

# Initial Environmental Examination

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## MLD: Greater Malé Environmental Improvement and Waste Management Project –Transfer Station Improvements Subproject for Malé and Villingilli

Prepared by the Ministry of Environment and Energy of the Republic of Maldives for the Asian Development Bank.

## **CURRENCY EQUIVALENTS**

(as of 15 March 2018)

Currency unit	–	Rufiyaa (Rf)
Rf1.00	=	\$0.065
\$1.00	=	Rf15.449

## **ABBREVIATIONS**

ADB	-	Asian Development Bank
BPEO	-	best practicable environmental option
CDTA	-	capacity development technical assistance
CDW	-	construction and demolition waste
CEMP	-	Contractor's Environmental Management Plan
dB L <sub>eq</sub>	-	continuous noise equivalent level, expressed in decibels
DMS	-	detailed measurement survey
ELV	-	end of life vehicle
EMP	-	Environmental Management Plan
EPA	-	Environmental Protection Agency
EPPA	-	Environmental Protection and Preservation Act of 1993
GOM	-	Government of the Republic of Maldives
GRC	-	grievance redress mechanism
GRM	-	grievance redress mechanism
IEE	-	initial environmental examination
IMO	-	independent monitoring organization
IRC	-	Inter-Ministerial Resettlement Committee
IWMC	-	Island Waste Management Centre
MEE	-	Ministry of Environment and Energy
MPW/100ml	-	most probable number (of bacteria) per 100 milliliters of water
NAPA	-	National Action Programme of Action (for climate change)
O&M	-	operation and maintenance
PMDSC	-	Project Management, Design and Supervision Consultants
PMU	-	project management unit
RWMF	-	regional waste management facility
WAMCO	-	Waste Management Corporation

## **NOTE**

In this report, "\$" refers to US dollars.

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## EXECUTIVE SUMMARY

1. The Greater Malé Environmental Improvement and Waste Management Project (the Project) will establish a sustainable solid waste management (SWM) system in the Greater Malé capital region and its inhabited outer islands by (i) establishing a modern waste collection, transfer, and disposal system, (ii) improving community-based outer island waste management systems, (iii) building institutional capacity for sustainable services delivery, and (iv) raising public awareness in reduce, reuse, recycle (3R) behaviors. Physical and non-physical investments are designed to curb climate change and disaster impacts while creating a cleaner environment in Maldives. The executing agency is the Ministry of Finance and Treasury (MOFT). The implementing agency is Ministry of Environment and Energy (MEE) who will establish a project management unit (PMU) comprising officials from MEE and Waste Management Corporation Limited (WAMCO). The PMU will have responsibility for overseeing project management, with support from Project Management, Design and Supervision Consultants (PMDSC).

2. The Project will have three outputs: (i) Output 1: Waste collection, transfer, and disposal systems improved and made climate and disaster resilient, (ii) Output 2: Community-based outer island waste management systems targeting poor and women enhanced, and (iii) Output 3: Institutional capacity and public awareness in sustainable waste management strengthened.

3. **Output 1: Waste collection, transfer, and disposal systems improved and made climate and disaster resilient.** This will include (i) an efficient waste collection strategy designed and applied in Malé and Hulhumalé in consultation with local communities targeting women; (ii) waste collection and transport equipment (trucks, bins, containers) for Malé, Hulhumalé and Villimalé provided; (iii) transfer stations in Malé and Villimalé constructed and transfer station in Hulhumalé designed; (iv) construction and demolition (C&D) waste processing plant and end of life vehicle (ELV) dismantling workshop constructed; (v) waste vessel harbor at Thilafushi rehabilitated; (vi) 3 vessels for waste transport from outer islands to Thilafushi provided; (vii) heavy equipment (bulldozers, excavators, roll trucks) for controlled dumpsite management at Thilafushi provided; and (viii) construction of 2 administrative buildings for WAMCO at Malé transfer station and Thilafushi waste vessel harbor. All facilities designed will consider climate change and disaster resilient features.

4. **Subproject Scope.** This initial environmental examination (IEE) has been prepared for the subproject on improvements to waste handling and processing facilities including transfer stations in Greater Malé and Villingilli. The planned improvement works comprise the following components: (i) rehabilitation of existing transfer station on Malé; and (ii) upgrading of an existing Island Waste Management Center (IWMC) on the island of Villingilli to a transfer station. These facilities will, collectively, improve the handling and transport of solid waste in Greater Malé, benefiting a population of approximately 183,000 at present, which is projected to rise to 333,000 by 2030 and 528,000 by 2047. Waste collected from homes, institutions and industries is conveyed to transfer stations and then to a waste management facility at Thilafushi, which will be covered under a separate ADB loan in the future.

5. **Malé.** The Malé transfer station will have a vehicle weighbridge and administration building, a ramp system to transfer waste from collection trucks to the containers, an improved perimeter fence and an allowance for green space and a buffer zone. It is to be a focal point for the development of the Waste Management Corporation's (WAMCO's) activities to facilitate organizational and logistical improvement and will include facilities for parking and maintenance for WAMCO's vehicle fleet. The station will be built at an existing site on newly reclaimed land, with an available area of approximately 6,000m<sup>2</sup>. This area is surrounded by Malé's south harbor and various administrative buildings, which are government-owned. The site is serviced by a water supply, electrical power and drainage.

6. **Villingilli.** The IWMC on Villingilli island will be improved and upgraded as a small transfer station, with a secure perimeter wall, asphalt or concrete surface, sheds and equipment. Currently, the existing IWMC has a wall along one side which does not cover the full perimeter, and has no facilities to encourage separation of different fractions of waste. This is underutilized, and consequent haphazard dumping occur in the residential area.

7. This IEE has been prepared based on preliminary designs of the subproject and will be finalized based on the final detailed design. This IEE shall be attached in the bid and contract documents. The civil works package of the transfer station subproject will be awarded to selected Contractor who shall update this IEE based on the final detailed design, and submit the final IEE to the executing agency through the project management unit (PMU). Subsequently, the PMU shall submit the final IEE to ADB for final review and disclosure.

8. **Categorization.** ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB Safeguard Policy Statement (SPS), 2009. Using ADB Rapid Environmental Assessment Checklist, the subproject is classified as Environmental Category B as per the ADB SPS, 2009 as no significant impacts are envisaged. Accordingly, this IEE has been undertaken, which assesses in more detail the likely environmental impacts of the subproject and provides an environmental management plan (EMP) specifying the required mitigation and monitoring measures to ensure that these impacts are managed to acceptable levels. This IEE also emphasizes the need to incorporate pollution prevention and control technologies during the design, construction, and operation of the subproject and adhere to internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines.

9. **Environmental Management.** The potential impacts and mitigation measures have been identified through review of the feasibility study prepared for the project, discussion with the designers, and stakeholder consultation. An environmental management plan (EMP) is included as part of this IEE, which discusses the following:

- (i) mitigation measures for environmental impacts during implementation and operation; and
- (ii) an environmental monitoring program, and the responsible entities for mitigating, monitoring, and reporting.

10. The transfer stations exist in their current form to address existing impacts of solid waste generation and accumulation, by enabling bulk handling of waste such that it can be efficiently removed from residential and industrial areas and construction sites, sorted and loaded onto vessels for transport to the landfill on Thilafushi island. The project is to improve these facilities, and enable them to handle growing future waste flows, and will be situated at sites currently in use for waste management. Project includes a community outreach component to promote the 3Rs and mitigate both the volume of solid waste that will increase with growing population and the level of separation, to facilitate efficient handling of the different fractions. Each facility is located close to, or on the shoreline and some waste is lost to the sea during the process of loading of onto transfer vessels and this is likely to increase with population growth and consequent increases in quantities of solid waste generated. The project envisages introducing a containerized system and upgraded equipment for handling and transportation as well as more efficient separation of waste fractions. The resulting improvements in efficiency of waste handling are expected to result in long term, positive and significant impacts covering both the immediate area around the islands and the wider marine environment in Zone 3 and beyond.

11. No impact on vegetation is envisaged at any of the locations. Land surrounding the facilities is mainly reclaimed land in the case of Malé, and residential in the case of Villingilli. Improvements in efficiency of operation are expected to reduce current noise and exhaust and dust emissions at each of the three sites. Similarly, improved efficiency is likely to lessen traffic impacts on Malé, though there will be no significant impact in Villingilli as traffic levels are low on the island as a result of restrictions on numbers and types of vehicle allowed on the island.

12. No private property will be affected and no land acquisition will be required for any of the sites. The methods to be used for site preparation, fabrication, construction and commissioning, as well as associated arrangements to ensure sound environmental management and safety at all times, are to be defined by the Contractor in a Contractor's Environmental Management Plan (CEMP) submitted to the project management, design, and supervision consultants (PMDSC) for approval. These will cover the following areas of impact which are potentially significant but can be mitigated by the adoption of good practice: (i) impedance of traffic, (ii) noise pollution and vibration, (iii) waste generation (iv) release of silt from excavations, (v) water pollution, (vi) air and dust pollution, (vii) community health and safety risks, and (viii) occupational health and safety.

13. The proposed improvements are designed specifically to address existing and future operational constraints related to safe and efficient handling of waste, collection of recyclables and shipment to Thilafushi. Existing impacts that are addressed including excessive loss of waste to the sea during loading of transfer vessels, site security, inability to accurately weigh incoming waste, constraints on maintenance and safe storage of vehicles and plant, and site drainage. The use of containers will provide a more efficient system of handling and loading waste, reducing potential losses into the sea. Risks of breakages or mishandling will be mitigated by operation and maintenance training for the containers and handling plant. Improvements will reduce exposure of waste to pests and reduce their occurrence. While each station will handle a growing quantity of waste, and therefore increased vehicle movements, this will occur without the project and will be mitigated by support to WAMCO in developing improved systems of waste collection rosters on each island.

14. **Analysis of Alternatives.** Options analysis for the best practicable environmental option (BPEO) has been undertaken by the consultant team engaged by MEE. For Malé, the layout of the proposed infrastructure improvements has been dimensioned in such a way that future strategies in terms of sorting, recycling and waste flow handling have been taken in account, and projected quantities of each fraction of solid waste have been projected for the design.. The option of direct transport of waste to Malé via a bridge is mentioned for the Villingilli facility, however the construction of such a bridge is likely to be well into the future.

15. Regarding alternatives to project scope, the design of the transfer stations envisages the use of containers, to receive waste from delivery trucks and transfer it to vessels. An alternative to this is an "open" system where trucks are offloaded mechanically, or they tip the waste to a central area or directly onto awaiting vessels, which is not considered acceptable due to likelihood of excessive losses of waste to the sea.

16. Under the "no project" scenario, there will be no means of increasing the handling capacity of the existing waste handling facilities to meet the requirements imposed by the growing volumes of waste, which would vastly exacerbate existing problems.

17. During feasibility study preparation and the identification of the BPEO for the transfer stations and other aspects of the integrated solid waste management system for Zone III, the team worked with key stakeholders such as MEE and WAMCO, and stakeholders are identified

in a stakeholder analysis. Consultations have consistently shown a strong desire for the existing solid waste management system to be improved.

18. **Grievance Redress Mechanism.** A Grievance Redress Mechanism (GRM) will be established at two levels, one at the project site level and another at the level of the PMU, to receive, evaluate and facilitate the resolution of concerns, complaints and grievances of all affected persons. The Grievance Redress Committee will aim to provide a time bound, transparent and thereby trusted way to voice and resolve concerns linked to the project, including environmental concerns, and to be an effective way to address affected the concerns of affected persons without allowing it to escalate and cause delays in project implementation. The GRM will operate on two levels: (i) the first level to be handled on the island where the work is to take place, via a committee; and (ii) the second level to be handled by the PMU.

19. **Implementation Arrangement.** The executing agency is the Ministry of Finance and Treasury. The implementing agency is the Ministry of Environment and Energy (MEE), which will establish a PMU comprising officials from MEE and WAMCO. The PMU will be strengthened with external experts in the areas of finance, procurement, technical areas, and contract management. The PMU will have responsibility for overseeing project management, with support from PMDSC. These functions will include overseeing EMP implementation.

20. For civil works, the Contractor will be required to (i) obtain all statutory clearances prior to commencement of civil works; (ii) establish an operational system for managing environmental impacts (iii) prepare a CEMP based on the EMP of this IEE, and submit to PMDSC for approval; (iv) carry out all of the monitoring and mitigation measures set forth in the approved CEMP; and (v) implement any corrective or preventative actions set out in safeguards monitoring reports that the executing agency or implementing agency will prepare from time to time to monitor implementation of this IEE, EMP, and CEMP. The Contractor shall allocate a budget for compliance with these EMP measures, requirements and actions.

21. **Monitoring and Reporting.** An environmental monitoring system has been designed, based on an analysis of the key environmental performance issues associated with each stage of the project. Two areas of environmental monitoring are identified, namely: compliance monitoring and community feedback, which are in addition to monitoring measures in the Design and Monitoring Framework for the project. These provide a means of gauging whether the stations operate more efficiently and with less loss of waste into the sea.

22. EMP compliance monitoring will be undertaken by the PMU, with support of the PMDSC. Effects will be monitored by means of community feedback and laboratory testing. Consistent with reporting requirements set out in the Project Administration Manual, PMU will prepare and submit reports to ADB on a semi-annual basis. To facilitate monitoring and enable responses to emerging issues, monthly reports will be prepared by the PMU and submitted to the MEE.

23. The overall finding of this IEE is that the subproject will result in significant environmental benefits, because it is conceived and designed to address major environmental issues associated with existing difficulties in waste handling and transfer and the rapidly growing volumes of waste that are projected in coming decades. The subproject will not have significant adverse environmental impacts and the potential adverse impacts identified are associated with the construction phase, which can be managed through effective implementation of the EMP. No further environmental assessment is therefore required and the classification of Category B is confirmed. However, this IEE will be finalized based on the final detailed design and this classification shall be reassessed or reconfirmed.



## I. INTRODUCTION

1. The Greater Malé Environmental Improvement and Waste Management Project (the Project) will establish a sustainable regional solid waste management (SWM) system in Greater Male by (i) improving collection, transfer, disposal, treatment, recycling, and dumpsite rehabilitation; (ii) strengthening institutional capacities for solid waste services delivery and environmental monitoring; and (iii) improving public awareness and behaviors in reduce-reuse-recycle (3R).<sup>1</sup> The Project will be designed to reduce disaster risk and improve climate change resilience while creating a cleaner environment and reducing greenhouse gas emissions.

2. The Project will establish a sustainable SWM system in the Greater Malé capital region and its inhabited outer islands by (i) establishing a modern waste collection, transfer, and disposal system, (ii) improving community-based outer island waste management systems, (iii) building institutional capacity for sustainable services delivery, and (iv) raising public awareness in 3R behaviors.<sup>2</sup> Physical and non-physical investments are designed to curb climate change and disaster impacts while creating a cleaner environment in Maldives, one of the world's lowest-lying nations.<sup>3</sup>

3. The Greater Malé capital region (classified as Zone 3 in the National Solid Waste Management Policy and the most populated in the country),<sup>4</sup> suffers from severe environmental pollution and deteriorating livability due to inadequate collection and haphazard disposal of solid waste. Open dumping and burning of garbage at the 30-year-old 10-hectare dumpsite on Thilafushi Island (6 km from Malé) creates a significant environmental and public health hazard. Plumes of smoke visible from the capital city Malé, the international airport, and surrounding resorts compromise air quality and pose a daily nuisance to residents and tourists, while toxic leachate contaminates soil and groundwater. Greater Malé and its 32 inhabited outer islands lack an organized and sustainable waste management system for the 774 tons of mixed solid waste generated per day (tpd).<sup>5</sup> With rapid urbanization and tourism development in the region, waste generation is expected to grow to 924 tpd by 2022. This increasing pressure on an already stressed waste management system poses a significant threat to tourism and fisheries, both of which rely heavily on the country's pristine environment and are cornerstones to the Maldives economy.<sup>6</sup> Poor communities in outer islands suffer from accumulated garbage with limited awareness and capacity to effectively manage solid waste.

4. **Existing waste collection, transfer, and disposal system.** High population density and narrow streets present unique challenges for waste collection in Malé. Waste collection is operated by the Waste Management Corporation Limited (WAMCO), a state-owned operator created in 2015 to collect and transport waste and manage the regional waste management facilities throughout the

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<sup>1</sup> ADB. 2016. *Country Operations Business Plan: Maldives, 2017–2019*. Manila. The project is confirmed via letter dated 17 July 2016.

<sup>2</sup> The project area encompasses the inhabited islands of the Malé Atoll, North Ari Atoll, South Ari Atoll, and Vaavu Atoll with a total population of 216,000 inhabitants (51% of Maldives). It comprises the capital city of Malé, and 35 inhabited islands. There are 76 resorts in the project area. The Greater Malé capital region within the project area consists of seven islands (Thilafushi, Gulhifalhu, Villimalé, Malé, Funadhoo, Hulhulé and Hulhumalé) and is the most populated.

<sup>3</sup> ADB. 2017. *Technical Assistance to Maldives for Preparing the Greater Malé Environmental Improvement and Waste Management Project*. Manila.

<sup>4</sup> The National Solid Waste Management Policy (2015) divided the country into 7 regional waste management zones (map) each with a regional waste management facility and system for safe transfer to those facilities.

<sup>5</sup> Breakdown of solid waste by type: household = 149 tpd (19%), commercial = 27 tpd (3%), resort = 48 tpd (6%), C&D = 530 tpd (68%), market = 2.5 tpd (0.3%), airport = 9.3 tpd (0.3%), hazardous = 1.5 (0.2%), end of life vehicles = 0.65 tpd (0.1%), industrial = 6 tpd (0.8%). Waste composition: organic (53%), paper and cardboard (12%), plastic (11%), hazardous (medical) waste (8%), metal (3%), glass (3%), and others (11%). Source: *Project Feasibility Study final report (2017)*.

<sup>6</sup> Tourism and fisheries account for a quarter of total employment in the country (2014 Census). Tourism being the most rapidly expanding industry and being the highest contributing sector to the Maldivian gross domestic product.

country.<sup>7</sup> WAMCO has limited professional experience in modern and efficient waste collection systems. The lack of technical and managerial skills is a key issue affecting sector performance.<sup>8</sup> While WAMCO is trying various initiatives to improve collection, the company received nearly 150 complaints per day (as of September 2017) on its hotline mostly related to non-collection. Collection equipment includes a fleet of aging vehicles unable to access narrow streets. There are no uniform refuse bins or formal transfer stations. Waste is transported to Thilafushi Island in open non-containerized vessels resulting in significant spillage into the ocean.<sup>9</sup> Since 2008, fires have been deliberately set at the dumpsite to reduce growing mounds. On-site equipment and poor site logistics are severely inadequate to efficiently manage incoming waste and maximize use of limited space. There is no separate collection and processing of construction and demolition waste (CDW) and end-of-life vehicles (ELV).<sup>10</sup> Household surveys in the project area show a high demand for 3R awareness and education programs.<sup>11</sup>

5. **Impact and Outcome.** The Project is aligned with the following impact: a healthy living environment created in the Greater Malé capital region and its outer islands. The Project will have the following outcome: climate and disaster resilient SWM services improved.<sup>12</sup>

6. **Outputs.** The Project will have three outputs.

7. **Output 1: Waste collection, transfer, and disposal systems improved and made climate and disaster resilient.** This will include (i) an efficient waste collection strategy designed and applied in Malé and Hulhumalé in consultation with local communities targeting women; (ii) waste collection and transport equipment (trucks, bins, containers) for Malé, Hulhumalé and Villimalé provided; (iii) transfer stations in Malé and Villimalé constructed and transfer station in Hulhumalé designed; (iv) construction and demolition (C&D) waste processing plant and end of life vehicle (ELV) dismantling workshop constructed; (v) waste vessel harbor at Thilafushi rehabilitated; (vi) 3 vessels for waste transport from outer islands to Thilafushi provided; (vii) heavy equipment (bulldozers, excavators, roll trucks) for controlled dumpsite management at Thilafushi provided; and (viii) construction of 2 administrative buildings for WAMCO at Malé transfer station and Thilafushi waste vessel harbor. All facilities designed will consider climate change and disaster resilient features.

8. **Output 2: Community-based outer island waste management systems targeting poor and women enhanced.**<sup>13</sup> This output will provide comprehensive support to strengthen sustainable solid waste management in poor outer island communities. It includes (i) a minimum of 22 island waste management centers (IWMCs) with processing equipment (balers, glass crushers, metal presses) developed or upgraded in consultation with community targeting women and incorporating climate and disaster risk measures;<sup>14</sup> (ii) collection equipment for outer islands (bins, refuse collection vehicles, dump trucks) provided; (iii) capacity building of eligible island councils targeting women in waste collection, segregation, composting, recycling, and O&M; and (iv) community awareness and behavior change campaigns in 3R targeting women in outer islands delivered. As subprojects under Output 2 will be prepared after Board approval, each island is required to meet minimum eligibility and selection

<sup>7</sup> WAMCO does not operate collection within the outer islands. This is the responsibility of island councils.

<sup>8</sup> Current collection coverage is estimated to be 89% in Malé, 89% in ViliMalé, and 84% Hulhumalé though highly inefficient resulting in waste piles.

<sup>9</sup> Government of Maldives, Ministry of Environment and Energy. 2016. *State of the Environment*. Malé.

<sup>10</sup> The project will extend the life of the existing dumpsite in the medium term (8-11 years).

<sup>11</sup> Around half of TRTA household survey respondents highlighted increasing awareness and education is important. ADB. 2017. TA-9327. *Socioeconomic survey for Preparing the Greater Malé Environmental Improvement and Waste Management Project*. Manila

<sup>12</sup> The design and monitoring framework is in Appendix 1.

<sup>13</sup> There are 32 outer islands in the project area eligible for support under Output 2.

<sup>14</sup> Out of 32 outer islands, some have existing facilities but are not operational due to inadequate design and insufficient equipment which would be upgraded under the project.

criteria, including safeguards, to receive support from the Project.<sup>15</sup> The criteria is intended to ensure sustainability and is outlined in the Project Administration Manual (PAM).<sup>16</sup> Output 2 will be partially funded by a Trust Fund grant focusing on poverty reduction, which will support islands in the following areas:<sup>17</sup> (i) IWMCs constructed in a minimum of 11 eligible islands, (ii) skills and capacity building in eligible islands targeting women provided, and (iii) awareness campaigns in 3R delivered in all outer islands.<sup>18</sup>

**9. Output 3: Institutional capacity and public awareness in sustainable waste management strengthened.** This will include (i) capacity building support to eligible WAMCO staff (including all eligible women staff) in waste collection, controlled dumpsite management, strategic and financial planning (tariffs, diversified revenue stream), and disaster risk management provided;<sup>19</sup> (ii) a recycling market study conducted;<sup>20</sup> (iii) public awareness and behavior change campaigns in 3R targeting the poor and women in Greater Malé delivered;<sup>21</sup> and (iv) project management, design, and supervision consultant support provided.

10. This initial environmental examination (IEE) has been prepared for the subproject on improvements to transfer stations in Malé and Villingilli under the Project. The planned improvement works comprise the following: (i) a rehabilitated transfer station on Malé; and (ii) upgrading of an existing Island Waste Management Center (IWMC) on the island of Villingilli to a transfer station. These facilities will, collectively, improve the handling and transport of solid waste in Greater Malé, benefiting a population of approximately 183,000 at present, which is projected to rise to 333,000 by 2030 and 528,000 by 2047. Waste collected from homes, institutions and industries is conveyed to transfer stations and then to the RWMF at Thilafushi, which will be covered under a different loan in the future. For existing transfer stations and IWMCs that will require rehabilitation, environmental audit will be conducted in accordance with ADB SPS. to determine the existence of any areas where the Project may cause or is causing environmental risks or impacts. If the Project does not foresee any new major expansion, the audit constitutes the environmental assessment for the project. A typical environmental audit report includes the following major elements: (i) executive summary; (ii) facilities description, including both past and current activities; (iii) summary of national, local, and any other applicable environmental laws, regulations, and standards; (iv) audit and site investigation procedure; (v) findings and areas of concern; and (vi) corrective action plan that provides the appropriate corrective actions for each area of concern, including costs and schedule.

11. This IEE has prepared based on preliminary designs of the subproject and will be finalized based on the final detailed design. This IEE shall be attached in the bid and contract documents.

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<sup>15</sup> All 32 outer islands will be screened through the selection criteria outlined in the PAM and EARF. Appraisal and safeguard reports will be approved by ADB prior to start of any project-related physical activities. Subprojects having resettlement impacts will not be included. IWMCs consist of concrete platforms, small covered sheds, segregated waste processing and storage areas, small office, fencing.

<sup>16</sup> Project Administration Manual (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).

<sup>17</sup> Additional selection criteria for Trust Fund supported islands includes climate change vulnerability, and women participation in island councils, and is outlined in the Project Administration Manual (accessible from the list of linked documents in Appendix 2 of the report and recommendation of the President).

<sup>18</sup> Upon confirmation from the government and the approval of Trust Fund.

<sup>19</sup> Disaster risk management capacity building will include preparation of a SWM disaster action plan outlining prevention, preparedness, response and recovery tasks. DRM risk awareness activities will include first responders (police, fire fighters) on Thilafushi.

<sup>20</sup> The recycling market study will cover plastics, construction and demolition waste, and other primary recyclables.

<sup>21</sup> Public awareness and behavior change activities under Outputs 2 and 3 will be implemented through a Public Awareness and Community Capacity Building consultant recruited by the PMU.

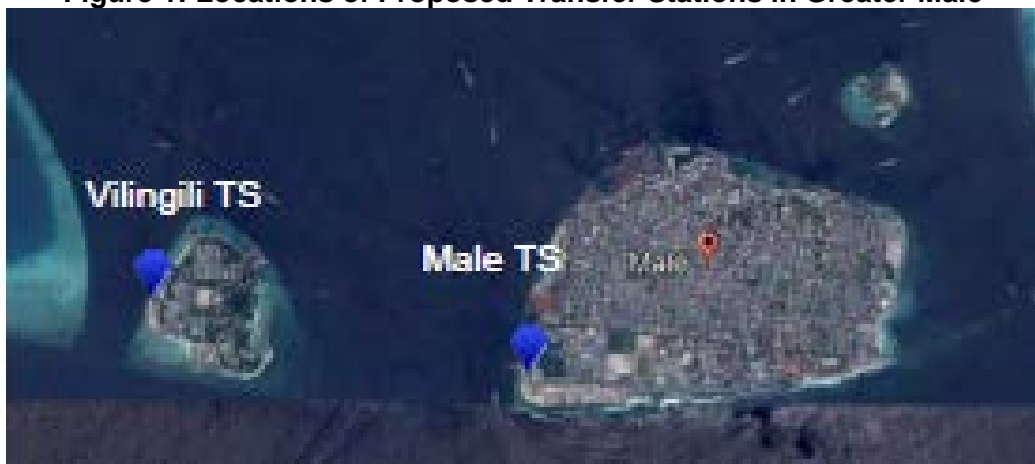
The civil works package of the transfer station subproject will be awarded under a design-build (DB) contract. As such, the DB Contractor shall update this IEE based on the final detailed design, and submit the final IEE to the executing agency through the project management unit (PMU). Subsequently, the PMU shall submit the final IEE to ADB for final review and disclosure.

## II. DESCRIPTION OF THE PROJECT

12. The proposed infrastructure improvements are to form part of an improved integrated system of waste management in Zone 3, one of seven zones into which the country is divided for waste management purposes and consisting of the atolls of Alifu Alifu, Alifu Dhaalu, Kaafu, and Vaavu). This description is based on a concept design, prepared by Water Solutions in association with Kocks Ingenieure, which uses a 30 year planning horizon, from 2017 to 2047.

13. The planned works comprise (i) rehabilitation of existing transfer station on Malé and (ii) upgrading of an existing Island Waste Management Center (IWMC) on the island of Villingili to a transfer station. These facilities will improve the handling and transport of solid waste from a catchment area comprising Malé City and Villingili. Greater Malé has a population of approximately 183,000 people at present, projected to rise to 333,000 by 2030 and 528,000 by 2047. Over this period the total tonnage of solid waste produced daily is projected to rise from 148.5 tons/day at present to 434.5 in 2030 and 957,000 in 2047, reflecting population growth, increasing per capita waste generation and greater numbers of passengers at the airport.

**Figure 1: Locations of Proposed Transfer Stations in Greater Malé**



14. Waste is collected from homes, institutions and industries and conveyed to the transfer station. The transfer station at Malé will receive waste from Villingili and from a future facility on Hulhumale. Following further separation will be transported to the Regional Waste Management Facility (RWMF) at Thilafushi. The main waste streams will comprise household waste and mixed waste from homes, commercial entities including markets and Velana International Airport, construction and demolition waste (CDW) and paper and cardboard waste collected primarily from schools and administrative establishments.

15. Based on a survey of existing CDW generation and composition, and likely levels of construction in the future, carried out by Water Solutions / Kocks in October/November 2017, generation of CDW is likely to rise from a present level of 530 tons/day to 634 tons/day in 2020 and 731 in 2040. CDW is composed mainly of inert material such as aggregates and dust, making

up 91.8% of the total by weight, while most of the rest is wood, making up 7.1%, paper and plastic film material make up a further 1% and the final 0.2% is metal waste.

16. Design of the transfer stations envisages the use of steel containers for conveying waste to the vessels.

17. **Malé Transfer Station.** The feasibility study estimates that around 305,000 tonnes of waste from the Malé, Hulhumalé and Velana airport will be received at the station in the year 2022, the start of operation. This comprises 58% C&D waste, 29.7% household waste, 0.4% market waste, 1.7% commercial waste and 0.2% clinical waste from hospitals. Surveys of waste composition carried out for the feasibility study found that C&D waste comprises mainly 92% aggregates and related (concrete fragments, rock fragments, sand, soil and gravel), 7% wood and the remainder metals and plastics. The composition of household waste is broken down into organic waste (kitchen, garden and other) 60%, paper and cardboard 10%, plastics 10%, glass 3%, hazardous waste (including clinical) 3% and 10% others.

18. At present, the facility receives typically 10 truckloads of waste per day. The feasibility study forecasts this rising to approximately 20 daily truckloads over the life of the Project. Two to three daily transfer vessel sailings to the RWMF are projected, with a turnaround time of approximately 5 hours including loading at the transfer station, the time taken for the crossing (45 mins each way) and waiting and unloading time at the RWMF.

19. Based on requirements for waste handling operations (including sorting, recycling and waste flow handling), vehicle movement and parking, a vehicle weighbridge and administration building, with an allowance for green space and a buffer zone, the improved transfer station at Malé has been designed. Part of the concept is that the Transfer Station will be a focal point for the development of the Waste Management Corporation's (WAMCO's) activities to facilitate organizational and logistical improvement and will include facilities for parking and maintenance for WAMCO's vehicle fleet. It will comprise:

- (i) A steel fenced area with an entrance gate;
- (ii) A waste acceptance office (2 store office container) with a weighbridge;
- (iii) A raised transfer deck with 5 bays and access ramp, for the transfer of waste from trucks (which drive up the ramp and reverse into the bays to tip the waste into containers placed below at ground level);
- (iv) A further raised deck, connected by a curved ramp, to provide parking space for the WAMCO vehicle fleet;
- (v) Space for an administration building;
- (vi) A parking shed for heavy vehicles;
- (vii) Vehicle workshops;
- (viii) Roads; and
- (ix) Miscellaneous site infrastructure (lighting, water supply, rainwater drainage, landscaping etc.).

20. The station will be built at the existing site on newly reclaimed land, with an available area of approximately 6,000m<sup>2</sup>. Surroundings include Malé's south harbor and various administrative buildings, and is under public ownership. The site is serviced by a water supply, electrical power and drainage. A due diligence will be undertaken on the suitability of the reclaimed land where the station will be located.

21. The improved Malé transfer station employs a ramp system for unloading trucks into containers for transfer to the vessel serving the route between the transfer station and the RWMF at Thilafushi. From the design concept report prepared by Water Solutions / Kocks Consulting, Figure 2 and Figure 3 depict the site layout, including an administration building (Which, it is assumed, is being constructed under separate arrangements and is not part of the Project. Environmental audit on the building will be conducted in accordance with ADB SPS.). Incoming vehicles pass over a weighbridge, drive up the access ramp and reverse into unloading bays where containers are placed. Separate containers are to be used for MSW, bulk waste and CDW. The use of standard stackable 6m shipping containers is envisaged, which will be transferred by a reach loader to the Thilafushi bound vessel. Sheltered space is provided for boxes, waste bales and garaging of heavy equipment.

**Figure 2: Layout of Malé Transfer Station<sup>22</sup>**



<sup>22</sup> Consultancy Services for Feasibility Study for an Integrated Solid Waste Management System for Zone III (including Greater Malé) and Preparation of Engineering Design of the Regional Waste Management Facility at Thilafushi. Feasibility Report. Ministry of Environment and Energy, Republic of Maldives. December 2017.

**Figure 3: 3D Representation of Proposed Layout of the Malé Transfer Station**



22. **Villingilli Transfer Station.** The island of Villingilli has an existing Island Solid Waste Management Centre (ISEMCIWMC) which has a wall along one side which does not cover the full perimeter. There are no facilities to encourage separation of different fractions of waste, or to assist loading the waste into containers. Dumping on the beach and within the island is commonplace, showing lack of acceptance and underutilization by islanders. Figure 4 shows an aerial view of the existing IWMC from the air. The IWMC was assessed by Water Solutions / Kocks Ingenieure and found to be managed more or less properly, though in need of some improvement. Deficiencies found include (i) that the area is only partly fenced, (ii) C&D waste is dumped in an uncontrolled manner and (iii) probably undersized for purpose, as much illegally dumped waste can be seen on the beach and around the island, indicating a need for greater capacity.

23. Figure 5 shows the existing poor condition of the site. The concept is for the site to be rehabilitated and provided with a security gate, entrance building, small administration building, a store for recyclables, and a transfer area paved with asphalt or concrete. It retains the existing boundary wall but requires an improved perimeter fence.



**Figure 4: Aerial view of the existing IWMC at Villingilli<sup>23</sup>**



**Figure 5: Existing condition of the IWMC**

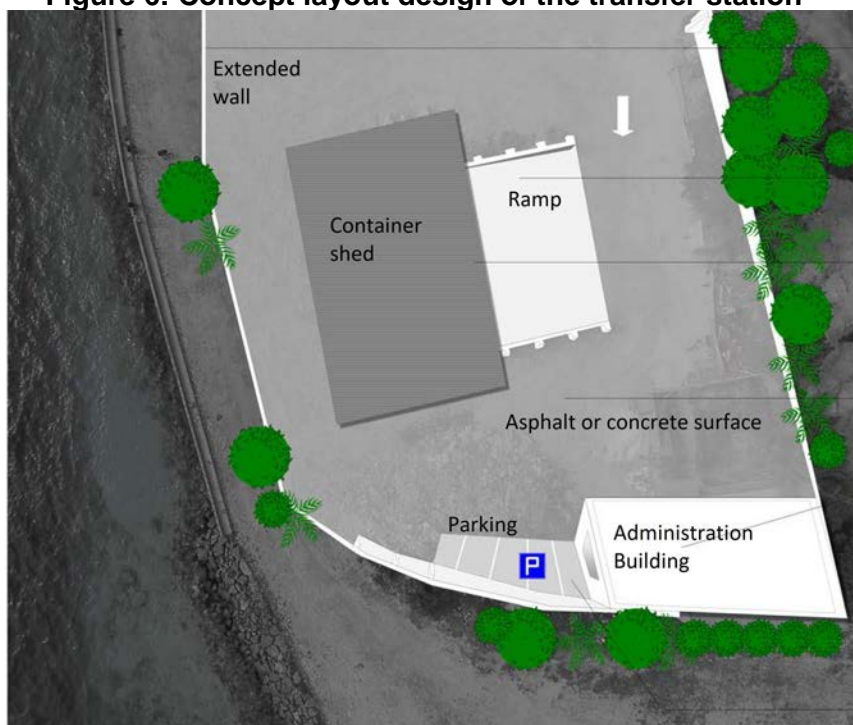


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<sup>23</sup> Water Solutions / Kocks Ingenieure (2017) Consultancy Services to Develop and Conceptualize an Efficient and Proper Waste Management System for K Vilingili and K Hulumalé.



**Figure 6: Concept layout design of the transfer station<sup>24</sup>**



### **III. POLICY LEGAL AND ADMINISTRATIVE FRAMEWORK**

#### **A. Applicable National Laws, Rules and Regulations**

24. The law governing the protection of the environment is the Environmental Protection and Preservation Act (EPPA) of 1993 (Act No 4/93). The law is brief, and sets out the principles for sustaining and extending the benefits of the environment of the Maldives for the people and coming generations. The EPPA confers powers on the MEE to issue regulations and formulate policies for environmental protection and preservation. Such regulations include:

- (i) EIA regulations of 2007, updated in 2012 (Regulation No. 2012/R-27);
- (ii) By-law on Uprooting, Cutting and Transportation of Plants and Trees (2006);
- (iii) Regulation on Stone, Coral and Sand Mining (undated);
- (iv) Regulation for the Protection and Conservation of the Natural Life and character of Old Plants and Trees in the Maldives;
- (v) Dewatering Regulation (213/R-R1697);
- (vi) Environmental Damage Liabilities Regulation (2011/R-9); and
- (vii) Waste Management Regulation (2013-R58).

#### **1. National Solid Waste Management Policy of 2008 and 2015**

25. The National Solid Waste Management Policy was developed in 2008, by the Ministry of Environment, through consultations with the community and evaluation of existing waste management

<sup>24</sup> Consultancy Services for Feasibility Study for an Integrated Solid Waste Management System for Zone III (including Greater Malé) and Preparation of Engineering Design of the Regional Waste Management Facility at Thilafushi. Feasibility Report. Ministry of Environment and Energy, Republic of Maldives. December 2017.

practices and scope for improved efficiency. The policy was then revised and adapted, and a new policy formulated and adopted in 2015.

26. The policy is in line with government commitment to provide the resources required for waste management in all inhabited islands of the Maldives and is founded on the following 10 principles:

- (i) Each person should be responsible for waste generated at the individual level and should comply with rules and regulations established locally;
- (ii) All household waste should be managed in accordance with the requirements of the local council;
- (iii) Each inhabited island should prepare and submit an island waste management plan for the island;
- (iv) Waste collection should be undertaken on a fee based system for all waste producers, including households and industries;
- (v) Agreements with government agencies in different inhabited islands to ensure management of waste in the islands;
- (vi) Establishment of a waste management system in each inhabited island that is appropriate for the needs of the population and quantity and type of waste generated;
- (vii) Establishment of regional waste management facilities (RWMF) in each waste management zone;
- (viii) Establishment of arrangements to transport all residual waste to a RWMF
- (ix) Promote adoption of waste management practices that generate revenue and to apply revenue to waste management at the island level; and
- (x) Undertake waste management training and awareness campaigns at the national level.

## **2. Waste Management Regulation (No. 2013/R-58)**

27. The Waste Management Regulation of the Maldives was enacted under Article 3 of the EPPA in 2013 and is implemented by the Environmental Protection Agency. The regulation focuses on the following five areas:

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

## **3. Other relevant legislation**

28. **Cultural Heritage.** Items of cultural heritage significance are protected under the Law of Historical and Cultural Properties of the Republic of Maldives of 1979 (Law number 27/29) and its implementation is currently under the Ministry of Education. UNESCO state that there is a lack of rules and regulations, constraining the implementation of the law and that there is also no national inventory of heritage properties (no site has yet been inscribed under the World Heritage List). A new law is under preparation and awaiting completion as of June 2017 .

29. **Health and Safety.** Legislation covering occupational health and safety is currently included in the Employment Act (2008), Chapter 8 “Work Place Safety and Employer Health”. This requires employers to implement measures for the safety and protection of employees at the work place, including safe work place, procedures, safe equipment and materials, provision of protective equipment, safety training to employees, conducting health checks where work involves chemical or biological materials that may cause a hazard, providing medical care as well as first aid for employees injured while at work. The law also sets out employee’s obligations with regard to safety at work.

30. **Land use and acquisition.** The Land Act (2002) covers matters relating to land including land use, land ownership, and permissible uses of land belonging to island councils, which includes environmental protection. The land act and processes relating to the project are described in the Resettlement Framework (RF).

## **B. Environmental Assessment Requirements**

31. Responsibilities and procedures for conducting environmental assessments, together with the requirements for environmental monitoring of projects, are set out in the EIA Regulations of 2012. All projects that may have an impact on the environment are referred to the Minister of Environment and Energy (EPPA 5(a)).

32. The EIA Regulations assign primary responsibility for undertaking environmental assessment of projects to the project proponent and set out procedures, rights and responsibilities for the preparation and approval of EIAs. The Ministry of Environment and Energy (MEE) undertakes review and approval of environmental assessment reports.

33. Project proponents are defined in the EIA regulations as a person, department or agency that is seeking to carry out or proposes to carry out the development proposal and in this case is the MEE, as implementing agency for the Project. EIA work must be carried out by registered consultants, and the procedures and requirements for registration are set out in Part V of the regulations.

34. The EIA regulations include a schedule (Schedule D) of investment project types that require an EIA. These include landfills, waste incinerators and large scale waste storage projects. However, some of these project types may be classified as environment Category A as per ADB SPS, 2009, and therefore, will not be considered under this subproject of GMEIWMP.

35. For schedule D projects and those identified by the IEE as requiring an EIA, a scoping meeting is convened by the MEE to determine the specific Terms of Reference for the EIA. On completion of investigations and reporting, the EIA report is subject to review by MEE, which invites comments from other relevant ministries and the public following which an environmental decision is made. Although the transfer station in Malé is a large scale facility, it is not a storage or separation facility and the subproject comprises improvements to the existing facility. However, confirmation should be provided by MEE that improvements to the transfer station do not qualify as a schedule D project.

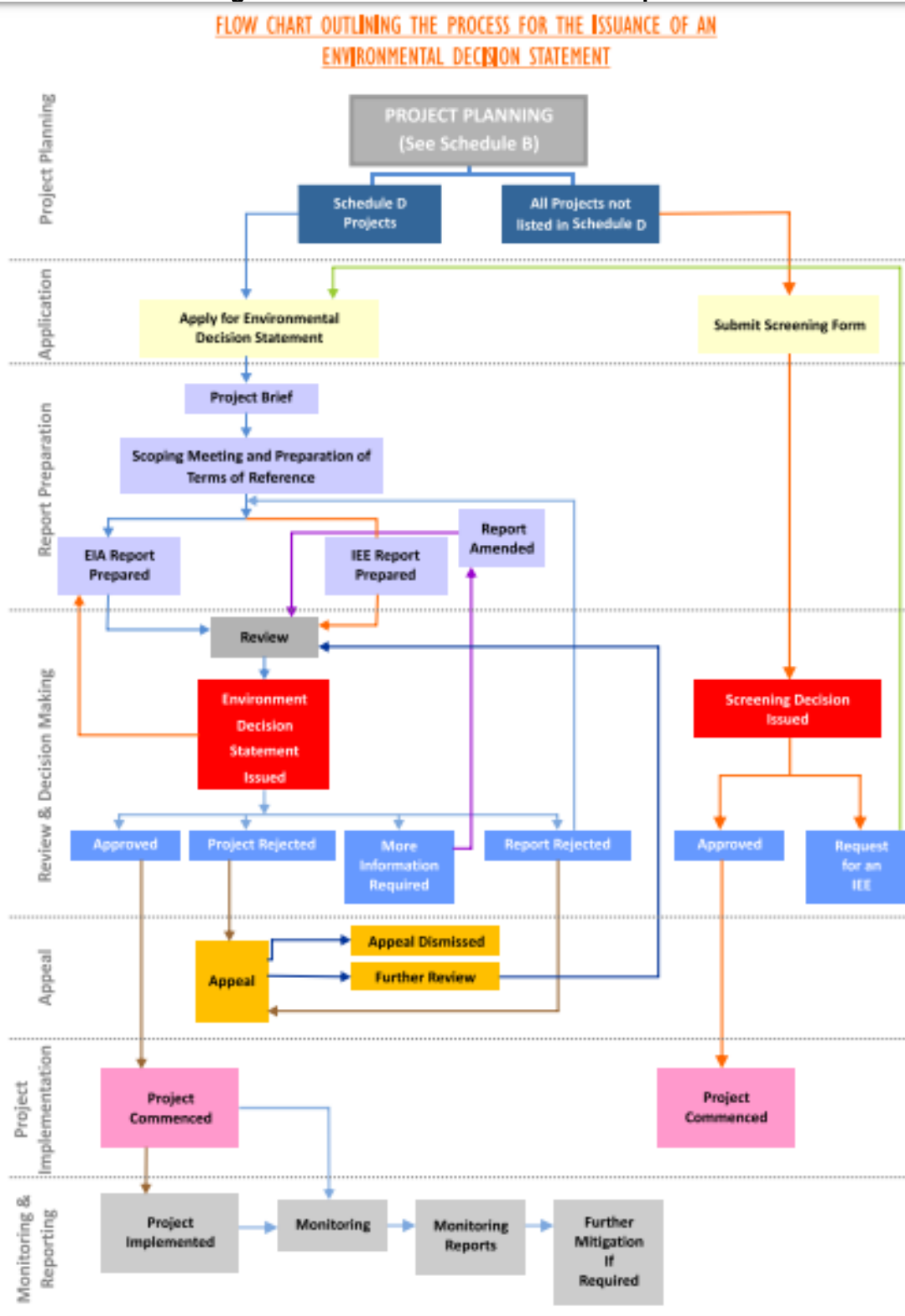
36. For project types not included schedule D, a screening form is submitted in a specified format on the basis of which the MEE decides whether an Environmental Management Plan is required or if further information is required, in which case an Initial Environmental Examination (IEE) will be carried out. The IEE is completed according to a specified format. If the IEE finds

that the project may cause a significant environmental impact, a full EIA is required, prior to preparation of an Environmental Management Plan (EMP). If an EIA is not required, an EMP is then prepared to address the impacts identified in the IEE.

37. The Environmental Management Plan, following either the IEE or the EIA process, is prepared on a specified format and reviewed for compliance by MEE.

38. The MEE issues the decision in the form of a decision note issued to the proponent, which sets out specific binding requirements for the conduct of the project on the basis of review of the EIA report.

39. Summary of application stages and steps is outlined in Figure 7.

Figure 7: Flow chart of Maldives EIA process<sup>25</sup>

<sup>25</sup> [Source:](#) Environmental Assessment Regulations (2007), Schedule A

40. The timelines for clearance and approvals are as follows:
- (i) On completion of a screening form for non-schedule D projects – 10 working days for a screening decision from MEE
  - (ii) For review of compliance of an EMP by MEE – 7 working days
  - (iii) For review of a project brief on Schedule D projects – 5 days to confirm the date of a scoping meeting
  - (iv) For consideration of Terms of Reference drafted by the project proponent following the scoping meeting – 10 days to confirm the Terms of Reference.
  - (v) For the review of a completed EIA report for completeness – 2 working days.
  - (vi) For circulation of an EIA report to other ministries and to the public for comment – 10 working days
  - (vii) For issuance of a decision or to request revisions, following circulation of the EIA report and receipt of comments – 28 working days.

### **C. Applicable International Environmental Agreements**

41. In addition to national laws, rules and regulations, the government of Maldives is also a signatory to various applicable international conventions, as follows:
- (i) UN Convention on the Law of the Sea – UNCLOS (1982);
  - (ii) International Convention for the Prevention of Pollution of the Sea by Oil (1982);
  - (iii) Vienna Convention for the Protection of the Ozone Layer (1985);
  - (iv) Montreal Protocol on Substances that Deplete the Ozone Layer (1987);
  - (v) Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal (1989);
  - (vi) The London Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (1990);
  - (vii) Agenda 21 and the Rio Declaration of the United Nations Conference on Environment and Development (1992);
  - (viii) Convention on Biological Diversity (1992);
  - (ix) United Nations Framework Convention on Climate Change (1992);
  - (x) The Copenhagen Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (1992);
  - (xi) The Montreal Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (1997);
  - (xii) The Beijing Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer (1999);
  - (xiii) Washington Declaration on Protection of the Marine Environment from Land-Based Activities;
  - (xiv) Kyoto Protocol to the United Nations Framework Convention on Climate Change (1998);
  - (xv) Cartagena Protocol on Biosafety (Maldives acceded on 2 September 2002); and
  - (xvi) United Nation Convention to Combat Desertification (2002).

### **D. ADB Policy**

42. ADB requires the consideration of environmental issues in all aspects of ADB's operations, and the requirements for environmental assessment are described in ADB SPS, 2009. This states that ADB requires environmental assessment of all ADB investments.

43. **Screening and categorization.** The nature of the environmental assessment required for a project depends on the significance of its environmental impacts, which are related to the type

and location of the project; the sensitivity, scale, nature, and magnitude of its potential impacts; and the availability of cost-effective mitigation measures. Projects are screened for their expected environmental impacts, and are assigned to one of the following four categories:

- (i) **Category A.** A proposed project is classified as category A if it is likely to have significant adverse environmental impacts that are irreversible, diverse, or unprecedented. These impacts may affect an area larger than the sites or facilities subject to physical works. An environmental impact assessment is required.
- (ii) **Category B.** A proposed project is classified as category B if its potential adverse environmental impacts are less adverse than those of Category A projects. These impacts are site-specific, few if any of them are irreversible, and in most cases mitigation measures can be designed more readily than for category A projects. An initial environmental examination is required.
- (iii) **Category C.** A proposed project is classified as category C if it is likely to have minimal or no adverse environmental impacts. No environmental assessment is required although environmental implications need to be reviewed.
- (i) **Category FI.** A proposed project is classified as category FI if it involves investment of ADB funds to or through a financial intermediary (FI).

44. **Environmental management plan.** ADB SPS, 2009 further requires the development of an environmental management plan (EMP) specifying the required mitigation and monitoring and who is responsible for implementation.

45. **Public disclosure.** ADB will post the following safeguard documents on its website so affected people, other stakeholders, and the general public can provide meaningful inputs into the project design and implementation:<sup>26</sup>

- (i) final or updated IEE upon receipt; and
- (ii) environmental monitoring reports submitted by the project management unit (PMU) during project implementation upon receipt.

46. **Pollution Prevention and Control Technologies.** During the design, construction, and operation of the Project the PMU will apply pollution prevention and control technologies and practices consistent with international good practice, as reflected in internationally recognized standards such as the World Bank Group's Environment, Health and Safety Guidelines. These standards contain performance levels and measures that are normally acceptable and applicable to projects. When Government of Maldives regulations differ from these levels and measures, the PMU will achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, the PMU will provide full and detailed justification for any proposed alternatives that are consistent with the requirements presented in ADB SPS, 2009.

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<sup>26</sup> As per ADB SPS, 2009, prior to disclosure on ADB website, ADB reviews the "borrower's/client's social and environmental assessment and plans to ensure that safeguard measures are in place to avoid, wherever possible, and minimize, mitigate, and compensate for adverse social and environmental impacts in compliance with ADB's safeguard policy principles and Safeguard Requirements 1-4."

Table 1: Applicable WHO Ambient Air Quality Guidelines<sup>27</sup>

Table 1.1.1: WHO Ambient Air Quality Guidelines <sup>7, 8</sup>		
	Averaging Period	Guideline value in $\mu\text{g}/\text{m}^3$
Sulfur dioxide (SO <sub>2</sub> )	24-hour	125 (Interim target-1) 50 (Interim target-2) 20 (guideline)
	10 minute	500 (guideline)
Nitrogen dioxide (NO <sub>2</sub> )	1-year	40 (guideline)
	1-hour	200 (guideline)
Particulate Matter PM <sub>10</sub>	1-year	70 (Interim target-1) 50 (Interim target-2) 30 (Interim target-3) 20 (guideline)
	24-hour	150 (Interim target-1) 100 (Interim target-2) 75 (Interim target-3) 50 (guideline)
Particulate Matter PM <sub>2.5</sub>	1-year	35 (Interim target-1) 25 (Interim target-2) 15 (Interim target-3) 10 (guideline)
	24-hour	75 (Interim target-1) 50 (Interim target-2) 37.5 (Interim target-3) 25 (guideline)
Ozone	8-hour daily maximum	160 (Interim target-1) 100 (guideline)

<sup>7</sup> World Health Organization (WHO). Air Quality Guidelines Global Update, 2005. PM 24-hour value is the 99<sup>th</sup> percentile.

<sup>8</sup> Interim targets are provided in recognition of the need for a staged approach to achieving the recommended guidelines.

Table 2: World Bank Group's Noise Level Guidelines

Table 1.7.1- Noise Level Guidelines <sup>54</sup>		
Receptor	One Hour L <sub>Aeq</sub> (dBA)	
	Daytime 07:00 - 22:00	Nighttime 22:00 - 07:00
Residential; institutional; educational <sup>55</sup>	55	45
Industrial; commercial	70	70

<sup>54</sup> Guidelines values are for noise levels measured out of doors. Source: Guidelines for Community Noise, World Health Organization (WHO), 1999.

<sup>27</sup> World Bank Group's General Environmental, Health, and Safety Guidelines: [www.ifc.org/ehsguidelines](http://www.ifc.org/ehsguidelines)



47. All statutory clearances will be obtained prior to commencement of civil works. IEEs will be prepared for each package involving civil works and EMP to be attached in the bid and contract documents. IEE will be submitted to ADB for review and approval prior to issuance of bid documents. Monitoring of EMP implementation by the executing agency is reported to ADB.

#### **IV. DESCRIPTION OF THE ENVIRONMENT**

48. To establish specific baseline values for indicators of ambient air and water quality and noise levels at the proposed subproject site, measurements will be taken by the Contractor prior to construction.

##### **A. Physical Resources**

##### **4. Geology, Topography and Soils**

49. The Maldives archipelago comprises 22 atolls which are peaks of a vast submarine mountain range in the Indian Ocean, the Chagos-Maldives-Laccadive Ridge. The atolls collectively contain over 1,192 reef islands that have formed atop former peaks of former submarine mountains of the Ridge, which is slowly subsiding. The reef islands form mainly at the periphery of each atoll, with the inner area, the eroded former mountain peak, occupied by a lagoon. Formation takes place by the deposition of shallow-water carbonates and successive coral deposits at the tidal level which gradually rise as a rock base forms from the calcium carbonate deposits of dead coral. Underlying rock is variable in consistency, reflecting the growth patterns of the coral, which forms dense colonies (coral heads) and large voids between the heads. The coral heads form hard rock, while the voids fill with coral derived fragments that form a softer rock. Unconsolidated sand and gravel on top of the rock layer is subject to seasonal conditions, particularly monsoons as well as wave action, and the beaches are dynamic subject to continual erosion and accretion – phenomena that are known and understood by island communities who have adapted to these patterns in the past, though increasing population density and development of infrastructure involve an outward spread toward the shorelines, making infrastructure in such locations vulnerable to erosion.

50. The islands have soils derived exclusively from coral deposits which are predominantly sandy in texture, with a significant silt component formed from abrasion within the sand deposits. In inner parts of the islands, deposition and breakdown of organic matter has led to the formation of a thin layer of topsoil. The soils are free draining when uncompacted, have poor nutrient status and are generally alkaline. Surface relief is extremely low, generally below 2m above sea level.

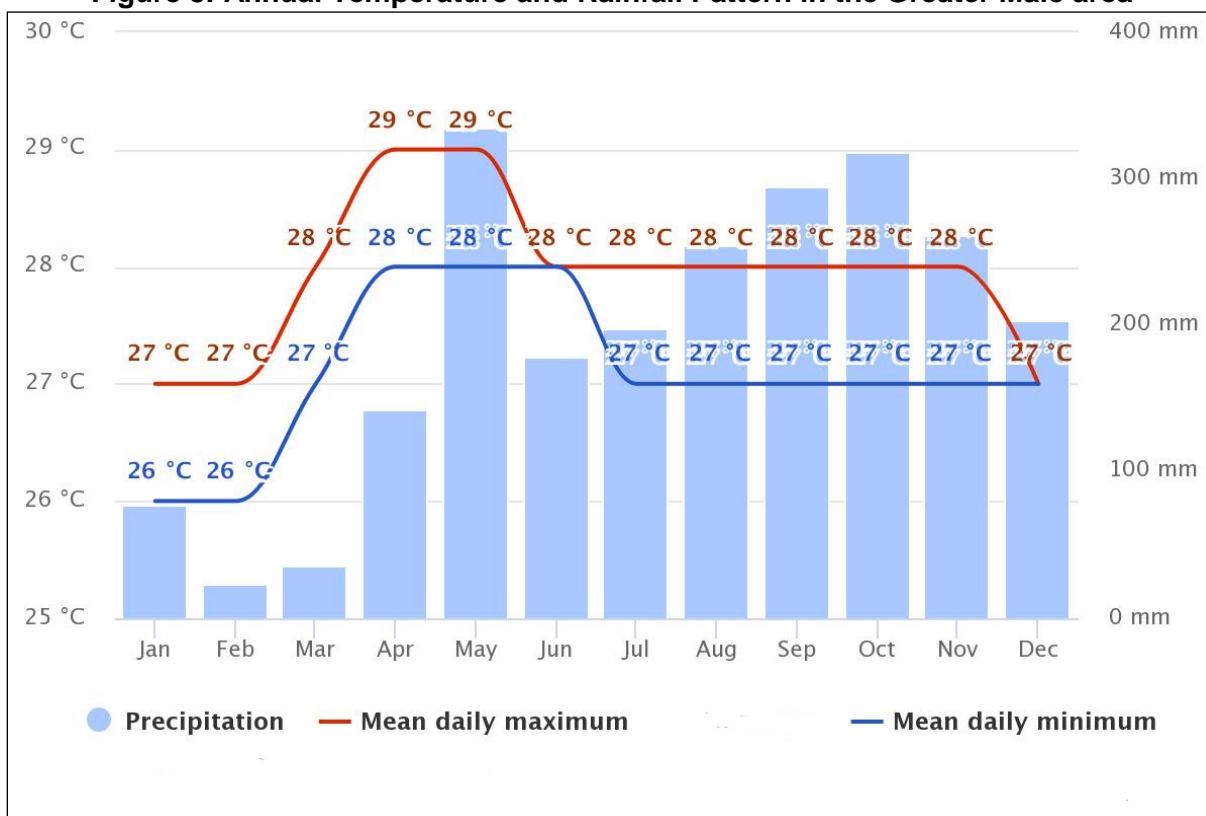
##### **5. Climate**

51. The Maldives have a maritime tropical climate featuring two monsoon seasons, originating over the Indian Ocean to the southwest between May and September (Halhangu), and the Bay of Bengal to the drier northeast between December and February (Iruvai). The southwest monsoon is the stronger and monthly rainfall typically exceeds 200mm towards the end of the southwest monsoon period, and is lowest in February after the cessation of the northeast monsoon rains. Cyclones are a regular occurrence in the Indian Ocean, occurring mainly between April and December, although those that have affected the Maldives occur between October and January. These are more common either side of India, further north of the Maldives, though damage from “edge effects” of the larger cyclones is not uncommon. Cyclone Ockhi occurred in late November / early December 2017 and caused capsizing of vessels and damage to homes,

including on Kaafu Atoll. The United Nations (2007) <sup>28</sup> estimate that there is a 10% probability of a level one storm on the Saffir-Simpson scale occurring over Kaafu Atoll in a 10 year period. Storms in the level one category are described as being “very dangerous” with wind speeds likely in the range of 119 – 153 kph, and pressures below 100hPa, but not lower than 980 hPa.

52. Temperatures are relatively constant and range between 25°C and 30°C, with the hottest period occurring in March/April and the coolest, December/January. Monthly rainfall fluctuates between around 20mm in February to over 300mm in May, and is over 200mm for most of the year, the annual average in the Greater Malé area is 2,200mm. Figure 8 below shows the annual temperature and rainfall pattern in the Greater Malé area.

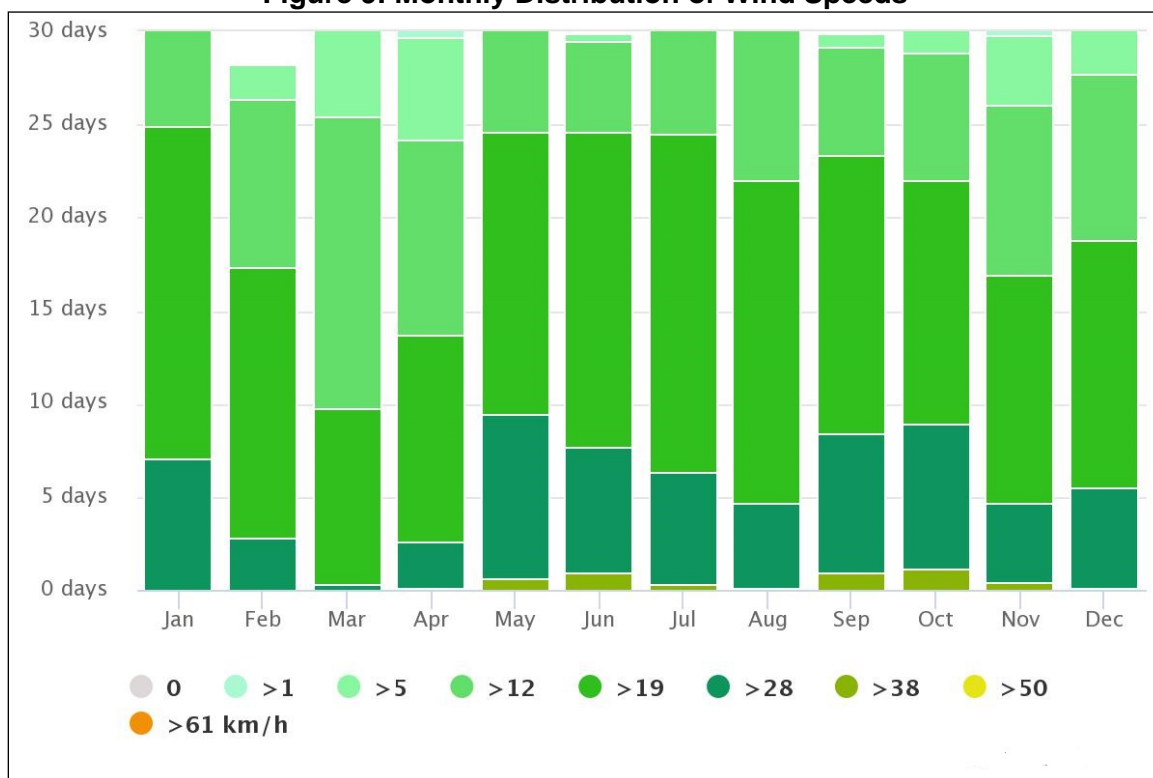
**Figure 8: Annual Temperature and Rainfall Pattern in the Greater Malé area**



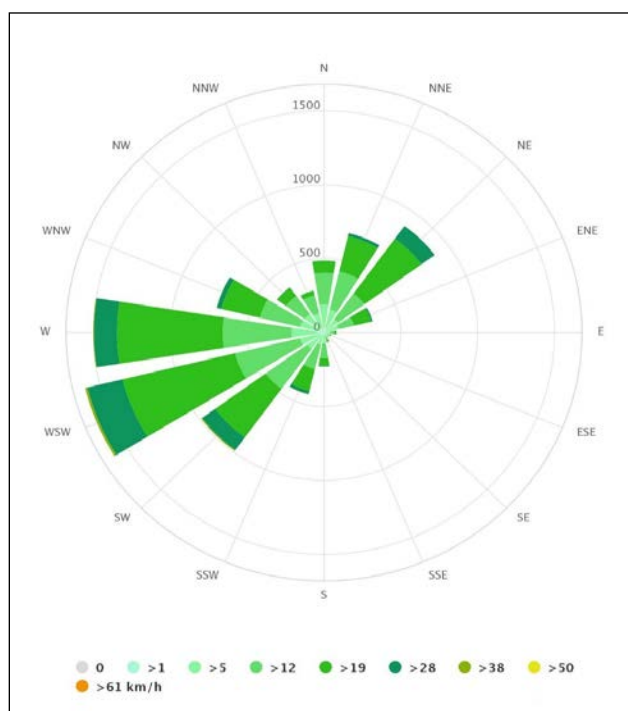
Source: meteoblue.com

53. The prevailing winds are predominantly westerly for much of the year, with easterly winds rare and south-easterly winds almost non-existent. Winds are influenced by the monsoon patterns. Figure 9 below shows the monthly distribution of wind speeds, and Figure 10 is a rose diagram, showing the prevailing direction of winds over an annual period.

<sup>28</sup> United Nations Office for the Coordination of Humanitarian Affairs - Regional Office for Asia and the Pacific (OCHA ROAP) (2007) Maldives: Composite Hazard Map.

**Figure 9: Monthly Distribution of Wind Speeds**

Source: meteoblue.com

**Figure 10: Rose Diagram of Prevailing Wind Direction over an Annual Period**

Source: meteoblue.com

54. The tidal regime is semi-diurnal – two high and two low tides a day. The range for spring tides is approximately 1m and for neap tides, 0.3m while the extreme range between highest high water and lowest low water is 1.32m at the tidal gauge for the Malé area, on Hulhulé Island. Table 3 below gives the average tide levels at Hulhulé,

**Table 3: Average tide levels at Hulhulé<sup>29</sup>**

<b>Tidal level</b>	<b>Water level from mean sea level (m)</b>
Highest High Water (HHW)	0.62
Mean Highest High Water (MHHW)	0.34
Mean High Water (MHW)	0.33
Mean Low Water (MLW)	-0.36
Mean Lowest Low Water (MLLW)	-0.37
Lowest Low Water (LLW)	-0.72

55. Wave heights are also influenced by variations in atmospheric pressure and strong winds. Atmospheric pressure at sea level at Malé typically varies between 1011 and 1017 hPa, and an increase in air pressure of 1 hPa typically lowers the water level by 1cm. Lower pressures can occur in storm events, and may drop below 1000 hPa, entailing an increase of around 10cm or more, adding to effective storm wave heights.

56. Surface currents reflect tides and wind, and generally follow the monsoon pattern, with westward currents dominant from January to March, and the reverse between April and December. Current direction and velocity at any one time depends on the interaction between the wind induced prevailing currents and tidal currents. Measurements taken around Thilafushi during June 2017<sup>30</sup> found current velocities around the island to range between 0.2 m/s and 0.4 m/s – though this gives only a “snapshot” indication.

## **6. Freshwater Resources**

57. Natural freshwater sources for the Maldives islands are rainwater collected from roofs and groundwater that accumulates through infiltration of rainwater into a freshwater lens that forms in underlying strata. In the Greater Malé area however, these sources do not suffice for the large domestic and commercial demand and the islands of Male, and Villingilli are heavily dependent on salt water reverse osmosis plants for the supply of freshwater. Freshwater reserves are subject to degradation as a result of high salinity and/or polluted water.

## **7. Marine Resources**

58. Marine waters around the islands are used extensively for fishing and recreational diving. The marine environment in the immediate vicinity of the transfer station at Malé is affected by loss of solid waste, including organic, plastic and inorganic fractions, due to inefficiencies in handling at the transfer station, as well as effects of intense ship and boat traffic around Malé island and urban development on the island. Floating waste accumulates in and around the docking area.

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<sup>29</sup> Source: University of Hawaii Sea Level Center Database, quoted in the Second National Communication of the Maldives to the United Nations Framework Convention on Climate Change. Ministry of Environment and Energy, 2016.

<sup>30</sup> Water Solutions Pvt Ltd (2017) Environment Impact Assessment: Reclamation of 15 hectares of land at Thilafushi for development of the Regional Waste Management Facility for Zone 3. Submitted to the Ministry of Environment and Energy.

59. The quality of water both in and around the islands is influenced by sewerage discharge, illegal dumping of solid waste and industrial activity. While no data could be provided for water quality around the transfer station, marine water quality testing carried out by Water Solutions for the Reclamation of 15 hectares at Thilafushi (2017), 6km away provided the following results:

**Table 4: Marine Water Quality Test Results**

Test	Unit	Average result from six sites	Comparable international standards <sup>31</sup>
Salinity	(‰)	32.6	-
Electrical Conductivity at 25°C	mS/cm	49.75	-
pH at 25°C		8.09	6.5 – 8.5
Total Dissolved Solids	mg/l	36,529.83	-
COD	mg/l	420.5	-
Iron (Fe)	mg/l	0.15	0.3
Boron (as B)	mg/l	2.67	1
Arsenic (as As)	mg/l	0.0016	0.05

60. The report states that biological oxygen demand (BOD) values and values for phosphate exceed the levels given in Maldivian Water Quality standards, but that temperature and turbidity are within the limits. For heavy metals, Chromium, Mercury, Lead, Cadmium and Zinc were not detected, and nor were phenolic compounds. No values for these are given however. In comparison to international standards, None of the above values exceed trigger values above which damage to the marine ecosystem is expected. Turbidity, Total Suspended Solids, Phenolic Compounds, Zinc, Cadmium, Lead, Mercury and Chromium, but not detected. The level of Boron found significantly exceeds international standards.

## **8. Marine Sediment**

61. Pollutants from industrial activity and waste, particularly hazardous waste, can accumulate in the sediment on the lagoon or sea floor. These can include heavy metals, organometallic compounds and aromatic benzene compounds. Samples of sediment taken by Water Solutions in 2017 and tested for a set of contaminants by a recognized international laboratory in Sri Lanka found some traces of copper and lead, but did not detect other contaminants. A comparison of the levels of copper and lead, which reached 31.3 and 2.7 mg/kg respectively, against international standards<sup>32</sup> were below trigger values of 65 and 50 mg/kg respectively. An earlier set of tests carried out in 2011 by CDE Consultants for a greater range of contaminants on six sites detected ten heavy metals in the samples, but levels were below trigger values given in international standards.

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<sup>31</sup> The figures used for this comparison are those of recreational water quality standards of the Australian and New Zealand Environment and Conservation Council. Recreational water standards which apply to situations where users have body contact with water. Other standards for marine water quality relate to primary production are more stringent and would not apply to this situation.

<sup>32</sup> Australian and New Zealand Environment and Conservation Council (2000) Australian and New Zealand Guidelines for Fresh and Marine Water Quality.

## 9. Air Quality

62. Air pollution sources include vehicle emissions, emissions of other plant and machinery including diesel power generators, and construction activity, and industrial activity (mainly on Thilafushi). While Malé in particular sees heavy traffic for much of the day, concentrated on a small area, air is rapidly dispersed by wind action from the surrounding ocean.

63. Equipment for continuous monitoring of air quality in the area is not currently in operation. Air quality monitoring equipment and data logging had been set up for Malé, but was discontinued due to a lack of suitably qualified technical staff.

64. Ambient air quality was studied by AECOM in 2010 on Malé, Hulhulé and Hulhumale and compared with World Health Organization (WHO) standards for ambient air. Focusing on the main pollutants of potential concern, namely particulate matter of between 2.5 and 10 µg in size, particulate matter of less than 2.5 µg, Sulphur Dioxide (SO<sub>2</sub>), Oxides of Nitrogen (NO<sub>x</sub>) and Carbon Monoxide (CO), none were found to exceed WHO guideline levels in terms of the average 24hr mean. Levels of particulate matter were relatively constant for each island, though CO, NO<sub>x</sub> and SO<sub>2</sub> levels were markedly higher in Malé than in the other islands.

## 10. Noise

65. Sources of noise pollution are similar to those for air quality, particularly the operation of vehicles and machinery of various kinds. Wind and waves can contribute significantly to ambient noise levels. Noise measurements over a 24 hour period to determine the continuous noise equivalent level (dB L<sub>eq</sub>) of ambient noise for daytime (10am to 6pm) and night time (7pm to 5am) were taken at a variety of locations on Malé, Hulhumale and Hulhulé, and were found to range between 55 and 71 dB L<sub>eq</sub> during the day and 50 and 69 dB L<sub>eq</sub> during the night. These are moderate to high, in comparison to national standards.

## B. Ecological Resources

### 1. Marine Ecosystems

66. Coral ecosystems have significant ecological significance and occur within lagoon waters and on the periphery of the islands. Information on the status of benthic communities in the vicinity of the transfer station at Malé was not available, however surveys undertaken at other locations in Greater Malé area give an indication of the existing state of marine biodiversity in the area. A survey of the status of the corals, using an established coral survey method, established by the international NGO Reef Check<sup>33</sup> to assess the coverage of coral and other substrates on the sea bed. Seven sites around Thilafushi island were surveyed, finding predominantly rock, rubble and sandy cover, with live corals accounting for up to 20% of cover in one location, to the south of the island. Studies on the reef at Hulhulé were carried out in 2007 and 2010 in connection with airport expansion projects and summarized in the EIA report carried out in 2011 for the Male International Airport Concession Project<sup>34</sup>. A study was carried out at Villilingili also in 2007 by Land & Marine Environmental Resource Group, as part of an EIA for the construction of a maritime survival

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<sup>33</sup> Hodgson, G., W. Kiene, J. Mihaly, J. Liebeler, C. Shuman, L. Maun and J. Hill (2006). Reef Check Instruction Manual: A Guide to Reef Check Coral Reef Monitoring Published by Reef Check, Institute of the Environment, University of California at Los Angeles.

<sup>34</sup> AECOM in association with Water Solutions (2011). Expansion and Modernization of Malé International Airport: Social and Environmental Impact Assessment, prepared for GMR Malé International Airport Private Limited.

training center<sup>35</sup>. This similarly found the dominant cover to be rock, rubble and sand, with low level coral cover (approximately 6%) and significant algal cover (around 30%).

67. Pelagic fish form an important part of the local economy, both through commercial fishing activities and game fishing. Fishing activity focuses on areas known to be abundant and these occur throughout the Maldives waters, usually distant to the coast. Fish populations in inshore waters around Thilafushi were assessed by Water Solutions in 2017, again using a method developed by Reef Check employing a transect method, undertaken by a diver travelling on a transect and stopping at 5m intervals, to count fish of indicator species. The transect was undertaken at three locations, and identified 20 indicator species belonging to 7 families. None of the observed species are of conservation significance, as rated by the International Union for the Conservation of Nature (IUCN). At Hulhulé / Hulhumale a fish census was taken at two sites by AECOM in 2010 for the Malé International Airport expansion project EIA, also finding indicator species from 7 families. Fish populations were also surveyed around Villingilli by Land & Marine Environmental Resource Group in 2007, who listed 35 species in 11 families.

## 2. Avifauna

68. The Maldives has a diverse range of birds, including a significant seasonal population of migratory birds. The islands are important wintering grounds for a large number of migratory species that follow the Central Asian Flyway, a flyway covering a large continental area of Eurasia between the Arctic Ocean and the Indian Ocean, and comprising several important migration routes, extending from the northernmost breeding grounds in Siberia to the southernmost non-breeding wintering grounds in West and South Asia and the Indian Ocean Territory including the Maldives. Within Greater Malé, bird populations are influenced by urbanization, and birds (largely non migratory) common to urban areas in South Asia, such as crows and sparrows, are commonplace. The landfill at Thilafushi and other areas where waste accumulates, such as markets and the transfer stations attract significant numbers of birds. Uncollected waste, particularly floating waste, is a known hazard to birdlife in Greater Malé and elsewhere in the islands, particularly when toxic waste is ingested or when articles such as plastic bags and string can cause birds to be debilitated or where they cause damage to the digestive system, or when it damages a natural habitat. The habitat of the white-breasted waterhen (*Amaurornis phoenicurus*) is known to be threatened by floating, uncollected solid waste.<sup>36</sup>

## 3. Terrestrial Ecosystems

69. The present day vegetation cover on the islands is substantially influenced by human habitation and has little biodiversity conservation significance. Vegetation is dominated by pan-tropical species such as coconut (*Cocos nucifera*), Goats foot creeper (*Ipomea pes-caprae*), hibiscus (*Hibiscus tiliaceus*) and beach colophyllum (*Calophyllum inophyllum*).

## 4. Protected Areas

70. There are 42 protected areas in the Maldives designated under the EPPA and covering around 24,500ha, or 0.2% of national territory totalling more than 24,494 hectares (0.2% of the national territory) designated under the Environment Protection and Preservation Act 4/93 (EPPA 4/93) to prevent over exploitation, and improve conservation and preservation, including banning

<sup>35</sup> Land & Marine Environmental Resource Group (2007). Environmental Impact Assessment for Construction of Maritime Survival Training Centre at K. Villingili. Prepared for Maldives College of Higher Education.

<sup>36</sup> Common Birds of the Maldives. Live & Learn Environmental Education. [www.livelearn.org](http://www.livelearn.org)

of export of important baitfish as aquarium fish, protection of threatened marine species such as sharks, sea turtles, giant clams and black coral and also to enhance and sustain dive tourism.

71. The Baa Atoll, in the central western part of the Maldives, is a UNESCO Biosphere Reserve, designated in 2011. An initiative commenced in 2012 to make the entire Maldives a UNESCO Biosphere Reserve and following consultations in late 2012 an implementation plan was formulated in 2013 to set out the vision and strategies to make the Maldives a biosphere reserve. The implementation plan recognizes inadequate solid waste management as a threat to the environment and envisages that a "effective waste management system" will be in place.<sup>37</sup>

72. Four protected areas occur in the vicinity of Greater Malé, all designated by the Government on 1 October 1995 and listed by the IUCN as dive sites. The IUCN has not set a category for any of the sites.

**Table 5: Protected areas in the vicinity of Greater Malé**

Name	Type	Area	Notes	Location relative to Greater Malé project area
Dhekunu Thilafalhu Miayaruvani (Lions Head)	Reef	142	Situated on a reef face, favoured as a dive site for shark viewing. Overhanging reef features.	Immediate Southwest of Thilafushi Island
Gulhee Falhu Kollavaani (Hans Hass Place)	Reef	102	Deep lagoon area	East of Gulhifalhu Island, itself 0.4km to the East of Thilafushi Island
Giraavaru Kuda Haa	Reef	200	Isolated reef approx. 30m above lagoon floor	4km North of Thilafushi island

## C. Socio-Economic Factors

### 1. Population Levels

73. The population of the atolls making up Zone 3 is 182,102 of which the majority, 127,079 are on Malé and a significant but rapidly growing population, 15,769 at the time of the census, are on Hulhumale. Population growth predictions by Water Solutions and Kocks Engineers the feasibility study of an integrated Solid Waste Management System for Zone 3,<sup>38</sup> based on an extrapolation of growth rates between the 2006 and 2014 census and varying scenarios. This predicts a rise in the total population of Zone 3 to 253,000 by 2020 and 405,000 by 2035.

### 2. Economy

74. Tourism and fishing dominate the national economy, with the contribution to GDP of 17% and 15% respectively, and the tourism sector growing rapidly in recent years, with a sharp increase of visitor arrivals. The nation's economy has seen a rapid rise over the past 30 years,

<sup>37</sup> Ministry of Environment and Energy. 2012. Maldives as a Biosphere Reserve, Implementation Plan 2013 – 2017. <http://www.environment.gov.mv/v2/wp-content/files/publications/20130507-pub-maldives-as-a-biosphere-reserve-implementation-plan-2013-2017.pdf>

<sup>38</sup> Water Solutions in association with Kocks Ingenieure (2017) Consultancy Services for Feasibility Study for an Integrated Solid Waste Management System for Zone III (including Greater Malé) and Preparation of Engineering Design of the Regional Waste Management Facility at Thilafushi: Feasibility Report.



from ranking by the United Nations among the world's least developed countries in the early 1990s, to being among those showing "high human development" in 2016.<sup>39</sup>

75. Outside tourism and fishing, agriculture is significantly constrained by the poor soils characteristic of coral reef islands and scarce arable land though these suffice for some trade in crops such as coconut, banana, breadfruit, papayas, mangoes, taro, betel, chilies, sweet potatoes, and onions. There is heavy reliance on imported foods, including staples such as rice. Agriculture provides about 1.0% of GDP.

76. The manufacturing sector provides less than 4% of GDP, the larger areas of activity being boat building and handicrafts, while modern industry is limited to a few tuna canneries, bottling plants, and limited manufacturing industries (PVC pipe, soap, furniture, and some food products).

77. While the economic outlook is generally positive, the economic base, reliant on tourism and fishing, is narrow and diversification is a challenge. The country has a shortage of labor and relies on workers from Bangladesh, Sri Lanka and elsewhere for manual labour, work on construction and service on the resorts. At the same time, increasing employment for the educated workforce is a significant challenge.

78. Access to education in the national as a whole is good, with enrolment in primary education close to 100% and literacy rates at about 98%.

### **3. Public Health**

79. In the health sector, indicators also show improvements over recent decades. The Infant and maternal mortality rate has declined rapidly. With international assistance, authorities have succeeded in eradicating or heavily reducing the incidence of a number of infectious diseases including leprosy, measles and lymphatic filariasis, though tuberculosis, hepatitis, HIV/AIDS cases continue and dengue and the zika virus are emergent threats. Non communicable diseases including addictions and nutrition related conditions are also a current focus of health authorities.

## **D. Site-specific Baseline Environmental Conditions**

### **1. Malé**

80. The site is situated to the south of the island, where land use is dominated by commercial facilities, and land to the south of the site is newly reclaimed. The edge of the residential part of the island is around 300m distant from the site. Figure 11 shows the island, with the location of the site indicated.

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<sup>39</sup> <http://hdr.undp.org/en/composite/HDI>

**Figure 11: Malé island, showing the location of the transfer station in the mainly commercial area. Figure 2 gives a detailed view of the transfer station.**



## **2. Villingilli**

81. The IWMC is situated next to a road, outside residential core of the island, and close to the beach. The area is identified on an aerial photograph of Villingilli shown in Figure 12.

**Figure 12: Villingilli island showing the location of the existing IWMC / future transfer station**



## **V. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES**

### **A. Method of Assessment**

82. The potential impacts and mitigation measures have been identified through review of the Feasibility Study prepared for the Project, discussion with the designers and stakeholder consultation. The feasibility study presents the preliminary design. Initial screening and categorization was done using ADB Rapid Environmental Assessment Checklist and the assessment shows that the subproject is unlikely to cause significant adverse impacts. See Appendix 1. As such, the subproject is classified as environment category B as per ADB SPS, 2009. This IEE is based on this rapid environmental assessment, and on the preliminary design. Therefore, this EE will

be updated based on the final detailed design, due for completion by quarter 3, 2020, and the classification will be reassessed or reconfirmed accordingly.

## **B. Environmental Impacts Related to Location**

83. The transfer stations exist in their current form to address existing impacts of solid waste generation and accumulation, by enabling bulk handling of waste such that it can be efficiently removed from residential and industrial areas and construction sites, sorted and loaded onto vessels for transport to the landfill on Thilafushi island. The Project is to improve these facilities, and enable them to handle growing future waste flows, and will be situated at sites currently in use for waste management. Project includes a community outreach component to promote the “3 Rs” and mitigate both the volume of solid waste that will increase with growing population and the level of separation, to facilitate efficient handling of the different fractions.

84. **Effects on the surrounding seawater and marine ecosystems.** Each facility is located close to, or on the shoreline. Some waste is lost to the sea during the process of loading of onto transfer vessels, including food waste, household waste, construction and demolition waste and likely, hazardous waste. With population growth and consequent increases in quantities of solid waste, the risk of this loss will increase. The use of a containerized system and upgraded equipment, to be provided by the Project, will reduce the loss of waste to the sea. More efficient separation of waste fractions including hazardous waste as a result of the improved collection system and capacity building support to WAMCO, also to be included in Project, will further reduce levels of contamination. If the efficiencies of site operation made easier by the use of the containerized system are achieved, the potential impact is long term, positive, significant and will cover both the immediate area around the islands and the wider marine environment in Zone 3 and beyond.

85. **Effects on vegetation.** Infrastructure improvements will be within the footprint of existing solid waste management facilities at Malé and Villingilli and will not entail removal of vegetation. Given space constraints, site improvements are not likely to improve significant landscaping or planting. No damage or improvement to vegetation is expected. No impact on vegetation is envisaged at any of the locations.

86. **Surrounding land use.** The area immediately adjoining the facility in Malé is reclaimed land, currently under development and likely to be used for commercial and industrial purposes. The existing transfer station cause noise generation from machinery, exhaust emissions and odors. The levels of these are expected to increase as population and the waste stream grow, however the Project itself will mitigate this growth through greater efficiency in waste handling and transfer to Thilafushi-bound vessels. The ambient noise levels from wind and sea waves masks noise of operation of the facility. The potential impact is positive, mainly as a result of ensuring efficient truck movements, preventing congestion and traffic queues that cause noise and increased emissions, long term and confined to the area immediately surrounding the transfer station.

87. The existing site in Villingilli is close to a residential area. Again, improvements in efficiency and protected storage areas will mitigate the effects of increased waste and by community outreach to be included with Project, providing advice and assistance related to reduced, re-used waste and recycling to reduce the volume that needs to be handled at the facility. The potential impact is positive, significant, long term and will cover the immediate area around the transfer station and also the residential area on the island.

88. **Impedance of traffic.** In Malé, the layout of the improved facility is designed to enable more efficient transfer of waste to containers, and therefore more rapid throughput of trucks bringing waste from around the island. This measure, in combination with careful scheduling of waste collection (including maximizing truck trips during night hours and minimizing or prohibiting trips during peak traffic hours) will reduce the risks of queuing of vehicles containing waste and impeding traffic in the area. The potential impact is positive, significant and long term.

89. On Villingilli, restrictions apply to types of vehicle allowed on the island, and private vans and motorized scooters or motorcycles are banned. The operation of collection vehicles is therefore unlikely to impede local traffic. The potential impact is not significant.

90. **Loss of land and effects on property.** In each case, improvements will take place within the boundaries of existing waste management facilities. No private property will be affected and land acquisition will be required and there is therefore no impact.

91. Table 6 summarizes the impacts related to location. Based on the assessment, the location of the two transfer stations will have potential impacts that are general positive, consistent with the Project's objectives.

**Table 6: Summary of impacts related to location**

Potential Impact	Malé	Villingilli
Surrounding seawater and marine ecosystems	Long term, positive, significant	Long term, positive, significant
Vegetation	Nil	Nil
Birdlife	Long term, positive, not significant	Long term, positive, not significant
Surrounding land use	Long term, positive, confined to immediate surrounds	Long term, positive, confined to immediate surrounds
Impedance of traffic	Long term, positive, significant	
Loss of land and effects on property	Nil	Nil

### **C. Environmental Impacts Related to Construction**

92. **Construction method.** The methods to be used for site preparation, fabrication, construction and commissioning, as well as associated arrangements to ensure sound environmental management and safety at all times, are to be defined by the Contractor in a Contractor's Environmental Management Plan (CEMP) submitted to the PMDSC for approval. The CEMP must adhere to EHS general guidelines 1 to 4 (environmental, occupational health and safety, community health and safety and for construction and decommissioning).

93. **Impedance of traffic.** Construction vehicle movements will add to traffic levels in the vicinity of each construction site, particularly in Malé where traffic levels are already high. The impact is temporary and will be mitigated by requiring the contractor to provide notices to the public advising of timing and duration of construction work and the effects on traffic routes during construction and to the extent practicable, schedule work that blocks roadways to periods of low traffic.



94. **Noise pollution and vibration.** Construction operations, particularly excavations and compaction will cause noise and vibration, which will be particularly apparent at Villingilli where ambient noise levels are lower. The nearest residential area to the Malé transfer station is approximately 300m away. In Villingilli there are homes approximately 50m from the existing waste management site, while the school on Villingilli is approximately 250m away. To mitigate the impacts the contractors will be required to (i) provide information on scheduled work to affected persons through direct liaison and via the local media about the timing and duration of the works (ii) limit construction activities to normal daylight working hours (iii) adhere to the planned work schedule and (iv) ensure that all construction equipment and vehicles are kept in good working order with working exhaust mufflers.

95. **Waste Generation.** Construction waste will include packaging of equipment, fuels, lubricants, materials, equipment and food and some rubble where existing structures need to be demolished. Some specialist lubricants and paint for marking may be hazardous. Contractors will be responsible for removing waste to Thilafushi. Approval from the PMDSC must be obtained prior to importing materials rated as hazardous under the Globally Harmonized System of Classification and Labelling of Chemicals.

96. **Handling of Waste during the Construction Period.** Waste produced and collected from households, markets and construction sites during construction needs to be transported to the RWMF at Thilafushi. To ensure that this takes place the design-build contractor will include in the Contractors Environmental Management Plan details of how waste will be loaded onto transfer vessels during construction. Measures may include designated times for waste transfer to the vessels to take place, machinery to be used to ensure efficient handling, and alternative docking sites while work takes place on the existing docking site.

97. **Release of silt.** Excavations to form foundations for structures will involve making temporary stockpiles of material that will either be removed or re-used. To prevent the release of silt into drains or the sea contractors will be required to ensure that (i) excavated areas are rapidly refilled on completion of works, (ii) to place silt fences around temporary piles of excavated material and (iii) avoid excavation in wet weather to the extent practicable.

98. **Water pollution.** The use of vehicles and plant can cause risks of water pollution, in the event of leaks and spills of fuel, lubricants, hydraulic fluid or other fluids used for vehicle operation. To reduce risks and limit impacts the contractor will be required to ensure that vehicles and plant are maintained in sound operable condition, free of leaks and that the condition of vehicles and equipment is regularly checked. The contractor will prepare and submit a plan for spill management, including provision of spill kits, training/briefing of workers on procedures on handling spills and allocation of responsibility within the contractor's team for ensuring that spill kits are available and that workers know how to use them.

99. **Air and dust pollution.** Potential sources of air pollution are exhaust fumes from vehicles and plant, dust from transport of construction and waste materials and areas around work sites where soil and debris is deposited. The effect will be limited in Malé where there are high ambient levels of vehicle exhaust fumes from traffic, but significant in Villingilli where the site is close to homes. The mitigation measures are to require vehicles and equipment to be well maintained and tuned and fitted with exhaust baffles. Water will be applied to suppress dust around work sites where needed.

100. **Community health and safety risks.** The use of plant and machinery, use of compressed air lines and cables and excavations are potentially hazardous but most work sites are within the

transfer station areas where public access is restricted. The contractor will ensure that restrictions to access are enforced and for work on gates and boundary fences adjoining public roads and footpaths, will provide notices to the public identifying hazards and erect safety barriers/covers for areas of open excavation.

101. Contractors shall establish their community health and safety plans following international best practices and the World Bank EHS guidelines on construction and decommissioning activities<sup>40</sup>. As a minimum and whichever is applicable, the community health and safety plan shall ensure the following:

- (i) Implement risk management strategies to protect the community from physical, chemical, or other hazards associated with sites under construction and decommissioning;
- (ii) Restricting access to the site, through a combination of institutional and administrative controls, with a focus on high risk structures or areas depending on site-specific situations, including fencing, signage, and communication of risks to the local community;
- (iii) Removing hazardous conditions on construction sites that cannot be controlled affectively with site access restrictions, such as covering openings to small confined spaces, ensuring means of escape for larger openings such as trenches or excavations, or locked storage of hazardous materials; and
- (iv) Implement measure to prevent proliferation of vectors of diseases at work sites.

102. **Occupational Health and Safety.** To reduce day to day risks associated with working with heavy equipment in trafficked areas, contractors will be required to appoint health and safety officers for each site and to ensure regular briefing of the construction workforce on health and safety issues. Contractors shall establish their occupational health and safety plan to be adopted at each site following international best practices and the World Bank EHS guidelines on construction and decommissioning activities. As minimum and whichever are applicable, the occupational health and safety plan shall ensure the following:

- (i) Communication and Training
  - (a) Training of all workers on occupational health and safety prior to construction works;
  - (b) Conduct of orientation to visitors on health and safety procedures at work sites;
  - (c) Signages strategically installed to identify all areas at work sites, including hazard or danger areas;
  - (d) Proper labeling of equipment and containers at construction and storage sites; and
  - (e) Suitable arrangements to cater for emergencies, including: first aid equipment; personnel trained to administer first aid; communication with, and transport to, the nearest hospital with an accident / emergency department; monitoring equipment; rescue equipment; fire fighting equipment; and communication with nearest fire brigade station.
- (ii) Physical Hazards

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<sup>40</sup> <http://www.ifc.org/wps/wcm/connect/554e8d80488658e4b76af76a6515bb18/Final%2B-%2BGeneral%2BEHS%2BGuidelines.pdf?MOD=AJPERES>

- (a) Use of personal protective equipment (PPE) by all workers such as earplugs, safety shoes, hard hats, masks, goggles, etc. as applicable, and ensure these are used properly;
  - (b) Avoidance of slips and falls through good house-keeping practices, such as the sorting and placing loose construction materials or demolition debris in established areas away from foot paths, cleaning up excessive waste debris and liquid spills regularly, locating electrical cords and ropes in common areas and marked corridors, and use of slip retardant footwear;
  - (c) Use of bracing or trench shoring on deep excavation works;
  - (d) Adequate lighting in dark working areas and areas with night works;
  - (e) Rotating and moving equipment inspected and tested prior to use during construction works. These shall be parked at designated areas and operated by qualified and trained operators only;
  - (f) Specific site traffic rules and routes in place and known to all personnel, workers, drivers, and equipment operators; and
  - (g) Use of air pollution source equipment and vehicles that are well maintained and with valid permits.
- (iii) General Facility Design and Operation
- (a) Regular checking of integrity of workplace structures to avoid collapse or failure;
  - (b) Ensuring workplace can withstand severe weather conditions;
  - (c) Enough work spaces available for workers, including exit routes during emergencies;
  - (d) Fire precautions and fire fighting equipment installed;
  - (e) First aid stations and kits are available. Trained personnel should be available at all times who can provide first aid measures to victims of accidents;
  - (f) Secured storage areas for chemicals and other hazardous and flammable substances are installed and ensure access is limited to authorized personnel only;
  - (g) Good working environment temperature maintained;
  - (h) Worker camps and work sites provided with housekeeping facilities, such as separate toilets for male and female workers, drinking water supply, wash and bathing water, rest areas, and other lavatory and worker welfare facilities; and
  - (i) Maintain records and make reports concerning health, safety and welfare of persons, and damage to property. Take remedial action to prevent a recurrence of any accidents that may occur.

103. Table 7 summarizes the impacts related to construction. As all can be mitigated by consistent application of the mitigation measures described, none are significant.

**Table 7: Summary of impacts related to construction**

Potential Impact	Malé	Villingilli
Impedance of traffic	Negative, temporary, not significant	Negative, temporary, not significant
Noise pollution and vibration	Negative, temporary, not significant	Negative, temporary, significant
Waste generation	Negative, temporary, not significant	Negative, temporary, not significant



Potential Impact	Malé	Villingilli
Release of silt	Negative, temporary, not significant	Negative, temporary, not significant
Water pollution	Negative, temporary, not significant	Negative, temporary, not significant
Air and dust pollution	Negative, temporary, not significant	Negative, temporary, not significant
Community health and safety risks	Negative, temporary, not significant	Negative, temporary, not significant
Occupational health and safety	Negative, temporary, not significant	Negative, temporary, not significant

#### D. Environmental Impacts Related to Operation

104. **General.** The proposed improvements are designed specifically to address existing and future operational constraints related to safe and efficient handling of waste, collection of recyclables and shipment to Thilafushi. Existing impacts that are addressed including excessive loss of waste to the sea during loading of transfer vessels, site security, inability to accurately weigh incoming waste, constraints on maintenance and safe storage of vehicles and plant, and site drainage. The impacts for each location are summarised in Table 8.

105. **Use of containers.** While containers provide a more efficient system of handling and loading waste, reducing potential losses into the sea, any breakages or mishandling of containers will result in significant discharge of waste into the sea. Operation and maintenance training must provide for instruction on maintenance of containers, loaders, cranes and vessels and sound operation including licensing of vehicle and plant operators and restrictions on operation during stormy weather.

106. **Retention of waste awaiting transfer to the RWMF.** In practice, vessels may not, on some occasions, be stacked with a full payload of filled containers. However, deferring of sailings will entail retention of waste with a putrescible content which under usual conditions will result in rapid decomposition and emissions of odors, creating unacceptable working conditions. Adherence to a daily sailing schedule needs be observed to avoid excessive in-situ decomposition of waste.

107. **Pests.** Although improvements will reduce access to them, the transfer stations will still be subject to pests such as birds and rodents. Numbers of these can be kept down by improved operation regimes, including site hygiene and regular cleaning of surfaces, minimizing time that putrescible waste is stored, and provision for enclosed storage of such waste.

108. **Effects on traffic.** Each station will handle a growing quantity of waste, and therefore increased vehicle movements. This can add to or cause traffic congestion in the vicinity of the stations. The impact is mitigated by careful planning by WAMCO of waste collection rosters on each island.

109. **Occupational health and safety.** Improved site cleanliness at the transfer stations will reduce exposure to toxins and disease and improve the existing level of occupational health and safety for workers. The operators of these transfer stations shall implement measures following

international best practices and the World Bank EHS industry sector guidelines for infrastructure: waste management facilities.<sup>41</sup>

**Table 8: Summary of impacts related to operation of the improved facilities**

Potential Impact	Malé	Villingilli
General	Positive, significant, long term	Positive, significant, long term
Losses of waste during handling	Positive, significant, long term	Positive, significant, long term
Pests	Positive, significant, long term	Positive, significant, long term
Effects on traffic	Positive, significant, long term	Not significant
Air and dust pollution	Positive, significant, long term	Positive, significant, long term
Community health and safety risks	Positive, significant, long term	Positive, significant, long term
Occupational health and safety	Positive, significant, long term	Positive, significant, long term

## **E. Global, Transboundary and Cumulative Impacts**

110. The proposed improvements will occur within the Greater Malé area, on the individual islands of Malé, and Villingilli. However, the improvements in collection, treatment and disposal of waste, which will be facilitated by the transfer station improvements, will reduce the discharge of waste from these islands into the surrounding ocean waters.

111. Capacity building for the EPA will assist in the build-up of capabilities required to further improve and manage waste management facilities throughout the Maldives.

## **VI. ANALYSIS OF ALTERNATIVES**

112. The Feasibility Study prepared by Water Solutions and Kocks Ingenieure discusses the best practicable environmental option (BPEO) for the transfer stations.

### **A. Alternatives to the Transfer Station Improvements**

113. For Malé, the Feasibility Study report states that the layout of the proposed infrastructure improvements has been dimensioned in such a way that future strategies in terms of sorting, recycling and waste flow handling have been taken in account, and projected quantities of each fraction of solid waste have been projected for the design.

114. Consideration was given to the use of purpose built, steel 25 m<sup>3</sup> containers to receive waste from the collection trucks for transfer to the Thilafushi-bound vessels, and emptied on Thilafushi. The movement of these containers would involve mobile cranes, using a hook-lift system. However, in view of the advantages of a stackable container system to enable greater flexibility in scheduled sailings of the waste transfer vessels, standard 6m containers are favored. These are readily transported with reach-stacker vehicles, in favor of mobile cranes.

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<sup>41</sup> World Bank EHS Industry Sector Guidelines: Infrastructure; Waste Management Facilities

## **B. Alternatives within the Project Scope**

115. The design of the transfer stations envisages the use of containers, to receive waste from delivery trucks and transfer it to vessels. An alternative to this is an “open” system where trucks are offloaded mechanically, or they tip the waste to a central area or directly onto awaiting vessels. The use of containers however provides a much higher level of control, and greatly limits the risk of waste being lost to the sea during the offloading and loading processes.

116. The concept design envisages separate selection of wet waste (primarily organic waste from eating or retail establishments) and dry waste (primarily wood and other fibre based products, metals and glass). This enables dry waste to be pre-sorted and pressed into bales for temporary storage on site or direct shipping to a user. The system relies on separated streams for collection, and enables a greater level of recycling and reuse of waste.

## **C. The no project alternative**

117. Under the “no project” scenario, there will be no means of increasing the handling capacity of the existing waste handling facilities to meet the requirements imposed by the growing volumes of waste, projected to rise at current rapid levels. This may lead to excessive on site storage, in conditions that allow increased loss of waste to the sea. Figure 13 below provides a view of the existing situation at Malé. Waste is piled high on a barge about to depart to Thilafushi. Some of the uncompacted, uncontained waste falls into the sea either at the transfer station or Thilafushi harbor or during the crossing. Limited space for maintenance of vehicles and plant will not be upgraded by provision of the workshop area, and separation of recyclable factions will remain haphazard.

**Figure 13: Existing Situation.** The transfer of waste from delivery trucks to barges is time consuming and inefficient, and significant volumes of waste are lost to the sea.



## **VII. INFORMATION DISCLOSURE, CONSULTATION AND PARTICIPATION**

### **A. Consultations and information during design**

118. During feasibility study preparation and the identification of the BPEO for the transfer stations and other aspects of the integrated solid waste management system for Zone III, the team worked with key stakeholders such as MEE and WAMCO, and stakeholders are identified in a stakeholder analysis. Consultations have consistently shown a strong desire for the existing solid waste management system to be improved.

119. Public consultations were held on 13<sup>th</sup> February 2018 in Malé and Villingilli in relation to the proposed transfer station improvements, through individual interviews. Respondents were given an introduction to the project, covering project background and likely construction and operation phase impacts. The table below summarizes the views and concerns of respondents and how they are addressed in project design and the EMP.

**Table 9: Summary of outcomes of public consultation on Malé**

<b>Views and concerns expressed</b>	<b>Responses / Appropriate Action</b>
The transfer station is distant from residential homes, no direct impact on homes and	-

<b>Views and concerns expressed</b>	<b>Responses / Appropriate Action</b>
businesses due to smell, dust or noise are expected to reach the area.	
Workers in the southwestern part of Malé notice odors during existing conditions when the wind comes over the transfer station	Improved handling, use of containers and site hygiene to reduce odor emissions
Concern over traffic impacts of other planned activities in the industrial area where the transfer is situated, namely moving of fuel sheds, warehouses and industries.	The Contractor is to (i) provide notices to the public, scheduling work that blocks roadways to periods of low traffic and (ii) co-ordinate with any other major construction projects taking place in the vicinity of the transfer station on Malé to agree measures such as scheduling of construction traffic to avoid peak vehicle movements occurring at the same time.
Improvements in waste handling by WAMCO observed, also creation of job opportunities, particularly for women	-
Respondents mentioned that two dumpsites elsewhere in Malé had been closed in favour of a single location at the transfer station, which had reduced public nuisance	-
No burning at the transfer station should be permitted	The improvements provide for more efficient handling and transport and the use of containers, no burning is envisaged or to be permitted.

**Table 10: Summary of outcomes of public consultation on Villingilli**

<b>Views and concerns expressed</b>	<b>Responses / Appropriate Action</b>
Bad smells occur, particularly as waste accumulates prior to being taken to Thilafushi, however some participants said that the situation has improved due to more regular collections.	Improvements are to include improved processing and storage as well as more efficient collection.
Participants that improvements to the waste transfer area are needed and are in favour of the project	-
Concern over noise and dust during construction.	Noise: the EMP requires Contractors to (i) provide information, (ii) confine construction activities to daylight hours and (adhere to the construction schedule). The EMP also requires contractors to maintain plants and vehicles in good condition with noise suppression. Dust: Addressed by (i) maintenance of vehicles and plant in good condition and (ii) Apply water to suppress dust where needed and sweeping of work sites.

Views and concerns expressed	Responses / Appropriate Action
Consensus that the project is needed and happy about the current location of the site	-

## B. Further Information Disclosure and Public Consultation

120. This IEE, once updated on the basis of detailed design and a Dhivehi translation of the executive summary will be provided to commune officials for public disclosure. Similarly, the updated IEE based on detailed design will be shared with stakeholders, as will results of monitoring. Stakeholders will be kept informed of construction activities that are likely to cause noise and dust nuisance (particularly on Villingilli), or disruption to roads and pathways and will be made aware of the grievance redress mechanism and consultations will take place regularly to gain feedback and ensure that impacts are being adequately managed.

121. **Information, Education and Communication (IEC).** The IEC component will address perceptions on solid waste management, communication channels within the island communities, the role of women and scope for public involvement in improved solid waste management activity, in line with the “3 Rs”. This will potentially include adopting practices at the household level that reduce waste generation (including in particular reduced use of disposable plastics) and the separation of compostable and recyclable waste, and eliciting participation in community level activity.

122. The IEC will also support island councils in the management of solid waste, particularly through partnerships with resorts, NGOs or other islands to support initiatives to manage solid waste safely and sustainably. Resorts could provide technical training to islands, help in repair of SWM equipment, joint transport of waste to treatment centers, and carry out joint awareness programs on SWM. Strategies may include:

- (i) Involvement of environmental clubs that have been formed in schools;
- (ii) Use of social media, particularly those in common use already such as “facebook” and “viber”;
- (iii) Setting up a dynamic knowledge portal;
- (iv) Sharing information on the project, its activities and roll out schedule of the project components;
- (v) Partnerships between resorts and neighbouring islands on sustainable waste management;
- (vi) Promoting 3R practices, including reduction of plastic water bottles through use of reusable glass bottles and/or large, reusable bottles for drinking water; and
- (vii) Encouraging use of locally produced compost.

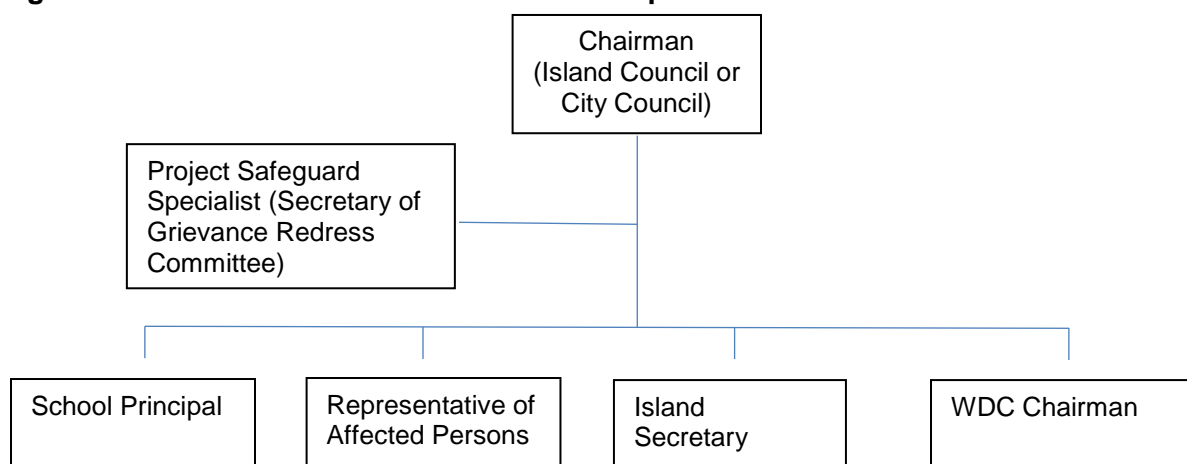
## VIII. GRIEVANCE REDRESS MECHANISM

123. A grievance redress mechanism (GRM) will be established to receive and facilitate the resolution of affected persons (APs) concerns, complaints, and grievances on negotiated/voluntary land donation or involuntary land acquisition, relocation, income restoration, environmental management and other construction and operation related issues. The GRM is accessible to all APs to address their concerns, grievances and issues effectively and swiftly, in accordance with ADP SPS, 2009.

124. **First Tier:** City Council/Island Council – grievances will be registered informally by contacting the city/island councils. If the grievance cannot be resolved informally then the APs can register a formal complaint. The council must screen the grievance to determine whether the

concerns raised in the grievance are within the scope of the project. The council will determine solutions to the issues either by (i) discussing internally, or (ii) joint problem solving with aggrieved parties, or (iii) a combination of both options. If the complaint is resolved within a week, the council must communicate the decision to the aggrieved party formally or informally. Should matter be unresolved and/or the affected person be unhappy with the result, the complaint will be referred to the next tier. The grievance redress committee (GRC) includes the island's representatives as well as project officers related to each island, as shown in the figure below.

**Figure 14: Grievance Redress Committee Composition for First Tier**



125. **Second Tier:** The AP can elevate the grievance to the second tier, and submit a complaint on a letter addressed to MEE. The MEE will forward the letter to the PMU. The PMU will be responsible to resolve the complaint within 15 days and communicate the decision to the aggrieved party. The PMU screens the grievance and determines if it is related to the project. If unrelated, the AP is notified in writing. If it is relevant to the project, the PMU will hold discussions with the MEE on the matter and if necessary, (i) arranges visit the site and hold on-site discussions and/or (ii) refers the matter to the project steering committee. The PMU then decides on the action that will be taken by the project to address the grievance, and the decision will be conveyed to the AP in writing.

126. The affected persons can also direct contact (in writing) the ADB Project Officer at ADB headquarters. The complaint can be submitted in any of the official languages of ADB's Developing Member Countries. This may be done at any time by sending the written complaint to the following address:

Project Officer – Greater Malé Environmental Improvement and Waste Management Project  
South Asia Urban Development and Water Division  
South Asia Regional Department  
Asian Development Bank  
6 ADB Avenue, Mandaluyong City 1550  
Metro Manila, Philippines

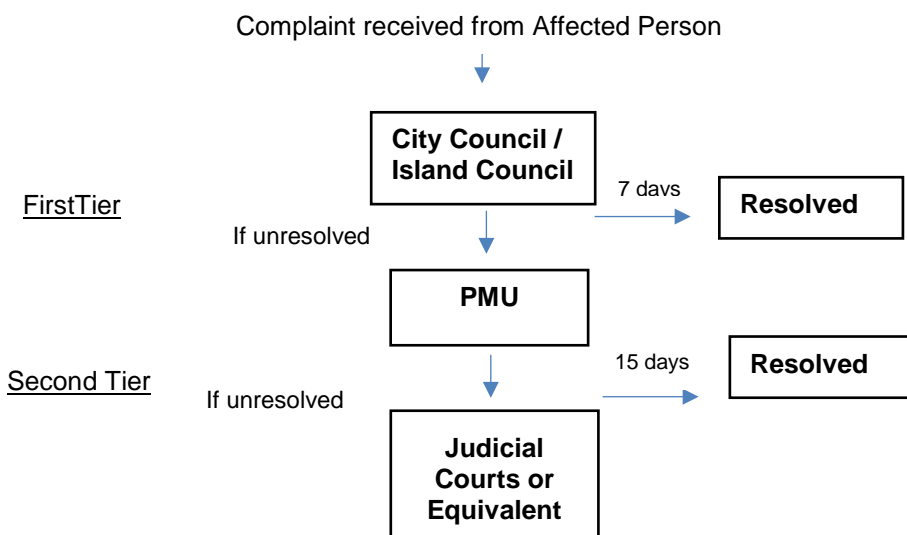
127. The affected persons can also use the ADB Accountability Mechanism through directly contacting (in writing) the Complaint Receiving Officer (CRO) at ADB. The complaint can be submitted in any of the official languages of ADB's DMCs. The ADB Accountability Mechanism information will be included in the Project Information Document to be distributed to the affected communities, as part of the project GRM.

128. The legal system is accessible to all the APs. APs can seek legal redress through Maldives judicial or appropriate administrative system at any stage of the matter or issue concerned. The affected persons can also use the ADB Accountability Mechanism through directly contacting (in writing) the CRO at ADB. The complaint can be submitted in any of the official languages of ADB's DMCs. The ADB Accountability Mechanism information will be included in the PID to be distributed to the affected communities, as part of the project GRM.

129. The GRM notwithstanding, an aggrieved person shall have access to the country's legal system at any stage through the Maldives judicial or appropriate administrative system. This can run parallel to accessing the GRM and is not dependent on the negative outcome of the GRM.

130. The flow diagram of resolving complaints under the GRC is shown in Figure below.

**Figure 15: GRM Diagram for Complaints Resolution**



131. The GRM will include group meetings and discussions with APs to address general and common grievances. These meetings and discussions will be announced in advance, conducted at the time of day agreed on with APs (based on their availability), and facilitated by the PMU and PMDSC at least are assisted to understand the grievance redress process, to register complaints and with follow-up actions at different stages in the process. Records will be kept by the PMU to keep track of all grievances received, both informal and formal, including contact details of complainant, date when the complaint was received, nature of grievance, agreed corrective actions and the date when these were effected, and final outcome. A Sample Grievance Registration Form is attached in Appendix 2.

132. All costs involved in resolving the complaints (meetings, consultations, communication and reporting, and information dissemination) will be borne by the PMU.



## IX. ENVIRONMENTAL MANAGEMENT PLAN

### A. Objectives

133. This EMP sets out the needs for environmental management of transfer station improvements within the GMEIWMP in terms of institutional responsibilities to ensure mitigation and monitoring takes place during the pre-construction, construction and operation phases, meeting the requirements of the Government of the Maldives and the ADB's SPS.

134. A copy of the EMP must be kept on work sites at all times. This EMP will be included in the bid documents and will be further reviewed and updated during implementation. The EMP will be made binding on all contractors operating on the site and will be included in the contractual clauses. Non-compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance.

135. For civil works, the contractor will be required to (i) establish an operational system for managing environmental impacts (ii) carry out all of the monitoring and mitigation measures set forth in the EMP; and (iii) implement any corrective or preventative actions set out in safeguards monitoring reports that the employer will prepare from time to time to monitor implementation of this IEE and EMP. The contractor shall allocate a budget for compliance with these EMP measures, requirements and actions.

### B. Institutional Arrangement

136. **Implementation arrangements.** The executing agency is the Ministry of Finance and Treasury (MOFT). The implementing agency is the Ministry of Environment and Energy (MEE) who will establish a project management unit (PMU) comprising officials from MEE and WAMCO. The PMU will be strengthened with external experts in the areas of finance, procurement, technical areas, and contract management. The project steering committee chaired by Minister, MEE will provide overall guidance and strategic directions to the project. Consultant firms will be recruited under the project to support engineering designs, supervision, project management, institutional capacity strengthening, and community awareness.

137. **Project Management Unit.** The Director General of the Solid Waste Department of MEE proposed that a dedicated full-time PMU for the ADB Zone 3 waste management project will be established (pending approval by MOFT) with eight staff as follows: (i) Project Director (part-time, Director General of Department), (ii) Project Manager (full time), (iii) Procurement Specialist, (iv) Finance Specialist, (v) Safeguard Specialist, (vi) Civil Engineer, (vii) IEC Specialist, and (viii) administrative assistant. The Project Director is a government official empowered to take official decisions, while remaining PMU staff are contracted staff recruited from the market. The PMU will be supported by consultants for project management, capacity building, monitoring, and technical design and supervision support. The proposed PMU contract staff are to be recruited competitively without further delay in phases.

138. **Terms of Reference for PMU Environment Officer.** Key tasks and responsibilities of the PMU environment officer are as follows:

- (i) confirm existing IEEs/EMPs are updated based on detailed designs, and that new IEEs/EMPs are prepared in accordance with the EARF and subproject selection criteria related to safeguards;
- (ii) confirm whether IEEs/EMPs are included in bidding documents and civil works contracts;

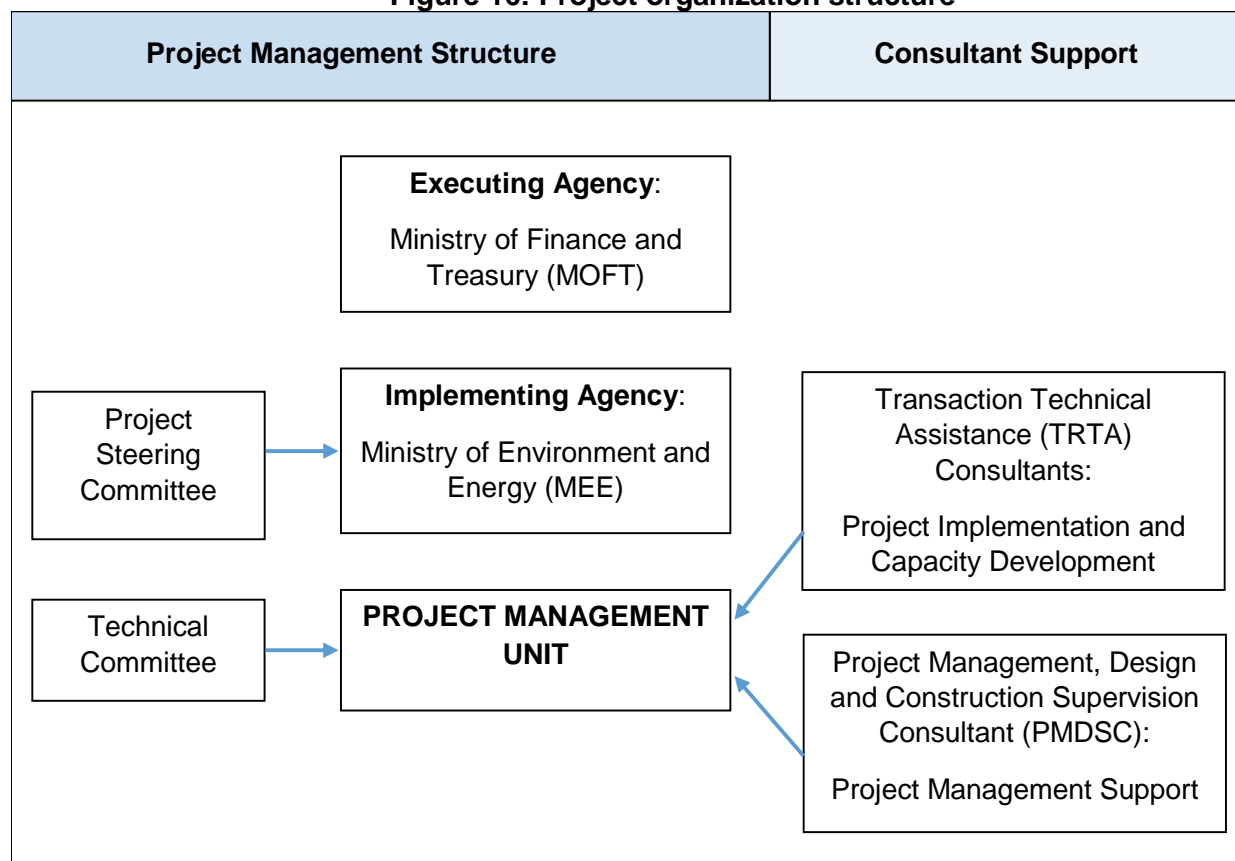
- (iii) provide oversight on environmental management aspects of subprojects and ensure EMPs are implemented by island councils and contractors
- (iv) establish a system to monitor environmental safeguards of the project, including monitoring the indicators set out in the monitoring plan of the EMP;
- (v) facilitate and confirm overall compliance with all government rules and regulations regarding site and environmental clearances, as well as any other environmental requirements (e.g., location clearance certificates, environmental clearance certificates, etc.), as relevant; e. supervise and provide guidance to the island councils to properly carry out the environmental monitoring as per the EARF;
- (vi) review, monitor, and evaluate the effectiveness with which the EMPs are implemented, and recommend necessary corrective actions to be taken as necessary;
- (vii) consolidate monthly environmental monitoring reports from PIUs and submit semi-annual monitoring reports to ADB;
- (viii) ensure timely disclosure of final IEEs/EMPs in locations and form accessible to the public;
- (ix) address any grievances brought about through the grievance redress mechanism in a timely manner;
- (x) With assistance from the PMDSC, provide orientation to PCU and PIU staff in environmental management arrangements for the project;
- (xi) Provide inputs to progress reports and the project completion report;
- (xii) Visit worksites during construction and provide guidance relating to supervision and compliance monitoring; and
- (xiii) Visit completed works and assist with establishing environmental monitoring procedures for the operation phase of the improved infrastructure.

139. Terms of Reference for PMDSC Safeguard Consultants. The Social, Environmental and Occupational Health and Safety Expert in PMDSC will:

- (i) Ensure compliance with ADB safeguard requirements;
- (ii) Screen and categorize IWMCs for inclusion in the project;
- (iii) Ensure no Category A subproject per ADB SPS definition;
- (iv) Provide guidance on safeguards and issue instructions to the Contractors;
- (v) Assist in obtaining all necessary permissions and complying with statutory requirements;
- (vi) Prepare necessary IEE and EMP for each IWMC that will be considered in the project.
- (vii) Submit IEE and EMP to PMU for submission to ADB;
- (viii) Ensure IEE and EMP is included in the bid and contract document and ) and such items are included in BOQ;
- (ix) Review the Contractor's Environmental Management Plan (CEMP) for adequacy in terms of compliance with the requirements of the EMP and instruct amendments and additions as necessary;
- (x) Monitor and ensure compliance with ADB SPS and contractors' implementation of the EMPs;
- (xi) As part of the EMP, prepare a project focused Occupational Health and Safety Plan (OHS) to be adopted by the Client and the Contractor;
- (xii) Ensure that relevant provisions in contracts on OHS are abided by the contractors during the construction works;
- (xiii) Facilitate meaningful consultations and carry out disclosure of safeguard documents;
- (xiv) Prepare environmental and social mentoring reports;

- (xv) Prepare corrective action plan/s as required to ensure compliance with ADB SPS, 2009 and national laws and regulations;
- (xvi) Assist in GRM implementation;
- (xvii) Conduct Safeguards Orientation to contractors prior to mobilization; and
- (xviii) Develop and conduct regular safeguards trainings (see indicative institutional capacity development program) to ensure PMU, island councils and other stakeholders have common understanding of ADB SPS requirements during all phases of project implementation.

**Figure 16: Project organization structure**



**Table 11: Roles and Responsibilities of Project Implementation Organizations**

Project Implementation Organizations	Management Roles and Responsibilities
Executing agency Ministry of Finance and Treasury (MOFT)	Guide and monitor overall project execution. Financial oversight. Ensure flow of funds to the implementing agency and timely availability of counterpart funding; ensure adequate budget for successful implementation of the project. Monitors compliance with project legal Agreements Procurement oversight. Responsible for approving procurement. Review and coordinate evaluation of bids for works, goods, and consultant services. Maintaining project accounts and project financial records; Review and sign withdrawal applications before submitting to Asian Development Bank (ADB). Approve project management unit (PMU).

Project Implementation Organizations	Management Roles and Responsibilities
Project steering committee [Chair: Minister, Ministry of Environment and Energy (MEE)]	Provide policy direction to facilitate project implementation. High-level troubleshooting.
Implementing agency 1 (MEE)	Meets quarterly (or as needed) to review project performance and resolve issues.
PMU in MEE	<p>Overall day-to-day project management, monitoring, and evaluation.</p> <p>Responsible for overall project management, implementation and monitoring; Reviews the reports submitted by (project management, design and construction supervision consultant) PMDSC with respect to detailed design, costs, safeguards, financial, economic, and social viability Prepare, with the support of PMDSC, bidding documents, request for proposals, and bid evaluation reports; Serves as point of contact with ADB, maintains project documents, and submits timely reports (quarterly progress reports and project completion report) to ADB by consolidating relevant inputs from PMDSCs and island council; Consolidates expenditures and prepare withdrawal applications for direct payment, reimbursements and use of imprest advance; Opens and manages imprest account for ADB Grant; Organize project orientation for participating island councils by elaborating scope of the project and sharing about their obligation and including maintaining separate accounts for their respective contributions; Establishment and maintaining of project website by disclosing progress reports, safeguard monitoring reports and design reports; and Collect supporting documents and submit withdrawal applications to ADB via MOFT. Monitors and ensures the compliance of covenants, particularly timely submission of audited project accounts and compliance with safeguard requirements;</p>
Technical committee	Advise and facilitate to resolve technical issues.
WAMCO	<p>Operator for collection, transport, and disposal of waste services in project area</p> <p>Manage regional waste management facilities</p>
Island Councils	<p>Operators of solid waste services on outer islands</p> <p>Responsible for management and O&amp;M of Island Waste Management Centers</p>
ADB	<p>Conducts project review missions, midterm review mission and project completion review mission to assess project implementation progress of all outputs, compliance of grant covenants including actions required in terms of safeguards (environmental impacts and social mitigation measures applicable); timeliness of budgetary allocations and counterpart funding; project expenditures; progress with procurement and disbursement;</p> <p>Post on ADB website the updated project information documents and safeguards documents as per disclosure provision of the ADB safeguards policy statement.</p> <p>Reviews executing agency and implementing agency's submissions for procurement of goods, equipment, works and services and provides comments and no objection on the submissions</p>

Project Implementation Organizations	Management Roles and Responsibilities
	Checks Statement of Expenditure on sampling basis

140. **The Contractor.** The contractor will have the following roles and responsibilities:
- (i) obtain all statutory clearances prior to commencement of civil works;
  - (ii) complies with all applicable legislation, is conversant with the requirements of the EMP, and briefs staff about the requirements of same;
  - (iii) prepare a Contractor's EMP based on the EMP of this IEE, and submit to PMDSC for approval;
  - (iv) carry out all of the monitoring and mitigation measures set forth in the approved CEMP;
  - (v) ensures any sub-contractors/ suppliers, who are utilized within the context of the contract, comply with the environmental requirements of the CEMP/EMP. The Contractor will be held responsible for non-compliance on their behalf;
  - (vi) implement any corrective or preventative actions set out in safeguards monitoring reports that the executing agency or implementing agency will prepare from time to time to monitor implementation of this IEE, EMP, and CEMP;
  - (vii) provides environmental awareness training to staff;
  - (viii) bears the costs of any damages/ compensation resulting from non-adherence to the EMP or written site instructions;
  - (ix) conducts all activities in a manner that minimizes disturbance to directly affected residents and the public in general, and foreseeable impacts on the environment;
  - (x) ensures that its staff or engineers are informed in a timely manner of any foreseeable activities that will require input from the environment and safety officers (or equivalent);
  - (xi) appoints one full time environment and safety officer (or equivalent) for implementation of EMP, community liaising, reporting and grievance redressal on day to day basis; and
  - (xii) receives complaints/grievances from the public, immediately implements the remedial measures and reports to the PMU and PMDSC.

### C. Institutional Capacity Development Program

141. The PMU, to be established by the MEE, will be responsible for the implementation of safeguards and ensuring that they comply with ADB requirements as well as the EPPA. The body responsible for approving environmental impact assessments and issuing of permits is the Environmental Protection Agency (EPA), which is under the Ministry of Environment and Energy.<sup>42</sup> Capacities were assessed by the PPTA consultants during interviews that took place in July and September 2017. The EPA has few trained technical staff and at the time of capacity assessment work undertaken by the PPTA consultants, all senior members of the EPA's waste department were away from the office for study, which is indicative of a low staffing resource level. The agency relies on external consultants for functions such as environmental monitoring for projects, however this is usually confined to the construction phase. The EPA does have one team of field staff a laboratory and a boat for fieldwork, but laboratory operations and travel is constrained by budget constraints. The situation is reflected in other departments of the MEE.

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<sup>42</sup> Note that EPA, while it comes under MEE, has a governing board which is a statutory body.

142. The PMDSC will provide assistance during the project for the implementation of safeguards in compliance with ADB SPS 2009 requirements and with the requirements of the EPPA. This provision responds to lessons learned for project design to include support to PMU staff in project implementation particularly in procurement, contract management, and safeguards . The PMDSC will provide assistance to the PMU for overseeing EMP implementation.

143. Besides the IEC component which includes some capacity building measures for ICs (e.g. increasing outreach of IEC, closing feedback loop), the Transaction Technical Assistance (TRTA) for Strengthening Capacity for Sustainable Solid Waste Management in the Greater Malé Region will provide both implementation and safeguard guidance and assistance towards the PMU. Since recycling is of a major concern, a market sounding will be carried out during the TRTA to increase the knowledge in this regard and to inform the institutional stakeholders (mainly MEE, WAMCO and ICs) about the potential for recycling of certain waste components.

144. Capacity development support will be provided via the TRTA including support for the improvements of the Malé and Villingilli transfer stations. It will also include implementation guidance specifically to the new PMU to be formed for the project. The TRTA team includes a national safeguards and gender expert.

#### **D. Impacts and Mitigation**

145. Table 10 summarizes the potential impacts and mitigation measures in relation to location, construction and operation identified in the IEE.

**Table 12: Environmental Management Plan**

<b>Impacts</b>	<b>Location</b>	<b>Mitigation Measures</b>	<b>Performance Standard</b>	<b>Source of Funds</b>	<b>Responsible for Implementation</b>	<b>Responsible for Supervision</b>
<b>Pre-Construction Stage</b>						
Efficiency of operation of the transfer stations	Malé, and Villingilli	Inclusion in detailed design of provisions needed for efficient and high standard of operation of the transfer stations, including drainage design, handling of clinical waste, washing of sites, vehicles and containers and treatment of drain runoff water and water used for washing, effluent management, fire prevention and fire fighting measures and site security	Compliant with PMDSC company quality control standards	Design cost	DB Contractor; PMDSC	MEE
Sanitation and welfare provisions for the administration building	Malé	Inclusion of provisions for canteen, meeting room and toilet facilities, including provisions for treatment/discharge of wastewater in design of the administration building	Approval by PMDSC	Design cost	DB Contractor; PMDSC	MEE
Pests: Birds and Rodents	Malé, and Villingilli	Provision in the design of enclosed areas for storage of putrescible waste and of cleaning equipment such as hoses.	Compliant with PMDSC company quality control standards	Project funds	PMDSC	MEE
Effects on traffic	Malé – primarily Villingilli – limited	Consideration of traffic flows in final layout design	Compliant with PMDSC company quality control standards	Project funds	PMDSC	MEE
Construction Impacts	Malé; Villingilli	Preparation of Contractor's Environmental Management Plan providing specific detail in relation to chosen construction methods	Approval by PMDSC	Construction Cost	Contractor	PMDSC
General impacts on local residents		Provision of information to the public on Grievance Redress Mechanism	Completion of disclosure measures as prescribed in the GRM	Project Management Cost	PMU	-

Impacts	Location	Mitigation Measures	Performance Standard	Source of Funds	Responsible for Implementation	Responsible for Supervision
Climate risk and vulnerability mitigation		Incorporation of recommendations from CRVA into detailed design	Compliant with PMDSC company quality control standards	Design cost	PMDSC	MEE
<b>Construction stage impacts</b>						
Impeding access to property or facilities, or traffic disruption	Malé – primarily Villingilli – limited	<p>Notices to the public, scheduling work that blocks roadways to periods of low traffic.</p> <p>Co-ordination with any other major construction projects taking place in the vicinity of the transfer station on Malé to agree measures such as scheduling of construction traffic to avoid peak vehicle movements occurring at the same time.</p>	No complaints registered via the GRM in respect of traffic impacts, or any such complaints addressed	Construction Cost	DB Contractor	PMDSC
Noise pollution and vibration	Villingilli – primarily Malé - limited	<p>Providing information to the affected persons through direct liaison and via the local media about the timing and duration of the works.</p> <p>Construction activities will be limited to normal daylight working hours. A work schedule will be followed.</p> <p>All construction equipment and vehicles will be in good working order with working mufflers and noise suppression.</p>	<p>No complaints registered via the GRM in respect of noise and vibration, or any such complaints addressed</p> <p>Noise level not to exceed 70L<sub>Aeq 1hr</sub> dBA at construction site.</p>	Construction Cost	DB Contractor	PMDSC



<b>Impacts</b>	<b>Location</b>	<b>Mitigation Measures</b>	<b>Performance Standard</b>	<b>Source of Funds</b>	<b>Responsible for Implementation</b>	<b>Responsible for Supervision</b>
Waste generation from construction activities	Malé; Villingilli	All solid waste must be disposed of at a landfill or approved disposal site. Importation of any materials rated as hazardous under the Globally Harmonized System of Classification and Labelling of Chemicals to be subject to approval by PMDSC, which will be conditional on stating adequate arrangements for disposal.	Site free of construction waste on commissioning.  Written PMDSC approval available for any hazardous chemical in use	Construction Cost	DB Contractor	PMDSC
Handling of day to day waste during construction	Malé; Villingilli	Inclusion in CEMP of measures to ensure regular transfer of waste from households, markets and construction sites	Continued collection of waste during the construction period; no impede of works or traffic from piled waste	Construction Cost	DB Contractor	PMDSC
Release of silt	Malé; Villingilli	Excavated areas to be rapidly refilled on completion of works. Use of silt fences around temporary piles of excavated material. Avoid excavation in wet weather to the extent practicable.	No instances when silt release is uncontrolled	Construction Cost	DB Contractor	PMDSC

<b>Impacts</b>	<b>Location</b>	<b>Mitigation Measures</b>	<b>Performance Standard</b>	<b>Source of Funds</b>	<b>Responsible for Implementation</b>	<b>Responsible for Supervision</b>
Water pollution	Malé; Villingilli	<p>Vehicles and plant are to be maintained in sound operable condition, free of leaks. The condition of vehicles and equipment will be periodically checked.</p> <p>Contractor to prepare and submit a plan for spill management, including provision of spill kits, training/briefing of workers on procedures on handling spills and allocation of responsibility within the DB Contractor's team for ensuring that spill kits are available and that workers know how to use them.</p>	<p>Vehicles and construction plant to have at all times at a minimum: (i) intact and securely fitted exhaust pipes and mufflers (ii) operable brakes (iii) no fuel or lubricant leaks.</p> <p>Spill kits on site at all times</p>	Construction Cost	DB Contractor	PMDSC
Air and dust pollution	Villingilli – primarily Malé – limited	<p>Require vehicles and equipment to be well maintained and tuned and fitted with exhaust baffles. Apply water to suppress dust where needed and sweep to remove and clear spoil on surfaces.</p>	<p>Vehicles and construction plant to have at all times at a minimum: (i) intact and securely fitted exhaust pipes and mufflers (ii) operable brakes (iii) no fuel or lubricant leaks</p>	Construction Cost	DB Contractor	PMDSC



<b>Impacts</b>	<b>Location</b>	<b>Mitigation Measures</b>	<b>Performance Standard</b>	<b>Source of Funds</b>	<b>Responsible for Implementation</b>	<b>Responsible for Supervision</b>
Risks of loss of containers and contents	Malé;; Villingilli	O&M training to include instruction on maintenance of containers, loaders, cranes and vessels and sound operation including licensing of vehicle and plant operators and restrictions on operation during stormy weather	O&M training completed  Operators to have undergone training and have licences to drive/operate vehicles and machinery.	Training budget	Implementation consultants / DB Contractor	MEE
Pests: Rodents and birds and odors	Malé; Villingilli	Maintenance of site cleanliness, minimizing storage time for putrescible waste, provision of enclosures for putrescible waste.	Sites to be clean and all putrescible waste enclosed at the close of operations each day	Operation Cost	WAMCO	MEE
Retention of waste awaiting transfer to the RWMF	Malé	Adherence to a daily sailing schedule needs be observed to avoid excessive in-situ decomposition of waste.	No cancellations of vessel transfers to RWMF except in the case of storms or unavoidable mechanical outage	Operation Cost	WAMCO	MEE
Operator occupational health and safety	Malé; Villingilli	Operators trained to recognize risks and hazards. Personal safety equipment issued and worn. Health and safety recognized as primary employer responsibility.  Operator to adopt the WB EHS Guidelines on OHS for SWM projects.	Allocation of responsibility for safety standards to a full time member of staff. Appropriate protective equipment to each construction operation to be worn at all times (including steel toe capped boots and hard hats at all times)	Operation Cost	Implementation consultants / DB Contractor  WAMCO	MEE
Community Health and Safety Hazards	Malé; Villingilli	Operate a security system to restrict access to the public.  Operator to adopt the WB EHS Guidelines on Community Health and Safety for SWM projects.	Perimeter fence intact and site secure at all times	Construction and Operation Cost	WAMCO	MEE

<b>Impacts</b>	<b>Location</b>	<b>Mitigation Measures</b>	<b>Performance Standard</b>	<b>Source of Funds</b>	<b>Responsible for Implementation</b>	<b>Responsible for Supervision</b>
Effects on traffic	Malé; Villingilli	Scheduling of waste collection to night/low traffic hours.	Submission of waste collection schedule to MEE and adherence to it	Operation Cost	WAMCO - Operator	MEE
Damage to the facility and loss of waste during storm events	Malé; Villingilli	Procedures for shut-down and securing of site, vehicles and vessels in the event of severe storm warnings	Availability of written procedures for inspection; awareness of staff of such procedures	Operation Cost	Implementation consultants / DB Contractor  WAMCO	MEE

## E. Environmental Monitoring

### 1. Monitoring Plan

146. The design of the environmental monitoring system is based on an analysis of the key environmental performance issues associated with each stage of the project, set out in Table 11 below.

**Table 13: Analysis of Environmental Monitoring Needs**

Phase	Key Environmental Performance Issues	Environmental Performance Indicator	Means of Monitoring
Design/ Preconstruction	Inclusion of mitigation measures in design/build and/or detailed design documentation and construction activities  Air and water quality  Noise	Compliance with EMP design measures  Water Quality: BOD, TSS, TPH Faecal coliform/enterococci; Metals (Pb, Cu, Cd, Hg, Cr)  Air Quality: SO <sub>2</sub> , NO <sub>2</sub> , PM <sub>10</sub> , PM <sub>2.5</sub> , O <sub>3</sub>  Noise L <sub>Aeq</sub> 1hr (dBA)	Compliance monitoring   Measurements prior to construction
Construction	Adherence to provisions in the EMP to mitigate construction impacts	Compliance with EMP	Compliance monitoring
	Direct effects on communities from impacts such as accidental damage, dust generation, noise generation and safety	Views and opinions of communities  Contractor's records relating to minor and major pollution and health and safety incidents (with a target of zero incidents)	Community feedback  Grievance redress mechanism
	Air and water quality; noise	As above	Measurements at monthly intervals
Operation	Effectiveness of waste transfer system	Reduced occurrence of floating waste in the sea in the Greater Malé area	Site observations Community feedback
	Air and water quality; noise	As above	Regular measurements according to agreed monitoring plan for operation

BOD = biological oxygen demand; TSS = total suspended solids; TPH = Total Petroleum Hydrocarbons, L<sub>Aeq</sub> = weighted continuous noise equivalent level dBA = decibels

147. Two areas of environmental monitoring are identified: compliance monitoring and community feedback, which are in addition to monitoring measures in the Design and Monitoring Framework for the project. These provide a means of gauging whether the stations operate more efficiently and with less loss of waste into the sea.

148. Compliance monitoring is required during detailed design and construction of the transfer station facilities, to ensure that mitigation specified in the EMP is carried out to an adequate standard. Compliance monitoring is a function of the PMU and its cost of this monitoring is part of the running cost of the PMU.

149. Community feedback provides for the monitoring of environmental indicators gauged by public perception. Appropriate indicators are:

- (i) Reductions in the incidence of waterborne diseases
- (ii) Effectiveness of waste handling (appearance of floating waste in the sea in the vicinity of the transfer stations and between the Malé station and Thilafushi)

150. Costs of environmental assessment and monitoring during construction are project costs. Environmental monitoring during operation is carried out by the WAMCO, and costs will be met from O&M budgets prepared and managed by the WAMCO.

**Table 14: Environmental Monitoring Plan**

Impact to be Monitored	Means of Monitoring	Construction Phase			Operation Phase		
		Frequency	Responsible Agency	Indicative Annual Cost	Frequency	Responsible Agency	Indicative Annual Cost
General Construction Impacts	Community Feed-back	To be established by PMDSC	PMU	Covered in project participation plan	To be established by PMDSC	WAMCO	Operational Cost
Compliance with EMP	Inspections	As set up by supervising engineers	PMU / PMDSC	Included in project management and consultancy cost	To be established by PMDSC	WAMCO	Operational Cost
Occurrence of floating waste	Community Feed-back	To be established by PMDSC	PIU	To be determined in design of community outreach component of Project	To be established by PMDSC	WAMCO	Operational Cost
Air and water quality	On site measurements and lab analysis	Prior to construction then monthly	Contractor	Construction cost	To be established by PMDSC	WAMCO	Operational Cost



## **2. Reporting**

151. EMP compliance monitoring will be undertaken by the PMU, with support of the PMDSC. Effects will be monitored by means of community feedback and laboratory testing. Consistent with reporting requirements set out in the Project Administration Manual (PAM). PMU will prepare reports to be sent to ADB on a semi-annual basis during and immediately after construction. Semi-annual reports during operation are to be prepared by WAMCO (suggested outline is attached as Appendix 3). To facilitate monitoring and enable responses to emerging issues, monthly reports will be prepared by the PMU and submitted to the MEE.

## **X. CONCLUSION**

152. The overall finding of the IEE is that the Project will result in significant environmental benefits, as it is conceived and designed to address major environmental issues associated with existing difficulties in waste handling and transfer and the rapidly growing volumes of waste that are projected in coming decades. It will not have significant adverse environmental impacts and potential adverse impacts are manageable through the effective implementation of the EMP.

153. The classification of Category B is confirmed. No further environmental assessment is therefore required. However, this IEE will be finalized based on the final detailed design and this classification shall be reassessed or reconfirmed accordingly.

## Rapid Environmental Assessment Checklist

**Instructions:**

- (i) The project team completes this checklist to support the environmental classification of a project. It is to be attached to the environmental categorization form and submitted to the Environment and Safeguards Division (RSES) for endorsement by the Director, RSES and for approval by the Chief Compliance Officer.
- (ii) This checklist focuses on environmental issues and concerns. To ensure that social dimensions are adequately considered, refer also to ADB's (a) checklists on involuntary resettlement and Indigenous Peoples; (b) poverty reduction handbook; (c) staff guide to consultation and participation; and (d) gender checklists.
- (iii) Answer the questions assuming the "without mitigation" case. The purpose is to identify potential impacts. Use the "remarks" section to discuss any anticipated mitigation measures.

**Country/Project Title:** Transfer Station Improvements in Male and Villingilli

**Sector Division:** SAUW

Screening Questions	Yes	No	Remarks
A. Project Siting Is the project area...			
▪ Densely populated?	✓		Population density of Malé is 23,002/km <sup>2</sup> (59,570/sq mi) while Villimalé (also known as Villingilli) is 26,000/km <sup>2</sup> (67,000/sq mi).
▪ Heavy with development activities?	✓		Malé is the center of many development activities in the Maldives. Villimalé used to be a resort earlier before it became a residential island and popular holiday destination among the residents of Malé and Hulhumalé, specially during the weekends. There are several hotels and guest houses in Villimalé.
▪ Adjacent to or within any environmentally sensitive areas?		✓	
• Cultural heritage site		✓	
• Protected Area		✓	
• Wetland		✓	
• Mangrove		✓	
• Estuarine		✓	
• Buffer zone of protected area		✓	
• Special area for protecting biodiversity		✓	
• Bay	✓		Malé is geographically located in Kaafu Atoll. Villimalé considered the fifth district of Malé.
B. Potential Environmental Impacts Will the Project cause...			

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>impacts associated with transport of wastes to the disposal site or treatment facility</li> </ul>	✓		<p>The transport of waste from collection points to transfer stations may have potential impact to the environment due to littering along transport routes. Similarly, transport of wastes from transfer stations to the disposal site may also have potential impact as the route will be by the sea through marine vessels.</p> <p>The Project will include the introduction of a containerized system to improve the efficiency of waste handling from collection points to the disposal site and substantially limit the scope for waste losses during transport. These measures are reflected in the in the designs and EMP of the transfer station subproject .</p>
<ul style="list-style-type: none"> <li>impairment of historical/cultural monuments/areas and loss/damage to these sites?</li> </ul>		✓	There are no historical and cultural monuments at the subproject sites.
<ul style="list-style-type: none"> <li>degradation of aesthetic and property value loss?</li> </ul>		✓	The subproject will improve land aesthetics because of expected better efficiency of collection and transport of solid wastes currently being dumped.
<ul style="list-style-type: none"> <li>nuisance to neighboring areas due to foul odor and influx of insects, rodents, etc.?</li> </ul>	✓		Likely. However, the improvements to the transfer stations and their operations will reduce existing odor and pest issues. The designs and the EMP ensure good housekeeping and site management measures to mitigate the impacts within and adjacent to the subproject sites.
<ul style="list-style-type: none"> <li>dislocation or involuntary resettlement of people?</li> </ul>		✓	Not anticipated. All lands to be used for the subproject are owned by the government. Social safeguards due diligence conducted shows no potential for IR impacts.
<ul style="list-style-type: none"> <li>disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?</li> </ul>		✓	The project will benefit all sectors in the subproject areas.
<ul style="list-style-type: none"> <li>risks and vulnerabilities related occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?</li> </ul>	✓		Occupational health and safety (OHS) risks are inherent to construction activities. However, these risks can be reduced through implementation of good construction practices and adoption of internationally recognized OHS measures such as the WB EHS guidelines on construction OHS and SWM. These are included in the EMP.
<ul style="list-style-type: none"> <li>public health hazards from odor, smoke from fire, and diseases transmitted by flies, insects, birds and rats?</li> </ul>	✓		<p>Likely. However, the EMP ensures good housekeeping measures are included to mitigate the impacts at all subproject sites.</p> <p>The Project will significantly reduce exposure of waste to pests and vectors of disease.</p> <p>Limited public access; reduced exposure of pests to waste. The operation of the transfer stations will ensure community health hazards are avoided with the adoption of WB EHS guidelines on SWM as indicated in the EMP.</p>
<ul style="list-style-type: none"> <li>deterioration of water quality as a result of contamination of receiving waters by leachate from land disposal system?</li> </ul>	✓		Transfer stations will be designed with concrete flooring and provided with leachate management (onsite treatment or store and transfer to appropriate treatment facilities will be finalized during detailed design stage).

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>contamination of ground and/or surface water by leachate from land disposal system?</li> </ul>	✓		Transfer stations will be designed with concrete flooring and provided with leachate management (onsite treatment or store and transfer to appropriate treatment facilities will be finalized during detailed design stage).
<ul style="list-style-type: none"> <li>land use conflicts?</li> </ul>		✓	Not anticipated. All lands to be used for all subprojects are owned by the government.
<ul style="list-style-type: none"> <li>pollution of surface and ground water from leachate coming from sanitary landfill sites or methane gas produced from decomposition of solid wastes in the absence of air, which could enter the aquifer or escape through soil fissures at places far from the landfill site?</li> </ul>		✓	Not applicable. The subproject will involve construction of transfer stations.
<ul style="list-style-type: none"> <li>inadequate buffer zone around landfill site to alleviate nuisances?</li> </ul>		✓	Not applicable. The subproject will involve construction of transfer stations. However, preliminary designs of the transfer stations incorporated buffer zones.
<ul style="list-style-type: none"> <li>road blocking and/or increased traffic during construction of facilities?</li> </ul>	✓		Anticipated during construction activities. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts. Construction contractors will be required to coordinate with the local traffic police and they will prepare Traffic Management Plan. This will be included in the Contractor's EMP.
<ul style="list-style-type: none"> <li>noise and dust from construction activities?</li> </ul>	✓		Baseline data on noise shows high ambient noise levels. No dust monitoring has been conducted but expected to be low level due to inherent high winds condition in the islands. The impact of increase in noise will be avoided by undertaking activities during day time when background noise is high. There are no works during night time. Noise-suppression gadgets may also be used. Dust emission can be avoided with the implementation of dust control measures such as sprinkling of water on sites and regular hauling of spoils.
<ul style="list-style-type: none"> <li>temporary silt runoff due to construction?</li> </ul>	✓		Run-off during construction will be more. However, impacts are temporary and short in duration. The EMP ensures measures are included to mitigate the impacts. Construction contractors will be prohibited from stockpiling loose materials along drain channels and will be required to immediately dispose any waste materials. Silt fences and traps to be used.
<ul style="list-style-type: none"> <li>hazards to public health due to inadequate management of landfill site caused by inadequate institutional and financial capabilities for the management of the landfill operation?</li> </ul>		✓	Not applicable. The Project will not cover the existing landfill in Thillafushi. However the Project will support capacity building support to WAMCO staff (including all eligible female staff) in waste collection, controlled dumpsite management, strategic planning, and disaster risk management (Output 3).
<ul style="list-style-type: none"> <li>emission of potentially toxic volatile organics from land disposal site?</li> </ul>		✓	Not applicable.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>surface and ground water pollution from leachate and methane gas migration?</li> </ul>	✓		<p>Waste in the transfer stations to be stored in containers with limited holding time.</p> <p>The transfer stations will be designed in such a way that leachate formed, especially during monsoon season, will not flow to receiving water bodies or seep to the ground.</p> <p>The operation will have a regular schedule of turnover of solid wastes to the landfill site. Hence, no methane gas formation is expected at these stations.</p>
<ul style="list-style-type: none"> <li>loss of deep-rooted vegetation (e.g. trees) from landfill gas?</li> </ul>		✓	Not applicable.
<ul style="list-style-type: none"> <li>explosion of toxic response from accumulated landfill gas in buildings?</li> </ul>		✓	Not applicable.
<ul style="list-style-type: none"> <li>contamination of air quality from incineration?</li> </ul>		✓	Not applicable. The subproject will not cover incineration.
<ul style="list-style-type: none"> <li>public health hazards from odor, smoke from fire, and diseases transmitted by flies, rodents, insects and birds, etc.?</li> </ul>	✓		<p>Likely. However, the EMP ensures good housekeeping measures are included to mitigate the impacts at all subproject sites.</p> <p>The Project will significantly reduce exposure of waste to pests and vectors of disease.</p> <p>Limited public access; reduced exposure of pests to waste. The operation of the transfer stations will ensure community health hazards are avoided with the adoption of WB EHS guidelines on SWM as indicated in the EMP.</p>
<ul style="list-style-type: none"> <li>health and safety hazards to workers from toxic gases and hazardous materials in the site?</li> </ul>	✓		The EMP ensures OHS measures are included following relevant WB EHS guidelines. Chemicals other than vehicle fuels will not be used during construction and operation activities. Fuels will be stored and handled properly as per EMP.
<ul style="list-style-type: none"> <li>large population influx during project construction and operation that causes increased burden on social infrastructure and services (such as water supply and sanitation systems)?</li> </ul>		✓	<p>Not anticipated. Population influx due to project construction and operation is minimal. Labor requirements will be sourced locally.</p> <p>Priority in employment will be given to local residents. Construction contractors will be required to provide workers camp with water supply and sanitation.</p>
<ul style="list-style-type: none"> <li>social conflicts if workers from other regions or countries are hired?</li> </ul>		✓	Labor requirements will be sourced locally.
<ul style="list-style-type: none"> <li>risks to community health and safety due to the transport, storage, and use and/or disposal of materials such as explosives, fuel and other chemicals during construction and operation?</li> </ul>	✓		The EMP ensures community health and safety measures are included following relevant WB EHS guidelines on waste management. Chemicals other than vehicle fuels will not be used during construction and operation activities. Fuels will be stored and handled properly following WB EHS guidelines as included in the EMP.

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>community safety risks due to both accidental and natural hazards, especially where the structural elements or components (e.g., landfill or incinerator) of the project are accessible to members of the affected community or where their failure could result in injury to the community throughout project construction, operation and decommissioning?</li> </ul>	✓		During construction and operation of the transfer stations, community health and safety risks will be managed by adopting the WB EHS guidelines as indicated in the EMP.

### A Checklist for Preliminary Climate Risk Screening

**Country/Project Title:** Greater Malé Environmental Improvement and Waste Management Project

**Sector :** Waste Management

**Subsector:** Water and urban infrastructure and services

**Division/Department:** South Asia Department / Urban Development and Water Division

Screening Questions		Score	Remarks <sup>a</sup>
<b>Location and Design of project</b>	Is siting and/or routing of the project (or its components) likely to be affected by climate conditions including extreme weather related events such as floods, droughts, storms, landslides?	1	All sites are located close to the coastline
	Would the project design (e.g. the clearance for bridges) need to consider any hydro-meteorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	1	Sea level rise and peak tide levels need to be considered in design
<b>Materials and Maintenance</b>	Would weather, current and likely future climate conditions (e.g. prevailing humidity level, temperature contrast between hot summer days and cold winter days, exposure to wind and humidity hydro-meteorological parameters likely affect the selection of project inputs over the life of project outputs (e.g. construction material)?	1	Design life of structures to take account of heat stress due to predicted temperature increases
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s) ?	0	
<b>Performance of project outputs</b>	Would weather/climate conditions, and related extreme events likely affect the performance (e.g. annual power production) of project output(s) (e.g. hydro-power generation facilities) throughout their design life time?	0	

<sup>a</sup> If possible, provide details on the sensitivity of project components to climate conditions, such as how climate parameters are considered in design standards for infrastructure components, how changes in key climate parameters and sea level might affect the siting/routing of project, the selection of construction material and/or scheduling, performances and/or the maintenance cost/scheduling of project outputs.

Options for answers and corresponding score are provided below:

Response	Score
Not Likely	0
Likely	1
Very Likely	2

Responses when added that provide a score of 0 will be considered low risk project. If adding all responses will result to a score of 1-4 and that no score of 2 was given to any single response, the project will be assigned a medium risk category. A total score of 5 or more (which include providing a score of 1 in all responses) or a 2 in any single response, will be categorized as high risk project.

**Result of Initial Screening (Low, Medium, High):** Medium

**Other Comments:** \_\_\_\_\_  
\_\_\_\_\_

**Prepared by:** \_\_\_\_\_

### Grievance Redress Mechanism Complaint Form

(To be available in local language, if any)

The Greater Malé Environmental Improvement and Waste Management Project welcomes complaints, suggestions, queries and comments regarding project implementation. We encourage persons with grievance to provide their name and contact information to enable us to get in touch with you for clarification and feedback.

Should you choose to include your personal details but want that information to remain confidential, please inform us by writing/typing **\*(CONFIDENTIAL)\*** above your name. Thank you.

<b>Date</b>		<b>Place of registration</b>			
<b>Contact Information/Personal Details</b>					
<b>Name</b>		<b>Gender</b>	<b>Male</b> <b>Female</b>	<b>Age</b>	
<b>Home Address</b>					
<b>Village / Town</b>					
<b>District</b>					
<b>Phone no.</b>					
<b>E-mail</b>					
<b>Complaint/Suggestion/Comment/Question Please provide the details (who, what, where and how) of your grievance below:</b> <b>If included as attachment/note/letter, please tick here:</b>					
<b>How do you want us to reach you for feedback or update on your comment/grievance?</b>					

#### FOR OFFICIAL USE ONLY

<b>Registered by: (Name of official registering grievance)</b>	
<b>If – then mode:</b> <input type="checkbox"/> <b>Note/Letter</b> <input type="checkbox"/> <b>E-mail</b> <input type="checkbox"/> <b>Verbal/Telephonic</b>	
<b>Reviewed by: (Names/Positions of Official(s) reviewing grievance)</b>	
<b>Action Taken:</b>	
<b>Whether Action Taken Disclosed:</b>	<input type="checkbox"/> <b>Yes</b> <input type="checkbox"/> <b>No</b>
<b>Means of Disclosure:</b>	

#### GRIVENCES RECORD AND ACTION TAKEN

Sr. No.	Date	Name and Contact No. of Complainer	Type of Complain	Place	Status of Redress	Remarks



## Template for Semi-Annual Environmental Monitoring Report

### Introduction

- Overall project description and objectives
- Environmental category as per ADB Safeguard Policy Statement, 2009
- Environmental category of each subproject as per national laws and regulations
- Project Safeguards Team

Name	Designation/Office	Email Address	Contact Number	Roles
1. PMU				
2. PIUs				
3. Consultants				

- Overall project and sub-project progress and status
- Description of subprojects (package-wise) and status of implementation (preliminary, detailed design, on-going construction, completed, and/or O&M stage)

Package Number	Components/List of Works	Contract Status (specify if under bidding or contract awarded)	Status of Implementation (Preliminary Design/Detailed Design/On-going Construction/Completed/O&M) <sup>1</sup>	If On-going Construction	
				%Physical Progress	Expected Completion Date

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<sup>1</sup> If on-going construction, include %physical progress and expected date of completion

**Compliance status with National/State/Local statutory environmental requirements<sup>2</sup>**

Package No.	Subproject Name	Statutory Environmental Requirements <sup>3</sup>	Status of Compliance <sup>4</sup>	Validity if obtained	Action Required	Specific Conditions that will require environmental monitoring as per Environment Clearance, Consent/Permit to Establish <sup>5</sup>

**Compliance status with environmental loan covenants**

No. (List schedule and paragraph number of Loan Agreement)	Covenant	Status of Compliance	Action Required

**Compliance status with the environmental management plan (refer to EMP TABLES in APPROVED IEE/S)**

- Confirm if IEE/s require contractors to submit site-specific EMP/construction EMPs. If not, describe the methodology of monitoring each package under implementation.

**Package-wise IEE Documentation Status**

Package Number	Final IEE based on Detailed Design				Site-specific EMP (or Construction EMP) approved by Project Director? (Yes/No)	Remarks
	Not yet due (detailed design not yet completed)	Submitted to ADB (Provide Date of Submission)	Disclosed on project website (Provide Link)	Final IEE provided to Contractor/s (Yes/No)		

- For each package, provide name/s and contact details of contractor/s' nodal person/s for environmental safeguards.

<sup>2</sup> All statutory clearance/s, no-objection certificates, permit/s, etc. should be obtained prior to award of contract/s. Attach as appendix all clearance obtained during the reporting period. If already reported, specify in the "remarks" column.

<sup>3</sup> Specify (environmental clearance? Permit/consent to establish? Forest clearance? Etc.)

<sup>4</sup> Specify if obtained, submitted and awaiting approval, application not yet submitted

<sup>5</sup> Example: Environmental Clearance requires ambient air quality monitoring, Forest Clearance/Tree-cutting Permit requires 2 trees for every tree, etc.

**Package-wise Contractor/s' Nodal Persons for Environmental Safeguards**

Package Name	Contractor	Nodal Person	Email Address	Contact Number

- With reference to approved EMP/site-specific EMP/construction EMP, complete the table below

**Summary of Environmental Monitoring Activities (for the Reporting Period)<sup>6</sup>**

Impacts (List from IEE)	Mitigation Measures (List from IEE)	Parameters Monitored (As a minimum those identified in the IEE should be monitored)	Method of Monitoring	Location of Monitoring	Date of Monitoring Conducted	Name of Person Who Conducted the Monitoring
<b>Design Phase</b>						
<b>Pre-Construction Phase</b>						
<b>Construction Phase</b>						
<b>Operational Phase</b>						

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<sup>6</sup> Attach Laboratory Results and Sampling Map/Locations

### Overall Compliance with CEMP/ EMP

No.	Sub-Project Name	EMP/ CEMP Part of Contract Documents (Y/N)	CEMP/ EMP Being Implemented (Y/N)	Status of Implementation (Excellent/ Satisfactory/ Partially Satisfactory/ Below Satisfactory)	Action Proposed and Additional Measures Required

### Approach and methodology for environmental monitoring of the project

- Briefly describe the approach and methodology used for environmental monitoring of each sub-project.

### Monitoring of environmental IMPACTS on PROJECT SURROUNDINGS (ambient air, water quality and noise levels)

- Discuss the general condition of surroundings at the project site, with consideration of the following, whichever are applicable:
  - Confirm if any dust was noted to escape the site boundaries and identify dust suppression techniques followed for site/s.
  - Identify if muddy water is escaping site boundaries or if muddy tracks are seen on adjacent roads.
  - Identify type of erosion and sediment control measures installed on site/s, condition of erosion and sediment control measures including if these are intact following heavy rain;
  - Identify designated areas for concrete works, chemical storage, construction materials, and refueling. Attach photographs of each area in the Appendix.
  - Confirm spill kits on site and site procedure for handling emergencies.
  - Identify any chemical stored on site and provide information on storage condition. Attach photograph.
  - Describe management of stockpiles (construction materials, excavated soils, spoils, etc.). Provide photographs.
  - Describe management of solid and liquid wastes on-site (quantity generated, transport, storage and disposal). Provide photographs.
  - Provide information on barricades, signages, and on-site boards. Provide photographs in the Appendix.
  - Indicate if there are any activities being under taken out of working hours and how that is being managed.
- Briefly discuss the basis for environmental parameters monitoring.
- Indicate type of environmental parameters to be monitored and identify the location.
- Indicate the method of monitoring and equipment used.
- Provide monitoring results and an analysis of results in relation to baseline data and statutory requirements.

*As a minimum the results should be presented as per the tables below.*

### Air Quality Results

Site No.	Date of Testing	Site Location	Parameters (Government Standards)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

Site No.	Date of Testing	Site Location	Parameters (Monitoring Results)		
			PM10 µg/m3	SO2 µg/m3	NO2 µg/m3

### Water Quality Results

Site No.	Date of Sampling	Site Location	Parameters (Government Standards)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

Site No.	Date of Sampling	Site Location	Parameters (Monitoring Results)					
			pH	Conductivity µS/cm	BOD mg/L	TSS mg/L	TN mg/L	TP mg/L

### Noise Quality Results

Site No.	Date of Testing	Site Location	LA <sub>eq</sub> (dBA) (Government Standard)	
			Day Time	Night Time

Site No.	Date of Testing	Site Location	LA <sub>eq</sub> (dBA) (Monitoring Results)	
			Day Time	Night Time

### Grievance Redress Mechanism

- Provide information on establishment of grievance redress mechanism and capacity of grievance redress committee to address project-related issues/complaints. Include as appendix Notification of the GRM (town-wise if applicable).

### **Complaints Received during the Reporting Period**

- Provide information on number, nature, and resolution of complaints received during reporting period. Attach records as per GRM in the approved IEE. Identify safeguards team member/s involved in the GRM process. Attach minutes of meetings (ensure English translation is provided).

### **SUMMARY OF KEY ISSUES AND REMEDIAL ACTIONS**

- Summary of follow up time-bound actions to be taken within a set timeframe.

### **APPENDIXES**

- Photos
- Summary of consultations
- Copies of environmental clearances and permits
- Sample of environmental site inspection report
- all supporting documents including signed monthly environmental site inspection reports prepared by consultants and/or contractors
- Others

**SAMPLE ENVIRONMENTAL SITE INSPECTION REPORT**

Project Name  
Contract Number

NAME: \_\_\_\_\_ DATE: \_\_\_\_\_  
TITLE: \_\_\_\_\_ DMA: \_\_\_\_\_  
LOCATION: \_\_\_\_\_ GROUP: \_\_\_\_\_

WEATHER CONDITION:

INITIAL SITE CONDITION: \_\_\_\_\_

CONCLUDING SITE CONDITION:

Satisfactory \_\_\_\_\_ Unsatisfactory \_\_\_\_\_ Incident \_\_\_\_\_ Resolved \_\_\_\_\_ Unresolved \_\_\_\_\_

INCIDENT:  
Nature of incident:

Intervention Steps:

Incident Issues

Resolution

Project Activity Stage	Survey	
	Design	
	Implementation	
	Pre-Commissioning	
	Guarantee Period	

**Inspection**

Emissions	Waste Minimization
Air Quality	Reuse and Recycling
Noise pollution	Dust and Litter Control
Hazardous Substances	Trees and Vegetation

Site Restored to Original Condition      Yes      ☐      No      ☐

Signature

**Sign off**

