KALAIDHOO ISLAND WASTE MANAGEMENT CENTER

ENVIRONMENTAL MANAGEMENT PLAN

October 2017

Prepared for: Kalaidhoo Island Council

On behalf of: United Nations Development Programme

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ACCRONYMS AND ABBREVIATIONS

Council	Island Council
EIA	Environmental Impact Assessment
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EMP	Environmental Management Plan
HCW	Health-care waste
HCWM	Health-care waste management
IWMC	Waste Management Center
LECReD	Low Emission Climate Resilient Development
MEE	Ministry of Environment and Energy
MLSA	Maldives Land and Survey Authority
MOFA	Ministry of Fisheries and Agriculture
MOH	Ministry of Health
MPA	Marine Protected Area
RWMC	Regional Waste Management Center

1 INTRODUCTION

1.1 BACKGROUND

CDE Consulting was contracted by Low Emission Climate Resilient Development (LECReD) Project of the United Nations Development Programme (UNDP) to produce an Environmental Management Plan (EMP) for the Kalaidhoo Waste Management Center (IWMC).

EMP is an instrument that examines the likely environmental and social impacts associated with a project and proposes a management framework to address those impacts. This EMP is prepared to develop a responsible framework to manage effectively and ethically the environmental and social impacts of the IWMC. The scope of EMP covers both construction and operation stage of IWMC.

The Environment Protection and Preservation Act (EPPA 4/93) and National Waste Management Regulations (2013) provide the legal and regulatory framework for each aspect of IWMC operation. Island Council will ensure that operations undertaken at the IWMC are in accordance with national regulatory requirements including any conditions of consent imposed by EPA.

Protecting environmentally sensitive areas from project interventions and prevention of damage to groundwater, air, land and ecosystems is a priority of the EMP. Protecting human health and the rights of people, in particular the poor and vulnerable groups, including foreign migrant workers is given due priority in the EMP.

This EMP adopts a performance-based approach. Rather than prescribing actions, the EMP is designed to encourage the Island Council to use their initiative to develop integrated,

appropriate and relevant solutions for their IWMC to achieve beneficial outcomes in an ethical and cost effective manner.

1.2 PURPOSE OF EMP

The EMP has been prepared as a tool to assist the Island Council in the management of the IWMC in accordance with national laws and international best practices.

The EMP contains site-specific strategic actions that the Island Council can implement to ensure the IWMC is managed in a sustainable manner. The EMP provides guidelines for Council staff and employees of IWMC regarding general operational procedures to deal with environmental and social impacts associated with the construction and operation of IWMC. The specific objectives are as follows:

- Identify the Maldives government laws, regulations, policies, guidelines and procedures applicable to the type of project activities financed by LECReD for IWMC;
- Provide stakeholder values and opinions on potential adverse environmental and social impacts due to IWMC construction and operation;
- Provide the environmental and social impact mitigation plans to address the likely adverse impacts;
- Describe the implementation and institutional arrangements for managing environmental and social impacts;
- Provide a mechanism for consultation and disclosure of information; and address complaints and grievances;

- Ensure that environmental and social issues are thoroughly monitored, communicated and necessary interventions are incorporated in the decision-making, and implementation of project activities.

1.3 METHODOLOGY

The methodology adopted for the preparation of the EMP included: review of relevant national environmental and social laws and policy guidelines; review of relevant literature; stakeholder consultations with key agencies of the government and primary and secondary stakeholders; field study visits to IWMC site location; development of management tools; evaluation of proposed tools, in particular with MEE and service providers related to waste recycling and waste disposal.

Information on the existing physical and biological environment and socio- economic conditions (population, employment, economic activities, etc.) was gathered. This information was used as the baseline and to guide the key assumptions and approach of the EMP. The baseline information relevant to the project's implementation covers:

biophysical environment conditions

socio-economic status of project island

membership of the Island Council

registered Non-Governmental Organizations (NGOs)

An outlined management system was developed to enable the Council to manage the environmental, social, health and safety aspects of the IWMC operation.

1.4 STRUCTURE OF EMP

The EMP is structured in the following order:

Legislative and regulatory requirements

Stakeholder values

IWMC Description

IWMC Location and Site

Biophysical Environment

Socio Economic Environment

IWMC Operation

Resource Recovery and Recycling

Environmental Impact Mitigation

Social Sustainability

Environmental Approval Conditions

Environmental Monitoring

Reporting

Grievance Mechanism

This EMP first sets out the principles, laws, regulations, guidelines and procedures to assess the environmental and social impacts related to the IWMC project. It analyses the environmental and social policies and legal requirements of the Government of the Maldives. The EMP then focuses on stakeholder values and concerns. The EMP identifies the environmental and social issues that are important to the stakeholders and ensure the issues are dealt with in a proper and efficient manner.

The EMP then describes the biophysical and social environment parameters relevant to the IWMC. Next, the EMP describes the IWMC designs and operations and the waste management

processes. The EMP outlines the measures that will be taken to mitigate the potential adverse environmental and social impacts, how to offset them, or reduce them to acceptable levels. It contains measures and plans to reduce, mitigate and/or offset adverse impacts and enhance positive impacts, provisions for estimating and budgeting the costs, and information on the agency or agencies responsible for addressing project impacts. In addition, it identifies the monitoring and reporting needs for the IWMC.

1.5 DOCUMENT CONTROL

A copy of the EPA Decision Note for IWMC operation and this EMP shall be kept on site at the IWMC as well as at the Council at all times and shall be made available for inspection.

Council shall ensure that all staff and sub-contractors at the IWMC are familiar with the relevant requirements described in this EMP.

1.6 REVIEWS AND UPDATES

The Council will review and update the EMP as necessary. The EMP will be updated after every review of the annual report or at least every 2 years to ensure that it reflects the facilities and operations at the IWMC and any changes in regulatory requirements. This shall include undertaking revisions and updates due to changes in the IWMC or due to changes in operations or directives from EPA or the MEE.

2 LEGISLATION, POLICIES AND GUIDELINES

Activities carried out at IWMC must comply with the relevant provisions of all legislation relating to the operation of the IWMC. This includes but is not limited to the following:

2.1 CONSTITUTION OF THE MALDIVES

The constitution of the Maldives adopted in 2008 has several provisions to protect the rights of citizens to environment, health, and private property that are relevant to the establishment of the IWMC. The relevant articles include:

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

Article 23: "Every citizen has the following rights pursuant to this Constitution, and the State undertakes to achieve the progressive realization of these rights by reasonable measures within its ability and resources:

(a) adequate and nutritious food and clean water;

(b) clothing and housing;

(c) good standards of health care, physical and mental;

(d) a healthy and ecologically balanced environment;

(e) equal access to means of communication, the State media, transportation facilities, and the natural resources of the country;

(f) the establishment of a sewage system of a reasonably adequate standard on every inhabited island;

(g) the establishment of an electricity system of a reasonably adequate standard on every inhabited island that is commensurate to that island."

Article 67: "The exercise and enjoyment of fundamental rights and freedoms is inseparable from the performance of responsibilities and duties, and it is the responsibility of every citizen: (h) to preserve and protect the natural environment, biodiversity, resources and beauty of the country and to abstain from all forms of pollution and ecological degradation;

Article 230 (a) The administrative divisions of the Maldives shall be administered decentrally.

Article 231 (a) "All members of councils created for decentralized administration shall be democratically elected by secret ballot by their respective communities."

Article 232: "The responsibilities of councils elected for decentralized administration shall include:

to provide democratic and accountable governance;

to foster the social and economic well-being and development of the community;

to establish a safe, healthy and ecologically diverse environment;

to achieve such other objects as prescribed by law.

Access to the court or other impartial and independent authority for the determination of the interest or right of a citizen, provision for payment of adequate compensation when a citizen is deprived of a right are all provisions that are relevant to the scope of activities in IWMCs.

2.2 ENVIRONMENT PROTECTION AND PRESERVATION ACT

The Environmental Protection and Preservation Act (EPPA, Act No: 4/93) enacted on 19 March 1993 is the framework law related to environment protection in the Maldives. Articles 2, 4, 5, 6, 7, and 8 of the law are relevant to the IWMC Project.

According to **Article 7:** any type of waste, oil, poisonous gases or any substances that may have harmful effects on the environment shall not be disposed within the territory of the Maldives. In cases where the disposal of the substances becomes absolutely necessary, they shall be disposed only within the areas designated for the purpose by the government. If such waste is to be incinerated, appropriate precaution should be taken to avoid any harm to the health of the population.

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

Article 5 (a): An Environmental Impact Assessment study shall be submitted to the Ministry of Environment before implementing any development project that may have a potential impact on the environment.

5 (b): The Ministry of Environment shall formulate the guidelines for EIA and shall determine the projects that need such assessment as mentioned in paragraph (a) of this clause.

Article 6: the Ministry of Environment has the authority to terminate any project that has any undesirable impact on the environment. A project so terminated shall not receive any compensation.

Article 4: Ministry of Environment shall be responsible for identifying protected areas and natural reserves and for drawing up the necessary rules and regulations for their protections and preservation.

Article 2: concerned government authorities shall provide necessary guidelines and advise on environmental protection in accordance with prevailing conditions and needs of country.

The authority responsible for the Environment Act is the Ministry of Environment and Energy.

2.3 DECENTRALIZATION ACT

The Decentralization Act establishes the local councils as the highest political authority in the locality and who shall have executive powers to be exercised in accordance with the Act. The Act establishes Atoll Councils, Island Councils and City Councils.

Articles 24 (b) and 42 (b) of the Act mandate Island Councils and City Councils to provide adequate waste management services.

According to Article 23 (h), (i) and Article 41 (g), Island Councils and City Councils are responsible for release of land for development according to the provisions of the Land Act, the Land Use Plan of the island, and any guidelines issued by the Ministry responsible for land.

According to Articles 24 (e) and 42 (e) of the Decentralization Act provision of electricity, water, sewerage and other utility services in their jurisdictions according to the laws of the Maldives is the responsibility of Island Councils and City Councils respectively.

2.4 WASTE MANAGEMENT POLICY

The aim of the waste management policy is to formulate and implement guidelines and means for solid waste management in order to maintain a healthy environment. The key elements of the policy include:

Ensure safe disposal of solid waste and encourage recycling and reduction of waste generated;

Develop guidelines on waste management and disposal and advocate to enforce such guidelines through inter-sectoral collaboration;

Ensure safe disposal of chemical, hazardous and industrial waste.

The Council must be aware of the policy and all solid and hazardous waste brought to IWMC should be disposed according to the EMP, which reflects the principles of the Waste Management Policy.

2.5 WASTE MANAGEMENT REGULATION

The Waste Management Regulation (WMR) put on gazette in August 2013 came into force in February 2014. EPA implements the WMR. The aim of WMR is to implement the national

waste policy which contains specific provisions to (a) implement measures to minimize impacts on human health; (b) formulate and implement waste management standards; (c) implement an integrated framework for sustainable waste management (d) encourage waste minimization, reuse and recycling (e) implement Polluter Pays Principle; (f) introduce Extended Producer Responsibility.

WMR contains four main sections: (1) waste management standards; defines standards for waste collection, transfer, treatment, storage, waste site management, landfills and managing hazardous waste (2) waste management permits; defines approval procedures for waste sites (iii) waste transfer. Standards and permits required for waste transport on land and sea, including transboundary movements, (iv) reporting requirements: defines reporting and monitoring requirements and procedures (v) enforcement: defines procedures to implement WMR and penalties for non-compliance.

If any hazardous waste including electronic waste is to be disposed in the Maldives, waste sites specifically approved to manage hazardous and Special Category waste should handle it. Transportation and handling shall also conform to the standards specified in WMR. If the waste is to be exported for reuse or disposal in another country, an application needs to be submitted to EPA 03 months prior to the shipping date. EPA will issue an approval based on compliance with WMR clauses and international conventions.

Thus IWMC shall comply with WMR in construction and operation activities.

2.6 EIA REGULATIONS

Environmental Impact Assessment regulations were issued by MEE on 8 May 2012. The first step in environmental assessment process involves screening of the project to be classified as

one that requires an EIA or not. Based on this decision, the Ministry then decides the scope of the EIA which is discussed with the proponent and the EIA consultants in a "scoping meeting". The consultants then undertake the EIA starting with baseline studies, impact prediction and finally reporting the findings with impact mitigation and monitoring program. This report follows the principles and procedures for EIA outlined in the EIA regulations.

The EIA report is reviewed by MEE following which an EIA Decision Note is given to the proponent who will have to implement the Decision Note accordingly. As a condition of approval, appropriate environmental monitoring may be required and the proponent shall have to report monitoring data at required intervals to the Ministry. The project proponent is committed to implement all impact mitigation measures that are specified in this EMP. Furthermore, the proponent is committed to environmental monitoring and shall fulfil environmental monitoring requirements that may be specified in the decision note as a condition for project approval. The processes specified in this EMP are based on the EIA regulations.

2.7 LAND ACT

The Land Act (1/2002) governs the allocation of land for different purposes and uses and other issues regarding the issuing of land, and the sale, transfer and lease of Maldivian land.

The Act states that: All transactions concerning the issuing, receiving, owning, selling, lease, utilizing and using Maldivian land shall be conducted in compliance with this Act.

Policies concerning Maldivian land shall be decided by the President of the Maldives on the advice of the discussions in the Cabinet of Ministers. Under the Land Act several regulations have been formulated and include:

Issuing state dwellings regulation

Regulation governing the transfer of Land as a gift or by will

Lease of buildings and dwellings regulation

Mortgaging land, building and flats regulation

Registration of state dwelling and building regulation

Regulation on the inheritance of fixed assets on state dwellings

Transfer or transfer by will regulations (2004)

Privatization of state business land regulations (2006).

2.8 LAND USE PLANNING REGULATION

The Land Use Planning Regulations and Guidelines (2005) include land use instruments such as inclusionary zoning and quotas. Land use plans are prepared in consultation with the Ministry of Housing and Infrastructure, which does have allocations for residential areas as well as for different infrastructure and social needs.

2.9 CULTURAL AND HISTORICAL PLACES AND OBJECTS ACT

The Law on Cultural and Historical Places and Objects of the Maldives (27/79) prohibits destroying or damaging any historical and cultural places, sites, objects and artefacts belonging to the sovereign area of the Maldives. The historical and cultural objects are those that were used by or feature the life of locals or foreign ancestors who had resided in the Maldives. The historical and cultural places refer to religious monuments, idols or place of worship or residences used by locals or foreign ancestors who had resided in the Maldives.

2.10 GENERAL LAWS ACT

The General Laws Act 4/68, Paragraph 7 stipulates that public property such as trees, coconut palms, farm land, households and such owned by public or private individuals, if required to be obtained by the Government, the property can be obtained by the High Court of the Maldives. The above shall be done only after the individual is fairly compensated for the property or by financial compensation proposed by the property holder. If the public property to be attained is a land plot or a household, the property holder shall be given adequate time for clearance of the area.

If a private property belonging to one individual creates nuisance to another, for issues in Male' the matter shall be resolved by the Ministry of Home Affairs and Housing or Ministry of Atolls and Development for issues arising in the islands.

2.11 CONSERVATION OF OLD TREES REGULATION

The contractors shall ensure that no old trees are felled in any island of the Maldives to be transferred to this project or for any need of this project.

2.12 CUTTING DOWN AND EXPORT OF TREES AND COCOUNUT PALMS

The Regulation on Cutting Down, Uprooting, Digging Out and Export of Trees and Palms from One Island to Another specifies that the cutting down, uprooting, digging out and export of trees and palms from one island to another can only be done if it is absolutely necessary and

there is no other alternative. It further states that for every tree or palm removed in the Maldives two more should be planted and grown in the island.

The regulation prohibits the removal of the following tree types;

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

2.13 BUILDING ACT (4/2017)

The Building Act (4/2017) regulates construction of buildings and structures. It requires that all buildings and structures be constructed in accordance with the Act and after obtaining the required permits from the concerned authorities. The Act gives legal empowerment to the Maldives Building Code.

2.14 MALDIVES BUILDING CODE

The building code hand book of Maldives details the guidelines and standards that should be used for designing building in Maldives. All construction projects are required to meet the standards specified in the building code. All construction activities of the project will follow

the Building code. Construction waste and debris disposal must be undertaken in accordance with the requirements of the Building Code.

2.15 CORAL AND SAND MINING REGULATION

Coral mining from house reef and atoll rim has been banned through a directive from President's Office dated 26 September 1990.

Regulation on sand mining covers sand mining from uninhabited islands that have been leased; sand mining from the coastal zone of other uninhabited islands; and aggregate mining from uninhabited islands that have been leased and from the coastal zone of other uninhabited islands.

Sand should not be mined from any part of the existing Island, beach or the newly reclaimed island beach. Sand should also not be mined from within 100 ft. of the shoreline. Please see regulation on dredging and reclamation for further controls.

2.16 DEWATERING REGULATION (2013/R-1697)

This regulation is drafted under the Act number 4/93 (Maldives Environment Protection and Preservation Act) and issued on 31st December 2013. The main purpose of the regulation is to minimize the impact of dewatering activities on ground water table and also to decrease the impacts on the receiving environment of the disposed water. The regulation encourages prevention of contamination and damage to ground water table, protect the living organisms as well as the environment from the negative impacts due to dewatering activities.

This regulation is enforced by EPA of the Maldives.

If dewatering is to be carried out for any development purposes in any of the islands in Maldives, it shall be done by gaining a written approval from the enforcing agency or an agency assigned by the enforcing body. However, dewatering done at individual level i.e., from a bore well or for the purpose of installing a bore well and water drawn for agricultural purposes are considered exceptions from the regulation.

Dewatering can only be to be carried out, after gaining approval by submitting "the dewatering approval form" in the annex 1 to the enforcing body for approval with all the required documents expressed and with an administrative fee of Rf500. Water quality tests results also have to be submitted as one of the required component.

The regulation also guides on where and how the extracted water shall be disposed of, and how it has to be handled. According to the regulation, permission can be granted for dewatering at a stretch for a maximum of 28 days, for which a sum of Rf500 should be paid per day. This amount is liable to be increased with the number of days increased.

A fine not exceeding Rf100 million may be charged for violation.

2.17 HEALTH CARE WASTE MANAGEMENT POLICY

The "National Policy on Healthcare Waste Management" (2016) stipulates that all health facilities have to be responsible for the safe management of health care waste in an environmentally sound manner that minimizes risk to the community and the staff involved in its management. All health facilities are required to develop a Healthcare Waste Management Plan as part of an overall environmental management system, unless exempted by the responsible authority. The policy requires that quantities of hazardous health care waste and handling information be documented and reported to the relevant departments of MoH

2.18 SUBSTANCES PROHIBITED TO BE BROUGHT INTO THE MALDIVES ACT

The objective of Act (4/75) is to deal with substances that are prohibited to be imported unless for government purposes, or only to be imported with special permission, or materials which are completely prohibited from being imported into the country. Chemical substances are under import, use and manufacture control unless accompanied with a special permission from the Ministry of Defence and National Security. These include hazardous chemicals and chemical based toxins that do not fall under the category of explosives, but may be used as substances for chemical weapons.

2.19 PESTICIDES BILL

Pesticides Bill has been drafted and sent to the Attorney General's Office by MOFA. The objective of the Bill is to manage pesticide use in the country at every stage of its chemical life cycle. The Bill will regulate the management of importation, manufacture, distribution, sale, use and disposal of pesticides with the aim of protecting human, animal and plant health, marine and terrestrial environment. The Ministry of Fisheries and Agriculture is the authority responsible for enforcement of the provisions and a Pesticide Unit is to be established.

2.20 HUMAN RIGHTS ACT

In 2005, the Human Rights Commission Act was passed. The Act (6/2006) was subsequently amended in 2006 to ensure compliance with the Paris Principles on the status and functioning of national institutions for protection and promotion of human rights. The amended Human Rights Commission Act provides the HRCM independence and autonomy as a statutory body.

2.21 EMPLOYMENT ACT

The legal framework to govern the rights and responsibilities of workers in the Maldives is included in the Employment Act (2/2008) that was ratified and signed into law in May 2008. The Employment Act provides for the creation of a Labour Relations Authority, an Employment Tribunal and an Advisory Board on wages. To date, four amendments have been brought to the Employment Act (2/2008). The amendments were made through the following Acts: 14/2008; 12/2010; 3/2014; 14/2015.

2.22 PENSIONS ACT

Article 12 of the Maldives Pensions Act (8/2009) introduced the Maldives Retirement Pension Scheme. It is mandatory for the private and public sectors as well as the self-employed to participate in the contributory Maldives Retirement Pension Scheme. The annual contribution each employee and employer has to make to the employees retirement savings account is set at seven per cent of pensionable wage for a total of 14 per cent.

2.23 IMMIGRATION ACT

The Maldives Immigration Act (1/2007) lays down the rules for entry, departure and deportation of foreign nationals. Article 15 of the Act provides for work visa: the permit to remain in the Maldives for the duration of a work permit granted to a foreign national visiting the Maldives for the purpose of working, where a work permit has been obtained by that foreign national consistent with the regulations of the concerned Government authority.

2.24 ANTI-HUMAN TRAFFICKING ACT

The Anti-Human Trafficking Act (12/2013) passed by the parliament on 03 December 2013 and ratified on 08 December 2013 makes trafficking in persons a criminal offence in the Maldives. The purposes of the Act are to: prevent trafficking of persons through and across the Maldives; establish the crimes of trafficking in persons and prescribe punishments; provide for prosecution of perpetrators of trafficking in persons; provide protection and assistance to victims of human trafficking; promote and protect the human rights of trafficked victims; and engage with local and international NGOs working against human trafficking.

The Act defines the crimes of trafficking, exploitation, and debt bondage. According to this Act, forced labour and fraudulent recruitment are considered human trafficking. The Act specifies the penalties for perpetrators of trafficking. The penalty for trafficking offence is a jail imprisonment up to 10 years that can be extended to 15 years if children are involved.

2.25 ENERGY POLICY AND STRATEGY

Maldives Energy Policy and Strategy (2016) consists of 5 key policy statements:

1. Strengthen the institutional and regulatory framework for the energy sector
2. Promote energy conservation and efficiency
3. Increase the share of renewable energy in the national energy mix
4. Improve the reliability and sustainability of electricity service and maintain universal access to electricity
5. Increase national energy security

2.26 WATER AND SEWERAGE POLICY

The National Water and Sewerage Policy (NWSP 2017) focuses on providing access to safe water and sewerage services for all. The NWSP has 9 goals: ensure access to safe water supply and adequate sewerage services; adopting cost-effective, environment friendly and appropriate technologies; strengthening legal framework; encourage private sector investments; building institutional capacity; maintain financial and environmental sustainability; strengthen advocacy and awareness; promote research and development; and protect and conserve water resources. Policy objective 9: calls for adopting a holistic approach to water resources protection, conservation, management, and pollution control. Among the strategies for objective 9 are: establish an effective research based monitoring program and information platform for inhabited islands' water resources; develop and implement evidence based water resources management plans taking into consideration the sustainability and vulnerability of the island fresh water resources, wastewater reclamation, water reuse and minimize impact from pollution.

2.27 DESALINATION REGULATION

According to Desalination Regulation of the Maldives, all desalination plants operating in the Maldives catering for public water supplies and commercial purposes would have to be registered with EPA.

2.28 GENERAL GUIDELINES FOR DOMESTIC WASTEWATER DISPOSAL (2006)

General Guidelines for Domestic Wastewater requires wastewater disposal to be undertaken with written consent of the Agency.

2.29 OZONE PROTECTION – HCFC REGULATION

HCFC Regulation (2010/R-19) was issued by the Ministry of Environment and Energy under the Environment Protection and Preservation Act (4/93). The regulation manages the HCFC usage and phase-out in line with the obligations under the Montreal Protocol on Substances that Deplete the Ozone Layer. This regulation controls the importation, sale and usage of HCFC and HCFC blends.

2.30 EXPORT IMPORT ACT (31/79)

The exporting of items naturally formed and produced in the Maldives, importing items into the Maldives, re-exporting, selling of imported goods, and operation of such activity shall be carried out with the permission of the Ministry of Economic Development, and in accordance with the regulations made by the Ministry.

2.31 PUBLIC HEALTH PROTECTION ACT (7/2012)

The purpose of the public health protection act is to establish policies for protection of public health, identify persons responsible for protection of public health, define how public health protection policies will be implemented. The objectives of the Act also include: establishing policies to respond to public health emergencies; classify situations which may be harmful to health and establish methods to act in such a situation; establish roles and responsibilities of island, atoll, and city councils in protection of public health. Chapter 5 of the Public Health Protection Act covers identifying health hazards, eliminating risk, reporting health hazards, and orders on things to be done or not done in relation to a building.

2.32 ENVIRONMENTAL LIABILITY REGULATION (Regulation 2011/R-9)

This law is pursuant to Article 22 of national constitution that states that protection, preservation and maintenance of the Maldivian natural environment, the richness of the living species, the natural resources and the beauty of the Maldives for the present generations as well as for the future generations is a basic obligation of the Maldivian government. The government shall enforce that the activities conducted in order to gain economic and social development should be of sustainable nature that protect the environment and such activities shall not deteriorate the environment, endanger any species, damage the environment, and shall not waste any natural resources.

This regulation is also pursuant to Environment Protection and Preservation Act of Maldives (4/93). The regulation is aimed at maintaining equal standards for reprimanding and enforcing environmental liabilities, fines for those who violate the rules and regulations and give guidance to those who are involved in the implementation process of the regulations pursuant to Preservation Act of Maldives (4/93).

One of the key objectives of the environmental liability regulation is also to practice polluter-pay-principles in the Maldives.

3 STAKEHOLDER CONSULTATIONS

The successful implementation and management of the IWMCs would require adopting an approach such as 'Cradle-to-Cradle lifecycle approach. The Cradle-to-Cradle lifecycle approach is continuous with end products reintroduced into the lifecycle for reuse. Minimizing waste is a key principle of the EMP. In the collection process, the waste going to the IWMC would need to be segregated. At the IWMC, waste would need to be further sorted for composting and recycling and re-introduced back into the lifecycle as products to be reused.

3.1 FRAMEWORK FOR CONSULTATION

Maximizing stakeholder value is a key principle of the EMP. To assess issues for successful management and implementation of the IWMCs, the stakeholder consultations were conducted using the sustainability framework. The consultations were structured around the three fundamentals of sustainability – social performance, environmental performance and economic performance of the IWMC. Governance is built in to the structure, as management of IWMCs is imperative for successful implementation of the project. In this regard, the employees of the project, people's trust in the system, environmental resources, biodiversity and financial management of the waste sites were the key discussions around which the consultations were structured. The framework for the structure of consultation is presented below.

Table 1: Sustainability framework for stakeholder consultation

Social performance	Employees of the project, trust in the management of the system
Environmental performance	Biodiversity around the waste site, renewable energy, material inputs and outputs
Economic performance	The equipment and its maintenance, financial management of the project
Governance	Procedures for functioning of IWMC, willingness to pay, set up of IWMC, management of IWMC, monitoring of IWMC

3.2 KEY STAKEHOLDERS

Prior to the start of consultations; the stakeholders were mapped using the stakeholder mapping framework – internal stakeholders and external stakeholders. External stakeholders were further mapped as primary and secondary stakeholders. The internal stakeholders are the owners, employees and sponsors of the project. The primary stakeholders comprise of the users, buyers, regulators, suppliers, community and the media. The secondary stakeholders comprise the participants in broad economic sectors, society, environment and governance. The stakeholder framework and the identified stakeholders for the EMP are presented below.

Table 2: Stakeholder identification framework for EMP

Level	Category	Type	Stakeholder
Primary Stakeholders	*Owners:*	Island Councils	Elected councilors
			Secretariat staff
	Employees:	Waste sweeping	Maldivians
			Foreigners
		Waste collection	Maldivians
			Foreigners
		Waste burning	Maldivians
			Foreigners
	Sponsors	Finance	UNDP
			LECReD
			Ministry of Finance and Treasury
		Households	All households
		Businesses	Shops
			Café's & Restaurants
			Guesthouses
			Dhoni
			Fish processors
			Farmers
			Service providers
		Institutions	Health Center
			Hospital
			Schools

	Buyers	Compost	Farmers
			Households
			Resorts
		Recyclables	PARLEY
			BEAM
			Secure Bag
	Regulators	Environment	EPA
		Waste	Waste Department
		Health waste	Health Protection Agency
		Tourism	Ministry of Tourism
		Waste to energy	Maldives Energy Authority
		Land	Land Survey Authority
	Suppliers	Electricity	Fenaka
		Water	Fenaka
		Sewerage	Fenaka
		Construction material	
		Construction labour	
		Machinery	
		Vehicles	
		Materials	
	Community	Women	
		Men	
	Media	National TV	
		National Radio	
		National Newspapers	
		Local TV	
		Local Radio	
		Local Newspapers	
Secondary stakeholders	*Economy*	Tourism	Tourist resorts
			Guesthouses
			Dive and surf
			Café's and restaurants
		Fishermen	
		Farmers	
	Society	Future generations	Youth
			Children
		NGOs	
	Environment	Natural environment	Ministry of Environment
	Governance	Local Governance	LGA
			Atoll Council
		Parliament	MPs
		Judiciary/Courts	Island Courts

3.3 KEY FINDINGS OF STAKEHOLDER CONSULTATIONS

Stakeholder consultations were undertaken with relevant agencies in Male' and the stakeholders in the island. The consultants travelled to the island to undertake the consultation with stakeholders in the island. The sustainability framework for consultation was used in categorizing the issues identified by the stakeholders. In order to maximize value for internal stakeholders, efficient use of the capital and resources, successful implementation of the project and monitoring of the waste center are important. To maximize stakeholder value for external stakeholders, uninterrupted services, respect for worker's rights and sustainably managed waste centres are important. The table below presents the framework used for consultation, with topic of discussion, the issues related to the topic and the recommendations proposed to address the issues.

Table 3: Key concerns of stakeholders and relevant recommendations for EMP

		Kalaidhoo	
	Topic	**Issues**	**Recommendation**
Social performance	Public acceptance	All stakeholders welcome the project and are supportive.	
		The results of the project shall be sustainable, otherwise there is risk of losing public and stakeholder confidence and trust.	
	Resettlement	No issue at present	
	Land acquisition	No issue at present	
	Employment	No staff employed at the moment	
	Wages	Future employee wages was not discussed	

	Work hours	Not decided yet	
	Work condition	MWC work not started yet.	
	Occupational health and safety	Protection gear is to be provided by LECReD project.	
	Training of staff	Staff have not been recruited yet	
	Communication with staff		
	Public awareness	Public are aware of the IWMC site and agree with the location. Public have not been informed of the waste collection and management process. The island concil requested for external support to create public awareness.	
Environmental performance	Clean up of existing waste dumps	Kalaidhoo is a big island with farming as the main activity. Disposing green waste to IWMC is a concern as the quantity of greenwaste is high	
	Location of proposed IWMC		
	Clearance of vegetation and trees		
	Existing waste management	Currently households dispose waste on their own in different parts of the island.	
	Flooding (tidal and wave)		
	Flooding (rainfall)		
Economic performance	User fee		
	Equipment and vehicle		
	Compensation for property	No issue	
Governance	Waste management plan	Waste managament plan has been prepared for the island.	
	Proposed procedures and process	No policies or procedures have been designed.	

	Waste collection process	Waste collection process has not been designed yet.	
	Cultural, historic or religious sites	No such areas have been identified in the aoolcated site.	
	Access road	Access road present.	
	Access to electricity	No access to electricity in the allocated area yet.	
	IWMC operation responsibility	Island Council currenly in planning stages to take the operation responsibility by recruiting people to manage IWMC.	
	Public disclosure	No official system designed	
	Enforcement of regulations		
	Grievance mechanism	No official system designed	

3.4 FUTURE CONSULTATIONS

It is recommended that comprehensive community consultations be conducted before the operation of IWMC. All households will need to be informed and educated on the waste segregation, waste collection and waste management protocols that will be adopted at IWMC. Households and businesses shall be consulted on user fees to ensure sustainable operations of IWMC.

4 IWMC DESCRIPTION

4.1 PROJECT TITLE

Project title is: “Construction and Operation of Island Waste Management Center in Laamu Kalaidhoo”.

4.2 PROJECT PROPONENT

The proponent of this project is United Nations Development Programme (UNDP) on behalf of Kalaidhoo Island Council. UNDP LECReD is financing the project.

The address and contact information of the proponent are as follows:

United Nations Development Programme

4Fl, Aage, Boduthakurufaanu Magu

Henveiru, Male',Maldives

Tel: (+960) 334 3265

Fax: (+960) 332 4504

Email: registry.mv@undp.org

The implementing agency for the Project is:

Laamu Kalaidhoo Island Council

Laamu Kalaidhoo

Email: idhara456@gmail.com

Tel: 6800730

4.3 PROJECT DESIGN

This project is aimed at addressing the solid waste management problem faced by the island community of Kalaidhoo. Laamu Kalaidhoo has a population of 579 according to the latest Census 2014. The registered population of the island is 1078. The total number of households in Kalaidhoo is 137. The average size of household is 4.2 persons. Kalaidhoo has a total land area of 360 hectares.

For waste management at island level, the establishment of an island IWMC is a prerequisite as identified in the National Waste Management Policy 2015. The IWMC design and construction has to meet regulatory requirements stipulated in the Solid Waste Regulation 2012.

4.4 WASTE QUANTITY AND SOURCES

It is estimated that 0.37 tonnes of waste is generated daily in Kalaidhoo that requires disposal. Hence, it is anticipated that more than 135 tonnes of waste will need to be managed by IWMC on an annual basis.

The predominant source of waste in Kalaidhoo is domestic municipal waste. Only municipal waste will be disposed at the IWMC. This is following the regional approach to the management of waste whereby recyclables, organic and residual waste from IWMC will be taken to a regional IWMC for resource recovery and processing.

There are no major industrial and commercial activities in Kalaidhoo. A small quantity of institutional waste and commercial waste will need to be accepted and managed at IWMC.

4.5 TYPES OF WASTE

Of the total waste generated in the island, 66% is considered compostable, 12.5% is recyclable and 21.4% is likely to need incineration. The recyclable component consists of glass, plastic, metals and paper & cardboard. Waste that requires incineration is considered to be the hazardous & infectious waste and the types of waste categorized as others.

4.6 WASTE GROWTH

With no industry and limited commercial activity, the waste growth is dependent on domestic household waste. There are no accurate population figures for Kalaidhoo from Censuses. Kalaidhoo population figures were counted under Isdhoo population until 2014 Census when Kalaidhoo was considered as a separate administrative island for Census purposes. It is estimated that the population has remained relatively stable over the last 25 years. Furthermore, there is evidence of high level of outward migration from the island as indicated by the gap in registered population (1078) and census population (579).

The amount of waste generated has increased significantly over the last 25 years, perhaps due to lifestyle changes and income growth during this period. With the level of well-being, income, and lifestyle at present, slow and steady increase in waste generation patterns is anticipated. It is estimated that the quantity of waste generated in Kalaidhoo will continue to increase and will reach more than 250 tonnes per year by 2025.

4.7 PROJECT SCOPE

The proposed project covers 9 main elements:

1. Mobilization of construction materials
2. Site preparation

3. Foundation laying and concrete works

4. Construction of storage, equipment room, sorting area, and compost bed

5. Installation of rainwater tank

6. Installation of water pump

7. Power connection

8. Installation of signboards

9. Installation of fire extinguishers

4.8 DESIGN AND ENGINEERING CONSULTANTS

Ministry of Environment and Energy and UNDP LECReD Project have developed the design criteria and technical specifications. The drawings for IWMCs were prepared by G. Saravanan (Consultant Civil Engineer) and checked by Fathimath Shafa-ath (Engineer – MEE).

4.9 EMP CONSULTANT

CDE Consulting (www.cde.com.mv) undertook all the EMP related work for the project. The team of consultants who contributed to this EMP are:

Dr. Shaig Ahmed (Lead Author and EIA Consultant)

Dr. Simad Saeed (EIA Consultant)

Ms. Nashiya Saeed (Social and Economic Assessment)

Ms. Hana Saeed (Bio Physical Environment Assessment)

Mr. Ali Nishaman Nizar (Terrestrial Environment Assessment)

Mr. Hussain Khalid (Water and Noise Assessment)

5 IWMC LOCATION AND SITE

5.1 LOCATION

The proposed IWMC is located in the South Eastern corner of the island (Figure 1).

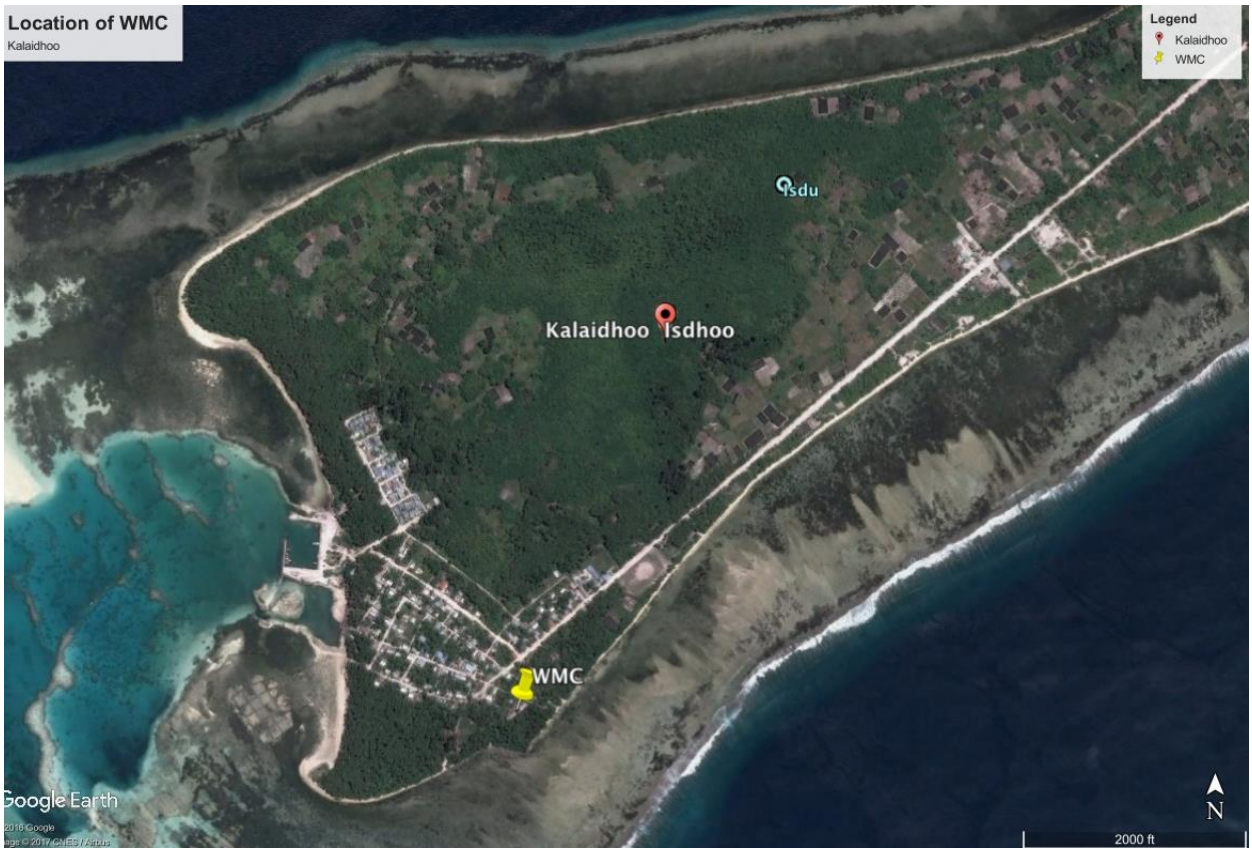

Figure 1: Waste Management Center (IWMC) location

5.2 OWNERSHIP

The State of Maldives is the owner of the land where IWMC will be located.

5.3 LAND USE PLANNING AND ZONING

At present there is no land use plan for the island.

The Island Council has allocated land for this project in accordance with the government protocols. The site has been approved by the Maldives Land and Survey Authority (MLSA).

The council proposed land boundary is 693.6 m2 (27.2m x 25.5m).

The IWMC is located with a buffer zone of 15 m from the beach line and 30 m from the nearest housing plot. The neighboring land use is for sewage treatment plant.

5.4 FACILITIES AND SERVICES

The main facilities of the IWMC (Figure 2) are:

Waste transfer area

Sorting platform

Stockpile area for metals, plastics, paper/cardboards, glass, and hazardous waste

Equipment room

Compost bed for organic waste

Staff room

Toilet

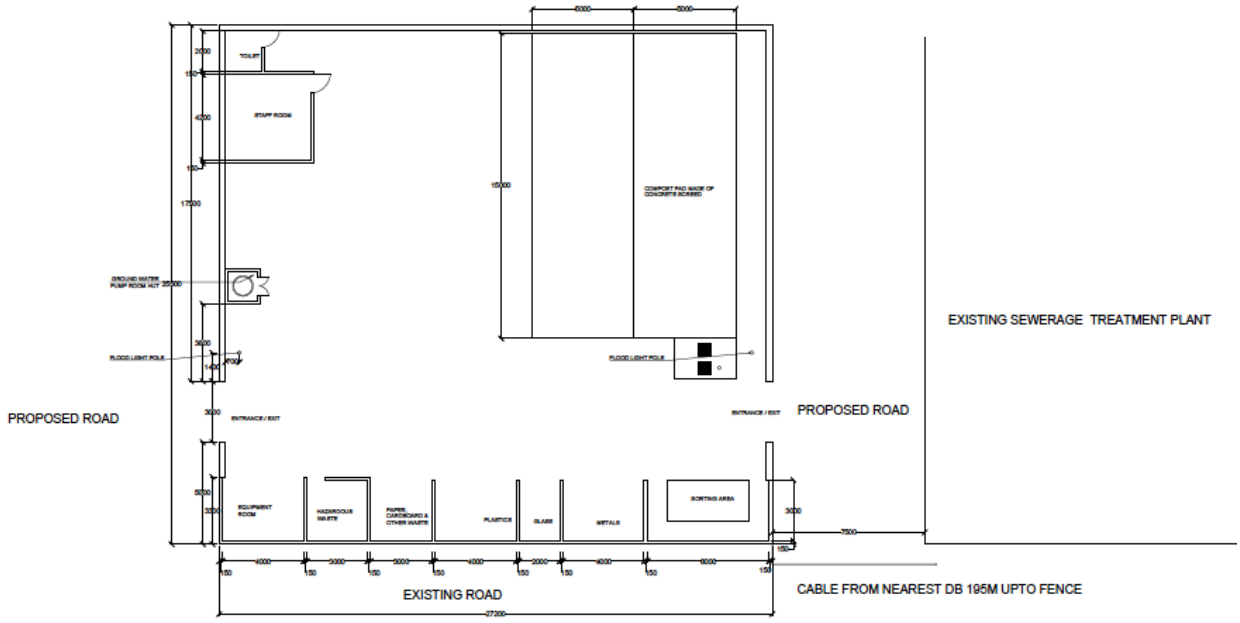

Figure 2: Main facilities to be established in IWMC

5.5 SITE HISTORY

The site allocated for IWMC is previously unused green land. There is no evidence of previous land use in the site.

5.6 NEAREST SENSITIVE LAND USE

There is no environmentally sensitive land use in the vicinity of the site. The nearest sensitive environmental area is the beach that is located to the east at the distance of 105 feet.

5.7 NEIGHBOURING LAND USES

There is a sewage treatment plant (STP) located to the west of the IWMC site. The Kalaidhoo Island Council Secretariat is adjacent to the STP plot of land. To the north, east and south of

the IWMC plot is green land under vegetation cover. The nearest housing plot is located 426 feet from the IWMC and the beach is 105 feet away from the IWMC to the east.

5.8 SITE ACCESS

There is an east-west road that provides access to the IWMC (Figure 3). The design of the IWMC includes two roads to provide access to the site on the western and eastern sides of the plot.

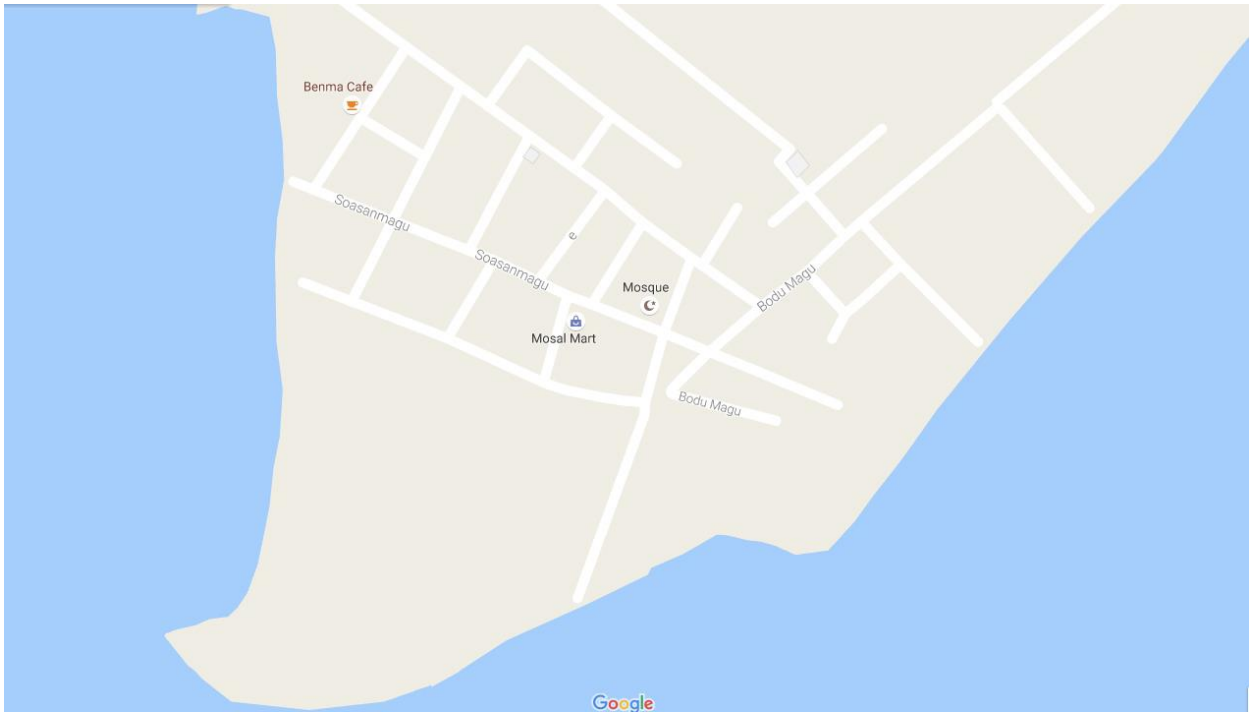

Figure 3: Land use adjacent to the proposed location

5.9 LAND USE CONSENT

The MLSA has provided consent for IWMC and use.

5.10 LICENSE TO CONSTRUCT AND OPERATE IWMC

The Island Council has sent to Environment Protection Agency a request to get the project screened for Environmental Impact Assessment.

EPA has informed the Island Council that the Island Council has to prepare and submit an EMP for the IWMC. This EMP is designed to fulfill the requirement of EMP. The IWMC will require a Decision Note from the Environment Protection Agency to operate. A copy of the Decision Note shall be annexed to this document.

6 BIOPHYSICAL ENVIRONMENT

6.1 CLIMATE AND METEOROLOGY

The climate in the island is warm and humid, typical of the tropics. The average temperature ranges between 25°C to 30°C and relative humidity varies from 73 percent to 85 percent. The annual average rainfall is approximately 1,948 mm. As the island lies close to the equator, it receives plenty of sunshine throughout the year. On average the island is expected to receive 2704 hours of sunshine each year. Table 4 provides a summary of key meteorological findings for Maldives that is applicable for the project location.

Table 4: Key meteorological parameters for Maldives

Parameter	Data
Average Rainfall	9.1mm/day in May, November; 1.1mm/day in February
Maximum Rainfall	184.5 mm/day in October 1994
Average air temperature	30.0 C in November 1973; 31.7 C in April
Extreme Air Temperature	34.1 C in April 1973;17.2 C in April 1978
Average wind speed	3.7 m/s in March; 5.7 m/s in January, June
Maximum wind speed	W 31.9 m/s in November 1978
Average air pressure	1012 mb in December; 1010 mb in April

The climate of project location is characterised by the monsoons of the Indian Ocean. Monsoon wind reversal significantly affects weather patterns. Two monsoon seasons are observed: the Northeast (Iruvai) and the Southwest (Hulhangu) monsoon. The parameters that best distinguish the two monsoons are wind and rainfall patterns. The southwest monsoon is the rainy season while the northeast monsoon is the dry season. The southwest monsoon occurs from May to September and the northeast monsoon is from December to February. The

transition period of southwest monsoon occurs between March and April while that of northeast monsoon occurs from October to November.

Winds

The winds that occur are mostly determined by the monsoon seasons. The two monsoons are considered mild given that the location is close to the equator. As a result, strong winds and gales are infrequent although storms and line squalls can occur, usually in the period May to July. During stormy conditions gusts of up to 60 knots have been recorded at Male'.

Wind has been uniform in speed and direction over the past twenty-plus monsoon seasons in the Maldives (Naseer, 2003). Wind speed is usually higher in central region of Maldives during both monsoons, with a maximum wind speed recorded at 18 ms-1 for the period 1975 to 2001. Mean wind speed is highest during the months May and October in the central region.

Besides the annual monsoonal wind variations there are occasional tropical climatic disturbances (tropical storms or low intensity tropical cyclones) in the central region which increases wind speeds up to 110 km/h, precipitation to 30 to 40 cm over a 24 hour period and storm surges up to 3 m in open ocean (UNDP, 2006).

Table 5 summarizes the wind conditions in central Maldives throughout a year. Medium term meteorological data from Hulhule Meteorological Centre (see Figure 4, Figure 5 and Figure 6) and findings from long-term Comprehensive Ocean-Atmosphere Data Set (COADS) are used in this analysis.

Table 5: Summary of General Wind Conditions from National Meteorological Centre

Season	Month	Wind
NE - Monsoon	December	Predominantly from NW-NE. High Speeds from W
	January	
	February	
Transition Period 1	March	From all directions. Mainly W. High Speeds from W.
	April	
SW - Monsoon	May	Mainly from W. High Speeds from W.
	June	
	July	
	August	
	September	
Transition Period 2	October	Mainly from W. High Speeds from W
	November	

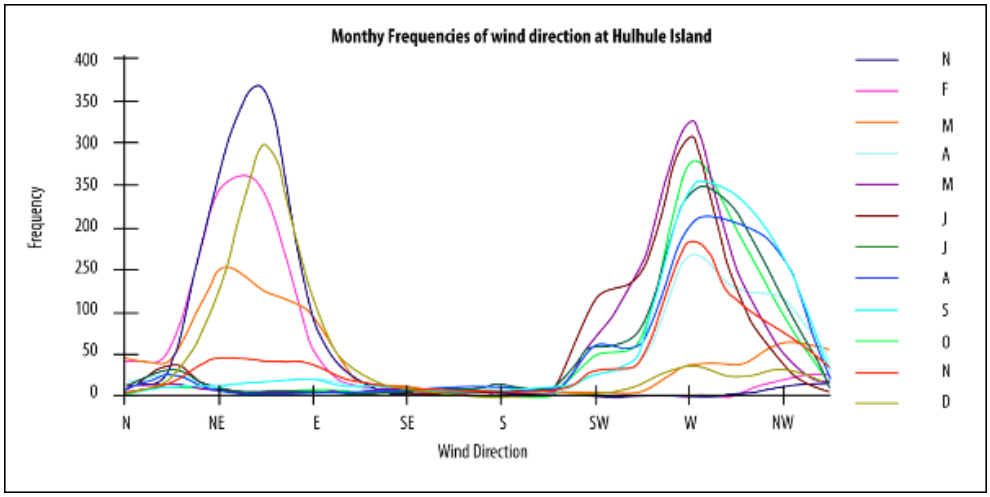

Figure 4: Monthly Frequencies of Wind Direction in Central Maldives based on National Meteorological Center 10 year Data (adapted from Naseer, 2003).

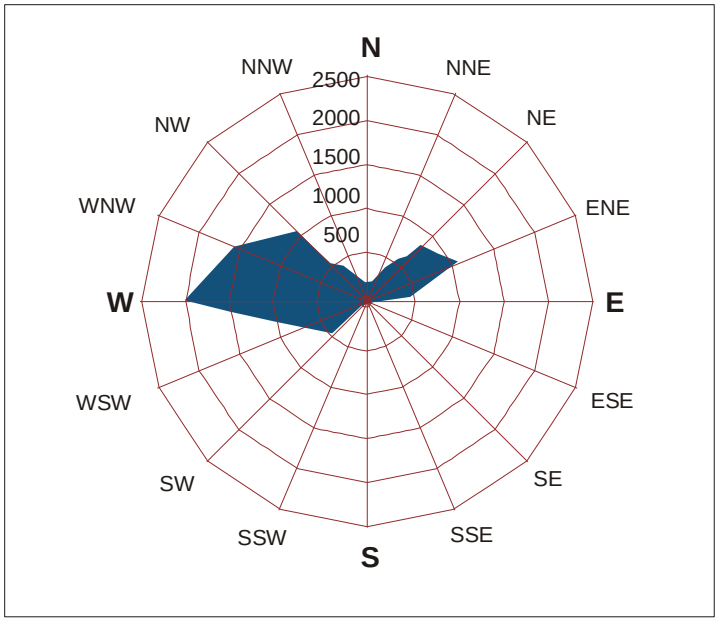

Figure 5: 24 Year Wind Frequency Recorded at National Meteorological Center.

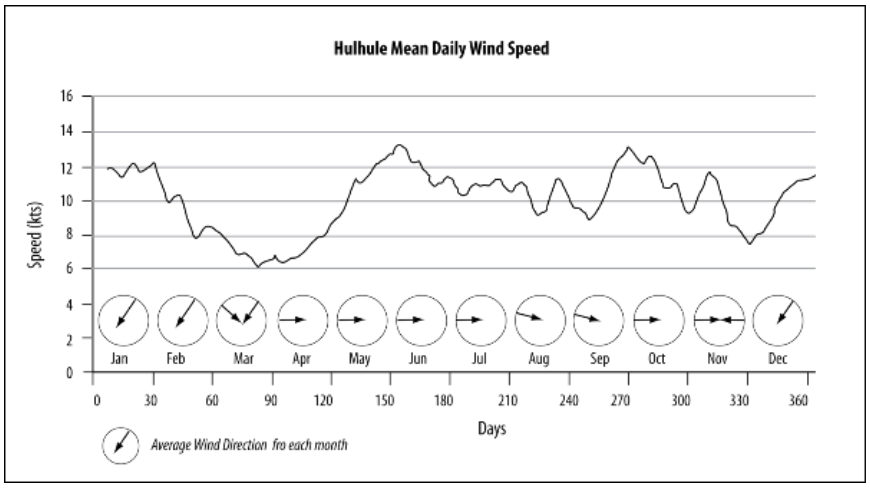

Figure 6: Mean Daily Wind Speed and Direction Recorded at National Meteorological Centre (1978 – 2004)

The Disaster Risk Profile of Maldives (UNDP, 1006) reports 11 cyclonic events over the Maldives in the last 128 years and only one event over the central Maldives. All of these events were of category 1 cyclones. There have been no cyclonic events since 1993.

The island is located in a moderate risk cyclonic hazard zones (UNDP, 2006). The project site is expected to receive regular annual strong winds during NE monsoon and the peak SW monsoon.

Rainfall

The average annual rainfall for the Maldives is 2,124 mm. Mean monthly rainfall varies substantially throughout the year with the dry season getting considerably less rainfall. The proportions of flood and drought years are relatively small throughout the archipelago, (UNDP, 2006).

The nearest meteorological station is in Kadhdhoo Airport but it does not have adequate data compared to the National Meteorological Centre at Hulhule. The mean annual rainfall in Hulhule' is 1991.5 mm with a Standard Deviation of 316.4 mm and the mean monthly rainfall is 191.6 mm. Rainfall varies throughout the year with mean highest rainfall during October, December and May and lowest between February and April (See Figure 7).

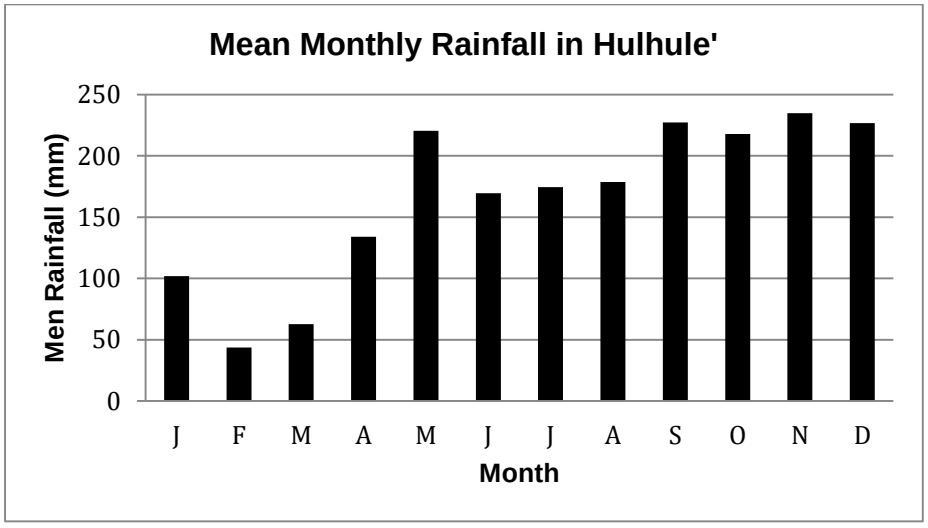

Figure 7: Mean Monthly Rainfall in Hulhule' (1975-2004)

Analysis of daily maximum annual rainfall data shows high variability, including extremes (see Figure 8). However, no significant long term trends are evident in the Hulhule data.

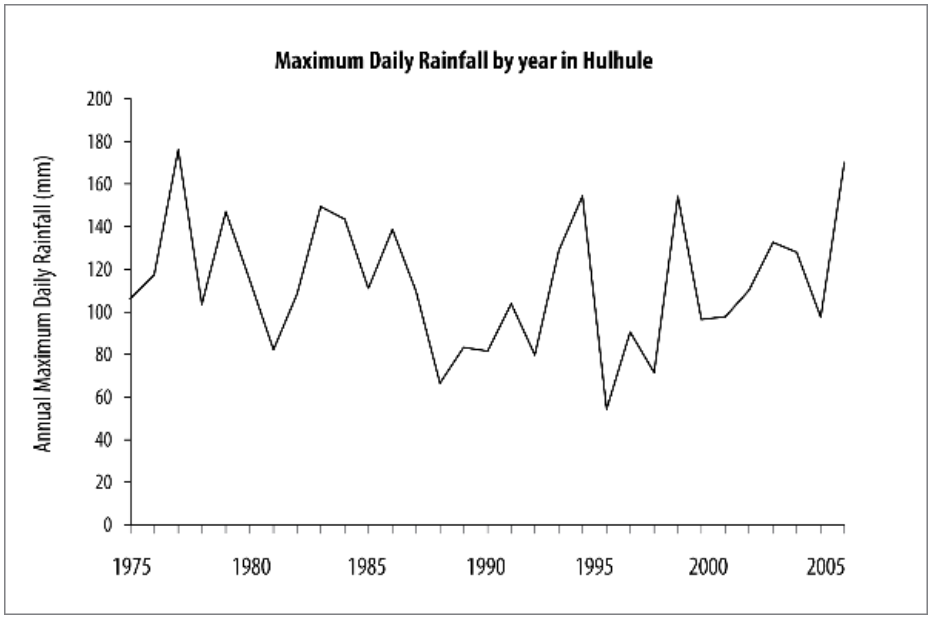

Figure 8: Maximum daily rainfall by year in Hulhule' (1975-2005) - (Source: Hay, 2006)

The probable maximum precipitations predicted for Hulhule' by UNDP (2006) are shown in Table 6.

Table 6: Probable Maximum Precipitation for various Return periods in Hulhule'

Station	**Return Period**			
	50 year	100 year	200 year	500 year
Hulhule'	187.4	203.6	219.8	241.1

Source (UNDP, 2006)

Temperature

Daily temperatures of Maldives vary little throughout the year with a mean annual temperature of 28°C. The annual mean maximum temperature recorded for Male' during the period 1967-1995 was 30.4°C and the annual mean minimum temperature for the same period was 25.7°C. The highest recorded temperature for Male' was 34.1°C on 16th and 28th of April 1973. The hottest month recorded was April 1975 with a maximum monthly average temperature of 32.7°C, the next highest being 32.6°C in April 1998. The lowest minimum average temperature of 23.7°C was recorded in July 1992.

There is considerable inter annual variability in extreme temperatures for Hulhule as shown in Figure 9. A maximum temperature of at least 33.5ºC is rare at Hulhule and has a return period of 20 years (Hay, 2006).

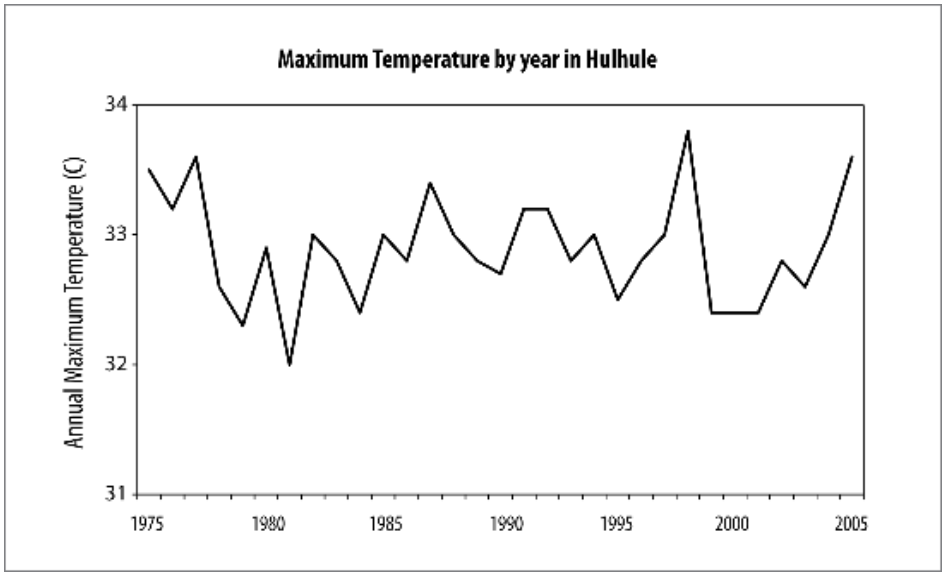

Figure 9: Maximum Temperature by year in Hulhule'- 1975-2005 (Source: Hay, 2006)

Tidal Pattern

Tides in the Maldives are mixed and semi-diurnal/diurnal. Water levels at the site vary mainly in response to tides, storm surge or tsunamis. Tidal variations are referred to the standard station at Hulhulé Island. Typical spring and neap tidal ranges are approximately 1.0 m and 0.3 m, respectively (MEC, 2004). Maximum spring tidal range in Hulhulé is approximately 1.1 m. There is also a 0.2 m seasonal fluctuation in regional mean sea level, with an increase of about 0.1 m during February to April and a decrease of 0.1 m during September to November. Table 7 summarizes the tidal elevations reported at Hulhulé, which is representative of tidal conditions at the project site.

Table 7: Tidal Variations at Hulhule International Airport

Tide Level	Referred to Mean Sea level
Highest Astronomical Tide (HAT)	+0.64
Mean Higher High Water (MHHW)	+0.34
Mean Lower High Water (MLHW)	+0.14
Mean Sea Level (MSL)	0.00
Mean Higher Low Water (MHLW)	-0.16
Mean Lower Low Water (MHLW)	-0.36
Lowest Astronomical Tide (LAT)	-0.56

Waves

There are two major types of waves observed along the islands of Maldives. The first type is wave generated by local monsoon wind with a period of 3-8 seconds and the second type is swells generated by distance storms with a period of 14-20 seconds [Kench et. al (2006), DHI (1999), Binnie Black & Veatch (2000), Lanka Hydraulics (1988a & 1998b)]. The local monsoon predominantly generates wind waves, which are typically strongest during April-July in the southwest monsoon period. Wave data for Male and Hulhulé' between June 1988 and January 1990 (Lanka Hydraulics 1988a & 1998b) shows that the maximum significant wave

height (Hs) recorded for June was 1.23 m with a mean period (Tm) of 7.53s. The maximum recorded Hs for July was 1.51 m with a Tm of 7.74s. The mean wave periods were 5.0 – 9.0s and the peak wave periods were within 8.0 – 13.0s.

Maldives experiences occasional flooding caused by long distance swell waves that are generated by South Indian Ocean storms (Goda 1988). The swell waves of height 3 meters that flooded Male' and Hulhulé in 1987 are said to have originated from a low pressure system off west coast of Australia. In addition, Maldives has been subject to an earthquake-generated tsunami reaching heights of 4.0m on land (UNEP, 2005). Historical wave data from Indian Ocean countries show that tsunamis have occurred in more than 1 occasion, most notable has been the 1883 tsunami resulting from the volcanic explosion of Karakatoa (Choi et al., 2003).

The island is located on the eastern rim of Laamu Atoll. It is exposed to wind waves during both seasons. During NE monsoon outside the eastern rim wave conditions will be strong. Peak periods of SW monsoon will create rough conditions particularly strong outside western reef rim but moderately low further inside the reef flat.

Swell Waves and Storm Surges

Waves studies around Maldives have identified the presence of swell waves approaching predominantly from a southwest to a southerly direction Kench et. al (2006), Young (1999), DHI(1999), Binnie Black & Veatch (2000) and Naseer (2003).

Being located on the eastern rim of atoll, the reef is exposed to Indian Ocean swells approaching from the NE. There will be a constant presence of swells outside the atoll in the area peaking around December to February.

Waves generated from abnormal events could also travel against the predominant swell propagation patterns (Goda, 1998), causing flooding on the eastern and southern islands of Maldives (UNDP, 2009).

Kalaidhoo is located in a moderate risk cyclonic hazard zone. It has the potential for a 1.8 m storm tide in a 500 year return period (UNDP, 2006).

6.2 FLORA AND FAUNA

Kalaidhoo has a land area of 360 hectares and is a relatively large island in the Maldives. Of the land, 17 hectares has been used for residential development. Hence the island has more than 300 hectares of green land, relatively untouched.

The site is located on the south eastern side of the island, close to the beach. The site is adjacent to an existing wide road. There are coconut groves Ruh (*Cocus nucifera*) nearby. No floral species of significant importance (protected/sensitive) were identified at the proposed site or along the access road during the field visit. Since the area of assessment is relatively small compared to the size of the island and as it is located on the eastern edge of the island, there are no specific vegetation groups that can be classified at this location, but the surrounding area can be classified as a coconut dominated forest.

Apart from the 8 coconut palms and 2 trees, there are no significant trees and large vegetation that falls within the footprint of the project site that needs removal. Based on the information received from the Island Council, and the expertise of terrestrial survey consultant, it is unlikely that vegetation removal for the project will have any significant impact on the flora and fauna.

6.3 TOPOGRAPHY

The IWMC is proposed to be located in flat land.

6.4 VISUAL AMENITY

The area of the IWMC has high aesthetic value from a local island level comparison. It is located close to the beach (105 feet away) and the Island Council Secretariat.

6.5 NATURAL HAZARDS AND RISKS

According to the UNDP Disaster Risk Assessment Report of Maldives in 2006, proposed site is located in an area exposed to tsunami, wind storms, storm surges and flooding. The following parameters can be deduced for the island based on Disaster Assessment Report and the Detailed Island Risk Assessment Reports (UNDP, 2009).

Tsunami: Maximum probable wave height less than 4.2m

Cyclone or storm (wind): Probable maximum wind speed 55.9 knots

Storm surge: predicted storm surge height – 0.45 m; predicted storm tide height 1.38 m

Rainfall: probable maximum daily rainfall for Hulhule' for a 500 year return period 284.4 mm

The methodology for risk assessment identified in the Detailed Island Risk Assessment Reports (UNDP, 2009) and findings from Ali (2005) was used to assess the hazard risks on the site. However, the results should be treated with caution, as this is a preliminary risk assessment. A more comprehensive assessment will require a longer time frame and more data.

6.6 CULTURAL AND HERITAGE VALUES

People have lived in the islands of Laamu Atoll for more than 2000 years. Isdhoo and Kalaidhoo are well known for their heritage and historic value. Kalaidhoo has an area of 113,000 square feet designated as of historical significance.

There are no areas of cultural and historic significance in the vicinity of the IWMC site. However, careful attention has to be given when clearing and excavating for construction purposes. If any items of historic values are discovered, concerned government agencies must be informed.

7 SOCIO-ECONOMIC ENVIRONMENT

7.1 POPULATION

According to Census 2014, Kalaidhoo had a total population of 579. The population in 2014 was comprised of 552 Maldivians (269 males and 283 females) and 27 foreigners (20 males and 7 females).

7.2 LAND RESOURCE

The total land area of the island is 360 hectares according to the Land Budget. Of the 360 hectares 17 hectares have been allocated for housing and residential development. The available vacant land resource is about 330 hectares. There is a wetland with an area of 1.67 hectares.

7.3 POPULATION DENSITY

The population density was 1.6 people per hectare in 2014.

7.4 HOUSEHOLDS

There were a total of 137 households as per Census 2014 dataset. Average household size is 4.3.

7.5 WATER RESOURCES

The island does not have a desalinated water supply system. At present, the main sources of water are ground water and rainwater collected and stored during rainy season.

7.6 SEWERAGE SERVICES

The island does have a sewerage system and most of the households are connected to the system.

7.7 ECONOMIC ACTIVITIES

According to census 2014, the total number of employed population in Kalaidhoo was 214. Amongst them 71 are employed in farming, 38 in education, and 23 in public administration.

7.8 TRANSPORT

Kalaidhoo is accessible via Kadhdhoo Airport from Atoll Ferry. Kadhdhoo Aiport is the nearest airport. There are ferries operating between the islands on the eastern rim of Laamu Atoll.

7.9 ELECTRICTY

Electricity is provided by FENAKA Corporation. Kalaidhoo has installed capacity of 205 KW and has a daily peak demand of 95 KW. The island contributes 447.3 tCO2 of Carbon Dioxide from electricity production annually.

8 IWMC OPERATION

The IWMC shall be operated in accordance with the 'Decision Note' given by EPA, other relevant regulatory requirements, and this EMP. The responsibility for the operation of the IWMC lies with the Island Council.

The primary activities carried out in the IWMC shall include:

Receive domestic waste and commercial waste

Receive hazardous waste that originate from household activities

Separation of received waste

Retrieval of recyclable resources

Redistribution of recyclable resources

Storage and transfer of received waste

Monitoring of waste movement and maintenance of records of that movement

The control of the aspects of the IWMC and its operations that may affect the environment

Management of the IWMC to ensure the safety of the public, the operators and the environment

8.1 OPENING HOURS

The IWMC shall be open to the public as advertised by the Island Council. It will be closed on nominated public holidays and as advertised by Council. The EPA does not set limitations on

opening hours. It is absolutely essential that the public is well informed about the opening hours so that trust of the IWMC is not compromised.

The site will remain in operation until no later than 4:00 pm so that staff may undertake required earthmoving activities such as compaction of deposited waste, separation of waste materials and application of daily cover material. This ensures that waste management activity disturbance impacts such as odour, pests, noise, and dust will be minimized during times where the majority of staff and residents would be onsite.

8.2 SUPERVISION AND MANAGEMENT

The IWMC is to be supervised by suitably trained staff at all times during operating hours. Council will provide as a minimum one (1) staff member on site at any given time to ensure that the overall management, supervision, operation and maintenance of the site and operations at the IWMC are achieved such as:

Directing the public to designated stockpile areas and ensuring public safety and access;

Supervision of any active disposal of waste to designated waste disposal and stockpile areas;

Maintenance of access roads and associated drainage works as required;

Waste screening and recording;

Ensuring that incoming collected waste is appropriately segregated,

Ensuring that waste is compacted and covered using equipment as required;

Weed, vermin, fire and litter management practices are undertaken by staff appropriately and in accordance with this EMP; and

Security of the site preventing unauthorised entry and illegal dumping.

8.3 STAFF TRAINING

All IWMC staff will be appropriately trained to conduct tasks allocated by the Council in a safe and proper manner.

At a minimum, staff training is to ensure that:

1. All operators of compaction, crushing or composting equipment are skilled at undertaking all tasks required of them
2. Al those who inspect or direct the placement of incoming wastes are capable of accurate data recording and skilled at identifying wastes that are unacceptable.
3. Using, inspecting, repairing and replacing IWMC emergency and monitoring equipment
4. Activating communication and alarm systems
5. Appropriate response to fire and other emergencies
6. Responding to water pollution incidents
7. Procedures for managing incoming waste other than acceptable wastes
8. Rejecting waste not accepted at the IWMC
9. Procedures for stopping compost feedstock deliveries
10. Feedstock quality control
11. Mixing feedstocks
12. Compost documentation and record keeping

13. Temperature reading in compost system
14. Sampling techniques for samples to be analyzed by laboratories
15. Data entry and record keeping
16. Safety
17. All those who operate water sampling or testing are familiar with process required for testing and sample preservation procedures, to a standard approved by the EPA

Compost site employees will be sent to attend compost courses such as those offered by Ministry of Environment and Energy. Staff training procedures and materials will be documented and recorded in Councils files. Re-training will take place when needed.

The IWMC staff will be empowered to direct the movement of vehicular and pedestrian traffic to ensure their safety. This shall be noted as a condition of entry on the gate signage. Traffic control signage shall be erected as directed by the Council or the EPA. The signage shall include:

Conditions of entry

Hours of operation

Acceptable and prohibited wastes signage

Speed restriction signage (10 km/h max)

Directional signage

Material drop off points signage

Notification that it is the vehicle operator's responsibility to ensure that the remnants of their load or the material stuck to the underside of the vehicle or the wheels does not litter public roads

There will be no vehicle washing facilities in operation at the IWMC.

8.4 SAFETY AND HEALTH

Council will ensure that all staff and contractors are provided with training in workplace, health and safety issues as it relates to the duties performed at the IWMC. All staff will be made aware of the potential hazards and risks present at the IWMC.

Council will also ensure that staff are provided with personal protective equipment as required to perform their duties in a safe and responsible manner, in particular when handling hazardous waste materials or operating machinery.

Signage relating to safety on site will be clearly displayed for the public, staff and contractors visiting the site to ensure that safety precautions are adhered to. The types of signage include but not are limited to:

The types of wastes not accepted on site, e.g combustible materials, unauthorised chemical drums;

Location of first aid and fire extinguishers; and

Excluded or barricaded areas.

Equipment will be operated in such a way as to minimise risk to persons delivering waste for disposal or transfer.

8.5 PERSONAL PROTECTIVE EQUIPMENT

IWMC must at all times have a fully stocked first aid kit. Regularly scheduled safety meetings must be held for staff. Staff must be provided with gloves, hard-soled shoes, hard hats, dust masks, hearing protection and other safety clothing and equipment as may be necessary.

8.6 IWMC SECURITY

The IWMC will be gated and surrounded by a 1.5 metre high fence along the boundaries. Council will maintain adequate security on the IWMC during its life. This will include:

Access gates being locked at all times outside opening hours

Maintenance of boundary fences

Maintenance of lockable gates

Staff and contractors will be provided with keys to the main gate and IWMC building as deemed necessary for after hour access.

8.7 WASTE ACCEPTANCE

All wastes entering the IWMC will be inspected before disposal to ensure they are not hazardous, and their entry is to be recorded. If the load is suitable for the disposal, the drivers will be subsequently advised as to which section of the IWMC each component of their load should be taken.

The total quantity of waste disposed of at the premises in accordance with EPA's Decision Note must not exceed 200 tonnes per year. The IWMC will accept the following wastes as shown below. The Council will not permit or allow any waste to be received at the premises

except for those expressly referred to in the EPA “Decision Note”. The materials listed below will not be accepted at IWMC. Council staff will be responsible for preventing their acceptance.

1. Liquid wastes
2. Medical wastes
3. Explosive and flammable materials
4. Any toxic organic material, including any pesticide or weedicide, in particular containing:
    a. Chlorinated hydrocarbons
    b. Fluorinated hydrocarbons
    c. Organophosphates
    d. Carbamates or thiocarbamates
    e. Phenols
5. Any material containing:
    a. Arsenic
    b. Cadmium
    c. Cyanide
    d. Lead
    e. Mercury
    f. Selenium
    g. Sulphide
6. Any toxic inorganic material including any soluble salt or the following:
    a. Barium
    b. Boron
    c. Chromium
    d. Copper

e. Manganese

f. Silver

g. Zinc

7. Any soluble acid or alkali or acidic or basic compound, unless it can be shown that it may be beneficial to the operation of the IWMC.

8.8 WASTE SCREENING, SEGREGATION AND HANDLING

Households will be encouraged to sort waste materials at home. Waste collection service operators will be encouraged by staff at the IWMC entrance to sort waste materials into designated stockpiles or transfer bins at the point of access.

Material suitable for sale in the IWMC is to be identified and placed aside for processing.

All staff members that monitor the site entrance shall be trained in the identification and classification of waste. New staff will undergo at least one week of supervised training in the identification of materials not accepted at the IWMC. Vehicles with unacceptable loads of waste will be refused entry to the site. Waste handling will be undertaken in accordance with relevant government guidelines and standards.

The following activities are carried out for waste screening purposes:

1. Signs will clearly be in place showing types of waste accepted and those not accepted at the IWMC.

2. The staff will visually inspect all waste loads for materials not accepted at the IWMC. Staff shall also enquire to the customer whether hazardous materials, such as lead acid batteries, gas bottles, solvents, paints etc, are contained within the load. Empty chemical containers should be checked for triple rinsing before accepting for recycling.
3. Where there is any uncertainty regarding whether waste is contaminated the IWMC Coordinator will require EPA or Council approval before accepting the material on site. This process will enable Council to screen out any hazardous waste.
4. Records of all inspections are to be maintained for at least 5 years.
5. The EPA will be notified if any unauthorised hazardous wastes have been discovered on-site. The identity of the person/s found dumping the waste must be reported to the EPA if known.
6. Appropriately trained staff should handle hazardous waste. It is the Council responsibility to ensure that staff is appropriately trained and that a record of the training is maintained.

8.9 UNACCEPTABLE WASTE PROCEDURE

Vehicles that are deemed by IWMC staff to be carrying unacceptable waste will be refused entry, re- directed, and details of the incident recorded. Details to be recorded include:

Date and time

Waste type

Source of waste

Approporite waste management facility and results of contact

EPA contact if required

IWMC staff will advise the driver of the vehicle of appropriate waste management alternatives, or to contact the EPA for advice on appropriate management of the unacceptable waste.

8.10 RECORDING OF WASTES RECIEVED

Staff at the gate will inspect all waste loads that come into the IWMC. As there is no weighbridge a volumetric survey will be used for the recording of quantities of wastes received. This will involves the council surveyors surveying green waste and scrap metal stockpiles at the end of each reporting period.

8.11 EQUIPMENT

The Council will maintain, hire or purchase required machinery and equipment sufficient to undertake the following:

Separation of waste at household level;

Waste collection and transfer service;

Separating and maintaining stockpiles of metals, tyres, timber, concrete and demolition wastes;

Compaction of metal cans and plastic bottles; and

Composting.

All equipment will be maintained in a proper and efficient manner and in accordance with relevant manufacturer standards. Maintenance and monitoring of equipment will be undertaken by IWMC staff daily. Servicing of equipment and machinery will be undertaken regularly by a suitably qualified third party mechanic as required.

8.12 WASTE COMPACTION

IWMC will use waste compaction equipment as required to ensure that waste is adequately compacted. IWMC will use equipment that are suitable for the small size of the site and low tonnages. Currently it is proposed to use compaction for metal cans and plastic bottles.

It is not anticipated that new large machinery will be brought in for the foreseeable future.

8.13 COMPOSTING PLAN

Experts will develop a composting plan and guidelines. The plan will include the necessary technical drawings and calculations.

The Council will assess the quality of the compost through liaison with experts from the Ministry of Fisheries and Agriculture. Data will be gathered during the annual volumetric survey on the quantity of compost produced.

8.14 WET WEATHER OPERATIONS

The storm water management and collection systems at IWMC will be constructed and maintained in such a way that minimizes the risk of flood events and spills. Access into the IWMC will be maintained during all weather conditions without compromising the environmental management of the site. The access roads will be leveled and graded to ensure traffic is maintained in a safe manner and damage to the environment and property are minimized.

9 RESOURCE RECOVERY AND RECYCLING

The Council will continue to assess methods to maximize materials recovery and minimize the amount of waste going to RWMC. Council will continue its involvement in community campaigns to educate the public about separation of waste at the household and on site.

9.1 MIXED RECYCLABLES

IWMC staff will direct customers to deposit any mixed recyclables into a skip bin near the entrance of the IWMC. The skip bin will be serviced by IWMC staff.

9.2 GREEN WASTE

The IWMC will accept source separated compostable material. The source separated organics are made up of the following materials:

Vegetables and fruits

Bread, rice, pasta, and cereals

Dairy products

Fish, bones, shell fish

Eggs

Meat and poultry

Coffee grounds, filters and tea bags

Non recyclable paper including

Food soiled paper

Paper napkins, plates, cups

Paper towels

Certified compostable products

IWMC staff will direct customers to deposit any green waste adjacent to the green waste stockpile. The staff will be responsible for visual inspecting of the deposited green waste before it is pushed up into the stockpile.

The green waste stockpile shall not exceed the limits set in the composting plan. All works required to keep the stockpile within the size constraints will be conducted by IWMC staff. Once the stockpiles have reached adequate size, the composting staff will shred the material and transfer it to the composting pit.

9.3 SCRAP METAL

The staff at IWMC will separate the scrap metal into ferrous metal and non-ferrous metal. Ferrous metals will be stockpiled in a separate area. The non-ferrous metals comprising mainly aluminium and copper will be stockpiled separately. Scrap metal stockpiles will be kept tidy and located in an accessible location for recyclers. All works required to keep the stockpile within size constraints will be conducted by IWMC staff. IWMC staff will also be responsible for preventing the public from scavenging directly from the scrap metal stockpile. Council will make arrangements for the removal of scrap metal and receive any income from scrap metals.

9.4 BATTERIES

The batteries will be separated and stockpiled separately. The Council will seek the guidance of EPA on stored batteries. All arrangements for the removal of batteries shall be informed to the EPA and permission obtained.

9.5 WASTE OIL

Waste oil will be placed in waste oil containers in a waste oil shed. IWMC staff will be responsible for decanting containers into the waste oil collection tank. Customers will not be permitted to have access to the oil collection tank for any reason.

9.6 CONCRETE, BRICKS, AND TILES

Concrete, bricks and tiles will not be specifically separated for recovery due to low volumes anticipated and high crushing costs. They will be provided to customers for use in construction site filling or other construction needs.

9.7 REUSE CENTER

The Council will build a reuse shed to display items of value that may be sold back to the public and avoid being disposed. Items that will be put in the re-use shed will include:

Kitchen crockery

Household appliances

Books

Bulky items such as sofa and furniture of a reasonable condition

Childrens toys

Bicycles and bicycle parts

Motorcycle parts

Reusable construction materials

10 ENVIRONMENTAL IMPACT MITIGATION

10.1 FLY PREVENTION AND CONTROL

Flies have the potential to cause regular and significant problems on and around the IWMC. Common houseflies have always been associated with putrescible waste (includes both food and green waste). Infestation typically starts at the point of waste generation, when eggs are laid on waste in domestic or commercial waste bins. The longer the period of time before the waste reaches the IWMC, the greater the opportunity for fly problems to develop.

It is critical that proper fly control is used at the IWMC with the flexibility to carry out additional treatments at peak times. IWMC staff will:

Monitor adult fly numbers twice a week using an appropriate technique, such as resting counts in squares marked on internal walls and floors

Carrying out waste acceptance checks, monitoring fly numbers in each load, recording heavily infested loads in a fly contaminated load log sheet, treating loads and priority covering of loads.

Where it is not possible to monitor loads at entry, operators would monitor upon discharge

Rejecting infested/problematic waste if from a known repeat problematic source,

Proper waste handling and rotation

Ensuring that waste does not accumulate in inaccessible areas such as behind walls or in corners

When fly numbers are high, investigate potential fly breeding areas

Applying a daily cover thick enough to prevent fly infestation at the tipping area

Immediately covering waste streams that ate highly attractive to flies or which commonly experience infestation such as food waste

Training staff in the use of fly spray, identifying flies, and understanding the importance of monitoring/recording fly infested loads.

Houseflies may not breed within good quality green waste. However, green waste may attract flies to it. Hence, regular turning of waste windrows, especially the fresher waste, will limit any fly breeding that may occur.

10.2 PESTS AND VERMIN CONTROL

Incidence of cats and rats is a problem for IWMC. Rats and cats have the potential to cause regular and significant problems on and around the IWMC.

Council will manage pest and vermin numbers through the use of baits, traps and bird scares where required. Should the use of chemicals be deemed necessary, care will be exercised to ensure that chemicals are not subject to stormwater or leachate runoff or not susceptible to becoming air borne and posing an environmental pollution hazard. Areas of the IWMC that will require particular attention will be:

Green waste stock piles

Scrap metal stockpiles

Tyres and plastic stockpiles

10.3 ODOUR CONTROL

The IWMC is not in close proximity to neighbouring residents. Hence complaints from residents regarding odour is not anticipated. However, all complaints will be logged in Council

records. Operation of composting will be undertaken in such a manner so as to minimize the generation of odour and impacts on surrounding residents.

Special attention will be given to manage fish viscera which could lead to foul odour, All practicable measures will be implemented to minimize offensive odours escaping the IWMC site. These include:

Application of daily cover to putrescible waste

Covering all fish viscera deposited at IWMC at a burial pit with daily cover material

Maintenance of water run off prevention to ensure that storm water does not enter the stockpiles and compost pit.

Any odours identified will be covered immediately with cover material.

10.4 LITTER CONTROL

Blowing of rejects during screening operations could potentially be a problem on windy days. Fencing is provided to catch litter downwind from the operation. Council will take all practical measures to prevent the incidence of wind blown litter at the IWMC. Measures that will be adopted include:

Litter fence and screen patrols on a daily basis;

Waste loads on vehicles must be covered;

Enforce the covering of loads to prevent escaped litter;

Intermediate covering of waste layers at the end of each day and as often as required.

10.5 LEACHATE MANAGEMENT

The leachate on site will consist of stormwater run-off from stock pile area and green waste stockpiles.

Leachate from the IWMC will be generally managed by:

Grading of the site to prevent the ponding of water

Application of cover to waste stockpiles during rainy weather

Diversion of stormwater away from the waste stockpiles

Construction of bunds to divert water away from the waste stockpile areas

Minimising the amount of water used to the clean the IWMC and storage areas generally;

Only operating one compost pit

Denying the deposition of prohibited liquid wastes.

Planting of grass in the compound of the IWMC

The small size of the IWMC, low tonnages, and management system will limit the leachate collection and treatment options. Council will be focused on leachate minimization as the primary method of leachate management. It is expected that any leachate entering the groundwater will have its TSS, metals and nutrients reduced.

10.6 STORMWATER MANAGEMENT

Stormwater gathered at IWMC will be managed to ensure it is not contaminated with leachate and is free of sediment. The stormwater on site will consists of:

Clean stormwater from roofs

Clean stormwater from undisturbed areas

Leachate contaminated stormwater run-off from active composting areas and green waste stockpiles

Stormwater runoff from waste stockpile areas.

Council will manage stormwater by:

Constructing and maintaining a series of temporary stormwater drains to prevent stormwater

run-off from active waste disposal area or green waste stockpile area

Constructing and maintaining a series of bunds to prevent stormwater coming into contact with active waste stockpiles and compost pit

Maintaining a grass cover in all non-paved areas of IWMC

Ensuring all drains are cleaned, desilted and functional

10.7 NOISE MANAGEMENT

There are no national standards on noise limits. The Council will implement the following measures to minimize the noise generated from the IWMC:

Equipment and machinery is to be used within specified working hours that will have the least impact on surrounding residents. i.e sometime between 9.00 am and 6.00 pm.

All equipment is to be maintained regularly in a proper manner.

Traffic to be controlled by Council ensuring that customers who visit the IWMC use designated roads and work areas.

IWMC is not in close proximity to neighbouring residents and complaints from residents regarding noise pollution is not anticipated. Equipment and machinery will be run infrequently. Noise measurements will only be taken should valid complaints be received.

10.8 DUST CONTROL

Since the nature of composting operations requires that material remain moist, dusting from the compost and mulch piles will be minimal. Dust is likely to be a problem from the access road. However, the total number of vehicle movements on the access road is not anticipated to be many. Council will maintain the IWMC in a condition that minimizes the emission of dust from the premises. Council will ensure dust generation at the site is minimized where practicable by adhering to the following practices:

Use of water cart if required on access road during dry season and as required;

Maintenance and enforcement of speed limits to avoid disturbance of roads and dust generation;

Machinery and equipment to be washed frequently;

To delay or suspend earth moving activities when excessive dust is being generated that may affect residents

To rehabilitate and re-vegetate areas within IWMC as soon as practicable after construction or works have been completed.

10.9 WEED MANAGEMENT

Weed management is required to be undertaken as frequently as deemed necessary to sufficiently control numbers. Council will undertake regular patrols and spray weeds as deemed necessary. To minimize the incidence of weed growth, disturbed land areas will be re-vegetated

as soon as practicable. Green waste material will be stockpiled appropriately in windrows to ensure organic matter and seeds are kept at optimum temperatures for organic breakdown. Residents will be directed to cover all incoming and outgoing waste loads, including green waste, to prevent dispersal of seed.

11 SOCIAL SUSTAINABILITY

11.1 COMMUNICATION

All stakeholders welcome the IWMC concept and are supportive of IWMC. The operation of the IWMC and services shall be sustainable; otherwise there is risk of losing public and stakeholder confidence and trust on waste management.

There is a need to ensure that all aspects of the IWMC are properly communicated on a timely manner to all stakeholders.

11.2 EMPLOYMENT

The anticipated number of full-time staff for the IWMC is four, including one driver and three laborers. The driver for the collection system will also undertake supervision of waste management at the IWMC. Similarly, the laborers will work in both the collection system and at the IWMC.

In addition, both administrative services and financial management related to the operation of the waste management system will need to be included in the job descriptions of the staff at the Island Council Secretariat. Tasks related to the waste management system will include, but not be limited to, record keeping on the operation of the waste management system, reporting, monitoring and collection of user fees.

For social sustainability it is essential to ensure the work rights of the employees at IWMC. Proper job description has to be prepared and contracts need to be signed with workers. Procedures must be put in place to ensure protection of worker rights.

11.3 EMERGENCY RESPONSE

The IWMC shall develop a procedure manual for emergency and corrective action that may include:

Unauthorised access to the IWMC

Fire

Severe storm

Serious injury

Delivery of unacceptable materials

Spills or leak of vehicle fuel

The person responsible for all emergency response is the IWMC site manager. Employees must be trained in the proper response to emergencies.

11.4 FIRE PREVENTION AND FIRE SAFETY

All incoming loads will be inspected for any unacceptable materials that might present a fire hazard. Any loads that would present a fire hazard will be rejected and returned.

Woody materials will be processed in a timely manner. The mulch stockpiles will not be allowed to exceed 20 feet.

Fire extinguishers will be located on site near equipment and near the gate.

In the event a fire does occur, the Site Manager will determine if it is necessary to shut down the IWMC. The MNDF Fire Service will be called.

If a small fire or smoldering materials are identified, staff may separate the fire from the bulk of the materials and attempt to extinguish it by using IWMC fire extinguishers and or water hoses. Following a fire, the IWMC will be inspected for any sign of damage or hazard prior to reopening.

Staff at the IWMC will be trained in fire safety practices and will be made aware of the location of fire safety equipment on site such as fire extinguishers. Council will work in collaboration with MNDF Fire Service who are to be contacted immediately in the event of a fire outbreak. Any fire incidents are to be recorded in detail and reported immediately to the EPA.

The incidence of accidental fires occurring at the IWMC will be minimized by the implementation of the following measures:

1. Signage on display advertising to the public that flammable liquids are not permitted on site;
2. Regular fire break maintenance around the perimeter of the site;
3. Internal fire breaks around combustible stockpiles;
4. Combustible materials such as fuels and other flammables are separated into small secure storage areas away from the active stockpile areas;
5. Green waste materials are stored separately in small windrows to minimise combustion;
6. Staff will be present at IWMC during operating hours preventing people deliberately lighting fires;
7. All staff at IWMC will be trained in fire management procedures;

8. A fire log book to record any fire incidents and relevant contact numbers for fire fighting authorities will be in a central location readily accessible for staff;
9. IWMC will have fire extinguishers and staff will be appropriately trained in the use of fire fighting equipment.
10. Clear signage for visitors and staff relating to types of flammable materials not accepted, prohibition of deliberate burning and access to firefighting equipment;
11. Designated non-smoking areas.

In the event of a fire Council will notify the EPA as soon as practical and provide written details of the notification to the EPA within 7 days of the date on which the fire occurred. Council will record the following data in relation to fires occurring at the IWMC:

Time and date when the fire started;

Whether the fire was authorized, and, if not, the circumstances which ignited the fire.

The time and date that the fire burnt out or was extinguished;

The location of fire (e.g clean timber stockpile, putrescibles garbage cell, etc..);

Prevailing weather conditions at the time of the fire;

Observations made in regard to smoke direction and dispersion;

Amount of waste combusted by the fire;

Action taken to extinguish the fire;

Action taken to prevent a reoccurrence.

11.5 FINANCE

Council must ensure that it has the financial assurance to appropriately manage and undertake required developments at IWMC. It is a means of ensuring that IWMC operations continue smoothly and do not lead to environmental impacts and social conflicts. The Council must

develop a specific mechanism to accumulate requisite funding for the life of the IWMC. The estimated costs of the IWMC are given in the waste management plan developed for the island. The following activities will be implemented:

Collecting waste disposal fees from residents accessing the IWMC

Balancing the cash register after the IWMC has closed each day

Depositing collected cash in the bank account specified by the Island Council

Auditing the cash flow on a regular basis

Ensure revenue is collected from waste management fees and waste disposal fees

Ensure funds in the IWMC are capable of site remediation and managing contingencies.

The user fees will be decided after detailed consultations with the households and businesses in the island.

11.6 CAPITAL COSTS

Capital costs will be calculated and expressed on annual equivalent basis in order to be combined with recurrent costs in a useful way. The following items and activities will be included in calculating the capital costs:

- All equipment needed for the waste handling
- Vehicles used for the transportation of waste
- Long term training that needs to be provided to the staff to safely handle the equipment
- Bins for segregation at source
- Bins for collection vehicles
- IWMC buildings
- Composting equipment

- Waste processing equipment
- Waste storage units

The items to be used in the IWMC are based on the Solid Waste Regulation of Maldives 2012 and by a categorization of islands using population statistics by the Ministry of Environment.

Capital costs for the proposed waste management system at the island level is given in Table 8.

Table 8: Capital costs – island waste management system

Item	Specifications	No.s	Unit cost (USD) incl GST	Total cost (USD)	Remarks
Lorry truck	2 tons	1	30,000.00	30,000.00	Varies between 0.8T to 2T
Garbage bins - food waste	30L	220	6.36	1,399.20	Ave. no. of households
Garbage bins - recyclables	120L	300	98.93	29,679.00	Households + other facilities
Garbage bins	240L	4	119.12	476.48	For collection truck
IIWMC construction inc material & labour	Average price per island	1	49,477.67	49,477.67	
Electricity connection	3-phase	1	388.67	388.67	STELCO; Excavation cost not included. Varies from island to island.
Solar PV	Per kW; inc installation and commissioning	5	1,590.00	7,950.00	Local suppliers
Groundwater well	Concrete	1	353.33	353.33	Local suppliers
Water pump	Water pump Shimizu	1	170.02	170.02	Local suppliers

Item	Specifications	No.s	Unit cost (USD) incl GST	Total cost (USD)	Remarks
	PS230				
Sewerage connection				-	
Rainwater tank (2500L)		1	800.00	800.00	Local suppliers
Sign boards		10	300.00	3,000.00	An estimate
First aid kit		1	75.26	75.26	Local suppliers
Fire Extinguisher	Water	2	671.30	1,342.60	Local suppliers
Baler	Baler size 900x600mm ; Work pressure 300kn; Motor power 7.5kW;	1	12,773.00	12,773.00	Local suppliers
Glass grinder	Local manufacture	1	1,766.67	1,766.67	Local suppliers
Vegetation Shredder	Model GBD-70; Chipping cap 70mm; Diesel;	1	5,319.08	5,319.08	Local suppliers
Plastic Shredder		1	4,770.00	4,770.00	
Can Crusher		1	5,227.02	5,227.02	
Chain Saw	Craftsman 20 in. L Gas Chainsaw	1	388.67	388.67	Local suppliers
Crane scale + top dial scale	Capacity 100-1000kg and Top dial scale	1	318.00	318.00	Local suppliers
Composting equipment	Per set for each labourer	6	224.37	1,346.22	Local suppliers
TOTAL				**157,020.89**	
25% contingency				39,255.22	
TOTAL inc contingency				**196,276.11**	

11.7 OPERATION AND MAINTENANCE COSTS

Recurrent cost items consist of:

Staff salaries

Short term training

Fuel or electricity used

Equipment maintenance

Safety gear

Bags for transport of waste

Bins and containers

Blades and cutters

The O&M costs for the island waste management system are given in Table 9.

Table 9: Operation and maintenance costs – island waste management system

Items	No.s	Cost/Unit in MRF	Cost/Unit in USD	Monthly cost in USD	Annual cost USD
Truck Driver Salary	1	6,000.00	389.11	389.11	4,669.26
Laborer Salary	3	5,100.00	330.74	992.22	11,906.61
Truck maintenance and repair	1	7,000.00	453.96	453.96	5,447.47
Truck depreciation	2	5,237.00	339.62	679.25	8,150.97
Insurance premium (full cover)	1	598.00	38.78	38.78	465.37
Fuel Cost	1	5,500.00	356.68	356.68	4,280.16
Utilities	1	5,000.00	324.25	324.25	3,891.05
Safety materials	1	1,000.00	64.85	64.85	778.21
Pest control	1	1,542.00	100.00	100.00	1,200.00

Total Expenses				**3,399.09**	**40,789.11**

The potential sources of revenue directly related to waste management for the O&M costs are user fees, sale of recyclables, and sale of compost.

11.8 UTILITIES AND FUEL

Utilities necessary for the operation of the IWMCs are electricity, potable and non-potable water and sanitation facilities. Electricity to the IWMC will be provided through the local utility service provider.

Drinking water will be provided to the staff working on-site through rainwater harvesting. Water source for non-potable use will be supplied by establishing a groundwater well.

Operation of the waste collection service will require fuel for the vehicles and operation of machineries. Fuel will be sourced from local suppliers.

11.9 SITE COMMUNICATION

The IWMC site staff must carry mobile phones at all times during work hours with which to communicate with management and each other when necessary.

12 ENVIRONMENTAL APPROVAL CONDITIONS

The IWMC will be operated in accordance with Environmental Approval conditions stipulated in the Decision Note to be provided by EPA.

13 ENVIRONMENTAL MONITORING

13.1 GROUNDWATER QUALITY MONITORING

It is recommended that groundwater quality sampling and testing be required for the IWMC. The Island Council shall ensure that environmental monitoring of groundwater is carried out in accordance with EPA guidelines. The methods for sampling and analysis of water must be agreed prior to the operation of IWMC.

Monitoring must be undertaken as required under the Decision Note by EPA to ensure legislative and regulatory requirements are met. Suitable qualified technical staff shall undertake the sampling. All samples collected shall be sent to a laboratory for final analysis and reporting.

For each of the required monitoring points records shall be kept of any samples collected for the purpose of this EMP:

1. The date(s) on which the sample was taken;
2. The time(s) at which the sample was collected;
3. The point at which the sample was taken; and
4. The name of the person who collected the sample.

All records required to be kept by the Council shall be:

1. In a legible form, or in a form that can be readily be reduced to a legible form;
2. Kept for at least 5 years after the monitoring or event to which they relate took place;
3. Produced in a legible form to any authorized officer of EPA who asks to see them.

In the event that the Council is required to undertake groundwater sampling the results of analyses will have to be compared to EPA guidelines and checked for relevant trigger levels. If the parameters measured during testing exceed the established limits then the affected locations will have to be re-sampled as soon as possible. If any contamination is confirmed by the re-sampling, the EPA will have to be notified by the Council, in writing, within 14 days.

Within 28 days of notifying the EPA, the Council will have to prepare a detailed groundwater assessment plan which will determine the extent of remediation required. Upon completion of the groundwater assessment program, a remediation plan will be prepared, if required by the EPA, detailing the protective actions proposed.

14 REPORTING

14.1 MONTHLY REPORTING

The staff of IWMC must provide to the Council, within 60 days of the end of each month, a monthly report that includes information on:

1. the quantity, source (MSW, C&I, C&D) and type of waste received at the IWMC
2. the quantity and type of waste transported from the IWMC
3. any other information specified by EPA.

The quantity of waste shall be determined according to guidelines provided by EPA.

The Council shall keep records for at least 5 years of:

1. The movement of waste into IWMC
2. The movement of waste within the atoll
3. The movement of waste material, composted, recycled, recovered or processed out of IWMC
4. Exempted waste that is received at IWMC.

At all times, the Council will have to follow the requirements stipulated in Waste Management Regulation.

14.2 ANNUAL REPORTING

An Annual Report will be prepared by Council and submitted to the EPA for the required reporting period i.e. twelve (12) months ending 31 December. Council must submit the Annual Report to the EPA no later than sixty (60) days after the expiry of the reporting period in a pre-

approved format comprising a signed Statement of Compliance and Monitoring and Complaints Summary.

The Monitoring and Complaints Summary will generally include information such as:

a summary report on total wastes received;

a summary report of fires that occurred on site;

a copy of flies, odour, litter and other complaints received by the IWMC in the past twelve months and

a summary of any incident reports during the 12 month reporting period.

14.3 INCIDENT REPORTING

The Council must report to EPA immediately if any pollution incident occurs at IWMC that involves:

Actual or potential harm to the health or safety of any human beings that is not trivial

Actual or potential loss or property damage of an amount, or amounts in aggregate, exceeding MVR 10,000.

Actual or potential loss to ecosystems and species that includes the reasonable costs and expenses that would be incurred in taking all reasonable and practicable measures to prevent, mitigate or make good to the environment.

Should an incident occur, the Council shall notify the EPA by telephoning EPA. A written report must be submitted within seven (7) days of the date on which the incident occurred. The following types of incidents shall be reported to the EPA:

Groundwater contamination

Fires

Chemical spills

Oil/fuel spills

Failure of containment tanks/bund

Wind blown litter

Odour

Explosion (Gas Cylinders).

Occurrence of any incident must be reported in the site's daily logbook as appropriate. The EPA shall be notified of any incident that represents a threat to human health, property or ecosystems.

A written incident report will be provided to the EPA if requested by an authorized officer of EPA. The report will include, but not be limited to, the following details.

The cause, time and duration of the event;

The type, volume and concentration of every pollutant discharged as a result of the event;

The name, address and telephone number of employees of IWMC or other witnesses;

Actions taken by the Council in relation to the event;

Details of any measure taken or proposed to be taken to prevent or mitigate against a recurrence of such an event;

Any other matters.

15 GRIEVANCE MECHANISM

The residents and community concerns are a top priority. Arrangement will be made to receive complaints through the Council Secretariat or through the IWMC after hours as listed in Incident Reporting. Staff will be instructed to respond to community concerns as outlined below:

Staff will maintain a community notification list of those residents who would like advance notice of site operations that may create temporary odours, temporarily increased noise, or increased traffic.

Complaints received from an outside party will be reported, investigated and appropriate action taken/implemented as required. Complaints will be handled as follows: site staff will record the call in detail including time and date, caller's name, address and phone number, and a detailed description of the concern. A complaint log will be maintained at the site.

Site staff will contact Council Secretariat immediately. The Council Secretariat will contact the resident immediately to obtain further information on the concern.

If the concern is about odour, the staff will walk through the IWMC to identify the source of odour including the compost pads and bins. Operations will also be investigated. Current weather conditions will be recorded including wind direction, temperature, and rainfall. Once the source of the odour has been identified, procedures to alleviate the problem will be implemented. This may include ceasing to turn piles, adding moisture, mixing in bulking agent and others.

If the concern of the resident is litter, staff will be dispatched immediately to clean up the problem area.

If the resident concern is regarding flies, vectors, dust, noise, or any other problem, staff will be dispatched for immediate response.

Once the problem has been identified and a course of action decided upon, staff will contact the resident to inform them of the measures being taken to address their concern.

Any complaint received will be investigated including:

Date and time of the complaint;

The cause of the complaint;

The climatic conditions at the time of the incident which is the cause of the complaint;

If known, the date and time the incident took place;

The occurrence of similar complaints in the past;

Actions taken in the past to overcome similar complaints.

Details of the complaint received, investigations and actions taken will be recorded on Councils Corporate Records System and kept for at least five years. The records will be available in either electronic or physical form to any authorised officer of the EPA who asks to see them.

Tiers of Grievance Mechanism	Nodal Person for Contact	Contacts, Communication and Other Facilitation by Project	Timeframe to address grievance
First Tier: Council	Council will be the first point of contact. Designated contact persons should be established within the Council.	• In the Council Secretariat there will be an Information Board listing the names and contact telephones/emails. • Grievances can be registered informally by contacting the	7 working days

	Complaints received by Police will also be shared with the contact person(s) at the Council.	Council (directed to the contact person(s)). • If the grievance cannot be resolved informally, an aggrieved party must submit a complaint on a letter addressed to the President of the ICouncil on the Tier I Complaint Form to take the grievance further. For those who cannot properly write, the Council staff will fill a Complaint Form and get it signed by the aggrieved party. The form must be available online or from the Council Secretariat. A copy of the form must be provided as a receipt to the aggrieved person at the time of submission. The form will be prepared and produced by the Council. • The Council must screen the grievance to determine if the issues and concerns raised in the complaint falls within the mandate of the IWMC. • The list of grievances classified as IWMC related must be maintained on a register at the Council. Informally communicated grievances must also be listed on the register and must be maintained by the designated contact person(s) at the Council. • The Council will determine the solutions to the issues either by (i) discussing internally; (ii) joint problem solving with the aggrieved parties or; (iii) a combination of both options. • If the complaint is resolved within 7 working days the Council must communicate the decision to the aggrieved party informally or in writing, depending on how the complaint was lodged.	

		• The aggrieved party must acknowledge the receipt of decision and submit their agreement or disagreement with the decision within 10 days. • If no acknowledgement is submitted from the aggrieved party then the decision will be considered as accepted.	
Second Tier: Environment Protection Agency; Ministry of Environment and Energy	For IWMC Projects, MEE will forward the grievance to the EPA.	• If unresolved, the aggrieved party can elevate the grievance to Tier 2 and submit a complaint on a letter or on the Tier II Complaint Form addressed to EPA or MEE. Submission must contain a copy of Tier I submission form or letter and if available, the decision statement from Council from Tier I. • MEE will forward the matter to EPA. • EPA will screen the grievance to determine if it is related to the IWMC project. If it is unrelated, the aggrieved party must be notified in writing and the way forwarded must be outlined to them including the necessary government institutions to follow up, like the Police. • A contact person in EPA must be identified for processing a grievance through the Second Tier. • If required, the EPA/MEE must arrange a public meeting to address the tier 2 grievance and notify the nature of the grievance and the meeting venue to the aggrieved party.	15 Working Days

		• EPA may also visit the site and hold onsite discussions and meetings. • The EPA 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 EPA 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 days. • If no acknowledgement is submitted from the aggrieved party then the decision will be considered as accepted. • 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 EPA, in writing, of the intention to move to tier 3.	
Third Tier: Judiciary/ Assistance to Vulnerable Persons beyond the Project's Grievance Redress Mechanism	Court System or Arbitration will remain as an option for an aggrieved person and/or community in case that the others tiers haven not been effective.	• The legal system is accessible to all aggrieved persons. • Assistance may be 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 EPA must assist the vulnerable person(s) in getting this support from	As per established judicial procedures established in Maldives

		Attorney General´s Office. EPA 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 EPA. • The verdict of the Courts will be final.	