

# E-WASTE MANAGEMENT GUIDELINE

Maldives Competitiveness and Growth Project  
(MCGP) (P179286)

2<sup>nd</sup>-July-2024



**Ministry of Finance**  
Republic of Maldives

# 1 Table of Contents

## Contents

1	Table of Contents.....	1
2	List of Abbreviations .....	3
1	Introduction .....	4
1.1	Project Introduction.....	4
1.2	E-Waste.....	6
1.3	Benefits of E-Waste Management in an Organized and Sustainable Manner .....	8
1.4	Final Disposal Options for Hazardous Waste in the Maldives .....	8
2	Relevant Laws, Regulations and Standards Pertaining to E-Waste Management.....	10
2.1	Laws and Regulations.....	10
2.1.1	Environment Protection and Preservation Act (EPPA) (4/93).....	10
2.1.2	Environmental Impact Assessment Regulation (NO. 2012/R-27) and Amendments .....	10
2.1.3	Waste Management Act (24/2022) .....	11
2.1.4	Circular on Auctioning Assets by Government Institutions .....	11
2.1.5	Basel Convention on the Control of Transboundary Movement of Hazardous Waste and their Disposal .....	11
2.1.6	Magey saafu raajje national waste & resource management policy and strategy 2024-2028	11
2.2	Institutional Arrangements for E-Waste Management in the Maldives .....	12
2.3	The World Bank Group Environmental, Health, and Safety (EHS) Guidelines.....	12
2.4	ESS and Good International Industry Practice (GIIP) .....	12
3	Summary of Associated Environmental and Human Health Risks Associated with E-Waste.....	13
3.1	The Negative Effects on Air.....	13
3.2	The Negative Effects on Soil.....	13
3.3	The Negative Effects on Water .....	13
3.4	The Negative Effects on Humans .....	14
4	E-waste Management Criteria and Protocols.....	15
4.1	Objectives of the Guideline.....	15
4.2	General e- waste management process .....	15
4.2.1	E-waste prevention processes .....	15
4.2.2	Recycling and reuse .....	15

4.2.3	Transportation .....	16
4.2.4	Treatment and disposal .....	16
4.3	Hazardous e-waste management .....	16
4.3.1	Hazardous e-waste storage.....	17
4.4	Conducting diagnostics for feasibility and need for management Steps .....	17
4.5	Budget and Costs .....	17
4.6	Implementing Arrangement and Compliance Monitoring Requirements.....	19
4.6.1	Project Implemenetation.....	19
4.6.2	Implementation of the Guideline .....	19
4.6.3	Compliance Monitoring .....	19
5	Implementation matrix for e-waste mangement guideleine .....	21
6	Annexes.....	23
6.1	Estimated E-Waste Generation of the Project.....	24
7	References .....	25

List of Figures.

Figure 1: E-waste processing: Adapted from the World Bank Group (2012). Wasting No Opportunity: The case for managing Brazil's electronic waste. ....	7
---	---

List of Tables.

<b>Table 1: Training details on E-Waste Guideline .....</b>	<b>18</b>
<b>Table 2: Monitoring matrix .....</b>	<b>20</b>
<b>Table 3: Implementation Matrix for E-Waste Guideline.....</b>	<b>21</b>

## 2 List of Abbreviations

BESS	Battery Energy Storage Systems
CAM	Communications Authority of Maldives
C&D	Construction and Demolition Waste
CR	Civil Registration
CO2	Carbon Dioxide
EIA	Environmental Impact Assessment
EPA	Environment Protection Agency
EPPA	Environmental Protection and Preservation Act
EPR	Extended Producer Responsibility
GDS	Government Digital Service
IBM	Interactive Beneficiary Mechanism
ID	Identification
IWMC	Island Waste Management Centers
IXP	Internet Exchange Point
MoEDT	Ministry of Economic Development and Trade
MoF	Ministry of Finance
MoCCEE	Ministry of Climate Change Environment and Energy
MMA	Maldives Monetary Authority
MSW	Municipal Solid Waste
NCIT	National Center for Information Technology
RWMF	Regional Waste Management Facilities
RWMT	Regional Waste Management and Treatment
SOPs	Standard Operations Procedures
WEEE	Waste electronic, and electrical equipment
WtE	Waste to Energy

# 1 Introduction

The Maldives Competitiveness and Growth Project (MCGP) is a 5-year investment project financed by the World Bank.

The overall Project Development Objective (PDO) is to strengthen private participation in and financial sustainability of State-Owned Enterprises (SOEs), and the support mechanisms for the competitiveness of small and medium enterprises (SMEs).

In the recent years there has been a significant increase in utilization of various gadgets and products which has become a major source of electronic wastes. The development of technology related solutions and various platforms also adds to this burden of e-wastes. In most of these cases the old and worn out electronic items used in both public and personal capacity are not disposed off properly due to lack of proper infrastructure and regulatory measures. The MCGP project involves enhancing digital financial infrastructure as a key component. Consequently, the obsolescence of electronic equipment procured for the project will result in the generation of e-waste. Hence it is critical to develop a guideline to properly manage the e-waste resulting from the project. This will ensure safe disposal of waste and mitigation of possible harm to the environment and people. This guideline is a guiding document for all project activities related to e-waste.

The guideline will describe the appropriate processes for the effective and efficient use and management of electronic equipment procured via the project and details on minimizing associated risks. This guideline is particularly relevant to Subcomponent 2.1: Digital Financial (fintech) Infrastructure.

All minimum standards and guidance provided in this E-waste Management Guideline will be followed during project implementation, throughout the procurement and use of electronic equipment. Clauses which provide required information and specifications on e-waste management will be inserted in procurement contracts and the PMU will ensure that the clauses are reviewed by the Bank's procurement, and environmental and social specialists prior to the signing of contracts. A status update of the implementation of the E-Waste Management Guideline will be prepared and submitted to the World Bank on a semi-annual basis. This guideline will be updated as required, based on procurement and implementation updates.

## 1.1 Project Introduction

The Maldives Competitiveness and Growth Project (MCGP, "the project") is a new 5-year investment project financed by the World Bank for the Government of Maldives (GoM) through Investment Project Financing (IPF) with Performance-Based Conditions (PBCs), declared effective on 23 June 2023 and to be implemented by the Ministry of Finance (MoF).

The overall Project Development Objective (PDO) is to strengthen private participation in and financial sustainability of State-Owned Enterprises (SOEs), and the support mechanisms for the competitiveness of small and medium enterprises (SMEs). The project comprises of three components which are as follows:

### **Component 1: Accelerating SOE Reforms**

- Sub-component 1.1: Increasing Private Participation in Ownership of Select SOEs
- Sub-component 1.2: Improving Governance of SOEs at the Program and Corporate level

## E-Waste Management Guideline

- Sub-component 1.3: Reforming SOE Public Service Obligations

### **Component 2: Fostering SME Competitiveness**

- Sub-component 2.1: Digital Financial Infrastructure
- Sub-component 2.2: SME Growth Acceleration Program

### **Component 3: Project Management**

The project is expected to finance the following activities:

1. Technical assistance to support select SOEs to develop policies and business plans, identify specific private participation opportunities, on-boarding transaction advisors and undertaking necessary technical evaluations / due diligence.
2. Development of a communications program for SOE reform.
3. Technical assistance to strengthen the design and implementation of SOE laws, regulations and guidelines.
4. Capacity building of Government institutions engaged in owning and monitoring SOEs, as well as specific SOE support to improve corporate governance practices.
5. Technical assistance and consultancy activities to support better targeting and accountability of operating and direct subsidies to SOEs, including public service obligations reform plans for significant SOEs.
6. Development of a technology platform to collect secure SME business data that incorporates value-added business management features and building an alternative credit scoring model based on transactions history and SME cash flow.
7. Technical assistance to (i) promote financial literacy and technology adoption for SMEs, (ii) support financial institutions' uptake of lending opportunities created by the fintech transformation, and (iii) strengthening Government regulations and policies on data protection, data sharing and secured transactions.
8. Development of a structured, high quality, intensive business support program for select SMEs through the hiring of an international private sector consulting entity (which can be a consortia of local and international parties) that will (i) provide growth diagnostics; (ii) develop action plans; (iii) offer performance-based technical assistance from experts/mentors for structured management improvement; (iv) link to finance providers for additional finance; and (v) provide targeted capacity building support to local knowledge providers.
9. Technical assistance and capacity building for project management staff to support the overall implementation, monitoring and evaluation of project activities.

Project implementation will be supported by a dedicated Project Management Unit (PMU) housed at MoF, led by a Project Director and supported with capabilities for project coordination, procurement and contract management, financial management, environmental and social safeguards, communications, monitoring and evaluation, and other skills as necessary to support the project. Project oversight and high-level monitoring of project implementation will be provided by an empowered inter-ministerial Project

Steering Committee (PSC), comprising of representatives from key stakeholders. In addition, public-private expert advisory committees / working groups (including key stakeholders, such as private sector representatives and financial institutions) will be formed to consult and advise on critical project implementation aspects.

While project activities will be mainly geared towards consultancy works and the procurement of consultants, the project will make use of a range of electronic devices and systems designed to support and enhance project activities, particularly for subcomponent 2.1: Digital Financial infrastructure. This subcomponent involves the development and implementation of digital platforms targeted towards SMEs, necessitating the acquisition of various electronic equipment. These may include computers, laptops, servers, networking equipment, and other essential peripherals crucial for the efficient functioning of the digital financial infrastructure. It is essential that the procurement and utilization of these electronic resources align with environmentally sustainable practices and adhere to relevant regulations to minimize electronic waste (e-waste) generation.

## 1.2 E-Waste

E-waste is a term used to cover items of all types of waste electrical and electronic equipment (WEEE) and its parts that have been discarded by the owner as waste without the intention of re-use. Although e-waste is a general term, it is considered to cover any item with circuitry or electrical components with power or battery supply. E-waste contains toxic heavy metals and flame retardants such as mercury, lead, cadmium, polybrominated flame retardants and lithium and barium, that, if mishandled, can be hazardous to human health and the environment, but, most importantly, the raw materials are valuable and scarce. E-waste volumes are growing exponentially because products are designed for linearity, and not circularity. The product either becomes obsolete due to planned obsolescence or design features at the upstream stage, or because product life is not extended by repairing, or reuse. Moreover, in the absence of proper collection and recycling policies and infrastructure, e-waste ends up in the environment. If not properly treated, e-waste can have negative impacts, both on human health and on the environment. When improperly disposed, e-waste can leach harmful substances into the soil and groundwater, that have deleterious effects on biodiversity, and it can also harm human health from direct contact or inhalation, such as neurological and endocrinological disorders, congenital mutations and respiratory impacts.

Sustainable management of e-waste avoids these negative impacts. Proper management of e-waste can prevent both serious health and environmental damage, and also have the potential for recovery of valuable metals, including rare earth and precious metals. The recycling chain for e-waste is classified into three main subsequent steps: i) collection, ii) sorting/dismantling and pre-processing (including sorting, dismantling and mechanical treatment), and iii) end processing. All three steps should operate and interact in a holistic manner to achieve the overall recycling objectives. In addition, for this to be implemented successfully there needs to be actors and entities that are active in all three areas and steps. The main objectives of sustainable e-waste recycling are to: i) treat the hazardous fractions in an environmentally sound manner, ii) maximize the recovery of valuable materials, III) create eco-efficient and sustainable business, and iv) consider social impact and local context.

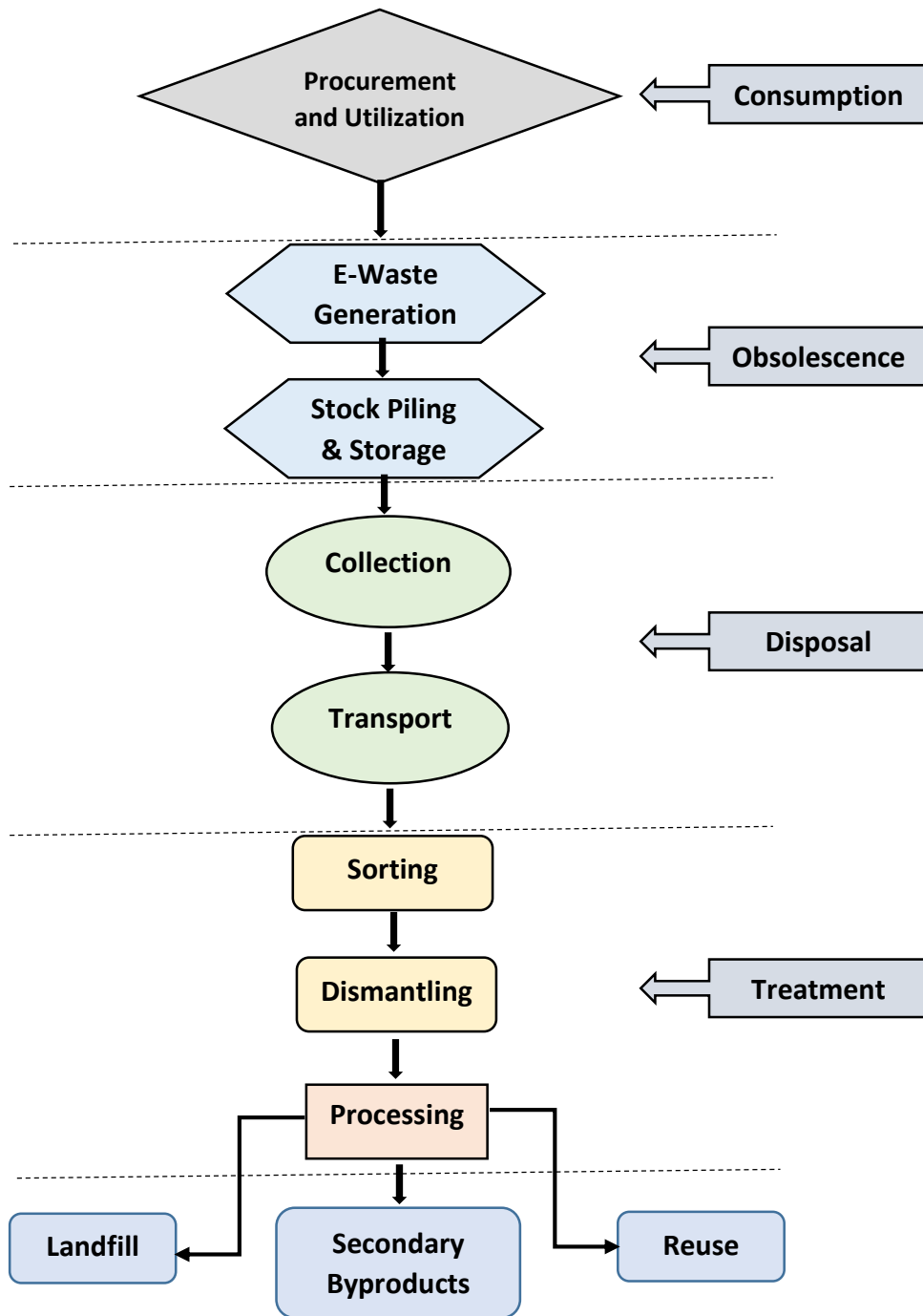


Figure 1: E-waste processing: Adapted from the World Bank Group (2012). *Wasting No Opportunity: The case for managing Brazil's electronic waste.*



### 1.3 Benefits of E-Waste Management in an Organized and Sustainable Manner

Sustainable management practices, i.e. recycling operations contribute considerably to reducing greenhouse gas emissions. Primary production of metals that are part of electrical and electronic equipment are usually large contributors to greenhouse gas emissions, i.e. mining, concentrating, smelting and refining, especially of precious and special metals has a significant carbon dioxide (CO<sub>2</sub>) impact due to the low concentration of these metals in the ores and often difficult mining conditions. But, “mining” of old phones, servers or old computers to recover the contained metals – if done in an environmentally sound or correct manner – needs only a fraction of energy compared to mining ores in nature, i.e reduced emissions but also reduced impacts from land degradation, biodiversity loss and soil and water contamination. Recycling of e-waste equipment reduces the amount of land that has to be set aside specifically as landfill zones, which in turn can be used for far more productive and socially beneficial usages such as low-income housing, more farming, or renewable energy power supplies. Recycling means that less money and energy has to be expended for the mining of the various minerals which are used during the manufacturing process for the production of electronic equipment.

The environmental footprint of a phone, a computer and other electronic devices could be significantly reduced if its life cycle is prolonged by measures such as repairing, either by maintenance or extended warranties, or if the product was built for circularity in the design phase. In addition, the impacts from the end-of life stage could be reduced by efficient collection and treatment of e-waste in an environmentally sound, managed, recycling operations, which will prevent hazardous emissions and ensure that a large part of the contained metals are recovered. This e-Waste Management Guideline does not include or mandate for the establishment of e-waste recycling infrastructure, but reiterates that; building a sustainable recycling infrastructure can contribute to sustainable waste management in the country.

### 1.4 Final Disposal Options for Hazardous Waste in the Maldives

In general, the Maldives has limited options for managing hazardous waste. Although most of the Island Waste Management Centers (IWMC’s) have designated specific areas for intermediary storage of hazardous waste (ventilated enclosed areas with sealed floors and roofs), there is no formal mechanism or infrastructure for the separate collection and recycling of e-waste in the country. The most prominent type of Hazardous Waste identified in the Maldives are engine oil, solvents, paint, boat coatings and worn-out lead batteries. Currently, e-waste such as computers, printers, and cellphones can be collected by waste collectors along with household waste, as there are no legal provisions or regulations enforcing the separate collection, treatment and recycling of e-waste.

The two major Regional Waste Management Facilities (RWMFs) operated at present are Vandhoo RWMF located in Raa Atoll and Thilafushi RWMF in Kaafu Atoll. Vandhoo is used as a final disposal destination for municipal solid waste (MSW) generated in Zone 2, a catchment of 45 islands clustered into 4 atolls (Noonu, Raa, Baa and Lhaviyani atoll). This facility has a 35 ton per day capacity incinerator that was recently upgraded into a Waste to Energy (WtE) plant, a baling facility, an ash disposal landfill, a leachate collection pond, power house, RO plant and waste processing and storage sheds. The plant is not yet brought back to operating conditions after its conversion to WtE, owing to an issue with a faulty part, which is expected to be resolved soon. Despite the foregoing limitation, the facility has been operational since mid-2019 with MSW being regularly collected from the IWMCs within the catchment and intermediary storage and baling at the facility continuing. It is important to note that, Vandhoo is not

## E-Waste Management Guideline

designed to cater for hazardous waste, however, some provisions have been made such as the inclusion of an 8000-liter used oil collecting tank. Further expansion works are planned with funding secured for creating additional storage spaces, rehabilitation of leachate collection ponds and the ash landfill, while discussions are ongoing with various funding agencies to expand its capacity even further to include provisions for recycling and chemical waste management.

Thilafushi has been used to cater for the waste management needs of Male' region ever since 1992. It was originally a lagoon (6km away from the capital city of Male') which was used to dump waste and as a result has turned into an island with a land area of 10 hectares, which is being used for waste management and industrial purposes. Until very recently, unconventional practices involving open burning and open landfilling techniques were employed in Thilafushi to manage waste. However, MoCCEE has completely ceased open burning of waste in Thilafushi in the year 2020. To facilitate this, a large compactor has been brought to the facility to enable large scale compressing of waste, which could be then stored for longer periods, and 4 incinerators with a processing capacity of 300-800 kg of waste per hour has been acquired, installed and operated. Additionally, works are on-going to convert Thilafushi into a full-fledged RWMF capable of processing, treating and disposing residual MSW and Construction and Demolition (C&D) waste coming from Zone 3, which is comprised of 32 islands grouped into 4 atolls namely Kaafu, Alif Alif, Alif Dhaalu and Vaavu atolls. The main components of this project are installation of two 250 ton per day capacity WtE plant and a baling facility with ancillary facilities, such as ash disposal landfills, intermediary storage spaces, bottom ash processing facility (brick making and road development) and C&D waste processing plant. A complete solution for hazardous waste is not offered through the regional facility initially, however, storage of hazardous waste will be facilitated. It is anticipated that, hazardous waste will be transferred periodically from this storage facility to a hazardous waste management facility abroad, until a proper mechanism is established.

Taking the above into consideration, it is evident that neither Vandhoo nor Thilafushi is fully geared to offer a complete solution for hazardous waste such as e-waste, and further developments are needed to facilitate a complete solution to deal with the concerned stream of waste, which is not available in country. Under the project on Eliminating Persistent Organic Pollutants (POPs) through Sound Management of Chemicals, funded by GEF and managed by MoCCEE, plans are underway to build hazardous waste storages in Addu and Thilafushi. These storages will also cater for E-waste. The plan is to export this waste to facilities abroad. Currently the storage site in Addu is under completion and will be used in 2024. However, work on the Thilafushi facility has not started and is subject to availability of land.

Private entities do work on e-waste recycling and buy-back arrangements have been conducted with vendors that export metals usually. While, there are no such formal or informal arrangements for e-waste at present, in some waste centers, used electronics are collected by individuals for reuse and repair.

Under the Waste Management Act (24/2022) of the Maldives, regulation on standards for management of hazardous waste and categories of special waste must be developed. Currently burning of any hazardous waste including E-Waste is prohibited and burying or dumping such waste in to the sea is also prohibited. Hence, for management (including storage, transportation, and disposal) of hazardous waste, which include E-Waste, GIIP such as the World Bank Groups Environmental, Health, and Safety Guidelines for Waste Management Facilities that provide guidance on best practice in terms of waste storage and transfer, and strict criteria on manufacturer/supplier management of e-waste, including the transport of decommissioned systems out of the country as part of the investments, will be followed. For this purpose

MoF must make arrangements with a certified e-waste recycling facility to safely manage E-waste generated from the project. Certified E-waste management facilities can be found in countries within Asia-Pacific and exist in countries like India, China, South Korea, Japan and Australia. Until such an arrangement can be made the waste must be safely stored.

## 2 Relevant Laws, Regulations and Standards Pertaining to E-Waste Management

### 2.1 Laws and Regulations

#### 2.1.1 Environment Protection and Preservation Act (EPPA) (4/93)

This is the primary umbrella law for environmental protection in the Maldives. It was enacted in April 1993 to protect and preserve the environment of the country. The EPPA has specific clauses on waste disposal that are of relevance to the project. They are as follows:

**Waste Disposal, Oil and Poisonous Substances:** Any type of waste, oil, poisonous gases or any substance that may have harmful effect on the environment shall not be disposed within the territory of the Maldives. In case where the disposal of the substance stated in paragraph (a) of this clause 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 precautions shall be taken to avoid any harm to the health of the population.

**Hazardous/ Toxic or Nuclear Wastes:** 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. Permission shall be obtained from the relevant government authority at least 3 months in advance for any trans-boundary movement of such wastes through the territory of the Maldives.

The presence of elements lead, mercury, arsenic, cadmium, selenium and hexavalent chromium and flame retardants in Waste electronic, and electrical equipment (WEEE) classifies it as a hazardous waste.

#### 2.1.2 Environmental Impact Assessment Regulation (NO. 2012/R-27) and Amendments

Article 5 of the EPPA (above) stipulates that any development work or project that have a significant impact on the environment should have an Environmental Impact Assessment conducted and approved/cleared by the Environmental Protection Agency (EPA). For the nature of project interventions which would generate E-waste there is not requirement of an EIA or clearances from the Maldives Environmental Protection Agency.

The Environmental Impact Assessment (EIA) regulation defines the procedure to follow when attaining environmental approval for development projects. The regulations lists those projects that require EIA (schedule D), those projects that do not require EIA (Schedule T) and those projects that can be undertaken as per the mitigation plan provided by EPA (Schedule U). These schedules are not relevant for this project while this document is the overarching document for Environmental Management of e-waste in the Maldives.

### 2.1.3 Waste Management Act (24/2022)

The Waste Management Act 24/2022 has been gazetted on the 18<sup>th</sup> of December 2022. The Act has specific chapters on waste management responsibilities, such as in collection, waste transfer, and disposal. Article 48 in Section 11 of the Act lists Hazardous and Toxic Waste, which WEEE can fall under, but the list does not include WEEE under the Hazardous Waste category. Under the Act, MoCCEE must publish a list of waste streams which include the listed hazardous waste and this list may include WEEE. However this list is not yet gazetted.

### 2.1.4 Circular on Auctioning Assets by Government Institutions

Under the article seven of the Financial Act (3/2006), any non-consumable durable asset should be auctioned or discarded according to the protocols stipulated in this circular. According to this circular, any public assets such as vehicles, furniture or electronic equipment must be discarded only after ensuring that no other public institution requests to reuse the items. And if no government institution shows interest to re-use them, the assets should be auctioned through the auction system established by the Ministry of Finance or discarded.

As stipulated in this circular, electronic assets which are old or worn out could can be re-used by other government entities and the option is available. If no other government intuition opts to reuse them, assets should be auctioned to interested buyers before being discarded.

### 2.1.5 Basel Convention on the Control of Transboundary Movement of Hazardous Waste and their Disposal

The Basel Convention aims to protect the environment by bringing measures to control and regulate hazardous and other waste disposals. It came into force in 1992 and the Maldives has ratified the convention. It applies Prior Consent Approval procedure to regulate the transboundary movement of the hazardous and other wastes. Non-parties cannot transport hazardous waste to and from each other unless specially agreed. Basel Convention states such transportation is illegal. The member nations to the convention are required to have domestic legislation for both prevention and punitive measures for the illegal trafficking of such hazardous wastes. It ensures that the member nations control the generation, storage, transportation, treatment, reuse, recycling, recovery and final disposal of hazardous wastes. Conference of Parties (COP) is a primary organ of the Basel Convention and is responsible to make decisions about the operations of the convention. It meets biennially.

### 2.1.6 Magey saafu raajje national waste & resource management policy and strategy 2024-2028

The government of the Maldives initiated the policy and strategy in June 2024. The aim of this strategy is to provide a framework for implementation of sustainable solid waste management in the Maldives. The policy aims to achieve separate collection of 50% by weight of electronic waste generated by the end of 2028. The policy and strategy does not specify any specific targets on treatment and processing of e-waste.

## 2.2 Institutional Arrangements for E-Waste Management in the Maldives

Roles and responsibilities of solid waste management is shared among various institutions. MoCCEE is mandated to formulate policies and strategies and to develop mechanisms for national and regional level strategies to align with national policies. The licensing and tariff approval for waste management on inhabited islands is mandated to the Utility Regulatory Authority of the Maldives. EPA is responsible for enforcement and regulation environmental standards and ensuring environmental safety related to operation of waste management facilities. Currently there is no specific entity designated for e-waste management in the Maldives while regulation is handled by the Waste Management Department of MoCCEE and the Maldives EPA. These two agencies as per the regulations and legal provisions presented above have mandate to enforce provisions of the relevant acts. Article 11 of the Waste Management Act 24/2022, stipulates local island and city councils must manage waste on their respective islands according to the act and regulations of the act. The councils must plan, manage and provide resources for waste management on the island according to the act. Under the Decentralization Act 07/2010, councils are given authority to formulate and enforce regulations on disposal and treatment of waste on the respective islands and cities.

## 2.3 The World Bank Group Environmental, Health, and Safety (EHS) Guidelines

The EHS Guidelines aims to prevent waste generation, and to promote reuse and recycling, good housekeeping, inventory control, avoidance of damage and instituting procurement measures that allow the return of reusable material. Section 1.6 of the EHS guideline on Waste Management requires the segregation of hazardous wastes from other wastes, its appropriate storage (labelled containers) and record keeping. In addition, collection, transport, and disposal should be in accordance with the guidelines and local regulations. The EHS guidelines also requires monitoring records for hazardous waste collected, stored, or shipped using the recommended procedures.

## 2.4 Good International Industry Practice (GIIP) and the World Bank ESS

GIIP promotes the use of an obligation on distributors/sellers to offer to consumers a take-back system where e-waste related purchases can be disposed of free of charge. GIIP stipulates two types of take-back systems, and distributors of EEE items must offer one of these schemes to their customers. This may include free in-store take-back schemes where distributors accept e-waste items from customers purchasing equivalent new items. Another scheme is take-back whereby consumers can dispose of WEEE items free of charge at designated collection facilities. E-waste generators should manage and dispose of e-waste responsibly according to WB ESF and EHS requirements.

ESS1 on Assessment and Management of Environmental and Social Risks and Impacts requires borrowers to identify, assess, manage and monitor environmental and social risks and impacts associated with project activities. ESS3 on Resource Efficiency and Pollution Prevention and Management requires borrowers to ensure resource efficiency and pollution prevention throughout the project life-cycle where by minimizing pollution related to project activities and promoting sustainable consumption of resources.

Based in the ESS1, that establish responsibilities in relation with the risk and impact levels during the different project phases, the generation of all types of waste must be considered from the very beginning; during the pre-design contracting, construction and operational phases. In all cases, provisions shall be taken, in order to minimize waste production and to reduce the impacts that the waste could create,

specific (solid, liquid, toxic, sewers, etc.), and Electrical and Telecommunication (E-Waste) management guideline would be adopted during projects implementations to avoid affectation to stakeholders and livelihood, biodiversity and habitats nearby and surroundings of the project site and activities.

### 3 Summary of Environmental and Human Health Risks Associated with E-Waste

The consequences of improper e-waste disposal in landfills or other non-dumping sites pose serious threats to current public health and can pollute ecosystems for generations to come. When electronics are improperly disposed and end up in landfills, toxic chemicals are released, impacting the earth's air, soil, water and ultimately, human health.

#### 3.1 The Negative Effects on Air

Contamination in the air occurs when e-waste is informally disposed by dismantling, shredding or melting the materials, releasing dust particles or toxins, such as dioxins, into the environment that cause air pollution and damage respiratory health. E-waste of little value is often burned but burning also serves a way to get valuable metal from electronics, like copper. Chronic diseases and cancers are at a higher risk to occur when burning e-waste because it also releases fine particles, which can travel thousands of miles, creating numerous negative health risks to humans and animals. Higher value materials, such as gold and silver, are often removed from highly integrated electronics by using acids, de-soldering, and other chemicals, which also release fumes in areas where recycling is not regulated properly. The negative effects on air from informal e-waste recycling are most dangerous for those who handle this waste, but the pollution can extend thousands of miles away from recycling sites

The air pollution caused by e-waste impacts some animal species more than others, which may be endangering these species and the biodiversity of certain regions that are chronically polluted. Over time, air pollution can hurt water quality, soil and plant species, creating irreversible damage in ecosystems.

#### 3.2 The Negative Effects on Soil

When improper disposal of e-waste in regular landfills or in places where it is dumped illegally, both heavy metals and flame retardants can seep directly from the e-waste into the soil, causing contamination of underlying groundwater or in the case of the Maldives coastal areas and wetlands.

When large particles are released from burning, shredding or dismantling e-waste, they quickly re-deposit to the ground and contaminate the soil as well, due to their size and weight. The amount of soil contaminated depends on a range of factors including temperature, soil type, pH levels and soil composition. These pollutants can remain in the soil for a long period of time and can be harmful to microorganisms in the soil and plants. Ultimately, animals and wildlife relying on nature for survival will end up consuming affected plants, causing internal health problems.

#### 3.3 The Negative Effects on Water

After soil contamination, heavy metals from e-waste, such as mercury, lithium, lead and barium, tend to leach through the earth even further to reach groundwater. When these heavy metals reach groundwater, they eventually make their way into ponds, streams, rivers and lakes or coastal systems and the ocean. Through these pathways, acidification and toxification is created in the water, which is unsafe for animals,

plants and communities even if they are miles away from a recycling site. Clean drinking water becomes problematic to find.

Acidification can kill marine and freshwater organisms, disturb biodiversity and harm ecosystems. Acidification of water bodies, can damage ecosystems to the point where recovery is doubtful, if not impossible.

### 3.4 The Negative Effects on Humans

As mentioned, electronic waste contains toxic components that are dangerous to human health, such as mercury, lead, cadmium, polybrominated flame retardants, barium and lithium. The negative health effects of these toxins on humans include brain, heart, liver, kidney and skeletal system damage. It can also considerably affect the nervous and reproductive systems of the human body, leading to disease and birth defects. Improper disposal of e-waste is unbelievably dangerous to the global environment, which is why it is so important to spread awareness on this growing problem and the threatening aftermath.

## 4 E-waste Management Criteria and Protocols.

### 4.1 Objectives of the Guideline

The key objective of this guideline is to achieve sustainable and integrated E-Waste management, that is effective and efficient for the use and management of electronic equipment procured via the project for digital financial infrastructure development. The guideline has been developed to ensure the sustainable and integrated management of electronic waste (e-waste) generated to minimize environmental and social risks. The objectives of this guideline are:

1. Minimize environmental pollution and health hazards associated with improper e-waste disposal.
2. Promote resource recovery, recycling, and responsible disposal practices to conserve natural resources and reduce impacts on environment.
3. Enhance awareness among stakeholders on e-waste management.

These objectives will be achieved through:

- Integrated E-waste management: through reduction of E-waste generation, and by promoting reuse and recycling initiatives to extract valuable raw material from electronic equipment procured via the project.
- Effective E-Waste Management: ensure utilization of waste management services that provide for reliable collection and management of E-wastes consistent with sound environmental principles and standards when product life cycle of project financed equipment ends.
- Efficient waste management: ensure collection, transport and disposal and treatment of waste generated from equipment procured is efficiently and safely managed.

### 4.2 General e- waste management process

The following guidance steps will be followed on the management of non-hazardous e-waste that is deemed as General E-Waste. Additional guidance specifically applicable to hazardous e-wastes is presented below. E-waste management should be addressed through an e-waste management system that addresses issues linked to e-waste minimization, generation, transport, disposal, and monitoring. Under this guideline, screening will be conducted to characterize e-waste according to composition, source, types of e-wastes produced, generation rates, according to local regulatory requirements.

#### 4.2.1 E-waste minimization processes

The e-waste guideline is formulated to ensure prevention, minimization and reduction of waste generated from the project activities. To achieve this the procurement process will be carried out by seeking any alternative products which contain materials or parts with less hazardous substances and those which will generate less toxic materials during the end of life processing. Additionally careful planning and good housekeeping including inventory control will be implemented to ensure less waste is generated after obsolescence or due to damages and being out of date. Also generation will be reduced through proper segregation and by preventing commingling with nonhazardous waste.

#### 4.2.2 Recycling and reuse

In addition to prevention recycling and reuse will be practiced and any materials to be discarded will be made available to any other public entities who may be able to reuse them. Also, the following elements



will be considered: i) Identification and reuse/recycling of products that can be reintroduced into the operational processes ii) Investigation of external markets for recycling by other industrial processing operations located abroad; iii) Providing training and incentives to employees in order to meet objectives of this guideline.

#### 4.2.3 Transportation

Containerized waste for transport and shipment should be secured and labelled with the contents and associated hazards. The containers must be properly loaded and secured into transportation vehicles and must be accompanied by a shipping paper (i.e., cargo manifest, record, etc.) that describes the load and its associated hazards, and which is consistent with the Transport of Hazardous Materials good practices and guidance.

When preparing for shipment the following should be implemented:

- Name and identification number of the material(s) composing the e-waste
- Physical state (i.e., solid, liquid, gaseous or a combination of one, or more, of these)
- Quantity (e.g., kilograms or liters, number of containers)
- Waste shipment tracking documentation to include, quantity and type, date dispatched, date transported, and date received, record of the originator, the receiver, and the transporter
- Method and date of storing, repacking, treating, or disposing at the facility, cross-referenced to specific manifest document numbers applicable to the e-waste.
- Location of each e-waste within the facility, and the quantity at each location

#### 4.2.4 Treatment and disposal

At the end of the life time of the products procured to establish the financial infrastructure, all obsolete equipment must be managed properly, to avoid impacts to humans and the environment. Treatment and disposal must follow the local regulations, World Bank EHS and ESS standards and GIIP such as:

- i) On-site or offsite chemical, or physical treatment of the e-waste material to render it non-hazardous prior to final disposal;
- ii) Treatment or disposal at permitted facilities specially designed to receive the e-waste;
- iii) Permitted and operated landfills or disposal facilities designed for the respective type of e-waste or other methods known to be effective in the safe, final disposal of e-waste materials.

### 4.3 Hazardous e-waste management

The sections below provides guidelines on managing hazardous e-wastes. Any hazardous e-waste from project activities must be segregated, collected, transported and processed according to international industry good practice. Prevention and minimization should be the prioritized and in case it is unavoidable the following principles must be adhered. i) Understanding potential risks and impacts associated with the management of any generated hazardous e-waste during its complete life cycle; ii) Ensuring that contractors handling, treating, and disposing of hazardous e-waste are reputable and legitimate enterprises, licensed by the relevant regulatory agencies and following good international industry

practice for the e-waste being handled; iii) Ensuring compliance with applicable local and international regulations, WB ESS/EHSG, and GIIP.

### 4.3.1 Hazardous e-waste storage

Accidental releases of hazardous e-waste in to the environment (air, soil, and water) must be prevented by: i) Storing waste to prevent the commingling or contact between incompatible e-waste and by thorough inspection between containers to monitor leaks or spills. Examples include sufficient space between incompatible wastes or physical separation such as walls or curbs; ii) Storing waste in closed containers (some could be radioactive proofed), away from direct sunlight, wind and rain; iii) Utilizing secondary containment systems constructed with materials appropriate for the e-waste being contained to prevent loss to the environment; iv) Provision of readily available information on compatibility to employees, including labelling each container to identify its contents; v) Limiting access to hazardous e-waste storage areas to only employees who have received proper training; vi) Clearly identifying (labelling) and demarcating the area, including documentation of its location on a facility map or site plan; and, vii) Conducting periodic inspections of e-waste storage areas and documenting the findings.

### 4.4 Conducting diagnostics for feasibility and need for management Steps

A diagnostic analysis must be performed in order to determine the level of involvement and processes needed to implement the steps in the guidelines and to what extent on a case-by-case basis; in line with project procurements, nature of e-waste procured and the quantity. For instance, if the e-wastes identified are in small quantities, the possible option is to accumulate it until there is enough volume to procure services a processing party. In all cases this analysis will include a screening assessment to understand the potential negative impacts associated with the guideline and implementation of the guideline, and in this process, the following must be conducted:

1. Quantify the volume and types of electronic equipment procured for digital financial infrastructure development.
2. Assess the lifespan and expected end-of-life of electronic equipment to anticipate e-waste generation rates.
3. Identify potential environmental and social risks associated with improper e-waste management, such as soil and water contamination, health hazards for communities, and from informal recycling practices.
4. Make provisions with processing facilities abroad and export them safely to authorized and easily accessible facilities.

### 4.5 Budget and Costs

In each phase of the project a budget with the costs for the provisions of this Guideline, must be prepared, specifically for each managerial action proposed. These budgets must be prepared in charts showing costs estimations categorized for each managerial activity presented, including those contingency expenditures and expending charted chronogram. The budget will be itemized, following the project administrative/financial organization protocols and submitted for World Bank review with the diagnostic survey during the first 6 months of project implementation.

Awareness and Training will be provided as necessary for users and relevant parties responsible for asset disposal on types of e-wastes including used laptop batteries (such as nickel-cadmium or lead acid), servers, computers, cables, etc.

The information provided to the Project Management Unit should be done via internal emails as well as for E-waste handling procedures via communication material such as posters for offices, copies of equipment management guides etc.

The E&S Specialist of the PMU will work with the Communication Specialist to design all communication material in line with the implementation of this Guideline. Good International Industry Best Practice and examples will be used on design and communication.

At minimum the following training plans will be undertaken.

**Table 1: Training details on E-Waste Guideline**

Training Program	Target Audience	Mode	Comments
Training Program on E-Waste and the Use of the E-Waste Guideline	Project Coordinating Teams in MoF, MMA and MoEDT Users	Virtual/Face to Face- 2–3-hour session	To be conducted by the PMU and World Bank E and S Specialists
Safe storage and disposal of e-waste	Relevant parties responsible for asset disposal	Virtual/Face to Face- 2–3-hour session	To be conducted by the PMU and World Bank E and S Specialists

## 4.6 Implementing Arrangement and Compliance Monitoring Requirements

### 4.6.1 Project Implementation.

MoF will be responsible for leading the overall implementation of this project. The Project Management unit (PMU) will be responsible for all fiduciary matters as well as monitoring and evaluation and safeguards.

The project will adopt streamlined implementation arrangements that aim to enhance efficiency and effectiveness of project operations while ensuring a synergistic approach through collaborative coordination and participation from all relevant stakeholders. While MoF is the sole designated implementing and executing agency for the project, relevant partner agencies will also be actively involved to provide component-level technical leadership and support. These partner agencies will include, inter alia, two MoF departments (Fiscal Affairs Department [FAD] and State Shareholding Management Department [SSMD]), PCB, MoEDT, MMA (including the Credit Information Bureau [CIB] and Financial Consumer Protection Section [FCPS]), CMDA, MSE, BCC, different financial institutions and SOEs. Consultations and trainings will be conducted for all implementing partners by the PMU.

Project implementation will be supported by a dedicated Project Management Unit (PMU) housed at MoF, led by a Project Director and supported with capabilities for project coordination, procurement and contract management, financial management, environmental and social safeguards, communications, monitoring and evaluation, and other skills as necessary to support the project. Project oversight and high-level monitoring of project implementation will be provided by an empowered inter-ministerial Project Steering Committee (PSC), comprising of representatives from key stakeholders. In addition, public-private expert advisory committees (EACs) including key stakeholders, such as private sector representatives and financial institutions will be formed to consult and advise on critical project implementation aspects. Working Groups including technical staff from relevant partner agencies will be formed to work on project activities at the ground level. In addition, the project will make use of long-term and short-term consultants to provide specialized technical input as needed.

### 4.6.2 Implementation of the Guideline

The Implementation of this Guideline will be the responsibility of PMU and the implementing party and direct oversight will be with the project's Environmental and Social Safeguards Specialist who will be housed within the PMU. He/she will work with the focal points from the project implementing institutions to ensure all provisions of the guideline are implemented within the project. In addition the PMU ESSS will organize and conduct trainings, prepare the requisite monitoring updates to the World Bank as per the guideline and maintain a direct line of communication with the World Bank team.

The Environmental and Social Safeguards specialist will work with the Procurement Specialist in implementing this plan.

### 4.6.3 Compliance Monitoring

Monitoring of all project activities will be undertaken by PMU and respective implementing partners. Each implementing agency will monitor the aspects assigned to them and report to PMU. The PMU will establish a monitoring and evaluation matrix to track progress and measure the effectiveness of e-waste

management guideline by using key performance indicators (KPIs) to assess implementation of this guideline during procurement, use and disposal of equipment.

The following table provides the monitoring matrix.

**Table 2: Monitoring matrix**

<b>Monitoring Aspect</b>	<b>Frequency</b>	<b>Purpose</b>	<b>Responsible party</b>
Knowledge and awareness on e-waste management	At the end of training	To ensure, users and implementing partners are aware of the guideline and have general awareness on e-waste management	MoF/PMU
Storage & collection area	Once the fintech infrastructure is established	<ul style="list-style-type: none"> <li>To ensure mitigation for accidental leakage is addressed.</li> <li>To verify the waste can be properly labelled and stored and ensure all safety measures are in place.</li> </ul>	MMA
Storage & collection area	One year after establishment of fintech infrastructure	To ensure the storage and collection area has no damages on walls, floor or containers and to ensure locks and safety equipment are in good condition	MMA
Storage & collection area emergency system	Annually after establishment of fintech infrastructure	To ensure emergency systems including fire alarms and fire safety systems are in working conditions	MMA
Collection and segregation practices	Annually after establishment of fintech infrastructure	To ensure GIIP is followed in segregation and storage of waste	MMA
Waste generated and their destination	When the waste is transported and sent off for disposal and processing	<ul style="list-style-type: none"> <li>To ensure all details of manifests or other records that document the amount of e-waste transported and sent off is properly logged and records maintained</li> <li>Ensure the third party handling the waste for disposal and processing is authorized and licensed by the respective government regulator.</li> </ul>	MMA

## 5 Implementation matrix for e-waste management guideline

This e-waste guideline will be implemented by following the matrix below;

**Table 3: Implementation Matrix for E-Waste Guideline**

Impact	Mitigation measures	Monitoring	Responsible party
<b><i>Pollution of air, lands and water through improper disposal</i></b>	Procure Electronic devices from credible manufacturers and ensure they are not refurbished. If possible, select sources offering repair and take back schemes. Ensure insurance coverage and electronic physical protective devices are fitted and obtain safety related information from manufacturers and suppliers.	Warranty and take back schemes for Electronic Devices purchased. Credibility of manufacturers supplying the electronic devices	MoF/PMU
<b><i>Human Health affected by improper management</i></b> Electrical and electronic equipment contain different hazardous materials, which are harmful to human health. For instance, bio-accumulative toxins (PBTs) have been associated with cancer, nerve damage and reproductive disorders. Chronic exposure to arsenic can cause lung cancer. Also, exposure to barium can lead to brain swelling, muscle weakness, damage to the heart, liver, and spleen.	Reuse and recycle all e-waste where applicable and possible. Establish an e-waste collection point in MMA, including collection bins/receptacles. Conduct awareness and sensitization targeting the users of the electronic devices to ensure that they engage in best practice for e-waste management.	Availability of e-waste receptacles in MMA. Number of awareness and training conducted for users of electronic devices on e-waste. Contracts made with third parties for disposal, ensuring they are licensed by concerned authorities.	MoF/PMU

<b><i>Lack of knowledge and awareness and improper sensitization of users of electronic equipment after obsolescence.</i></b>	Creating awareness among staff of PMU and implementing partners on the use and safe disposal of electronic wastes that are damaged or become irreparable at their end of life. Awareness should include importance of recycling, reusing and properly storing electronic equipment after obsolescence.	Number of training conducted and content covered.	MoF/PMU
<b><i>Procurement of equipment which contain more toxic materials</i></b>	Select electronic equipment with less hazardous or toxic materials, or those where processing generates a lower e-waste volume.	Ensure procurement plans and suppliers ToRs address the issue	MoF/PMU
<b><i>Dumping of e-waste whereby contaminating the environment</i></b>	Identification of electronic equipment which can be reused/recycled or reintroduced into the operational processes. Identify any institutions which may want to reuse the equipment.	Inventory and asset register	MoF/PMU
<b><i>Improper transportation of e-wastes leading to incidents thereby littering toxic substances and polluting the environment.</i></b>	All containers to be transported should be secured and labeled with the contents and associated hazards. All containers must be properly loaded and secured into transportation vehicles before leaving the site and must be accompanied by a shipping paper (i.e., manifest, record, etc.) that describes the load and its associated hazards, and which is consistent with GIIP.	Logistics records and contracts with service providers	MoF/PMU and MMA
<b><i>Lack of proper waste storage facilities in MMA</i></b>	A proper storage room for e-wastes must be in place before the end of the project. All the discarded ICTs or the E-waste will be handed over to the administration/asset management department. The department will receive the E-waste and record it in its E-waste inventory, and place it in the specified storage bins or storage facilities based on the volume and recycling purposes of E-waste. The list of the items placed in the bin will be displayed on the bin so that anybody can see what type of items are placed inside the bin. The storage bins should have appropriate space for the collection of the items. The bin should be covered from all sides with one opening from the top for placing and removing the E-waste items. The bins should be placed under a covered ventilated area to protect it from sunlight and rain. The bins should be placed under normal room temperature. There should be arrangements in the storage room to remove heat, such as exhaust fans. The surface of the storage bins should be impermeable and should prevent seepage of any material to/from the bin.	Monthly inspection records of storage area. Inventory and asset register	MoF/PMU and MMA

## 6 Annexes

### Annex 1: Do's and Don'ts of E-Waste Recycling

# Do's and Don't of E-Waste Recycling





6.1 Estimated E-Waste Generation of the Project.

Name of Equipment	Number to be Procured	Typical Life Cycle	Project Component it is procured for

\*To be updated once the exact procurement requirements on Component 2.1 are further detailed

## 7 References

Electronic Waste (E-waste) Management Plan (EWMP) (2023), Ministry of Finance and Planning, Republic of South Sudan: South Sudan Public Financial Management and Institutional Strengthening Project (P176761).

Environmental and Social Management Framework (ESMF) to be used under the Caribbean Digital Transformation Program (P171528) (CARDTP) - 2020

South Africa E-Waste Industry Management Plan V-1 (2014). Waste Policy and Information Management, Department of Environmental Affairs,

World Bank Group Environmental, Health, and Safety (EHS) Guidelines for Waste Management Facilities, December 2007