring houses should the need arise during construction work) • Measures to ensure public safety during construction work • Proper use or Personal Protective equipment (Contractor's responsibility to provide these to their workforce) • Regulation further specifies measures to be in place when working on different phases of the project and while using different equipment for work (working at levels 3m high from ground level, on rooftops, in enclosed areas, using scaffoldings, ladders, working with electricity, use of chemicals and welding, use of electric power tools and mechanical tools, heavy machinery) • Measures to be in place when storing materials for construction • Use of safety boards issued by relevant authorities • Use of safety measures (such as demarcation tape) to clearly demarcate construction site, so as to ensure safety of public • Operation procedures in instance of accidents at the site Chapter 3 of the Regulation identifies measures to be taken by enforcement authority in instances of an accident at the construction site. The chapter also details penalties to be issued in instances where the Regulation is not adhered to during construction projects.	
Public Health Protection Act (07/12)	The Public Health Protection Act aims to establish policies to protect public health and identify the institutional arrangement for implementing the polices, regulations and guidelines. The act has a chapter on health hazards which should be adhered in any development project as well.	The proposed project should adhere to this act in relation to identifying the potential health hazards during construction and operation stage of the IWRMC. Furthermore, as per this act the policies and guidelines formulated

	It also includes a section on establishing policies to respond to public health emergencies.	under this act and the ones formulated for the ongoing COVID pandemic should be strictly followed during the development phase of the project. During the preparation of the ESMP, HPA guidelines are followed in carrying out the field surveys and also the stakeholder discussions.
Guideline on travel related quarantine among people travelling in 10 or more groups (HPA Guidelines of relevance to present COVID 19 situation)	This guideline highlights the measure to observe if group of 10 people or more stays in a shared accommodation (room or barracks or dormitory) during travel related quarantine. This guideline also applies to those who are travelling to an island where there is no community spread, from any island where there is community spread of COVID19. Clauses of this guideline of relevance to this project include: • If Maldivians and expatriates living in an island where there is community spread of COVID-19 travels to an island where there is no community spread of COVID-19, PCR test must be done not more than 72 hours prior to the scheduled time of departure to the island and should have a negative PCR result prior to travel. • People who have COVID-19 like symptoms such as fever, cough, respiratory symptoms etc., must not travel until 48 hours after resolution of symptoms even if their PCR test results are negative. The Guidelines also details procedures for travel applications, procedures to be followed during quarantine period inclusive of accommodation (such as accommodation in small groups, without meeting people from outside, distance between beds of 3ft etc.) during this period. It also gives details on procedures to be followed if someone who is in quarantine shows symptoms of COVID 19.	Construction workforce will abide by these guidelines prior to departure to the island and during their stay on the island. During the preparation of the ESMP, HPA guidelines are followed in carrying out the field surveys and also the stakeholder discussions
Labour and Working Conditions National Laws	The national laws and regulations relevant to labour and working conditions include: • Employment Act (2/2008) • Immigration Act (1/2007) • Anti-Human Trafficking Act (12/2013) • Pensions Act (8/2009)	Contractors should ensure that all workers are treated according to the Employment Act.

	• Human Rights Act (6/2006) • Regulation on Employment of foreign workers in the Maldives (2011/R-22) • Work Visa Regulation (2010/R-7)	Contractor should ensure that all foreign workers have relevant documentations including the work visa as per Immigration Act and Work Visa Regulation.
National Policies and Action Plans		
National Biodiversity Strategy and Action Plan 2016 – 2025 (NBSAP) prepared under the Convention of Biological Diversity (CBD)	NBSAP is a 10-year plan with the vision of Maldives is to be *"a nation of people that co-exist with nature and has taken the right steps to fully appreciate, conserve, sustainably use, and equitably access and share benefits of biodiversity and ecosystem services."* by integration of biodiversity conservation into all areas of national planning, policy development and administration (MEE, 2015). The 6 strategies developed to achieve this includes; S1: Strengthen governance, policies and strategies for biodiversity, S2: Enhancing communication and outreach through awareness programs and capacity building, S3: Work together globally for biodiversity conservation, S4: Ensure sustainable use of biological resources, S5: Address threats to conserve biodiversity, S6: Strengthen information management and resource mobilization. Among these strategies, includes identifying ways to address threats to conserve biodiversity conservation (Strategy 5) under which targets includes: Target 17: By 2025 pressures on coral reefs and other vulnerable ecosystems due to anthropogenic activities and climate change are minimized Target 19: By 2025, impacted ecosystems that provide essential services related to water, human health, wellbeing and livelihood are restored significantly Target 23: By 2020 pollution from waste and sewage has been brought to levels that are not detrimental to ecosystem functions and biodiversity.	The current project conforms to these policies, by carrying out the ESMP work prior to commencement of the project, so as to minimize impact on the environment and to incorporate ways of environmental monitoring and management during the project works.
National Waste management policy (2015)	The key objective of the National Waste Management Policy is to ensure that all the policies, regulations, standards plans and masterplans are prepared with a common basis. The policy includes roles and responsibilities of waste management at individual level, household level, atoll level, regional level and national level.	Operations of the waste management centre will be as per this policy and other waste management guidelines. Island Waste management plan will be implemented to ensure proper operations.

	The policy outlines 10 strategies to address the issue of waste management in Maldives. These include the individual responsibilities of managing waste and island councils' responsibilities to prepare waste management plans and manage the waste at island levels; Collecting fees from households to manage waste; Encourage the utilities companies to carry out the task of managing waste at the islands; Establishment of regional waste management centers; Encourage and provide means to generate income using waste products; carry out trainings on waste management at national level.	
International legal frameworks		
IFC guidelines Environmental, Health and Safety guidelines for Waste management facilities	This set of Guidelines are applicable to all projects involving the management of municipal solid waste and industrial waste, including waste collection and transport; waste receipt, unloading, processing, and storage; landfill disposal; physico-chemical and biological treatment; and incineration projects The Guideline has two main parts: 1. Industry specific impacts on the environment, occupational health and safety and community health and safety. Recommendations on ways to mitigate and manage these impacts are also given in the guideline. 2. Performance indicators and industry benchmarks for environmental performance and occupational health and safety performance.	
Labour and Working Conditions	Maldives has signed 10 convention of the International Labour Organisation with regards to labour and working conditions These includes: Fundamental 8 conventions • C029 - Forced Labour Convention, 1930 (No. 29) *ratified on 04 Jan 2013* • C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948 (No. 87) *ratified on 04 Jan 2013* • C098 - Right to Organise and Collective Bargaining Convention, 1949 (No. 98) ratified on *04 Jan 2013* • C100 - Equal Remuneration Convention, 1951 (No. 100) *ratified on 04 Jan 2013* • C105 - Abolition of Forced Labour Convention, 1957 (No. 105) ratified on 04 Jan 2013	The contractor (s) should adhere to the measures mentioned in these conventions where relevant. Among the many things, abiding to these laws would ensure no exploitation of foreign migrant. The contractors should make timely payment to the workers (in full) and they should not hold documents of the workers against their will. It is important to know that foreign migrant workers are not required to

	• C111 -Discrimination (Employment and Occupation) Convention, 1958 (No. 111) ratified on 04 Jan 2013 • C138 - Minimum Age Convention, 1973 (No. 138) Minimum age specified: 16 years r*atified on 04 Jan 2013* • C182 - Worst Forms of Child Labour Convention, 1999 (No. 182) *ratified on 04 Jan 2013* Technical 2 conventions • C185 - Seafarers' Identity Documents Convention (Revised), 2003, as amended (No. 185) *ratified on 05 Jan 2015* • Amendments of 2016 to the Annexes of the Convention No. 185 *ratified on 08-Jun-2017* • MLC, 2006 - Maritime Labour Convention, 2006 (MLC, 2006) *ratified on 07 Oct 2014* Al these conventions are considered in-force in the Maldives. Hence these should be strictly adhered in relation to all labour and working affairs.	pay recruitment fees and there should not be any forced labour. Contractors should ensure that all workers local or foreign should be treated with equality, dignity and respect.

4 Project Description

4.1 Study Area

The proposed project will be undertaken in Fonadhoo, Laamu Atoll located in southern region of Maldives. The island is located on the southeastern peripheral reef of the atoll, at the geographic coordinates of N 01°50'3.06"N; E 73°30'9.93". Fonadhoo is the capital of Laamu Atoll and has a total land area of approximately 159.2 hectares (ha). The inhabited area of the island is approximately 75.1ha. The closest inhabited island to Fonadhoo is Gan, which is located approximately 9 km from Fonadhoo. Fonadhoo and Gan are connected via the Gan-Fonadhoo link road which starts from the southern end of Gan and passes through Maandhoo and Kahdhoo before connecting to Fonadhoo at the northern end of the island. The proposed work will be undertaken at the existing IWRMC of 1000m^2 area located on the southern end of Fonadhoo. The land area required for project development was allocated for the purpose and approved by Maldives Land and Survey Authority in 2017 (evidence of land area approval is given in Appendix 4). Figure 1 shows the location of Fonadhoo in Laamu Atoll and location of the existing IWRMC in the island. The closeup image also shows current waste dumping area just outside the existing IWRMC.

Figure 1. Location of Fonadhoo in Laamu Atoll (left, top), location of IWRMC at Fonadhoo (left, bottom) and closeup of IWRMC and current waste dumping area (right)) (Large scaled map given in Appendix 5)

4.2 **Project components**

The IWRMC was initially constructed by the Island Council and later upgraded through the UNDP funded LECReD project. However, the IWRMC is not being used at present due to issues with proper waste management and the waste is at present being dumped to an area just outside the IWRMC site. The existing boundary fence and many of the existing infrastructure will be retained and additional development of the IWRMC will be undertaken inside the demarcated boundary.

The proposed project will retain many of the existing infrastructure and corresponding facilities of the IWRMC and the size of the IWRMC will remain the same (1000m^2). All the civil works will be confined to the previously demarcated boundary. Details of existing infrastructure and new infrastructure to be developed are given in Table 2.

Table 2. Existing and new infrastructure to be developed under the project

Existing infrastructure	New infrastructure
• Equipment Room - will be converted to an office via the proposed project. • Hazardous Waste Storge - will be converted into a storeroom via the proposed project. • Compost Screed and Bed • Leachate Well • Collection Bays • Groundwater Well • Boundary Fence with Gate	• Office • Store • Toilet / washing area • Waste unloading, loading and weighing area (4.5 x 12.05m) • Organic waste processing area (12 x 14m) • Proposed inorganic waste processing area (10.38 x 12.05m) • Processed inorganic waste storage area (10.38 x 19.65m) • Bulk waste storage area (8.65 x 14.88m) • Hazardous waste storage area • Catch Pit • Installing drains • Connecting Water • Fire safety equipment • Connecting electricity to the new developments

Details of the existing infrastructure are given below:

1. **Equipment Room**
   Fully enclosed lockable room with roof, floor screed (concrete slab) and brick walls, designated for storage of equipment. The equipment room will be converted to an office via the proposed project.

2. **Hazardous Waste Storge**
   Fully enclosed room with roof, floor screed (concrete slab) and brick walls, designated for storage of hazardous waste. The hazardous waste store will be converted into a storeroom via the proposed project.

3. **Compost Screed and Bed**
   12m by 15m slabs designed for open windrow composting

4. **Leachate Well**
   The leachate well adjoins the compost screed and bed, where leachate generated through composting is collected.

5. **Collection Bays**
   Roofed areas with floor screed (concrete slab) where sorted inorganic waste area is stored to some extent

6. **Groundwater Well**
   A ground water well is present from which water can be drawn for composting.

7. **Boundary Fence with Gate**
   A boundary fence is present surrounding the IWRMC. A gate is present north of the IWRMC, towards the main road of the island (*Siraajudheen magu*).

Figure 2 gives a schematic of the layout for proposed IWRMC. A larger scale drawing is given in Appendix 6 of this report.

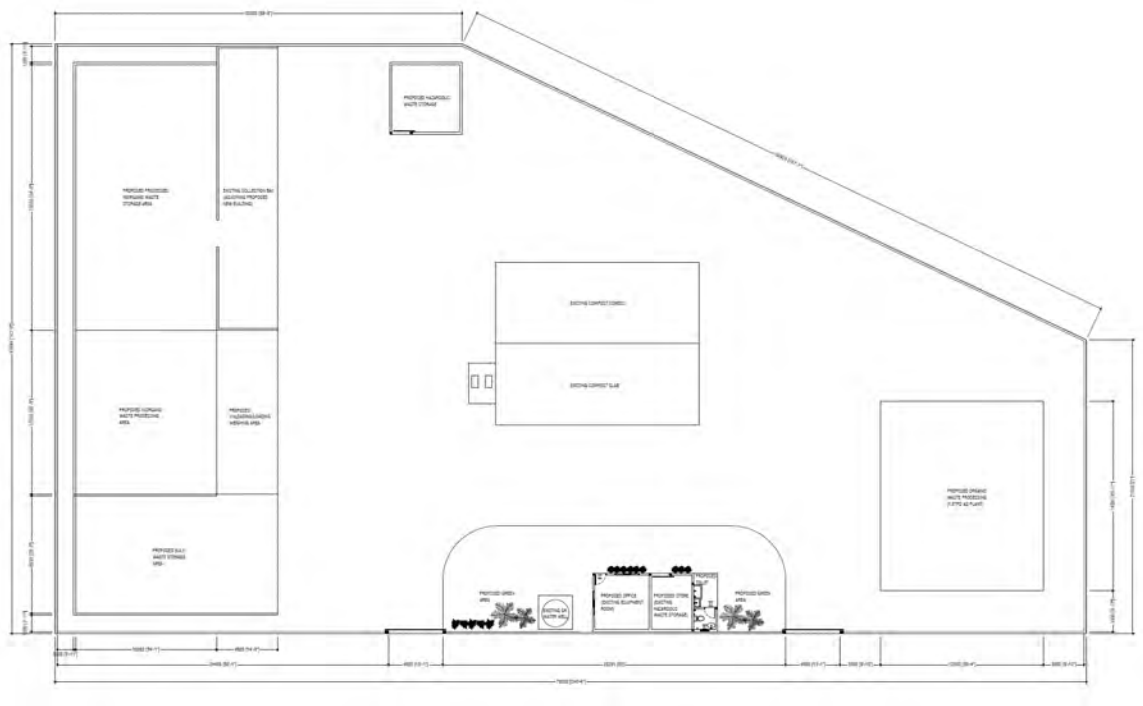

Figure 2. Schematic layout of IWRMC proposed (scaled site plan given in Appendix 6)

4.2.1 **Anaerobic Digestion (AD) plant**

4.2.1.1 **Technology**

The proposed technology for treating organic waste in Fonadhoo is a 1.5 ton capacity Plug Flow Reactor or PFR anerobic digestion (AD) plant. Its main function is converting organic waste into biogas, while compost and liquid digestate are produced as biproducts. The liquid digestate can be directly used as a fertilizer, while the wet compost can be dried to obtain compost of high nutrient value.

Although the biogas produced can be utilized for cooking or converted to electricity with the addition of a bio-generator or IR biogas stoves with a biogas compressor (2-5Kg/cm^2) to the system, provisions for such arrangements are not being made via the proposed project due to budgetary limitations. Instead, the biogas generated will be flared.

Around 5-10% of the biodegradable waste fed into the bio-methanation plant comes out as compost in case of food waste/MSW/cow dung and 30-40% of the material comes out undigested organic residue. The residues and leafy material containing lignin which does not get digested completely comes out of the digester at the end of 30-day solids retention time (SRT). This material

can be pulled out of the digester and dried to obtain compost of high nutrient value. Anaerobic compost is found to have higher nutrient content when compared to aerobic compost. From 1tpd of biodegradable waste fed into a biogas plant, around 30-40kg of wet compost (6-10kg dry) compost can be achieved. The digester liquid (600- 700L/pd) is also high in nutrients can be used as fertilizer.

4.2.1.2 Cost

The cost of the plant excluding civil works is approximately $25,000 to $30,000. The cost of the project including civil works is estimated as Rf 2.5 million (USD 162,127).

4.3 Construction phase

4.3.1.1 Construction methods

The construction contractor for the project has not been identified yet. The contractor will be identified upon approval of ESMP. The contractor shall provide details of materials and methodology for construction subject to approval from the client. Hence, construction work will be carried out as per contract for various components of the project. Machinery and materials to be used (including sand required for construction) will be bought locally or imported if not available. Details of construction methods given below are as provided by the proponent (in the absence of a contractor). As per the proponent, normal civil works will be undertaken for the construction of the buildings. New infrastructure to be developed at the IWRMC as part of the proposed project includes:

1. **Office**
   The existing equipment room will be converted into an office. Structural changes will be brought including but not limited to, fitting of doors, windows and air conditions.

2. **Store**
   The existing hazardous waste storage will be converted into a store, where equipment and other material can be kept.

3. **Toilet / washing area**
   A toilet will be developed adjacent to the store.

4. **Waste unloading, loading and weighing area**

A roofed area (54m^2) with a floor screed (concrete slab) constructed adjoining the existing collection bays, designated for sorting and weigh of incoming waste to organic and inorganic fractions.

5. **Organic waste processing area and Installation of Anaerobic Digestion (AD)Plant**

A 1.5-ton anaerobic digestion (AD) plant will be installed at an area of 168m^2. Details of the technology are provided in section 4.4.1. Civil works at the area allocated for this purpose will be carried out later, when the AD plant is procured. Normal masonry work will be carried out at the site.

6. **Proposed inorganic waste processing area**

A roofed area (125m^2) with floor screed (concrete slab) developed adjoining the waste unloading, loading and weighting area to the left, designated for carrying out glass crushing, metal can baling, plastic shredding etc.

7. **Processed inorganic waste storage area**

A roofed area (204m^2) with floor screed (concreted slab) developed adjoining the inorganic waste processing area and the waste unloading, loading and weighing area. This would enable storage of processed inorganic waste for a period of 4 – 6 months.

8. **Bulk waste storage area**

A roofed area (128m^2) with a floor screed (concrete slab) enclosed by 3 brick walls, where bulk waste such as old furniture, roofing sheets etc. will be stored and sold or given free to the community. This area will adjoin the unloading, loading and weighing area, and the inorganic waste processing area.

9. **Hazardous waste storage area**

A fully enclosed room with a roof, floor screed (concrete slab), 4 walls and a gate, where the received hazardous waste will be stored prior to its final disposal at a RWMF. Appropriate hazard, flammable liquid and warning signage will be installed.

10. **Catch Pit**

A catch pit will be developed close to the toilet to deal with wastewater coming from the drains of the toilet and other areas of the IWRMC, which would be in turn connected to the STP. The STP site office is present next to the IWRMC.

11. Installing drains

Drains will be installed at the newly constructed waste unloading and loading areas, the waste processing areas and waste storage areas, which will be connected to the catch pit.

12. Connecting Water

Water taps will be installed at the waste unloading and loading areas, the waste processing areas, waste storage areas and close to the AD plant.

13. Fire safety equipment

Fire safety equipment such as CO_2 and water-based fire extinguishers will be supplied and installed as part of the contract, if not already installed at the existing IWRMC. Details of equipment to be installed are as below:

- 50KG DCP Trolley 2 nos.
- 50LTR Foam Trolley 1 no.
- Wet Chemical 6Ltr with Cabinet for hazardous waste area 1 no.
- Water 9Ltr with Cabinet for Office Area – Outside 1 no.
- CO_2 2KG with Cabinet for Office Area – Outside 1 no.

14. Connecting electricity to the new developments

Electricity will be connected to the new developments from the existing electricity distribution board of the IWRMC.

Construction of Foundation and concrete slab

The proposed method of foundation construction for the IWRMC is using concrete footing and concrete foundation beams. As detailed designs are not available at present, depth of excavation is unavailable. However, since the structures are single storey structures, it is assumed that depth of excavation will not exceed 600mm. Excavation will be done manually and given the shallow excavation necessary, dewatering will not be required. Ordinary Portland cement will be used for all concrete works.

The Concrete foundation beams will be covered with a concrete slab with varying thickness at different areas of the IWRMC. Thickness of slab at the office area is proposed to be 75mm, while that at hazardous waste storage area and bulk waste storage area will be 100mm. The concrete slab at the rest of the waste processing areas will have a thickness of 150mm.

4.4 **Operational phase**

In Fonadhoo estimated 2,286kg of waste is generated per day (CITRES and MEECO, 2019). This corresponds to 1,600kg of organic and 688 kg of inorganic waste. The fraction of food is estimated as 1280kg daily. To process this daily food waste an Anaerobic Digester (AD Plant (Plug flow reactor) of 1.5-ton capacity will be installed at the current waste management facility.

The organic proportion of waste would be processed through AD plant, via systematic collection from households at source and transported (motorized vehicles) to the waste management facility. Waste will be sorted at site and the organic (food and easily degradable organic materials) will be processed through anaerobic digestion. The following figure shows a general schematic flow diagram of the process.

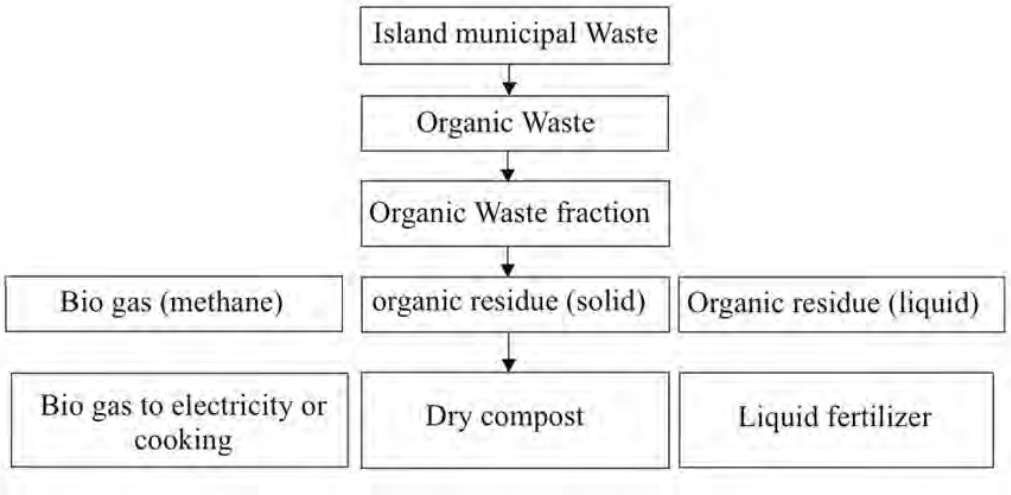

Figure 3. Schematic of the flow diagram of the organic waste treatment process

Bi product of the digestion process after approximately 30 days are biogas (predominantly methane, 50% of gaseous composition), liquid biproduct of organic digestion and solid residues. Biogas can be used for generating electricity or cooking, though this will not be further processed through this project due to financial restrictions. Gas produced from the anaerobic processing of organic waste will be flared (wasted). Liquid residue and solid residues has the potential to be used as organic fertilizers such as liquid fertilizer or compost. The fate of the residues are not clear yet.

Other components of the operational phase include:

1. **Waste Collection**
   Each household will be supplied with bins to facilitate segregation of waste at household level. Three motorized vehicles are proposed to be used for household waste collection. Daily collection services will be provided for a monthly fee.

2. **Sorting**
   Collected waste will be sorted into organic and inorganic waste at site. After sorting, the inorganic waste will be further segregated into plastic, metal, glass etc., and processed via baling, compaction and crushing. The processed waste will be stored at the area designated for storage within the management facility. This waste will be shipped periodically (once enough bulk material for a ship load is processed) to the nearest regional waste management facility (Thilafushi in Male' atoll is the designated site for Zones 4 & 5). The organic waste will be treated through anaerobic digestion. The facility also has separate storage areas for hazardous waste.

3. **Leachate Management**
   The proposed method of organic waste disposal through mechanical anaerobic digestion will greatly reduce leachate from waste handling and disposal. Appropriate design with leachate proof flooring associated with the proposed construction aspects, with surface drainage mechanisms at site ensures unmanaged leachate seepage leaked to the ground. The drainage system will be connected to the septic tanks constructed to dispose sewage and other wastewater generated at site.

4. **Waste Transport to a Regional Facility**
   The inorganic waste processed and hazardous waste stored at storage areas within the management facility. This waste will be shipped periodically (once enough bulk material for a ship load is processed) to the nearest regional waste management facility. The organic waste will be composted through mechanical composting. Thilafushi has been proposed as the regional waste management facility for zone 4 and 5 of strategic waste management policy of Maldives. Thilafushi is currently being developed under financing from the Asian Development Bank.

4.4.1 Anaerobic Digestion Plant Process

The Anaerobic technology which is adopted for the facility is Plug Flow Reactor or PFR technology. The PFRs function like a three-zone fermenter where rapid fermentation occurs within the inlet zone with over production of volatile fatty acids (VFA) making it acidic. During this

phase gas bubbles (CO_2) generally nucleate around and adhere to the biomass making them float in the digester liquid. In the second zone after the simple compounds present in the leaf biomass are converted to acids, a balance between the acidogenic and methanogenic bacteria is achieved when the biomass is still in a floating state. The third zone is a region where VFA produced in earlier zones diffuse into it and are converted to biogas. Under normal circumstances when the digesting biomass from the inlet starts to float it tends to gradually dry and form fermentation arrested 'scum'. The PFR system overcomes this issue by retaining the biomass under digester liquid for a sufficiently long period for the acidogenic bacteria to initiate fermentation and digests the easily fermentable fractions of the biomass. As the decomposition rates fall and several slow-growing methanogenic bacteria colonize this biomass in sufficient numbers, the rates of acidogenesis and methanogenesis very quickly become balanced enough to carry out a stable and continuous fermentation of the biomass even when the biomass feedstock is afloat.

The technology allows domestic waste to be fed in a partially segregated manner, wherein inorganic waste like glass and plastic bags (less than 2%) can be fed to the reactor without segregation and can be collected from a passage of the reactor later. Additionally, any type of waste even agro-residues and long banana stems can be fed as it is without pulverization. Thereby, labor charges spent for segregation and preparation can be largely minimized. The technology also does not require the addition of water for pre-treatment or for any other process. The machinery and other moving parts involved in the reactor are less hence reducing the consumption of energy used to produce biogas, of which this technology produces a high volume (up to $60m^3$/TPD; 80-85% of the theoretical methane yields). The PFR reduces one ton of bio-waste to less than 100kg in a 30-day retention time. A schematic of the anaerobic digestion process by the proposed technology is shown in Figure 4.

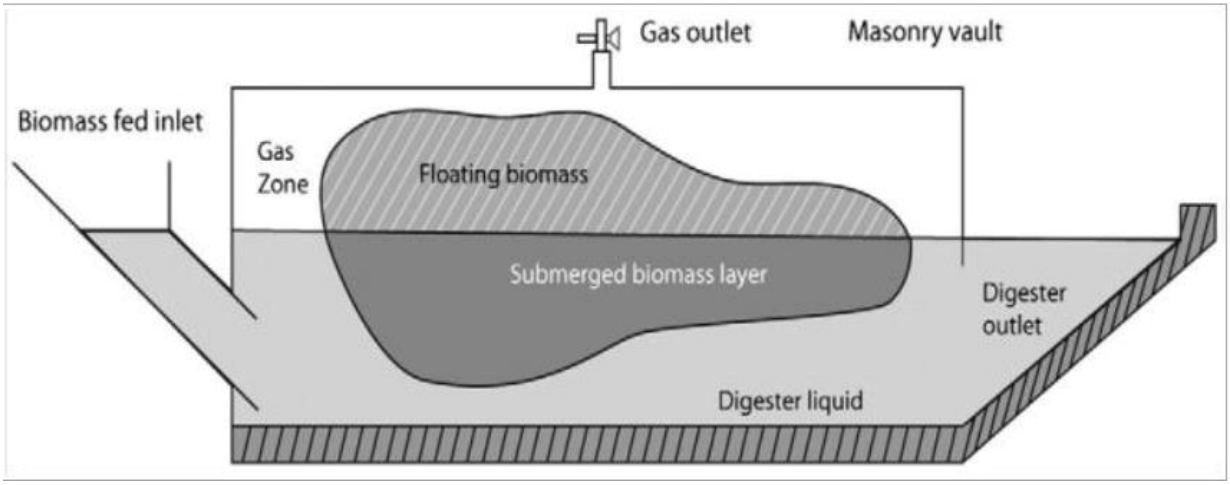

Figure 4. schematic of the anaerobic digestion process

4.4.1.1 **Input (Feed material)**

The proposed feedstock in these bio-methanation plant are food waste, agriculture residues etc. This technology enables material to be fed to the machine as it is without size reduction or pulverization. Hence the material can be added without pre-processing to form slurry-like material with water.

4.4.1.2 **Outputs**

The main output of the processing is biogas (60m^3/day, mainly methane) from food waste & agricultural residues. In addition, the digester will generate solid residues and organic liquids.

Around 5-10% of the biodegradable waste fed into the bio-methanation plant comes out as compost in case of food waste. The leafy material containing lignin does not get digested completely and comes out of the digester at the end of 30d period. This material can be pulled out of the digester and dried to obtain compost of high nutrient value. Anaerobic compost is found to have higher nutrient content when compared to aerobic compost. Approximately 30-40kg of wet compost (~10kg dry) can be achieved from 1ton of biodegradable waste fed into a biogas plant on a daily basis. The digester liquid (500liters/day) is also high in nutrients and can be used as fertilizer.

It is proposed that the gas will be flared at site. Liquid fertilizer and compost is to be used locally for agricultural purposes or processed and sold to nearby resorts. While, this is the plan, storage capacity of the product or method of disposal or handling of surplus liquid fertilizer is not decided at the time of report preparation. Given the large quantity of liquid fertilizer and compost produced on a daily basis, any excess generated will need to be handled in an environmentally sustainable manner. Hence recommendations to manage excess liquid biproduct is given in Chapter 14.

Figure 5. Example of AD plant installed in a resort hotel, Reethifaru, Baa atoll (source: BIOGEN, India)

4.4.2 Schedule for implementation

As per information provided by the Client, all civil works of the project is anticipated to be completed within 6 calendar months. An estimated schedule for construction (as given by Client) is provided in Table 3.

Table 3. Tentative Project Schedule

Activity	Month 1		Month 2	Month 3	Month 4	Month 5	Month 6
Mobilization & Supply of Construction Materials							
Site Preparation: levelling. Earthworks and relocation of existing waste							
Civil Works							
Demobilization							

The Client informs that the AD plant will be supplied at a later stage after the completion of the civil works required for its installation and hence is considered as an associated activity of the project. As per the current project implementation schedule, the AD plant is expected to be supplied, installed and commissioned within the last quarter of 2021.

4.4.3 Major inputs and outputs

4.4.3.1 Inputs

Access to site, mobilization and material unloading

Access to site and material unloading will be via existing harbour on the western side of the island. Materials will be transported to the project site and stored at the site.

Workforce requirements, availability and logistics

Work will be carried out by a Contractor, though contractor for the project has not been assigned as yet. Based on information provided by client, workforce will comprise of approximately 10 personnel inclusive of Site supervisor (1), engineer (1) and laborers (8). Workforce will be accommodated through rental of property from the island. If workforce is to be mobilized during the current COVID-19 health emergency, they will follow all required guidelines by HPA prior to and during their time on the island (inclusive of required tests, quarantine etc.).

Provision for water, electricity and Sewerage services during construction

Electricity, Water and Sewerage services required for the workers will be arranged via the existing facilities available on the island as the workforce will be accommodated in existing houses and/or guesthouses.

Electricity and non-potable water are available at the proposed site, which the workforce can use during the working hours. Mineral water bottles or rainwater will be used for drinking purposes.

Vegetation clearance

The proposed work will be carried out at an existing IWRMC facility with easy access via one of the main roads which goes along the whole length of the island. Hence no vegetation clearance is necessary for the proposed work.

Fire hazard, health and safety

Fire safety equipment such as CO_2 and water-based fire extinguishers will be supplied and installed as part of the contract, if not already installed at the existing IWRMC. Details of equipment to be installed have been given in Section 4.2.

The IWRMC will be operated by the Council. During consultations it was identified that training would be required for those involved in the operations, both in operations of the centre and firefighting skills. This is hence involved in the training programme identified in Chapter 10 of this report.

Construction waste and waste oil

The upgrading of the existing IWRMC would inevitably generate some construction and demolition waste such as parts of demolished walls and roofing materials. However, quantity of such waste generated is anticipated to the insignificant. These materials will be utilized for the construction of the proposed new infrastructures of the IWRMC as much as possible, with any remaining waste temporarily stored an allocated area within site, before being disposed to Thilafushi. Other construction waste may include materials slightly hazardous in nature such as used thinners and paint cartons which will be properly sealed and stored at the existing hazardous waste storage room of the IWRMC for further treatment and or disposal to Thilafushi.

Existing waste disposal in the island is being carried out at the area immediately adjacent to the IWRMC. However, a considerably small amount of waste was also observed within the centre, at the collection bay area and in jumbo bags. These will also be disposed at the site being used at present.

4.4.3.2 **Outputs**

The key output of the project is an IWRMC setup with AD plant for processing of organic waste. In the absence of a contractor, Inputs / outputs of the project have been provided after discussion with the PMU of the MCEP. Table 3 gives details of inputs of the project while Table 4 gives details of outputs of the project.

Table 4. Inputs of the project

	Input resource	**Type and amount**	**Means of obtaining the resource**
Construction phase	Workforce	Site supervisor – 1 Site engineer - 1 Workers - 8	Contractor hired for the project
	Water for Construction	Ground water (150 litres per day)	Groundwater well at the site
	Construction Materials .	Concrete, cement, sand, masonry blocks, flood lights, G.I. pipes, metal sliding doors, aluminium doors and windows, emulsion paint, Lysaght Roofing Sheet, 3 phase power sockets, ceiling fan and Timber	Imported or purchased where available locally. Contractor will make arrangements to import or purchase these materials and transport to the island
	Construction Machinery	Compactor (for ground levelling), pickups or trucks (for land transport of construction material), Concrete mixing machine and concrete supply pump and pipe	Responsibility of the contractor. Local resources such as pickups for hire will be utilized as much as possible. If not available locally the contractor will import these machineries.
	Fuel	Diesel	Local suppliers
	Firefighting	• Portable fire extinguisher	Responsibility of the contractor. Imported or purchased locally and to be brought to the site during mobilization.
Operational phase	Equipment	1.5-ton capacity Plug Flow Reactor or PFR anerobic digestion (AD) plant	Purchased locally or imported. Responsibility of the Proponent (Capital Investment) and Island Council (O&M). Purchased locally or imported.
	Water	Groundwater (non-potable use)	Groundwater well within the IWRMC

		Approx. 150 m^3 of water is required to fill the reactor along with the inoculum (for the start-up of the reactor). However, this is a onetime requirement.	
	Power	3-phase power for operation of waste management equipment.	Power connection already made to the IWRMC site. Total estimated power requirement for operations of the AD plant is approximately 3kW.
	Labour	3 workers - to manage waste in the IWRMC 3 workers - to provide collection services to the community 2 trained personnel – to oversee the operations of the AD plant	To be sourced ideally from within the community, or if not available, other locals or expatriate workers. Responsibility of the Island Council. The Council or the outsourced third party will make accommodation arrangements within local houses or guest houses is expatriate workers are hired.
	Fuel	Diesel	Local suppliers
	Firefighting equipment	• 50KG DCP Trolley (2) • SOL TR Foam Trolley (1) • Wet Chemical 6Ltr with Cabinet for hazardous waste area (1) • Water 9Ltr with Cabinet for Office Area - Outside (1) • CO_2 2KG with Cabinet for Office Area - Outside (1)	Responsibility of the Proponent (Capital Investment) and Island Council (O&M). Purchased locally or imported.
	Waste	Waste generated within the island - approximately 2,286 kilograms per day.	Waste will be collected from households and businesses within the island

Table 5. Project outputs

	Output	Type and amount	Means of managing the output
Construction phase	General Construction Waste	Moderate amount of Solid Waste	General construction waste will be reused as much as possible. Any remaining waste will be transferred to the nearest regional facility by the contractor/operator.
	Municipal Waste	Small quantity	Removed to the disposal site designated by the council.
	Soil	Excavation for substructure	Product at site, will be used for backfilling during construction.
	Dust	Moderate amount during cement mixing and excavation	Product at site
	Waste oil and diesel	Small quantity	By-product at site
	Greenhouse Gas Emissions	Small quantity. Emissions from construction material transporting vehicles and construction machinery.	By-product at site .
Operational phase	Biogas ($60m^3$/day), liquid fertilizer (500L/day) and compost (10kg /day)	AD plant	Produced at site, biogas flared and liquid fertilizer and compost used locally for agricultural purposes or sold to nearby resorts. Fate of any excess liquid fertilizer and compost unknown at present.
	Inorganic Waste	Crushed glass, compacted metal, shredded plastic	Produced at site and reused within community as much as possible. Remaining waste to be stored in their respective area within the IWRMC and transferred to a regional facility every 4 to 6 months.
	Greenhouse Gas Emissions	Electricity usage (Minute quantity) Biogas (Methane)	N/A Flared (resulting in CO_2 and water vapour)

5 Existing environment

5.1 Current Waste Management Practice

The waste management issue is one of the significant environmental concern for the island and communities. The island council have undertaken all the necessary preparatory work in order to facilitate the implementation of the IWRMC at the island. These include clearance of the access road facilities and preparation of lighting poles for the access road and most importantly designating land area for waste management. The land for the waste management is distanced from the residential area which would not cause any significant impact to the communities during waste management at the site.

A poorly managed waste collection and management system exits in the island. In the current system, waste is segregated at the household levels and collected by the waste management unit at the council. Waste is separated as plastic, wood, metal, glass and kitchen waste. A waste collection scheme is established for the household and businesses, for a monthly fee of MRF 150. Participation in this waste collection schemes is currently not mandatory. According to the waste management unit at the council, currently 70% of the households have participated in the waste collection scheme. In contrast to some other islands, the council indicated that they have not been able to make it mandatory for all the households to participate in this due to legislative issues. A regulation for waste collection and management has already been established in discussion with the public. However, it is yet to be gazetted, waiting for LGA approval.

A designated waste management center exists in the island although it is currently closed. It was indicated by the council that it is temporary closed as waste is not properly managed at the site. Therefore, waste is currently being dumped outside the site (see Figure 1). Since Fonadhoo is a large island, currently there are more than 350 waste collection points. Waste is collected on trucks from these collection points. With the LECReD program, the waste center underwent an upgrade. The encloser fence was renewed and equipment such as plastic scrappers, glass crusher and a woodchip machine was provided. Training to the staff was also provided via the LECReD program. However, due to the temporary closure of the site, these equipment are not used.

The site gets cleared occasionally. When the waste piles get too large, council looks for an opportunity with the close by islands or any vessels who can carry the waste to Thilafushi. This is a very expensive process and not a sustainable way to manage with the limited resources available for the waste management. Once the site is cleared, it normally takes about 3 months before it could fill for a next clean up. Kitchen waste is separated and disposed at the sea.

Figure 6. Waste site enclosed by fence and site is closed. Waste is currently dumped outside the site

5.1.1 Island Waste Stream

Different zones are identified to store and manage the waste at the IWRMC. Since the site is closed waste is dumped outside the center as shown in Figure 7. Visual assessment was undertaken at the site to estimate current waste stream of the island. Although waste is segregated at the household levels, they are dumped as mixed waste at the site due to closure of the IWRMC and poor management. Therefore, it was difficult to assess the volume of waste at the site. Large stockpile exists outside the center. To some extent, dry wood and scrap metal are placed in separate places although everything is outside the center. Since the waste dumping area is outside the fences and in very close proximity to the sea, waste ends up on the beach. In addition, cans and bottles were found to be sometimes mixed with the food waste and they were found on the beach and sea.

Figure 7. Waste at the site is highly mixed. With proximity to coast, waste end ups at the beach.

5.2 Unassigned Waste Dumping

Waste was found along the access road to the site. It is inevitable that as the stockpile grows larger, it spreads inland. In addition, with the wind, a lot of light weight waste such as cardboard boxes, plastic bags, plastic bottles etc. were found extending into the road (see Figure 8).

Figure 8. Waste is found to extend into the access road

5.3 Project Site

The IWRMC is located on the southern end of the island (Figure 9). The site is far from the residential area. The entire site is fenced with mesh wire. Waste center is in close proximity to the southern coast.

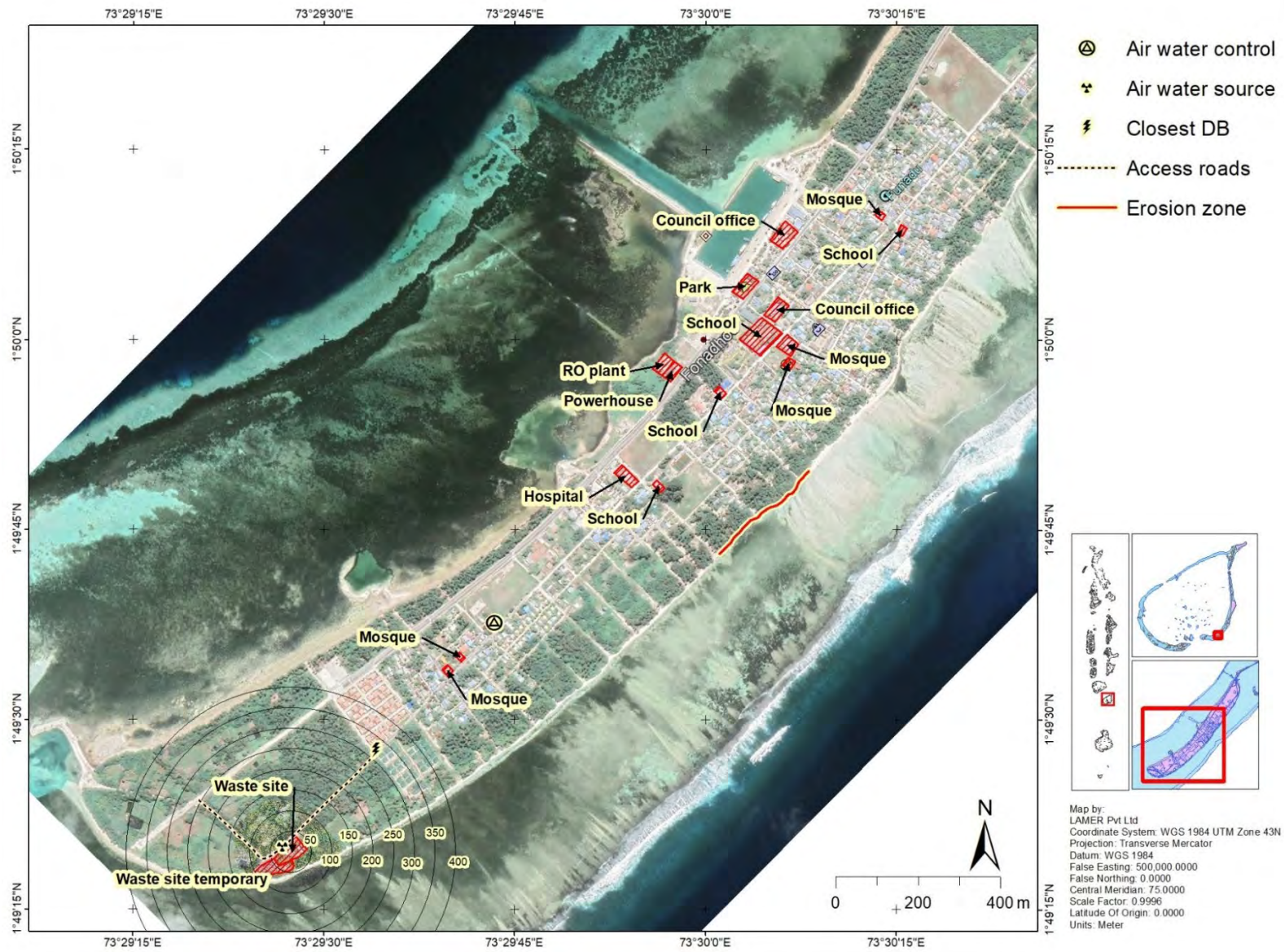

Figure 9. Location of the waste site in L. Fonadhoo

5.3.1 Soil Condition

The soil condition at the site is generally similar to that of the island. There is no observation of contamination of the ground (see Figure 6 and 7). The soil, however, contains ashes from the open burning that is taking place at the site.

5.3.2 Proximity to residential areas

The site in Fonadhoo is not in very close proximity to the residential area as seen in Figure 9. The closest residential blocks are within a radius of 300m. Since the location is far from the residential area no disturbances due to burning are experienced by the community.

Power distribution boxes are also found within a radius of 300m which is in the nearest residential block and the site is provided with three phase electricity for 24 hours provided by FENAKA. The island does have and RO water network established and a water connection is available at the site. A gravity type sewerage network is established on the island.

5.3.3 Accessibility to the waste site

Waste site is accessible by road. Main roads connecting to the site are depicted in Figure 9.

5.3.4 Land ownership

The allocated land for IWRMC is designated by the council and approved by Maldives Land and Survey Authority. Land approval letter is found in Appendix 4 of this report.

5.3.5 Coastal environment

There are no major changes brought to the coast of the island other than construction of a harbour. Similar to other islands of Maldives, this island also observes coastal erosion in several place as shown in Figure 10. Erosion scarps of approximately 3ft are observed in some of the places. Areas where most significant erosion is observed are marked in Figure 9. There were no erosion zones observed near the coast of the project zone.

Figure 10: Sediment being eroded as there was no protection put in place

5.4 Vegetation

Council indicated that the current waste dumping area would be used as the temporary place while the construction proposed under the project would be undertaken. Therefore, there is no vegetation to be cleared for the proposed project in Fonadhoo.

5.5 Groundwater Quality

The groundwater samples are taken from two locations (IWRMC and Control Site). Geographic coordinates of groundwater sample sites are:

- Project site: N1°49'19.63”; E 073°29'27.39”
- Control site: N 1°49'37.64"; E 073°29'44.51"

The physical, chemical and biological parameters in accordance with the TOR was investigated at MWSC laboratory. Table 6 below shows the results of the sampling. MWSC laboratory analysis is given in Appendix 7. Most of the parameters are within the normal range.

Table 6. Water quality test results

Parameter	Source or Site	Control	EPA Optimum Range
Physical Appearance	Clear with particles	Clear with particles	
Temperature /^{o}C	24.5	24.5	25-30
pH	7.43	7.59	6.5-8.5
Conductivity / μscm^{-1}	850	901	<1500
Total Dissolved Solids / mgl^{-1}	425	451	<1000
Nitrate	2.7	0.6	
Total Petroleum Hydrocarbon	<0.036	<0.036	

5.6 Air Quality

Air quality was measured at the waste site and a control site. Location of the air quality monitoring zones are shown in Figure 9 (coordinates are same as those for groundwater quality sample locations). Air quality measuring equipment was installed at the site. Wolfsense instruments (Figure 11) which measure particulate matter (PM10 and PM2.5) and toxic gases; carbon monoxide (CO), nitrogen dioxide (NO_2) and Sulphur dioxide (SO_2) were used to collect air quality information.

Figure 11. Air quality measuring instrument

Data was collected twice, once during the daytime and another during the night. Data is collected for 1 hour at a sampling rate of every 10 sec. Following describes the results of the air quality.

Table 7 show the air quality analysis summary for both the sites. As expected, during the daytime, the PM10 and PM2.5 levels are higher at the site. On average, PM10 levels of 9.76 µg/m^3 and 7.42 µg/m^3 were observed at the site during the day and night, respectively. On average, PM2.5 levels of 4.30 µg/m^3 and 8.62 µg/m^3 were observed at the site during the day and night, respectively. Similar pattern although with higher levels were observed for PM2.5. It is to be noted that levels at control are slightly high at night as there were human activity near the site.

Toxic gases also show a similar pattern. Due to time limitations and COVID restrictions, monitoring was limited during the site visit. Pollution monitoring was done in Thilafushi (Ministry of Environment, 2019), where Villingili a close by island was used as a control and results from that assessment is shown in Table 8. However, it is difficult to compare the results due to different sampling methods.

Table 7. Summary of air quality at both the sites

	Source (site)				Control			
	PM10 (µg/m³)		PM2.5 (µg/m³)		PM10 (µg/m³)		PM2.5 (µg/m³)	
	Day	Night	Day	Night	Day	Night	Day	Night
Max	182.97	44.36	2745.16	1525.35	66.53	33.27	56.14	69.59
Min	0.00	0.00	27.19	43.56	0.00	0.00	23.68	29.24
Average	**9.76**	**7.42**	**465.32**	**294.09**	**4.30**	**8.62**	**38.92**	**43.50**

	Source (site)						Control					
	NO_2 (ppm)		CO (ppm)		SO_2 (ppm)		NO_2 (ppm)		CO (ppm)		SO_2 (ppm)	
	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night	Day	Night
Max	0.24	0.24	9.50	7.80	0.25	0.00	0.24	0.24	3.30	2.50	0.00	0.00
Min	0.17	0.22	1.10	2.10	0.00	0.00	0.20	0.20	0.60	1.80	0.00	0.00
Average	**0.21**	**0.23**	**5.07**	**3.44**	**0.08**	**0.00**	**0.23**	**0.23**	**2.12**	**2.06**	**0.00**	**0.00**

Table 8. Pollution monitoring levels observed at Thilafushi (Ministry of Environment, 2019)

	Parameters / Results (based on 24 hr average)			
	PM10	PM2.5	SO_2	NO_2
	µg/m³	µg/m³	µg/m³	µg/m³
	Thilafushi Downwind (AQ-1)			
Minimum	7.0	8.0	5.0	0
Maximum	427.0	384.0	72.0	87.0
Mean	**26.5**	**26.9**	**25.3**	**59.5**
99th Percentile	147.0	122.0	76.0	78.0
	Thilafushi Crosswind (AQ-2)			
Minimum	8.0	5.0	0.0	49.0
Maximum	134	112	18.5	65.0
Mean	**19.3**	**12.1**	**9.8**	**56.0**
99th Percentile	37.6	24.6	16.5	60.0
	Thilafushi Downwind (AQ-3)			
Minimum	4.0	1.0	2.0	53.0
Maximum	690.0	362.0	112.2	81.0
Mean	**88.4**	**42.8**	**32.4**	**64.9**
99th Percentile	281.0	85.4	40.3	72.1
	Villingili Island (AQ-4)			
Minimum	13.0	22.7	2.0	2.0
Maximum	41.0	41.0	19.0	87.0
Mean	**22.7**	**22.1**	**7.6**	**60.6**
99th Percentile	32.0	32.0	2.0	70.8
WHO Standard	**50.0 (24 hr avg)**	**25.0 (24 hr avg)**	**20.0 (24 hr avg)**	**200.0 (1 hr avg) 40.0 (1 yr avg)**

5.7 Noise

Noise level around project site was measured using noise meter. Sound was measured for 1 minute at the desired location both at the site and control area during day and night (coordinates for sampling location same as that for groundwater sampling). The maximum, minimum and average noise was recorded. Table 9 shows the noise recordings at Fonadhoo. Noise measurements

indicate that level of noise does change significantly during day and night times at the IWRMC site. This may be due to reduced activity at the site during nighttime. On the other hand, the noise level observed at control site during nighttime is higher than at day time. This is because of higher night activity near the football stadium.

Table 9. Noise levels at source and control locations

	Noise level at Source		**Noise level at Control**		**USEPA Noise level standards**	
Date	14 January, 2021				Day	Night
Time	1520 hrs	2015 hrs	1415 hrs	2110 hrs	50	45
Minimum / dBs	48.2	40.2	**46.1**	36.7		
Average / dBs	**50.4**	**46.0**	**47.8**	42.6		
Maximum / dBs	**53.4**	**58.5**	**51.1**	**50.1**		

5.8 Protected Areas and Environmentally Sensitive Sites

There are no environmentally sensitive or protected areas within the vicinity of the project location.

5.9 Areas of Historic and Cultural Significance

There are no nationally significant historical places on this island.

5.10 Socio-Economic Environment

5.10.1 Demography

The Island Council reports the current registered population of the island as 2,943, with the current resident population at 3,500 (Figure 12). Based on the population census of 2014, the resident population of the island then was 2,078 (1,027 Male and 1,051 Female). The island have generally maintained number of female and male population in a balanced manner (Figure 13). The island have an annual population growth rate of 0.97. The growth of population is slow in contrast to the national population growth which is estimated at 2.9.

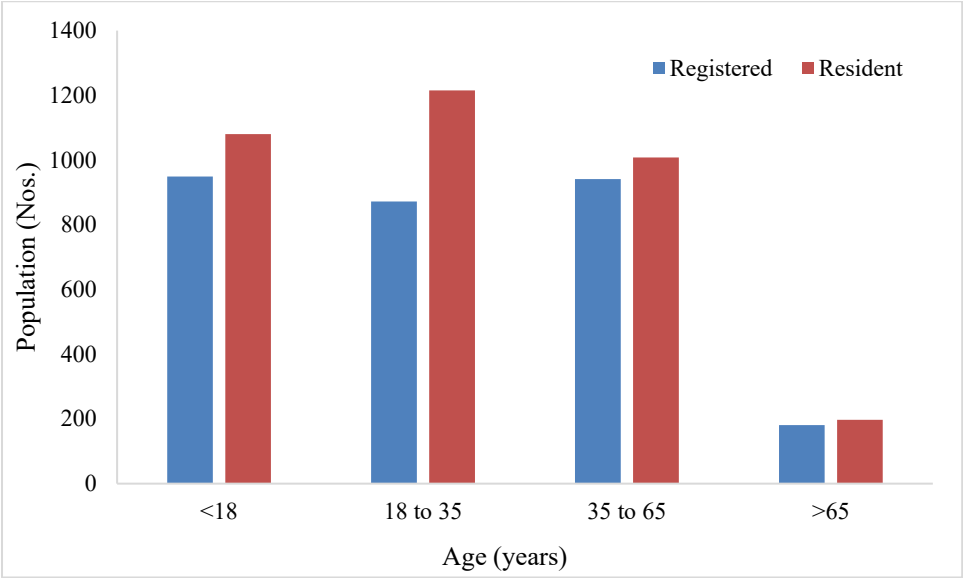

Figure 12. Current registered and resident population of L. Fonadhoo as reported by the Island Council

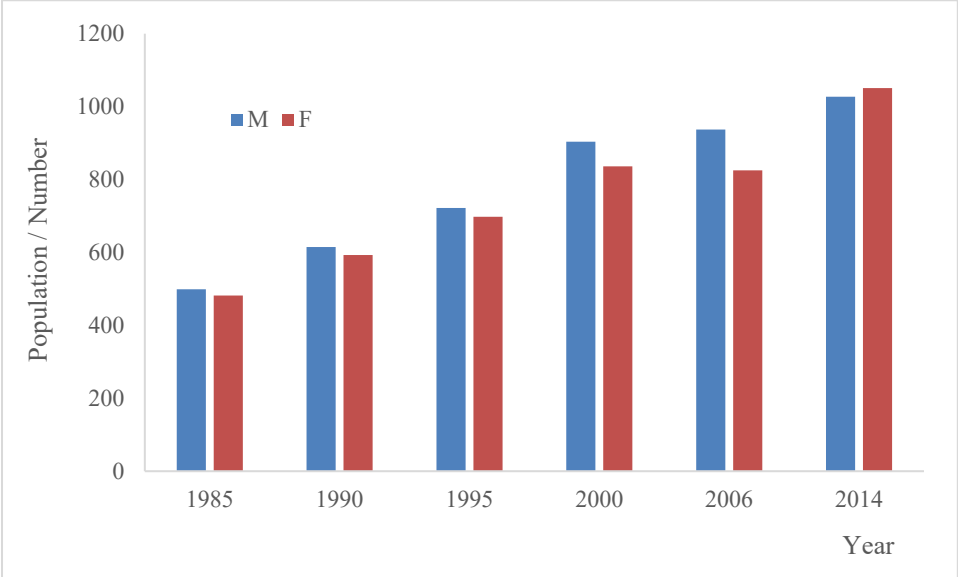

Figure 13. Gender disaggregated population of L. Fonadhoo (1985 – 2014) (Source: Isles)

The total number of registered housing plots on the island are 1177, of which 489 are at present empty plots and 149 are uninhabited houses. There are total 539 inhabited houses.

5.10.2 Non-governmental organisations

The island of Fonadhoo has several Non-governmental organisations, who are active in different areas. The Ministry of Youth, Sports and Community Empowerment report a total of 8 NGOs registered from Fonadhoo (NGO Portal, n.d.). Of the 8 registered NGO's one is focussed on environmental issues and sustainable development. However, during consultations with the Island Council, it was stated that no NGO's are involved in the waste management work in the island.

5.10.3 Economy

The largest employment sector of the island is civil servants or public sector. Furthermore, since the island is linked to Kahdhoo, Maandhoo and Gan via a causeway the island people also enjoy employment at both airport as well as Maandhoo Fisheries Complex. Fisheries, agriculture, construction and carpentry are also reported as areas of employment of the island community.

5.10.4 Infrastructure

The island has a large harbour which has improved access to the island. Apart from the harbour, Fonadhoo is also connected to its neighbouring islands within the same lagoon via Gan-Fonadhoo Link road. The Kahdhoo airport serves an efficient and reliable transport between the island and the capital, Male'.

The island also hosts the Atoll Education Center which offers classes until high school level. Moreover, the island has a Health Centre where basic services can be obtained, though the community also has access to the Laamu Atoll Hospital which is a tertiary level hospital located in L. Gan, connected to Fonadhoo via the link road. The island also has private pharmacies and one operated by STO. Banking services are also available through the atoll branch of Bank of Maldives on the island.

5.10.5 Utility Services

The island has three phase electricity for 24 hours provided by FENAKA Fonadhoo branch. A sewerage network established on the island provides disposal of sewage to the sea, although not treated. Rainwater is used for drinking purposes while groundwater is used for showering and other non-potable uses. Bottled water is also used to some extent.

6 Environmental Impacts

Various methods are available to categorize impacts and identify the magnitude and significance of the impact, such as checklists, matrices, expert opinion, modeling etc. Impacts on the environment from various activities of the project construction work (constructional impacts) and post construction (operational impacts) have been identified through interviews with the project management team and field data collection surveys. Data collected during field surveys have been used to predict outcomes of various operational and construction activities on the various related environmental components. This data can also be used as a baseline for future monitoring of the environment. The basis for environmental impact evaluation for this report is based on Rapid Impact Assessment Matrix (RIAM) which allows judgements (both subjective and quantitative assessments) to be made and provide good understanding of these decisions (Pastakia and Jensen, 1998).

6.1 Impact analysis methodology

The environmental impacts as a result of this project was analysed using the Rapid Impact Assessment Method (RIAM). The RIAM approach allows us to analyse and present the results of an all-inclusive EIA, which analyses impacts on all environmental components (physical, biological, social, cultural, economic etc.); the approach allows for data from these different components to be analysed against common important criteria within a common matrix, thus providing a rapid, clear assessment of the major impacts (Pastakia and Jensen, 1998).

Methodology description has been sourced from Pastakia and Jensen (1998). The approach is based on standard definition of important assessment criteria and collation of partially quantitative values for each of these criteria so as to achieve an accurate and independent score for each of the environmental conditions being assessed. The assessment criteria fall into two groups A and B as described in Table 10 below.

Table 10. Assessment criteria used in RIAM approach

Criteria		Scale	Description
A - Criteria that are of importance to the condition, and which can individually change the score obtained	A1 – importance of condition	4	Important to national/international interests
		3	Important to regional/national interests
		2	Important to areas immediately outside the local condition
		1	Important only to the local condition
		0	No importance
	A2 – Magnitude of change / effect	+3	Major positive benefit
		+2	Significant improvement in status quo
		+1	Improvement in status quo
		0	No change / status quo
		-1	Negative change to status quo

		-2	Significant negative disbenefit or change
		-3	Major disbenefit or change
B - Criteria that are of value to the situation, but individually should not be capable of changing the score obtained.	B1 – Permanence	1	No change / not applicable
		2	Temporary
		3	Permanent
	B2 – Reversibility	1	No change / not applicable
		2	Reversible
		3	Irreversible
	B3 – Cumulative	1	No change / not applicable
		2	Non – cumulative / single
		3	Cumulative / synergistic

The value for each of these criteria is obtained through a series of simple formulae as below:

- (A1) x (A2) = AT
- (B1) + (B2) + (B3) = BT
- Environmental score (for any given condition) = (AT) x (BT)

Multiplication of the values of group A ensures that the weight of each score is expressed, while summation of values of group B ensures that the individual value scores cannot influence the overall score, but that the collective importance of all values group (B) are fully considered.

Environmental components to be assessed are identified through the EIA process and in the RIAM approach, these are divided into four categories as below:

- Physical/Chemical (PC): covers all physical and chemical aspects of the environment
- Biological/Ecological (BE): covers all biological aspects of the environment
- Sociological/Cultural (SC): covers all human aspects of the environment, including cultural aspects.
- Economic/Operational (EO): qualitatively to identify the economic consequences of environmental change, both temporary and permanent.

A matrix is then produced for the different components identified for the project set against the different assessment criteria. Criteria scores are then given to each component and the environmental score for each component calculated using the formulas given above.

The scores obtained are then interpreted based on range bands, as given in Table 11. Each range band describes the level of an expected change (positive or negative) and they also represent the final assessment from the RIAM analysis. Once the ES score is set into a range band, these can be shown individually or grouped according to component type and presented in a graphical or numerical form as preferred.

Table 11. Range bands used for RIAM approach, with Environmental scores, criteria number and code

Scoring values (ES)	Range band	Criteria Number	Criteria Colour Band Description
72 to 108	**E**	**5**	Major positive change/impact
36 to 71	D	4	Significant positive change/impact
19 to 35	C	3	Moderate positive change/impact
9 to 18	B	2	Positive change/impact
1 to 9	A	1	Minimal positive change/impact
0	N	0	No change/status quo / not applicable
-1 to -9	-A	-1	Slight negative change/impact
-10 to 18	-B	-2	Negative change/impact
-19 to -35	-C	-3	Moderate negative change/impact
-36 to -71	-D	-4	Significant negative change/impact
-72 to -108	-E	-5	Major negative change/impact

Possible impacts arising from the construction and operation works are categorized into physical, biological, socio cultural and economic including operational aspects of the project. Environmental impacts of the project are evaluated against these environmental components. The impacts identified are also described according to their location, extent (magnitude) and characteristics. Positive and negative impacts are categorized by intensity of impacts for identifying best possible remedial (mitigation measures) action to be taken. Below are the impact scale and categories.

6.2 Impact Analysis

The significance of environmental impacts associated with the project (positive and negative) is ranked and colour coded to show the intensity of the impact for each environmental component as listed in Table 11. Impacts are assessed according to probability, significance, magnitude and duration. Tables 12 gives the assessment for the impacts, and these are further discussed in the following sections.

Figure 14 provides a graphic summary of the overall impacts for all the environmental components considered. Negative impacts of the project and their negativity scale was in the low range (-A to -B) while positive impacts were in the low to high range (A to D). The most significant negative impact was that due to sorting and handling of hazardous waste, while the benefits on the environment and community due to proper waste management was the most significant positive impacts.

Table 12. Outcome of the environmental impacts with reference to environmental components considered. (PC = Physical/Chemical, BE = Biological/Ecological, SC = Social/Cultural and EO = Economic/Operational. Colour codes refers to intensities of impact each component subjected to assess)

Code	Description	RIAM Criteria Scores					Environmental Value Score (ES)	Range Value Band (RB)	Criteria number
		A1	A2	B1	B2	B3			
PC 1	Changes to the ambient air quality (smell) due to waste sorting and processing	1	1	3	2	2	7	+A	1
PC 2	Changes to the ambient noise due to waste sorting and processing	1	-1	3	2	2	-7	-A	-1
PC 3	Air pollution at the project site due to emmisions associated with construction machinery and vehicles and dust	2	-1	2	2	2	-12	-B	-2
PC4	Air pollution due to emmissions associated with operation of bio-digestor and flaring of Methane	2	-1	3	3	2	-16	-B	-2
BE 1	Impact on island environment/soil due to waste handling and processing	1	-1	1	1	1	-3	-A	-1
BE 2	Impact to the groundwater due to use for construction	1	0	2	2	2	0	N	0
BE 3	Impact to the groundwater due to proper waste handling and processing	1	1	2	2	2	6	+A	1
BE 4	Impact to the flora (vegetation) due to the land clearing required for the project	1	0	1	1	1	0	N	0
BE 5	Impact to the flora and fauna (animals) due to material transfer	1	-1	1	1	1	-3	-A	-1
SC 1	Health and safety risks to the workers due to construction works	2	-1	2	2	2	-12	-B	-2
SC 2	Health and safety risks to the workers due to operation of waste facility	1	-1	2	2	2	-6	-A	-1
SC 3	Impacts of hazardous waste sorting and storage and disposal to the workers	2	-1	2	2	3	-14	-B	-2
SC 4	Benefits associated with improved waste processing and disposal to the community	2	3	3	1	3	42	+D	4
EO1	Changes to the environment due to improved waste processing	2	2	3	3	3	36	+D	4
EO2	Benefits ito the community due to improved waste management practice and operation of the facility	2	2	3	3	3	36	+D	4
EO3	Changes to the ambient air quality (smell) due to waste sorting and processing	1	2	3	2	3	16	+B	2
EO4	Changes to the ambient noise due to waste sorting and processing	1	-1	3	2	3	-8	-A	-1
EO5	Health and safety risks to the workers due to operation of waste facility	1	-1	3	3	3	-9	-A	-1
EO6	Impact on island environment/soil due to waste handling and processing	1	2	3	2	3	16	+B	2
EO7	Impact to the groundwater due to waste handling and processing	1	1	3	2	3	8	+A	1

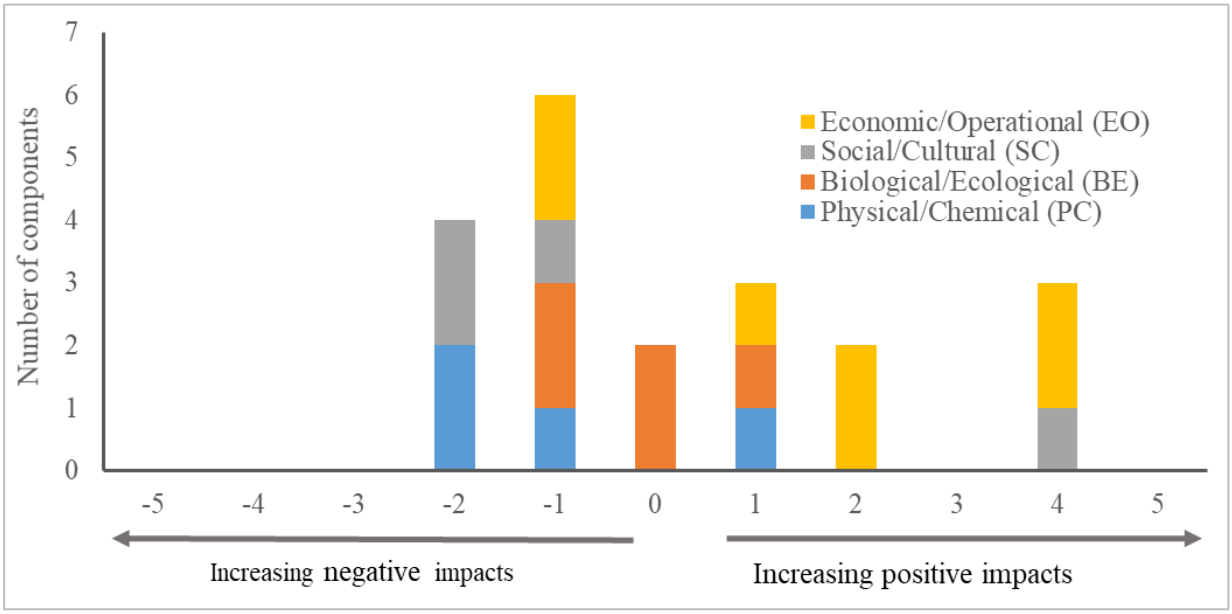

Figure 14. Graphic summary of RIAM analysis for the upgrading of IWRMC at L. Fonadhoo. Y-axis shows the number of components

6.2.1 Construction phase

Impacts on noise pollution and disturbances (PC and SC)

The project site is at a distance of approximately 300m from the nearest residential. While noise impacts during construction work is an unavoidable impact, the work entailed does not require use of much heavy machinery. This coupled with the distance between project site and residential area is hence envisaged to result in negligible impact due to noise during construction phase.

Impacts on groundwater table and quality due to construction work (PC)

Groundwater quality of the island is seen to be in good condition. Construction phase will utilise groundwater resource for civil works. This would have a localised negative impact on the groundwater resource of the island. This impact is envisaged for the short term.

Impacts on ground vibrations to nearby houses and buildings (PC)

The nearest residential area is approximately 300m from project site. Furthermore, the scope of work and construction required is not envisaged to have any disturbances in terms of ground vibrations as no heavy machinery or vehicles will be used.

Impacts on air quality (PC)

The construction work requires civil works, with main machinery used being a cement mixing machine. The construction work is envisaged to have a negative impact on the air quality at the site, due to generation of dust. This will be a short-term impact, which would clear up after construction work is completed.

Impacts due to material spillage during transfer of construction materials to the project island (PC and BE)

Construction material will be carried to site on barges and bigger vessels. There is always the chance of pollution of the marine environment during mobilization and material unloading. However, given that the materials will be packaged with no loose items, this impact is envisaged to be minor to negligible. However, any oil spills during such trips has the potential to have a significant negative impact both on the physical (seawater quality, reef health) and biological aspects (marine fauna and flora) of the marine environment.

Impact due to vegetation removal (PC and BE)

The proposed work does not require any vegetation clearance and hence this is not applicable to current project.

Impacts to vegetation and fauna due to improper handling and driving during material transportation (PC and BE)

Material transportation during construction phase will be from the harbour to the project site, though the access road to this has also already been cleared. Hence, while impacts due to transport of material is envisaged to be negligible, that due to handling of materials and potential accidents, if it happens, is envisaged to be minor to moderate, depending on the material being handled. Pollution due to accidental spill of construction materials to be used (due to improper handling), especially oil will have a significant negative impact on the environment at the site (on groundwater resource and fauna).

Impacts due to arrival of workforce (SC)

The proposed work will be carried out by an assigned contractor who have their own workforce. Majority of development projects are carried out in the same manner and arrival of workforce on the island to carry out construction work would not be a new aspect for the island community. The Contractor has the responsibility to ensure that the workforce is comprised of all legal personnel and that their actions while on the island are within accepted social norms. The Contractor also

has the responsibility to ensure that the workforce also have the required needs met, such as proper accommodation and daily meals as well as other logistics. This component of the project is not envisaged to have a significant impact on the social environment of the island.

Health and safety of workforce (SC)

The Contractor has the responsibility to ensure the health and safety of the workforce which will be taken to the island. As such the Contractor must ensure that their accommodation and meals while on the island are taken care of regularly. Accommodation in cramped quarters, especially during the COVID 19 pandemic has the potential to have a significant negative impact on the health and safety of the workforce and even the community. First aid kits available on site will ensure that any minor injuries are easily taken care of without delay.

Impacts due to road closure (SC)

Proposed work will be carried out a site located 300m from residential area and on the uninhabited side of the island. Hence any road closure (if required) is not envisaged to have an impact on the day-to-day life of the island community.

Impact due to loss of land (SC)

The proposed work will be undertaken at the existing IWRMC, for which land clearance has already been given by MLSA. Hence proposed work will not have any impact in terms of loss of land.

6.2.2 Operational phase

Impacts on noise pollution and disturbances (PC and EO)

The operations of the IWRMC and the technology to be used for composting is not envisaged to have a significant impact in terms of noise pollution. Furthermore, operation of the facility would alleviate existing other disturbances such as that due to open burning currently practiced on the island.

Impacts due to litter, odour and vectors (PC, SC and EO)

The collected waste which is transferred to the IWRMC should be unloaded and stored in the appropriate areas. Improper handling of waste at this stage has the potential to increase the severity of impact due to litter, odour and vectors. However, on the other hand proper handling, treatment and disposal of waste will aid to improve the air quality of the area over time.

Impacts on groundwater table and quality due to operations (leachate/ stormwater runoff) (PC and EO)

The IWRMC has been designed with provisions in place for drainage of wastewater and any leachate which maybe generated. The proposed technology does not generate much leachate. Hence, any liquid on the floor would be mostly due to cleaning of the floors, where the product would be mixed with any leachate generated during composting. The centre also has rainwater pits installed throughout the open area of the IWRMC to deal with potential storm water produced during rainy seasons. Hence no impacts are envisaged on the groundwater quality due to operations at the centre.

Impacts due to material spillage during transfer (PC, BE and EO)

Waste materials will be collected from households and transferred to the centre by staff hired to the centre. They will undergo all necessary training to ensure that the operations are carried out as per all operation guidelines. However, accidental spills during material transfer to site is a potential impact, with significance of impact dependent on the type of material spilled.

Health and safety of the IWRMC operators (SC and EO)

The workforce hired for IWRMC operations will be given all necessary trainings and provided with all required safety equipment and attire. First aid kits will also be available on site to handle any minor injuries. Impact on health and safety during general operations is envisaged to be minor to moderate (if proper care is not taken), especially since the technology to be used at the site is quite environmentally friendly.

The new waste collection would be more efficient and attract more waste which will include hazardous waste (e.g., waste oil, solvents, batteries, hospital and industrial waste etc) sorting and storage before disposal or transfer. Handling of hazardous waste would be harmful and of high risk to the IWRMC workers and extra precaution needs to be taken by the workers to avoid contamination or any health issue.

Economic impacts due to the IWRMC (SC and EO)

Development of the IWRMC opens employment opportunities for the island community, to be involved in different stages of implementation of the work Island Waste Management Plan. Hence this is a major social benefit due to the centre, which would be for the long term. Additionally, the compost generated through the project is a potential source of income through sale of the product. With the proper implementation of the centre, the Council is looking into fully establishing a waste collection and disposal system (mandatory participation), which would come at a cost.

Island community health (SC and EO)

The setup of the IWRMC would enable proper and safe disposal of the waste generated by the island community. This has a multitude of benefits key of which are improved health of the community and improved aesthetics. The operation of the facility would bring a cessation to the practice of open dumping and burning. Hence the project is envisaged to have a major socioeconomic benefit.

Impacts associated with proposed technology

The proposed organic waste treatment technology is quite simple and requires very little manpower. The technology allows domestic waste to be fed in a partially segregated manner, wherein inorganic waste like glass and plastic bags (less than 2%) can be fed to the reactor without segregation and can be collected from a passage of the reactor later. Additionally, any type of waste even agro-residues and long banana stems can be fed as it is without pulverization. The process generates some level of odour, although not of significance. The key outputs of the process, biogas (Methane and CO_2), liquid fertilizer and compost can be utilized for various purposes. The compost and liquid fertilizer are of high nutrient quality. The compost can be used for agricultural purposes on the islands or can be packaged and sold to nearby resorts/islands. However, method of disposal or handling of excess biproducts are unclear at present. The method of disposal has potential to have a significant negative impact on the environment, if seeped into the ground, due to high BOD of the product. The Biogas is proposed to be flared, which would produce CO_2 and water vapour. CO_2 is a GHG and will cause an increase in emissions from waste composting thereby degrading the quality of air. However, this impact will be significantly lower than emission of Methane which is found in the biogas.

The AD plant and waste treatment method also addresses the issue of leachate generation, hence minimising the need for construction of additional leachate collection tanks. The design of the area where the AD plant will be houses incorporates drains which will provide the necessary means for removal of any leachate generated.

The existing IWRMC is already connected to the existing power grid of the island which can cater to the additional load. Hence there is no need for setup of a separate power generator at the site. While one impact due to the sourcing of power is the generation of greenhouse gases through burning of fuel, this is an existing impact due to operation of the powerhouse. The additional load due to connection of IWRMC to the power grid is not envisaged to be of significance.

Overall, the proposed technology is not envisaged to have significant negative impacts on the environment. Moreover, it is envisaged to have major positive impacts due to proper waste disposal.

7 Alternatives

Alternatives for a project are considered for various components of the project, in terms of location, methodology to be implemented etc. Alternatives considered will identify the best practical environmental option for the different components.

Location for the proposed work is at the existing IWRMC of the island. Furthermore, there are no negative impacts on environment with regards to the choice of location, hence an alternative location will not be considered in this plan.

7.1 Considered alternatives

Waste treatment method / technology

The feasibility report for the project considers different types of waste treatment methods and their advantages and disadvantages (CITRES and MEECO, 2019). The recommended method for organic waste treatment, based on rationales given in the feasibility report is in-vessel composting based on the current waste quantity produced on the island and its projections for 2050. Alternatives considered in this report are:

- Proposed method: Anaerobic digestion
- Alternative 1: In-vessel composting
- Alternative 2: Windrow-based open composting

The environmental, social and economic aspects of anaerobic digestion (proposed option) are;

- Relatively large land area required for setup (environmental)
- Biogas generated can be reused as a potential source of energy (for cooking or converted to electricity). But this would require additional investments (environmental / economic)
- Increased in emissions of CO_2 due to biogas flaring (waste treatment) - environmental
- Higher nutrient content compost and digestate material which can be used as a fertilizer (environmental / economic)
- High energy requirement (environmental)
- Labour requirement for operation of Anaerobic digestion composting machine is low (social)
- Processing time approximately 1 month (social/ economic)
- Potential for moderate odour generation (social)
- Highly dependent on mechanical equipment (economic)
- Very high capital cost (economic)
- Very high operations and maintenance cost (economic)
- Economic turnover is high (economic)

Appendix 8 gives a matrix of the environmental, economic and social aspects of these three different methods of waste treatment (Table 1 in Appendix 8). The Appendix also gives mitigation measures for each of the alternatives (Table 2 in Appendix 8).

Anaerobic digestion means a higher capital cost, greater land requirement and higher operation and maintenance costs. At the same time, it also means low labour requirement, faster processing time (1 month), high quality biproducts which can be used as liquid fertilizer and compost, and high economic turnover. The process is ideal for larger islands, with greater quantity of waste generation and greater land availability. Furthermore, the biogas generated could be utilized through additional investments, which while removing negative impacts associated with emissions, is also a potential positive impact of the method.

In comparison, the second alternative, which is the use of in-vessel composting also has many advantages such as smaller land area requirement, low labour requirement and high economic turnover due to faster processing. However, this option is not feasible for larger islands with generation of large quantity of waste on a daily basis. The third alternative, which is use of windrows-based composting means greater land area and higher labour requirement. The piles have to be turned manually every 5 days and usually takes longer to process (2 to 4 months for final product). Additionally, given that this is undertaken in an open area, this will inevitably attract vectors such as flies and rats and other pests.

Hence, after considerations of the three option, the proposed method of anaerobic digestion as proposed in the feasibility study (CITRES and MEECO, 2019) is considered as the most feasible option for organic waste management in this project for upgrading waste management at Fonadhoo. This has been concluded based on the environmental and economic benefits of the method, size of the island and quantity of waste generation.

Power supply and energy source

A second component for which an alternative can be considered is the energy source to be used for power generation and operation of the IWRMC.

- Proposed method: power connection already made to the IWRMC
- Alternative 1: installation of solar panels
- Alternative 2: Use of bio-generator to convert biogas generated as output of anaerobic digestion to electricity (for use at IWRMC)

The proposed method of sourcing power for the IWRMC is through connection to the existing power grid of the island. Total power requirement for the AD plant is very low, approximately 3kW and the existing capacity of the island power facility is 2.65MW, with average load of 1.2MW. While use of fuel as energy source at the power facility is a negative impact on the

environment, the additional load is not expected to increase the significance of this impact by a great extent. The capital cost is low though, and an operations and maintenance cost will be incurred due to monthly bills. The absence of fuel handling however greatly lowers the risk of environmental pollution due to accidental spills and fire hazards at the centre.

An alternative and more environmentally friendly method is to install solar panels on the roofed areas of the IWRMC so as to generate the required electricity for operation of the centre. However, this would increase the financial cost of the proposed project, as this would incur a high capital cost, although in the long term has the potential to be financially more feasible, due to minimal operations and maintenance cost. Furthermore, the roof areas of the centre can be used, as there is no open burning or incineration at the centre. Other benefits include the avoidance of pollution of groundwater and other environmental components due to accidental spills, nullification of emissions of greenhouse gases due to fuel burning for IWRMC operations and reduced risk on workforce due to use of flammable liquids.

A second alternative option is to install a bio-generator at the IWRMC, to convert the biogas generated during AD process into electricity which can specifically be used for the centre and its operations. This option would reduce any negative impacts due to bio-gas flaring which is currently proposed, while at the same time providing an environmentally friendly source of power for the IWRMC. However, additional land area would be required for the installation of the bio-generator and set up of a small power facility within the IWRMC. This space could however be put to better use. Furthermore, addition of a bio-generator would increase the cost of the project (by $10,000 – 15,000), which is a present not financially sustainable.

While the installation of a solar panel to source power is seen to be most environmentally feasible option of the three options considered, this is an unaccounted high capital cost at present, which is not financially feasible. Hence the proposed option using the power which has already been connected to the IWRMC is the most feasible option, as it does not require additional work or incur additional cost. The Consultant, however, strongly urges the installation of renewable energy sources at IWRMC, through a separate project. Consultant also recommends the exploration of the option of bio-gas conversion to electricity, to be used at the facility.

Mitigation measures for the alternative energy sources are also given in Appendix 8 (Table 3).

8 Mitigation Plan

Environmental impacts that are associated with the project, both during construction and operational phase and which have been identified as significant impacts are discussed in this chapter. These are discussed in the context of various components of the project; evaluation of baseline environmental conditions at the project impact area and vicinity; concerns raised by the stakeholders through consultations and review of the literature of similar projects and experience of the EIA Consultant.

There are a number of actions that can be taken to minimize or avoid impacts altogether. Mitigation measures are selected to reduce or minimise the severity of any predicted adverse environmental effect and improve the overall environmental performance and acceptability (lower environmental damage) of the project from the perspective of construction and operation.

Mitigation measures are discussed for the construction and operational phase of the project with respect to various components and their likely impacts on physical, biological (within the project area), and social and economic environment (health, culture and economy). Impacts due to the project based on the assessment principles followed are foreseen as low to moderately negative to moderately positive. In order to further minimise potential negative impacts, mitigation measures have been discussed below (Table 13). Translation of the proposed ESMP in Dhivehi is given in Appendix 9 of this report.

Table 13. Mitigation measures proposed for the project (ESMP matrix)

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
Detailed design and Planning Phase	Improper functioning of the waste management facility and associated environmental impacts due to improper design	• Ensure detailed design takes into account details of the proposed layouts and all designs are as per specifications required, taking into account the environmental components that may be affected.	Proponent	NA	NA	
	Noise pollution	• Ensure that the site selection sets a minimum distance of 60m from residential and public areas	Island council MLSA Proponent	NA	NA	Already approved site
	Coastal erosion due to the proximity of the facility to the shoreline	• Vegetation buffer of 20m maintained between IWRMC boundary extent and high tideline.	Island council MLSA Proponent	NA	NA	
Pre-construction Phase	Impact on marine and terrestrial environment during handling and transport of construction materials	• Material should be sourced from the closest point or should be brought in bulk and transported to the island. • Detailed BOQ shall be made and should be followed to reduce the waste and to reduce	Contractor (implementation) Proponent (supervision)	N/A	N/A	

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		the number of trips made to the island to provide the resources • Ensure all materials being transferred are packed properly with no loose materials • Monitor oil spills and maintain machinery				
	Impact on environment due to improper storage	• Storage areas for construction materials should have an impermeable surface and should be covered • Materials should be stored in appropriate containers • Area should be regularly monitored for any leaks • Storage facility should be setup within project site to minmise vehicle movements	Contractor (implementation) Proponent (supervision)	N/A	N/A	
	Impact on flora, fauna and groundwater due to handling of construction related materials and equipment	• Ensure workforce are trained and supervised to handle materials during transfer, and unloading so as to minimize accidental spills, littering etc. • Ensure materials are properly packed and any oil/fuel is	Contractor (implementation) Proponent (supervision)	N/A	N/A	Pre-construction – site preparation phase

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		properly stored in containers used for that purpose				
	Sociocultural impact due to arrival of workforce	• Recruit local companies and Maldivians for the work (priority given to locals) • Workforce should be sensitized to the social norms and acceptable behaviour of the Maldivian culture. • Workforce should be fully aware of the Do's and Don'ts of the Maldivian culture. • Develop Contractor's Code of Conduct (sample Code of Conduct provided by World Bank given in Appendix 10, which the contractor can adopt by customizing it to the local context). • Establish Grievance Redress mechanism given in the report. Information displaying contact details of the focal points (Tier 1 and Tier 2) should be displayed on the project board, council notice board and via posters	Contractor (implementation) Proponent (supervision)	Grievance Redress Mechanism given Section 9.4 to be enforced.		Council / MCEP PMU staff to be assigned as focal points hence no additional cost for implementation of GRM

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		displayed in public areas. QR code for downloading the forms and information on GRM should be given in each of the media used.				
Construction Phase	Noise pollution	• Operate machinery during daytime hours (6am to 6pm)	Contractor (implementation) Proponent (supervision)	N/A	N/A	
	Air pollution / Dust	• Regularly maintain machinery so as to reduce emissions. • Provide workers with masks and other required gear • Regular watering of site to minimize dust (after work every day)	Contractor (implementation) Proponent (supervision)	As per operational manual of machinery	N/A	Should be included in the construction contract
	Impact on groundwater table and groundwater quality	• Extract only quantity of water required for the civil works.	Contractor (implementation) Proponent (supervision)	N/A	N/A	
	Impact on health and safety of workforce	Occupational Health and Safety measures • Ensure workers are well briefed on the health and safety measures to be followed during the project • Ensure work force are given all the appropriate safety	Contractor / Island Council (implementation) Proponent (supervision)	Contractor to provide Health and Safety Plan	N/A	Should be included in the construction contract

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		equipment and gear required for the work (safety hats, boots, glasses, masks and gloves) • Display PPE requirement board at site which should the PPE required by the workers when carrying out different tasks of the construction work • Minimal use of manual lifting must be practiced. • Ensure set up of easy access toilets, wash basins at the site. either through rental from nearby area or installation of a portable toilet. • Provision of regular meal breaks and an onsite resting area for the workers, where they can rest during the breaks • Ensure provision of first aid kit on site ensure readily available transfer in instances of emergency use • Ensure workforce are accommodated in appropriate				

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		quarters where they are not cramped. • All staff handling hazardous waste should be given the proper protective gear (protective eye gear, protective gloves) COVID 19 related preventative measures • Ensure that there is set number of workers in each room so as to allow social distancing • Ensure that workforce follows all HPA guidelines at all times, with respect to COVID 19 pandemic. • Measures should be in place to undertake daily temperature checks of workforce and enable social distancing at the accommodation facilities and work site.				
	Impact on public health and safety	• Clearly demarcate project area through metal sheet fencing • Ensure public does not have access to the project site and	Contractor (implementation) Island Council	N/A	N/A	Should be included in the project cost

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		appropriate signs are put up at the required areas • Establish Grievance Redress mechanism given in the report. Information displaying contact details of the focal points (Tier 1 and Tier 2) should be displayed on the project board, council notice board and via posters displayed in public areas. QR code for downloading the forms and information on GRM should be given in each of the media used.				
	Fire safety	• Ensure connections to power facility are established by trained and competent personnel • Ensure construction workforce are trained in firefighting so as to address any fire hazards promptly • A portable fire extinguisher should be used at the site. • Installation of a fire hydrant / water point at site	Contractor (implementation) Island Council	Firefighting equipment should be included as part of equipment inventory of IWRMC	Should be included in the project cost	

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
	Waste Management During Construction Phase .	• Construction waste produced should be reused for the construction of the IWRMC as much as possible. The remaining reusable materials such as (metal bars and roofing sheets) should be given to the island community or the island council free of cost. • Any green waste generated to be sundried and left at the forest area for natural decomposition. • Any remaining construction waste shall be temporarily stored and taken out of the island to a RWMF at the time of demobilizing. • Hazardous waste generated should be collected and stored in sealed containers • Area where hazardous waste is stored should have an impermeable surface (such as concrete layer, metal sheet)	Contractor / Island Council (implementation) Proponent (supervision)	N/A	N/A	Should be included in the project cost

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		and should be clearly marked with warning signs				
Operation and maintenance phase	Impacts due to waste spillage during transfer of waste from households to the centre	• Identify correct way in which waste should be left for collection (properly closed bags with no leakage) • Ensure transport vessel carrying the waste carries only a set load • Vessels should be enclosed on all sides to prevent spills • Setup of appropriate bins at identified locations • Provision of proper and complete training to IWRMC operators (in all aspects of operations) • Provision of all required PPE to the staff of IWRMC • Protective clothing, gloves, respiratory face masks and slip-resistant shoes are recommended for waste transport workers and hard-soled safety shoes for all workers to avoid puncture wounds to the feet.	Waste Facility Operator Island Council	Operational plan should be prepared and IWRMC should be registered and licensed by EPA as per Waste Management Regulation.	N/A	Should be included in the project cost

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		• Noise protection gear such as earmuffs should be provided to all workers operating or working within vicinity of loud equipment • Provision of hard hats for workers operating or working within vicinity of heavy mobile equipment, and at the discharge location for collection trucks, include provision of hard hats				
	Impacts due to installation and operation of AD plant	• Design and construct an appropriately sized area for machine installation, with an impermeable layer, drainage mechanism and leachate collection tank for leachate management • Ensure Carbon: Nitrogen (C:N) ratio is between 20:30.1 optimum methane production. If ratios is higher than this, nitrogen availability will limit the process and consequentially decrease gas production and digestate	Waste Facility Operator Island Council	N/A	N/A	Should be included in project cost

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		produced will be less in nutrient quality (Environment Agency, 2013) • Ensure that the AD plant is operated at the correct operational temperature for the specific plant being used (Environment Agency, 2013) • Operate an anaerobic digester under thermophilic digestion conditions, in order to increase the pathogen destruction, biogas production rate (hence higher energy recovery) and the retention time (World Bank Group, 2007) • Ensure pH inside the AD plant is maintained between 6.5 to 8 which is the wider range for optimum growth rate of methane producing organisms (Environment Agency, 2013). • Recycle wastewater to the reactor to the greatest extent possible • Explore the potential use of biogas (Methane) such as use				

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		for cooking or generating electricity				
	Potential increase in air pollution due to flaring of methane	• Warming potential of CH4 is higher than CO2. Therefore, flaring of CH4 will reduce the warming potential by conversion to water vapour and CO_2. • Care should be taken to maintain the flaring vent and the flame so as to have controlled burning (to prevent CH4 emissions).	Waste Facility Operator Island Council	N/A	N/A	
	Impacts due to AD plant malfunction	• Provision of proper and complete training to IWRMC operators (in all aspects of operations and AD plant maintenance) • Undertake routine maintenance of machinery as per the manual • 1 year stock of spare parts that might be required for the routine functioning of the AD plant should always be maintained.	Waste Facility Operator Island Council	N/A	N/A	Should be included in project cost

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
	Impacts of hazardous waste sorting and storage and disposal to the workers	• Specific times should be allocated to receive hazardous waste in the facility. • Dedicated area should be marked for collection and storing of hazardous waste. • The floor should be concrete to minimize seepage into ground should there be a spill or an accident. • Chemicals and other hazardous material should be placed in closed containers with proper signage. • Fire extinguishers should be available in close proximity.	Waste Facility Operator Island Council	N/A	N/A	Should be included in project cost
	Impact on groundwater resource due to leachate and wastewater processing	• Ensure drains are cleaned regularly to prevent clogs • Organic waste brought to the IWRMC must be prepared for anaerobic digestion according to a scheduled plan	Waste Facility Operator Island Council	Associated with operation	Associated with operation	
	Litter, odour and vectors	• Sort waste brought to IWRMC and carry out organic waste processing in the AD plant according to a scheduled plan	Waste Facility Operator Island Council		N/A	Should be included in project cost

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		• Store inorganic waste and other bulk waste in their allocated storage areas • Undertake volume reduction via glass crushing, metal can baling, plastic shredding, wood chipping etc. • Arrange regular disposal of inorganic waste through transportation to the RWMF				
	Socio-cultural conflicts	• Hiring of locals (especially from within the island community) to operate and manage the IWRMC and implement the Island Waste Management Plan • Establish the Grievance Redress Mechanism given in this report. Information displaying contact details of the focal points (Tier 1 and Tier 2) should be displayed on the project board, council notice board and via posters displayed in public areas. QR code for downloading the forms and information on	Waste Facility Operator Island Council	Costs associated with the contract	Not known	Should be included in project cost

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		GRM should be given in each of the media used.				
	Workplace safety	• Set up of all required sign boards as per the Waste Management regulation • Ensure all firefighting equipment required for the facility are in place and in good condition	Waste Facility Operator Island Council	Fire safety equipment to be supplied and installed as part of the contract: • 50KG DCP Trolley (2) • 50LTR Foam Trolley (1) • Wet Chemical 6Ltr with Cabinet for hazardous waste area (1) • Water 9Ltr with Cabinet for Office Area – Outside (1) • CO2 2KG with Cabinet for Office Area – Outside (1)	N?A	Should be include in project cost
	Impact on resources	• Prepare a plan to switch on the compactors and shredders depending on the incoming waste stream to conserve electricity. • Ensure that all equipment is serviced and kept clean daily,	Waste Facility Operator Island Council	N/A	N/A	Should be included in project cost

Project activity	Potential Environmental impacts	Proposed mitigation measures	Institutional responsibility (implementation and supervision)	Estimated quantities required and material specifications recommended	Cost estimates	Comments
		to reduce the amount of water required for cleaning. • Work shall be planned to be carried out during day times. • Use solar lights in the premises.				

9 Environmental Management and Monitoring Plan

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

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

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

Table 14 shows the monitoring work to be carried out for the construction and operational phase of the project. Commitment to carrying out and financing the mitigation and monitoring work is given in the proponent's declaration at the beginning of the report.

Table 14. Monitoring programme for the project

Proposed mitigation measure	Parameters to be monitored	Location	Measurements	Frequency of monitoring	Responsibility	Cost (MRF)
Pre-construction phase						
Monitor oil spills	Spill events	Sea/land	Logs of spill events	After every event	Contractor	N/A
Construction phase						
Groundwater quality	Temperature, Conductivity, pH, Total Dissolved Solids and Nitrate, TPH	Project site and control site	Water samples tested in-situ using probe or sent to competent laboratory if necessary	Once every 2 months during construction phase	Contractor	7,500.00 (total)

Monitor quality of outlet flows of the anaerobic digester.	Total Organic Carbon (TOC), Chemical Oxygen Demand (COD), Nitrogen (N), Phosphorus (P) and Chlorine (Cl)	AD plant at IWRMC	Sample collected from outlet flow of AD plant sent to competent laboratory	Once after installation of AD plant and priming of unit (test run)	AD plant installation contractor/ Proponent	2,500.00
Workforce health and safety	Daily temperature checks General health and wellbeing of workforce	Project site	Logs of any illness amongst workforce	Daily	Contractor	Part of the contract
Grievance redress mechanism	Monitor grievances by the community or other personnel	Whole island	Log of grievances filed and how these were handled	Continuous process	Island Council / MCEP	Part of the contract
Operational phase						
Monitor spills during the waste collection and disposal process	Spill assessments during collection, transfer, with IWMRC and transfer to RWMF Littering around the island	IWRMC site and transport route Around the island	Logs of spills and type Logs of littering incidents (date, location and type of waste)	Spill logs after every incident Littering monitoring every 3 months	IWRMC operator / Island Council	Part of operational cost
Monitor IWRMC operations	Waste generated and disposed quantities	IWRMC	Daily logs of waste generated Composting logs with details of input/output quantities Logs of disposal of inorganic waste	Daily / for every incidence of disposal of inorganic waste	IWRMC operator / Island Council	Part of operational cost

Groundwater quality	Temperature, Conductivity, pH, Total Dissolved Solids and Nitrate	Project site and control site	Water samples tested in-situ using probe or sent to competent laboratory if necessary	Once every 6 months	IWRMC operator / Island Council	4,000.00 (per year)
Grievance redress mechanism	Monitor grievances by the community or other personnel	Whole island	Log of grievances filed and how these were handled	Continuous process	Island Council / MCEP	Included in operational cost

9.1 Reporting Procedures and Implementation Schedule

The reporting procedures and schedule for the various monitoring components are given in Table 15 below.

Table 15. Reporting schedule for the monitoring programme

Phase	Deliverables	Responsibility	Accountability
Construction phase	Monitoring report (as per format provide by MCEP Safeguards Specialist) submitted every 3 months or earlier based on date of invoice submission by the Contractor which should include the following: • Log of spill events during material transfer • Groundwater quality monitoring reports	Contractor	MCEP
Operational phase	Monitoring report submitted once a year (as per format provide by MCEP Safeguards Specialist) which should include the following: • Logs of spill / littering assessments • Waste quantification logs • Compost quantification logs • Groundwater quality monitoring reports • Outcomes of grievances filed	IWMRC Operator / Island Council	MCEP

9.2 Cost Estimates and Sources of Funds

The cost estimates for the different mitigation measures and monitoring work are given in Tables 13 and 14 respectively. The Tables also identify the personnel responsible for the implementation of these measures, who will also be responsible for funding these components.

9.3 Contract Clauses

Contractual clauses have been identified to ensure that the full implementation of the ESMP which is a requirement of both the World Bank and EPA is carried out during the construction phase of the project. Operation of the facility will be handed over to the Island Council. The Consultant recommends incorporation of the following clauses into the agreement signed with the construction contractor for the project:

1. Contractor should submit a report inclusive of photographic evidence of implementation of mitigation measures such as set up of sign boards, provision of safety gear to workforce at the start of construction
2. Payment invoices must be accompanied with progress reports, which give the following details:
    - Work completed to date of invoice
    - Delays faced and reasons for delay
    - Mitigation measures implemented during the time period
    - Environmental impacts observed during the work period and measures taken to correct these impacts
3. Monitoring reports should be submitted in the format required by MCEP, as per the schedule identified in this ESMP. Employer has the right to withhold payment if reports are not submitted as per schedule and in required format
4. The Employer or the Contractor have the right to terminate the contract, if either party is in violation of any part of the contract. Termination in such instances will be effective immediately from the date of termination.

9.4 Grievance redress mechanism

The Maldives Clean Environment Project has formulated a Grievance Redress Mechanism (GRM) for these projects, which would facilitate the receiving and addressing of any grievances which may arise during both the construction and operational phase of the project. The mechanism has two tiers, whereby Tier 1 will be facilitated by the Island Council and Tier 2 by the MCEP.

The Island Council were briefed about the mechanism during the stakeholder consultation meeting held with them regarding the project and operations of the IWRMC. The Council have also been requested to identify a focal point for managing the GRM at Tier 1. Details of focal point identified by the Council are:

- Name: Fathimath Zaeema
    - Designation: Director, Fonadhoo Council
    - Contact number: 7933131

Tier 2 will be managed by the MCEP, with the Environmental and Social Safeguards Specialist as the focal point.

Table 16 below gives the details of the GRM formulated by MCEP.

Table 16. Grievance Redress Mechanism for the project, formulated by the PMU

Tiers of Grievance Mechanism	Nodal Person for Contact	Contact Communication and other facilitation by the project	Timeframe to address grievance
First Tier: Island Council	Island Council will be the first point of contact for any grievances. The staff designated as the waste management focal point by the island council will manage grievances on behalf of the council.	GRM should be publicly displayed in the construction site as well as the council office. GRM should also be outlined in official website and/or social media pages of Council, ME (and/or the project), including contact details of the nodal person in each tier. Grievances can be addressed informally by contacting the council through email / telephone / in person. If the grievance cannot be resolved informally, an aggrieved party must submit a complaint on the Tier I Complaint Form. A copy of the form (with the council seal) should be provided to the aggrieved party as evidence of receipt. Electronic version of the complaint form should be available from the websites and/or social media pages of ME and the council. Physical copies of the form should be available from the council front office. Council will provide assistance to fill the form for those who cannot write. The council should keep separate registries for informal and formal complaints and maintain records of all complaints received. The council will discuss the matter with all relevant stakeholders (Farmers, Fishermen, School, Health Centre, Women's group etc.), where deemed necessary and attain views of them. If such	15 working days

		meetings are arranged, the date, time, location or venue, list of participants (with contact details) and a summary of the main outcome of the consultation must be annexed to the written decision issued by the council. If the complaint is resolved within 15 working days, the council must communicate the decision to the aggrieved party in writing. The aggrieved party must acknowledge the receipt of decision and submit their agreement or disagreement with the decision within 10 working days. If no acknowledgement is submitted from the aggrieved party within this period, then the decision will be considered as accepted. If a complaint requires more time to address, this requirement must be communicated to the aggrieved party in writing and the aggrieved party must consent and sign-off the request for the extension to take effect. An extension can be made to an additional 15 working days. The staff designated as the waste management focal point by the island council will manage and provide feedback for grievances submitted to the council.	
Second Tier: Ministry of Environment (ME)	Environmental and Social Safeguards officer at the Project Management Unit (PMU)	If the grievance cannot be resolved through Tier 1 to the satisfaction of the aggrieved party or if the issue is outside the jurisdiction of the council (issues related to RWMF), an aggrieved party may submit a complaint on the Tier 2 Complaint Form. A copy of the form (with ME seal) should be provided to the aggrieved party as evidence of receipt. Electronic version of the complaint form should be available from the websites and/or social media pages of ME and the council. Physical copies of the form should be available from the council and ME front office.	15 working days

		A copy of the Tier 1 Complaint Form should be submitted with the Tier 2 Complaint Form. ME will forward the grievance to PMU. PMU screens the grievance and determine if its related to MCEP. If it is unrelated, the aggrieved party must be notified in writing and the way forward must be outlined to them including the necessary government institutions to follow up. Environment and Social Safeguards Officer at the PMU will be the contact person in processing a grievance through the Second Tier. PMU will discuss the matter with EPA and other relevant institutions, where deemed necessary and attains views of them. PMU will also arrange site visits and hold onsite discussions and meetings if necessary. The PMU will be responsible to ensure that there is no cost imposed on the aggrieved person, due to the grievance mechanism at the second tier. If the complaint is resolved within 15 working days, the PMU must communicate the decision to the aggrieved party in writing. The aggrieved party must acknowledge the receipt of decision and submit their agreement or disagreement with the decision within 10 working days. If no acknowledgement is submitted from the aggrieved party, then the decision will be considered as accepted. If a complaint requires more time to address, this requirement must be communicated to the aggrieved party in writing and the aggrieved	

		party must consent and sign-off the request for the extension to take effect. An extension can be made to an additional 15 working days. If the grievance is not resolved to the satisfaction of the aggrieved party within 15 working days of submission of the grievance to tier 2 then the aggrieved party may notify the ME, in writing, of the intention to move to tier 3.	
Third Tier: Judiciary Power / Assistance to Vulnerable Persons beyond the Project's Grievance Redress Mechanism	Judiciary system is an option for an aggrieved person and/or community in case that the other tiers have not been effective	The legal system is accessible to all aggrieved persons. Assistance from the PMU of MCEP is available only for vulnerable person(s)* as per this grievance mechanism. In cases where vulnerable person(s) are unable to access the legal system, the Attorney General´s office will provide legal support to the vulnerable person(s). The PMU must assist the vulnerable person(s) in getting this support from Attorney General´s Office. PMU must also ensure that there is no cost imposed on the aggrieved person if the person belongs to the vulnerable groups. The list of vulnerable groups is as defined in the footnote but may be further defined by MEE. The verdict of the Courts will be final.	As per established Judicial Procedure

*Vulnerable person(s): A vulnerable person(s) for the purpose of this project is a person who is poor, physically or mentally disabled/handicapped, destitute, disadvantaged for ethnic or social reasons, an orphan, a widow, a person above sixty years of age, or a woman heading a household.

10 Training recommendations

During consultations meetings with the Island Council, it was identified that operations of the IWRMC can only be effectively and fully implemented with training of the staff involved in the operations. As a result of this, the ESMP identifies areas where training is required and who the training is targeted for and this is given in Table 17. Consultant would like to note that given that training needs for most of these IWRMC projects would be very similar, some details of the training programme have been sourced from ESMP carried out for upgrading of IWMC in N. Holhudhoo (Zuhair, 2019).

Table 17. Training requirements for the implementation of the ESMP

Training activity	Participants	Type of training and content	Responsibility	Scheduling	Cost estimates
Strengthening the capacity of the contractor on ESMP implementation and reporting.	PMU personnel and Contractor	Brief of the ESMP and monitoring requirements Data to be collected and how to be presented (Format of monitoring report)	PMU / Environmental and Social Safeguards Specialist	Kick off meeting	N/A
Strengthening PMU's capacity on compliance monitoring	All PMU staff involved in the work	Familiarisation with monitoring requirements and monitoring report template	Environmental and Social Safeguards Specialist	Construction phase	N/A
General awareness on health, safety and environment	Construction workforce	Introduction to the health and safety precautionary measures to be implemented (site safety rules / PPE / emergency response) Training in environmentally friendly ways of carrying out construction work with minimal littering	Site Supervisor / Contractor	Pre-construction phase Construction phase	N/A

		Training in following COVID 19 guidelines at workplace and accommodation.			
Community Mobilization	Waste Management Committee	Introduction (Refresher) to the Waste Management Regulation, Policy and Guidelines Introduction (Refresher) to the Island Waste Management Plan and Waste Management Committee Training in ways to segregate waste at household level Training in marketing of compost product	Communication Specialist of MCEP	Pre-construction phase	Travel cost of facilitators Designing and printing of training materials and workshop costs
Operation and Maintenance training of the anaerobic digestion plant	IWMRC staff	Introduction to compost preparation using organic waste Step by step guidance on anaerobic digestion and preparation of compost Step by step guidance to use and maintenance of the AD plant installed on the island	Zone-5 Project Coordinator of MCEP WMPCD Island Council Communications Specialist of MCEP	Prior to commencement of operations	Travel cost of trainer Developing and printing of Training Manual

Fire safety training and fire drills.	IWRMC staff	Introduction to potential hazard scenarios and fire safety Training in use of fire safety equipment on the site Emergency response and evacuation plan and drill	PMU/ MCEP MNDF	Prior to commencement of operations	Travel cost of trainer Developing and printing of Training Manual

11 Contingency plans

The following contingency plan is proposed in case that the project planning, construction and operation as scheduled have not been met due to unforeseen circumstances such as failure to meet specific performance criteria established by law or necessary for the project to meet its commitments in the ESMP and including responses to natural and other risks identified and mitigated in the ESMP. The project related risks and mitigation measures addressed in the report are mainly environmental and socio economic. The significance of environmental and other impacts identified through RIAM are low negative and failure to or deviation from the proposed mitigation measure will not significantly affect the outcome of the project from impact on natural environment and in the worst-case scenario the island waste management system defaults to current status quo. Nevertheless, the following sections highlights proposed measures in the event the upgraded facility and its operations are interrupted.

11.1 **Natural Disasters**

Natural disaster such as earthquakes are rare in the Maldives. However, the risk of flooding associated with extreme weather such as storm surges and heavy rain is notable. Climate change risks such as sea level rise is projected as long term and such future risks are high with respect to the low elevation of islands in the Maldives.

This ESMP has not addressed potential risks to the project with respect to project design. It appears, from the limited information made available with regard to architectural design of the layout of the facility from the proponent, that the design has not included project sea level risk mitigation factor into the design, somewhat considered for critical infrastructures as general policy (legally not required by law or regulation as yet). That been said, it is challenging to identify what becomes a critical infrastructure or not as any infrastructure (public or private) are equally vulnerable to flooding.

Locally applicable regulation such as EIA regulation requires for all development project to ensure that a minimum 20m vegetation buffer be maintained. The location of this project conforms to that requirement. Additionally, it may be important to review the design of the facility to assess whether the design has considered climate proofing (e.g. flooding risks) as part of the design. If not, identify potential costs involved for such design so that future projects of similar nature consider such cost if they are feasible or important as part of national sustainable development strategy.

11.2 **Disruptions to operation of the facility**

Few aspects may be associated with potential destruction to the operation of the facility. These include;

- Breakdown of the machinery
- Components required for optimal processing of organic waste not available
- Staff not appropriately trained to operate the machinery

Breakdown of the machinery is often associated with lack of routine maintenance services that are required for any machinery. Hence the facility operator should ensure that adequate supply of materials are stocked at site so that any minor breakdown or disruption to the operation of the machinery is immediately or quickly addressed. Required routine services to the machinery or other equipment or vehicle should be followed according to the operation manuals and guidelines. The facility or operation supervisor shall ensure such protocols are maintained through proper logs and documentations.

Interruption to the operations of vehicles and machinery is also associated with lack of or inadequate training provided to the machinery operators. Adequate training provided to the operators of the machinery or equipment is thus essential. Hired staff shall be based on optimal technical qualifications. If technical qualification are not available due to local human resources capacity that project shall include training to the staff hired prior to the facility become operational.

In case of interruption to the operation of the facility, place for storage of the unprocessed waste at the site should be established by an agreed SOPs established as part of the operation of the facility, between stakeholders of the project. Such shall be agreed by;

- Formulation of agreements with the facility operator, island council and ME to agree on a procedure to handle waste in case of emergency
- Transport the waste to nearby island where such facility is operational until operational issues are rectified
- Ensure appropriate and secured finance is made available in the operational budget.

12 Stakeholder consultation

Stakeholder consultations with relevant personnel, as identified in the TOR for the ESMP, was carried out as online meetings, telephone conversations and through a short survey of households. Key stakeholders identified in the TOR are:

- Island Council of L. Fonadhoo
- Environmental Protection Agency
- FENAKA Corporation Limited
- Health Protection Agency
- Ministry of National Planning, Housing and Infrastructure and Maldives Land and Survey Authority (MLSA)
- Maldives National Defense Force
- Women's Development Committee of the island
- Community Consultation or Household Survey on their perception of the project
- Ministry of Environment / MCEP

Table 18 gives details of the discussion points of the different stakeholder consultation meetings. Details of personnel consulted with are given in Appendix 11.

Table 18. Outcomes of the consultation meetings

Meeting details	Discussion points and feedback (in italics)
Consultation with the Island Council Date: 16th January 2021 Meeting held at the Office of the Secretariat of Laamu Fonadhoo Council	The objective of this meeting was to inform and undertake consultation on the current waste management practices on the islands and identify concerns of the council with regards to installation of Anaerobic Digester. **General Waste Management Issues in the island:** • Council outlined that waste management issue is one of the problems the island is facing. The Council stressed on the importance of the waste issues and this has been a concerning and growing issue of the public. • Council explained about the current waste practice in the island. They mentioned that 70% of the households have participated in the waste management program which is conducted by the waste management unit of the council. Waste is segregated at the houses and is collected on a regular basis. There are more than 350 waste collection points. • They mentioned that currently the waste site is closed due to poor management. • Waste is segregated at household level mainly into kitchen waste, green waste, metal waste, bulk waste, and plastic waste. The waste site have different zones allocated to separate waste stream at the site shall be there any mix.

	• They do have difficulty of disposing the waste metal as they have no means to dispose them of. • The council spends from their resources to clear the waste occasionally. For this the council seeks an opportunity for a vessel going to Thilafushi from a nearby island. If the facility could be completely cleared, it could stay for 3 months before the next clean is needed. • The council has difficulty to get everyone into the waste collection scheme due to regulatory difficulties. Especially those within close proximity to the waste site have not participated. However, when individuals dump the waste, it is difficult to manage and maintain the place. • The council stated that there have been difficulties and irregularities in collection of the waste on number of occasions due to technical and administrative difficulties. Therefore, there have been complaints from the public due to the poor service. • The land for the waste management is distanced from the residential area which would not cause any significant impact to the communities during waste management at the site. • Waste is currently managed by open burning of green waste and sea disposal of kitchen waste. Currently at the site, waste is a mix as its not managed at the property now. **GRM at Council Level** • The island does have a waste management plan. The council have designated municipal council unit established at the Council office with a focal person who handles all municipal services including waste management issues. A designated person is in charge of the waste management issues for the island. In addition, a dedicated hotline is established for the public complaints. The same person will also be responsible for implementing the GRM through this project. **Removal of vegetation from the site** • Council indicated that the proposed upgrade from this project would be within the fenced boundary. Since the area outside the fenced boundary is currently used from waste dumping, there would be no difficulty during the upgrade. The current area will also be used as the temporary area during the upgrade. Therefore, there is no additional place allocated and no need for any land clearance. **Proposed composting technology** • The council welcome the proposed technology by the Project Proponent as it would enable production of a usable material (compost) from the otherwise not usable waste material which is disposed to the sea. In addition, since Fonadhoo and many islands of Laamu are famous for agriculture, the compost will be a useful commodity.

	• Council also marked the importance of capacity building and training needed for new technologies. They informed that staff would be identified for training once the installation of the system beings.
Consultation with the Environmental Protection Agency Date: 12h January 2021 Meeting held via Googlemeet	EIA Consultant enquired about the licensing requirements for operating island waste management centers: • *Operation License needs to be acquired for the vehicles and vessels used for transport of waste from one place to another.* • *Operation Permits are given to operate the waste management center upon submission of waste management plans.* • *All waste management practices should be in accordance with the guidelines provided in the waste management regulation* EIA Consultant enquired about the duration of the operation permits issued: • *The duration depends on the method of waste management planned for that island. It may be 5 years, 2 years or even 1 year. The duration is determined after reviewing the waste management plan.* • *The permits can also be renewed with completion of terms.* EIA consultant enquired if there would be any inspection carried out by the EPA before renewing operating permits of the centers. • *EPA will carry out an inspection and decide on renewal of permit.* EIA Consultant enquired if EPA has any comments on the design of the waste management centres. • *There are no specific design requirements yet from EPA. The participant noted that the drawings shared were not very clear and to send clear drawings for them to review.* Meeting was ended with no further comments. It was agreed to share the drawings for their review.
Consultation with the FENAKA Date: 16th January 2021 Meeting held at the Office of the Secretariat of Laamu Fonadhoo Council	The objective of this meeting was to inform and undertake consultations on the current electricity demand and understand FENKA capacity to provide electricity for operation of the IWRMC including the Anerobic Digestor. **Current Electricity demand** • The island has installed capacity of approximately 2MW generator and a 650 kW generator. All the generators are synchronized and the island is provided with 3 phase electricity for 24 hours. • The current peak demand is approximately 1.2 MW. • FENAKA indicated that a small size of the proposed digestor can be managed easily with the current installed capacity. • FENAKA has the capacity to provide electricity requirements to the IWRMC including the power requirements of the proposed digestor. Furthermore, FENAKA would be able to provide electricity requirements to contractors who will undertake civil works. **Future plans** • Future plans are there from the FENAKA head office to upgrade the power infrastructure of the island. A network upgrade which includes

	additional transformers, high voltage cables and extra distribution boxes are planned for a near future. • Additionally, Renewable Energy projects are also planned although the sizes are not finalized yet. Currently a 2 MW solar PV project is to be implemented by the Ministry of Environment and the necessary preparations are underway
Consultation with the MNPHI / MLSA Date: 11h January 2021 Meeting held via Googlemeet	Meeting was held with participant from Land use planning department. EIA Consultant briefed the participant about the project and enquired whether they had any issues with respect to the area allocated for the project site. EIA Consultant also informed that the Client had already received letters from MLSA, approving the locations (for at least majority of the islands)and agreed to send a list of islands for which letters had been received. • *Participant of the meeting stated that if approval had already been given, then they had not further comments or issues. They further stated that once the list is shared with them, they will also discuss with MLSA and communicate their comments to the consultant in writing.*
Consultation with Women's Development Committee Date: 16th January 2021 Meeting held at the Office of the Secretariat of Laamu Fonadhoo Council	The objective of this meeting was to inform and undertake consultation on the current waste management practices on the islands and identify concerns of the Women's Development Committee (WDC) with regards to installation of Anaerobic Digester. **Institutional capacity and role of WDC** • WDC comprises of 5 members. • Initially it was a cooperative society called Laamu Farmers corporation and later its attached to council as a functioning body. • The committee has its own workplan and makes every effort to implement the workplan. It has been challenging to implement the workplan with the limited financial resources. As a financial resource from the council, 5% of the council budget is given to implement the activities of the work plan. However, these resources are not used to pay any salary of the women workers. • When the council began the waste management program, WDC played an active role. They played a major part in creating the awareness and other social campaigns. • WDC was involved in distribution of the dustbins to the households. • It is to be noted that there is no direct role of the WDC in the waste management program. • To clean up the public areas, a public announcement is made and any individual who is interested can apply and the job will be done on a payment basis. The WDC did not want to take this function as waste management is a mandated function of the council and a dedicated unit with resources are there at the council for waste management.
Consultation with MNDF Date: 28th January 2021 Meeting held via Googlemeet	Meeting was held with personnel from the fire safety and training departments of MNDF. EIA Consultant briefed the participant about the project and stated that main points of discussion for the meeting was with respect to fire safety and willingness of MNDF to assist in training the IWRMC operators on firefighting.

	EIA Consultant enquired whether they had any concerns about the project from a fire safety / hazards aspect. • *Since there is no fuel storage on site or use of fuel for any purpose on the site, they had no major concerns* • *Some drawings for these centres have been shared with MNDF. Request to send all drawings, inclusive of fire safety measures to them for their approval.* • *Recommend to formulate a firefighting and fire safety plan prior to project commencement, so that in the instance of a fire incidence, personnel are well aware of how to handle the situation.* • *The plan should include details of firefighting team, leading staff, equipment details, assembly points and .emergency contact numbers. The plan should be approved by MNDF fire department.* • *Fire hydrant or water point to be established on site and a water pump should be added to the list of firefighting equipment to be sourced for the site. This will be used for handling of any major fire events.* EIA Consultant enquired about the willingness of MNDF personnel to give the required training for the workforce of the IWRMC • *The MNDF regional branch at L. Kahdhoo, F. Nilandhoo and Dh. Kudahuvadhoo can undertake the trainings for the IWRMC staff of Faafu, Dhaalu, Thaa and Laamu atoll as required by the proponent. Ministry should send a formal request to MNDF to this effect and the public affairs department of MNDF will arrange the trainings.* Meeting adjourned with no further questions or queries on either sides.
Ministry of Environment / MCEP	A formal consultation/meeting with the project PMU was held at the Inception stage. Regular communications have also been carried out via phone or email throughout the report formulation process, which also includes communications regarding project progress, delays, request for information.

Note: Meeting request has been made to Health Protection Agency with numerous followups, though a meeting has not been scheduled to date (copies of email communications given in Appendix 12). Consultation with Maldives Energy Authority has not been carried out, as the PMU have later informed that this is not required, since installation of bio-generator is not within the scope of this project.

12.1 **Results of the Household survey**

A household survey was undertaken to assess the perception of the community with regards to the current waste management practice and their willingness to pay for a proper waste management system. Survey forms were sent to the Island Council so as to enable the household survey data collection (copy of survey form is given in Appendix 13). Questions were asked about their waste segregation methods, waste disposal methods for both biodegradable and non-biodegradable waste and their perception on the location and size of proposed IWRMC. A total of 18 households took part in the survey, which is approximately 3.3% of households on the island. Key findings of the survey include:

- On average, all households report production of equal quantities of non-biodegradable and biodegradable waste. An average of 5kg of waste (of both biodegradable and non-biodegradable) was reported to be produced by households on a daily basis.
- Majority of respondents reported to disposing of biodegradable waste to the sea, while other reported dumping it at the garbage disposal area, or through the Council waste disposal services
- Non-biodegradable waste was reported (by the majority) as being disposed at the site allocated for this purpose by the Island Council
- Waste segregation at household level was being undertaken by almost 100% of the respondents. Disposal was through the waste collection service provided by the council (78% respondents) or by themselves (22% respondents)
- When enquired about the fee being taken by the council for waste collection (MRF 100), 89% reported that the fee was acceptable.
- When enquired about their view about the location of the proposed IWRMC, 67% felt that the location was suitable, while 22% felt that it was too close to the residential area and hence the island community felt negative impacts due to the proximity. Remaining respondents did not have a view regarding this question. Views regarding the size of the centre was divided, with 83% reporting it as a being too small, while 11% reported the site to be of suitable size. Remaining respondents did not express a view.
- 78% of the respondents felt that there would not be any impacts on the residential area due to the project work (construction) and operation of the IWRMC at the proposed site.
- When enquired about the best mitigation measures to minimize impacts due to the IWRMC and associated work, the following was reported:
    - Regular disposal of non-biodegradable waste from the centre (78%)
    - Creation of a vegetation buffer between the site and residential area (44%)
    - Complete cessation of burning of waste at the centre (28%)
    - Increase height of perimeter wall (16%)
    - Installation of firefighting equipment at the IWRMC (16%)

13 Gender Empowerment / Preparation of Gender Action Plan

Traditionally cleaning the roads, houses and waste collection and disposal are carried out mostly by women. With establishment of waste management centres with machinery and facilities in some islands, the activities related to waste management are not only a responsibility of women but men are also actively involved in the process. In most islands with waste management systems in place, women are mostly involved at household level; in cleaning and waste segregation, whereas men are involved in collecting waste from the households and managing the waste at the waste management centres.

As per Census 2014 resident population, in L. Fonadhoo 51% of the population are women and 49% are men (NBS, 2014). The island has a Women's Development committee, who played an active role in waste management programme (in terms of awareness raising and distribution of materials) when the programme was first started. However, at present they do not have a direct role in the waste management system and the Island Council has a dedicated waste management unit who carry out the work.

The Environmental and Social Assessment and Management Framework and Resettlement Policy Framework for the MCEP consists of a Gender Development Plan which identifies Gender Issues, Strategies and Proposed activities relevant to the project (MEE, 2016). As this is the basis for the formulation of a Gender Action Plan for the components under the MCEP and hence is of significant relevance to the proposed project, the Gender Development Plan has been directly sourced from Zuhair (2021) and is given in Table 19 below.

As highlighted in the Gender Development Plan, currently women feel they are excluded from the opportunities of being part of the waste management system, and they have suggestions that would help in management of waste at the island. Based on the findings listed in the Gender Development Plan and the findings from the consultations, a Gender Action Plan is proposed as given in Table 20.

Table 19. Gender Development Plan as in the ESMF for the MCEP (sourced from Zuhair, 2021)

Gender issues	Strategy	Proposed Activities
Lack of awareness	Awareness campaign about the project for the community focusing on the vulnerable group including women.	Formation of women groups around specific project areas. Share information about the project benefits with local community.
Low Level of literacy	Support functional literacy campaign and develop extension programs to	Undertake literacy programs as built- in activities coordinated with literacy programs.

	take the benefits from the project as per the needs of illiterates.	Develop the implementing strategies to communicate real time information specifically for economically weaker section. Develop audio-visual aids and documentary for training programs about the project for illiterate women groups.
Excluded from opportunities because of social boundaries as a result low level of participation in decision making process	Rapport building with Women Development Office at District or local level involving them in Program. Gender sensitization to all stakeholders including project entities. Ensure Women‘s participation during meetings, project implementation and monitoring.	Carry out meetings and interaction program with and orientation to women in the community. Conduct leadership training for women members of commodity groups.
Lack of knowledge / access to technical knowhow	Promote need based technical awareness and support services.	Organize training on technologies. Provide opportunities of exposure or study visit to women's group to develop their leadership capacity.
Disparity in Wages	Accord Priority Employment to women in project generated construction activities. Promote equal wages for equal work.	Inform women groups regarding proposed construction works. Identify women interested to Work; assess their skills and involve them as per their capabilities. Monitor women wage rate and do the needful to ensure wage equality for similar type of construction works. Inclusion of the above elements in the contractors’ document

Table 20. Gender Action Plan for the project

Gender Activity/Action Plan	Performance Indicators / Targets	Responsibility	Timeline
Outcome: L. Fonadhoo IWRMC is upgraded with the required environmental and social safeguards as per the existing laws and regulations of the Maldives and the World Bank's Safeguard Policies			
Output 1: Promote gender equality in employment and income			
1.1 Ensure both genders gain employment and economic benefit during the construction and implementation phase of the project. This may include, but not be limited to architects, quantity surveyors, human resource managers, procurement experts, waste management experts and engineer, fire and safety personnel, heavy duty vehicle drivers, operators and machines.	1.1.1 Include a minimum of 30% female staff in the construction of the project (2021 baseline: 0) 1.1.2 Include a minimum of 50% female staff in the implementation of the project (2021 baseline: 0)	Island council Island council	2021 2021
Output 2: Promote gender equality in capacity building and training			
2.1 Ensure trainings conducted for the staff of the waste management center including training for operation of various vehicles and machines, will be conducted for both male and female staff.	2.1.1 Include participation from both genders with a minimum of 30% females in all trainings conducted as part of the project (2021 baseline: 0)	Ministry of Environment	2021 – 2022
Output 3: Ensure safety and protection from sexual harassment for all staff			
3.1 Ensure safety of both male and female workers as per the health and safety measures and policies in place	3.1.1. Ensure strict policies are in place in order to prevent acts of sexual harassment among the workers and/or by any member of the workers	Ministry of Environment	2021 – 2022

	towards someone in the community (2021 baseline: 0) 3.1.2 Ensure strict actions are taken against those who violate such health and safety regulations and policies	Ministry of Environment Island council	2021 - continuous
Output 4: Gender equal participation in decision making			
4.1 Ensure gender equality in decision making level including but may not be limited to architects, quantity surveyors, human resource management experts, waste management experts and engineers, fire and safety personnel, heavy duty vehicle drivers operators and machinery. 4.2 Ensure equal representation of men and women in public consultations with regards to the project. This will ensure key decisions regarding the project are made in consultation with both genders.	4.1.1 Include a minimum of 30% females at decision making level (2021 baseline: 0). 4.1.2 Include 50% of women in any public consultations held with regards to waste management in the island 2021 baseline: 0).	Ministry of environment Island council Ministry of environment Island council	2021 – continuous 2021 - continuous

14 Conclusion

The findings of this assessment for the formulation of an Environmental and Social Management Plan for the proposed project by the Ministry of Environment through the Maldives Clean Environment Project to establish a full-fledged IWRMC and facilitate piloting of anaerobic digestion for organic waste treatment in Fonadhoo shows that the project has low to moderate negative impacts on the environment. The process followed to identify environmental impacts associated with project was Rapid Impact Assessment Matrix (RIAM) which is based on standard definition of importance assessment criteria, with semi quantitative values for each of these criteria, to provide an accurate and independent score (environmental value) for each condition.

The environmental score for the project is of positive and negative. Positive changes that are of importance (highest positive environmental score) are;

1. Benefits to the island community (both social and economic) due to improved waste management practices and operation of the facility
2. Changes to the environment due to improved waste processing methods

Negative changes or impacts that are of significance (highest negative environmental score) are;

1. Impacts due to sorting and storage of hazardous waste
2. Health and safety risks to the workers during construction and operational work
3. Air pollution due to emissions associated with construction machinery
4. Groundwater pollution due to potential disposal of excess digestor liquid

Lesser negative impacts from the project includes impacts on the environment due to accidental spills during transfers and material handling. The proximity of the project site from the residential area aids to minimize a lot of impacts due to the project, such as that due to noise and air pollution and other disturbances. The project will be undertaken at the existing IWRMC. Hence vegetation clearance and loss of land is also not an impact of this project.

The proposed method of organic waste treatment, which will be done inside the plant itself is predicted to have minimal negative impacts as it greatly overcomes the issues faced by other methods of composting such as windrow-composting. Additionally, it has several benefits, some of which that have been reported are:

- Input source can be fed into the plant with partial segregation and without the need for pulverization

- Low labour requirement
- Plant composed of minimal parts, hence energy requirement is low
- High nutrient quality end products (compost and digester liquid)
- Biogas generated can be utilized for cooking or converted to electricity
- Comparatively shorter processing times ensures high economic return
- Beneficial to the environment;
- Minimises the problems of odour, leachate generation and ground water contamination associated with traditional methods of waste disposal

Stakeholder consultations carried out as part of the project showed support for the project overall, especially due to the project enabling the conversion of waste into a usable material. Fonadhoo and other islands of the atoll are quite involved in the agriculture sector and hence stakeholders felt that the conversion of waste would be beneficial both environmentally (due to proper disposal and availability of a high quality compost product for agricultural use) and economically (through sale of the compost).

A household survey was undertaken to assess the perception of the community with regards to the current waste management practice and their willingness to pay for a proper waste management system. Results of the survey showed that on average, all households produce almost equal quantities of non-biodegradable waste and biodegradable waste. Waste segregation at household level was currently being implemented at some households, while others disposed of their waste without segregation. Waste collection was being implemented by the Council, though participation was not mandatory. However, results of the household survey indicated that the fee being taken by the Council at present was acceptable to the participants of the survey, thus indicating that the community was willing to pay the fee for proper waste disposal. Majority of respondents reported location of the IWRMC as being suitable due to the distance from the residential area, though in terms of size, it was too small to cater to the waste management needs of the island.

Mitigation measures considered for the various impacts predicted for the project include:

- Provision of adequate training in proper method of handling of machinery and materials during both construction and operational phase
- Provision of adequate training in proper method of handling of waste during collection and disposal during operational phase
- Provision of all protective gear to workers during both construction and operations
- Implementation of the Grievance Redress Mechanism which has been formulated by the proponent, both during construction and operations
- Care should be taken to maintain the flaring vent and the flame to have controlled burning and not to allow CH4 to escape.

Mitigation measures have also been discussed for the alternative methods discussed in the report. However, should the proponent decide at a later stage to choose one of the alternative methods, rather than the selection option in this report, the Consultant stresses the importance of getting environmental clearance for the change in design and scope through a separate document, as the process would require consultations with the Council amongst other additional information.

Monitoring programme identified in the report will enable the proponent to assess whether the mitigation measures which have been identified in the report are effective. Early identification of negative impacts will enable the proponent to rectify the course of activities.

In order to further minimise and manage environmental and social impact associated with the project the following are recommended:

1. Adherence to all relevant legislations, regulations, guidelines and standards during construction and operation of the IWRMC;
2. Establish environmental and occupational health and safety procedures for all relevant components;
3. Installation of renewable energy sources at IWRMC, such as solar panels to source power for operations;
4. Utilise the biogas produced to generate electricity which can be used to power the IWRMC operations
5. Ensure that measures are in place to address the issue of excessive digestor liquid, so as to enable its utilization or disposal in an environmentally friendly manner
6. Carryout awareness raising campaigns to increase awareness of the general public regarding proposed work
7. Ensure all trainings identified under the Training programme of this report are properly implemented so as to ensure proper implementation of the project at all phases.
8. Encourage greater participation of women, especially during operational stage
9. Ensure proper supervision and inspection of the IWRMC at regular intervals

In the context of the above conclusions and recommendations, with due consideration to the environmental components identified above and the extent of the project activities and their likely and predicted impacts identified, with proposed mitigation measures and monitoring followed, it is concluded that the project is feasible and justified. Furthermore, the positive benefits due to the project, both to the environment and island community overweigh the negative effects on the environment during the project.

Acknowledgements

The consultant acknowledges the contribution provided by the team members in this report for the valuable contribution to the report and especially at the field. The consultant also acknowledges the assistance provided by the PMU of MCEP. Appreciation also to the Island Council of Fonadhoo, especially the focal point for the project, Fathimath Zaeema (Director, Fonadhoo Council) for their continuous assistance during the project report formulation and survey work.

CVs of team members are given below.

Curriculum Vitae

Position	Environmental Consultant
Name	Shahaama Abdul Sattar
Address	G. Helengeli, Lily Magu Male', Rep. of Maldives
Contact	Mobile: +9607904985 Email: shahaama.abdulsattar@lamer.com.mv shahaama.sattar@gmail.com
Date of Birth	30 September 1980
Nationality	Maldivian
Education	**Master of Science (MSc)** in Fisheries Biology and Fisheries Management, University of Bergen. Bergen, Norway, 2004 - 2006 **Bachelor of Science (BSc.),** The Flinders University of South Australia, Adelaide, South Australia, 1999 - 2001
Membership of Professional Associations	Small Island Research Group (SIRG) Maldives, Vice President
Countries of Work Experience	Maldives
Languages	**Dhivehi** Mother tongue **English** Fluent

Employment Record

From: 2008 - 2011
Employer: Marine Research Centre, Ministry of Fisheries and Agriculture, Male', Maldives.
Position: Fisheries Biologist

From: 2006 to 2008
Employer: Marine Research Centre, Ministry of Fisheries Agriculture and Marine Resources, Male', Maldives.
Position: Senior Research Officer

From: 2002 – 2004
Employer: Marine Research Centre, Ministry of Fisheries Agriculture and Marine Resources, Male', Maldives.
Position: Research Officer

Line of work at MRC included:
Assessment of the reef and grouper fisheries of Maldives, with surveys to monitor fisheries and fish species behavior. Compilation and analysis of data, for regular reviews and reporting and formation of management recommendations. Key role in the formulation of the Grouper Fisheries Management Plan / Grouper Fisheries and Export Regulation

Focal point for the IUCN funded project on identification of reef fish spawning aggregations in the Maldives through fishermen interviews (2007)

Secretariat and key organizer – Indian Ocean Cetacean Symposium 2009

Project Partner for Maldives for the Darwin Initiative Coral Reef Fish Project, Maldives

MRC Focal Point for the Atoll Ecosystem Conservation Programme, Ministry of Housing and Environment (2009 – 2011)

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

From: May 2011 – Dec 2012
Employer: Darwin Reef Fish Project / Marine Research Centre (Maldives) and Marine Conservation Society (UK)
Position: Consultant, Darwin Reef Fish Project (4 year joint collaboration between MRC and MCS, UK)
Assess the various reef fisheries (grouper, aquarium and food fisheries) of the Maldives and aims to establish management plans for these fisheries. Provision of technical support and assistance to the project staff and MRC in implementing the project and formulation of the management plans.

From: July 2011 – Dec 2011
Employer: Bay of Bengal Large Marine Ecosystem Project
Position: BOBLME Sharks Working Group Coordinator
Coordinator for the Sharks WG of BOBLME project, and work with the focal points in the member countries, to assist in the formulation and implementation of their National Plans of Action for Sharks.

From: June 2011 to Present
Employer: Land and Marine Environmental Resource Group Pvt Ltd
Position: Environmental Consultant

Workshops/Seminars Participated

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

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

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

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

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

17-19 June 2008 – Workshop on Assessment and Management of the Offshore Resources of

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

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

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

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

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

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

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

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

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

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

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

10 April 2014 - Stakeholder Consultation to present the National Plan of Action on the Conservation and Management of Sharks (NPOA-Sharks), Male', Maldives

Publications

Sattar, S. A., Najeeb, A., Islam, F., Afzal, M. S. and Wood, E. (2012) Management of the grouper fishery of the Maldives, *Proceedings of the 12th International Coral Reef Symposium, Cairns, Australia*, *9-13 July 2012, Session 13E* (in press)

Ushan, M., Wood, E., Saleem, M. and Sattar, S. A (2012) Maldives Sharkwatch Report for 2009 - 2010, *Proceedings of the 12th International Coral Reef Symposium, Cairns, Australia*, *9-13 July 2012, Session 13D* (in press)

Sattar, S. A., Andréfouët, S., Ahsan, M., Adam, M. S., Anderson, C. R. and Scott, L (2012) Status of the Coral Reef Fishery in an Atoll under tourism development: the case of Central Maldives, *Atoll Research Bulletin 590*: 163-186

Sattar, S. A., Amir, H. and Adam, M. S. (2012) Reef fish tagging programme – Baa Atoll Pilot project, *Atoll Research Bulletin 590*: 187-200

BOBLME (2011) Report of the BOBLME Sharks Working Group, 5-7 July 2011, Male' Maldives,

Prepared for the Bay of Bengal Large Marine Ecosystem Project by Sattar, S. A. and Anderson, R. C.
Saleem, M., Sattar, S. A. (2009) Study on post-tsunami restoration and conservation projects in Maldives, *Prepared for the International Union for Conservation of Nature*.

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

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

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

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

Environmental Impact Assessments Reports and other studies

The following are a selected list of the projects I have been involved in as an environmental consultant at LaMer Group Pvt Ltd.

Name of assignment or project	EIA for development of domestic airport facility at Funadhoo, Shaviyani Atoll
Year	2018
Location	Funadhoo, Shaviyani Atoll, Maldives
Client	Regional Airports, Ministry of Tourism
Project features	Development of domestic airport facility at Funadhoo
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA for agricultural development project at Hulhidhoo, Vaavu Atoll
Year	2017
Location	Hulhidhoo, Vaavu Atoll, Maldives
Client	Aarah Investments Pvt Ltd
Project features	Development of Hulhidhoo as a mix-use island with an agricultural (hydroponics) and tourism component
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA for development of 100 bed hospital at Addu City
Year	2017
Location	Addu City, Maldives
Client	Ministry of Housing and Infrastructure
Project features	Redevelopment of Equatorial Convention Centre as a 100 bed tertiary level hospital
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA for relocation of sewer outfalls at IGMH and Westpark area, Male' City
Year	2017
Location	Male', Maldives
Client	MWSC Pvt Ltd
Project features	Relocation of sewer outfalls at IGMH and Westpark area to industrial village area of Male'
Positions held	EIA team member

Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA for resort development at Islands I and E of Emboodhoofalhu Finolhu Development project
Year	2017
Location	Emboodhoofalhu Finolhu, Maldives
Client	Dream Islands Development Project
Project features	Development of reclaimed islands I and E of Emboodhoofalhu Finolhu as tourist resorts
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	Environmental Impact Assessment Report for aquatic animal quarantine facility at Hulhumale'
Year	2016
Location	Hulhule, Maldives
Client	Ministry of Fisheries and Agriculture
Project features	Setting up an animal quarantine facility within plant quarantine service area in Hulhule
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	Environmental Impact Assessment report for relocation of Male' Submarine cable landing
Year	2016
Location	Male', Maldives
Client	Dhiraagu
Project features	EIA related to relocation of the submarine cable from existing location to a new location
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	Socioeconomic Situation analysis of selected fishing communities as part of formulation of Master Plan for Sustainable Fisheries (MASPLAN)
Year	2015
Location	ADh. Mahibadhoo, F. Bilehdhoo, GA. Villingili, HA. Ihavandhoo, L. Gan, L. Maamendhoo, Lh. Naifaru, S. Maradhoo, Maldives, Maldives
Client	Ministry of Fisheries and Agriculture
Project features	Socioeconomic survey of selected islands, to undertake a situational analysis of the island communities
Positions held	Fisheries Management Consultant
Responsibilities	Carryout socioeconomic surveys in forms of group discussions and household surveys. Data collection and analysis and report formulation (trip reports and overall situational analysis).
Name of assignment or project	Development of Training material for project staff on mainstreaming and increasing awareness on climate change adaptation and mitigation measures in tourism operation
Year	2015
Location	Male', Maldives
Client	Ministry of Tourism
Project features	Mainstreaming and increasing awareness on climate change adaptation and mitigation measures in tourism operation
Positions held	Team member
Responsibilities	Material development and presentation
Name of assignment or project	Development of water supply and a sewerage system at Fuvahmulah
Year	2015
Location	Fuvahmulah, Gnaviyani atoll. Maldives
Client	Ministry of Environment and Energy
Project features	Setting up a water supply and a sewerage facility
Positions held	EIA team member

Responsibilities	Preparation of the EIA report
Name of assignment or project	Environmental Impact Assessment for soft coastal protection works at GDh. Thinadhoo
Year	2014
Location	GDh. Thinadhoo, Maldives
Client	Ministry of Environment and Energy
Project features	Beach Nourishment and Coastal protection
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	Beach Nourishment and Coastal Protection works at a private land at Praslin, Seychelles
Year	2014
Location	Praslin, Seychelles
Client	Ahmed Didi
Project features	Beach Nourishment and Coastal protection at Praslin, Seychelles
Positions held	Environmental assessment team member
Responsibilities	Preparation of the report submitted to the client
Name of assignment or project	1500 Housing Unit construction Project Maldives
Year	2014
Location	Fuvahmulah, Gadhdhoo, Hoadedhdhoo, Hithadhoo, Holhudhoo, Madaveli, Thinadhoo, Maldives
Client	Ministry of Housing and Infrastructure
Project features	Construction of Housing Units at the specified Islands
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for Coastal modification at Robinson Club Maldives
Year	2013
Location	Ga. Funamaudua, Maldives
Client	Robinson Club Maldives, Maldives
Project features	Coastal modification at the NW side of the island, construction of geo-bag revetment and harbor basin maintenance dredging works
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for construction of gravity type waste water collection system at ADh Omadhoo
Year	2013
Location	ADh Omadhoo, Maldives
Client	ADh Omadhoo Island Council Office
Project features	Construction of gravity type waste water collection system and sea outfall pumping system
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for upgrading of Maldive Gas Pvt Ltd Gas jetty
Year	2013
Location	Thilafushi, Maldives
Client	Maldive Gas Pvt Ltd
Project features	Reconstruction of existing gas jetty head and expansion of jetty head
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for Resort development at GDh Havvodaa
Year	2013
Location	GDh Havvodaa, Maldives
Client	Crystal Plaza Pvt Ltd, Maldives
Project features	Construction of a resort hotel and all the related amenities
Positions held	EIA team member
Responsibilities	Preparation of the EIA report

Name of assignment or project	EIA report for Coastal protection, coastal modification, beach nourishment, coral nursery setup and entrance channel maintenance dredging work
Year	2013
Location	Gili Lankanfushi, Maldives
Client	Gili Lankanfushi, Maldives
Project features	Coastal protection, coastal modification, beach nourishment, coral nursery setup and entrance channel maintenance dredging work
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for Harbor development project at Dh. Maaenboodhoo
Year	2013
Location	Dh. Maaenboodhoo, Maldives
Client	Ministry of Housing and Infrastructure
Project features	Development of harbor facility (dredging of harbor basin, construction of wharfs and breakwater)
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for Flood mitigation and reclamation work at Faresmaathoda
Year	2013
Location	GDh. Faresmaathodaa, Maldives
Client	United Nations Office for Project Services (UNOPS)
Project features	Construction of breakwater and reclamation of land
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for Development of Domestic Airport Facility
Year	2012
Location	Th. Thimarafushi, Maldives
Client	Maldives Airports Company Limited
Project features	Construction of runway apron
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for Wharf reconstruction and upgrading of existing berthing facility and slipway
Year	2012
Location	Thilafushi, Maldives
Client	Fuel Supply Maldives Pvt Ltd, Maldives
Project features	Reconstruction of wharf and upgrading of existing berthing facility and slipway
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for Resort development at B. Kanifinolhu
Year	2012
Location	B. Kanifushi, Maldives
Client	Coastline Hotels and Resorts Pvt Ltd, Maldives
Project features	Construction of a resort hotel and all the related amenities
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for Borehole construction at Cyprea Mrine Food Fish Factory
Year	2012
Location	K. Himmafushi, Maldives
Client	Cyprea Marine Food Pvt Ltd, Maldives
Project features	Construction of a 8 inch borehole at factory premise
Positions held	EIA team member
Responsibilities	Preparation of the EIA report

Name of assignment or project	EIA report for resort development at K. Kudavilligili, Maldives
Year	2011
Location	K. Kudavilingili, Maldives
Client	Yacht Tours Pvt Ltd, Maldives
Project features	Construction of resort hotels and all the related amenities. In addition a large reclamation of the shoreline as additional land as part of the resort development is also part of the project
Positions held	EIA team member
Responsibilities	Preparation of the EIA report
Name of assignment or project	EIA report for development of city hotel, hospitality institute and resort development at Gasfinolhu and Bodufinolhu, L. Atoll
Year	2011
Location	L. Gan, Bodufinolhu and Gasfinolhu, Maldives
Client	Premier Equities Pvt Ltd, Maldives
Project features	Construction of a resort hotel and required amenities including a training hotel for hospitality industry
Positions held	EIA team member
Responsibilities	Preparation of the EIA report

Referees

Dr. Mohamed Shiham Adam, PhD
Marine Research Centre
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Dr. Charles Anderson
anderson@dhivehinet.net.mv
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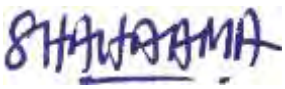
Certification

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



Shahaama A. Sattar Date: October 2018

CURRICULUM VITAE

1. POSITION: Environment Analyst

2. NAME OF FIRM: LaMER Group Pvt.Ltd

3. NAME: Azim Musthag

4. DATE OF BIRTH: 13th December 1985

5. NATIONALITY: Maldivian

6. PERSONAL ADDRESS: M. Anthias, Fulooniya Magu, Malé, Maldives

7. EDUCATION

Bachelor of Marine Science (Majoring in Marine Ecology), Griffith University, Queensland, Australia.

DELF (Diplôme d'études en langue française) Level A1 and Level A2

8. MEMBERSHIP OF PROFESSIONAL SOCIETIES: Master Instructor with the Scuba Schools International (SSI).

9. OTHER TRAINING:

Fish Watch Training Workshop conducted by Darwin Reef Fish Project initiated by the Marine Research Centre of Maldives in collaboration with Marine Conservation Society (UK) in 2009.

IUCN Manta Ray Workshop in 2013.

National Coral Reef Monitoring Framework monitoring protocols training in 2014 conducted by IUCN Maldives.

10. COUNTRIES OF WORK EXPERIENCE: Maldives and Australia

11. LANGUAGE AND DEGREE OF PROFICIENCY:

English - Native or bilingual proficiency
Dhivehi - Native or bilingual proficiency
French - Limited working proficiency

12. EMPLOYMENT RECORD:

2005 - 2011	Dive Instructor, Maldivers Diving Centre, Malé.
2012 – 2014	Dive Instructor, Diveoceanus Dive Centre at Paradise Island Resort
2017 - 2017	Research Assistant Griffith University, Gold Coast, Australia.
2018 (Present)	Environmental Analyst Lamer Pvt Ltd

13. DETAILED TASKS ASSIGNED: **WORK UNDERTAKEN THAT BEST ILLUSTRATES CAPABILITY TO HANDLE TASKS:**

Project: Ecological surveys for the proposed, potential UNESCO biosphere reserves.
Year: 2018

Location: Maldives
Client: IUCN Maldives
Main project features: Surveying of 5 reefs and 3 islands.
Position: Consultant.
Activities performed:
Conducted ecological (marine and terrestrial) surveys at the proposed sites
Data compilation and analysis
Assisted in the final report development.

Project: Environmental Monitoring Report for resort development
Year: 2018
Location: Maldives
Client: Pearl Atoll Pvt Ltd
Main project features: Survey for the Environmental Monitoring Report
Position: Environmental Analyst
Activities performed:
Conducted the marine component of the survey. The seawater quality analysis, sedimentation analysis, reef benthic surveys, and fish surveys.

Project: Environmental Impact Assessment Report for resort development
Year: 2018
Location: Bodufushi, Raa Atoll.
Client: Alibey Maldives Pvt Ltd
Main project features: EIA Survey for an addendum
Position: Environmental Analyst
Activities performed:
Conducted the marine component of the survey. The seawater quality analysis, reef benthic surveys, and fish surveys.

Project: Environmental Impact Assessment for Coastal Protection and Entrance Clearance.
Year: 2018
Location: Bandos Island Resort, Kaafu Atoll.
Client: Bandos Island Resort.
Main project features: EIA Survey
Position: Environmental Analyst
Activities performed:
Conducted the marine component of the survey. The seawater quality analysis, reef benthic surveys, and fish surveys.

Project: Third Addendum to the Environmental Impact Assessment Report
Year: 2018
Location: Enboodhoo Finolhu Lagoon
Client: Dream Islands Development Pvt Ltd
Main project features: Reclamation of Islands for Resort Development at Enboodhoo Finolhu Falhu, South Malé Atoll
Position: Environmental Analyst
Activities performed:
Conducted the marine component of the survey. The seawater quality analysis, reef benthic surveys, and fish surveys.

14. Certification:

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

_____ Date: 05th August 2018

[*Signature of staff member or authorized representative of the staff]* *Day/Month/Year*

Full name of staff member: Azim Musthag

بسم الله الرحمن الرحيم

CURRICULUM VITAE (CV)

1. **Full Name/ Address:** Aishath Abdulla

2. **Date of Birth**: 10/09/1986 **Nationality**: Maldivian

3. **Education**: 2012 Masters in Environment & Development, University of Melbourne, Australia

   2010 BA (Hons) in Urban and Regional Planning, International Islamic University Malaysia, Malaysia

4. **Membership of Professional Associations/Non-Governmental Organisations**: - Secretary of Small Island Research Group NGO

5. **Other Training**: Attended the Expert Group Meeting (EGM) on: Urbanization in Small Island Developing States as an Urban Planner from the Maldives; at the United Nations in New York (June 2016)

6. **Countries of Work Experience**: Maldives, Malaysia

7. **Languages**: Dhivehi-Good, English-Good

8. **Experience/ Employment Record (General)**

February 2013- Present	Senior Planner: Work in environmental and planning consultancies, including preparation of plans, studies and EIA reports etc LAMER Group Pte Ltd Male' Maldives
November 2010 – January 2011	Urban Planner/ Acting- Business Development Manager: Work in handling and managing bidding processes, HR, project proposals, Marketing. Planning related projects Riyan Pte.Ltd Male' Maldives
May 2009 - July 2009	Urban Planner-Trainee ANZ PLANNERS SDN. BHD Selangor Malaysia

9. Specific Experience/ Employment Record (as per TOR requirements)

Maldives Housing Market Needs and Assessment Study; Maldives Urban Development and Resilience Project (MUDRP)
Year: September 2020-Ongoing
Client: Ministry of National Planning, Housing and Infrastructure
Position Held: Qualitative Analyst
Duties Rendered: Design, conduct and reporting of Consumer Research; mapping of existing regulatory and institutional frameworks related to housing and land in Maldives; provide input to the recommendations to develop national housing policy and housing strategy.

Developing International Port Facilities in the North or South of Maldives; Stage 2 Reports – Transhipment Hub in Ihavandhippolhu Atoll
Year: July 2020
Location: Upper North Atoll, Maldives
Client: Ministry of Economic Development
Positions Held: Social Impact Assessment Consultant
Duties Rendered: Assessment of socio-economic setting and impacts, stakeholder consultations, public perception survey, social impact analysis and report writing.

Preparation of an Integrated Urban Development Master Plan for Addu City
Year: October 2019-Onhold
Client: Addu City Council
Position Held: **Urban** Planner and Project Manager
Duties Rendered: Carry out consultations and assessments, preparation of plans, overall management of the project

Preparation of B. Hithaadhoo Land Use Plan
Year: August 2019 to October 2019
Client: Hithaadhoo Island Council
Position Held: Planner
Duties Rendered: Community Consultations, land use planning and reporting

Preparation of Ga. Kondey Land Use Plan
Year: March 2019 to July 2019
Client: Kondey Island Council
Position Held: Planner
Duties Rendered: Community Consultations, land use planning and reporting

Maldives Building Regulatory Capacity Assessment (BRCA), Building Regulation for Resilience Program
Year: January 2018- October 2019
Location: Male', Maldives
Client: Ministry of National Planning and Infrastructure, Maldives
Positions Held: Urban Planner,
Duties Rendered: Technical contribution to BRCA Component 1 and 3 assessment for Maldives, and associated recommendation development. Material and technical support to 2. Participation and

facilitation of kick-off workshop in Maldives. Facilitation and logistical support for the Action-Planning Workshop in Maldives

Environmental and Social Impact Assessment for the proposed North Upgrading of Infrastructure at North Regional Waste Management Facility Zone 2, Raa Vandhoo
Year: December 2018 – January 2019
Location: Raa atoll Vandhoo, Maldives
Client: Ministry of Environment, Maldives
Positions Held: Urban Planner, Social Impact Assessment Consultant
Duties Rendered: Assessment of possible environmental and social impacts of the proposed upgrade at the WMC. Community consultations, social impact analysis and report writing

Assessment of Climate Sensitive Natural Resources in Laamu Atoll and Preparation of Resources Maps
Year: July 2016- July 2018
Client: UNDP
Position Held: Project Coordinator
Duties Rendered: Overall coordination of the project which includes project planning, keeping PMU updated on the progress of the project, facilitate the project team in addressing the issues, delays etc during the project.

Preparation of R. Inguraidhoo Land Use Plan
Year: March 2018 to May 2018
Client: Inguraidhoo Island Council
Position Held: Planner
Duties Rendered: Community Consultations, land use planning and reporting

Development of Training Modules, Materials and Field Training; Organic Farming and Handicraft, Climate Change Adaptation Project (CCAP), Livelihood support program for wetland management
Year: June 2017 to February 2018
Client: Ministry of Environment and Energy
Position Held: Project Leader
Duties Rendered: Development of training materials, project Coordination and Reporting

Formulation of Coastal Protection Regulation, ICCRRIP Project
Year: September 2014 to January 2015
Client: Ministry of Environment & Energy
Position Held: Project Coordinator
Duties Rendered: Consultations, Input in formulation of Regulation and reporting

Developing a Handbook to Enhance the Capacity of Trainers to Increase the Resilience of People with Disabilities to DRR and CCA
Year: 2016
Client: National Disaster Management Center
Position Held: Consultant
Duties Rendered: Review and analyze existing; provide input in relevant stakeholder consultations;

Preparation of the handbook Preparation of AA. Feridhoo Land use plan
Year: 2016

Client: Feridhoo Island Council
Position Held: Planner
Duties Rendered: Community Consultations, land use planning and reporting

Preparation of K. Himmafushi Land use plan
Year: February 2016 to March 2016
Client: Himmafushi Island Council
Position Held: Planner
Duties Rendered: Community Consultations, land use planning and reporting

Tool Kit and Training Materials for Increasing Awareness on Climate Change Adaptation & Mitigation Measures in Tourism Sector (Kaaf, Alif Alif, Alif Dhaal, Baa & Lhaviyani Atoll)
Year: May 2015 to August 2015
Client: Ministry of Tourism
Position Held: Project manager
Duties Rendered: Preparation of Materials, Conducting workshops

Tool Kit and Training Materials for Increasing Awareness on Climate Change Adaptation & Mitigation Measures in Tourism Sector (For Tourism Staff)
Year: December 2015 to February 2015
Client: Ministry of Tourism
Position Held: Project manager
Duties Rendered: Preparation of Materials, Conducting workshops

Situation Analysis for the formulation of Master Plan for Sustainable fisheries (MASPLAN)
Year: February 2015 to March 2015
Client: JICA
Position Held: Consultant
Duties Rendered: Community Consultations, Analysis and reporting

Preparation of AA. Bodufolhudhoo Land use plan
Year: May 2015 to June 2015
Client: Bodufolhudhoo Island Council
Position Held: Planner
Duties Rendered: Community Consultations, land use planning and reporting

Preparation of AA. Mathiveri Land Use Plan
Year: June 2014 to July 2014
Client: Mathiveri Island Council
Position Held: Planner
Duties Rendered: Community Consultations, land use planning and reporting

Development of a National Framework/Plan on managing IDP's (internally displaced) persons/population caused by crises, emergencies and climate change
Year: May 2014 –Dec 2014
Client: UNDP/NDMC
Position Held: Team Leader
Duties Rendered: Overall project coordination and delivery

Preparation of Disaster Management Plan for a Guest House

Year: 2014
Client: Sea Side Lodge Guesthouse Manager, Hulhumale'
Position Held: Planner
Duties Rendered: Preparation of the disaster management plan according to the guidelines set by

Perceptions and understandings of climate change and migration survey (K.Guraidhoo and R.Dhuvaafaru) carried out by a Norwegian Research Institute
Year: August 2013 September 2013
Client: CICERO - Center for Climate and Environmental Research – Oslo; Norwegian Academic Institution
Position Held: Local Consultant
Duties Rendered: Assisted (CICERO to carry out the household survey, focus group discussions and the key informant interviews

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

Integration of Climate Change Risk Resilience into Land Use Planning
Year: February 2011 to April 2011
Client: Ministry of Housing and Environment
Position Held: Planner/Project Coordinator
Duties Rendered: Provide input in planning perspective and also over all coordination of the project inclusive of conducting a workshop to present the findings

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

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

Reviewing the Third Tourism Master Plan 2005-2011
Year: December 2010 to October 2011
Client: Ministry of Tourism Arts and Culture
Position Held: Planner/Project Coordinator
Duties Rendered: Provide input in planning perspective and also over all coordination of the project inclusive of conducting a workshop to present the findings

Preparation of a detailed Layout Plan for Tourism Zone (Asseyri Project)

Year: December 2010 to February 2011
Client: Ministry of Tourism Arts and Culture
Position Held: Planner/Project Coordinator
Duties Rendered: Provide input in planning perspective through preparing the layout plan and also over all coordination of the project inclusive of conducting a workshop to present the findings

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

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

Professional Referees

Name: Najfa Shaheem Raazee

Position: Project Manager of ICCRRIP Project, Ministry of Environment and Energy

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Name: Hamdhaan Zuhair

Position: Environmental and Social Safeguards Officer (CCAP), Ministry of Environment and Energy

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Name: Ismail Abid

Position: Managing Director, Land and Marine Environmental Resource Group Pvt Ltd.

Email Address: ismail.abid@lamer.com.mv

References

Al Seadi, T., Rutz, D., Prassl, H., Köttner, M., Finsterwalder, T., Volk, S., Janssen, R. 2008. *Biogas handbook*. Published by University of Southern Denmark Esbjerg,

CITRES and MEECO, 2019. *Feasibility Study for a Regional Solid Waste Management System in Zone IV and V, Maldives - REPORT PHASE 2 – DRAFT 1 FINAL VERSION*. Prepared for Maldives Clean Environment Project - Ministry of Environment

Environment Agency, 2013. How to comply with your environmental permit. Additional guidance for: Anaerobic Digestion (Reference LIT 8737)

Falkland, T. 2001. *Report on Groundwater Investigations in Northern Development Region (ADB Regional Development Project).* Report for Ministry of Planning and National Development. Maldives.

Falkland, A.C., 1993. *Hydrology and water management on small tropical islands. Hydrology of the warm humid tropics (Proceedings of the Yokohama Symposium).* Yokohama, July 1993. IAHS Publication No. 216.

Isles (n.d.) Isles - Fonadhoo [online] Available at: https://www.isles.gov.mv/Island/Details/816 (accessed in January 2021)

MEE, 2016. *Environmental and Social Assessment and Management Framework (ESAMF) & Resettlement Policy Framework (RPF)* - Maldives Clean Environment Project. 203 pp

MEECO, 2018. *Environmental and Social Management plan for the establishment of Island Waste Management Centre - Th. Kin'bidhoo.* Prepared for Ministry of Environment and Energy

Ministry of Environment, 2019. *Environmental Impact Assessment Greater Male' Waste to Energy Project.* Prepared for Asian Development Bank

Ministry of Youth, Sports and Community Empowerment, n.d. Maldives NGO Portal [online] Available at Maldives NGO Portal - The Maldives NGO Directory (accessed on 9th February 2021)

National Bureau of Statistics, 2015. Maldives Population & Household Census 2014, Ministry of National Planning, Housing and Infrastructure, Maldives.

Pastakia C. M. R and Jensen A, 1998. The Rapid Impact Assessment Matrix (RIAM) for EIA. *Environmental Impact Assessment Review* 18: 461-482.

Secretariat of the Fonadhoo Council, 2021. Island Information sheet

USEPA, n.d. *AgStar Project Development Handbook – A Handbook for developing Anaerobic Digestion / Biogas Systems on Farms in the United States*. 3rd ed.

World Bank Group , 2007. Environmental, Health, and Safety Guidelines for Waste Management Facilities. Washington, D.C., United States

Zuhair, A. H., 2019. *Environmental Management plan for the upgrading of Island Waste Management Centre in N. Holhudhoo*. Prepared for Ministry of Environment

Zuhair, A. H., 2021. *Environmental and Social Management plan for the proposed establishment of Island Waste and Resource Management Centre in Th. Madifushi*. Prepared for Ministry of Environment

Appendices

Appendix 1 List of abbreviations

AD	-	Anaerobic Digestion
EIA	-	Environmental Impact Assessment
EPA	-	Environmental Protection Agency
ESMP	-	Environmental and Social Management Plan
GoM	-	Government of Maldives
IWRMC	-	Island Waste Resource Management Centre
IWMP	-	Island Waste Management Plan
MCEP	-	Maldives Clean Environment Project
ME	-	Ministry of Environment
MSL	-	Mean Sea Level
RIAM	-	Rapid Impact Assessment Matrix
RWMF	-	Regional Waste Management Facility
SOP	-	Standard Operating Procedures
TOR	-	Terms of Reference
WMPCD	-	Waste Management and Pollution Control Department

Appendix 2 Island Waste Management Plan – L. Fonadhoo

ތަޢާރަފް

މި ޕްލޭނަކީ ރަށުގެ ކުނިބެހި މެނޭޖްމަންޓް ފައިދާ ކުރުވަނިވި ގޮތަކަށް ރާވާފައިވާ ބަލަހައްޓާން ނިޒާމެއް ގާއިމުކުރުމުގެ ގޮތުން ހެދިފައިވާ ޕްލޭނެކެވެ.

ކުނީގެ މައްސަލައަކީ ރާއްޖޭގެ މުޅިން ދިރިއުޅޭ ހުރިހާ ރަށްރަށުންވެސް ދިމާވެފައިވާ ވަރަށްބޮޑު މައްސަލަ އެކެވެ. މިގޮތުން ފަރުދު އަކިފަސް ކުނީގެ މައްސަލައަށް ހައްލެއް ނުހޯދިއްޖެނަމަ ބޮޑުވާނެކަމެވެ.

މި ޕްލޭން ތައްޔާރުކުރުމުގައި ކައުންސިލުގެ ފަރާތުން ރަށުގެ ސްޓޭކްހޯލްޑަރުންގެ އިތުރުން ދިރާސާއި، ރަށުގެ ކޮމިއުނިޓީއާއި އަދި ރަށުގެ ތަފާސްހިސާބުތައް ބޭނުންކޮށްފައެވެ.

ރަށާބެހޭ މައުލޫމާތު

ރާއްޖޭގެ ވެރިރަށް ކަމަށްވާ މާލެއިން 256 ކިލޯމީޓަރު ދުރުގައިވާ ފުނަދޫ އަކީ ށ. އަތޮޅުގެ ވެރިރަށް ކަމަށްވާ ރަށެވެ. 2009 ވަނަ އަހަރުގެ ޖެނުއަރީ މަހުގެ ނިޔަލަށް ފުނަދޫގެ އާބާދީ އަކީ 1914 އެވެ. މީގެތެރޭގައި 915 އަކީ އަންހެނުންނެވެ. އަދި 999 އަކީ ފިރިހެނުންނެވެ. ފުނަދޫގެ ބޭރުމީހުން 159 ހުރެއެވެ.

މިހާރުގެ ހާލަތު

ކުނިނައްތާލުން ރަނގަޅު ނިޒާމެއް އޮތުމަކީ ވަރަށް މުހިންމު ކަމެކެވެ. ފުނަދޫ އަކީ ކުނީގެ މައްސަލަ ވަރަށް ބޮޑު ރަށެއްކަމަށް ފާހަގަކުރެވެއެވެ. ނަމަވެސް މިހާރުގައި ކުނި ބެލެހެއްޓުމުގެ ރަނގަޅު ނިޒާމެއް ގާއިމް ވެފައެއް ނުވެއެވެ. ފުނަދޫގައި ކުނި އުކާލުމަށް އަމިއްލަ ގޮނޑުދޮށެއް ކަނޑައަޅާފައިވާ ނަމަވެސް ކުނި އުކާލާ ސަރަޙައްދު ސާފުކުރެވިފައިނުވާ ގޮތުން ބޮޑު ގަދަކަމެއް ވެފައި ދެއެވެ.

2004 ވަނަ އަހަރު ދިމާވި ސުނާމީ ކާރިސާ އައި ގުޅިގެން ރިކަންސްޓްރަކްޝަނުގެ އެހީގައި ފުނަދޫގައި ވެސް ކުނިކޮށްޓެއް ގާއިމު ކުރެވިފައެވެ. ނަމަވެސް މިކޮށްޓަކީ ބަލަހައްޓަން ކުނި ވަކިވަކިން ނައްތާލުމުގެ ރަނގަޅު ނިޒާމެއް ގާއިމުވެފައި ހުރި ކޮށްޓެއް ނޫނެވެ. އަދި ހަމަ އެހެންމެ މިކޮށްޓަށް ދިއުމަށް ރާސްތާ ދުރުކަމުގައި ހުރިކަމަކަށް މި ކުނިކޮށްޓަކީ ބޭނުން ވެސް ނުކުރެވިފައެވެ.

ކުނި އުކާލުމުގެ މަސައްކަތުގައި ޝާމިލުވާ ފަރާތްތައް

ފުނަދޫގައި ކުނިގެ ކަންތައް ބަލަހައްޓަނީ ރަށުގައި އުފެދިފައިވާ ކޮމިޓީތަކާއި ރަށުއޮފީސް ގުޅިގެންނެވެ. ކުނިނައްތާލުމުގައި މިރަށުގެ ރަށުއޮފީހާއި އިތުރުން ފަރާތްތަކުން ބައިވެރިވެއެވެ. ނަމަވެސް އެކަމުގެ ކުރިން ރަށުއޮފީހުގެ ޢާންމުކޮށް އެކަމަށްޓަކައި މަސައްކަތްކުރާ ކަމަކު ބައިވެރިވާ އެއްވެސް ޖަމާޢަތްތަކެއް ކުރިއަށް ނުދެވިފައެވެ.

ކައުންސިލްގެ ދަށުން ހިންގާ ކަންކަމާ ގުޅޭ ކަންކަން

ކައުންސިލްގެ ދަށުން ހިންގާ ކަންކަމާ ގުޅޭ ކަންކަން ބަލަހައްޓަން ކައުންސިލްގެ ކޮންމެ ކޮމިޓީއަކަށް ކައުންސިލްގެ ތެރެއިން ތިން ބޭނުން ކުރެވެ. ކައުންސިލްގެ ކޮންމެ ކޮމިޓީއަކުން ކަންކަން ބަލަހައްޓަން ކުރިއަށް ގެންދާ ގޮތް ކައުންސިލްގެ ކަނޑައެޅުން ދެވޭ ގޮތަށެވެ.

ކައުންސިލްގެ ކޮންމެ ކޮމިޓީއަކުން ކުރިއަށް ގެންދާ ކަންކަމާ ގުޅޭ ރިޕޯޓްތައް ، ތަކުރާރުތަކާ ، ތަކުލީފުތަކާ، ކައުންސިލްގެ ކޮންމެ ކޮމިޓީއަކުން ކުރިއަށް ގެންދާ ކަންކަމާ ގުޅޭ ކަންކަން ކައުންސިލްގެ ކަނޑައެޅުން ދެވޭ ގޮތަށެވެ.

ކައުންސިލްގެ ކޮމިޓީތަކުގެ ބާއްވާ ގޮތާ ގުޅޭ ކަންކަން

ކައުންސިލްގެ ކޮންމެ ކޮމިޓީއަކުން ކުރިއަށް ގެންދާ ކަންކަމާ ގުޅޭ ކަންކަން ބަލަހައްޓަން ކައުންސިލްގެ ކޮންމެ ކޮމިޓީއަކަށް ކައުންސިލްގެ ތެރެއިން ތިން ބޭނުން ކުރެވެ. ކައުންސިލްގެ ކޮންމެ ކޮމިޓީއަކުން ކުރިއަށް ގެންދާ ކަންކަމާ ގުޅޭ ކަންކަން ބަލަހައްޓަން ކުރިއަށް ގެންދާ ގޮތް ކައުންސިލްގެ ކަނޑައެޅުން ދެވޭ ގޮތަށެވެ.

ކައުންސިލްގެ ކޮންމެ ކޮމިޓީއަކުން ކުރިއަށް ގެންދާ ކަންކަމާ ގުޅޭ ރިޕޯޓްތައް ، ތަކުރާރުތަކާ ، ތަކުލީފުތަކާ، ކައުންސިލްގެ ކަނޑައެޅުން ދެވޭ ގޮތަށެވެ.

މިކަމަށް ބޭނުންވާނެ އާލާތްތަކަކީ :

- * އޮފީސް ފަރުނީޗަރު
- * 3 އޮފީސް ސްޓާފް (މެނޭޖްމަންޓް)
- * 10 މަސައްކަތު މީހުން
- * 2 ޓްރަކު
- * 2 ޑްރައިވަރުން
- * 1 ކްރޭން އޮޕަރޭޓަރު

ކުނިކޮށިގައި ބޭނުންކުރާ އާލާތްތައްގެން އެތަކެތި ބޮޑެތިއުޅަނދުތަކާއި އަދި އެތަން ހިންގުމަށް ފައިސާ ހޯދާނީ ސަރުކާރުގެ އިޖުރާއަތުގެ ދަށުން، ވޯރލްޑްބޭންކާއި ކޮސްޓްގެ ތެރޭގައި ޝާމިލްވާނީ ސަރުކާރާ ރަށުގެ ރައްޔިތުންގެ އަތުން ނަގާ ކަލެކްޝަން ފީ އާއި ކޮމްޕޯސްޓް ވިއްކައިގެން ލިބޭ އާމްދަނީ އެވެ.

ވޭސްޓް މެނޭޖްމަންޓް ސެންޓަރެއް ގާއިމުކުރުމުން ހިންގުމުގެ ޒިންމާ ސަޕްލައިކުރާނީ ކޮމިޓީ ނުވަތަ ކައުންސިލްގެ ބެލުމުގެ ދަށުންނެވެ. އަދި ކޮމިޓީ އާއި ކައުންސިލުން މަހަކު އެއްފަހަރު އިންޖިނިއަރާ ސަޕްލަޔަރުންގެ އެއް ބައްދަލުވުން ބާއްވަންވާނެއެވެ.

ރަށު ފެންވަރުގައި ޙާސިލުކުރަން ބޭނުންވާ ލަނޑުދަނޑިތައް

- * ކުނި މުދުކުރުން
- * އަލުން ބޭނުންކުރުމާއި ރީސައިކަލް ކުރުން
- * ކުނިން ހަކަތަ އުފެއްދުން
- * ދެމެހެއްޓެނިވި ގޮތެއްގައި ރަށުގައި އުފެދޭ ކުނިބައި މެނޭޖްކުރެވޭނެ ފަދަ ނިޒާމެއް ޖަމާނީ މެޝިނަރީ އާއި އެކު އިކުއިޕްމަންޓް ބޭނުންކޮށްގެން ގާއިމު ކުރުން.

ހޭލުންތެރިކަން އިތުރުކުރުން

- * ކުނި ބެހެއްޓުން ވަކިކުރުމަށް ދަސްކޮށްދީ ހޭލުންތެރިކުރުމުގެ ޕްރޮގްރާމް ހިންގުން.
- * ކުނީގެ ތެރޭގައި ހިމެނޭ ރީޔޫސް ކުރުމުގެ އާދަ މުޖުތަމަޢުގައި އަށަގަންނުވުން.
- * ކުދި ސުކޫލްތަކާއި ވޯކްޝޮޕް ހިންގާ ، ލީފްލެޓް ބުރޯޝަރާއި ޕޯސްޓަރު ފަދަ ތަކެތި އާންމުންނާއި ހަމައަށް ފޯރުކޮށްދިނުން.

* ކުނި ބެލެހެއްޓުމުގެ ރަނގަޅު އާދަތަކަށް އެންމެން ވެސް އަމަލު ކުރުމަށް ރަށުފެންވަރުގައި އަމަލު ކުރުމަށް ބޭނުންވާ "ގަވާއިދުތަކަކީ" :

- * ސަރުކާރުން ޕްރިއޮރިޓީ ޕޮލިސީއެއް ގައިޑްލައިން އެކަން ޤާނޫނުގެ ތެރެއިން ހިންގުން.

* ކަނޑުތަށް ދިއުމުގެ ކަންތައްތަކުގެ ތަފްޞީލު ހުށަހަޅާ ދުވަހުގެ ކުރިން.

1. ތަކުލީފު ދޫކުރާ ކުންފުނީ ފަރާތުގެ ތަފްޞީލު ފުރިހަމަ ކުރަންވާ

2.1 ތަކުލީފު ދޫކުރާ ކުންފުނީ ގަވަރުމަންޓް	2.2 ކުންފުނީ ގަވަރުމަންޓް ދިނުމަށް ބެލެހެއްޓޭ ބައި (%)	2.3 ކުންފުނީ ދޫކުރާ ބައި (ގަވަރުމަންޓް ކުންފުނިއަށް ދޫކުރާ ބައި)	2.4 ފެނި ކުންފުނީ ކުންފުނީ ތަކުލީފު ދޫކުރާ ގަވަރުމަންޓް؟ (ގަވަރުމަންޓް ކުންފުނި ނަމާ ދެކޮޅަށް ބަލާ ފަރާތް)	2.5 ފެނި ކުންފުނީ ކުންފުނީ ތަކުލީފު ދޫކުރާ ގަވާއިދު	2.5 ފެނި ކުންފުނީ ކުންފުނީ ތަކުލީފު ދޫކުރާ ގަވާއިދުގެ ދަށުން ކަނޑައަޅާ ގޮތް
ގައުމަކުން ފެނުން	70%	ގަވަރުމަންޓް.	ބަލި ހަދަން ބޭނުންކުރާ ގައުމުގެ ގަވަރުމަންޓް.		ތަކުލީފު ދޫކުރާ ގޮތާ ގުޅޭ ގަވާއިދުގެ ދަށުން ކަނޑައަޅާ ގޮތް.
ދިވެހި ކުންފުނި ފެނުން	4%	ފުރަތަމަކުން.	ކުއްލި ފަރާތްވެގެންނެވެ.		ތަކުލީފު ދޫކުރާ ގޮތާ ގުޅޭ ގަވާއިދުގެ ދަށުން ކަނޑައަޅާ ގޮތް.
ދިވެހި ކުންފުނި ފެނުން	25%	ކުންފުނީ ގަވަރުމަންޓް ހިއްސާ ކުރާ ގޮތަށް.	ކުއްލި ފަރާތްވެގެންނެވެ.	ތަކުލީފު ދޫކުރާ ގޮތާ ގުޅޭ ގަވާއިދުގެ ދަށުން ކަނޑައަޅާ ގޮތް.	ތަކުލީފު ދޫކުރާ ގޮތާ ގުޅޭ ގަވާއިދުގެ ދަށުން ކަނޑައަޅާ ގޮތް.
ފަރާތްތަކުން ފެނުން	1%	ގަވަރުމަންޓް	ގަވަރުމަންޓް ދޫކުރާ ބައި ކުންފުނީ ގަވަރުމަންޓް ކުންފުނި ނަމާ ދެކޮޅަށް ބަލާ ފަރާތް.		ތަކުލީފު ދޫކުރާ ގަވާއިދު ފުރިހަމަ ކުރަންވާ ގޮތް.

			ކަމަށްވާނަމަ ކަނޑައެޅުން ކުރުމުގެ ކުރިން.		

ހިސާބުގައި

ދިވެހި ރާއްޖޭގެ ތަރުތީބުގެ ދަށުން ހިންގާ ތަކެއްޗާ ގުޅޭ ކަންކަން ހިނގާ ގޮތް ބަލައި ގެންދިއުމަށް ކަނޑައެޅިފައިވާ ބޯޑެއް ، ތަންކޮށްގެންވާ ގޮތަކަށް ހުންނަ ފަދަ ތަނެއްގައި ބާއްވަންވާ ކަމަށް ކަނޑައަޅަމެވެ.

Appendix 3 Terms of Reference issued by World Bank

ANNEX 1: TECHNICAL TOR A

ESMP or ESIA for the establishment or upgrading of IWRMC with Anaerobic Digestion (AD) Technology

Technical Terms of Reference A: ESMP for the establishment or upgrading of IWRMC with Anaerobic Digestion (AD) Technology

Objective and Scope of Preparation of ESMP or EISA

In order to ensure short and long term environmental and social impacts that would arise due to the proposed development are adequately mitigated and monitored, following the screening decision from EPA and the World Bank, an ESMP or an ESIA will need to be developed as per the scope presented below and in accordance with the ESAMF of the Project and the Environmental Impact Assessment Regulations (2012). The project IWMPs should be reviewed and used as the basis for baseline information. Field level verification should be conducted prior to the preparation of the ESMP or the ESIA.

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

Following should be the key components/assessment outline of the ESMP/ESIA:

1. **Executive Summary:** An executive summary of the significant findings of the report shall be prepared both in Dhivehi and English language. The executive summary shall include summaries of project description and how significant environmental and social issues will be resolved. The conclusion of the study must be stated.

2. **Introduction:** Briefly describe the major components of the proposed project. Provide a brief history and justification of the project and describe how the proposed development will improve on the current arrangements for waste management in the project area. Provide details of the proponent, and institutional arrangements for implementation and operations of the proposed development, and environmental and social issues of similar projects. Include desktop studies and review of similar ESMPs and ESIAs.

Major components of the Island Waste Management Regulation and the Island Waste Management Plan (IWMP) should be described (fee structure, consultations undertaken for plan preparation etc.), indicating the status of approval (prepared, under review or approved by EPA) and highlighting any

challenges faced by the council in plan preparation and approval (if any). The report also should indicate whether a study or public consultation has been (or should be) undertaken to assess willingness / ability to pay.

3. **Legislative and Regulatory Considerations:** This chapter should cover the legal aspects related to the project. Outline the project's consistency with the existing national, state, regional and local planning that apply to the project include reference to relevant statutory and non-statutory plans, planning policies, guidelines, strategies and agreements as appropriate. Outline the pertinent policies, regulations and standards governing project location, land use, environmental quality, and public health and safety. This should cover information on legal requirements specific to the project, such as permits to be taken under the Environmental Impact Regulations (2012) and the land allocation process followed with MLSA and other relevant institutions. There should be a brief description on the process (and law) pertaining to the allocation of land to development projects, in general, and to the IWRMC, in particular. Issues related to land acquisition and resettlement should be addressed, stating no impact or minimal impact.

If the gas generated from the AD plant is intended to be used to produce electricity using a bio-generator, approval from Maldives Energy Authority (MEA) should be acquired and included in the report.

4. **Study Area:** Submit an A3 scaled plan with indications of all the proposed land infrastructures. Specify the boundaries of the study area for the ESMP or the ESIA highlighting the location and size of the proposed construction. The study area should include nearby environmentally and socially sensitive areas (EPAs / ESAs, houses, mosques, schools, playgrounds etc.), nearest 3 phase distribution box, water connection point (if water network system is present at the island), sewer connection point (if sewer network system is present at the island). Justification for site selection shall be provided. Relevant developments in the area must also be addressed including residential areas and all economic ventures and cultural sites.

5. **Project Description:** Provide a full description and justification of relevant parts of the project, using maps at appropriate scale where necessary. The following should be provided including all inputs and outputs related to the proposed activities shall be justified.

<u>General Construction and Operations</u>

- Provide a clearly labelled concept design and scaled site plan of the project boundary. If the project involves upgrading of an existing IWRMC, the infrastructure already present and

those that will be introduced as part of the upgrading works should be clearly distinguished in the concept design presented.

- Submit a detailed description of the components of the project and how the project activities will be undertaken.
- Describe the construction phase components of the project including but not limited to site clearance, collection bay area, AD plant room, equipment room, groundwater well, toilet, septic tank, leachate collection tank, resting area and perimeter walls and fences. If the project involves upgrading of an existing IWRMC, provide information on the existing structures of the IWRMC and how these structures will be incorporated into the design for upgrading.
- If the project involves upgrading of an existing IWRMC, suggest ideal locations for temporarily relocating the waste currently present at the existing IWRMC (if any). Propose adequate mitigation measures to prepare the temporary storage site with particular emphasis given to leachate prevention.
- Describe the operational phase components of the project including but not limited to waste collection services, method of storing, AD plant operations, bio-generator operations (if applicable), leachate management, arrangements for the removal of inorganic waste from the IWRMC and clean-up of existing small open dump sites.
- Details, types and numbers of labor/workers required during construction/establishment and during operation
- Include a project schedule.
- A matrix of inputs and outputs related to the project activities shall be included and described separately for construction and operational phase.

<u>Design of AD plant and associated components</u>

- Concept design of the AD plant and process flow diagram with all its components including the proposed method for gas storage and its subsequent use (conversion to electricity).
- Description of the AD plant and associated bio-generator (if the intended use is for generating electricity for the energy requirements of the IWRMC). Details of the materials that will be used for the construction of the plant should be given (fiber reinforced plastic, stainless steel etc.)
- Corresponding sizes and daily processing capacities of the AD plant and the associated bio-genitor (if applicable) should be given.
- Type and amount of waste that it can treat (food waste, green waste, paper etc. in mixed form or separated) and details of any products required for activation (such as water and bacterial inoculum) including its corresponding quantities to operate for a period of 1 year.

- Type and quantity of gas generated (methane, CO2 etc.), method of gas collection and storage, process for conversion to electricity (or any other use) and how to deal with any excessive gas must be clearly mentioned.
- Solid and liquid bi-products and output of the process (wet / dry compost) including the method of their potential use and/or disposal.
- If a bio-generator is to be installed, the following should be addressed:
  - Noise ammunition measures
  - Cooling water system including cooling pipe location (if any) and justification.
  - Emergency power supply plan.
  - Lower energy consumption ventures and awareness.
  - Chimney height and justification on how the height was determined based on relevant local and international standards.

Fuel Management (if applicable – in case additional fuel is required to operate the bio-generator)

- Volume required for plant operation
- Rate of waste lube oil generation, its collection, storage and disposal.
- Fuel storage tank details (size, location, method of transportation from harbor to storage plant).
- Fuel transportation, pipeline drawing and specification especially leakage proofing.
- Measures of fuel containment
- Method of fuel transport from harbor to storage
- Fuel handling and management plan during operations
- Mitigation in case of fuel spillage

Fire hazard, health and safety

- Vulnerability analysis of the system to fire, electrical and explosion hazard.
- Provision to fire safety, including details of firefighting equipment that will be established, signage, alarm system etc.
- Firefighting capacity of IWRMC operators. If not found to be adequate, recommend a fire safety training program to the IWRMC operators which should be completed prior to operationalization of the center. Indicate the availability of fire wardens in the island and their capability to assist in such a program.

Construction waste and waste oil

- Waste fuel and oil management details.
- Construction waste management and disposal.

6. **Existing Environment:** The existing environment study will require data collection and survey analysis techniques given the nature of the project and the proposed technology. A vegetation survey of the site must be presented since a large number of vegetation are subject for clearance. The vegetation analysis should be supplemented by drone imagery and / or photographs. The following information should also be provided based on field observations and consultations with the island council and the community. Photographic evidence should be provided where appropriate.

a) Current Waste Management Practices: Describe how waste is managed at present. This should include information about waste collection method and times, means of disposal (both organic and inorganic), staffs managing waste etc. Information about existing open dump sites (if any) and method of disposal should also be provided. Provide a map indicating the locations and dimensions of the open dump sites. Describe the waste composition and estimated volumes of each open dump site with photographic references.

b) Unassigned Waste Dumping: Describe the overall cleanliness of the island and whether unassigned waste dumping is observed. This should include an assessment of the status of contamination of the site as well via visual observation.

c) Project Site and Access Road: Describe the condition of the ground and soil of the project site (visual analysis). Provide an estimate of the amount and composition of waste present at the existing IWRMC and existing environments of temporary relocation sites (only applicable if an upgrading project). Provide information related to distances between residential areas, commonly used public places (mosques, schools, parks etc.), nearest 3 phase electricity distribution box, water connection point (if water network system is present at the island), groundwater wells and sewer connection point (if sewer network system is present at the island). Additionally, information related to the access road and route to waste unloading area shall be provided.

d) Land ownership and usage: Describe the legal boundaries of the site, and identified current usage of the land in terms of squatters, land encroachments, fixed and movable structures, trees and wells, etc. Describe land allocation/ownership details of the project area and any need for land taking causing resettlement impacts.

e) Coastal Modification / Erosion: Provide information related to any coastal modifications undertaken in the island in recent history and the side of the island subjected to coastal

erosion. Indicate whether any coastal erosion is noticed from the shoreline closest to the proposed development.

f) Vegetation present at the site: Describe the number and type of vegetation present at the project site and access road including scientific and local names. The amount of vegetation that require compensation and estimated cost must be indicated (separate for project site and access road, as the proponent of the access road is the island council). An explanation on how the rate of compensation is set by the Council and the process undertaken for the payment of compensation for loss of coconut palms and other trees should be given. Vegetation cover maps shall be included where appropriate (identifying the areas subjected for vegetation removal and translocation). Emphasis must be given to translocate trees (within the source islands or out of the island in instances where space scarcity is an issue) as much as possible. Methods of vegetation removal and translocation must be described, which should yield the preferred method for the project site and access road. Locations for compensatory 2:1 replantation must be identified and indicated on a map. *(Note: If development of an access road is found to be an associated project to which the island council will be the proponent, commitment letter from the island council stating their full responsibility to implement mitigation measures and assume monitoring responsibilities for the associated project must be included in the ESMP or ESIA).*

g) Groundwater Quality: Temperature, pH, conductivity, total dissolved solid (TDS), Nitrate and total petroleum hydrocarbon (from the proposed location of AD plant).

h) Air Quality: Particulate matter (PM10 and PM2.5), carbon monoxide (CO), nitrogen oxide (NO) and Sulphur dioxide (SO2).

i) Noise: outside within 1m radius and within the nearest residential area.

j) Protected Areas and Environmentally Sensitive Sites: Provide information on the environmentally protected and sensitive areas that exists close to the proposed development. Indicate distances from the project sites and if the protected area is in the project impact zone and if there are any observed potential impacts. Proximity of the site to surface water bodies or sensitive habitats (e.g. coats, mangroves, wetlands) should also be identified.

k) Areas of Historic and Cultural Significance: Provide information on areas of historic and cultural significance that exist close to the proposed development. Indicate distance from the selected project site.

l) Socio-Economic Environment: Describe the socio-economic environment of the island.

- Demography: total population segregated by gender, density, growth and pressure on land and marine resources.
- Details of vulnerable/marginalized groups (households headed by females, households' special needs, households below poverty line etc.) and community-based organizations (i.e. women's/youth groups etc.) & their activities.
- Economic activities and livelihood patterns: Major economic activities of the community including but not limited to local tourisms (no. of operational guesthouses), businesses (no. of wholesale and retail shops), cafés / restaurants, fishing vessels etc.
- Status of access to market, health facilities, banking, communication, etc.
- Electricity: Describe how electricity is provided at the islands and the capacity of the generators installed.
- Water Resources and Sewerage: Source of portable and non-portable water supply. If through RO indicate the type and capacity of the plant and water storage tanks. Describe how sewerage is treated at the island (i.e. through septic tanks or sewer network system).

7. **Impact Identification:** The ESMP or EISA should identify all the impacts, direct and indirect, during and after construction, as well as for the operations of the IWRMC and evaluate the magnitude and significance of each. Particular attention shall be given to impacts associated with the following:

a) Physical / Chemical: describe impacts on groundwater, soil, noise, air and waste.

- Impacts on noise pollution and disturbances (both in construction and operations)
- Impacts on groundwater table and quality due to construction, operations (leachate / stormwater runoff) and accidental fuel spillage (if fuel tanks are included within project scope).
- Impacts on ground vibrations to nearby houses and buildings.
- Impacts on air quality.
- Marine water pollution due to spillage during material transfer.

b) Biological: describe impacts on vegetation and fauna.

- Impact due to vegetation removal.
- Impacts to vegetation and fauna due to improper handling and driving during material transportation.
- Impacts due to material spillage during transfer of construction materials to the project island.

c) Any resettlement impact - such as loss of land, livelihoods, assets etc. due to land taking/acquisition and/or other project interventions.
   - Verify the legal status of the land required; document existing structures, land plots, and other physical assets at the project site to establish a cut-off date for entitlements in accordance with the policies given in ESMF.
   - Identify the persons and their families likely to be affected by the project including those who are vulnerable. This should cover information pertaining to members of families who are residing, practicing any trade, occupation or vocation in the project affected area, including those who may potentially lose income due to loss of coconut palms having a moderate economic value.
   - Project Affected Families are those who are likely to lose their house, homestead, commercial establishment, agricultural land, employment or are alienated wholly or substantially from the main source of their trade, occupation or vocation, or who will lose any other immovable property or their source of livelihood. Including people losing access to private property or common property resources.

d) Sociological / Cultural: describe impacts of road closure, nearby sensitive areas (mosques, schools etc.), health and safety of surrounding community / contracted labor and sociocultural conflict.

   - Sociocultural conflict due to arrival of expatriate workers and recruitment of expatriate IWRMC operators.
   - Impacts due to illegal immigrants being potentially recruited by the contractor.
   - Contractors code of conduct and communication.
   - Loss of source of sand for local public use due to sand mining from the area of the lagoon permitted for local public sand mining (which is prohibited under law).
   - Health and safety of the construction workers and the IWRMC operators.
   - COVID19 restrictions and special considerations for the contractor (potential mitigation measures may include daily temperature checks, cleaning procedures, shift roaster, arrangement for social distancing in labor camps, establishment of handwashing facilities at work site and labor camp etc.).
   - Fire hazard due to improper handling of fuel (if fuel storage is included with the project scope) and waste.

e) Economic / Enhancement Plans: describe any potential benefits or losses to the economy.

- Employment opportunities.
- Impacts to the local economy due to purchasing of locally available construction materials.
- Impacts to the public due to high user fees.
- Cost saving in IWRMC operations due to electricity being generated from waste.
- Some of these opportunities can be further developed to draw environmental and social benefits to the local area. The ESMP should identify such opportunities and develop a plan to systematically harness any such benefit

f) Specific Impacts Associated with the Proposed Technology: The Consultant should assess the following aspects in line with the proposed technology.

- **Odor Management:** Assess if the technology has an inbuilt odor management system and managed odors automatically.
- **Fluid and Discharges:** Will there be any fluid discharges from the proposed technology, will the machines require any extra piping space or water discharge systems or expansion of the existing leachate management system provided via the design, the consultants should propose suitable design requirements if so in the ESMP.
- **Waste Inputs:** Assess if the technology requires additional segregation of pre management of the incoming organic waste. Indicate specifically under the section on operational aspects of the ESMP what steps need to be taken specifically by the IWRMC operators in handling in coming waste to ensure it can be efficiently used in line with the proposed technology.
- **Energy Requirements and Efficiency:** The energy requirement to run the machinery and the status of energy efficiency of the machinery proposed should be assessed, i.e. the consultants should assess the energy requirements for operating the technology and propose the most efficient means of managing. Can a connection be made to the existing Island Grid, if so, will the capacity suffice, can a solar and battery generator be used as an energy source and if diesel generators are to be used which is the least alternative, the amount of fuel required etc. should be asses as part of the project alternatives analysis. For all energy sources impacts in terms of emissions, noise, safety risks etc. should be assessed and mitigatory measures suggested in the ESMP accordingly.
- **Sludge and Residuals:** The nature and amount of all residual material produced, solid and liquid should be assessed and recommend means by which it can be re-

used and/or managed in the ESMP. If reuse is recommended the consultant should also recommend the requirements for routine monitoring of quality of the digestate and liquid residue for instance if it is recommended to be used in agricultural processes.

- **Safety features on the machinery:** such as presence of emergency stop buttons, emergency lights and/or alarms for emergency use are equipped to ensure the best level of safety should be present and the consultants should assess if the proposed technology, especially machinery include these in addition to proposing other safety features in the ESMP.

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

8. **Project Alternatives:** Describe alternatives including the "no project option" should be presented. Alternative examined for the project should include alternative locations, design and technology options, and alternative energy sources which shall be evaluated in environmental, social and economic terms. Alternative technology options for the treatment of organic waste may include manual composting and the use of compost machines. Depending on the source of energy proposed to operate the IWRMC, alternative energy sources evaluated shall include connection from existing power grid, solar, battery and diesel generators. For all energy sources impacts in terms of emissions, noise, safety risks etc. should be assessed and mitigatory measures suggested accordingly. All alternatives must be compared according to commonly accepted standards and norms and international standards as much as possible. The comparison should yield the preferred alternative for implementation. Mitigation options shall be specified for each component of the proposed project.

9. **Mitigation and management of negative impacts:** Identify possible measures to prevent or reduce significant negative impacts to acceptable levels. These will include both environmental and socio-economic mitigation measures. Mitigation measures to avoid or compensate habitat destruction caused by land clearance will have to be considered. Mitigation measures should be provided for COVID19 related aspects such as daily temperature checks, cleaning procedures, shift roaster, arrangement for social distancing in labor camps, establishment of handwashing facilities at work site and labor camp etc. Measures for both construction and operation phase shall be identified. Cost the mitigation measures, equipment and resources required to implement those

measures. The confirmation of commitment of the developer to implement the proposed mitigation measures shall also be included. An Environmental and Social Management Plan (ESMP) for the proposed project, identifying responsible persons, their duties and commitments shall also be given. The environmental and social management plan should be presented in matrix format, clearly indicting the responsible person, cost, equipment and resources required for each proposed action. In cases where impacts are unavoidable arrangements to compensate for the environmental and / or social effect shall be given.

On islands where large volumes of residual legacy waste are identified at the IWRMC site, the consultant will present a recommended course of action for island clean up, need for waste segregation and management options, including onsite and offsite, resource recovery, recycling and/or final disposal in the form of mitigatory actions defined for the context of each Island.

Mitigation measures should be presented as a matrix consistent to the format provided below.

Project Activity	**Potential Environmental Impacts**	**Proposed Mitigation Measures**	**Institutional Responsibilities** (Implementation and Supervision)	**Estimated Quantities Required and Material Specifications Recommended**	**Cost Estimates**	**Comments** (e.g. secondary impacts**)**
Detailed design and planning Phase						
Pre-Construction Phase -Site Preparation						
Construction Phase						
Operation and Maintenance Phase						

The proposed ESMP matrix shall be translated to Dhivehi language and provided as an Annex to the report.

10. **Development of monitoring and reporting plan:**

10.1. Monitoring Program: Identify the critical issues requiring monitoring to ensure compliance to mitigation measures and present impact management and monitoring plan for vegetation clearance, soil, groundwater, noise and air quality, spillage assessment and grievance redress mechanism. Detail of the monitoring program including the physical and biological parameters for monitoring, cost commitment from responsible person to conduct monitoring in the form of a commitment letter, detailed reporting scheduling, costs and methods of undertaking the monitoring program must be provided.

The monitoring program should give details of the following;

- Monitoring indicators to be measured for evaluating the performance of each mitigatory measure (for example national standards, engineering structures, extent of area replanted, etc.).
- Monitoring mechanisms and methodologies
- Monitoring frequency
- Monitoring locations
- Cost of monitoring
- Responsible party

The recommended format for presenting the monitoring program is given below.

Proposed Mitigation Measure	**Parameters to be monitored**	**Location**	**Measurements** (Incl. methods & equipment)	**Frequency of Measurement**	**Responsibilities** (Incl. review and reporting)	**Cost** (equipment & Individuals)
Detailed design and planning Phase						
Pre-Construction Phase						
Construction Phase						
Operation and Maintenance Phase						

10.2. Reporting Procedures and Implementation Schedule: The consultant should propose adequate reporting mechanisms with frequencies for the implementation of the ESMP and the proposed monitoring program.

10.3. Cost Estimates and Sources of Funds: Implementation of mitigatory measures mentioned in the ESMP will involve an initial investment cost as well as recurrent costs. The ESMP should include costs estimates for each measure and also identify sources of funding, which is to be covered under section 9. In addition to this, estimated costs shall be provided (separate for construction and operational phase activities) for specific items and materials that the contractor and the operators would require to implement the ESMP effectively. Such items may include the cost of purchasing PPEs, fire extinguisher, signages, trainings etc. This would essentially enable the contractor to reflect accurate costs in the bid documents. Potential sources of funding for the operational phase should be reflected.

10.4. Contract Clauses: This is an important section of the ESMP that would ensure recommendations carried in the ESMP will be translated into action on the ground. Contract documents will need to be incorporated with clauses directly linked to the implementation of mitigatory measures. Mechanisms such as linking the payment schedules to implementation of the said clauses could be explored and implemented, as appropriate.

11. Management of Other On- or Off-Site Environmental Pollution Control and Infrastructure

This section should address management of critical elements of pollution control and infrastructure that are not otherwise included in the mitigation plan because they were considered an essential part of the proposed project.

12. Summary of all Training Recommendations

This section should include programs targeted to increase the capacity of the contractor and the operator in the implementation of the ESMP. A capacity needs assessment for the operations of the IWRMC should be undertaken, highlighting gaps and training recommendations for a fully functional system. Special consideration must be given to cover operational training requirements of the proposed AD plant and associated bio-generator (if included with the project scope).

The training recommendations are likely to include the following:

- Strengthening the capacity of the contractor on ESMP implementation and reporting.
- Strengthening PMU's capacity on compliance monitoring.
- General awareness on health and safety.
- Contractor's code of conduct.
- Community Mobilization: Based on the assessment, the consultant should describe key messages for communication/awareness and recommend methods/tools. Also, recommend approaches to mobilize communities, enhance community participation (including that of women's groups) and create ownership/interest around waste management.
- Operation and Maintenance training of the AD plant and bio-generator.
- Fuel handling (if applicable).
- Fire safety training and fire drills.

Institutional Strengthening Activity	Position(s)	Scheduling	Responsibility(is)	Cost Estimates	

Training Activity	Participants	Types of Training	Content (modules, Etc.)	Scheduling	Cost Estimates

13. **Contingency Plans**

Contingency plans shall be prepared and described to address: a) failure to meet specific performance criteria established by law or necessary for the project to meet its commitments in the ESMP and b) respond to natural and other risks previously identified and mitigated in the ESMP in the event reasonable and feasible mitigation measures to address the risks are inadequate.

- Performance-related Contingency Plans, indicating the steps that will be taken should monitoring indicate that:
  - Environmental standards are not being met
  - Impacts are greater than predicted
  - Mitigation measures and/or rehabilitation are not performing as predicted
- Natural Disaster Risk Response Plan (assumes that risk identification and risk reduction have been addressed in other parts of the EA)
- Other Risks Response Plans (assumes that risk identification and risk reduction have been addressed in other parts of the EA)
- Contingency plans for maintaining service or reducing downtime in the event of accidents or natural catastrophes that disrupt project operation

14. **Grievance Redress Mechanism (GRM):** Describe the proposed grievance redress mechanism of the project developed by the PMU and offer suggested improvements including naming the responsible person in each tier.

15. **Stakeholder consultation:** Identify appropriate mechanisms for providing information on the development project and the GRM to relevant stakeholders. Consultations must be undertaken with all key stakeholders – including communities, government officials etc. During consultations the project activities should be introduced, and stakeholders given opportunity to ask questions/clarifications, raise their objections/concerns and the consultant should provide relevant feedback – this discussion should be documented in the form of a table noting the points discussed/issues raised and feedback provided. The report shall include a brief description of the Council's plan for GRM execution at tier 1. The report should include a list of people/groups consulted, their contact details and summary of the major outcomes. The following people or institutions should be consulted.

- Island Council (on GRM, Island Waste Management Plan, fee collection system, plan for 2:1 replantation, and the overall project in general)
- EPA (on the overall design of the IWRMC, AD component and operation licensing requirements).
- Maldives Energy Authority (on the operations and the bio generator to produce electricity for the IWRMC operations).
- FENAKA (on the capacity of the island power plant to cater for the energy requirements of the IWRMC).
- Health Protection Agency (on COVID19 health and safety requirements).
- Ministry of Planning and Infrastructure and Maldives Land and Survey Authority (regarding land use plan).
- Maldives National Defense Force (on handling of fuel, fire safety and willingness to assist in training the IWRMC operators on firefighting).
- Waste Management Committee (on their role of waste management at the island).
- Women's Development Committee (on their involvement and perspectives on how waste management can be improved in the Island)
- Community Consultation or Household Survey (randomly selected with emphasis given to those residing at a close proximity to the project site: on the adequacy of the proposed site, feasibility of overall design of the IWRMC and the proposed technology, health and safety considerations, proposed fee collection structure, willingness to pay and waste management plan of the council).
- Ministry of Environment / MCEP (on the overall project as the proponent and GRM at tier 2)

The consultant should take into consideration COVID19 safety measure during consultations, follow WHO/WB & GoM guidelines when conducting consultations and explore remote/online options when conducting consultation.

16. **Gender Empowerment / Preparation of Gender Action Plan**

The consultants will carry out Gender analysis as an integral part of the social assessment. The project designs should be gender responsive based on the gender analysis. The findings and recommendations from the gender analysis during project planning and feedback from beneficiaries during implementation must be discussed thoroughly to determine the need for further action. Listed below are the key action points:

- Identify key gender and women's participation issues.
- Conduct gender analysis as part of overall Social Assessment.

- Examine gender differences in knowledge, attitudes, practices, roles, status, wellbeing, constraints, needs, and priorities, and the factors that affect those differences.
- Assess men's and women's capacity to participate and the factors affecting that capacity.
- Assess the potential gender-differentiated impact of the project and options to maximize benefits and minimize adverse effects.
- Identify government agencies and nongovernmental organizations (NGOs), community-based organizations (CBOs), and women's groups that can be used during project implementation and assess their capacity. The possibility of utilizing such ground to execute 2:1 replantation and if so the requirement to provided financial assistance with estimates must be provided.
- List out major gender actions.
- Develop gender-disaggregated indicators and monitoring plan.

17. **Validation and Disclosure**

The draft executive summary and the ESMP (matrix table in mitigation chapter) in local language should be disclosed in all major affected settlements and at island level in printed format and disseminated as appropriate or made available via online means for public commenting. This should be completed prior to or at the time of submitting the report to the EPA and the World Bank for clearance, so the period for public commenting can be sequenced in parallel to the review process. The consultant will assist the project in disclosure documents in all major affected settlements and at island and national level. The final cleared version of the report will be disclosed in major project websites and social media platforms with a summary of major findings through the disclosure process reflected as an annex.

18. **Conclusion**

This section shall specify the environmental acceptability of the project, taking into account the impacts and measures identified during the assessment process. It shall also identify any other conditions or external requirements for ensuring the success of the project.

Presentation- The ESMP or ESIA report, to be presented in digital format, will be concise and focus on significant environmental issues. It will contain the findings, conclusions and recommended actions supported by summaries of the data collected and citations for any references used in interpreting those data. The ESMP or EISA report will be organized according to the final TOR, in accordance to, but not necessarily limited by, the outline the Environmental Impact Assessment Regulations (2012) and the ESAMF. The report shall include Dhivehi translations of the executive summary and the ESMP matrix. All raw data collected, including maps and surveys should be submitted in Raw form to the client in digital format.

Appendix 4 Approval letter from MLSA

Maldives Land and Survey Authority
Ministry of Housing and Infrastructure
Male', Republic of Maldives.

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ތިޔަ އިދާރާގެ ނަންބަރު:401-MU/240/2017/12 (01 ފެބްރުއަރީ 2017) ސިޓީއާއި ހަވާލާދީ ދަންނަވަމެވެ.

ލ. ފޮނަދޫގައި ކުނި މެނޭޖްކުރާ ސެންޓަރ ޤާއިމްކުރުމަށް ކަނޑައަޅާފައިވާ ބިމަކީ، ރަށުގެ ހުޅަނގު-ދެކުނުން ސަރަހައްދުން ޓުއަރިޒަމްގެ ބޭނުމަށް ކަނޑައަޅާފައިވާ ބިމާއި ކައިރި ސަރަހައްދެއްކަން ފާހަގަކުރަމެވެ. އެހެންކަމުން މިހާރުހުރި ކުނިކޮށީގެ އިރު-އުތުރު ފަރާތުން ކުނިކޮށިއެޅުމަށް ބޭނުންވާ 1000 އަކަފޫޓުގެ ބިން ކަނޑައެޅުއްވުން އެދެމެވެ.

އަދި މިސިޓީއާއެކު، އީޕީއޭގެ ފޯމު "[illegible] [illegible] ސަރަހައްދުތައް [illegible] [illegible] [illegible] ކުރުމުގެ ބޭނުންކުރާ ފޯމު" ފޮނުވީ ވާހަކަ ދަންނަވަމެވެ.

އިޙްތިރާމް ފޯރުކޮށްދެމުން އުޅެމެވެ.

16 ރަޖަބު 1438
13 އޭޕްރީލް 2017

ޚާދިމުކުމް

އަހުމަދު އާސިފް
ކޯޑިނޭޓަރ

ހައްދުންމަތީ ފޮނަދޫ ކައުންސިލްގެ އިދާރާ
ލ. ފޮނަދޫ، ދިވެހިރާއްޖެ.
ކޮޕީ: ހައްދުންމަތީ އަތޮޅު ކައުންސިލްގެ އިދާރާ

ތިލުގެ ތަފާސްކަރ

ތަކުރީފް ނަންބަރ: 26

ތިމަން ތެރިވަމުންދާ ސިޓީ ނަންބަރ : _

ތިއުޅަނީ ކުންފުނީ : ކުންނަކަށް ދާ ދަތުރުތަކަށް

ތިއުޅަނީ ތަން : ދ.ކުޑަދޫ

ތިލުގެ ބާވަތް : ތާއިރު145، ފާނުން70، ތެލް268، ހުރަސް300
(36000 ލަނޑުން)

ތިސް ކަންކަން ކުރުމަށް : ކަނޑުމަގުތަކުގައި ކުޑަދޫ ކައުންސިލްގެ ތިއުޅަނީ ތަކެއް

ތިސް ކަންކަން ފެށުނު : 30 ނޮވެމްބަރ 2006

ތިސް ކަންކަން ނިމޭނެ: 10 ޑިސެމްބަރ 2016

ތިލުގެ ތަފާސްކަރ

ދިގުކަމަށް ތަ.ކުޑަދޫ ކައުންސިލްގެ ކައުންސިލަރ ތ.ކުޑަދޫ ތ.ކުޑަދޫ
ކައުންސިލްގެ ތިލުގެ ކަންކަން ފާހަގަކުރުމަށް ކުރިން ތިލުގެ ތަފާސްކަރ 401-E/2016/01 (10 ޑިސެމްބަރ 2016) ދ.ކުޑަދޫ
ކައުންސިލްގެ ތަކުރީފް ކުރިއަށް ގެންދާ ތިލުގެ ކަންކަން ފާހަގަކުރުމަށް 30 ނޮވެމްބަރ 2006 ގައި ފެށުނު. ތިލުގެ
ކަންކަން 36000 ލަނޑުގެ. ދިވެހި ރިޔާލްގެ ތަކުރީފުގައި ތަކުރީފް ދީ ހުއްޓާލަނީ.

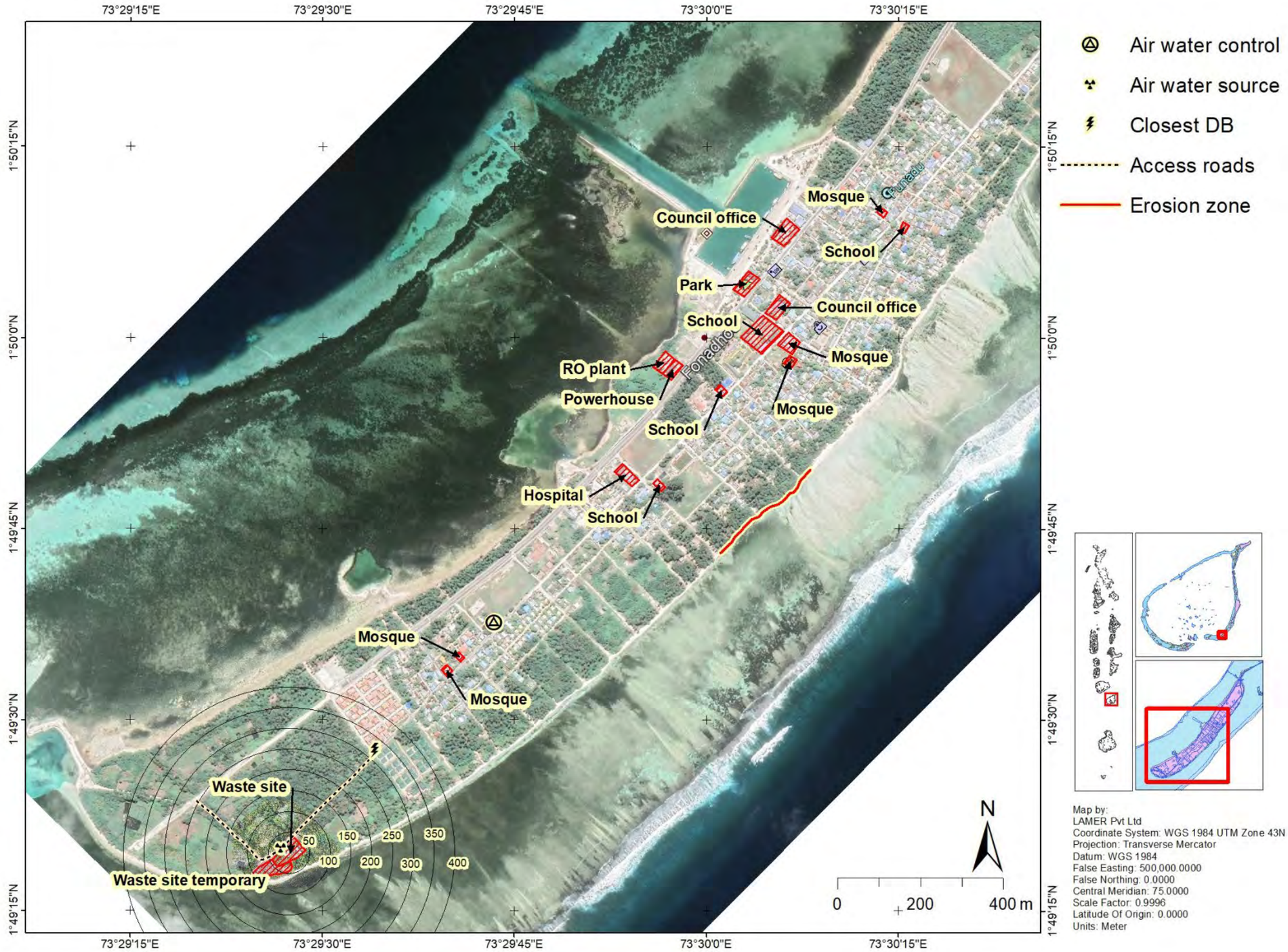
ދިވެހި ރާއްޖޭގެ ތަންތަނުގެ ކަނޑުކަނޑި ތަކެއް ތިއްބާ ތަންތަނުގެ ތަރައްގީ ތިލުގެ،
ފުންނާނެ ތިލުގެ، ތިލުގެ ތަކެއް ކުރުމަށް ކުރިއަށް ގެންދާ ތިލުގެ ކަންކަން ތަކެއް ތ.ކުޑަދޫ ތ.ކުޑަދޫ.

21 ރަމަޟާން 1439
05 ޖޫން 2018

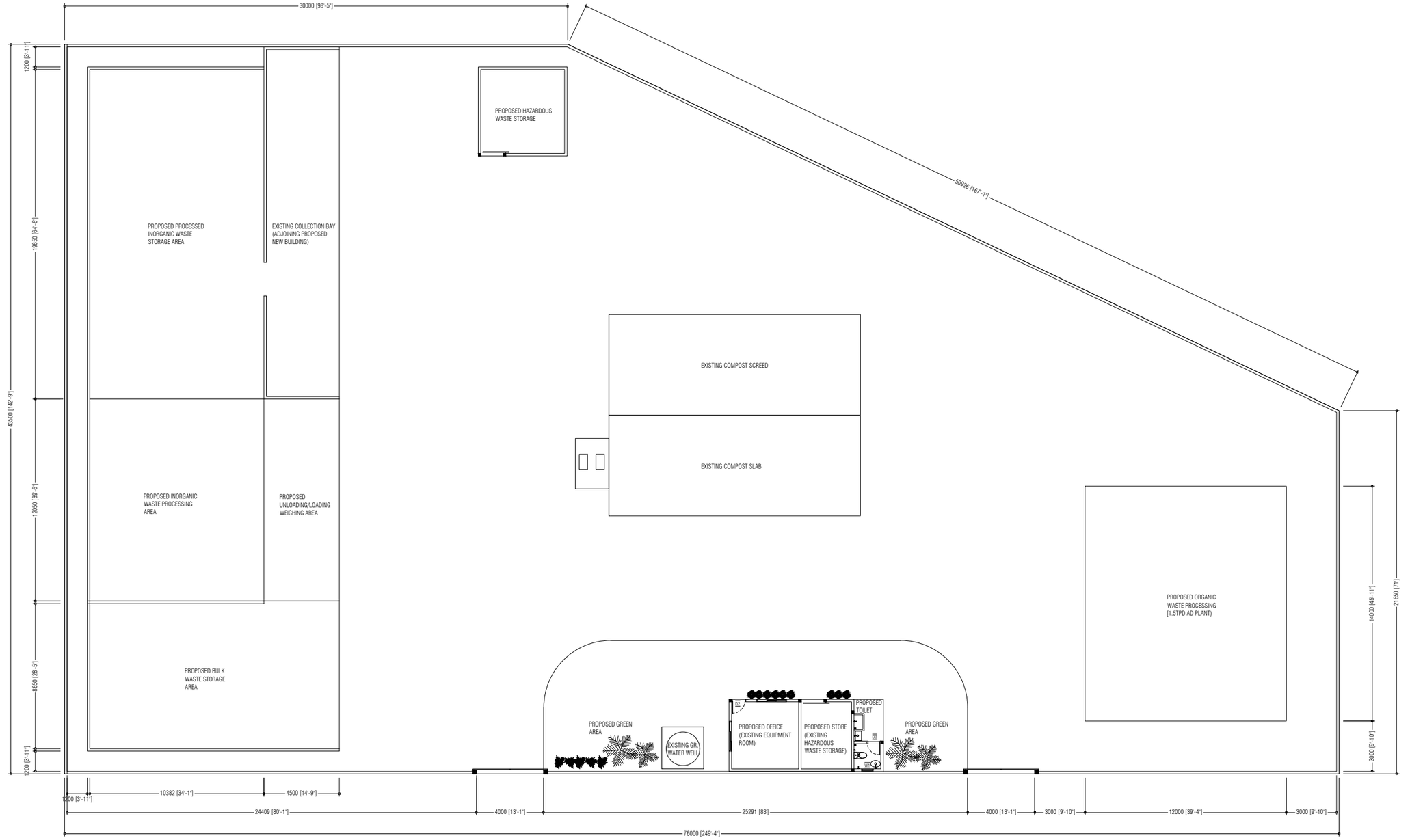
ދ.ކ ތ.ކ

ކައުންސިލްގެ ކަތިބ ކަ.ކ

Appendix 5 Map of study area


73°29'15"E
73°29'30"E
73°29'45"E
73°30'0"E
73°30'15"E
1°50'15"N
1°50'0"N
1°49'45"N
1°49'30"N
1°49'15"N
Air water control
Air water source
Closest DB
Access roads
Erosion zone
Mosque
Council office
School
Park
Council office
School
Mosque
RO plant
Powerhouse
Mosque
School
Hospital
School
Mosque
Mosque
Waste site
Waste site temporary
50
100
150
200
250
300
350
400
Fonadhoo
Gunadu
N
0
200
400 m
Map by:
LAMER Pvt Ltd
Coordinate System: WGS 1984 UTM Zone 43N
Projection: Transverse Mercator
Datum: WGS 1984
False Easting: 500,000.0000
False Northing: 0.0000
Central Meridian: 75.0000
Scale Factor: 0.9996
Latitude Of Origin: 0.0000
Units: Meter

Appendix 6 Site plan



PREPARED BY	PROJECT	DESIGN BY	AMENDMENTS
MCEP MINISTRY OF ENVIRONMENT GREEN BUILDING, HANDHUVAREE HIGUN, MAAFANNU, MALE' (20392), REPUBLIC OF MALDIVES, TEL: +960-3018431, +960-3018300, FAX: +960-328301	UPGRADING OF ISLAND WASTE MANAGEMENT CENTRE L.FONADHOO	AFRAZ	
	TITLE FLOOR PLAN	STRUCTURE BY AFRAZ	
	CLIENT DEPARTMENT WMPC DEPARTMENT	DRAWN BY AFRAZ	
	PAPER SIZE A3 PAGE NO. 02	SCALE 1:250 DWG NO. FONA-A1-02 DATE 23.12.2020	

Appendix 7 Water test results reports from MWSC

Male' Water & Sewerage Company Pvt Ltd
Water Quality Assurance Laboratory
Quality Assurance Building, 1st Floor, Male' Hingun, Vilimale', Male' City, Maldives
Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv

LB-TEST-090

WATER QUALITY TEST REPORT

Report No: 500185946

Customer Information:
Land & Marine Environment Resources
H.Azum
Ameeneemagu
Male' MALE

Report date: **24/01/2021**
Test Requisition Form No: **900191048**
Sample(s) Recieved Date: **19/01/2021**
Date of Analysis: **19/01/2021 - 19/01/2021**

Sample Description ~	Nilandhoo Control	Nilandhoo Site	Fonadhoo Site	**TEST METHOD**	**UNIT**
Sample Type ~	Ground Water	Ground Water	Ground Water		
Sample No	83216050	83216051	83216052		
Sampled Date ~	11/01/2021 09:00	11/01/2021 09:00	16/01/2021 09:00		
PARAMETER	**ANALYSIS RESULT**				
Physical Appearance	Clear with particles	Clear with particles	Clear with particles		
Conductivity *	653	780	850	Method 2510 B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	µS/cm
pH *	7.42	7.23	7.43	Method 4500-H+ B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	-
Temperature	24.3	24.4	24.5	Electrometry	°C
Total Dissolved Solids	326	390	425	Electrometry	mg/L
Nitrate *	1.4	0.5	2.7	HACH Method 8171	mg/L
Total Petroleum Hydrocarbon (TPH)	<0.036 (LoQ 0.036 mg/L)	0.042	<0.036 (LoQ 0.036 mg/L)	UV Fluorescence	mg/L

Keys: µS/cm : Micro Seimen per Centimeter, **°C** : Degree Celcius, **mg/L** : Milligram Per Liter

Checked by

Aminath Sofa
Laboratory Executive

Approved by

Mohamed Eyman
Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory
This report shall not be reproduced except in full, without written approval of MWSC
This test report is ONLY FOR THE SAMPLES TESTED.
~ Information provided by the customer
*Parameters accredited by EIAC under ISO/IEC 17025:2017

Male' Water & Sewerage Company Pvt Ltd
Water Quality Assurance Laboratory
Quality Assurance Building, 1st Floor, Male' Hingun, Vilimale', Male' City, Maldives
Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv

LB-TEST-090

WATER QUALITY TEST REPORT

Report No: 500185946

Customer Information:
Land & Marine Environment Resources
H.Azum
Ameeneemagu
Male' MALE

Report date: **24/01/2021**
Test Requisition Form No: **900191048**
Sample(s) Recieved Date: **19/01/2021**
Date of Analysis: **19/01/2021 - 19/01/2021**

Sample Description ~	Fonadhoo Control	Muli Site	Muli Control	**TEST METHOD**	**UNIT**
Sample Type ~	Ground Water	Ground Water	Ground Water		
Sample No	83216053	83216054	83216055		
Sampled Date ~	16/01/2021 03:00	14/01/2021 09:00	14/01/2021 03:00		
PARAMETER	**ANALYSIS RESULT**				
Physical Appearance	Clear with particles	Cloudy with particles	Clear with particles		
Conductivity *	901	973	481	Method 2510 B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	µS/cm
pH *	7.59	7.00	7.93	Method 4500-H+ B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	-
Temperature	24.5	24.5	24.6	Electrometry	°C
Total Dissolved Solids	451	487	241	Electrometry	mg/L
Nitrate *	0.6	0.8	0.8	HACH Method 8171	mg/L
Total Petroleum Hydrocarbon (TPH)	<0.036 (LoQ 0.036 mg/L)	0.038	<0.036 (LoQ 0.036 mg/L)	UV Fluorescence	mg/L

Keys: µS/cm : Micro Seimen per Centimeter, **°C** : Degree Celcius, **mg/L** : Milligram Per Liter

Checked by

Aminath Sofa
Laboratory Executive

Approved by

Mohamed Eyman
Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory
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This test report is ONLY FOR THE SAMPLES TESTED.
~ Information provided by the customer
*Parameters accredited by EIAC under ISO/IEC 17025:2017

********** END OF REPORT **********

Male' Water & Sewerage Company Pvt Ltd
Water Quality Assurance Laboratory
Quality Assurance Building, 1st Floor, Male' Hingun, Vilimale', Male' City, Maldives
Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv

LB-TEST-090

WATER QUALITY TEST REPORT

Report No: 500185945

Customer Information:
Land & Marine Environment Resources
H.Azum
Ameeneemagu
Male' MALE

Report date: **24/01/2021**
Test Requisition Form No: **900191049**
Sample(s) Recieved Date: **19/01/2021**
Date of Analysis: **19/01/2021 - 19/01/2021**

Sample Description ~	Gan Site	Gan Control	Kudahuvadhoo Control	**TEST METHOD**	**UNIT**
Sample Type ~	Ground Water	Ground Water	Ground Water		
Sample No	83216056	83216057	83216058		
Sampled Date ~	17/01/2021 09:00	17/01/2021 09:00	17/01/2021 09:00		
PARAMETER	**ANALYSIS RESULT**				
Physical Appearance	Pale yellow with particles	Clear with particles	Clear with particles		
Conductivity *	984	751	395	Method 2510 B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	µS/cm
pH *	7.40	7.56	7.57	Method 4500-H+ B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	-
Temperature	24.1	24.4	24.5	Electrometry	°C
Total Dissolved Solids	492	375	197	Electrometry	mg/L
Nitrate *	0.6	1.4	0.4	HACH Method 8171	mg/L
Total Petroleum Hydrocarbon (TPH)	<0.036 (LoQ 0.036 mg/L)	<0.036 (LoQ 0.036 mg/L)	<0.036 (LoQ 0.036 mg/L)	UV Fluorescence	mg/L

Keys: µS/cm : Micro Seimen per Centimeter, **°C** : Degree Celcius, **mg/L** : Milligram Per Liter

Checked by

Aminath Sofa
Laboratory Executive

Approved by

Mohamed Eyman
Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory
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This test report is ONLY FOR THE SAMPLES TESTED.
~ Information provided by the customer
*Parameters accredited by EIAC under ISO/IEC 17025:2017

Male' Water & Sewerage Company Pvt Ltd
Water Quality Assurance Laboratory
Quality Assurance Building, 1st Floor, Male' Hingun, Vilimale', Male' City, Maldives
Tel: +9603323209, Fax: +9603324306, Email: wqa@mwsc.com.mv

LB-TEST-090

WATER QUALITY TEST REPORT

Report No: 500185945

Customer Information:
Land & Marine Environment Resources
H.Azum
Ameeneemagu
Male' MALE

Report date: **24/01/2021**
Test Requisition Form No: **900191049**
Sample(s) Recieved Date: **19/01/2021**
Date of Analysis: **19/01/2021 - 19/01/2021**

Sample Description ~	Kudahuvadhoo Site	**TEST METHOD**	**UNIT**
Sample Type ~	Ground Water		
Sample No	83216059		
Sampled Date ~	17/01/2021 09:00		
PARAMETER	**ANALYSIS RESULT**		
Physical Appearance	Clear with particles		
Conductivity *	5660	Method 2510 B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	µS/cm
pH *	7.26	Method 4500-H+ B. (adapted from Standard methods for the examination of water and waste water, 23rd edition)	-
Temperature	24.5	Electrometry	°C
Total Dissolved Solids	2830	Electrometry	mg/L
Nitrate *	0.9	HACH Method 8171	mg/L
Total Petroleum Hydrocarbon (TPH)	<0.036 (LoQ 0.036 mg/L)	UV Fluorescence	mg/L

Keys: µS/cm : Micro Seimen per Centimeter, **°C** : Degree Celcius, **mg/L** : Milligram Per Liter

Checked by

Aminath Sofa
Laboratory Executive

Approved by

Mohamed Eyman
Manager, Quality

Notes: Sampling Authority: Sampling was not done by MWSC Laboratory
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This test report is ONLY FOR THE SAMPLES TESTED.
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*Parameters accredited by EIAC under ISO/IEC 17025:2017

********** END OF REPORT **********

Appendix 8 Alternatives proposed and respective mitigation measures

This section provides comparative description of organic waste composting technologies considered in the ESMP prepared for managing organic waste at Fonadhoo. Anaerobic digestion is the preferred technology where windrow-based open composting and in-vessel composting has been compared with preferred option. The following matrix provides a comparative assessment of the three options considered for the project from environmental, social and economic perspective (Table 1).

Table 1. Comparison of organic waste treatment option selected with alternatives considered

	Environmental aspects	Social aspects	Economic aspects
Anaerobic Digestion (preferred option)	• Relatively large land area required for set up • Biogas generated can be reused as a potential source of energy (for cooking or converted to electricity). • Orgnic nutrient content (liquid residue and undigested biproduct) can be used as a liquid fertilizer and compost. • High energy requirement	• Labour requirement for operation of Anaerobic digestion composting machine is low. • Processing time approximately 1 month • Low to moderate odour due to waste processing	• Highly dependent on mechanical equipment • Very high capital cost • High operation and maintenance cost • Economic turnover is high (shorter time than windrow-composting and high value product) • Potential to use bi products for economic use
In-vessel composting	• Small land area required for setup • Overcomes the problem of leachate generation • Burning of waste is not required • The system is only slightly affected by environmental conditions, as work will be carried out indoors (sheltered area)	• Labour requirement is low (2 to 3 persons can carry out operations) • Compost can be prepared in a short time frame (15-to-30-minute cycles in OWC machine and 10 to 12 days for curing) • Minimal odour associated with processing of waste	• Highly dependent on mechanical equipment High capital cost • Moderate operations and maintenance cost • Economic turnover is very high due to fast process

	• Moderate energy is required for operation		
Windrow-based open composting	• Large land area required for setup • High leachate generation with potential for groundwater contamination • The system is only highly affected by environmental conditions, as it is carried out in the open • Attracts flies, rodents and other pests • Low energy requirement	• Labour requirement is high as it involves strenuous work. The pile needs to be turned every 5 days or so to ensure even composting. • The whole process is time consuming and may require months to complete the process. • Strong odour associated with the processing, especially when the pile is being turned. • Attracts flies, rodents and other pests	• Minimally dependent on mechanical equipment • Low capital cost • Low operations and maintenance cost • Economic turnover low due to the long time taken for composting

The following table provides environmental and social impact mitigation measures proposed for the alternative technologies compared (Table 2).

Table 2. Mitigation measures proposed for the alternative waste treatment methods

Method	Mitigation measures proposed
Anaerobic Digestion (AD) (proposed method)	• Mitigation measures for the process as reported in ESMP matrix given in this report (Chapter 8, Table 13)
In-vessel composting	• Design and construct an appropriate sized area for machine installation, with curing racks. The area should have an impermeable layer with drains installed to drain any leachate generated • Ensure Bioculum is added at the correct rate to enhance the natural aerobic process • Ensure moisture level while in the machine is kept at required levels for that specific machine • Ensure moisture level of compost while of curing racks is maintained through installation of automatic fogging devices • Undertake routine maintenance of machinery as per the manual • 1 year stock of bioculum and spare parts that might be required for the routine functioning of the OWC machine should always be maintained. • Provide protective gears to the workers (gloves, water proof footwear, protective eye wear, masks) • Provide appropriate training to workforce with regard to waste handling, processing and management

	• Ensure provision of a first aid kit on site so as to attend to any medical emergencies immediately. Cover open wounds to prevent contact with the incoming loads
Windrow-based open composting	• Design and construct an appropriate sized compost slab with an impermeable layer, drainage mechanism with leachate collection tank established • Design of composting area should be at least partially shaded to enable composting during rainy season • Ensure compost material are appropriately segregated to avoid potential vermin infestation. Open compost is most suitable for garden waste (branches, twigs, and leaves), vegetable waste and fruit waste • Maintain adequate aeration, temperature and retention time in biological treatment systems to achieve pathogen destruction (World Bank Group, 2007) • Maintain Carbon: Nitrogen (C:N) ratio between 30:1, moisture content between 40-60%, temperature between 30-50ºC and pH between 6 and 8 (CITRES and MEECO 2019) • Ensure that the windrow is high enough to retain the heat and maintain the temperature, but still small enough to let air diffuse to the centre. • Ensure that the compost pile is regularly turned to allow for air diffusion into the material and mixing of the material in order to move larger particles into the core to undergo composting. • As per IFC EHS Guidelines "avoid conditions that can lead to spontaneous combustion (e.g., moisture between 25 – 45 percent and temperatures above about 93ºC. This can be achieved for example by keeping windrows less than about 3m high and turning them when the temperature exceeds 60ºC)" (World Bank Group, 2007) • Water the compost pile depending on the moisture content in the waste • Isolate workers from spore dispersing components of the composting process such as turning, by opting to mechanical turning (e.g., by using tractors). • Provide protective gears to the workers (gloves, water proof footwear, protective eye wear, masks) • Provide appropriate training to workforce with regard to waste handling, processing and management • Ensure provision and use of dust masks or respirators under dry and dusty conditions (e.g., when compost is being turned) • Ensure provision of a first aid kit on site so as to attend to any medical emergencies immediately. Cover open wounds to prevent contact with the incoming loads

Alternative sources of electricity for the operation of preferred waste management technology also have been considered. The following table provides options considered for using electricity and their potential impact mitigation measures (Table 3).

Table 3. Mitigation measures proposed for the alternative energy sources

Method	Mitigation measures proposed
Electricity already connected to the IWRMC	Mitigation measures for the process as reported in ESMP matrix given in this report (Chapter 8, Table 11)
Installation of solar panels	• Roof structure is appropriately designed and constructed to ensure that the solar panels and substructure load can be sustained • Enough roof area made available to ensure that the energy requirement can be tapped from photo voltic structures (PV) installed • Establish a way to provide the excess energy produced to the island electric grid
Installation of a bio-generator in the IWRMC to convert biogas to electricity	• Ensure required approvals and permits are obtained prior to construction of area for installation of bio-generator (design should meet all required criteria by relevant authorities) • Ensure that the generator set installed is sufficient to cater to the needs of the IWRMC • Ensure that all fire and explosion prevention measures are in place • Ensure wall-mounted sensors that are capable of detecting hazardous gases (Carbon monoxide, Hydrogen Sulphide, Ammonia, Carbon Dioxide and Methane) are installed • Ensure use of proper confined space entry procedures (providing proper ventilation, ensuring a second person is present outside any occupied confined space, and using safety harnesses. • Ensure use of a handheld multi-gas detector to determine if hazardous levels of biogas are present prior to entry into any confined space. • Enclosed transformers should always remain permanently sealed and locked. • Only a licensed electrician should perform any transformer maintenance. • Operators should ensure that proper cover plates are present and intact on panels and outlets. • Ensure use of utility-grade fire resistant clothing when working with electricity. • Ensure area where bio-generator is installed in properly ventilated • Clear warnings must be placed on the respective parts of the plant and the operating personnel must be trained. • Ensure proper operation of equipment like stirrers, pumps, feeding equipment to avoid fatal electric shocks. • Ensure that the power facility is soundproof. • Restrict operations to daytime hours • Ensure all the required sign boards are in place • Ensure power facility operators are provided with all the required protective gear • Ensure that there is sufficient and relevant fire prevention and firefighting equipment at the facility

	• Ensure that power facility operators are properly trained in all aspects of the operations and maintenance of the facility • Ensure that the generator set is regularly maintained and that the whole facility is kept in clean conditions • Ensure there are sufficient stock parts for a period of 1 year at any given time

Appendix 9 Translation of ESMP

ޕްރޮގްރާމްގެ މަރުޙަލާ	ތިމާވެއްޓަށް ކޮށްދާނެ އަސަރުތައް	ތިމާވެއްޓަށް ކޮށްދާނެ އަސަރު ކުޑަކުރުމަށް އެޅިދާނެ ފިޔަވަޅުތައް	ޒިންމާ ނަގަންވީ ފަރާތް (މަސައްކަތް ކުރުމުގައާއި ސުޕަވައިޒް ކުރުމުގައި)	ބޭނުންވާނެ ތަކެތީގެ ވަސީލަތާއި އަދަދު	އެސްޓިމޭޓް ކުރެވޭ އަގު	އިތުރު މަޢުލޫމާތު
ވޭސްޓް މެނޭޖްމަންޓް ސެންޓަރުގައި ގާއިމުކުރުމަށް ހަމަޖެހިފައިވާ އެކި ތަންތަނުގެ ތަފްސީލީ ޑިޒައިން (ޑީޓެއިލްޑް ޑިޒައިން) ކުރުމާއި ޕްލޭން ކުރުމުގެ މަރުޙަލާ	އެކަށީގެންނުވާ ޑިޒައިނެއްގެ ސަބަބުން ކުނި މެނޭޖްކުރާ ސެންޓަރު ހިނގަންވާގޮތް ނޫން ގޮތަކަށް ހިނގައި އަދި އެކަމުގެ ސަބަބުން ތިމާވެއްޓަށް ނޭދެވޭ އަސަރުކުރުން	ތަފްސީލީ ޑިޒައިން (ޑީޓެއިލްޑް ޑިޒައިން) ކުރެވިފައިވަނީ ކަނޑައެޅިފައިވާ އުސޫލުތަކާއި މިންގަނޑަށް ޔަޤީންކުރުން އަދި ތިމާވެއްޓަށް ކޮށްދާނެ އަސަރުތަކަށް ރިޢާޔަތްކޮށް އެއަސަރުތައް ކުޑަވާނެ ގޮތަކަށް ޑިޒައިން ކުރުން	- ޕްރޮޖެކްޓް ހިންގާ ފަރާތް	-	-	
	އަޑުގަދަވުމުގެ ސަބަބުން ދިމާވާނެ ދަތިތައް	ކުނި [illegible] ކަނޑައެޅޭ މަޝީނު މީހުން ދިރިއުޅޭ ހިސާބާއި މަދުވެގެން 60 މީޓަރު ދުރުގައި ހުރި ތަނެއްކަން ޔަޤީންކުރުން	- ރަށު ކައުންސިލް - [illegible] ([illegible]) ޕްރޮޖެކްޓް ހިންގާ ފަރާތް	-	-	
	ކުނި މެނޭޖްކުރާ ސެންޓަރު، ގޮނޑުދޮށާއި ކައިރިވުމުގެ ސަބަބުން އެހިސާބު [illegible]	[illegible] ([illegible] [illegible] [illegible] ([illegible]) ވޭސްޓް މެނޭޖްމަންޓް ސެންޓަރުގެ އިމާއި ދުރު މަދުވެގެން 20 މީޓަރުގެ ބަފަރއެއް ([illegible] [illegible] ސަރަހައްދެއް) ބެހެއްޓުން	- ރަށު ކައުންސިލް - [illegible] ([illegible]) ޕްރޮޖެކްޓް ހިންގާ ފަރާތް			

ތިމާގައި ކުރިއަށް ގެންދާ ފަރާތް	ތިމާގައި ކުރިއަށް ގެންދާ ވެސްޓަރ ސަބްސްޓޭޝަނ ތަކުގެ ކަންކަން ބަލަހައްޓަން، ފެނުން ފުރިހަމަ ކުރުމަށް ބަލަހައްޓަން ކަނޑައަޅާ ވަގުތުތަކުގައި ކަންތައް ކުރުން	- ތިމާގައި ކުރިއަށް ގެންދާ ވެސްޓަރ ސަބްސްޓޭޝަން ތަކުގެ ކަންކަން ބަލަހައްޓަން ކަނޑައަޅާ ވަގުތުތަކުގައި ކަންތައް ކުރުން - ކުރިއަށް ގެންދާ ކަންތައްތަކުގެ ރިކޯޑް ބަލަހައްޓަން - ތަކެތި ދިރާގުކުރުމަށް ބޭނުންކުރާ ކަންތައްތަކުގެ ލިސްޓް ތައްޔާރުކުރުން - ވެސްޓަރ ސަބްސްޓޭޝަނ ތަކުގެ ކަންކަން ބަލަހައްޓަން ކަނޑައަޅާ ވަގުތުތަކުގައި ކަންތައް ކުރުން	- ވެސްޓަރ-ތިމާގައި ކުރިއަށް ގެންދާ ކަންތައް (ތަކެތި ދިރާގުކުރުން) - ފުރަތަމަ ހިސާބުގެ ކަންތައް (ކުށްވެރިކަން ކުރުން)			
	ތިމާގައި ކުރިއަށް ގެންދާ ވެސްޓަރ ސަބްސްޓޭޝަނ ތަކުގެ ކަންކަން ބަލަހައްޓަން، ފެނުން ފުރިހަމަ ކުރުމަށް ބަލަހައްޓަން ކަނޑައަޅާ ވަގުތުތަކުގައި ކަންތައް ކުރުން	- ކިތަބުގެ ކަންކަން ބަލަހައްޓަން - ވެސްޓަރ ސަބްސްޓޭޝަނ ތަކުގެ ކަންކަން ބަލަހައްޓަން ކަނޑައަޅާ ވަގުތުތަކުގައި ކަންތައް ކުރުން - ވެސްޓަރ ސަބްސްޓޭޝަނ ތަކުގެ ކަންކަން ބަލަހައްޓަން ކަނޑައަޅާ ވަގުތުތަކުގައި ކަންތައް ކުރުން - ވެސްޓަރ ސަބްސްޓޭޝަނ ތަކުގެ ކަންކަން ބަލަހައްޓަން ކަނޑައަޅާ ވަގުތުތަކުގައި ކަންތައް ކުރުން	- ވެސްޓަރ-ތިމާގައި ކުރިއަށް ގެންދާ ކަންތައް (ތަކެތި ދިރާގުކުރުން) - ފުރަތަމަ ހިސާބުގެ ކަންތައް (ކުށްވެރިކަން ކުރުން)			
	ތިމާގައި ކުރިއަށް ގެންދާ ވެސްޓަރ ސަބްސްޓޭޝަނ ތަކުގެ ކަންކަން ބަލަހައްޓަން، ފެނުން ފުރިހަމަ ކުރުމަށް ބަލަހައްޓަން ކަނޑައަޅާ ވަގުތުތަކުގައި ކަންތައް ކުރުން	- ވެސްޓަރ ސަބްސްޓޭޝަނ ތަކުގެ ކަންކަން ބަލަހައްޓަން ކަނޑައަޅާ ވަގުތުތަކުގައި ކަންތައް ކުރުން	- ވެސްޓަރ-ތިމާގައި ކުރިއަށް ގެންދާ ކަންތައް (ތަކެތި ދިރާގުކުރުން)			

	ގެންދެވޭ ފަރާތް ތަކެއްގެ ގަސްގަނޑުގެ ތެރެ ގަސް ކެނޑުމުގެ ކުރިން ކަނޑާ ދުވަސް ކަނޑައެޅުން	ތަކެއްގެ ގަސް ކެނޑުމުގެ ކުރިން ކަނޑާ ދުވަސް ކަނޑައެޅުމުގެ ކުރިން ގަސް ކެނޑުމަށް ބޭނުންވާ ތަކެތި ހޯދައިގެން ތިބުމަށް ދެ ދުވަސް ކުރިން ގަސް ކެނޑުމަށް ބޭނުންވާ ތަކެތި ހޯދައިގެން ތިބުމަށް ދެ ދުވަސް ކުރިން - ގަސް ކެނޑުމަށް ބޭނައްތަ ތަކެތި (ގަސް ކެނޑުމަށް ބޭނުންވާ)			

	ދަނޑުވަށް ކުރުމާ ގުޅިގެން ކަނޑުގެ ތެރެއިން ކަނޑުގެ ތެރެ ބަދަލުކުރުމަށް ދިރާސާ ކުރުމަށް	- ދަނޑުވަށް ހަލާކުވާ ތަނުތައް ބަދަލުކުރުމާ ގުޅޭ ކަންކަން (ތަކެއް ހިފުމާ ގުޅޭ ކަންކަން) ތިލަވައްދާ ކަންކަން - ތަނަށް ވައްދާ ތަނުގެ ތަކެތި (ދަނޑުވަށް ކުރުމާ ގުޅޭ ކަންކަން، ފާހަނަ ބަލާ ފަރާތްތަކުގެ ތަނަށް ދާނެ ގޮތް ބަލާ ކަންކަން) ތަނަށް ވައްދާ ގޮތް ބަލާ ކަންކަން - ތަނުގައި ހުންނަ ކަންކަން ކަނޑުގެ ތެރެ ބަދަލުކުރުމާ ގުޅޭ ކަންކަން ކަނޑުގެ ތެރެ ބަދަލުކުރުމާ ގުޅޭ ކަންކަން ކަނޑުގެ ތެރެ ބަދަލުކުރުމާ ގުޅޭ ކަންކަން (ފ.ހުޅުދޫ ތިން ފަހަރުގެ ކަންކަން ކަނޑުގެ ތެރެ ބަދަލުކުރުމާ ގުޅޭ 10ގަޑި) - ދަނޑުވަށް ކުރުމުގެ ތަކެތި (ދަނޑުވަށް ކުރުމާ ގުޅޭ ކަންކަން) ގާތުގެ ކުދިން، ތަނަށް ދަނޑުވަރުގައި ހުންނަ ގޮތް ބަލާ ކަންކަން ކަނޑުގެ ތެރެ ބަދަލުކުރުމާ ގުޅޭ ކަންކަން، ތަނަށް ދާ ގޮތް ބަލާ ކަންކަން	- ކަނޑުގެ ތެރެ ބަދަލުކުރުމާ ގުޅޭ ކަންކަން-ތިލަވައްދާ ކަންކަން (ތަކެއް ހިފުމާ ގުޅޭ ކަންކަން) - ތަނުގައި ހުންނަ ތަކެތި (ދަނޑުވަށް ކުރުމާ ގުޅޭ ކަންކަން)	9.4 ގަބޫލުކުރާ ދަށުގެ ކުދިންގެ ކުރިމަގުގެ (ފަސްވަނަ ބައި) ދަށުގެ ކުދިންގެ ކުރިމަގުގެ	ދިވެހި ބަހުގެ ބަދަލުތަކާ ގުޅޭ ކަންކަން

				ތަކުރާރުވާ ހާދަ ދުއްސާ ހަމަކުރެވޭ ހަރަކާތްތަކާ ގުޅުންހުރި		
	ތަރައްޤީ ސަބަބުން ދަށ ދާ ދަރަޖަ	- ދިވެހި ބަންދުގައި (ހަ) ތަރައްޤީ ދީ 6 ދަހަރު ހިނގާ ފަހު 6ދަހަރު) ދިރާސާތަކުގެ ބޭނުންކުރާ ގޮތް	- ދިވެހި ބަންދުގައި ތަ-ދިވެހި ބަސް ގައިގެ ބަސް (ތަކެއްޗާ ބެހޭ ބަސް) - ދިވެހި ބަސް ހިނގާ ގޮތް (ކުއްލި ބަދަލުތައް ގެނައުން)			
	ތަރައްޤީ ސަބަބުން ދަށ ދާ ދަރަޖަ ލިބުނު ފަރާތްތަކުގެ ދިރާސާ ތަކެއްޗާ ބެހޭ ކަންކަން ދަށ ދާ ދަރަޖަ ލިބުނު ފަރާތްތަކުގެ ދިރާސާ ތަކެއްޗާ ބެހޭ ކަންކަން	- ދިވެހި ބަންދުގައި ހަ-ދިވެހި ބަސް ގައިގެ ބަސް (ތަކެއްޗާ ބެހޭ ބަސް) - ދިވެހި ބަސް ހިނގާ ގޮތް (ކުއްލި ބަދަލުތައް ގެނައުން)	ދިރާސާތަކުގެ ބާރަށް ބަދަލު ގެނައުން ދިރާސާ ތަކެއްޗާ ބެހޭ ކަންކަން ބަދަލު ގެނައުން			

		- ކެންޓް ފުރުވާލުމަށް ބަޖެޓުގައި ފަސޭހަ ގޮތެއް ހޯދުން				
	ފަރާތްތަކާ ގުޅިގެން ކަންކަން ކުރުމުގައި ކަންކަން ކުރުމަށް ކުރިން ގަބޫލުކުރަންޖެހޭ ގޮތްތައް ހަމަޖެއްސުން	- ދަތުރުކުރާ ފަރާތްތަކުގެ ކާނާ ބޯނުންވާ ގޮތް ހޯދުން - ކާނާ ހުއްދަ ލިބިގެން ކާނާ ހިފާ ފަރާތްތަކުގެ ލިސްޓެއް ހަމަޖެއްސުން	- ކާނާ ހިފާ ފަރާތްތަކާ ގުޅިގެން ކަންކަން ކުރުމަށް ކުރިން ގަބޫލުކުރަންޖެހޭ ގޮތްތައް ހަމަޖެއްސުން (ކާނާ ހިފާ ފަރާތްތަކުގެ ލިސްޓު ހަދާ ގޮތް ބަދަލުކުރުން ފަދަ)			
	ދަތުރުކުރާ ފަރާތްތަކުގެ ކާނާ ހިފާ ގޮތް ބަދަލުކުރުމަށް ކަންކަން ކުރުން ހަނދާންކޮށް ދިނުން	- ދަތުރުކުރާ ފަރާތްތަކުގެ ކާނާ ހިފާ ގޮތް ބަދަލުކުރުމަށް ކުރިން ގަބޫލުކުރަންޖެހޭ ގޮތްތައް ހަމަޖެއްސުން	- ކާނާ ހިފާ ފަރާތްތަކުގެ ކާނާ ބޯނުންވާ ގޮތް ހޯދުން - ކާނާ ހުއްދަ ލިބިގެން ކާނާ ހިފާ ފަރާތްތަކުގެ ލިސްޓެއް ހަމަޖެއްސުން	- ކާނާ ހިފާ ފަރާތްތަކާ ގުޅިގެން ކަންކަން ކުރުމަށް ކުރިން ގަބޫލުކުރަންޖެހޭ ގޮތްތައް ހަމަޖެއްސުން (ކާނާ ހިފާ ފަރާތްތަކުގެ ލިސްޓު ހަދާ ގޮތް ބަދަލުކުރުން ފަދަ)			
	ދަތުރުކުރާ ފަރާތްތަކުގެ ކާނާ ހިފާ ގޮތް ބަދަލުކުރުމަށް ކަންކަން ކުރުން ހަނދާންކޮށް ދިނުން	- ކާނާ ހުއްދަ ލިބިގެން ކާނާ ހިފާ ފަރާތްތަކުގެ ލިސްޓެއް ހަމަޖެއްސުން	- ކާނާ ހިފާ ފަރާތްތަކުގެ ކާނާ ބޯނުންވާ ގޮތް ހޯދުން - ކާނާ ހުއްދަ ލިބިގެން ކާނާ ހިފާ ފަރާތްތަކުގެ ލިސްޓެއް ހަމަޖެއްސުން	- ކާނާ ހިފާ ފަރާތްތަކާ ގުޅިގެން ކަންކަން ކުރުމަށް ކުރިން ގަބޫލުކުރަންޖެހޭ ގޮތްތައް ހަމަޖެއްސުން (ކާނާ ހިފާ ފަރާތްތަކުގެ ލިސްޓު ހަދާ ގޮތް ބަދަލުކުރުން ފަދަ)			

				ތަރުތީބުކުރާ ފަރާތް ފުރިހަމަ ކުރުމަށް ބޭނުންވާ ލިޔުންތައް - ގަވާއިދުގެ ދަށުން ދޫކުރާ ވަޒީފާ/ ސިކުނޑި ހިއްސާކުރާ ލިޔުން - ބަންދުގައި ހުންނަ ގަނޑުގެ ތެރެއިން ބަންދުގައި 3 ކަނޑައެޅުނު، ތަނުގެ ބޭނުންތަކަށް ތަނުގެ ތަފާތު ބަންދުގައި ތަނުގެ ތަފާތު ބަންދުގައި ތަނުގެ ތަފާތު ބަންދުގައި - ބަންދުގައި ބަލަހައްޓާ ގަނޑުގެ ތެރެ ކަނޑައެޅުނު ތަނުގެ ތަފާތު ބަންދުގައި ހުންނަ ގަނޑުގެ ތެރެ ތަފާތު ބަންދުގައި ހުންނަ - ބަންދުގައި ދިރިހުރާ ބަލިކަށި ތަކެތި ދިރިހުރާ ދަނޑުވެރިކަން ކުރެވޭ ބިން (ދިރިހުރާ ބަލިކަށި) - ކާނާ ކައިރީގައި ގަނޑުގެ ތެރެ ކައިރީ		

				ށެންޓަރ ފަދަ ތަންތާ ގައިގެ ތެރެއަށް ވަ ދެވުން ކޮވިޑް 19 ގެ ފަރާތުން ތަކެއްޗަށް ލިބޭ - ކޮވިޑ-19 ގެ ފަރާތ ތެރެއިން ބަލިވި، ގަދަ ލަކުޅެ ދަރަނި ކުރުމަށް ކުރިން ބަލި ހުރި ފަރާތ - ކަނޑައެޅިފައި ވާ ގޮތަށް ކ. ގުރައިދޫ ކޮމިއުނިޓީ ސެންޓަރ ގައި ބަލި ބަލަހައްޓާ ފަރާތް - ކުރިން ހުރި ދިގުދުވަ ބަލިތަކެއް ގެ ފަރާތ ކުރިން ބަލި ހުރި ފަރާތ ގެ ގާތް		

	އާންމު ރައްޔިތުންގެ ސިއްޙަތާއި ރައްކާތެރިކަމަށް ކޮންފާށް އަސަރު	- މަޝްރޫއު ކުރިއަށް ގެންދާ ސަރަހައްދު ރަނގަޅަށް އެނގޭނެހެން ފާހަގަ ކުރުން، އަދި ސައިން ބޯޑުތައް ރަނގަޅަށް ބަހައްޓުން - އާންމު ރައްޔިތުންނަށް މަޝްރޫއު ކުރިއަށް ގެންދާ ސަރަހައްދަށް ހުއްދައާ ނުލާ ނުވަދެވޭނެ ގޮތަށް ހެދުން - މައްސަލަ ހައްލުކުރުމުގެ ނިޒާމް (ގްރީވަންސް ރިޑްރެސް މެކޭނިޒަމް) ގާއިމް ކުރުން، އަދި މައްސަލައެއް އޮވެއްޖެނަމަ ގުޅަންޖެހޭނެ ފޯން ނަންބަރުތައް މަސައްކަތު ސަރަހައްދުގާއި، ކައުންސިލް ނޯޓިސްބޯޑް އަދި ރައްޔިތުން އެއްވެ އުޅޭ ސަރަހައްދުތަކުގައި ހަރުކުރުން	- ކޮންޓްރެކްޓަރު-އިމާރާތް ކުރާ ފަރާތް (ތަން އިމާރާތް ކުރާއިރު) - ރަށު ކައުންސިލް		ޕްރޮޖެކްޓުގެ ޚަރަދުތަކުގެ ތެރޭގައި ހިމަނަންވާނެ	
	އަލިފާނުގެ ރައްކާތެރިކަން	- ކަރަންޓު ވަޔަރު ކުރާނީ އެކަމުގެ ތަމްރީން ލިބިފައިވާ ގާބިލު މީހެއްކަން ޔަގީންކުރުން - އިމާރާތްކުރުމުގެ މަސައްކަތުގާއި ވޭސްޓް މެނޭޖްމަންޓް ސެންޓަރު	- ކޮންޓްރެކްޓަރު-އިމާރާތް ކުރާ ފަރާތް (ތަން އިމާރާތް ކުރާއިރު) - ރަށު ކައުންސިލް	އަލިފާން ނިއްވުމަށް ބޭނުންވާނެ އާލާތްތައް ރަށުގެ ވޭސްޓް މެނޭޖްމަންޓް ސެންޓަރުގެ އާލާތްތަކުގެ	ޕްރޮޖެކްޓުގެ ޚަރަދުތަކުގެ ތެރޭގައި ހިމަނަންވާނެ	

		ތަރުބިއްޔާ ދިނުމާ ގުޅޭ ކަންކަމުގައި ކުރިއަށް ގެންދާ ކަންތައްތަކާ ގުޅޭ ކަންތައްތަކުގައި ކަންކަން ކުރުމަށް ދަށްވާ ގޮތް				
	ތަރުބިއްޔާ ދިނުމާ ގުޅޭ ކަންކަމުގައި ކުރިއަށް ގެންދާ ކަންތައްތަކާ ގުޅޭ ކަންތައްތަކުގައި ކަންކަން ކުރުމަށް ދަށްވާ ގޮތް	- ތަރުބިއްޔާ ދިނުމާ ގުޅޭ ކަންކަމުގައި ކުރިއަށް ގެންދާ ކަންތައްތަކާ ގުޅޭ ކަންތައްތަކުގައި ކަންކަން ކުރުމަށް ދަށްވާ ގޮތް - ކުއްލި ހާލަތެއް ނުވަތަ ދެ ދުވަހުގެ ތެރޭ ކަންކަން ކުރުމަށް ދަށްވާ ގޮތް - ކުއްލި ހާލަތެއް ނުވަތަ ދެ ދުވަހުގެ ތެރޭ ކަންކަން ކުރުމަށް ދަށްވާ ގޮތް ބަދަލުކުރުމަށް ދަށްވާ ގޮތް - ތަރުބިއްޔާ ދިނުމާ ގުޅޭ ކަންކަމުގައި ކުރިއަށް ގެންދާ ކަންތައްތަކާ ގުޅޭ ކަންތައްތަކުގައި ކަންކަން ކުރުމަށް ދަށްވާ ގޮތް	-		

		ބަންދުކުރުން އަދި މަޝްރޫޢު ނިމުމުން ތިލަފުށިއަށް ބޭރުކުރުން - މިފަދަ ކުނި ބަހައްޓާ ސަރަހައްދުތަކުގައި ބިމަށް ނުފޯރާގޮތަށް ބިމުގައި ކޮންކްރީޓް ނުވަތަ ގޮޅިވާ ޝީޓެއް އެޅުމަށްފަހު އެކުނި ގުދަންކުރުން އަދި މިސަރަހައްދުތައް އެނގޭގޮތަށް ސައިން ބޯޑު ޖަހާފައިހުރުން				
ވޭސްޓް މެނޭޖްމަންޓް ސެންޓަރު ހިންގުމުގެ މަރުހަލާ	ރަނގަޅު ގޮތަކުން ކުނި ގެންދާއިރު ބާރަށް ބަންދުކުރާ ކުނިން ކަނޑައެޅިގެން އަސަރުކުރާ	- ކުނި ގެންދިއުމަށްޓަކައި ގޭގޭގައި ބަހައްޓާއިރު ކުނި ބަންދުކުރެވިފައި ހުންނަންޖެހޭނެ ގޮތް ފަރަގަތުން ހިމާރުނުން (މިސާލު ނުވާ ގޮތަށް ބަންދުކުރެވިފައިވާ ތަޅަފަށެއްގައި) - ކުނިގެންދާ ޓްރަކް/ޕިކަޕު އަކަން އެއްފަހަރާ ގެންދެވޭނީ ކަނޑައެޅިފައިވާ ވަކި ވަގުތެއްގެ ތެރޭގައި ހަރުދަނާކުރުން - ކުނިގެންދާ އުޅަނދު ހިންގަންވާނީ ބާރަށް އެއްކޮށް ނުޖެހޭނެހެން ހުރިހާ ފަރާތްތަކަށްވެސް ބަންދުކުރެވިފައި	- ވޭސްޓް މެނޭޖްމަންޓް ސެންޓަރު ހިންގާ ފަރާތް - ރަށު ކައުންސިލް	ވޭސްޓް މެނޭޖްމަންޓް ސެންޓަރު ހިންގާނެގޮތުގެ ޕްލޭން ތައްޔާރުކުރުން އަދި އީ.ޕީ.އޭ ގައި ރަޖިސްޓްރީ ކޮށް ތަން ހިންގުމުގެ ލައިސަންސް ހޯދުން	ސަލާމަތީ އާލާތްތައް ޕްރޮޖެކްޓުގެ ހަރަދުތަކުގެ ތެރޭގައި ހިމަނަންވާނެ	

				- ތަކެތި ހޯދުމާ ގުޅޭ ގޮތުން /ވަކި ގޮތެއް ނެތި ގަނެ ގެނެވޭ ތަކެތި ތަކެއް ހޯދުމަށް ބޭނުންކުރާ ގޮތް ބަލައި ހުށަހެޅުން - ވިޔަފާރި ފަންނުވެރިކަމުގެ ގޮތުގައި ކުރިއަށް ގެންދާ ކަންތައް (ކުރިއަށް ގެންދާ ކަންތައް ގެންދާ ގޮތާ ގުޅޭ ތަފާތު ތަކެއް ހުށަހެޅުން) - ތަކެތި ގަނެ ގެނެވޭ ގޮތާ ގުޅޭ ކަންތައް ކުރުމުގައި ދަށ ދިނުމަށް ބޭނުންކުރާ ގޮތް ބަލައި ހުށަހެޅުން - ތަކެތި ގަނެ ގެނެވޭ ގޮތާ ގުޅޭ ކަންތައް ކުރުމުގައި ދަށ ދިނުމަށް ބޭނުންކުރާ ގޮތް ބަލައި ހުށަހެޅުން - ތަކެއް ގަނެ ގެނެވޭ ގޮތާ ގުޅޭ ކަންތައް ކުރުމުގައި ދަށ ދިނުމަށް ބޭނުންކުރާ ގޮތް،			

		ކުޅިވެއްދުގެ ފަސޭހަކަމަށް ބޭނުންކުރާ ގޮތްތައް ދަސްކޮށްދިނުން				
	ކުޅި ކޮށްފައިވާ ތަނުގެ ފަސޭހަކަމާ ގުޅިގެން ދިރާސާ ކުރުން	- ފިޔަވަޅު ކަނޑައެޅުމުގެ ކުރިން ތަނުގެ ހާލަތު ބަލާ ގޮތް ދަސްކޮށްދިނުން (ބިމުގެ ގަދަ ކަންކަން، ގޯސްކަންތައް ތަނުގައި ހުންނަ ގޮތް ބަލާ ގޮތް) - ކ.ގެ. ގުދަނުގައި ހުންނަ ކަހަލަ ތަކެތި ކުރިން ބަލާ ގޮތް: ސަރުވޭ ކުރާ ދުވަސް 30.1.20ގެ ކުރިން ހުށަހެޅުން - ކ.ގެ ގުދަނުގައި ހުންނަ ތަކެތި ބަލާ ގޮތް ހުށަހެޅުމުގެ ކުރިން ކުރަންޖެހޭ ކަންތައް - ފޮތްފުށުގައި ހުންނަ ކަންތައް ކ.ގެ ގުދަނުގައި ހުންނަ ތަކެތި ބަލާ ގޮތް ހުށަހެޅުން (ފ.ހުޅުވާ 6.5 - 8)	-		

		- ލިބުނާތީމާ ދައުލަތުގެ ފުރަތަމަ ކަންތައް ކުރިއަށް ގެންދިއުން - ލިބުނާތީމާ ހަމައެކަނި ކުރިއަށް ގެންދާ ކަންތައް				
	ލިބުނީ ތަންތަނުގެ ސަބަބުން ތަކުރާރުވާ ތަކެއް ނުވާ ގޮތަށް	- ލިބުނީ ތަންތަނުގެ ސަބަބުން ކުރިއަށް ގެންދާ ކަންތައް ދެމެހެއްޓުމަށް ގަޑި ދިގުކުރުން - ލިބުނީ ތަންތަނުގެ ބަދަލުގައި ލިބުނީ ކުރިއަށް ގެންދާ ކަންތައް ކުރިއަށް ގެންދިއުމަށް	-			
	ކުރިން ކުރެވުނު ކަންތައް ދެމެހެއްޓުމަށް ބަލަހައްޓާ ގޮތް، ތަކުރާރުވާ ގޮތް ނުވަތަ ދެމެހެއްޓުމަށް ފަސޭހަ ގޮތް	- ދަށުން ކުރެވުނު ކަންތައް ކުރިއަށް ގެންދާ ގޮތް ބަލަހައްޓާ ގޮތް ބަދަލުކުރުމަށް ތަކުރާރުވާ ގޮތް - ކަނޑައެޅުނު ދަށުން ކުރެވުނު ކަންތައް ފުރިހަމަ ކުރުން - ދަށުން ކުރެވުނު ކަންތައް 1 ދުވަހުގެ ތެރޭގައި ކުރެވޭ ގޮތަށް ބަދަލުކުރުމަށް	-			

	ކުރިއަރާ ގޮތުގެ ކަންކަމާ ބެހޭ ކަންތައް		-	- ފިލާދަ ކަސް ކޮށްދިނުމަށް ބަލައި ގެންދާ ކަންތައް - ފިލާދަ ކަސް ބަލައި ގެންދާ ކަންތައް - ކަސްޓަމަރ ސަރވިސް ސެންޓަރ ހިންގުމާ ގުޅޭ ކަންތައް - ކަސްޓަމަރ ސަރވިސް ސެންޓަރ ހިންގުމާ ގުޅޭ ކަންތައް - ކަސްޓަމަރ ސަރވިސް ސެންޓަރ ހިންގުމާ ގުޅޭ ކަންތައް		
	ކަސްޓަމަރ ސަރވިސް ސެންޓަރ ހިންގުމާ ގުޅޭ ކަންތައް		- ކަސްޓަމަރ ސަރވިސް ސެންޓަރ ހިންގުމާ ގުޅޭ ކަންތައް - ކަސްޓަމަރ ސަރވިސް ސެންޓަރ ހިންގުމާ ގުޅޭ ކަންތައް	- ފައިނޭންސް ކަންތައް (ފައިނޭންސް ބަޖެޓިން ކުރިއަށް ގެންދާ ކަންތައް) - ކޮމްޕެނީ ދަށްދެނެގަނެ ކަންތައް ގެންދާ ކަންތައް/ ކުރަން ޖެހޭ ކަންތައް	ހިންގުމާ ގުޅޭ ކަންތައް	

	ކުށްވެރިކަމާ ގުޅުން ހުރި ފަރާތްތަކުގެ ގެންގުވުންތަކާ ގުޅޭ ކަންކަން ކަށަވަރުކުރުމަށް	- ފާސްކޮށް ދިނުމުގެ ކުރިން ކުށްވެރިކަމާ ގުޅުން ހުރި ފަރާތްތަކުގެ ގެންގުވުންތަކާ ގުޅޭ ކަންކަން ކަށަވަރުކުރުމަށް ކުށްވެރިކަމާ ގުޅުން ހުރި ފަރާތްތަކުގެ ގެންގުވުންތަކާ ގުޅޭ ކަންކަން ކަށަވަރުކުރުމަށް ފާސްކޮށް ދިނުމުގެ ކުރިން ކުށްވެރިކަމާ ގުޅުން ހުރި ފަރާތްތަކުގެ ގެންގުވުންތަކާ ގުޅޭ ކަންކަން ކަށަވަރުކުރުމަށް ފާސްކޮށް ދިނުމުގެ ކުރިން ކުށްވެރިކަމާ ގުޅުން ހުރި ފަރާތްތަކުގެ ގެންގުވުންތަކާ ގުޅޭ ކަންކަން ކަށަވަރުކުރުމަށް	- ކުށްވެރިކަމާ ގުޅުން ހުރި ފަރާތްތަކުގެ ގެންގުވުންތަކާ ގުޅޭ ކަންކަން ކަށަވަރުކުރުމަށް ކުށްވެރިކަމާ ގުޅުން ހުރި ފަރާތްތަކުގެ ގެންގުވުންތަކާ ގުޅޭ ކަންކަން ކަށަވަރުކުރުމަށް - ކުށްވެރިކަމާ ގުޅުން ހުރި ފަރާތްތަކުގެ ގެންގުވުންތަކާ ގުޅޭ ކަންކަން ކަށަވަރުކުރުމަށް			
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		- މައްސަލަ ހައްލުކުރުމުގެ ނިޒާމް (ގްރީވަންސް ރެޑްރެސް މެކޭނިޒަމް) ގާއިމް ކުރުން، އަދި މައްސަލައެއް އޮވެއްޖެނަމް ގުޅަންޖެހޭނޭ ފޯން ނަމްބަރުތައް މަސައްކަތު ސަރަހައްދުގައާއި، ކައުންސިލް ނޯޓިސްބޯޑު އަދި ރައްޔިތުން އެއްވެ އުޅޭ ސަރަހައްދުތަކުގައި ހަރުކުރުން				
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	މަސައްކަތުގެ ސަބަބުން އެކި ވަސީލަތްތަކަށް ކުރާ ނޭދެވޭ އަސަރު	- ސެންޓަރަށް އަންނަ ކުނީގެ މިންވަރަށް ބެލެވިގެން މިސެންޓަރުގައި ބޭނުންކުރެވޭ އެކި މެޝިން ބެނުންކުރެވޭނޭ ޝެޑިއުލެއް ހެދުން	-			

		- ގެންދެވޭ ބޭނުންވާ ގޮތް ހިންގުމަށް ބަދަލުތަކެއް ގެނައުން - ދާއިރާ ތަކުގެ ކަންކަމުގައި ބައިވެރިވުން - ގެންދެވޭ ބަދަލުތަކާ ގުޅޭ ކަންކަން ކުރުން				

Appendix 10 Sample Contractor's Code of Conduct provided by PMU

CODES OF CONDUCT

Codes of Conduct

Three Codes of Conduct are presented below:

i. **Company Code of Conduct:** Commits the company to addressing EHSH, OHS and GBV issues;
ii. **Manager's Code of Conduct:** Commits managers to implementing the Company Code of Conduct, as well as those signed by individuals; and,
iii. **Individual Code of Conduct:** Code of Conduct for everyone working on the project, including managers.

Company Code of Conduct
Implementing ESHS and OHS Standards
Preventing Gender Based Violence

The company is committed to ensuring that the project is implemented in such a way which minimizes any negative impacts on the local environment, communities, and its workers. This will be done by respecting the environmental, social, health and safety (ESHS) standards, and ensuring appropriate occupational health and safety (OHS) standards are met. The company is also committed to creating and maintaining an environment where children under the age of 18 will be protected, and where Sexual Exploitation and Abuse (SEA) and sexual harassment have no place. Improper actions towards children, SEA and sexual harassment are acts of Gender Based Violence (GBV) and as such will not be tolerated by any employee, sub-contractors, supplier, associate, or representative of the company.

Therefore, to ensure that all those engaged in the project are aware of this commitment, the company commits to the following core principles and minimum standards of behavior that will apply to all company employees, associates, and representatives, including sub-contractors and suppliers, without exception:

General

1. The company—and therefore all employees, associates, representatives, sub-contractors and suppliers—commits to complying with all relevant national laws, rules and regulations.
2. The company commits to full implementing its 'Contractors Environmental and Social Management Plan' (C-ESMP) as approved by the client.
3. The company commits to treating women, children (persons under the age of 18), and men with respect regardless of race, color, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status. Acts of GBV are in violation of this commitment.
4. The company shall ensure that interactions with local community members are done with respect and non-discrimination.
5. Demeaning, threatening, harassing, abusive, culturally inappropriate, or sexually provocative language and behavior are prohibited among all company employees, associates, and its representatives, including sub-contractors and suppliers.
6. The company will follow all reasonable work instructions (including regarding environmental and social norms).
7. The company will protect and ensure proper use of property (for example, to prohibit theft, carelessness or waste).

Health and Safety

8. The company will ensure that the project's OHS Management Plan is effectively implemented by company's staff, as well as sub-contractors and suppliers.
9. The company will ensure that all persons on-site wear prescribed and appropriate personal protective equipment, preventing avoidable accidents, and reporting conditions or practices that pose a safety hazard or threaten the environment.
10. The company will:
    i. prohibit the use of alcohol during work activities.
    ii. prohibit the use of narcotics or other substances which can impair faculties at all times.
11. The company will ensure that adequate sanitation facilities are available on site and at any worker accommodations provided to those working on the project.

12. The company will not hire children under the age of 18 for construction work, or allow them on the work site, due to the hazardous nature of construction sites.

Gender Based Violence

13. Acts of GBV constitute gross misconduct and are therefore grounds for sanctions, which may include penalties and/or termination of employment and, if appropriate, referral to the Police for further action.
14. All forms of GBV, are unacceptable, regardless of whether they take place on the work site, the work site surroundings, at worker's camps or within the local community.
15. Sexual harassment of work personnel and staff (e.g. making unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature) are acts of GBV and are prohibited.
16. Sexual favors (e.g. making promises of favorable treatment such as promotions, threats of unfavorable treatment such as losing a job, payments in kind or in cash dependent on sexual acts) and any form of humiliating, degrading or exploitative behavior are prohibited.
17. The use of prostitution in any form at any time is strictly prohibited.
18. Sexual contact or activity with children under 18—including through digital media—is prohibited. Mistaken belief regarding the age of a child is not a defense. Consent from the child is also not a defense or excuse.
19. Unless there is full consent[1] by all parties involved in the sexual act, sexual interactions between the company's employees (at any level) and members of the communities surrounding the work place are prohibited. This includes relationships involving the withholding/promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex (including prostitution). Such sexual activity is considered "non-consensual" within the scope of this Code.
20. In addition to company sanctions, legal prosecution of those who commit acts of GBV will be pursued if appropriate.
21. All employees, including volunteers and sub-contractors are highly encouraged to report suspected or actual acts of GBV by a fellow worker, whether in the same company or not. Reports must be made in accordance with project's GBV Allegation Procedures.
22. Managers are required to report and act to address suspected or actual acts of GBV as they have a responsibility to uphold company commitments and hold their direct reports responsible.

Implementation

To ensure that the above principles are implemented effectively the company commits to:

23. Ensuring that all managers sign the project's 'Manager's Code of Conduct' detailing their responsibilities for implementing the company's commitments and enforcing the responsibilities in the 'Individual Code of Conduct'.

[1] **Consent:** refers to when an adult makes an informed choice to agree freely and voluntarily to do something. There is **no** consent when agreement is obtained through the use of threats, force or other forms of coercion, abduction, fraud, manipulation, deception, or misrepresentation; the use of a threat to withhold a benefit to which the person is already entitled, or; a promise made to the person to provide a benefit. In accordance with the United Nations Convention on the Rights of the Child, the World Bank considers that consent cannot be given by children under the age of 18, even if national legislation of the country into which the Code of Conduct is introduced has a lower age. Mistaken belief regarding the age of the child and consent from the child is not a defense.

24. Ensuring that all employees sign the project's 'Individual Code of Conduct' confirming their agreement to comply with ESHS and OHS standards, and not to engage in activities resulting in GBV, child endangerment or abuse, or sexual harassment.
25. Displaying the Company and Individual Codes of Conduct prominently and in clear view at workers' camps, offices, and in in public areas of the work space. Examples of areas include waiting, rest and lobby areas of sites, canteen areas and health clinics.
26. Ensuring that posted and distributed copies of the Company and Individual Codes of Conduct are translated into the appropriate language of use in the work site areas as well as for any international staff in their native language.
27. Ensuring that an appropriate person is nominated as the company's 'Focal Point' for addressing GBV issues, including representing the company on the GBV Complaints Team (GCT) which is comprised of representatives from the client, contractor(s), the supervision consultant, and local GBV Service Provider.
28. Ensuring that an effective GBV Action Plan is developed in consultation with the GCT which includes as a minimum:
    i. **GBV Allegation Procedure** to report GBV issues through the project Grievance Redress Mechanism (Section 4.3 Action Plan);
    ii. **Accountability Measures** to protect confidentiality of all involved (Section 4.4 Action Plan); and,
    iii. **Response Protocol** applicable to GBV survivors and perpetrators (Section 4.7 Action Plan).
29. Ensuring that the company effectively implements the agreed final GBV Action Plan, providing feedback to the GCT for improvements and updates as appropriate.
30. Ensuring that all employees attend an induction training course prior to commencing work on site to ensure they are familiar with the company's commitments to ESHS and OHS standards, and the project's GBV Codes of Conduct.
31. Ensuring that all employees attend a mandatory training course once a month for the duration of the contract starting from the first induction training prior to commencement of work to reinforce the understanding of the project's ESHS and OHS standards and the GBV Code of Conduct.

I do hereby acknowledge that I have read the foregoing Company Code of Conduct, and on behalf of the company agree to comply with the standards contained therein. I understand my role and responsibilities to support the project's OHS and ESHS standards, and to prevent and respond to GBV. I understand that any action inconsistent with this Company Code of Conduct or failure to act mandated by this Company Code of Conduct may result in disciplinary action.

Company name: _____

Signature: _____

Printed Name: _____

Title: _____

Date: _____

Manager's Code of Conduct
Implementing ESHS and OHS Standards
Preventing Gender Based Violence

The company is committed to ensuring that the project is implemented in such a way which minimizes any negative impacts on the local environment, communities, and its workers. This will be done by respecting the environmental, social, health and safety (ESHS) standards, and ensuring appropriate occupational health and safety (OHS) standards are met. The company is also committed to creating and maintaining an environment where children under the age of 18 will be protected, and where Sexual Exploitation and Abuse (SEA) and sexual harassment have no place. Improper actions towards children, SEA and sexual harassment are acts of Gender Based Violence (GBV) and as such will not be tolerated by any employee, sub-contractors, supplier, associate, or representative of the company.

Managers at all levels have a responsibility to uphold the company's commitment. Managers need to support and promote the implementation of the Company Code of Conduct. To that end, managers must adhere to this Manager's Code of Conduct and also to sign the Individual Code of Conduct. This commits them to supporting the implementation of the Contractor's Environmental and Social Management Plan (C-ESMP), the OHS Management Plan, and developing systems that facilitate the implementation of the GBV Action Plan.

Managers need to maintain a safe workplace, as well as a GBV-free environment at the workplace and in the local community. Their responsibilities to achieve this include but are not limited to:

Implementation

1. To ensure maximum effectiveness of the Company and Individual Codes of Conduct:
    i. Prominently displaying the Company and Individual Codes of Conduct in clear view at workers' camps, offices, and in public areas of the work space. Examples of areas include waiting, rest and lobby areas of sites, canteen areas and health clinics.
    ii. Ensuring all posted and distributed copies of the Company and Individual Codes of Conduct are translated into the appropriate language of use in the work site areas as well as for any international staff in their native language.
2. Verbally and in writing explain the Company and Individual Codes of Conduct to all staff.
3. Ensure that:
    i. All direct reports sign the 'Individual Code of Conduct', including acknowledgment that they have read and agree with the Code of Conduct.
    ii. Staff lists and signed copies of the Individual Code of Conduct are provided to the OHS Manager, the GBV Complaints Team (GCT), and the client.
    iii. Participate in training and ensure that staff also participate as outlined below.
    iv. Put in place a mechanism for staff to:
        (a) report concerns on ESHS or OHS compliance; and,
        (b) confidentially report GBV incidents through the Grievance Redress Mechanism (GRM)
    v. Staff are encouraged to report suspected or actual ESHS, OHS, GBV issues, emphasizing the staff's responsibility to the Company and the country hosting their employment, and emphasizing the respect for confidentiality.
4. In compliance with applicable laws and to the best of your abilities, prevent perpetrators of sexual

exploitation and abuse from being hired, re-hired or deployed. Use background and criminal reference checks for all employees nor ordinarily resident in the country where the works are taking place.

5. Ensure that when engaging in partnership, sub-contractor, supplier or similar agreements, these agreements:
    i. Incorporate the ESHS, OHS, GBV Codes of Conduct as an attachment.
    ii. Include the appropriate language requiring such contracting entities and individuals, and their employees and volunteers, to comply with the Individual Codes of Conduct.
    iii. Expressly state that the failure of those entities or individuals, as appropriate, to ensure compliance with the ESHS and OHS standards, take preventive measures against GBV, to investigate allegations thereof, or to take corrective actions when GBV has occurred, shall not only constitute grounds for sanctions and penalties in accordance with the Individual Codes of Conduct but also termination of agreements to work on or supply the project.
6. Provide support and resources to the GCT to create and disseminate internal sensitization initiatives through the awareness-raising strategy under the GBV Action Plan.
7. Ensure that any GBV complaint warranting Police action is reported to the Police, the client and the World Bank immediately.
8. Report and act in accordance with the agreed response protocol any suspected or actual acts of GBV.
9. Ensure that any major ESHS or OHS incidents are reported to the client and the supervision engineer immediately, non-major issues in accordance with the agreed reporting protocol.
10. Ensure that children under the age of 18 are not present at the construction site, or engaged in any hazardous activities.

Training

11. The managers are responsible to:
    i. Ensure that the OHS Management Plan is implemented, with suitable training required for all staff, including sub-contractors and suppliers; and,
    ii. Ensure that staff have a suitable understanding of the C-ESMP and are trained as appropriate to implement the C-ESMP requirements.
12. All managers are required to attend an induction manager training course prior to commencing work on site to ensure that they are familiar with their roles and responsibilities in upholding the GBV elements of these Codes of Conduct. This training will be separate from the induction training course required of all employees and will provide managers with the necessary understanding and technical support needed to begin to develop the GBV Action Plan for addressing GBV issues.
13. Managers are required to attend and assist with the project facilitated monthly training courses for all employees. Managers will be required to introduce the trainings and announce the self-evaluations, including collecting satisfaction surveys to evaluate training experiences and provide advice on improving the effectiveness of training.
14. Ensure that time is provided during work hours and that staff prior to commencing work on site attend the mandatory project facilitated induction training on:
    i. OHS and ESHS; and,
    ii. GBV required of all employees.
15. During civil works, ensure that staff attend ongoing OHS and ESHS training, as well as the monthly mandatory refresher training course required of all employees to on GBV.

Response

16. Managers will be required to take appropriate actions to address any ESHS or OHS incidents.
17. Regarding GBV:
    i. Provide input to the GBV Allegation Procedures and Response Protocol developed by the GCT as part of the final cleared GBV Action Plan.

ii. Once adopted by the Company, managers will uphold the Accountability Measures set forth in the GBV Action Plan to maintain the confidentiality of all employees who report or (allegedly) perpetrate incidences of GBV (unless a breach of confidentiality is required to protect persons or property from serious harm or where required by law).
iii. If a manager develops concerns or suspicions regarding any form of GBV by one of his/her direct reports, or by an employee working for another contractor on the same work site, s/he is required to report the case using the GRM.
iv. Once a sanction has been determined, the relevant manager(s) is/are expected to be personally responsible for ensuring that the measure is effectively enforced, within a maximum timeframe of 14 days from the date on which the decision to sanction was made by the GCT.
v. If a Manager has a conflict of interest due to personal or familial relationships with the survivor and/or perpetrator, he/she must notify the Company and the GCT. The Company will be required to appoint another manager without a conflict of interest to respond to complaints.
vi. Ensure that any GBV issue warranting Police action is reported to the Police, the client and the World Bank immediately

18. Managers failing address ESHS or OHS incidents, or failing to report or comply with the GBV provisions may be subject to disciplinary measures, to be determined and enacted by the cCmpany's CEO, Managing Director or equivalent highest-ranking manager. Those measures may include:
    i. Informal warning.
    ii. Formal warning.
    iii. Additional Training.
    iv. Loss of up to one week's salary.
    v. Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months.
    vi. Termination of employment.
19. Ultimately, failure to effectively respond to ESHS, OHS, and GBV cases on the work site by the company's managers or CEO may provide grounds for legal actions by authorities.

I do hereby acknowledge that I have read the foregoing Manager's Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to ESHS, OHS, and GBV requirements. I understand that any action inconsistent with this Manager's Code of Conduct or failure to act mandated by this Manager's Code of Conduct may result in disciplinary action.

Signature: _____

Printed Name: _____

Title: _____

Date: _____

Individual Code of Conduct
Implementing ESHS and OHS Standards
Preventing Gender Based Violence

I, _____, acknowledge that adhering to environmental, social, health and safety (ESHS) standards, following the project's occupational health and safety (OHS) requirements, and preventing Gender Based Violence (GBV) is important.

The Company considers that failure to follow ESHS and OHS standards, or to partake in activities constituting GBV—be it on the work site, the work site surroundings, at workers' camps, or the surrounding communities—constitute acts of gross misconduct and are therefore grounds for sanctions, penalties or potential termination of employment. Prosecution by the Police of those who commit GBV may be pursued if appropriate.

I agree that while working on the project I will:

1. Consent to Police background check.
2. Attend and actively partake in training courses related to ESHS, OHS, and GBV as requested by my employer.
3. Will wear my personal protective equipment (PPE) at all times when at the work site or engaged in project related activities.
4. Take all practical steps to implement the contractor's environmental and social management plan (C-ESMP).
5. Implement the OHS Management Plan.
6. Adhere to a zero-alcohol policy during work activities, and refrain from the use of narcotics or other substances which can impair faculties at all times.
7. Treat women, children (persons under the age of 18), and men with respect regardless of race, color, language, religion, political or other opinion, national, ethnic or social origin, property, disability, birth or other status.
8. Not use language or behavior towards women, children or men that is inappropriate, harassing, abusive, sexually provocative, demeaning or culturally inappropriate.
9. Not sexually exploit or abuse project beneficiaries and members of the surrounding communities.
10. Not engage in sexual harassment of work personnel and staff ―for instance, making unwelcome sexual advances, requests for sexual favors, and other verbal or physical conduct of a sexual nature is prohibited. E.g. looking somebody up and down; kissing, howling or smacking sounds; hanging around somebody; whistling and catcalls; in some instances, giving personal gifts.
11. Not engage in sexual favors —for instance, making promises of favorable treatment (e.g. promotion), threats of unfavorable treatment (e.g. loss of job) or payments in kind or in cash, dependent on sexual acts—or other forms of humiliating, degrading or exploitative behavior.
12. Not use prostitution in any form at any time.
13. Not participate in sexual contact or activity with children under the age of 18—including grooming, or contact through digital media. Mistaken belief regarding the age of a child is not a defense. Consent from the child is also not a defense or excuse.
14. Unless there is the full consent[1] by all parties involved, I will not have sexual interactions with members of the surrounding communities. This includes relationships involving the withholding or

[1] **Consent** is defined as the informed choice underlying an individual's free and voluntary intention, acceptance or agreement to do something. No consent can be found when such acceptance or agreement is obtained using threats, force or other forms of coercion, abduction, fraud, deception, or misrepresentation. In accordance with the United Nations Convention on the Rights of the Child, the World Bank considers that

promise of actual provision of benefit (monetary or non-monetary) to community members in exchange for sex (including prostitution). Such sexual activity is considered "non-consensual" within the scope of this Code.

15. Consider reporting through the GRM or to my manager any suspected or actual GBV by a fellow worker, whether employed by my company or not, or any breaches of this Code of Conduct.

With regard to children under the age of 18:

16. Bring to the attention of my manager the presence of any children on the construction site or engaged in hazardous activities.
17. Wherever possible, ensure that another adult is present when working in the proximity of children.
18. Not invite unaccompanied children unrelated to my family into my home, unless they are at immediate risk of injury or in physical danger.
19. Not use any computers, mobile phones, video and digital cameras or any other medium to exploit or harass children or to access child pornography (see also "Use of children's images for work related purposes" below).
20. Refrain from physical punishment or discipline of children.
21. Refrain from hiring children for domestic or other labor below the minimum age of 14 unless national law specifies a higher age, or which places them at significant risk of injury.
22. Comply with all relevant local legislation, including labor laws in relation to child labor and World Bank's safeguard policies on child labor and minimum age.
23. Take appropriate caution when photographing or filming children (See Annex 2 for details).

Use of children's images for work related purposes

When photographing or filming a child for work related purposes, I must:

24. Before photographing or filming a child, assess and endeavor to comply with local traditions or restrictions for reproducing personal images.
25. Before photographing or filming a child, obtain informed consent from the child and a parent or guardian of the child. As part of this I must explain how the photograph or film will be used.
26. Ensure photographs, films, videos and DVDs present children in a dignified and respectful manner and not in a vulnerable or submissive manner. Children should be adequately clothed and not in poses that could be seen as sexually suggestive.
27. Ensure images are honest representations of the context and the facts.
28. Ensure file labels do not reveal identifying information about a child when sending images electronically.

Sanctions

I understand that if I breach this Individual Code of Conduct, my employer will take disciplinary action which could include:

1. Informal warning.
2. Formal warning.
3. Additional Training.
4. Loss of up to one week's salary.

consent cannot be given by children under the age of 18, even if national legislation of the country into which the Code of Conduct is introduced has a lower age. Mistaken belief regarding the age of the child and consent from the child is not a defense.

5. Suspension of employment (without payment of salary), for a minimum period of 1 month up to a maximum of 6 months.
6. Termination of employment.
7. Report to the Police if warranted.

I understand that it is my responsibility to ensure that the environmental, social, health and safety standards are met. That I will adhere to the occupational health and safety management plan. That I will avoid actions or behaviors that could be construed as GBV. Any such actions will be a breach this Individual Code of Conduct. I do hereby acknowledge that I have read the foregoing Individual Code of Conduct, do agree to comply with the standards contained therein and understand my roles and responsibilities to prevent and respond to ESHS, OHS, GBV issues. I understand that any action inconsistent with this Individual Code of Conduct or failure to act mandated by this Individual Code of Conduct may result in disciplinary action and may affect my ongoing employment.

Signature: _____

Printed Name: _____

Title: _____

Date: _____

Appendix 11 List of stakeholders consulted

Institution	Name	Designation	Contact
Fonadhoo Council	Ahmed Riyan	Council President	979 6368
	Moosa Abdhulla	Vice President	796 1331
	Ahmed Thoha	Council Member	777 3071
	Fathimath Zaeema	Director	793 3131
	Shimla Naseer	Admin Officer	7803334
EPA	Inaya Abdul Raheem	Civil & Structural Engineer	inaya.abdulraheem@epa.gov.mv
MNPHI/ Landuse planning dept)	Nihaaza Anees		nihaaza.anees@planning.gov.mv
MLSA	Fathimath Shanna	Director / Land department	fathimath.shanna@mlsa.gov.mv
Womens' Development Committee	Jabeen	WDC Member	9569657
	Farhaanaa		7622117
	Matheena		9890505
	Ameeliya		9980263
	Rizma	Vice President	9555032
	Zaeema	President	7933131
FENAKA Corporation Ltd	Abdul Azeez	Manager, Fonadhoo FENAKA branch	9644919
MNDF	Warrant Offier Grade 1	Ahmed Hassan	7795838
	Warrant Offier Grade 1	Farooq Ismail	9884399
	Staff Sergeant	Mohamed Ashraf	7776098

Appendix 12 Copies of emails sent to HPA regarding consultation meeting

LAMER

Shahaama Abdul Sattar <shahaama.abdulsattar@lamer.com.mv>

Formulation of ESMP for establishment or upgrading of IWRMC in Zone 4 and 5

Shahaama Abdul Sattar <shahaama.abdulsattar@lamer.com.mv> Wed, Jan 20, 2021 at 10:17 AM
To: shiyana@health.gov.mv

Dear Shiyana,

Please find below, mail sent on 9th Jan, requesting for a consultation meeting regarding the formulation of the Environmental and Social Management Plan for the establishment or upgrading of Island Waste Management and Resource Management centres in Zone IV (Meemu, Faafu Dhaalu) and Zone V (Thaa, Laamu). Would appreciate it if a consultation could be arranged at the earliest.

Thank you

Best Wishes,

Shahaama Abdul Sattar

Environmental Consultant

LAMER

LAMER Group Pvt. Ltd.

Azum(4th Floor), Ameenee Magu, Henveiru, Male' 20054, Maldives

T +960 331 5049, +960 333 5605 | F +960 331 0776 | M +960 790 4985 | E shahaama.abdulsattar@lamer.com.mv | W www.lamer.com.mv

---------- Forwarded message ---------
From: **Shahaama Abdul Sattar** <shahaama.abdulsattar@lamer.com.mv>
Date: Sat, Jan 9, 2021 at 5:38 PM
Subject: Formulation of ESMP for establishment or upgrading of IWRMC in Zone 4 and 5
To: <hpa@health.gov.mv>
Cc: Ismail Abid <ismail.abid@lamer.com.mv>, Hussein Zahir <hussein.zahir@lamer.com.mv>, Aisha Abdulla <aishath.abdulla@lamer.com.mv>

Dear Sir / Madam

LaMer has been awarded the work to carry out environmental and social assessments for the establishment or upgrading of Island Waste Management and Resource Management centres in Zone IV (Meemu, Faafu Dhaalu) and Zone V (Thaa, Laamu) by the Ministry of Environment (Letter from ME atttached for your information).

As a part of the formulation of the Environmental and Social Management Plans for these projects, we would like to consult with you regarding the three components as below (with specific emphasis on on COVID19 health and safety requirements):

1. Piloting Anaerobic Digestion (AD) and Upgrading of the Existing IWRMC of L. Fonadhoo, Dh. Kudahuvadhoo, M. Muli and F. Nilandhoo
2. Upgrading of IWRMC at Th. Vandhoo with Aerobic Technology using Composting Machine
3. Construction of an Island Waste Management Centre with Aerobic Technology using Composting Machine at six islands (Dh. Maaenboodhoo, L. Dhanbidhoo, L. Gan, M. Kolhufushi, Th. Hirilandhoo, Th. Guraidhoo).

I have attached the project briefs and site plans for the three components. for your information. Would appreciate it if you could inform us of a time for an online consultation regarding this project.

Looking forward to an early reply.

Best Wishes,

Shahaama Abdul Sattar

Environmental Consultant

LAMER

LAMER Group Pvt. Ltd.

Azum(4th Floor), Ameenee Magu, Henveiru, Male' 20054, Maldives

T +960 331 5049, +960 333 5605 | F +960 331 0776 | M +960 790 4985 | E shahaama.abdulsattar@lamer.com.mv | W www.lamer.com.mv

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4 attachments

- **Project brief - Piloting Anaerobic digestion and upgrade of 4 existing IWRMC.pdf**
  1551K
- **Project brief - Aerobic digestion and mechanical composting in Th. Vandhoo IWRMC.pdf**
  1357K
- **Project brief - Aerobic digestion and mechanical composting new IWRMC.pdf**
  2394K
- **Letter of Award from ME.pdf**
  54K

Appendix 13 Copy of Household survey form

ގްރޭޑް 4 އަދި 5 ގެ ދަރިވަރުންގެ ކުރިޔަށް (އަރިތުމެޓިކް ޕްރޮސެސް މެންޓަލް ސްޓްރެޓަޖީ) ގާބިލުކަން ނުވަތަ ފެންވަރު ބަރާބަރުކުރުމަށް ޓީޗަރުން އަދި މަސްއޫލުވެރިންގެ ބޮޑުވެރިން ޤަދަރުކުރުމަށް ގެންގުޅޭ ވަސީލަތްތަކާއި ގޭގެ ފެށުން އުނގަންނައިދިނުން

މަސައްކަތު ހިންގާ ތަން: ______________________

މި ސުވާލަކީ މިނިސްޓްރީ އޮފް އެޑިއުކޭޝަނުން ފަރާތުން ގްރޭޑް 4 އަދި 5 ގެ ދަރިވަރުންގެ ކުރިޔަށް (އަރިތުމެޓިކް ޕްރޮސެސް މެންޓަލް ސްޓްރެޓަޖީ) ގާބިލުކަން ނުވަތަ ފެންވަރު ބަރާބަރުކުރުމަށް ޓީޗަރުން އަދި މަސްއޫލުވެރިންގެ ބޮޑުވެރިން ޤަދަރުކުރުމަށް ގެންގުޅޭ ވަސީލަތްތަކާއި ގޭގެ ފެށުން (އުނގަންނައިދިނުމުގެ އެންމެ ސްކޫލް މެންޓަލް ސްޓްރެޓަޖީ ފެށުން) އުނގެނުމުގެ ބަދަލުކުރުމާއި ބޭނުންވާ މުޅިއުމުރު މައުލޫމާތު ދެނެގަތުމުގެ ގޮތުން ކުރާ ސުވާލުތަކެވެ. މިސާލު ކުރުވުން މަސްދަރު ބަޔާންކުރުވުން ފެށުން ހުރުމުގެ މަސައްކަތް ހަވާލުކުރުމުގައި ކުރުވުން، ތަފާސް ގޮތުގެ ފުރިހަމަ ލިޔުމަކުގެ ފަރާތުންނެވެ.

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1. ގޭގެ ނަން:
2. ގެ ހުންނަ ހިސާބު ފާހަގަ ކުރޭ
   - އުތުރު ފަރާތުގަ
   - ދެކުނު ފަރާތުގަ
   - އިރުމަތީ ފަރާތުގަ
   - ހުޅަނގު ފަރާތުގަ
3. ގޭގައި ދިރިއުޅޭ ކިތައް ގޭބިސީއަކުން ނިސްބަތްވާ މީހުން؟ __ __
4. ދުވާލެއްގެ މަސައްކަތް އުޅޭ ކުރި (ބަދަލުކުރުން ނުވަތަ ޕާޓްޓައިމް ނުވަތަ ގެސްޓްހައުސްގެ އަދަދުން) ބަޔާންކުރޭ
   (މިސާލު: ފަރާތް: 21 ހިލާ /1 ބޯޓު ގެސްޓްހައުސް ކޮމްޕެނީގެ ކުރި)
   - ފަންނާވާޖާ ބޮޑުގެ ކުރި:________________
   - ފަންނުވާ ޖާބޮޑުގެ ކުރި:________________
5. އުފެދޭ ކަންތަކާއި ގުޅޭ މިހާރު އަމަލުކުރުމުންދާ ގޮތް ބަޔާންކުރޭ
   - ފަންނާ ޖާބޮޑުގެ ކުރި: ____
   - ފަންނުވާ ޖާބޮޑުގެ ކުރި: ____
6. ގޭބިސީ ފުންވަރުގައި ކުރި ވަޒީފާކުރަންތޯ؟
   - އާން
   - ނޫން (ސުވާލު 8 އަށް ދޭ)
7. ގޭގައި ކުރި ވަޒީފާކުރަމަ، ކުރި ވަޒީފާކުރުމަށް ފުރުސަތު ދެވެންދެވޭ ތަނުގައި ބޭނުންކުރާ އާލާތްތަކަކީ ކޮބާ؟
   - ޓެސް ބިން
   - ކަން
   - ފީސް
   - އެހެނިހެން ____

8. ކުނި ކޮށި ނުވަތަ ކުނި މެނޭޖުކުރާ މަރުކަޒާ ހަމައަށް ކުނި ގެންދަނީ ކިހިނެއް؟
   - އަމިއްލައަށް
   - ކައުންސިލަށް ނުވަތަ އެހެން ފަރާތަކަށް ފީ ދައްކައިގެން

9. ކުނި އުކާލަން ރަށުގެ ކައުންސިލުން ނުވަތަ އެހެން ފަރާތަކުން ފީއެއްނަގާނަމަ، މިކަމަށް ނަގާ ފީއާއި މެދު ދެކޭ ގޮތަކީ ކޮބާ؟
   - ހިތްހަމަޖެހޭ
   - ހިތްހަމަ ނުޖެހޭ (ފީގެ ގޮތުގައި ކަނޑައަޅަން ފެނޭ އަދަދު ބަޔާން ކުރޭ ________________)
   - ފީ އެއް ނުނަގާ

10. ކުނި ކޮށި ނުވަތަ ކުނި މެނޭޖުކުރާ މަރުކަޒު މިހާރު ހުރި ސަރަހައްދާމެދު ދެކެނީ ކިހިނެއް؟
   - ހިތްހަމަޖެހޭ
   - ހިތްހަމަ ނުޖެހޭ (ސަބަބު:____)

11. މިހާރު ހުރި ކުނި ކޮށި ނުވަތަ ކުނި މެނޭޖުކުރާ މަރުކަޒުގެ ބޮޑުމިނާމެދު ހިޔާލަކީ ކޮބާ؟
   - ކުޑަ
   - ރަނގަޅު
   - ބޮޑު

12. ކުނި މެނޭޖުކުރާ މަރުކަޒު ގާއިމް ކުރާއިރު ނުވަތަ މިހާރު ހުރި މަރުކަޒު މަރާމާތު ކުރާއިރު ކައިރި ގޭބީސީތަކަށް ފޯރާނެ ކަމަށް ލަފާކުރެވޭ އަސަރުތަކަކީ ކޮބާ؟

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13. މި އަސަރުތައް ކުޑަކުރުމަށްޓަކައި ކުރެވިދާނެ ކަންކަން ފާހަގަކުރޭ (ތިރީގައިވާ ލިސްޓުން ނުވަތަ އެހެނިހެން ކަންކަންވެސް ފާހަގަ ކުރެވިދާނެ)
   - މީހުން ދިރިއުޅޭ ސަރަހައްދާ މަރުކަޒާ ދުރުގައި ގަސްގަހާގެހި ހުރަހެއް ބެހެއްޓުން
   - ކޮށީގެ ފާރު އުސްކުރުން
   - އެއްވެސް ވަރަކަށް މަރުކަޒުގައި ކުނި ނު އަންދުން
   - ރަނގަޅު ގޮތުގައި ކުނި ގުދަންކުރުން
   - ގަވާއިދުން ކުނި ރަށުން ބޭރުކުރުން
   - އަލިފާން ނިއްވާ ސާމާނު ބެހެއްޓުން
   - އެހެނިހެން ________________________________

14. އިޤްރާރު

މި ސާރވޭ ފޯމުގައި އަޅުގަނޑު ހިމަނާފައިވާ ސިއްރު ހުރި މައުލޫމާތެވެ. އަދި މި ސާރވޭގެ ނަތީޖާ މަޝްރޫޢުގެ ބިނާވެރިގެ މެނޭޖްމަންޓް ޕްލޭން އެކުލަވާލުމަށް ބޭނުން ކުރިއަސް [illegible] ރަނގަޅުކަމުގައި ދަންނަވަމެވެ.

ޝުކުރިއްޔާ

Ministry of Environment and Energy Maldives

Ahmed Hassaan Zuhair <ahmed.hassaan@environment.gov.mv>

CLEARED ENV: ESMP of L. Fanadhoo IWRMC (AD pilot project)

Shanek Mario Fernando <sfernando6@worldbank.org> Sun, Feb 21, 2021 at 10:59 PM
To: Mokshana Nerandika Wijeyeratne <mwijeyeratne@worldbank.org>, Ahmed Hassaan Zuhair <ahmed.hassaan@environment.gov.mv>
Cc: "Maldives Clean Environment Project | Min. of Environment" <mcep@environment.gov.mv>, Gangadari Ranawaka <granawaka@worldbank.org>, Nadeera Rajapakse <nrajapakse@worldbank.org>, Karin Shepardson <kshepardson@worldbank.org>

Dear Hassaan,

Cleared from my end too. I see thorough consultations have been conducted including a survey .Then gender, labour related issues are also well covered.

Best

Shanek Fernando

Social Development Specialist

Social, Urban, Rural and Resilience Global Practice

WORLD BANK GROUP
Social, Urban, Rural & Resilience

SL M: +9477 261 8872
Intl M: +1202 894 0933
E: sfernando6@worldbank.org
W: www.worldbank.org

From: Mokshana Nerandika Wijeyeratne <mwijeyeratne@worldbank.org>
Sent: Monday, February 15, 2021 4:31 PM
To: Ahmed Hassaan Zuhair <ahmed.hassaan@environment.gov.mv>
Cc: Maldives Clean Environment Project | Min. of Environment <mcep@environment.gov.mv>; Gangadari Ranawaka <granawaka@worldbank.org>; Nadeera Rajapakse <nrajapakse@worldbank.org>; Shanek Mario Fernando <sfernando6@worldbank.org>; Karin Shepardson <kshepardson@worldbank.org>
Subject: CLEARED ENV: ESMP of L. Fanadhoo IWRMC (AD pilot project)

Dear Hassan,

The ESMP for L. Fonadhoo has been reviewed and is CLEARED from the Environment Side with no further comments as it is comprehensive in line with the TOR.

Please keep us posted when for all these the works commence and the procurement process is completed and monitoring commences.

Do disclose these once both E and S clearance is received.

Best

Mokshana

From: Ahmed Hassaan Zuhair <ahmed.hassaan@environment.gov.mv>
Sent: Thursday, February 11, 2021 2:41 PM
To: Mokshana Nerandika Wijeyeratne <mwijeyeratne@worldbank.org>; Shanek Mario Fernando <sfernando6@worldbank.org>
Cc: Maldives Clean Environment Project | Min. of Environment <mcep@environment.gov.mv>
Subject: For Review: ESMP of L. Fanadhoo IWRMC (AD pilot project)

[External]

Dear Mokshana and Shanek,

The following ESMP is submitted for your review and clearance.

1. **ESMP for the proposed upgrading of Island Waste and Resource Management Center (IWRMC) with Anaerobic Technology at L. Fonadhoo.**

The report was prepared by LAMER Group, hired for the task, and the lead consultant is Hussein Zahir (Consultant Registration Number: EIA P04-07). The subject terms of reference for this instrument is the attached TOR A, cleared by WB SG on 6 August 2020.

Kindly acknowledge the receipt of this email.

Best Regards,

--

Ahmed Hassaan Zuhair

Environmental and Social Safeguards Specialist

Maldives Clean Environment Project

- Ministry of Environment, Green Building, Handhuvaree Hingun, Maafannu, Male', 20392, Maldives.

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Email: ahmed.hassaan@environment.gov.mv | Web: www.environment.gov.mv

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