Report and Recommendation of the President to the Board of Directors

Project Number: 51077-003
July 2020

Proposed Loan, Grant, Technical Assistance Grant, and Administration of Loan and Grant
Republic of Maldives: Greater Malé Waste-to-Energy Project

Asian Development Bank

CURRENCY EQUIVALENTS

(as of 7 July 2020)

Currency unit	–	Rufiyaa (Rf)
Rf1.00	=	$0.06
$1.00	=	Rf15.40

ABBREVIATIONS

3R	–	reduce-reuse-recycle
ADB	–	Asian Development Bank
AIIB	–	Asian Infrastructure Investment Bank
COVID-19	–	coronavirus disease
DBO	–	design–build–operate
EIA	–	environmental impact assessment
EIRR	–	economic internal rate of return
EMP	–	environmental management plan
EPA	–	Environmental Protection Agency
FMA	–	financial management assessment
ha	–	hectare
JFJCM		Japan Fund for the Joint Crediting Mechanism
MOE	–	Ministry of Environment
MOF	–	Ministry of Finance
MW	–	megawatt
O&M	–	operation and maintenance
PAM	–	project administration manual
PMU	–	project management unit
SWM	–	solid waste management
TA	–	technical assistance
tpd	–	tons per day
TRTA	–	transaction technical assistance
WTE	–	waste-to-energy

NOTE

In this report, "$" refers to United States dollars.

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CONTENTS

PROJECT AT A GLANCE

1. Basic Data

Project Number: 51077-003

Project Name	Greater Male Waste-to-Energy Project
Country	Maldives
Borrower	Government of Maldives
Country Economic Indicators	https://www.adb.org/Documents/LinkedDocs/?id=51077-003-CEI
Portfolio at a Glance	https://www.adb.org/Documents/LinkedDocs/?id=51077-003-PortAtaGlance
Department/Division	SARD/SAUW
Executing Agency	Ministry of Finance (formerly Ministry of Finance and Treasury)

2. Sector

	Subsector(s)	ADB Financing ($ million)
✓ **Water and other urban infrastructure and services**	Urban policy, institutional and capacity development	4.50
	Urban solid waste management	60.89
Energy	Renewable energy generation - biomass and waste	8.00
	Total	**73.39**

3. Operational Priorities

- ✓ Addressing remaining poverty and reducing inequalities
- ✓ Accelerating progress in gender equality
- ✓ Tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability
- ✓ Making cities more livable
- ✓ Strengthening governance and institutional capacity

Climate Change Information

GHG reductions (tons per annum)	40,000
Climate Change impact on the Project	High

ADB Financing

Adaptation ($ million)	7.11
Mitigation ($ million)	59.89

Cofinancing

Adaptation ($ million)	0.00
Mitigation ($ million)	49.50

Sustainable Development Goals

SDG 6.3
SDG 11.6
SDG 12.5
SDG 13.a

Gender Equity and Mainstreaming

Some gender elements (SGE) ✓

Poverty Targeting

Geographic Targeting ✓

4. Risk Categorization: Complex

5. Safeguard Categorization

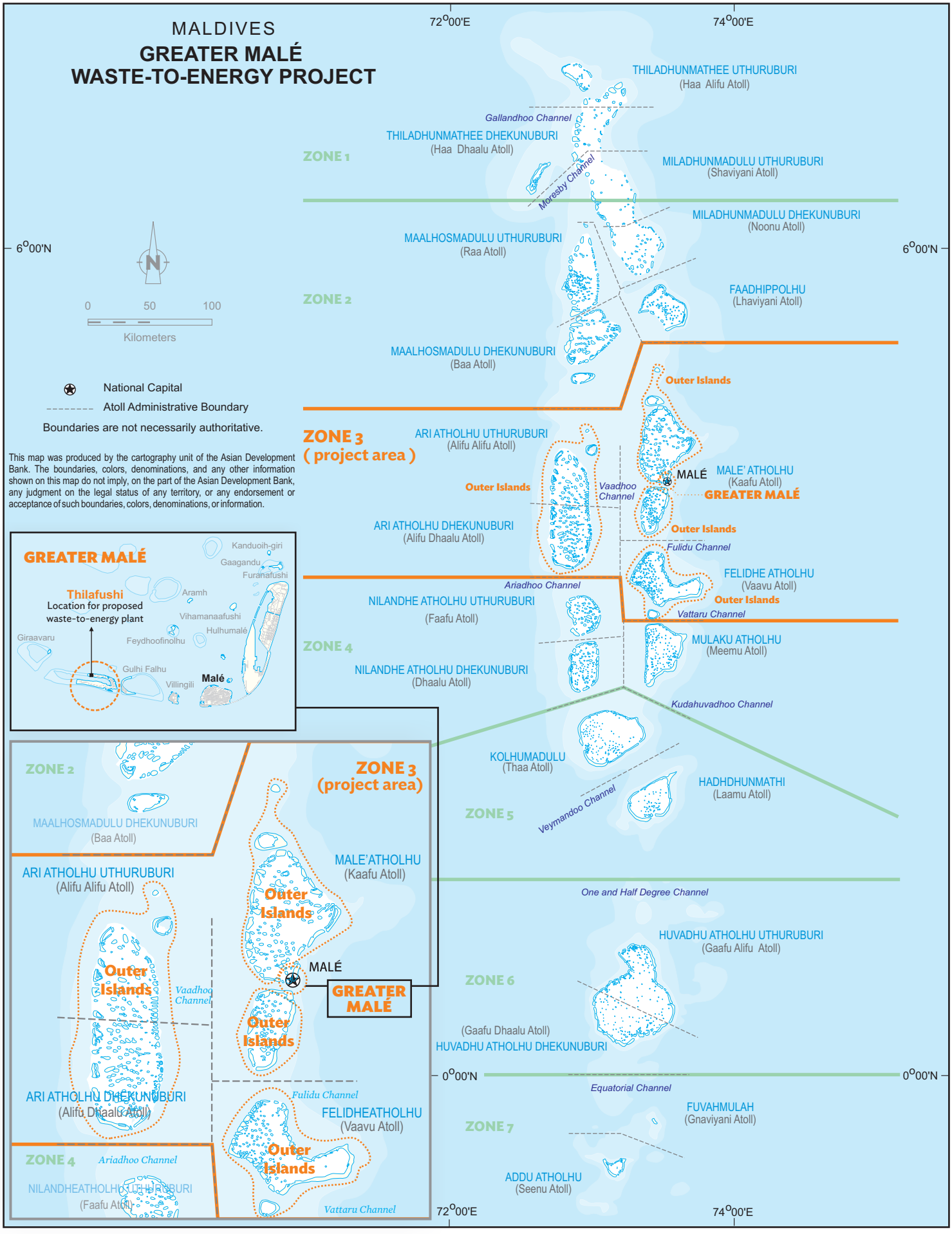
Environment: A **Involuntary Resettlement:** C **Indigenous Peoples:** C

6. Financing

Modality and Sources	Amount ($ million)
ADB	**73.39**
Sovereign Project grant: Asian Development Fund	35.18
Sovereign Project (Concessional Loan): Ordinary capital resources	38.21
Cofinancing	**50.00**
Asian Infrastructure Investment Bank - Project loan (Partial ADB Administration)	40.00
Japan Fund for the Joint Crediting Mechanism - Grant projects (Full ADB Administration)	10.00
Counterpart	**27.74**
Government	27.74
Total	**151.13**

Note: An attached technical assistance will be financed on a grant basis by the Technical Assistance Special Fund (TASF-6) in the amount of $500,000.

Currency of ADB Financing: US Dollar



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I. THE PROPOSAL

1. I submit for your approval the following report and recommendation on (i) a proposed loan; and (ii) a proposed grant, both to the Republic of Maldives for the Greater Malé Waste-to-Energy Project.[1] The report also describes (i) the proposed partial administration of a loan to be provided by the Asian Infrastructure Investment Bank (AIIB) for the project; (ii) the proposed administration of a grant to be provided by the Japan Fund for the Joint Crediting Mechanism (JFJCM); and (iii) proposed technical assistance (TA) for Supporting Capacity for Sustainable Waste-to-Energy Service Delivery, and if the Board approves the proposed loan and grant, I, acting under the authority delegated to me by the Board, approve the TA and administration of the loan and grant.

2. The project will establish a sustainable regional solid waste management (SWM) system for the Greater Malé region and its neighboring outer islands by (i) developing treatment (proven waste-to-energy [WTE] technology), recycling, and disposal infrastructure; (ii) strengthening institutional capacities for sustainable solid waste services delivery and environmental monitoring; and (iii) improving public awareness on WTE and reduce-reuse-recycle (3R). The project will be designed to reduce disaster risk and improve climate change resilience while creating a cleaner environment and decreasing greenhouse gas emissions.

II. THE PROJECT

A. Rationale

3. The Greater Malé region [2] and its neighboring outer islands suffer from severe environmental pollution and deteriorating livability because of inadequate collection and haphazard disposal of solid waste. The project area covers the Greater Malé region, and 32 inhabited outer islands and 86 tourist resorts within the Alifu Alifu Atoll, Alifu Dhaalu Atoll, Kaafu Atoll, and Vaavu Atoll, with a population of 295,000 (53% of Maldives' total population).[3] The lack of a sustainable system to manage the 836 tons per day (tpd) of solid waste generated in the project area (in 2019) results in waste spillage into the ocean, and open dumping and burning of garbage at the 10-hectare (ha) dump site on Thilafushi island established in 1992, which has no pollution control measures, creating a severe public health and environmental hazard.[4] Plumes of smoke visible from Malé, the international airport, and nearby resorts compromise air quality and pose a nuisance to residents and tourists, while leachate and plastics contaminate the surrounding marine environment. This poses a critical threat to tourism and fisheries, both of which rely heavily on the country's pristine environment and are cornerstones to Maldives' economy.[5]

4. **Existing waste collection, transfer, and disposal.** Waste Management Corporation Limited is the state-owned operator contracted for collecting waste in Malé, while in outer islands this is carried out by island councils. These institutions neither have sufficient capacity nor adequate equipment and infrastructure for efficient collection and transfer of waste, such as refuse bins, trucks, and formal transfer stations. Collected waste is transported to Thilafushi island

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[1] Asian Development Bank (ADB). 2019. *Country Operations Business Plan: Maldives, 2020–2022*. Manila.
[2] The Greater Malé region includes Malé, Hulhumalé, Villingili, and the industrial islands: Thilafushi and Gulhi Falhu.
[3] Government of Maldives, National Bureau of Statistics; and United Nations Population Fund. 2018. *Maldives Population Projections 2014–2054: Assumptions and Results Analysis*. Malé.
[4] Out of the total waste generated, about 300 tpd are suitable for incineration. The remaining quantity is mostly inert construction and demolition waste. Sector Assessment (Summary): Water Supply and Other Municipal Infrastructure Services (accessible from the list of linked documents in Appendix 2).
[5] Tourism is the largest and most rapidly expanding industry, accounting for 25% of gross domestic product (2018). As of 2014, one-quarter of the country's employment is in tourism and fisheries. ADB. 2019. *Maldives Economic Update 2019*. Manila.

in open vessels, resulting in significant spillage in the ocean. On Thilafushi island, waste is dumped with no treatment and often burned in the open. Construction and demolition waste, and end-of-life vehicles are not collected and processed separately.

5. **No treatment and disposal infrastructure.** There is no infrastructure to systematically treat and dispose the waste generated in the project area. This is a critical priority to improve public health and the environment. Given scarcity of land, there is a need to reduce volume of waste for final disposal. There are only 15 ha of land available for solid waste treatment and disposal, which the government had to reclaim in 2018 from the adjacent lagoon close to the Thilafushi island dump site because of insufficient space. Energy recovery from waste with electricity generation is an important opportunity given that the country is mostly powered by imported diesel, which has a high production cost ($0.30–$0.70 per kilowatt-hour) and high greenhouse gas emissions per unit of electricity.[6] Therefore, Maldives is vulnerable to oil price variations in the Asia and Pacific region (footnote 6).

6. **Climate and disaster risks.** Maldives is physically vulnerable to climate and disaster risks given its low elevation of 1.5 meters above sea level. The Indian Ocean tsunami in December 2004 dispersed about 290,000 cubic meters of waste from open dump sites on land, including municipal and hazardous waste.[7] Natural hazards such as extreme rainfall and severe storm surges pose risks to infrastructure and the continuity of service provision. As climate change is expected to exacerbate these hazards, it is necessary to protect systems through disaster- and climate-resilient project designs.[8]

7. **Policy framework and strategy for solid waste management.** The government's Strategic Action Plan, 2019–2023 recognizes SWM as the most visible and pressing environmental issue and details policy actions to promote waste as a valuable resource, including the establishment of regional waste management facilities and WTE.[9] The strategic action plan also prioritizes strengthening waste management in the Greater Malé region. The project is fully aligned with the strategic action plan and the National SWM Policy (2015)[10] and the Waste Management Regulation (No 2013/R-58), which outline key principles of SWM and environmental quality.[11] In 2019, the government established the Maldives Green Fund (MGF) to enhance investments in environmental improvement, including SWM.[12] A financing plan for operation and maintenance (O&M) services, including clear responsibilities, revenue enhancement measures, and fund flows, will need to be established to improve service sustainability. In terms of institutional arrangements, the Waste Management and Pollution Control Department of the Ministry of Environment (MOE) is mandated to provide safe waste disposal on all inhabited islands,

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[6] ADB. 2014. *Report and Recommendation of the President to the Board of Directors: Proposed Grant and Administration of Grant to the Republic of Maldives for the Preparing Outer Islands for Sustainable Energy Development Project*. Sector Assessment (Summary): Energy. Manila (accessible from the list of linked documents in Appendix 2).

[7] United Nations Environment Programme/United Nations Office for the Coordination of Humanitarian Affairs Joint Environment Unit. 2005. *Indian Ocean Earthquake-Tsunami of 26 December 2004: United Nations Disaster Assessment and Coordination—Rapid Environmental Assessment, Republic of Maldives*. Geneva.

[8] Climate Change Assessment (accessible from the list of linked documents in Appendix 2).

[9] Government of Maldives. 2019. *Strategic Action Plan, 2019–2023*. Malé.

[10] Government of Maldives, MOE. 2015. *National Solid Waste Management Policy for the Republic of Maldives*. Malé.

[11] Sector Assessment (Summary): Water Supply and Other Municipal Infrastructure Services (accessible from the list of linked documents in Appendix 2).

[12] The Maldives Green Fund (MGF) was established on 6 January 2019 as a trust fund under Public Finance Act (Law No. 3/2006). The fund's revenues are from a green tax, which is payable by tourists who stay in resorts, hotels, and tourist vessels at the rate of $6 per day of stay, and in guesthouses at the rate of $3 per day of stay. During 2019, the government received $59 million in green tax against total outflows of $21 million, resulting in a balance of $38 million. Government of Maldives, Ministry of Finance (MOF). 2019. *Green Fund Report: December 2019*. Malé.

while the Environmental Protection Agency (EPA) is responsible for regulatory activities for waste management and pollution prevention. Both institutions require better capacity to manage and monitor WTE operations. The MOE works closely with development partners to improve SWM, and requested support from the Asian Development Bank (ADB) because of its experience in the urban sector and SWM (footnote 11).

8. **Strategic approach.** The project will focus on solid waste treatment and disposal infrastructure as part of a phased approach to provide a full-fledged SWM service to the project area through two ADB projects. It will complement the ongoing Greater Malé Environmental Improvement and Waste Management Project, approved by ADB in 2018, which is assisting the government to (i) improve the upstream segment of the SWM chain, including systemic collection and containerized transfer; (ii) implement temporary measures, such as baling of municipal solid waste, as an adequate interim solution to stop open dumping and burning on Thilafushi island until a modern solid waste treatment and disposal facility is operational; (iii) treat and recover construction and demolition waste; and (iv) strengthen institutional capacity and public awareness for sustainable SWM service delivery.[13] ADB and the government agreed on this phased strategy to match the implementation and financing capacity of the government, and to improve project readiness of the complex WTE infrastructure (i.e., reclaim 15 ha of land, take advance procurement actions, and conduct an environmental impact assessment [EIA]) while implementing urgent measures. Implementation of the Greater Malé Environmental Improvement and Waste Management Project is on track as of 2020 Q1 validation. The collection and transfer system development and existing dump site improvement (under the ongoing project) are under implementation and expected to be completed by 2023, 1 year prior to the expected commissioning of the WTE plant.

9. **Private sector.** The private sector is expected to substantially contribute to the project through a design–build–operate (DBO) contract, which allocates technical risk to a private company and leverages its know-how for efficient design, construction, and O&M of WTE facilities. Private sector participation will be pivotal to bring the innovative solutions and efficiency required to address the complex challenges of providing SWM services in the project area, including logistic and resource constraints, and to sustain service delivery through a long-term contract. A build–own–transfer contract for SWM services in the project area was attempted in 2011 but canceled in 2014, as the conditions precedent were not met because of various issues, including technology selection and the contractor's slow progress. The government prefers to retain ownership and finance the project through public funds, also in view of high perceived financing and commercial risks because of the project's remote location, site constraints, and the low tariff for solid waste treatment services.

10. **Alignment with ADB priorities.** The project is aligned with the operational priorities (OP) of ADB Strategy 2030 as it will (i) enhance livability and environmental sustainability, including air quality and ocean health in the project area, as well as mitigate climate change (OPs 3 and 4); (ii) improve infrastructure resilience to disaster and climate risks (OP 3); and (iii) strengthen institutional capacity and standards for service delivery, and improve public awareness on sustainable waste management, targeting women (OPs 2, 4 and 6).[14] The project is also in line with ADB's Action Plan for Healthy Oceans and Sustainable Blue Economies, as it will reduce

[13] ADB. 2018. *Report and Recommendation of the President to the Board of Directors: Proposed Grant and Technical Assistance Grant and Administration of Grant to the Republic of Maldives for the Greater Malé Environmental Improvement and Waste Management Project*. Manila.

[14] Operational priorities: 2 (accelerating progress in gender equality), 3 (tackling climate change, building climate and disaster resilience, and enhancing environmental sustainability), 4 (making cities more livable), and 6 (strengthening governance and institutional capacity). ADB. 2018. *Strategy 2030: Achieving a Prosperous, Inclusive, Resilient, and Sustainable Asia and the Pacific*. Manila.

land-based sources of marine pollution, including plastics, through adopting proven high-level technology and strengthening institutions for improved SWM.[15]

11. **Lessons.** Lessons from implementation of previous projects in Maldives are incorporated in the project design. These are: (i) include long-term O&M in contracts to improve service continuity and sustainability; (ii) provide adequate preparation support to avoid downstream delays;[16] (iii) provide capacity support to project management unit (PMU) staff in project implementation, particularly in procurement, contract management, and safeguards;[17] (iv) complement infrastructure investments with strong capacity building for O&M; (v) promote strong community consultation and awareness on 3R, targeting women;[18] and (vi) incorporate disaster risk reduction and climate change-resilient measures into project designs.

12. **Project relevance amid coronavirus disease.** The project remains highly relevant in times of coronavirus disease (COVID-19) pandemic crisis considering its importance in limiting the spread of infectious diseases through the provision of sanitary treatment of solid waste, including medical waste. The project's positive impact on the environment and ocean health will contribute to the medium-term recovery of the tourism industry, which has been badly affected by the pandemic.

B. Project Description

13. The project is aligned with the following impact: waste as a valuable resource for income generation promoted (footnote 9). The project will have the following outcome: solid waste treatment and disposal services improved in the Greater Malé region and its outer islands.[19]

14. **Output 1: Disaster- and climate-resilient regional waste management facility developed.** This will include (i) a 500 tpd WTE plant with 15 years of O&M, including two treatment lines of 250 tpd each, a minimum 8-megawatt (MW) electricity surplus energy recovery facility, and an air pollution control system; and (ii) a landfill for safe disposal of hazardous air pollution control residues and non-marketable bottom ashes.[20] The facility (WTE plant and landfill) will be implemented through a DBO contract to a specialized firm, which will integrate a design–build phase and a 15-year operation (O&M) phase to improve sustainability of service delivery. The facility will be able to accommodate a third 250 tpd treatment line in the future, which will be required to respond to further demand increase. The incineration with electricity generation (WTE) technology minimizes land requirements and produces renewable energy, addressing the critical land and electricity constraints in Maldives. Recycling of marketable incineration bottom ash and metals will be promoted to further reduce landfill requirements and provide valuable materials for the construction and recycling industry. All facilities will adopt disaster- and climate-resilient features, such as raised floor elevations, flood-proof mechanical and electrical equipment and landfill cells, and enhanced drainage systems (footnote 8).

15. **Output 2: Institutional capacity in sustainable waste-to-energy service delivery and environmental monitoring, and public awareness on waste-to-energy and reduce-reuse-**

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[15] ADB. 2019. *Action Plan for Healthy Oceans and Sustainable Blue Economies*. Manila.
[16] Independent Evaluation Department. 2011. *Country Assistance Program Evaluation: The Maldives*. Manila: ADB.
[17] Independent Evaluation Department. 2012. *Learning Curves: Country Assistance Program Evaluation for the Maldives*. Manila: ADB.
[18] ADB. 2014. *Completion Report: Regional Development Project, Phase II—Environmental Infrastructure and Management in the Maldives*. Manila.
[19] The design and monitoring framework is in Appendix 1.
[20] The size of the facility will be able to treat combustible waste generated in the project area up to year 2032 (based on projections). This is assuming a worst-case scenario where waste 3R campaigns are not very successful.

recycle improved. This will include (i) preparing and implementing a capacity development plan to improve the capacity of MOE and EPA to supervise sustainable WTE service delivery; (ii) strengthening MOE and EPA staff capacity in supervising WTE operations, including monitoring WTE operational performance and environmental standards, and managing performance-based DBO contract; (iii) supporting enhanced financial sustainability for WTE O&M through implementation of an agreed O&M financing plan, including financial need forecasting and finalization of financing sources, a revenue enhancement plan, assignment of responsibilities, and fund flow arrangements for payment of O&M; and (iv) conducting public awareness campaigns on WTE and 3R benefits. The project will develop PMU and government capacity to prepare, monitor, and manage sustainable WTE through consulting services for contract management, monitoring, supervision, and institutional development.

C. Value Added by ADB

16. The project complements the ongoing Greater Malé Environmental Improvement and Waste Management Project and assists the government to provide a full-fledged SWM service to the project area through proven high-level waste treatment and disposal infrastructure, suitable for a small island country context and with positive benefits for ocean health. ADB took the leading role to mobilize the co-financing from AIIB and JFJCM to fully finance the project and maximize its development impact. The project is synergistic with other development partners' initiatives in the country that are supporting sustainable SWM in other areas of Maldives and strengthening SWM legislation (footnote 11). ADB is closely coordinating with the Islamic Development Bank, which is processing a loan with an indicative amount of $20.00 million for rehabilitating the Thilafushi island dump site (adjacent to the project site) and developing a transfer station in Hulhumalé.

17. ADB contributed to formulating critical components to project design, including (i) sustainable SWM strategies and solutions suitable for reducing ocean pollution in a small island context; (ii) adoption of the DBO modality to tap private sector know-how for efficient and innovative solutions, allocate risk properly, and ensure sustainability of service provision given the low capacity of the government to operate a complex WTE facility; (iii) incorporation of proven high-level technology and operational standards into the WTE DBO contract to ensure quality infrastructure,[21] value for money, and high technical and environmental performance during operations; (iv) strategic procurement initiatives, such as market sounding to understand WTE markets and ensure good competition in a small island country context; (v) capacity support for procurement, contract management, safeguards, and O&M to procure and manage complex WTE DBO contracts; (vi) development of an O&M financing plan to establish a clear fund flow arrangement and financing strategy for sustainable O&M; (vii) key designs to improve project resilience to climate and disaster risks (footnote 8); and (viii) community consultation and public awareness on WTE and 3R. With the support of ADB's High-Level Technology Fund, ADB (i) facilitated a knowledge exchange program with the Clean Authority of Tokyo for the Government of Maldives to learn how to adopt proven high-level technologies and service standards, and (ii) supported the preparation of a draft regulatory framework and standards for WTE in Maldives.

D. Summary Cost Estimates and Financing Plan

18. The project is estimated to cost $151.13 million (Table 1). Detailed cost estimates by expenditure category and by financier are included in the project administration manual (PAM).[22]

[21] Government of Japan, Ministry of Finance. 2019. *G20 Principles for Quality Infrastructure Investment*. Tokyo.
[22] Project Administration Manual (accessible from the list of linked documents in Appendix 2).

Table 1: Summary Cost Estimates ($ million)

Item	Amount[a]
A. Base Cost[b]	
1. Disaster- and climate-resilient regional waste management facility developed	121.69
2. Institutional capacity in sustainable WTE service delivery and environmental monitoring, and public awareness on WTE and 3R improved	6.11
Subtotal (A)	**127.80**
B. Contingencies[c]	**20.41**
C. Financing Charges During Implementation[d]	**2.92**
Total (A+B)	**151.13**

3R = reduce-reuse-recycle, SWM = solid waste management, WTE = waste-to-energy.

[a] Includes taxes and duties of $7.2 million to be financed from government resources by cash contribution.

[b] In mid-2019 prices as of 20 November 2019; exchange rate of $1.00 = Rf15.4 is used.

[c] Physical contingencies are computed at 10.0% for civil works and for equipment. Price contingencies are computed at 1.5%–1.6% on foreign exchange costs and 1.0%-1.5% on local currency costs; includes provision for potential exchange rate fluctuation under the assumption of a purchasing power parity exchange rate.

[d] Includes interest and commitment charges on all sources of financing. Interest during construction for the concessional Asian Development Bank loan has been computed at 1.00%. Interest during construction for the Asian Infrastructure Investment Bank (AIIB) loan has been computed at the 5-year United States dollar fixed swap rate plus a spread of 1.00% (inclusive of projected funding spread of 0.20%, risk premium of 0.10%, contractual lending spread of 0.50%, and maturity premium of 0.20%). Commitment charges for the AIIB sovereign loan are 0.25% per year to be charged on the undisbursed loan amount and one-time front-end fees of 0.25% on the AIIB loan amount. AIIB loan terms are subject to change as final terms and conditions will be determined at loan negotiation by AIIB in agreement with the government.

Source: Asian Development Bank estimates.

19. The government has requested (i) a grant not exceeding $35.18 million from ADB's Special Funds resources (Asian Development Fund); and (ii) a concessional loan of $38.21 million from ADB's ordinary capital resources to help finance the project. The loan will have a 32-year term, including a grace period of 8 years; an interest rate of 1.0% per year during the grace period and 1.5% per year thereafter; and such other terms and conditions set forth in the draft loan and grant agreements. The government has also requested a loan not exceeding $40.00 million from the AIIB to help finance the project. The AIIB loan will be partially administered by ADB. The AIIB loan's terms and conditions will be described in a loan agreement between AIIB and the government. The JFJCM will provide grant cofinancing equivalent to $10.00 million, to be administered by ADB.

20. The summary financing plan is in Table 2. ADB will finance the expenditures related to (i) the WTE DBO package (for the design and build phases only); (ii) consulting services for project management design and construction supervision, capacity building, and public awareness; (iii) incremental recurrent costs; and (iv) contingencies. The AIIB loan will finance expenditures related to the WTE DBO package (for the design and build phases only) and contingencies. The JFJCM will finance expenditures related to the WTE DBO package (for the design and build phases only), contingencies, and consulting services for the certification of greenhouse gases emission reduction from the WTE plant. ADB will fully administer the JFJCM grant and will partially administer the AIIB loan for environmental and social services, financial management services, investigative services, disbursement services, and procurement services. The government will contribute $27.74 million to the investment costs of the project to finance (i) taxes and duties; (ii) a portion of the costs related to works, equipment, consulting services, incremental recurrent costs, and contingencies; and (iii) financing charges. The government will also provide the grant and loan proceeds and counterpart funds to the implementing agency as a grant. The government has assured ADB that it will meet any financing shortfall to ensure that project outputs are fully achieved. The government will fully finance the 15-year O&M period of the WTE DBO package.

Table 2: Summary Financing Plan

Source	Amount ($ million)	Share of Total (%)
Asian Development Bank		
Special funds resources (Asian Development Fund grant)[a]	35.18	23.3
Ordinary capital resources (concessional loan)[a]	38.21	25.3
Japan Fund for the Joint Crediting Mechanism (grant)[b]	10.00	6.6
Asian Infrastructure Investment Bank (loan)	40.00	26.5
Government of Maldives	27.74	18.3
Total	**151.13**	**100.0**

[a] The Asian Development Fund 12 disaster risk reduction financing mechanism will finance $3.55 million of the Asian Development Fund grant and $3.55 million equivalent of the ordinary capital resources concessional loan.
[b] Administered by the Asian Development Bank.
Source: Asian Development Bank estimates.

21. Climate mitigation is estimated to cost $109.39 million and climate adaptation is estimated to cost $7.11 million. ADB will finance 54.75% of mitigation costs ($59.89 million), and 100% of adaptation costs. The entire financing for the WTE facility is considered for mitigation and only incremental costs for disaster and climate resilience are assumed as adaptation financing (footnote 8).

E. Implementation Arrangements

22. The project will follow the same implementation arrangements as the Greater Malé Environmental Improvement and Waste Management Project. The project steering committee will provide overall policy and strategic guidance to the project. The project technical committee will coordinate design and implementation issues. The implementing agency, through the PMU, will recruit consulting firms to support project management, supervision, capacity building, and community awareness. As the project is partially financed by ADB-administered cofinancing resources, universal procurement will apply.[23] The implementation arrangements are summarized in Table 3 and described in detail in the PAM (footnote 22).

Table 3: Implementation Arrangements

Aspects	Arrangements
Implementation period	September 2020–September 2026
Estimated completion date	30 September 2026
Estimated loan and grants closing date	31 March 2027
Management	
(i) Oversight bodies	Project steering committee The minister of environment or a senior official designated by the minister, MOE (chair) Representatives from: the MOF; Ministry of National Planning and Infrastructure; Ministry of Housing and Urban Development; WAMCO; Ministry of Tourism; Ministry of Health, Ministry of Gender, Family and Social Services; Local Government Authority, Environmental Protection Agency; STELCO; and Malé City Council Technical committee Project director, MOE (chair) Representatives from: the MOE, Ministry of Tourism, Ministry of Health, Local Government Authority, Ministry of Housing and Urban Development,

[23] ADB. 2013. *Blanket Waiver of Member Country Procurement Eligibility Restrictions in Cases of Cofinancing for Operations Financed from Asian Development Fund Resources.* Manila; and ADB. 2015. *Enhancing Operational Efficiency of the Asian Development Bank.* Manila.

Aspects	Arrangements		
	Malé City Council, Environmental Protection Agency, WAMCO, STELCO, Greater Malé Industrial Zone Limited, and two representatives from environmental nongovernment organization		
(ii) Executing agency	MOF		
(iii) Implementing agency	MOE		
(iv) Implementation unit	Project management unit at the MOE's Waste Management and Pollution Control Department (eight staff)		
Procurement	Open competitive bidding	1 contract	$121.69 million[a]
Consulting services	Quality- and cost-based selection (90:10)	271 person-months	$4.71 million
	Individual consultant selection	8 person-months	$0.18 million
Advance contracting	Advance contracting will be applied for DBO and consultant packages.		
Disbursement	The loan and grant proceeds will be disbursed following ADB's *Loan Disbursement Handbook* (2017, as amended from time to time) and detailed arrangements agreed between the government and ADB.		

ADB = Asian Development Bank, DBO = design–build–operate, MOE = Ministry of Environment, MOF = Ministry of Finance, STELCO = State Electric Company Limited, WAMCO = Waste Management Corporation Limited.

[a] Includes only design and build costs, financed by the project during implementation. Total contract (design, build and operate) value is estimated at $271.69 million, which includes $150.00 million for 15 years operation and maintenance costs, funded by the government.

Source: ADB.

III. ATTACHED TECHNICAL ASSISTANCE

23. The transaction technical assistance (TA) attached to the project will (i) strengthen the institutional capacity of the MOE and EPA to supervise WTE service delivery; (ii) support improvement of financial sustainability for WTE service delivery; and (iii) provide implementation support to the PMU in contract management, performance monitoring, compliance with safeguards requirements, and financial management during the design and build period (of the WTE DBO contract). The TA is estimated to cost $525,000, of which $500,000 will be financed on a grant basis by ADB's Technical Assistance Special Fund (TASF 6).[24] The government will provide counterpart support in the form of staff, office space, and other in-kind contributions. The MOF will be the executing agency and the MOE will be the implementing agency for the TA, which will be implemented over 4.5 years.

IV. DUE DILIGENCE

A. Technical

24. Technical due diligence included a comprehensive review of the project, comprising feasibility studies, preliminary DBO designs and suggested technologies, cost estimates, and site investigations. Technical aspects of the project were appraised based on (i) rationale and relevance, benefits, proposed designs, ease, and sustainability of implementation and operations; (ii) technical alternatives and their viability (the MOE evaluated a range of treatment technologies to choose the best practicable environmental option and promote service continuity); (iii) the life cycle costs (including capital and operating costs) and achievable cost savings (including climate- and disaster-resilient measures); (iv) minimization of adverse environmental and social impacts; and (v) optimization of timelines for implementation through high project readiness. The project design is robust and adequately addresses the key solid waste treatment and disposal issues facing the project area, positively impacting ocean health. The project design, including cost estimates and the implementation schedule, accommodates possible delays or cost increases because of the impact of COVID-19 pandemic on supply chains.

[24] Attached Technical Assistance Report (accessible from the list of linked documents in Appendix 2).

B. Economic and Financial Viability

25. **Economic analysis.** The economic analysis evaluated the economic feasibility of interventions proposed under the project. The economic analysis shows the project to be economically viable, with a calculated economic internal rate of return (EIRR) of 17.8%, which exceeds the economic opportunity cost of capital of 9%. The economic viability of this project will increase further if unquantifiable benefits, such as environmental improvements, are included in the analysis. The project's EIRR is higher than the economic opportunity cost of capital for all adverse sensitivity scenarios considered for the analysis, including a worst-case scenario where there is no overhead connection to Gulhi Falhu island (for full electricity utilization), and the grid energy demand on Thilafushi island remains 2 MW in 2025 (an EIRR of 10.8%), which is very conservative.[25] Construction of the WTE plant along with strengthening of institutional capacity and community awareness on sustainable waste management will benefit about 350,000 people from 2026. The estimated poverty impact ratio is 32.6%.[26]

26. **Financial analysis.** Financial analysis of the project was conducted as per ADB's guidelines.[27] The project is expected to substantially cover (96%) O&M costs through different revenue sources (sales of electricity, metals, and bottom ash, and tipping fee from resort waste). The government is committed to cover any shortfalls in O&M costs. The WTE plant will have four different sources of revenue: (i) proceeds from sales of electricity,[28] (ii) proceeds from sales of metals, (iii) proceeds from sales of incineration bottom ash, and (iv) tipping fees from resort waste delivered to Thilafushi island. The government-owned State Electric Company Limited plans to purchase electricity, and the construction and recycling industries are potential markets for bottom ash and metals. Estimated annual revenue from the sale of different by-products from the WTE plant and tipping fees from resort waste will cover a substantial part of the annual O&M requirements under the DBO contract (96% per annum on average). In the worst-case scenario (para. 25), the O&M cost recovery will decrease to 43% per annum on average. Potential budget shortfalls to pay any O&M gap pose a substantial financial sustainability risk. To address this risk, the government (i) will cover any O&M shortfall either through funds from the MGF (footnote 12) or other budgetary allocations; and (ii) has agreed to an O&M financing plan (para. 15), which will be finalized 1 year before commencement of O&M with support from the project. In the medium to long term, the MOE is also committed to moving toward a full O&M cost recovery and polluters-pay approach, and is planning to collect a tipping (treatment) fee for waste delivered to the WTE facility, which is currently not in place (except for resorts delivering waste to Thilafushi island). Although a revenue deficit was recorded each year from 2014 to 2019, the Government of Maldives is taking adequate steps to reduce the deficit through fiscal regulatory measures. Also, the increasing budget allocation to environmental protection, the introduction of a green tax, and the establishment of the MGF, which all occurred during 2014–2019, underline the government's commitment to the sustainability of SWM projects.

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[25] An overhead connection to Gulhi Falhu island (the nearest island, at a distance 300 meters) is planned to fully utilize energy from the WTE plant as the base case. Current grid demand on Thilafushi island is 2 MW, but total power demand on the island is more than 4 MW, as most industries have private diesel generators. Grid demand on Thilafushi island is expected to grow considerably with expansion of the power grid and planned developments on the island. Government of Maldives, MOE. 2020. *Malé Region Integrated Power System Note*. Unpublished.

[26] Economic Analysis and Financial Analysis (accessible from the list of linked documents in Appendix 2).

[27] ADB. 2015. *Financial Management Assessment Technical Guidance Note*. Manila; and ADB. 2019. *Financial Analysis and Evaluation Technical Guidance Note*. Manila.

[28] The government will confirm through a memorandum of understanding between the MOF, MOE, and State Electric Company Limited that all surplus electricity from the WTE plant will be sold at a minimum price of $0.10 per kilowatt-hour in line with current market prices (conservative assumption).

C. Sustainability

27. Solid waste treatment and disposal services established under the project will be maintained through a long-term O&M phase under the DBO contract with a specialized WTE operator, which will also design and build the facilities. The contract has 12 measurable operational performance guarantees, including service quality, efficiency, environmental standards, and damages, as effective leverage mechanisms for compliance. The MOE and EPA will supervise O&M performance, as they are the most suitable institutions with technical skills and experience in SWM projects and environmental monitoring. The MOE will take over the WTE plant after the 15-year O&M period. The project will also strengthen the monitoring and contract management capacity of the MOE and EPA, which is necessary because of the complexity of the WTE plant and its operations. Economic and financial sustainability will be ensured through the sale of electricity, metals, and bottom ash from the WTE plant; collection of a resort waste tipping fee; and government's transfers to cover any O&M shortfall and plan to enhance O&M cost recovery over the medium to long term (para. 26). If there is any indication that full energy utilization is unlikely at the time of WTE facility commissioning, other options to utilize energy, including desalination and hydrogen production, will be further explored to improve project benefits and sustainability. Effective SWM treatment services established under the project will minimize pollution and decrease the use of natural resources, thereby improving the environment, especially ocean health, with substantial spillovers to the tourism and fishery sectors that will help their recovery following the COVID-19 pandemic (footnote 5).

D. Governance

28. **Financial management.** A financial management assessment (FMA) was conducted in accordance with ADB guidelines (footnote 27). The FMA considered the financial management capacity of the MOE and its PMU, and covered the areas of fund flow arrangements, staffing, budgeting, accounting and financial reporting systems, internal control procedures, financial information systems, and internal and external auditing arrangements. The FMA found that the MOE and its PMU have adequate financial management capacity to (i) record the required financial transactions, (ii) provide reliable annual financial statements and audit reports in a timely manner, and (iii) safeguard the financial assets. The PMU is implementing the Greater Malé Environmental Improvement and Waste Management Project, and the first audit report was unqualified and submitted on time. However, the FMA identified the following risks: (i) insufficient staff in the PMU accounts section to handle multiple projects simultaneously, (ii) PMU accounts section staff lacks training in ADB procedures and systems, (iii) complex financing structure with several financiers, (iv) absence of an effective internal audit function, (v) insufficient interim financial analysis and reporting, and (vi) project transactions are not recorded using proper accounting software. The assessed pre-mitigation financial management risk is *moderate*.

29. These risks will be mitigated through an agreed action plan involving (i) appointing additional financial staff or an account officer to support the PMU in handling the additional workload during the period when implementation of the Greater Malé Environmental Improvement and Waste Management Project, and implementation of the Greater Malé Waste-to-Energy Project overlap; (ii) providing training on ADB's financial management requirements, disbursement procedures, and systems; (iii) including comprehensive financial information in the quarterly project progress reports; (iv) strengthening the MOE's internal audit function; and (v) procuring accounting software for the PMU to use. The MOE will maintain separate books of accounts for the project following the International Public Sector Accounting Standards under the cash basis of accounting, and the project financial statements will be audited annually by the Auditor General's Office in accordance with International Standards on Auditing.

30. **Procurement.** Procurement of civil works and goods, including the DBO contract scope and consulting services, will be undertaken in conformity with the ADB Procurement Policy (2017, as amended from time to time) and the Procurement Regulations for ADB Borrowers (2017, as amended from time to time). A procurement capacity assessment concluded that the overall procurement risk for the project is *moderate*. The MOF and MOE have extensive experience in procurement of works under ADB-financed projects and those of other development partners.

31. A DBO contract for the WTE plant, including 15 years of O&M service, was selected as offering the best fit for the project's objectives. The MOE, supported by ADB, conducted a market engagement to assess interest, and the feedback was incorporated into the bidding document, increasing the probability of optimal competition. The evaluation criteria adopted assesses life cycle costs of the WTE plant, including the guaranteed energy generation, and the contract conditions include various environmental performance guarantees. The strategic integration of these key aspects contributes to achieving value for money.

32. **Anticorruption measures.** ADB's Anticorruption Policy (1998, as amended to date) was explained to and discussed with the government (and the MOF and MOE). The specific policy requirements and supplementary measures are described in the PAM (footnote 22). Based on the risk assessments, some of the mitigation measures incorporated in the project design aim to (i) establish a mechanism for regular voluntary disclosure of relevant information; (ii) develop and update a website to enhance transparency in project implementation, procurement, and safeguards; and (iii) establish a grievance redress mechanism to provide effective resolutions to grievances, if any.

E. Poverty, Social, and Gender

33. In 2016, poverty in Maldives was estimated at 8.2%, with poverty levels in the project area of 1.7% in Malé city and Vaavu Atoll; 8.0% in Alifu Dhaalu Atoll; 15.7% in Kaafu Atoll; and 16.5% in Alifu Alifu Atoll.[29] The project includes improved waste management benefiting poor outer island communities. The project will result in a cleaner environment, positively impacting fishing and tourism-based livelihoods, on which many of the poor depend.

34. **Gender.** The project is classified as having *some gender elements*. The design and monitoring framework (Appendix 1) include indicators related to the training of eligible staff and the generation of public awareness with some gender elements. In addition, the project design will ensure the provision of male, female, and all-gender and barrier-free toilets at the WTE plant and other project facilities, and this will be a contractual requirement in the DBO contract. No separate gender action plan has been prepared.

F. Safeguards

35. In compliance with ADB's Safeguard Policy Statement (2009), the project's safeguard categories are as follows.[30]

36. **Environment (category A).** The draft EIA, including an environmental management plan (EMP), was disclosed on ADB's website on 24 December 2019. The construction and operation of a large WTE facility has potential significant adverse impacts that may affect an area larger than the sites or facilities subject to physical works. The findings of the EIA are as follows: (i) the project will result in significant environmental benefits because open dumping and burning of solid waste will be stopped in the project area; (ii) during construction, the project will not have

[29] The national poverty line is Rf74 per day. Government of Maldives, National Bureau of Statistics. 2016. *Household Income & Expenditure Survey 2016.* Malé.

[30] ADB. Safeguard Categories.

significant adverse environmental impacts, and potential adverse impacts are manageable through the effective implementation of the EMP; (iii) during operations, potential impacts are on ambient air quality, marine water quality, noise, and occupational and community health and safety. However, with the performance guarantees embedded in the DBO contract, significant impacts can be avoided, and residual impacts can be mitigated by measures specified in the EMP; and (iv) the project will have no social impacts pertaining to land loss, land fragmentation, physical displacement, loss of income, loss of productive land, potential income loss for fishers, and prevention of fishing-related activities and fishing routes.[31]

37. The MOE conducted public consultations from 2017 to 2019 with local communities, government authorities, and nongovernment organizations (ADB participated as observer to two consultations); their feedback was considered during project design.[32] The EPA provided environmental clearance in January 2020 adopting the conditions described in the EIA. A grievance redress mechanism was established for the Greater Malé Environmental Improvement and Waste Management Project and the PMU notified the public that the same mechanism will be used for the project. The project will ensure that members of the grievance redress committee, the PMU, and the contractor will be provided with trainings to address project-related grievances. The PMU has a dedicated environment officer and will receive capacity support from consultants to ensure sufficient monitoring and management of environmental impacts. The EMP will be part of the DBO contract for WTE, giving contractor responsibility and resources for implementation, under the oversight of the PMU. The PMU will retain external environmental experts to monitor the implementation of the project's EMP and compliance with ADB's Safeguard Policy Statement and conditions of the environmental clearance.

38. **Involuntary resettlement (category C).** The MOE prepared a draft due diligence report, which found no permanent or temporary resettlement impacts resulting from the project, as all works are proposed within the available government land reclaimed on Thilafushi island. A field visit to the project site and stakeholder consultations confirmed the findings reported in the draft due diligence report.[33]

39. **Indigenous peoples (category C).** The project is not expected to have impacts on indigenous peoples. Project due diligence confirmed that there are no indigenous peoples present at or around the project site.

G. Summary of Risk Assessment and Risk Management Plan

40. Significant risks and mitigating measures are summarized in Table 4 and described in detail in the risk assessment and risk management plan.[34] The FMA in the PAM (footnote 22) outlines other detailed risks and mitigation measures related to financial management.

Table 4: Summary of Risks and Mitigating Measures

Risks	Mitigation Measures
Logistics, sourcing challenges, and price surges of materials beyond projections due to remote context and COVID-19 pandemic result in cost overruns and delays in project completion.	A longer implementation period will accommodate possible project delays, including those caused by COVID-19 pandemic and its impacts on global supply chains. The project cost incorporates sufficient contingencies to cover cost overruns.

[31] Environmental Impact Assessment (accessible from the list of linked documents in Appendix 2).
[32] Specific discussions and documentation of consultation activities are included in the EIA.
[33] Due Diligence Report: Thilafushi Island (accessible from the list of linked documents in Appendix 2).
[34] Risk Assessment and Risk Management Plan (accessible from the list of linked documents in Appendix 2).

Risks	Mitigation Measures
Poor O&M performance of the WTE contractor results in poor or disruption of services and/or higher cost.	The DBO contract has measurable O&M performance guarantees and damages as leverage mechanisms for contractor performance. Capacity building support through project management, design and supervision, and technical assistance consultants will strengthen MOE and EPA capacity to monitor O&M performance and manage the DBO contract effectively.
Budget shortfalls or slow allocation delay payments to the DBO contractor during the O&M period, causing interruption of solid waste treatment (WTE) service.	The MOF and MOE agreed to a financing plan for O&M payment, which will be finalized 1 year before the start of the O&M period. Continuous policy dialogue with the government will be conducted for revision of tariffs or the green tax to fully cover O&M costs.
Surplus electricity from WTE plant is not fully utilized and unsold, lowering economic, financial, and environmental benefits.	If there is an indication that full energy utilization is unlikely at the time of WTE facility commissioning, other options to utilize the energy, such as hydrogen production, will be explored, including potential support from the Asian Development Bank.

DBO = design–build–operate, EPA = Environmental Protection Agency MOE = Ministry of Environment, MOF = Ministry of Finance, O&M = operation and maintenance, WTE = waste-to-energy.
Source: Asian Development Bank.

V. ASSURANCES

41. The government and MOF have assured ADB that implementation of the project shall conform to all applicable ADB policies, including those concerning anticorruption measures, safeguards, gender, procurement, consulting services, financial management, and disbursement as described in detail in the PAM, and loan and grant documents.

42. The government and MOF have agreed with ADB on certain covenants for the project, which are set forth in the draft loan and grant agreements.

VI. RECOMMENDATION

43. I am satisfied that the proposed loan and grant would comply with the Articles of Agreement of the Asian Development Bank (ADB) and recommend that the Board approve:

(i) the loan of $38,210,000 to the Republic of Maldives for the Greater Malé Waste-to-Energy Project, from ADB's ordinary capital resources, in concessional terms, with an interest charge at the rate of 1.0% per year during the grace period and 1.5% per year thereafter; for a term of 32 years, including a grace period of 8 years; and such other terms and conditions as are substantially in accordance with those set forth in the draft loan agreement presented to the Board; and

(ii) the grant not exceeding $35,180,000 to the Republic of Maldives from ADB's Special Funds resources (Asian Development Fund) for the Greater Malé Waste-to-Energy Project, on terms and conditions that are substantially in accordance with those set forth in the draft grant agreement presented to the Board;

Masatsugu Asakawa
President

21 July 2020

DESIGN AND MONITORING FRAMEWORK

Impact the Project is Aligned with

Waste as a valuable resource for income generation promoted (Strategic Action Plan, 2019–2023)[a]

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
Outcome Solid waste treatment and disposal services in the Greater Malé region and its outer islands improved[b]	By 2027: a. At least 80% of combustible municipal and commercial solid waste in the project area[b] treated, with residuals safely disposed or recycled[c] (2020 baseline: 0) (TI 3.3.2 and 4.3.1) b. Greenhouse gas emissions reduced by about 28,000 tons of CO_2 equivalent per annum[d] (2020 baseline: 0) (RFI 3.1) c. At least 50,000 megawatt-hours of electricity per year (of which 50% is renewable energy)[e] generated from the WTE plant (2020 baseline: 0) (TI 3.1.4)	a. MOE annual reports and DBO contractor reports b–c. State Electric Company Limited annual electricity wholesale purchase report and joint crediting mechanism report	Surplus electricity from WTE plant is not fully utilized and unsold, lowering economic, financial, and environmental benefits. Budget shortfalls or slow allocation delay payments to the DBO contractor during the O&M period, causing interruption of solid waste treatment (WTE) service.
Outputs 1. Disaster- and climate-resilient regional waste management facility developed	By 2025 1a. 500 tpd WTE plant[f] with 15-year O&M contract[g], designed with disaster- and climate-resilient measures[h], established and operational (2020 baseline: 0) (TI 3.3.2 and 4.1.2) 1b. Landfill for safe disposal of WTE air pollution control residues and non-marketable bottom ashes[g], of at least 500,000 m^3 capacity, with disaster- and climate-resilient measures[h], operational (2020 baseline: 0) (TI 3.3.1 and 4.1.2)	1a–b. Project management consultant's annual report; and quarterly progress reports	Logistics, sourcing challenges, and price surges of materials beyond projections due to remote context and COVID-19 pandemic result in cost overruns and delays in project completion.

Results Chain	Performance Indicators with Targets and Baselines	Data Sources and Reporting Mechanisms	Risks
2. Institutional capacity in sustainable WTE service delivery and environmental monitoring, and public awareness on WTE and 3R improved	By 2026 2a. MOE and EPA capacity improvement plan for supervising sustainable WTE service delivery finalized and implemented[i] (2020 baseline: Not applicable) (RFI 6.2) 2b. At least 10 eligible MOE and EPA staff, including at least 70% eligible women staff, reported improved skills in supervising sustainable WTE operations[i] (2020 baseline: 0) (TI 6.1.1) 2c. O&M financing plan for sustainable WTE services finalized and approved[i] (2020 baseline: Not applicable) 2d. At least 2,000 people in the Greater Malé region and its outer islands, at least 70% of whom are women, reported improved awareness on WTE and 3R (2020 baseline: 0) (TI 4.3.1)	2a. and 2c. Copy of approved plans, quarterly progress reports 2b. and 2d. Pre- and post-training assessment	

Key Activities with Milestones

1. Disaster- and climate-resilient regional waste management facility developed

1.1 Award DBO contract for WTE facility, including WTE plant and landfill (January 2021)
1.2 Commission the WTE facility and start O&M period (December 2024)

2. Institutional capacity in sustainable WTE service delivery and environmental monitoring, and public awareness on WTE and 3R improved

2.1 Mobilize project management, design, and construction supervision consultant (December 2020)
2.2 Mobilize public awareness and TA consultants (March 2021)
2.3 Finalize and approve O&M financing plan for sustainable WTE services (December 2023)
2.4 Conduct institutional capacity assessment, develop improvement plan, and conduct capacity building activities for the MOE and EPA to improve supervision of WTE operations (November 2024)
2.5 Conduct public awareness activities on WTE and 3R (December 2025)
2.6 Provide on-the-job training (during the WTE operation service period) to the MOE and EPA in monitoring WTE operations (May 2026)

Inputs

ADB
- Asian Development Fund: $35.18 million (grant)
- Concessional ordinary capital resources lending: $38.21 million (loan)
- Technical Assistance Special Fund (TASF 6): $500,000

Asian Infrastructure Investment Bank: $40.00 million (loan)
Japan Fund for the Joint Crediting Mechanism: $10.00 million (grant)

Government of Maldives: $27.74 million

3R = reduce-, reuse-, and recycle, ADB = Asian Development Bank, COVID-19 = coronavirus disease, CO_2-eq = carbon dioxide equivalent, DBO = design–, build–, operate, EPA = Environmental Protection Agency, m^3 = cubic meter, MOE = Ministry of Environment, O&M = operation and maintenance, RFI = results framework indicator, TA = technical assistance, TI = tracking indicators, tpd = tons per day, WTE = waste-to-energy.

[a] Government of Maldives. 2019. *Strategic Action Plan, 2019–2023*. Malé.

[b] The project area covers the Greater Malé region, and 32 inhabited outer islands and 86 tourist resorts within the Alifu Alifu Atoll, Alifu Dhaalu Atoll, Kaafu Atoll, and Vaavu Atoll.

[c] Air pollution control residues are safely disposed in hazardous landfill. Incineration bottom ashes are either recycled and sold to the construction or recycling industry, or disposed to landfill.

[d] In the first year of operation, annual greenhouse gas emissions reduction ($tCO_{2\text{-eq}}$/year) is estimated to be 28,000 $tCO_{2\text{-eq}}$/year due start up period of the plant. Greenhouse gas emission offset by the WTE plant will increase over the years of operations and estimated to amount to 40,000 $tCO_{2\text{-eq}}$/year on average over 20 years of operations.

[e] According to *European Union renewable energy directive (2009/28/EC),* the biodegradable fraction of municipal and industrial waste is considered biomass, and is thus a renewable energy source. On the average, the energy output from WTE plants is about 50% renewable.

[f] Includes two treatment lines of 250 tons-per-day each, a minimum 8-megawatt (MW) electricity surplus energy recovery facility, and an air pollution control system

[g] Implemented through a DBO contract, which will include a design and build phase, and a 15-year O&M phase. ADB will finance the design and build phase. The government will finance the full cost of the O&M phase. The DBO contract includes the waste-to-energy plant (1a) and landfill for disposal of WTE APC residues and non-marketable bottom ashes (1b).

[h] These include: (i) elevating base floor to 2.2 m of critical structures and facilities, (ii) enhancing capacity of drainage systems; (iii) enhancing stability and impermeability of landfill berms; (iv) flood-proofing critical mechanical and electrical systems and establishing redundancy; (v) protecting stormwater throughout pumps and backflow inverters; (vi) protecting key civil structures against buoyancy; and (vii) strengthening critical and elevated structures to withstand Category 2 cyclone and intensity V Modified Mercalli Intensity earthquake scale.

[i] To be supported under attached TA.

Contribution to the ADB Results Framework:

RFI 3.1: Total annual greenhouse gas emissions reduction (tons of CO_2 equivalent per $tCO_{2\text{-eq}}$/year). Target: 40,000 tons of CO_2 equivalent per $tCO_{2\text{-eq}}$/year on average over 20 years of operations. In the first year of operations this will be 28,000 tons of CO_2 equivalent per $tCO_{2\text{-eq}}$/year.

TI 3.1.4: Installed renewable energy capacity (MW). Target: 4 MW. Capacity of WTE plant is 8MW, of which 50% is renewable.

TI 3.3.1: Pollution control- enhancing infrastructure assets established or improved (number). Target: 1.

TI 3.3.2: Solutions to enhance pollution control and resource efficiency implemented (number). Target: 1.

TI 4.1.2: Urban infrastructure assets established or improved (number). Target: 2.

TI 4.3.1: Solutions to enhance urban environment implemented (number). Target: 2.

TI 6.1.1: Government officials with increased capacity to design, implement, monitor, and evaluate relevant measures (number) Target: 10 people.

RFI 6.2: Entities with improved service delivery (number). Target: 2.

Source: Asian Development Bank.

LIST OF LINKED DOCUMENTS
http://www.adb.org/Documents/RRPs/?id=51077-003-3

1. Loan Agreement: Ordinary Operations (Concessional)
2. Grant Agreement: Externally Financed
3. Grant Agreement: Special Operations
4. Sector Assessment (Summary): Water and Other Urban Infrastructure and Services
5. Project Administration Manual
6. Financial Analysis
7. Economic Analysis
8. Summary Poverty Reduction and Social Strategy
9. Risk Assessment and Risk Management Plan
10. Attached Technical Assistance Report
11. Climate Change Assessment
12. Environmental Impact Assessment
13. Land Acquisition and Due Diligence Report: Regional Waste Management Facility at Thilafushi Island

Supplementary Document

14. Financial Management Assessment