

# Initial Environmental Examination

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## Maldives: Enhancing Climate Resilience and Food Security Project

Prepared by the Ministry of Climate Change, Environment and Energy and endorsed by the Ministry of Finance for the Asian Development Bank (ADB).

## TABLE OF CONTENTS

List of Tables .....	iii
List of Figures .....	iv
Abbreviations .....	vi
Weights and Measures .....	vi
Glossary.....	vii
Executive Summary .....	ix
I. Introduction.....	1
<b>A.</b> Background .....	1
<b>B.</b> Project Rationale .....	1
<b>C.</b> Proposed Project .....	2
<b>D.</b> Project Proponents .....	4
<b>E.</b> Purpose and Objectives of the Initial Environmental Examination .....	5
<b>F.</b> Scope and Methodology of the Initial Environmental Examination .....	5
<b>G.</b> Structure of the Initial Environmental Examination .....	6
II. Policy, Legal and Administrative Framework.....	6
<b>A.</b> Republic of Maldives Environmental Laws and Regulations.....	6
<b>B.</b> International and Regional Agreements and Conventions.....	12
<b>C.</b> Permits and Approvals Required.....	14
<b>D.</b> ADB’s Environmental Safeguards Requirements .....	16
<b>E.</b> Compatibility between Country’s and ADB Safeguard Policies .....	18
<b>F.</b> Institutional Arrangements .....	19
<b>G.</b> Other Ministries and Departments.....	25
<b>H.</b> Atoll and Island Councils.....	25
<b>I.</b> Environmental Standards.....	25
III. The Project .....	28
<b>A.</b> Type and Location of the Project.....	28
<b>B.</b> Project Components .....	30
<b>C.</b> Climate Change Adaptation Considerations.....	38
<b>D.</b> Design and Construction Activities.....	39
<b>E.</b> Operational Phase .....	44
<b>F.</b> Decommissioning Phase .....	44
<b>G.</b> Contract Packaging and Project Cost .....	44
<b>H.</b> Implementation Arrangements .....	45
<b>I.</b> Schedule.....	48
IV. Analysis of Alternatives.....	50
<b>A.</b> With/Without Project .....	50
<b>B.</b> Alternative Locations.....	51
<b>C.</b> Alternative Technologies.....	52
V. Description of the Environment .....	53
<b>A.</b> Physical Resources .....	53
<b>B.</b> Ecological Resources .....	58
<b>C.</b> Socio-economic Context .....	73
<b>D.</b> Environmental and Social Profile of Project Islands .....	83
VI. Anticipated Environmental Impacts and Mitigation Measures.....	88
<b>A.</b> Overview.....	88
<b>B.</b> Design Phase (Pre-Construction).....	88
<b>C.</b> Construction Phase.....	89
<b>D.</b> Impacts and Mitigation: Operational Phase .....	94
<b>E.</b> Impacts and Mitigation: Decommissioning Phase .....	95
<b>F.</b> Cumulative and Induced Impacts of Project Components .....	95
VII. Consultation and Information Disclosure.....	95
<b>A.</b> Consultations .....	96
<b>B.</b> Findings of Consultation Meetings .....	97

C. Information Disclosure .....	98
D. Grievance Redress Mechanism .....	99
VIII. Environmental Management and Monitoring Plans .....	104
A. Environmental Management .....	104
B. Supervision, Monitoring and Reporting .....	109
C. Implementation Arrangements .....	115
D. Implementation Schedule and Budget .....	116
Annex 1: REA checklist.....	119
Annex 2: Project Island Land Use Plans .....	124
Annex 3: Maldives Protected Areas .....	129
Annex 4: Photographs of Consultations .....	137
Annex 5: Template for Site Environmental Management Plan.....	142
Annex 6: Standard Construction Contract Environmental Safeguard Clauses.....	153
Annex 7: Template of Environmental Monitoring Report .....	157
Annex 8: Worker's Camp Specification .....	163
Annex 9: Grievance Recording Form .....	164

## List of Tables

Table 1: Subprojects by Output.....	3
Table 1: Principal Legislation on Environmental Protection in Maldives .....	7
Table 2: Contents of Maldivian EIA report.....	11
Table 3: International Environmental Agreements and Conventions .....	12
Table 4: National EIA requirements for subprojects .....	15
Table 5: Permits.....	16
Table 6: Comparative analysis of Government and ADB safeguard requirements .....	20
Table 7: Institutional Roles.....	25
Table 8: Sea water standards .....	26
Table 9: Desalinated drinking water standards.....	26
Table 10: Ambient Air Quality Standards.....	27
Table 11: Noise Standards.....	27
Table 12: Vibration Limits relating to Minor or Cosmetic Damage to Buildings .....	27
Table 13: Guidelines and lists .....	27
Table 14: Project Components addressing Climate Change .....	38
Table 15: Component Wise Cost and Implementation Schedule .....	45
Table 16: Expected PMU Staffing .....	47
Table 17: Main Features of Project Islands .....	54
Table 18: Air quality near Addu International Airport (Gan) .....	56
Table 19: Noise levels near Addu International Airport (Gan).....	56
Table 20: Marine water quality around Gan Island .....	56
Table 21: Noise levels at Kulhudhuffushi City .....	56
Table 22: Groundwater quality data Kulhudhuffushi City.....	57
Table 23: Marine water quality around Kulhudhuffushi City .....	57
Table 24: Noise levels at Hanimaadhoo.....	58
Table 25: Groundwater quality data Hanimaadhoo .....	58
Table 26: Potential list of threatened species from IBAT analysis near each Island .....	63
Table 27: Overlap of Project islands with Protected Areas, Key Biodiversity Areas and Important Bird Areas of Maldives .....	65
Table 28: Details of Protected Areas, Key Biodiversity Area and Important Bird Areas within 10 km of Project islands .....	65
Table 29: Population by place of enumeration by nationality, sex and locality.....	76
Table 30: Demographic characteristics of Project islands .....	76
Table 31: Employment rates for Maldivian resident population, 2022.....	77
Table 32: Employment rates for Project islands in Haa Dhaalu atoll 2022.....	77
Table 33: Employment rates for Project islands in Addu City 2022.....	77

Table 34: Social and economic infrastructure on Project islands.....	80
Table 35: HDh. Hanimaadhoo.....	83
Table 36: HDh. Nohivaranfaru.....	84
Table 37: HDh. Kulhudhuffushi City .....	84
Table 38: K. Hulhule .....	85
Table 39: S. Gan.....	85
Table 40: S. Hulhudhoo .....	86
Table 41: S. Meedhoo.....	86
Table 42: S. Hithadhoo .....	87
Table 43: Data Sources for Social and Environmental Island Profiles .....	87
Table 44: Consultation with key stakeholders .....	96
Table 45: Summary of community consultations .....	97
Table 46: Summary of consultation meeting findings .....	97
Table 47: Grievance Redress Mechanism.....	100
Table 48: Composition of Island Grievance Redress Committee.....	102
Table 49: Environmental Management Plan.....	105
Table 50: Environmental Monitoring Plan.....	111
Table 51: Indicative cost of Environmental and Social Safeguards implementation.....	116
Table 52: Template for Site Environmental Management Plan.....	145
Table 53: Summary of Issues-Tracking Activity for Current Period.....	158

## List of Figures

Figure 1: Project Locations in Addu City .....	29
Figure 2: Project Locations in Haa Dhaalu Atoll .....	29
Figure 3: Project Locations in Greater Malé .....	30
Figure 4: Proposed Addu Radar Locations.....	31
Figure 5: Current status of the land planned for the weather radar system (option 1): view from the north, east, south and west .....	31
Figure 6: Current status of the land also considered for the weather radar system (option 2): view from the south and west (no.2) and north and east (no. 3) .....	32
Figure 7: Doppler Radar in Malé .....	34
Figure 8: Proposed drainage network interventions under Subproject 2.1 .....	35
Figure 9: Drone imagery (left) and photo (right) of the Eastern coastline of Kulhudhuffushi City .....	36
Figure 10: Concept layout for a potential groyne field under Subproject 2.2 .....	36
Figure 11: Hanimaadhoo Agriculture Center .....	37
Figure 12: Indicative sketch of HAC multipurpose facility .....	37
Figure 13: Typical Existing Structures at HAC.....	38
Figure 14: Current status of the area between original island and reclaimed area, and potential bioswale location (yellow box).....	40
Figure 15: Current beach access points at the eastern shoreline: north-east (left) and south-central (right).....	41
Figure 16: Kulhudhuffushi: Sand Stockpile.....	42
Figure 17: Conceptual design for layout of new HAC Facility .....	43
Figure 18: Project Organizational Structure and Staffing.....	46
Figure 19: Project's implementation schedule .....	48
Figure 20: Atoll island wave action and sedimentation processes .....	53
Figure 21: Typical aquifer.....	55
Figure 22: Northern mangrove ecosystem in Kulhudhuffushi City .....	59
Figure 23: Southern mangrove ecosystem in Kulhudhuffushi.....	60
Figure 24: Locations of Protected Areas and Project islands.....	64
Figure 25: Hanimaadhoo: Mangroves, wetlands, and environmentally sensitive areas .....	67
Figure 26: Nohivaranfaru: Mangroves, wetlands, and environmentally sensitive areas .....	68
Figure 27: Kulhudhuffushi: Mangroves, wetlands, and environmentally sensitive areas .....	69



Figure 28: Hithadhoo: Mangroves, wetlands, and environmentally sensitive areas .....	70
Figure 29: Hulhudhoo and Meedhoo: Mangroves, wetlands, and environmentally sensitive areas.....	71
Figure 30: Hulhule: Mangroves, wetlands, and environmentally sensitive areas .....	72
Figure 31: Gan: Mangroves, wetlands, and environmentally sensitive areas.....	73
Figure 32: Multidimensional Poverty by Malé and Atolls, 2009–2016/17 .....	78
Figure 33: Mosque and burial place located near the main site proposed for the radar tower .....	81
Figure 34: Existing structures south of the runway at Gan .....	82
Figure 35: Coir rope making by households in Kulhudhuffushi .....	82
Figure 36: Traditional coral compound walls in Kulhudhuffushi .....	83
Figure 37: Old harbour wall between the reclaimed and old land, Kulhudhuffushi .....	83
Figure 38: Paved Access Roads Along the Runway in Gan International Airport, Addu City	91
Figure 39: Kulhudhuffushi: Central Access to Eastern Shoreline.....	91
Figure 40: Submarine communications cable entering the island, under the revetment .....	92
Figure 41: Zigzag Stadium in Kulhudhuffushi, with an aquacell field underneath.....	94
Figure 42: Flow chart of Grievance Redress Mechanism .....	100
Figure 43: Composition of Island Grievance Redress Committee.....	103
Figure 44: Kulhudhuffushi draft Land Use Plan 2023 .....	124
Figure 45: Hanimaadhoo Land Use Plan 2022.....	125
Figure 46: Nolhivaranfaru Land Use Plan 2023.....	126
Figure 47: Hithadhoo Land Use Plan 2024.....	127
Figure 48: Meedhoo Land Use Plan 2023.....	128
Figure 49: Summary of Issues by Non-Conformance .....	159

## ABBREVIATIONS

ADB	-	Asian Development Bank
AP	-	Affected Person
CFU	-	Colony Forming Unit
EA	-	Executing Agency
EARF	-	Environmental Assessment and Review Framework
EHS	-	Environment, Health and Safety
EIA	-	Environmental Impact Assessment
EMP	-	Environmental Management Plan
EMR	-	Environmental Management Review
EPA	-	Environmental Protection Agency
ESHS	-	Environmental, Social, Health and Safety
ESMP	-	Environmental and Social Management Plan
GRC	-	Grievance Redress Committee
GRM	-	Grievance Redress Mechanism
HAC	-	Hanimaadhoo Agriculture Center
IA	-	Implementing Agency
IBAT	-	Integrated Biodiversity Assessment Tool
ICEM	-	International Centre for Environmental Management
IEE	-	Initial Environmental Examination
LGA	-	Local Government Authority
MAAW	-	Ministry of Agriculture and Animal Welfare
MCCEE	-	Ministry of Climate Change, Environment and Energy
MOF	-	Ministry of Finance
MMS	-	Maldives Meteorological Service
MVR	-	Maldivian Rufiyaa
NCN	-	Non-conformance Notice
NDMA	-	National Disaster Management Authority
NGO	-	Non-Governmental Organization
NTU	-	Nephelometric Turbidity Unit
PC	-	Public Consultation
PCM	-	Public Consultation Meeting
PCR	-	Physical Cultural Resources
PIC	-	Project Implementation Consultant
PMU	-	Project Management Unit
PSA	-	Poverty and Social Assessment
REA	-	Rapid Environmental Assessment
RF	-	Resettlement Framework
SAEMR	-	Semi-Annual Environmental Monitoring Review
SEMP	-	Site-Specific Environmental Management Plan
SME	-	Small and Medium Enterprise
SPS	-	Safeguard Policy Statement
ToR	-	Terms of Reference
URA	-	Utility Regulatory Authority
WDC	-	Women's Development Committee

## WEIGHTS AND MEASURES

ha	-	hectares
m, m <sup>2</sup> , m <sup>3</sup>	-	metre, square metre and cubic metres
km	-	kilometre

## GLOSSARY

**Activity:** A group of tasks carried out using project inputs to produce the desired outputs.

**Critical habitat:** Critical habitat includes areas with high biodiversity value, including habitat required for the survival of critically endangered or endangered species; areas having special significance for endemic or restricted-range species; sites that are critical for the survival of migratory species; areas supporting globally significant concentrations or numbers of individuals of congregatory species; areas with unique assemblages of species or that are associated with key evolutionary processes or provide key ecosystem services; and areas having biodiversity of significant social, economic, or cultural importance to local communities. Critical habitats include those areas either legally protected or officially proposed for protection, such as areas that meet the criteria of the World Conservation Union classification, the Ramsar List of Wetlands of International Importance, and the United Nations Educational, Scientific and Cultural Organization's world natural heritage sites.

**Hazard:** A condition with the potential for causing an undesirable consequence (e.g. an unstable slope above a settlement). The description of landslide hazard should include the location, volume (or area), classification and velocity of the potential landslides and any resultant detached material, and the probability of their occurrence within a given period of time.

**Impacts:** Positive and negative, short and long-term effects produced by a development intervention, directly or indirectly, intended or unintended.

**Impact statement:** (a) Report describing the results of an impact assessment process; (b) The expected results of a project, typically sourced from a government national or sector plan before the project is conceptualized (ADB 2016).<sup>1</sup>

**Natural habitat:** Land and water areas where the biological communities are formed largely by native plant and animal species, and where human activity has not essentially modified the area's primary ecological functions.

**Outcome:** The immediate and direct benefits of the use or application of a project's outputs (ADB 2016).

**Outputs:** Goods, services or products delivered by the project to beneficiaries (ADB 2016).

**Results chain:** A series of expected achievements, or positive changes, linked by causality. The results chain can be seen as a continuum from inputs to outputs to outcomes (ADB 2016).

**Risk:** (a) A measure of the probability and severity of an adverse effect to health, property or the environment (e.g. a potential slope failure); (b) Factors outside the project's control that can hinder its progress from one results level to the next.

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<sup>1</sup> ADB. 2016. *Guidelines for Preparing a Design and Monitoring Framework*. Manila.

**NOTE**

- (i) In this report, "\$" refers to United States dollars.

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## EXECUTIVE SUMMARY

The Republic of the Maldives (RoM) has approached the Asian Development Bank (ADB) for financial support to assist in implementation of the Enhancing Climate Resilience and Food Security project. The project aims to support Maldives' climate change adaptation efforts, particularly in enhancing the weather observatory capacity, safeguarding urban infrastructure from flooding and erosion, and improving agriculture and food security. Specifically, the project is expected to (i) strengthen capacity and awareness to plan, adapt, and respond to climate change, (ii) develop infrastructure and nature-based solutions for flood and coastal protection, (iii) enhance the resilience and supply capacity of islands' urban farming and agribusiness systems, and (iv) develop a matching grant scheme to support adaptation innovations. The project cost is estimated at \$23.96 million.

The physical interventions proposed for funding under the project cover three outer islands (two atolls in the north and south of the country) and one central island, and are:

- (i) Installation of a Doppler S-band weather radar and ancillary equipment in Addu City to improve real-time weather monitoring over the south of the country and refurbishment of the existing Malé weather radar.
- (ii) Construction of stormwater drainage and filtration systems and nature-based solutions such as bioswales for inland flood protection on Kulhudhuffushi, together with coastal protection measures to prevent overtopping and erosion.
- (iii) Upgrading the Hanimaadhoo Agriculture Center to an advanced research and advisory hub on climate smart agriculture.

The Ministry of Finance of Maldives (MoFoM) will be the executing agency for the project and the Ministry of Climate Change, Environment and Energy (MCCEE) will be the lead implementing agency (IA). The Ministry of Agriculture and Animal Welfare (MAAW) will also be an IA. Once constructed, the project-funded interventions will be operated by the Maldives Meteorological Service, Kulhudhuffushi City Council and MAAW.

The project is classified as category B for Environment as per ADB SPS, 2009 as determined by the project's most environmentally sensitive subprojects, which are the stormwater management and coastal protection measures on Kulhudhuffushi. An initial environmental examination (IEE) of the proposed project has been carried out in compliance with ADB's SPS, 2009 requirements and with reference to national environmental, health and safety (EHS) requirements and obligations under international agreements. In addition, an environmental assessment and review framework (EARF) has been prepared to guide safeguard actions in relation to subprojects for which full details are not available yet. All subprojects will undergo the impact assessment process mandated under Maldivian regulations for environmental permitting by the Environmental Protection Agency (EPA).

An environmental management plan (EMP) has been prepared for the physical interventions. Provided the EMP requirements are followed during detailed design and incorporated in the civil works contracts, the environmental and social impacts during construction will be small-scale, localized and of limited duration. No compulsory land acquisition is anticipated. There will be no need for dredging to provide sand for beach nourishment on Kulhudhuffushi due to existing large stockpiles on the island. During operation, the physical interventions are not predicted to have any significant negative social or environmental impacts, although they will require periodic monitoring and maintenance. The stormwater management measures will help to replenish the island's freshwater aquifer and the coastal protection measures will reduce erosion and the risk of overtopping of the eastern shoreline. The EMP includes a monitoring plan, including monitoring of health and safety incidents.

The assessment of the project's EHS and social impacts and risks has been carried out based on a review of the feasibility-level reports for the project components, and included field visits, surveys and consultations with key stakeholders and communities. This IEE was prepared between May and July 2024. At the detailed design phase, this existing draft of the IEE study will be updated by incorporating results of detailed ecological surveys, including marine surveys as well as coastal modeling results to avoid downdrift erosion and necessary mitigation measures will be provided. The updated IEE will be submitted to ADB for review and clearance prior to commencing any works.

Local communities and stakeholders including women's groups were involved in the assessment process through on-site discussions. As the project will resolve critical environmental issues (flooding, coastal erosion) and make practical improvements to weather forecasting and agricultural knowledge and capacity, island residents are supportive. Further consultations will be conducted at the detailed design stage to ensure all comments and feedback from concerned stakeholders are incorporated into the updated version of this IEE. Furthermore, this IEE will be made available at all relevant island council offices and disclosed more widely through the ADB and EPA websites while the consultative process will continue during the project construction and operation phases as well. A grievance redress mechanism (GRM) will be established by MCCEE and the island councils.

## I. INTRODUCTION

### A. Background

1. This Initial Environmental Examination (IEE) for the proposed *Enhancing Climate Resilience and Food Security Project* (hereinafter “the Project”) has been carried out in compliance with the Asian Development Bank (ADB)’s Safeguard Policy Statement (SPS) (2009) requirements and with reference to national environmental, health and safety (EHS) requirements and obligations under international agreements.

2. The Project aims to support Maldives’ climate change adaptation efforts, particularly in enhancing the weather observatory capacity to support informed climate decision-making, safeguarding urban infrastructure from flooding and erosion, and improving agriculture and food security. Specifically, the project is expected to (i) strengthen capacity and awareness to plan, adapt and respond to climate change, (ii) develop infrastructure and nature-based solutions for flood and coastal protection, (iii) enhance the resilience and supply capacity of islands’ urban farming and agribusiness systems, and (iv) develop a matching grant scheme to support adaptation innovations. The Project cost is estimated at \$23.96 million.

### B. Project Rationale

3. Maldives faces a variety of natural hazards, including hydrological hazards (pluvial flooding caused by heavy rainfall, coastal flooding from waves and tides, wave action such as *udha* or swells, and coastal erosion), meteorological hazards (cyclone winds and storm surges, and heat waves), geophysical hazards (earthquakes and tsunamis) and climatological hazards (drought).<sup>2</sup> Most hydrological and meteorological hazards occur with a medium to high frequency and low to medium severity. Disasters triggered by these natural hazards have potentially devastating impacts such as loss of lives, injury and displacement, house and other infrastructure damage, disruption of livelihoods and services, environmental degradation, reduced economic productivity and a potential increase in poverty and social vulnerability. While casualties caused by hazards are rare, damage to housing due to heavy rainfall and flooding, cyclone winds and surges is common.

4. Climate change projections for Maldives show a consistent increase in average annual maximum temperature (+1.17-1.51°C by 2050s), annual precipitation (+3.0-4.1% by 2050s) and a likelihood of more frequent and intense extreme weather events.<sup>3</sup> The sea level is rising at a rate of 4.79 mm/year. Based on the latest projections, the 2030s will see an average sea level rise of 0.10-0.12 m, 2050s a rise of 0.20-0.26 m and 2080s a rise of 0.43-0.57 m.<sup>4</sup>

5. By 2050, Maldives could incur economic losses due to climate change equivalent to 2.3% of its annual gross domestic product, increasing to 12.6% by 2100, the highest of six south Asian countries.<sup>5</sup>

6. Interactions between sea level rise and wave dynamics are expected to intensify wave action, affecting shorelines, damaging coastal infrastructure and contaminating the freshwater lens on each island with saltwater. While coral reefs and mangroves provide some degree of coastal protection, the proximity of critical infrastructure to the coast – 50% of housing, 75% of telecommunications, 99% of tourist facilities, and the majority of waste and power utilities within 100 meters of the shoreline – leaves it vulnerable to storm surges and swells.

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<sup>2</sup> Ministry of Environment. 2020. [Updated Nationally Determined Contribution of Maldives](#). Malé.

<sup>3</sup> Asian Development Bank. 2024. *Preparation of the Climate Change Adaptation and Resilience Project in Maldives. Climate Change Assessment*. Consultant’s Report. Manila.

<sup>4</sup> Footnote 3.

<sup>5</sup> Asian Development Bank. 2014. [Assessing the Costs of Climate Change and Adaptation in South Asia](#). Manila.

7. Urban infrastructure, located on low-lying land, faces significant climate risks, with conventional infrastructure providing inadequate protection. Population growth and associated development pressures have led to a decrease in permeable surfaces, alongside an increase in land reclamation and the construction of hard coastal protection measures.<sup>6</sup> In addition, most inhabited islands do not have an integrated stormwater drainage system.<sup>7</sup> Stormwater is being discharged directly onto roads and land via downspouts exacerbating flooding. Due to a low elevation and a shallow water table, the sub-soil layer is quickly saturated.

8. Systems and capacities for weather monitoring, forecasting and early warning are deficient. The only Doppler weather radar in the country has a limited radius of 200 km, restricting its coverage, and is requiring urgent upgrading and maintenance. Technical expertise to operate and maintain the radar is limited, and the procurement of expensive spare parts necessitates costly orders from a US-based manufacturer. To provide more accurate shorter-term alerts one to six hours before the weather events through nowcasting requires highly reliable radar systems, software and specialized personnel, both on radar, monitoring and forecasting techniques.

9. The country's economy and livelihoods are dependent on climate-sensitive sectors such as agriculture, fisheries and tourism. Agricultural productivity is already challenged by scarce freshwater and land, but loss of land due to erosion, sea level rise, projected changes in rainfall patterns and heat stress on plants form key additional risks to crop production. Due to the high dependency on imports, nutrition and food security are vulnerable to climate change-related impacts in countries where Maldives imports food from. Long-term cold food storage facilities in the country are limited. Adverse effects of climate change on food security will likely worsen malnutrition, particularly affecting women and children in rural communities.

### C. Proposed Project

10. In order to address some of these challenges, ADB is proposing an investment project on climate resilience. The overall objective of the Project is to strengthen the climate resilience of inhabited islands and agri-food systems. Key features of the Project include enhancing the weather monitoring capacity to support informed climate decisions and safeguarding urban infrastructure, agricultural productivity and food security. The Project interventions are both physical (engineering measures and nature-based solutions) and institutional (broader climate change adaptation measures to address gaps in the institutional and regulatory environment and build adaptive capacity within government and local communities).

11. The Project will have the following four outputs:

- (i) Output 1 strengthens the country's institutional capacity for weather monitoring, forecasting and early warning by improving infrastructure, software and capacities in real-time weather monitoring, forecasting and early warning. A Doppler S-band weather radar and ancillary equipment will be installed in Addu City to improve real-time weather monitoring over the south of the country. The existing Malé radar will be refurbished. An advanced data processing and analysis system will be put in place to ensure the interoperability of the various instruments and systems. The development and use of agro-climate forecasts and advisories will also be piloted. Lastly, capacity building and behavioral change activities will be conducted to maximize the effectiveness of the

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<sup>6</sup> Duvat V. and A. Magnan. 2019. Rapid Human-driven Undermining of Atoll Capacity to Adjust to Ocean Climate-related Pressures. *Scientific Reports*. 9. pp. 1–5.

<sup>7</sup> Ministry of Environment and Energy. 2015. [Survey of Climate Change Adaptation Measures in Maldives: Integrating Climate Change Risks into Resilient Island Planning in the Maldives Project](#). Malé.



- enhance monitoring and early warning systems at both institutional and community levels;
- (ii) Output 2 will implement infrastructure and nature-based solutions for pluvial flood mitigation, coastal protection and mangrove restoration in Kulhudhuffushi City. Stormwater drainage and filtration systems and nature-based solutions such as bioswales will be constructed for inland flood protection. Offshore and nearshore coastal protection structures will be improved to prevent overtopping and erosion. The island's long-term protection and resilience will be supported through the development of a drainage management plan and mangrove restoration and management plan. To maximize impacts nationwide, new design and construction standards, and associated training materials, for green and grey coastal and flood protection measures will be formulated, informed by the experience in Kulhudhuffushi. Modeling and detailed design studies are required as a first step to ensure appropriate designs suitable for the complex ecosystems on Kulhudhuffushi City;
  - (iii) Output 3 will capacitate farmers and other value chain stakeholders to enhance the resilience of island agri-food systems. The Hanimaadhoo Agriculture Center (HAC) will be upgraded to an advanced research and advisory hub on climate smart agriculture and supported to implement a farmer field school program; and
  - (iv) Output 4 will enable entrepreneurs to identify develop, and apply viable business proposals for innovative adaptation measures and demonstrate high-level technologies and improved techniques for climate smart agriculture through a matching grant scheme in partnership with the SME Development Finance Corporation.

12. Output 1 will be implemented in Addu City atoll (Gan), Hulhulé island (Greater Malé/Kaafu), and at national level; Output 2 will be implemented in Haa Dhaalu atoll (Kulhudhuffushi City); Output 3 will be implemented in Haa Dhaalu atoll (Hanimaadhoo, Kulhudhuffushi, Nolhivaranfaru). Output 4 demonstrations will initially be implemented in Haa Dhaalu atoll (Hanimaadhoo, Kulhudhuffushi, Nolhivaranfaru) and Addu City atoll (Hulhudhoo, Meedhoo and Hithadhoo) with the potential to be scaled up to national level, while the grant mechanism will be implemented nation-wide. Subprojects are listed in Table 1.

**Table 1: Subprojects by Output**

<b>OP1</b>	
1.1	Addu weather radar system, including tower
1.2	Male radar upgrades
1.3	Pilot agro-climate advisories
1.4	Behavioral Change Communication program
1.5	Capacity building program for MMS, including on improved models and software packages
<b>OP2</b>	
ST1	Mangrove and groundwater hydrology modeling and detailed design study
ST2	Marine and coastal modeling and detailed design study
2.1	Inland drainage network improvements, including bioswale
2.2	Measures for the protection of the eastern shoreline
<b>OP3</b>	
3.1	Construct a multipurpose facility at HAC
3.2	Capacity building program for HAC to support project island communities and urban farmers
<b>OP4</b>	
4.1	Matching grant scheme to support adaptation innovations

13. The indicative start date of the investment project is December 2024 and the project will be implemented until June 2030, with the estimated grant and loan closing date on 31 December 2030.

14. The Project is financed through a grant of \$17.94 million, a concessional loan of \$4.0 million, and a government contribution of an estimated \$2.02 million.

15. The project has a wide range of planned activities. Some involve small to medium-scale physical construction works in highly modified terrestrial and coastal habitats (small buildings, grey/green drainage infrastructure, grey/green coastal protection works). The specific techniques proposed are in common use throughout the world, and the works will be limited to specific sites with clear boundaries. Impacts during the construction process are predictable, limited and can be mitigated by standard best practice measures. After construction these works are not expected to have any negative off-site or indirect impacts except those intended (e.g., sediment trapping by coastal structures). Other interventions include support for the agriculture sector which might, indirectly, promote increased use of agrochemicals and therefore require appropriate mitigation such as an integrated pest management plan. Consequently, the project is categorized as B for environment as per ADB SPS, 2009.

16. A Climate Change Assessment (CCA) has been carried out to support the geographical scoping and prioritization for the investment project.<sup>8</sup> This included a country-level climate risk assessment which was developed based on the IPCC's risk framework<sup>9</sup> and performed by (i) developing geospatial representation of elements at risk, (ii) hazard zoning for pluvial floods, *udha*, storm surge, wind storm and coastal erosion, (iii) exposure mapping and analysis, (iv) vulnerability analysis, (v) risk analysis, and (vi) hotspot identification. The assessment found that 52 of the 189 islands (27.5%) are at high to very high risk of hazards and climate change (combining exposure and vulnerability) and can therefore be considered as multi-hazard exposure and vulnerability hotspots. A Preliminary Climate Risk Screening has been carried (Annex 1) which indicates that the project is high risk.

17. The project will not involve any significant involuntary land acquisition or resettlement, and therefore is categorized as C for involuntary resettlement.<sup>10</sup>

18. There are no indigenous people as defined by ADB's SPS (2009) in Maldives. Therefore, the project is categorized as C for indigenous peoples.

#### **D. Project Proponents**

Project Name:	Enhancing Climate Resilience and Food Security
Name of Proponent/s:	Ministry of Finance (MoF) Ministry of Climate Change, Environment and Energy (MCCEE) Government of the Republic of Maldives

<sup>8</sup> Footnote 3.

<sup>9</sup> IPCC. 2021. Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, In press.

<sup>10</sup> It should be noted that the Project Administration Manual for the overall Project has classified the project under category B for involuntary resettlement as per ADB SPS (2009). The preference of ADB to classify the project under category B is to err on the side of caution in case the project requires reclassification at a later stage, as some of the measures under the project will be further designed during Project implementation. Ministry of Climate Change, Environment and Energy. 2024. *Preparation of the Climate Change Adaptation and Resilience Project in Maldives. Resettlement Framework*.

Address of Proponent/s: Ameenee Magu, Malé 20379, Maldives  
Maafannu, Malé 20392, Maldives

19. The RoM will be the borrower and the Ministry of Finance will be the executing agency (EA). The MCCEE will be the lead implementing agency (IA) for all Project Outputs, while the Ministry of Agriculture and Animal Welfare (MAAW) will also be an IA. For Output 1 the main state agency involved will be the Maldives Meteorological Service (MMS), under MCCEE. For Output 2, Kulhudhuffushi City Council will be engaged, while for Output 3 and 4, MAAW will be the lead.

20. Once constructed, the Project-funded civil works will be operated by MMS for Output 1, Kulhudhuffushi City Council for Output 2, and MAAW for Output 3. There are no major civil works planned under Output 4, the grant beneficiaries will maintain any technologies or small works supported under the Project.

## **E. Purpose and Objectives of the Initial Environmental Examination**

21. The specific objectives of this IEE, which has been prepared in accordance with ADB's SPS (2009) requirements, are to:

- (i) Describe the project's environmental and social context.
- (ii) Identify and describe the project's potential environmental and social impacts.
- (iii) Describe mitigation measures to minimize adverse impacts.
- (iv) Describe the public consultation process and grievance redress mechanism (GRM).
- (v) Provide an environmental management and monitoring plan for the project (including defining institutional responsibilities, capacity building and training, and the required budget).

22. The project has been classified as category B for Environment as per ADB SPS, 2009, considering the project's most environmentally sensitive activities, the coastal protection and stormwater drainage subprojects of Output 2. These will have some limited adverse environmental impacts during construction.

23. This IEE has been prepared by the MCCEE, as IA, in mid-2024 and based on concept designs. Thus, at the detailed design phase, this existing draft of the IEE along with environmental management plan (EMP) will be updated by incorporating results of detailed ecological surveys, including marine surveys as well as coastal modeling results to avoid downdrift erosion and necessary mitigation measures will be provided. Also, any changes or advances in design details following ADB project approval will be considered in the Maldivian environmental permitting process for each sub-project, prior to commencing any works.. This is most relevant to the Output 2 subprojects, since their design will only be finalized after a 15-month technical study. In addition, an Environmental Assessment and Review Framework (EARF) has been prepared for the project which describes environmental assessment procedures for all subproject activities arising during project implementation, for example the multiple small grants to be awarded under Output 4.

## **F. Scope and Methodology of the Initial Environmental Examination**

24. **Scope:** This IEE cover the physical interventions proposed for funding under the project: construction of a new weather radar system and service buildings at Gan International Airport (Addu City atoll), rehabilitation and upgrades to the existing weather radar system at Velana International Airport (Hulhulé), coastal protection and stormwater drainage measures at Kulhudhuffushi City (Haa Dhaalu atoll), and expansion of the HAC (Haa Dhaalu atoll).

25. **Methodology:** Preparation of the IEE study has followed the standardized set of steps as listed below:

- (i) Review of available technical literature on the proposals, including close coordination with the design teams.
- (ii) Review of national and international environmental regulations and guidelines relevant to the project.
- (iii) Field visits to the various subproject sites for (i) familiarization, (ii) to obtain both primary and secondary information, and (iii) to carry out local consultation with key informants and stakeholders.
- (iv) Identification of potential impacts.
- (v) Subproject screening, using an adapted version of ADB's rapid environmental assessment (REA) checklist.
- (vi) Assessment of potential subproject impacts on the physical, biological and social environment at all project stages (pre-construction, construction, operation, de-commissioning), including direct, indirect, cumulative and induced effects.
- (vii) Development of mitigation measures following the mitigation hierarchy (avoid, minimize, mitigate, offset) and consideration of enhancement opportunities.
- (viii) Development of Environmental Management Plan (EMP) including a monitoring plan, GRM and institutional arrangements for EMP implementation.
- (ix) Preparation and disclosure of draft IEE.

## **G. Structure of the Initial Environmental Examination**

26. This IEE is consistent with the structure described in ADB's SPS (2009). It has eight sections: (i) Introduction; (ii) Policy, Legal and Administrative Framework; (iii) Description of the Project; (iv) Analysis of Alternatives; (v) Description of the Environment; (vi) Anticipated Environmental Impacts and Mitigation Measures; (vii) Consultation, Participation and Information Disclosure, including Grievance Redress Mechanism; and (viii) Environmental Management and Monitoring Plan.

27. The IEE is supported by nine appendices which include (i) the REA checklist, (ii) available land use plans of project sites, (iii) list of protected areas, (iv) photos of consultations, (v) site environmental management plan (SEMP) template, (vi) standard construction contract environmental provisions, (vii) an environmental monitoring report template, (viii) workers' camp specifications, and (ix) the grievance recording form.

## **II. POLICY, LEGAL AND ADMINISTRATIVE FRAMEWORK**

### **A. Republic of Maldives Environmental Laws and Regulations**

#### **1. Legal System and Environmental Policies and Laws**

28. Maldives is a Presidential Republic as per the constitution adopted on August 7, 2008. The constitution stipulates the separation of powers to three branches of the government: Executive, Legislative and Judicial. The Executive branch is led by the President, elected for a five-year term and assuming the roles of both head of state and leader of the government. The President appoints Cabinet Ministers who must be approved by the Legislature. This comprises a unicameral People's Majlis or Parliament with, at present, 87 members. The Judicial system is made up of a Supreme Court, a High Court and other lower courts. The highest authority is given to the chief justice of the Supreme Court.

29. Article 22 of the Constitution stipulates the need to protect and preserve the natural environment, biodiversity, resources and beauty of the country for the benefit of the present and future generations. The article also stipulates that all development activities should be

undertaken considering principles of sustainable development, taking measures as necessary to foster conservation, prevent pollution, the extinction of any species and ecological degradation.

30. The Environmental Protection and Preservation Act of the Maldives (4/93) is the primary legislation with respect to environmental management in Maldives. The Act identifies the Ministry designated for environment (currently the MCCEE) as the primary authority responsible for implementation of the Act. The primary enforcement agency is the Environmental Protection Agency (EPA) of Maldives and was established under a presidential decree on December 18, 2008. It is considered to be an affiliated agency of MCCEE.

31. Several other government entities have some environmental protection mandate. These include the Utility Regulatory Authority (URA), the National Disaster Management Authority (NDMA), the Ministry of Housing, Land and Urban Development, the Ministry of Construction and Infrastructure (MCI), the MAAW, the Ministry of Fisheries and Ocean Resources, and local councils (Island, Atoll and City Councils).

32. The principal regulations in effect to implement the provisions of the Environmental Protection and Preservation Act of the Maldives (4/93) are the Regulation on Environment Liabilities (2011/R-9), the Environmental Impact Assessment Regulation (2012/R-27), the Regulation Governing Reclamation and Dredging of Islands and Lagoons of Maldives (2013/R-15), the Regulation for Protection and Preservation of Island Vegetation and Flora in The Maldives (2022/R-92), the Protected Species Regulation (2021/R-25), the Protected Area Regulation (2018/R-78), the Regulation on Migratory Birds (2014/R-1236), the Water Resource Protection Regulation (2021/R-22), and the Dewatering Regulation for Construction and other Industrial Purposes (2021/R-20).

33. In addition to the Environmental Protection and Preservation Act of the Maldives (4/93), other acts directly related to environmental management are the Waste Management Act (24/2022), the Energy Act (18/2021), the Climate Emergency Act (9/2021), the Water and Sewerage Act (8/2020), and the National Disaster Management Act (28/2005).

34. The key environmental legislation and regulations are summarized in Table 2.

**Table 2: Principal Legislation on Environmental Protection in Maldives**

<b>Legislation/ Regulation</b>	<b>Date (Amended)</b>	<b>Purpose / Contents</b>	<b>Implementation Entity</b>
Constitution of Republic of Maldives	2008	The constitution assigns responsibility for protection of the environment to the state. It addresses intergenerational equity and highlights the need for sustainable development and for taking measures to prevent pollution, extinction of any species and ecological degradation.	Government of Maldives
Environment Protection and Preservation Act	1993 (2014, 2021)	This is the primary legislation with respect to environmental protection in Maldives. The act defines the requirement to undertake Environmental Impact Assessment (EIA) for any project that may cause significant negative impact on the environment. It prohibits irresponsible waste disposal and has provisions that facilitate designation of protected areas and protected species. The primary responsibility for enforcement of the act lies with the government Ministry with the mandate on environment. Amendments to the act allow the Ministry to delegate some functions to councils.	MCCEE/EPA/ Councils

<b>Legislation/ Regulation</b>	<b>Date (Amended)</b>	<b>Purpose / Contents</b>	<b>Implementation Entity</b>
Regulation on Environment Liability	2011	The objective of this regulation is to prevent actions violating the Environmental Protection and Preservation Act (4/93) and to ensure compensation for all damages caused by activities that are detrimental to the environment. The regulation provides guidance on how to value the damage and how fines should be calculated.	MCCEE/EPA
Environmental Impact Assessment Regulations	2012 (2013, 2015, 2016, 2017, 2018)	Provides guidance on the EIA process of Maldives. The regulations define the steps and timeframes involved in screening, scoping, review and monitoring the process. The regulation specifies that EIAs can be prepared only by registered consultants and it defines the procedure to register as a consultant. It provides guidance on reviewing reports and the qualifications for EIA reviewers.	MCCEE/EPA
Regulation governing dredging and reclamation in the Maldives	2013 (2014)	This regulation establishes guidelines for minimizing environmental damage caused by dredging and reclamation, including minimum distances from reefs and the shoreline.	EPA
Regulation for Protection and Preservation of Island Vegetation and Flora in Maldives	2022	The main objectives of this regulation are to promote greening and to protect old trees in Maldives. It defines the characteristics of plants that are protected, specifies that for each tree removed two or four trees need to be planted, and bans tree removal from inside and within 20 m of protected sites unless unavoidable.	MCCEE/EPA/ Council
Protected Species Regulations	2021	These regulations concern the designation, rehabilitation and management of protected species, and include fines for non-compliance.	MCCEE/EPA
Protected Area Regulation	2018	This regulation specifies mechanisms to protect, conserve and manage areas designated as protected areas.	MCCEE/EPA
Regulation on Migratory Birds	2014	The aim of this regulation is to ensure that migratory birds and their habitats are protected from damage and destruction. The regulation prohibits the capture of migratory birds, their use as pets, trade in birds or any parts, and actions harming the birds or their nests in anyway.	MCCEE/EPA
Water Resource Protection Regulation	2021	This regulation includes provisions to protect the water resources of the islands, especially groundwater. It gives guidance on protection of groundwater from spills, water quality testing requirements where chemicals are stored, use of groundwater for irrigation and the design of drainage systems.	URA
Regulation on dewatering for the purpose of construction and other industrial purposes	2021	The primary aim of this regulation is to protect the groundwater resource from dewatering activities. It requires permits to be obtained prior to dewatering, with a daily fee which progressively increases as the number of days of dewatering increases, providing a financial disincentive to long-term significant dewatering.	URA
Construction Site Health and Safety Regulations	2019	These regulations define the minimum standard for safety and security for the community and labour force when undertaking construction activities. It covers requirements for Personal Protective Equipment (PPE), safety signs and damage to nearby infrastructure.	Ministry of Construction and Infrastructure

Legislation/ Regulation	Date (Amended)	Purpose / Contents	Implementation Entity
Disaster Management Act	2015	The main objective of this act is to protect people from natural hazards and man-made disasters. It provides details of the composition and responsibilities of the NDMA. It also specifies the requirements for a National Disaster Management Plan and the requirements when preparing land use plans.	NDMA/ Council
Climate Emergency Act	2021	This act has several requirements that need to be achieved to address the climate emergency which was declared by parliament in February 2020. It specifies the establishment of a climate change Directorate and the assigning of a climate change envoy by the President. The act includes a requirement for preparation of a climate change national action plan and sectoral plans for the Tourism, Fisheries and Health sectors. The act also specifies that the country should become carbon neutral by 2030.	MCCEE
Waste Management Act	2022	This is the primary act that defines roles and responsibilities concerning waste management in Maldives. The act requires the Ministry to publish a waste management regulation, prepare guidelines for waste management and gazette a list of products to which extended producer responsibility applies. It also defines the responsibilities of councils, the EPA, URA and the Ministry with respect to waste management.	MCCEE, EPA, URA and Councils
Agriculture Pesticide Control Act	2019	This act concerns the import, production, safe use and disposal of pesticides. It defines overall responsibility, requirements and penalties for non-compliance. A regulation has been published under the act to define the required operational procedures.	MAAW
Decentralization Act	2010 (2011, 2015, 2017, 2019)	This act defines the composition, functions and responsibilities of the Island Council, Atoll Council, City Council, Local Government Authorities (LGA), and Women's Development Committees (WDC). It also creates a requirement for the preparation of island development plans and land use plans.	LGA, Councils, WDC and Ministry (Planning)
Land Act	2002 (2008, 2014, 2015, 2016)	This act governs the way in which land can be allocated for various uses. The categories include housing, economic purposes, community purposes, environment protection purposes and other uses of the government.	Ministry (Planning), Councils.

## 2. Environmental Assessment Procedures

35. The EIA process in Maldives is determined by the Environmental Impact Assessment Regulations (2012/R-27) which were formulated under article 5 of the Environmental Protection and Preservation Act (4/93) of Maldives.

36. The EIA regulations are implemented by EPA.

37. The process comprises the typical steps of screening, scoping, review, decision-making and monitoring.

38. For screening, the regulations list those projects that require EIA (schedule D), those projects that do not require EIA (Schedule T) and those projects that can be undertaken subject to a mitigation plan provided by the EPA (Schedule U). Any projects that do not fall

into these categories need to undergo a screening process, as described in article 8 of the regulation. Following screening, the EPA decides the level of assessment required. The screening decision will be one of the following:

- (i) EIA is required;
- (ii) EMP is required;
- (iii) IEE is required;
- (iv) The project can be undertaken with a mitigation plan proposed by the EPA;
- (v) The project can be undertaken without any further clearance through the regulation.

39. Where an IEE is required, after review of the IEE report the EPA decides as follows, as per the regulations:

- (i) EIA is required;
- (ii) EMP is required;
- (iii) The project can be undertaken without any further clearance through the regulations.

40. For projects that require EIA, the regulation details the scoping process in article 11. This includes a scoping meeting attended by stakeholders identified by the EPA. After scoping, Terms of Reference (ToR) will be issued which specify the technical requirements of the EIA report. For projects that require EMP, the format of the report is provided in the regulations and no further scoping is needed.

41. Under article 16 of the regulation, an EIA report must be prepared by a consultant who is registered with the EPA. The registration process is administered by a consultant registration board, as detailed in article 17 of the regulations. For an EMP, article 6 of the regulations requires the team preparing the report to include a person who has at minimum a bachelor's degree in environment.

42. Once the EIA/EMP/IEE report is submitted, the EPA sends it for review by two independent reviewers, as per article 13. The review duration depends on the amount paid by the proponent, in accordance with the following fee schedule (articles 7 and 13):

- (i) For a review fee of MVR 5,000 – 15 days
- (ii) For a review fee of MVR 10,000 – 10 days
- (iii) For a review fee of MVR 20,000 – 5 days

43. Schedule I of the regulations defines the qualifications and experience needed by EIA reviewers.

44. Following review, the EPA informs the proponent if any additional information is required, or approval can be given, or the EIA report is rejected, or the project itself is rejected due to potential irreversible damage to the environment.

45. The EIA regulations require the EPA to disclose all the reports that are currently on review, placing them in the public domain for public feedback. All comments received from the public are to be considered during the review process.

46. Where deemed necessary, a public hearing maybe undertaken by the EPA.



47. Article 15 describes the procedures for appealing an EPA decision, with the final determination being made by the Minister of Environment. Article 20 describes the fining mechanism for non-compliance.

48. During project implementation, monitoring reports, as detailed in the approved EIA/EMP reports, must be submitted to the EPA by the project proponent. As per article 6 of the regulations, a monitoring report can be prepared by anyone with a bachelor's degree in environment or related field.

49. The required content of an EIA report is set out in Schedule E-1 of the regulations, as summarized below.

**Table 3: Contents of Maldivian EIA report**

<ul style="list-style-type: none"> <li>(i) Executive Summary of the Report (both in English and Dhivehi).</li> <li>(ii) Introduction: This chapter covers the general introduction of the project, the proponent and financial arrangements of the project.</li> <li>(iii) Policy and Legal: This chapter highlight the laws, regulations and policies that are applicable for the project.</li> <li>(iv) Project Description: This chapter covers a detailed description of the project, individual components, land approvals, utility arrangements, project inputs, project outputs, conceptual drawings and project schedule.</li> <li>(v) Methodology: This chapter covers the method adopted in preparing the EIA report including various survey methods and methods adopted for impact assessment.</li> <li>(vi) Existing Environment: This chapter covers the results of the various baseline assessments that are undertaken as part of the assessment.</li> <li>(vii) Stakeholder consultation: This chapter includes details of the concerned public, NGOs and other government and non-government stakeholders consulted and the outcomes of these consultations.</li> <li>(viii) Impact Prediction: This chapter covers, direct, indirect and cumulative impacts during the construction, operation and demobilization phase of the project.</li> <li>(ix) Alternatives: This chapter covers alternatives explored for the project including the no project alternative. The alternatives are compared from environmental, social and economic points of view. The preferred alternative is required to be provided as part of this analysis.</li> <li>(x) Mitigation Measures: This chapter covers the mitigation measures for the impacts identified. The cost of mitigation measures, equipment and resources required to implement the measures are highlighted in this chapter.</li> <li>(xi) Monitoring: This chapter covers the monitoring requirements of the project, the monitoring schedule, the report submission schedule, the cost of monitoring and equipment and the resources required for monitoring.</li> <li>(xii) Conclusion: This chapter covers the overall conclusion of the EIA study.</li> </ul>
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### **3. Country Framework**

#### **a. Environmental management**

50. The mandate for environmental management of the country lies with MCCEE and EPA. EPA is the primary regulatory agency and MCCEE is the primary entity which formulates the policies relevant to environmental management.

#### **b. Public consultation**

51. Public consultation is required for development initiatives through a variety of laws and regulations, in particular the Decentralization Act. Article 68 of the act stipulates that for any proposed development the proponent must consult with the council and other relevant authorities established in the island. The same article also states that any EIA reports developed for any project need to be shared with the relevant council, including information

on the impacts and mitigation measures. Article 107-1 of the act requires councils themselves to hold meetings with the public regarding any important development activities undertaken in the islands, and give five days' notice of such meetings' time and place.

52. The EIA regulations also have provisions to ensure public/stakeholder consultation and participation. Firstly, all stakeholders are required to participate in the scoping meeting. The ToR issued as a result of scoping identify the parties to be consulted during the next stage of the process. Once an EIA report has been prepared and submitted to the EPA, the agency is required to disclose the report for public comments during the period of review. Moreover, where there is significant public concern during the review stage, the EPA can hold a public hearing.

### **c. Information disclosure**

53. The Right to Information Act (1/2014) requires each government institute to have an information officer. Subject to some exceptions, any person can request information from a state institution and the institution must provide the information within 21 working days or less, in normal cases. Where the institution has to carry out extensive research to find the information, a further 14 days may be allowed for it to comply with the request. The act also defines the responsibilities of the information commissioner and the information commissioner's office. This office is an independent body established to hear disputes and maintain records regarding state institutions.

54. EIA reports must be placed in the public domain during the review period, as per the EIA regulations.

### **4. National Environmental Regulator and Capacity of Implementation Agency**

55. The national environmental regulator is the EPA. EPA is responsible for regulatory activities for protecting, conserving and managing the environment and biodiversity, including pollution prevention and regulating waste management under the Environment Protection and Preservation Act (4/93).

56. The lead IA for the Project is MCCEE. The ministry's key mandate and functions relate to policy and regulatory development with respect to energy, waste, water, sanitation, climate change adaptation and coastal protection. In addition, the Ministry implements infrastructure development projects in these fields. MCCEE has many years of experience in implementing development cooperation initiatives, including ADB-funded projects, and MCCEE staff are familiar with donor requirements, procedures and terminology. Thus, in terms of capacity, the Ministry has the knowledge and know-how for implementation of the Project.

### **B. International and Regional Agreements and Conventions**

57. Maldives is party to a number of international conventions and agreements. Some of the key environmental agreements and conventions are summarized in the table below.

**Table 4: International Environmental Agreements and Conventions**

<b>Convention/Agreement</b>	<b>Brief Description</b>	<b>Date of Ratification</b>
Vienna Convention for the Protection of the Ozone Layer. Vienna, 22 March 1985.	International treaty designed to protect the ozone layer by reducing production and use of substances that leads to depletion of ozone layer.	26 April 1998
Montreal Protocol on Substances that Deplete	A landmark treaty that aims to phase-out of consumption and production ozone depleting	16 May 1989

Convention/Agreement	Brief Description	Date of Ratification
the Ozone Layer. Montreal, 16 September 1987.	substances by switching to alternatives. This treaty is largely seen as a very successful treaty and is seen as very effective in reduction of ozone depleting substances in the atmosphere.	
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. Basel, 22 March 1989.	This international treaty aims to reduce the transboundary movement of hazardous waste, particularly from developed countries to developing countries. The treaty covers a wide range of waste including explosive, corrosive, flammable, ecotoxic and infectious waste.	28 April 1992
United Nations Framework Convention on Climate Change. New York, 9 May 1992.	This international treaty's ultimate goal is stabilizing greenhouse gas emissions in the atmosphere to prevent/ minimize effects of human induced climate change.	9 Nov 1992
Convention on Biological Diversity. Rio de Janeiro, 5 June 1992.	This internationally binding treaty has three main goals, namely; conservation of biological diversity, sustainable use of components of biological diversity, fair and equitable sharing of benefits arising from use of genetic resources.	9 Nov 1992
Cartagena Protocol on Biosafety to the Convention on Biological Diversity. Montreal, 29 January 2000.	This international agreement is designed to ensure the safe handling, transport, and use of living modified organisms resulting from modern biotechnology. It aims to protect biological diversity and human health from potential risks posed by living modified organisms, with a particular focus on transboundary movement.	3 Sep 2002
United Nations Convention to Combat Desertification. Montreal, 16 September 1987.	This is a legally binding international agreement that links environment and development to sustainable land management. It aims to mitigate the impact of land degradation and protect land resources to ensure food, water, shelter, and economic opportunities for all.	3 Sep 2002
Convention Concerning the Protection of the World Cultural and Natural Heritage. 23 November 1972	This is a legally binding international treaty that establishes an intergovernmental framework for the identification, protection, conservation and presentation of the world's most outstanding natural and cultural properties.	22 May 1986
International Convention for the Control and Management of Ships' Ballast Water and Sediments, 2004	This convention was adopted by the International Maritime Organization to prevent the spread of harmful aquatic organisms and pathogens through ships' ballast water. The convention requires ships to manage their ballast water to meet a specified standard, ensuring that viable organisms are not released into new sea areas.	22 June 2005
Stockholm Convention on Persistent Organic Pollutants. Stockholm, 22 May 2001	This is an international treaty that aims to protect human health and the environment from chemicals known as Persistent Organic Pollutants, which have harmful impacts. The Convention, effective from May 17, 2004, requires parties to adopt control measures to reduce and, where feasible, eliminate the release of Persistent Organic Pollutants.	17 Oct 2006
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in	This is an international treaty that promotes shared responsibilities and informed decision-making in the trade of hazardous chemicals. It establishes a prior informed consent procedure that requires exporters of listed chemicals to obtain consent from importing countries before proceeding with the trade	17 Oct 2006

Convention/Agreement	Brief Description	Date of Ratification
International Trade. Rotterdam 10 Sep 1998		
International Convention for the Prevention of Pollution from Ships, 2 November 1973.	This is the main international convention aimed at preventing marine pollution by ships from operational or accidental causes. Adopted in 1973 and modified by the Protocol of 1978, The Convention sets limits on emissions and discharges, including oil, noxious liquid substances, harmful substances in packaged form, sewage, garbage, and air pollution from ships.	
Malé Declaration on Control and Prevention of Air Pollution and Its Likely Transboundary Effects for South Asia, April 1998.	This is an intergovernmental agreement that emphasizes the need for South Asian countries to initiate or carry forward studies and programs on air pollution. It aims to assess and analyse the origin, nature, extent, and effects of local and regional air pollution, develop strategies to prevent and minimize air pollution, and set up monitoring arrangements.	22 April 1998
Convention on International Trade in Endangered Species, 3 March 1973	This convention aims to ensure that international trade does not threaten the survival of wild animal and plant species. It regulates wildlife trade through controls and regulations on species listed in the appendices of the convention.	20 July 2022

### C. Permits and Approvals Required

58. A number of local approvals are required, based on the nature and type of work that is going to be implemented prior to commencement of the physical activities.

#### 1. Selection Factors

59. Various factors determine the type of permits required, for example if dewatering is needed or not, the value of the project, the amount of vegetation to be removed, and whether the proposal is listed as a project that requires EIA or is exempt, as specified in the EIA regulations.

#### 2. Environmental Decision Note and Project Implementation

60. Maldives' EIA Regulations require EIA to be undertaken for all projects that are listed in Schedule D of the regulations. No assessment (EIA, EMP or IEE) is needed for projects listed in Schedule T of the regulations. For projects that do not fall under either category, i.e., Schedules D or T, the proposal needs to undergo a screening process. This enables the EPA to determine if an IEE, EIA or EMP is needed for the project, or if it can proceed without any assessment, or whether the project can proceed by incorporating a list of mitigation measures provided by the EPA. The determination is issued in the form of a screening decision statement.

61. If an IEE is required, the IEE process and report enable the EPA to determine if a detailed EIA or an EMP are also required, or whether the project can proceed without any further assessment.

62. When projects require an EIA and EMP, the resulting reports undergo an EPA review process, the outcome of which is issuance of an EIA/EMP decision statement.

63. The validity of both the screening decision and the EIA/EMP decision is one calendar year, so the project needs to be implemented within this timeframe. If it is not, then a new assessment may be required.

64. If the scope of works changes after approval of the EIA/EMP report, an addendum report needs to be submitted and approval obtained prior to commencement of works.

65. The EIA/EMP reports require a commitment letter from the proponent confirming that the mitigation measures and monitoring requirements stated in the report will be implemented by the proponent, and that the costs required for this will be borne by the proponent.

### 3. National EIA Requirements for Subprojects

66. The table below identifies the level of assessment required for the Project's subprojects, per output, based on the information available at the time of IEE preparation.

**Table 5: National EIA requirements for subprojects**

#	Subproject	Listed in Schedule D (Yes/No)	Listed in Schedule T (Yes/No)	Level of Assessment Needed
<b>Output 1</b>				
1.1	Addu weather radar system including tower	No	No	Level of assessment to be finalized following screening.
1.2	Malé radar upgrades	No	No	Level of assessment to be finalized following screening.
1.3	Pilot agro-climate advisories	No	No	Level of assessment to be finalized following screening.
1.4	Behavioural change communication program	N/A	N/A	Soft component: no assessment or screening needed
1.5	Capacity building program for MMS, including training on improved models and software packages	N/A	N/A	Soft component: no assessment or screening needed
<b>Output 2</b>				
-	Mangrove and groundwater hydrology modeling and detailed design study	N/A	N/A	Soft component: no assessment or screening needed
-	Marine and coastal modeling and detailed design study	N/A	N/A	Soft component: no assessment or screening needed
2.1	Inland drainage network improvements, including bioswale	Yes	No	Requires EIA
2.2	Measures for the protection of the eastern shoreline	Yes	No	Requires EIA
<b>Output 3</b>				
3.1	Construction of multipurpose facility at HAC	No	No	Level of assessment to be finalized following screening.
3.2	Capacity building program for HAC to support project island communities and urban farmers	N/A	N/A	Soft component: no assessment or screening needed
<b>Output 4</b>				
4.1	Matching grant scheme to support adaptation innovations	No	No	Depends on type of innovation; if only soft components involved then no screening is needed; for others, level of assessment to be finalized following screening

#### 4. Permits and Approvals Required

67. In addition to the approvals required through the EIA regulations, various environmentally-related permits are required prior to the commencement of construction work. These depend on the nature of the work and the type of environment in which it is to be undertaken. The table below lists the permits most relevant to the project.

**Table 6: Permits**

Activity	Permit Needed	Regulatory Authority
Dewatering	Dewatering Permit	URA
Marine excavation or dredging and reclamation and/or backfilling works	Dredging and Reclamation Permit	EPA
Removal of vegetation	Vegetation Removal Permit	If more than 50 mature palms and trees: EPA. If less than 50 mature palms and trees: local council

#### D. ADB's Environmental Safeguards Requirements

##### 1. Policies

68. Safeguard Policy Statement (2009). This is ADB's main safeguards policy document<sup>11</sup>. It describes the common objectives and policy principles of ADB's safeguards, and outlines the delivery process for ADB's safeguard policy. It promotes sustainability through protection of people and the environment from the adverse impacts of projects, and by supporting the strengthening of country safeguard systems. It presents a consistent, consolidated framework for environment, resettlement, and indigenous people safeguards. Appendix 4 of the SPS specifies safeguard requirements for different financing modalities, including sector lending. For this project, the SPS requires:

- (i) Screening of subprojects using a REA checklist;
- (ii) Use of subproject selection criteria that exclude subprojects with potential high impact;
- (iii) Environmental categorization of both the overall project and each subproject, with category A subprojects excluded;
- (iv) Preparation of an Initial Environmental Examination and an EMP for both the overall project and any subproject subsequently classified as environmental category B but for which details were not available during project appraisal;
- (v) Consideration of physical cultural resources (PCR) including chance finds;
- (vi) Public disclosure of project plans, designs and impacts;
- (vii) Consultation and participation with all stakeholders, especially those directly affected;
- (viii) Establishment and operation of an accessible and effective GRM;
- (ix) Consideration of occupational safety and health at all stages of subproject planning and implementation;
- (x) Making provision for management of unanticipated environmental impacts;
- (xi) Use of international best practice for pollution prevention.

69. ADB Operations Manual, SPS (2009), Section F1/BP [Bank policies] & Safeguard Review Procedures, Section F1/OP [operational procedures] (2013). These documents operationalize SPS (2009). The policy sets out the scope of SPS (2009) applicability to ADB

<sup>11</sup> Currently ADB is conducting a comprehensive review of the policy in order to update it. <https://www.adb.org/news/events/adb-safeguard-policy-review-update-phase-2-regional-consultations>

operations, and the procedures describe the safeguards process and outputs, including consultation and disclosure requirements, through the various stages of project preparation.

70. The Access to Information Policy (2018) guides ADB's efforts to be transparent and accountable to the people it serves, which it recognizes are essential to development effectiveness. The policy recognizes the right of people to seek, access, and impart information about ADB's operations, and it aims to enhance stakeholders' trust in and ability to engage with ADB, through clearly stated principles including proactive disclosure, presumption in favor of disclosure, recognition of the right to access and impart information and ideas, country ownership, limited exceptions, and the right to appeal.

## 2. Guidance

71. Environmentally Responsible Procurement (2007) provides guidance to ADB staff, consultants, and executing agencies on environmentally responsible procurement, defined as "a systematic approach to the purchase of goods and services that are thought to be less damaging to the environment than other goods and services that serve the same purpose," specifically, products that "reduce waste, improve energy efficiency, limit toxic by-products, contain recycled content or are reusable, and are produced with the least environmental impact...[and] services...that help improve the environment, are rendered with minimum environmental and social impacts, and use resources and energy efficiently.

72. Complaint Handling in Development Projects - Grievance Mechanisms: A Critical Component of Project Management (2010). This document presents definitions, concepts, rationale, and history relevant to ADB project GRMs.

73. Complaint Handling in Development Projects - Building Capacity for Grievance Redress Mechanisms (2010). This document presents a framework and practical suggestions for building the capacity of an organization to manage an effective GRM.

74. Environment Safeguards, A Good Practice Sourcebook (2012). This draft working document aims to add clarity, provide technical guidance, and recommend good practices in SPS (ADB 2009) implementation.

## 3. ADB Environmental Screening and Categories

75. ADB projects are screened in-house using a rapid environmental assessment (REA) checklist, either generic or specific to the sector. The checklist captures the type, location, sensitivity, scale, nature, and magnitude of potential environmental impacts, and availability of cost-effective mitigation measures. Based on the checklist findings, a proposed project is assigned to one of the following ADB environmental categories, as determined by its most sensitive component:

- (i) Category A – 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 EIA, including an EMP, is required;
- (ii) Category B – potential adverse environmental 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 IEE, including an EMP, is required;
- (iii) Category C – a proposed project is likely to have minimal or no adverse environmental impacts. An EIA or IEE is not required, although environmental implications need to be reviewed.

76. This Project's subprojects have undergone initial screening during preparation of the IEE using a REA checklist adapted to the sector (Annex 1). They will be screened again when additional design details are available. This will be done by the PMU at an appropriate stage of subproject detailed planning. Subprojects assigned to Category A are excluded from project financing.

77. The Output 1 subprojects involve small-scale new physical infrastructure (radar tower) and rehabilitation of an existing radar station. The subprojects are physically located within working airports where the original natural habitats have been highly modified or completely removed, the civil works are simple, low impact and easily mitigable, and the likely screening Category is C. The Output 2 subprojects involve more extensive but nevertheless simple civil works (drainage, coastal protection), which again are low impact and easily mitigable. However, the drainage works will take place in an urban environment and will involve temporary, short-term disruptions for the installation of the nature-based solutions, and the coastal protection works are located on the eroding eastern shoreline between a belt of mature vegetation and the foreshore, which recent studies have found to be in very poor condition<sup>12</sup>. In addition, subject to a detailed study (Subproject 2.1), the drainage works may provide an opportunity to improve functioning of the remaining mangrove wetlands on the island (Figure 27). Consequently, both these subprojects fit the definition of Category B. The Output 3 subprojects involve localised civil works with no unusual features (expansion of HAC) and are also likely to be screened into Category B to ensure adequate management of the construction activities. The Output 4 subprojects involve support for a variety of agricultural enterprises, most of which are likely to be Category C but some of which may be B.

78. This IEE has been prepared for the overall Project (selecting five subprojects to be discussed in further detail). However, since it is a sector investment project with multiple subprojects, the Project also requires an EARF to guide environmental risk management procedures for all subprojects.

79. An EARF will (i) describe the project and its subprojects and/or components; (ii) explain the general anticipated environmental impacts of the components or subprojects to be financed under the proposed project; (iii) specify the requirements that will be followed in relation to subproject screening and categorization, assessment, and planning, including arrangements for meaningful consultation with affected people and other stakeholders and information disclosure requirements and, where applicable, safeguard criteria that are to be used in selecting subprojects and/or components; (iv) assess the adequacy of the borrower's/client's capacity to implement national laws and ADB's requirements and identify needs for capacity building; (v) specify implementation procedures, including the budget, institutional arrangements, and capacity development requirements; (vi) specify monitoring and reporting requirements; and (vii) describe the responsibilities of the borrower/client and of ADB in relation to the preparation, implementation, and progress review of safeguard documents of subprojects. An EARF has been prepared for the overall Project.

## **E. Compatibility between Country's and ADB Safeguard Policies**

80. The ADB's SPS is in line with the other principal multilateral development financing institutions. The environmental policies and laws of Maldives are similar in many ways, but with some differences. Table 7 provides a comparison of ADB SPS policy principles and the regulations of Maldives, identifying gaps and measures to be implemented by the project to address the gaps.

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<sup>12</sup> 2023. ESIA for the proposed PEACE Cable Branches in Kulhudhuffushi City. CDE Consulting for Ooredoo Maldives.



## **F. Institutional Arrangements**

81. The main government institutions responsible for implementation of the environmental policies and legal framework of Maldives with respect to the proposed Project are **MCCEE** and **EPA**.

82. **MCCEE** has overall responsibility for formulation of policies, laws and regulations in the following areas: climate change, water and sanitation, waste, energy, and environment protection. Moreover, MCCEE takes the lead in implementing donor-funded projects in these sectors. To this effect, MCCEE is the lead IA for the proposed Project.

83. **EPA** is a regulatory agency affiliated with MCCEE, established under a presidential decree on 18 December 2008. The EPA is responsible for implementation of regulations concerning waste management, pollution prevention, environmental protection and conservation and sustainable development, established under the Environment Protection and Preservation Act (4/93) and other environment protection laws. In this regard, EPA is responsible for implementation of the EIA Regulations (2012/R-27) of Maldives. In addition, the agency is responsible for developing the environmental standards required for implementation of the regulations.

Table 7: Comparative analysis of Government and ADB safeguard requirements

ADB SPS Requirement	ADB SPS Policy Principle	Maldives Regulation	Gap	Measures to Address Gap
1. Screening of environmental impacts and risks	Use a screening process for each proposed project, as early as possible, to determine the appropriate extent and type of environmental assessment so that appropriate studies are undertaken commensurate with the significance of potential impacts and risks.	The EIA regulations require screening of EIA reports for projects that do not fall in the categories of mandatory EIAs and Exemption list. If further information is required during the screening phase, an option for IEE is provided in the EIA regulations. <sup>13</sup>	No significant gap. ADB does not have an exemption list and screening is mandatory, even if a project is locally exempt.	Undertake screening of all sub-projects even though exempted by EPA.
2. Assessment of potential impacts and risks to physical, biological, socio-economic and PCR of the project affected area	Conduct an environmental assessment for each proposed project to identify potential direct, indirect, cumulative, and induced impacts and risks to physical, biological, socioeconomic (including impacts on livelihood through environmental media, health and safety, vulnerable groups, and gender issues), and PCR in the context of the project's area of influence. Assess potential transboundary and global impacts, including climate change. Use strategic environmental assessment where appropriate.	The EIA regulations define several levels of assessment, depending on the type, scale and potential impacts of the project. <sup>14</sup>	The EIA regulations focus on the natural environment rather than on social considerations such as livelihoods, vulnerable groups, gender issues and health & safety. There are no requirements for SEA in the regulations.	Even though not required by the EIA regulations, incorporate livelihoods, vulnerable groups, health & safety and gender issues in the ToRs for environmental assessments of all project activities. SEA is not considered necessary for this project.
3. Examination of alternatives for project's location, design, technology and potential environmental impacts	Examine alternatives to the project's location, design, technology, and components and their potential environmental and social impacts and document the rationale for selecting the particular alternative proposed. Also consider the no project alternative.	The EIA regulations specify that alternatives need to be explored. <sup>15</sup>	No gaps identified.	None needed.

<sup>13</sup> Article 08 of the regulations<sup>14</sup> Article 08 of the regulations<sup>15</sup> Article 12 and schedule E of the regulations

ADB SPS Requirement	ADB SPS Policy Principle	Maldives Regulation	Gap	Measures to Address Gap
4. Preparation of Environmental Management Plan	Avoid, and where avoidance is not possible, minimize, mitigate, and/or offset adverse impacts and enhance positive impacts by means of environmental planning and management. Prepare an EMP that includes the proposed mitigation measures, environmental monitoring and reporting requirements, related institutional or organizational arrangements, capacity development and training measures, implementation schedule, cost estimates, and performance indicators. Key considerations for EMP preparation include mitigation of potential adverse impacts to the level of no significant harm to third parties, and the polluter pays principle.	The EIA regulations stipulate that, following screening, standalone EMPs may be appropriate management tools for certain projects. Where an EIA has to be prepared, an EMP forms a key component of the study. <sup>16</sup>	No gaps identified.	None needed.
5. Public consultation and consideration of concerns	Carry out meaningful consultation with affected people and facilitate their informed participation. Ensure women's participation in consultation. Involve stakeholders, including affected people and concerned nongovernment organizations, early in the project preparation process and ensure that their views and concerns are made known to and understood by decision makers and taken into account. Continue consultations with stakeholders throughout project implementation as necessary to address issues related to environmental assessment.	The EIA regulations require stakeholder/public consultation during the EIA preparation phase. <sup>17</sup>	The ADB policy highlights topics such as informing all stakeholders, ensuring the involvement of all groups in consultations, and consultation during project implementation.	Develop a project-level stakeholder engagement framework or plan that specifically addresses all aspects of information sharing and consultation, for all project phases.
6. Grievance redress mechanism	Establish a GRM to receive and facilitate resolution of the affected people's concerns and grievances regarding the project's environmental performance.	No specific requirements for project-related GRMs.	No specific government regulation on addressing grievances.	Define project-level GRM in EARF.  All EIAs/EMPs prepared for all subprojects should have a GRM.
7. Disclosure of draft and final	Disclose a draft environmental assessment (including the EMP) in a timely manner, before	The EIA regulations require all reports to be published on the EPA	Disclosure typically involves stakeholder	Present the key findings of the draft and final

<sup>16</sup> Article 8 of the regulations

<sup>17</sup> Article 12 and Schedule E of the regulations

<b>ADB SPS Requirement</b>	<b>ADB SPS Policy Principle</b>	<b>Maldives Regulation</b>	<b>Gap</b>	<b>Measures to Address Gap</b>
environmental assessment reports	project appraisal, in an accessible place and in a form and language(s) understandable to affected people and other stakeholders. Disclose the final environmental assessment, and its updates if any, to affected people and other stakeholders.	website, with a limited comment period. They also require the Executive Summary of the reports to be in Dhivehi language. <sup>18</sup>	and/or public workshops; these are not mandated in Maldives. Website disclosure might be effective in terms of reaching the affected public, especially in the outer islands.	EIA/EMP reports prepared for the project and sub-projects to the affected public. Publicize the availability of reports on the EPA website.
8. Implementation of effective monitoring	Implement the EMP and monitor its effectiveness. Document monitoring results, including the development and implementation of corrective actions, and disclose monitoring reports.	The EIA regulations require preparation of a section on monitoring, where monitoring indicators and related aspects are defined. <sup>19</sup>	No gaps identified.	None needed.
9. Protection of critical habitats and protected flora and fauna	Do not implement project activities in areas of critical habitats, unless (i) there are no measurable adverse impacts on the critical habitat that could impair its ability to function, (ii) there is no reduction in the population of any recognized endangered or critically endangered species, and (iii) any lesser impacts are mitigated. If a project is located within a legally protected area, implement additional programs to promote and enhance the conservation aims of the protected area. In an area of natural habitats, there must be no significant conversion or degradation, unless (i) alternatives are not available, (ii) the overall benefits from the project substantially outweigh the environmental costs, and (iii) any conversion or degradation is appropriately mitigated. Use a precautionary approach to the use, development, and management of renewable natural resources.	Protected Area Regulations.  Protected Species Regulations.  These regulations require management plans to be developed for protected areas and species, and specify fines for non-compliance. <sup>20</sup>	The ADB policy has specific terminology on habitats and specific guidance on habitat assessment methodologies, as the basis for any further actions or planning.	Use ADB-style approach to habitat assessment as foundation in biodiversity studies and management.

<sup>18</sup> Article 13 of the regulations

<sup>19</sup> Article 12 and Schedule E of regulations

<sup>20</sup> Article 12 of the protected area regulations and article 09 of protected species regulations

ADB SPS Requirement	ADB SPS Policy Principle	Maldives Regulation	Gap	Measures to Address Gap
10. Application of pollution prevention and control technologies	Apply pollution prevention and control technologies and practices consistent with international good practices as reflected in internationally recognized standards such as the World Bank Group's EHS Guidelines. Adopt cleaner production processes and good energy efficiency practices. Avoid pollution, or, when avoidance is not possible, minimize or control the intensity or load of pollutant emissions and discharges, including direct and indirect greenhouse gases emissions, waste generation, and release of hazardous materials from their production, transportation, handling, and storage. Avoid the use of hazardous materials subject to international bans or phaseouts. Purchase, use, and manage pesticides based on integrated pest management approaches and reduce reliance on synthetic chemical pesticides.	Waste Management Act. Agriculture Pesticide Control Act.	ADB requirements are more stringent.  Many guidelines and standards to be prepared under the Waste Management Act are yet to come into force. .	Apply ADB standards where more stringent and where local standards/guidelines are missing.
11. Ensure worker and community health and safety (H&S)	Provide workers with safe and healthy working conditions and prevent accidents, injuries, and disease. Establish preventive and emergency preparedness and response measures to avoid, and where avoidance is not possible, to minimize, adverse impacts and risks to the health and safety of local communities.	Construction Site Health and Safety Regulations. These cover both community and worker health. <sup>21</sup>  For projects above a value of MVR 1.5 million (~\$100,000), the act requires preparation of a health and safety plan and an emergency response plan. <sup>22</sup>	ADB policy requires all projects, no matter how small, to consider health and safety during both planning and implementation.	Develop and include a standard, simple H&S code of practice for all small project activities, with an increased level of detail for sub-projects requiring an EMP.
12. Conservation of physical cultural resources and avoidance of	Conserve PCR and avoid destroying or damaging them by using field-based surveys that employ qualified and experienced experts during environmental assessment. Provide for the use of "chance find" procedures that include a pre-	The Heritage Act defines chance find procedures. <sup>23</sup>	ADB policy mandates a proactive approach to PCR management by assessing project sites for their PCR	Ensure all sites where project physical activities will occur are screened for potential PCR.

<sup>21</sup> Chapter 2 of the regulations concerns measures that need to be taken to ensure public and worker safety

<sup>22</sup> Article 5 and 6 of the regulations respectively

<sup>23</sup> Articles 28 and 29 of the Act.

<b>ADB SPS Requirement</b>	<b>ADB SPS Policy Principle</b>	<b>Maldives Regulation</b>	<b>Gap</b>	<b>Measures to Address Gap</b>
destroying or damaging them	approved management and conservation approach for materials that may be discovered during project implementation.		potential during the planning stage, as well as a reactive approach (Chance Finds procedures).	

## G. Other Ministries and Departments

84. Other key government agencies at central government level that will play an important role in implementation of the project are the **MAAW** and **MMS**. The table below summarizes the roles of these institutions and how they relate to the project.

**Table 8: Institutional Roles**

Institution	Key Mandate	Relevant project Component
MAAW	Promote and support sustainable and market oriented agricultural production, food security and household income.	OP3 (IA)
MMS	Collect and analyse meteorological information including forecasting, and provision of this information to the public in a timely manner including information on different weather-related hazard warnings.	OP1

## H. Atoll and Island Councils

85. The roles and responsibilities of island/city and atoll councils are determined by the Decentralization Act of the Maldives. Provisions in the act provide the councils with important environmental governance powers, especially to island and city councils. These include the following:

- (i) As per article 68 of the Act, for any development project undertaken in an island consultation needs to be undertaken with the city or island council and other relevant authorities established in the island. The same article also stipulates that any EIA reports developed for any project need to be shared with the island/city and atoll councils, and that information on the impacts and mitigation measures should be shared with the council.
- (ii) Under Chapter 14 of the Act the councils have the power to formulate regulations on matters which fall within their jurisdiction, with the advice of the LGA. In addition, and again with the advice of the LGA, the city councils, atoll councils and island councils all have the power to make regulations about waste management and disposal on their islands.
- (iii) Services provided by island councils under this Act include disposing of waste in a reasonably safe manner at the island level, so as it does not create any inconvenience to the community. The councils have the power to charge a fee or rent for the services they provide, including for safe disposal of wastes, the fees to be determined in consultation with the people of the area.
- (iv) The island/city councils have responsibility for preparation of island/city development/land use plans in consultation with the community, and submitting these to relevant government authorities for approval.
- (v) Provision of municipal services.
- (vi) Implementing development projects planned and assigned by the government to the councils, in line with the island/city development/land use plans.

## I. Environmental Standards

86. Maldives has yet to establish a comprehensive set of environmental standards. In their absence, reliance is placed on international best practice standards. Reference to some of these, especially with respect to water quality, is made in the [EIA data collection guidelines](#) published by EPA.

87. **Sea water:** the guidelines provide the following reference ranges for sea water quality.

**Table 9: Sea water standards**

Parameter	Reference Range
Temperature	18 °C and 32 °C *Changes should not surpass 1 °C above the average long-term maximum
Salinity	3.2% - 4.2%
pH	8.0-8.3 *Levels below 7.4 pH cause stress
Turbidity	3-5 NTU >5 NTU causes stress
Sedimentation	Maximum mean annual rate 3 mg/cm <sup>2</sup> /day Daily maximum of 15mg/cm <sup>2</sup> /day
Nitrates	< 5 mg l <sup>-1</sup> NO <sub>3</sub> -N
Ammonia	Max. 2-3 mg l <sup>-1</sup> N
Phosphate	0.005 - 0.020 mg l <sup>-1</sup> PO <sub>4</sub> -P
Sulphate	2 mg l <sup>-1</sup> and 80 mg l <sup>-1</sup>
Biological Oxygen Demand (BOD)	< 2 mg l <sup>-1</sup> O <sub>3</sub>
Chemical Oxygen Demand (COD)	< 20 mg l <sup>-1</sup> O <sub>2</sub>

88. The EPA data collection guidelines provide methodologies to follow for marine benthic assessment, terrestrial assessment, water quality and beach profiling, amongst others.

89. **Drinking water:** the URA has defined [Supply Water Standards](#) for desalinated drinking water supplied to households. The table below provides the reference ranges under this standard.

**Table 10: Desalinated drinking water standards**

Parameter	Reference Range
Physical Appearance	Clear and colorless
pH	6.5 – 8.5
Free Chlorine	0.004 – 0.2 mg/l
Electrical Conductivity (maximum allowable range)	< 1000 µs/cm
Electrical Conductivity (recommended range)	300 – 700 µs/cm
Total Coliform	0/100ml CFU
Fecal Coliform	0/100ml CFU
Turbidity	< 1 NTU
Total Dissolved Solids (Maximum allowable range)	<500 mg/L
Total Dissolved Solids (recommended range)	150 - 350 mg/L
Chlorides	<200 mg/l
Nitrates	<50 mg/l
Ammonia	<0.5 mg/l
Iron	<0.3 mg/l
Hydrogen Sulphide	0.05 mg/l
Total Hardness	<75 mg/l
Suspended Solids	5-750 mg/L
E. Coli	0/100 ml CFU

90. **Air quality, noise and vibration:** national standards have yet to be established. In such cases reference is often made to best practice standards, for example World Health Organization (WHO) air quality standards and the EHS guidelines of the International Finance Corporation (IFC). Relevant WHO air quality and noise standards are listed in Table 11 and



Table 12. Vibration is not considered to be a significant risk factor but if necessary reference could be made to international standards such as BS 5228-4, 1992 (Table 13)<sup>24</sup>.

**Table 11: Ambient Air Quality Standards**

Parameter	Maldives Ambient Air Quality Standard ( $\mu\text{g}/\text{m}^3$ )	Averaging Time	WHO Air Quality Guidelines 2021 ( $\mu\text{g}/\text{m}^3$ )
PM10, $\mu\text{g}/\text{m}^3$	-	24 hrs	45
PM10, $\mu\text{g}/\text{m}^3$	-	1 yr	15
PM2.5, $\mu\text{g}/\text{m}^3$	-	24 hrs	15
PM2.5, $\mu\text{g}/\text{m}^3$	-	1 yr	5
SO <sub>2</sub> , $\mu\text{g}/\text{m}^3$	-	24 hrs	40
NO <sub>2</sub> , $\mu\text{g}/\text{m}^3$	-	24 hrs	25
NO <sub>2</sub> , $\mu\text{g}/\text{m}^3$	-	1 yr	10
CO	-	24 hrs	4000
Ozone (O <sub>3</sub> ), $\mu\text{g}/\text{m}^3$	-	8 hrs	100

**Table 12: Noise Standards**

Receptor / Source	Maldives National Noise Level Standards (dBA)		WHO Guidelines Value for Noise Levels Measured Out of Doors (One Hour LAeq in dBA)	
	Day	Night	0700 - 2200	2200 - 0700
Residential, institutional, educational	-	-	55	45
Industrial, commercial	-	-	70	70

**Table 13: Vibration Limits relating to Minor or Cosmetic Damage to Buildings**

Building Classification	Intermittent Vibration (PPV, mms-1)	Continuous Vibration (PPV, mms-1)
Residential in generally good repair	10	5
Residential where preliminary survey reveals significant defects	5	2.5
Industrial/commercial – light and flexible structure	20	15
Industrial/commercial – heavy and stiff structure	30	15

PPV: Peak Particle Velocity  
Source: BS 5228:1992 Part 4

91. **Other** relevant guidelines, standards and lists are summarized in the table below.

**Table 14: Guidelines and lists**

Standard/Guidelines/List	Implementation Authority	Brief Description
<a href="#">Waste Transportation Guideline for Vehicles</a>	URA	Provides requirements for waste transportation vehicles.
<a href="#">Waste Transportation Guideline for Vessels</a>	URA	Provides requirements waste transportation by marine vessels.
<a href="#">Borehole Drilling Guideline</a>	URA	Defines technical specifications for all borehole drilling activities.
<a href="#">National Wastewater Quality Guideline</a>	URA	Defines maximum allowable standards of wastewater for various categories including

<sup>24</sup> BS 5228-4, 1992: British Standard Noise control on construction and open sites – Part 4: Code of practice for noise and vibration control applicable to piling operations

Standard/Guidelines/List	Implementation Authority	Brief Description
		discharge into deep sea and use for groundwater recharge.
<a href="#">Protected Area List</a>	EPA	Provides coordinates and other relevant information on all protected areas in Maldives.
<a href="#">Protected Birds List</a>	EPA	Provides a list of all protected birds in Maldives including common, scientific and local names.
<a href="#">Sensitive Area List</a>	EPA	Contains information on environmentally sensitive areas in Maldives where, when undertaking development projects, special considerations are required. These are not environmentally protected areas but are sensitive areas where development activities could be undertaken with relevant mitigation measures.
<a href="#">Guidelines for Coral Transplantation</a>	EPA	Provides guidelines to follow when transplanting corals from one location to another, for example as a mitigation measure when undertaking a development project.
<a href="#">Protected Trees List</a>	EPA	Lists the type, age and location information of protected trees in Maldives.
<a href="#">General Standards on the accommodation provided by Employers to Employees</a>	Ministry of Economic Development	Provides minimum requirements for restrooms and occupancy for all employee accommodation including temporary accommodation provided for construction workforce.

### III. THE PROJECT

#### A. Type and Location of the Project

92. The Project interventions are physical (grey-green engineering measures, facilities), economic (support for climate-adapted agriculture) and institutional (measures to build climate-related capacity within government and local communities).

93. Output 1 will be implemented in Addu City atoll (Gan), Hulhulé island (Greater Malé/Kaafu), and at national level; Output 2 will be implemented in Haa Dhaalu atoll (Kulhudhuffushi City); Output 3 will be implemented in Haa Dhaalu atoll (Hanimaadhoo, Kulhudhuffushi City, Nohivaranfaru). Output 4 demonstrations will initially be implemented in Haa Dhaalu atoll (Hanimaadhoo, Kulhudhuffushi City, Nohivaranfaru) and Addu City atoll (Hulhudhoo, Meedhoo and Hithadhoo) with the potential to be scaled up to national level, while the grant mechanism will be implemented nation-wide. Figure 1 to Figure 3 show the Project locations for Output 1, 2 and 3.

Figure 1: Project Locations in Addu City



Figure 2: Project Locations in Haa Dhaalu Atoll



Figure 3: Project Locations in Greater Malé



## B. Project Components

94. For this IEE, the following five subprojects under the Project have been selected as representative, as sufficient technical detail at concept design level is available to conduct the initial environmental examination:

- (i) Output 1: Subproject 1.1 – Installation of weather radar system in Addu City
- (ii) Output 1: Subproject 1.2 – Existing weather radar system in Malé upgraded
- (iii) Output 2: Subproject 2.1 – Inland drainage network improvements, including bioswale
- (iv) Output 2: Subproject 2.2 – Protection of the eastern shoreline
- (v) Output 3: Subproject 3.1 – Construct a multipurpose facility at HAC campus

95. **Output 1 Subproject 1.1 – Installation of weather radar system in Addu City.** A S band radar band (with an emission wavelength in the vicinity of 10 cm), with a thin beam ( $1^\circ$ ) and a sufficient scanning capacity (up to 4 rotations per minute) will be procured installed at Addu International Airport (Gan) in Addu City (Figure 4). A radar tower building of max. 24 m height will be constructed to house the radome ( $30 \text{ m}^2$  at base, 11 m<sup>2</sup> diameter), radar equipment room ( $50 \text{ m}^2$ ), appliances room ( $70 \text{ m}^2$ ), operations room ( $10 \text{ m}^2$ ) and maintenance room ( $25 \text{ m}^2$ ). The supporting works will include architectural and civil works, electrical works, air-conditioning and ventilation works, and plumbing works. Three locations (circled in yellow in Figure 4) in close vicinity are under consideration, to be finalized in the detail design phase.



**Figure 4: Proposed Addu Radar Locations**



Source: ICEM-Epoch via Google Maps, 2024

96. The current status of the land for option 1 and options 2 and 3 is shown in Figure 5 and Figure 6, respectively.

**Figure 5: Current status of the land planned for the weather radar system (option 1): view from the north, east, south and west**



Source: ICEM-Epoch, 2024





Source: MMS, 2024

**Figure 6: Current status of the land also considered for the weather radar system (option 2): view from the south and west (no.2) and north and east (no. 3)**



Source: ICEM-Epoch, 2024

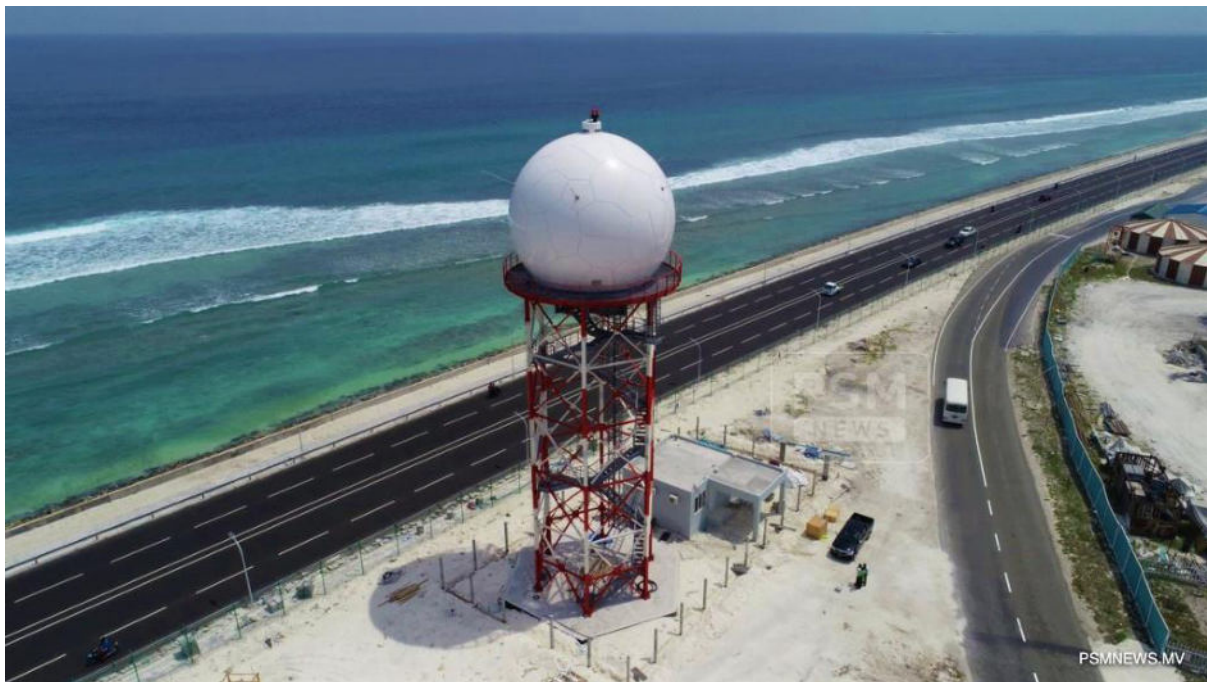




Source: MMS, 2024

97. **Output 1 Subproject 1.2 – Existing weather radar system in Malé upgraded.** The DWSR-8501S Doppler Weather Surveillance Radar System which is located at Malé Velana International airport (Hulhulé) (Figure 7) will be upgraded to ensure it remains operational for the next 15 years. Following an in-depth assessment to be undertaken during the investment project, the upgrades will likely include repair and painting of the metal radar tower, repair or replacement of power supply elements, of the air conditioning, of the radome, of antenna gear and control, of RF elements such as waveguides and rotary joints, and provision of spare parts (including a spare magnetron). The computer which tailors the radar products may also be modernized.

**Figure 7: Doppler Radar in Malé**

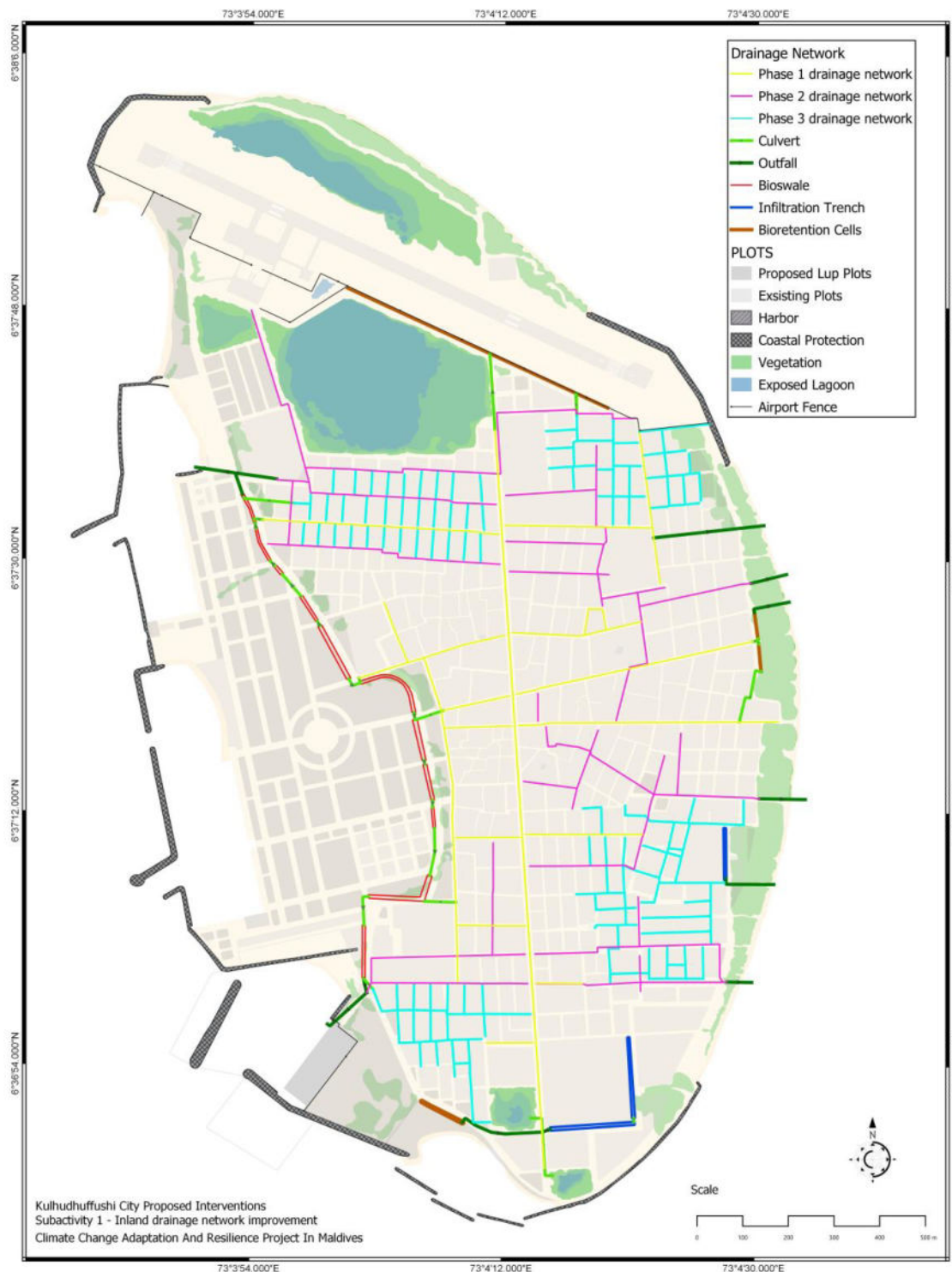


Source: PSM News, 2019

98. **Output 2 Subproject 2.1 – Inland drainage network improvements, including bioswale.** The existing drainage network in Kulhudhuffushi City will be improved by (i) construction of 13 interconnections between Phase 1 road drainage systems; (ii) provision of additional pipes in the Phase 1 road drainage systems; (iii) connecting 335 m of roads to existing aqua cells; (iv) installation of 16 infiltration pits in the Phase 2 road drainage system; (v) construction of the Phase 3 drainage network in four flood hotspot areas, comprising drains of 1690 m, 3035 m, 1880 m and 1795 m; (vi) installation of a 1040 m bioswale, 360 m culvert and 295 m outfall and culvert inspection chamber; (vii) provision of outfall connections from Phase 1 (155 m box culvert) and 3 (30 m and 110 m box culverts) into the bioswale; (viii) construction of three bioretention cells in the east, north and south of the island; (ix) connection of the outfall from Phase 1 and Phase 3 to the bioretention cells; (x) construction of an infiltration trench; and (xi) constructing of a 15 m box culvert to discharge runoff from selected Phase 3 roads into the infiltration trench. Figure 8 shows the locations of the subproject interventions.



**Figure 8: Proposed drainage network interventions under Subproject 2.1**



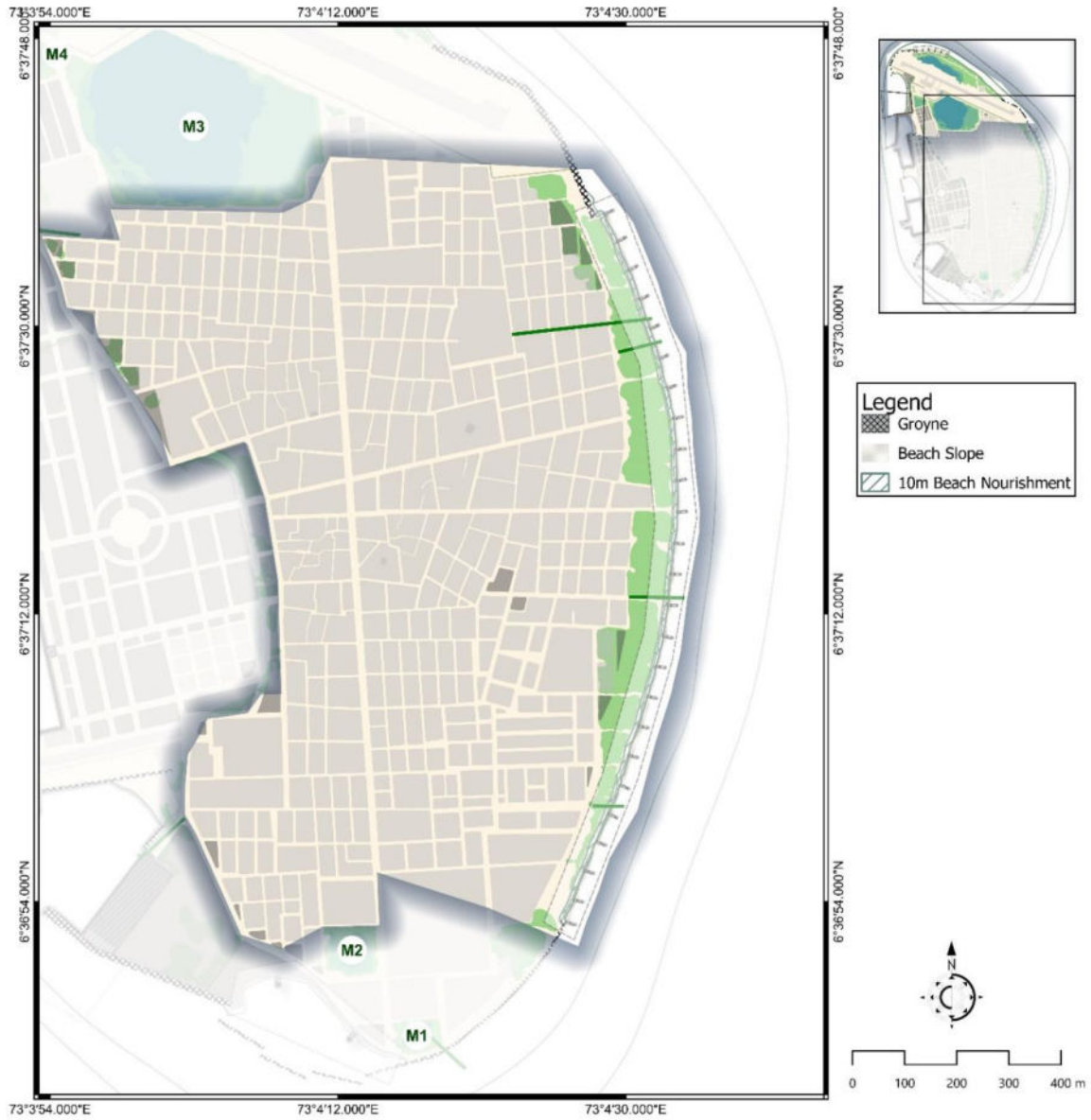
99. **Output 2 Subproject 2.2: Protection of the eastern shoreline.** The 1,500 m long eastern shoreline of Kulhudhuffushi City (Figure 9) will be further protected from erosion and coastal flooding by nourishing the shoreline. To achieve a 7-m additional ridge crest while maintaining the current beach slope, about 35 m<sup>3</sup> sand per m width is required. To prevent loss of sediment alongshore, approximately 25 groyne, each 20 m in length will be required (Figure 10).

Figure 9: Drone imagery (left) and photo (right) of the Eastern coastline of Kulhudhuffushi City



Source: ICEM-Epoch, 2024

Figure 10: Concept layout for a potential groyne field under Subproject 2.2



Source: ICEM-Epoch, 2024



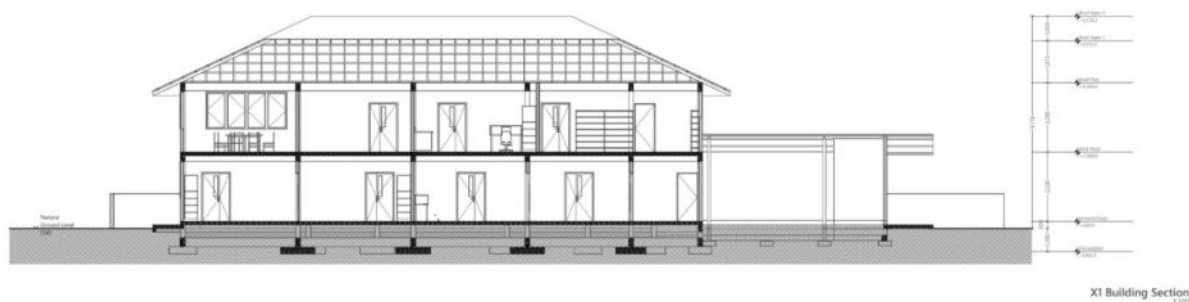
100. **Output 3 Subproject 3.1 – Construct multipurpose facility at HAC campus.** The Output 3 subprojects involve updating of the existing Hanimaadhoo Agriculture Center and associated capacity building and farmer training (Subproject 3.2). The Center is located on a fenced plot of land allocated for MAAW use (Figure 11). To enhance the HAC's capacity to support the country's agricultural development and food security needs, its current facilities require updating. The Project will design and construct a multi-purpose facility including a small training center, office and a small laboratory. The facility is anticipated to have two or three floors (subject to detailed design), with a lobby, parking space, office area and multi-purpose hall. On the upper floor the facility will provide accommodation space for staff and extension workers (Figure 12). The laboratory will be either be connected to or directly opposite the multi-purpose facility, and is anticipated have a soil lab and chemical storage on the ground floor, and a pathology lab and entomology lab above. Existing HAC buildings (Figure 13) will be retained and modernised.

**Figure 11: Hanimaadhoo Agriculture Center**

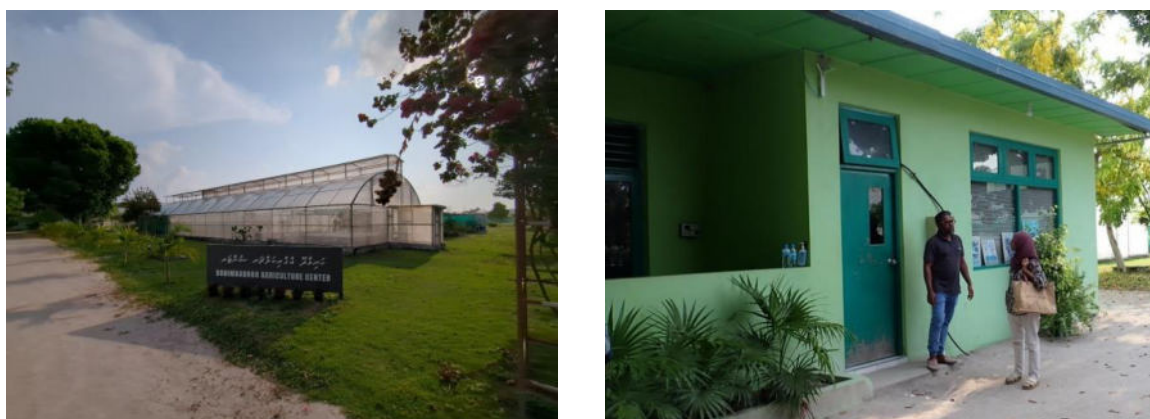


Source: ICEM-Epoch, 2024

**Figure 12: Indicative sketch of HAC multipurpose facility**



Source: ICEM-Epoch, 2024

**Figure 13: Typical Existing Structures at HAC**

Source: ICEM-Epoch, 2024

### C. Climate Change Adaptation Considerations

101. The likelihood, duration and intensity of extreme weather events such as extreme rainfall induced floods, wave action, cyclone winds and storm surges are to increase due to climate change. The effectiveness and maintenance requirements of the Project's supported civil works and equipment (e.g., drainage infrastructure, nature-based infiltration systems, onshore and offshore coastal protection infrastructure, small-scale agricultural technology systems and other measures) may be negatively impacted by these extreme weather events and sea level rise, necessitating more robust design and proactive maintenance. Impacts may be direct or indirect: damage, physical degradation, saltwater intrusion, corrosion of assets, water pollution, habitat loss or interruption of transport and services.

102. A series of options have been considered in response to the identified climate risks, on climate information systems, risk-informed land use planning, coastal protection, flood mitigation, water, agriculture and food security. The following adaptation measures have been prioritized so that the Project takes into account climate change and its impacts:

**Table 15: Project Components addressing Climate Change**

Adaptation Activity	Target Climate Risk	Adaptation Finance Justification
Weather and climate monitoring systems will be improved for better coverage, accuracy and downscaling of climate information.	Increase in temperature and precipitation, frequency and intensity of extreme weather events (pluvial flood, coastal floods, wave action, heatwaves and drought) and sea level rise	The project is predicated on climate change risks.
Multi-year training program will strengthen the capacity of MMS on risk assessment, data interpretation and translation, climate modeling, weather and hazard forecasting and early warning.		
A behavior change communication program will support community action on climate change adaptation and disaster risk reduction.		
Stormwater drainage and filtration systems and nature-based solutions such as bioswales will be constructed for inland flood protection.		
Offshore and nearshore coastal protection structures will be improved to prevent overtopping and erosion.		
Mangrove ecosystems will be restored through reconnectedness to the sea and improved management.		

Adaptation Activity	Target Climate Risk	Adaptation Finance Justification
Detailed design will include analysis of climate data and recommendations to address future climate changes acknowledging high uncertainties		
New design and construction standards for green and grey coastal and flood protection and resilience building measures will be formulated		
HAC will be upgraded to an advanced research and advisory hub on climate resilient agriculture and supported to implement a farmer field school program		
High-level technologies and farming techniques on urban agriculture will be demonstrated and supported through a grant mechanism targeted at women and youth entrepreneurs		

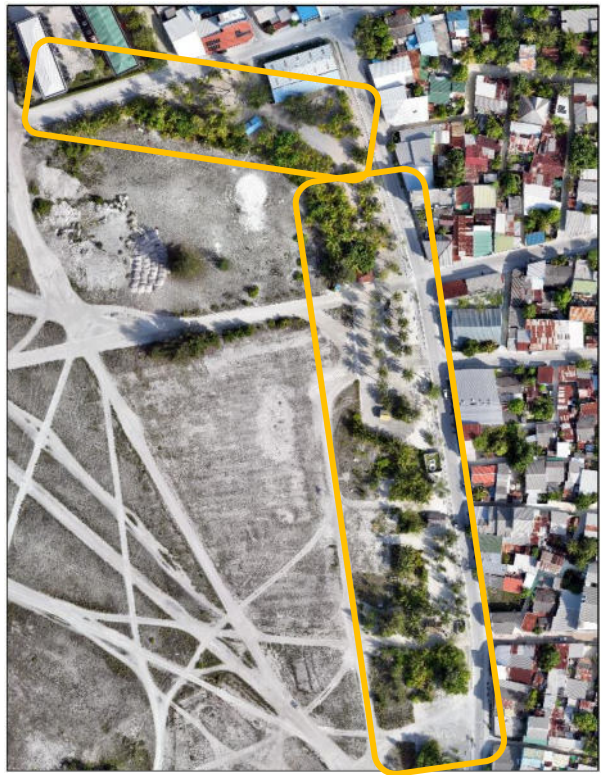
#### D. Design and Construction Activities

103. Civil works for the construction of the Addu radar system will involve excavation for the footings, erection of the tower and installation of the radar dome and equipment, together with a short length of paved road for access and all services. Construction materials and equipment will be stored at site, together a temporary site office (portakabin). The works will require limited machinery (e.g., excavator, compactor, mobile crane, cement mixer). The site is secure, being inside the perimeter of the Gan international airport. Imported materials and parts will be flown to the airport or brought by ship to the nearby port. Similar comments apply to the Malé installation, which is an upgrade rather than a new installation. Each installation should take about six months to complete.

104. On Kulhudhuffushi, construction of the stormwater drainage system will involve trenching, the installation of pre-formed concrete drain sections and some culverts, and placement of gravel and sand to promote infiltration (Figure 8). Construction of the north-south bioswale will take advantage of the existing depression between the original island and the newly-reclaimed land on the western side (Figure 14). A perforated pipe and infiltration layer will be placed at the bottom of the swale, carefully routed to minimize disruption to existing woody vegetation and social amenities. If necessary, mature shrubs will be removed and replanted using excavators to extract complete rootballs. A small construction camp will be established either in existing commercial compounds on the island or unused reclaimed land. Sand and gravel will be sourced from the large existing stockpile on the west wise of the island. Installation is planned to take 12-18 months.



Figure 14: Current status of the area between original island and reclaimed area, and potential bioswale location (yellow box)







Source: ICEM-Epoch, 2024

**Figure 15: Current beach access points at the eastern shoreline: north-east (left) and south-central (right)**



Source: ICEM-Epoch, 2024

105. Based on the current concept design, the installation of the coastal protection works on the eastern shore may involve (i) construction of a series of rock groynes perpendicular to the shoreline (Figure 10), and (ii) 'beach nourishment' by placing sand and gravel between the groynes to achieve the initial design profile. There is no local source for rocks; these are imported to Maldives by barge from India. They will be unloaded by grab crane at the harbor on the west side of the island and moved by dump truck to the eastern shore. Most of the way this will be on existing paved roads. Access to the beach will be from existing tracks already cut through the shoreline treebelt (Figure 15) and then along the beach on a temporary track made from the first layer of imported sand. The sand will be sourced from the existing stockpile (Figure 16). Rocks will be dumped near their site of use, then placed by excavator. Sand will be brought by dump trucks and smoothed to the design profile by light dozer or excavator.

**Figure 16: Kulhudhuffushi: Sand Stockpile**

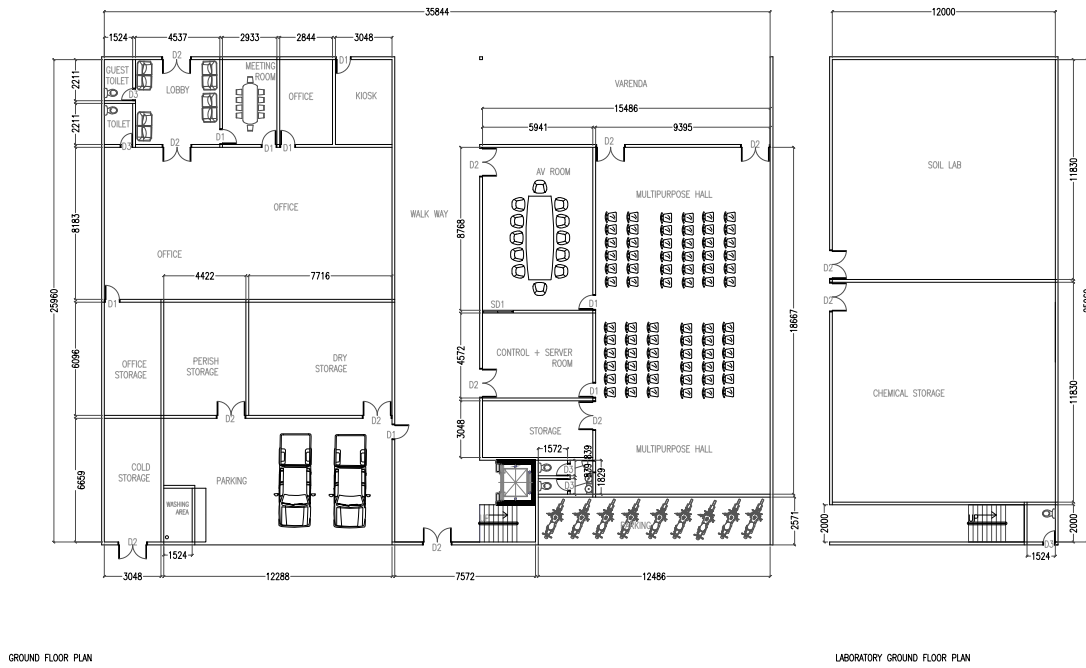


*Source: ICEM-Epoch, 2024*

106. Construction of the new facilities at HAC (Figure 11 and Figure 17) will follow the usual sequence for construction of multiple buildings on a relatively small site: part of the area will be fenced off as a contractor's yard for materials, vehicles, equipment and site offices; structures to be removed will be stripped of useful and recyclable material before demolition; after setting out, excavation for footings will be done, foundations and/or pads poured, building frames erected and roofed, then wall claddings, floors etc. installed, followed by interior fixtures and fittings. This process will be carefully sequenced to fit with the installation and connection of services (water, sewerage, electricity, cable). Materials and fuel will be brought to the site from the adjacent port on the west side of the island. After commissioning and handover, the contractor's yard will be cleared and the land restored to its previous condition. All inert waste will be used as fill, all other waste will be separated and then recycled or disposed of through appropriate channels.



**Figure 17: Conceptual design for layout of new HAC Facility**



Source: ICEM-Epoch, 2024

## **E. Operational Phase**

107. After construction and commissioning, the new and upgraded radar installations will be handed over to MMS for operation. MMS is a well-established government agency with technical personnel able to perform normal operational procedures, and who will be further trained in use of the new and upgraded equipment. The Malé system will not require consumables. The Addu system will use some diesel fuel when the backup generator is required to ensure uninterrupted operation.

108. Kulhudhuffushi City Council will operate and maintain the works constructed under Output 2 after hand over. Operation and maintenance of the stormwater drainage system on Kulhudhuffushi will involve regular inspections to check for siltation, blockages and damage from traffic and construction activities. It is a passive system, not requiring pumping. The coastal protection works are also passive, maintenance needs being based on regular monitoring to check on sediment movement and the need for further beach nourishment.

109. On Hanimaadhoo, the upgraded HAC will operate as at any other agricultural small-scale research and training institute: inputs will be needed for the on-site laboratory, mechanical workshop (for farm machinery and equipment), lecture rooms, offices and accommodation. Fuel (diesel), lubricants, paint and any other potentially hazardous materials will be stored in purpose-built facilities (e.g., with secondary containment). All services will be connected to the island's grid (water, sewerage, electricity, cable). Waste will be separated on site and recycled through the island's waste disposal system.

## **F. Decommissioning Phase**

110. The weather radars do not have a fixed lifespan and will not be decommissioned at a set date. Instead, they will be maintained, repaired, and upgraded as appropriate. Eventually, it is possible that the supporting and housing structures will require replacement or they may become obsolete. At this time, they will be dismantled, with any recyclable materials entering the appropriate waste stream and inert materials (e.g. concrete rubble) being crushed for re-use or used as fill.

111. On Kulhudhuffushi the drainage system has no fixed lifespan, the physical components being almost entirely gravel and concrete. Decommissioning is not foreseen. The coastal protection works also have no foreseen decommissioning date. The rock groynes are regarded as permanent structures.

112. On Hanimaadhoo the new facilities of the HAC will have a limited lifespan, as with all institutional buildings in tropical marine climates. Decommissioning will involve the removal of all useful fixtures and fittings, demolition of the structures including separation of recyclable materials such as metal frames and wiring and combustibles such as wood, and disposal of the remaining debris probably as fill. Treatment of the site will then be in accordance with its future designated use, e.g., for further development as part of the built environment or restoration to open space and/or agriculture.

## **G. Contract Packaging and Project Cost**

113. All the physical project components are packaged into three works contract packages and four goods contracts as shown in Table 16. The project will soon commence bid preparation stage. Table 17 presents the component wise cost and implementation period.

**Table 16: Component Wise Cost and Implementation Schedule**

Subproject	Contract Packages	Implementing Agency	Cost (USD million)	Implementation Period (months)
Subproject 1.1 – Installation of weather radar system in Addu City	G01: Design, Supply and Installation of Radar System - including civil works for radar tower building, training and after-sale services	MCCEE	3,600,000	24
Subproject 1.2 – Existing weather radar system in Malé upgraded	G04: Malé Radar Refurbishment	MCCEE	850,000	24
	CW01: Malé Radar Tower refurbishment	MCCEE	150,000	24
Subproject 2.1 – Inland drainage network improvements, including bioswale	CW03: Coastal protection and inland flood protection works (including bioswale) at Kulhudhuffushi	MCCEE	8,500,000	36
Subproject 2.2 – Protection of eastern shoreline				
Subproject 3.1 – Construct multipurpose facility at HAC campus)	G02: Laboratory equipment for HAC facilities	MAAW	145,000	12
	G03: Procurement of Double cab vehicles	MAAW	70,000	12
	CW02: Design-build upgrading of HAC facilities	MAAW	2,000,000	36

## H. Implementation Arrangements

114. A new Project Management Unit (PMU) will be established within MCCEE to implement the entire project scope comprising of: (i) a PMU Director to manage the overall project, supported by a Project Manager; (ii) a Procurement Unit covering finance and procurement for the entire project; (iii) a Safeguard Unit covering environmental and social safeguards including gender-responsive stakeholder engagement; (iv) a Technical Unit for project implementation; and (v) and Support Staff. The PMU will:

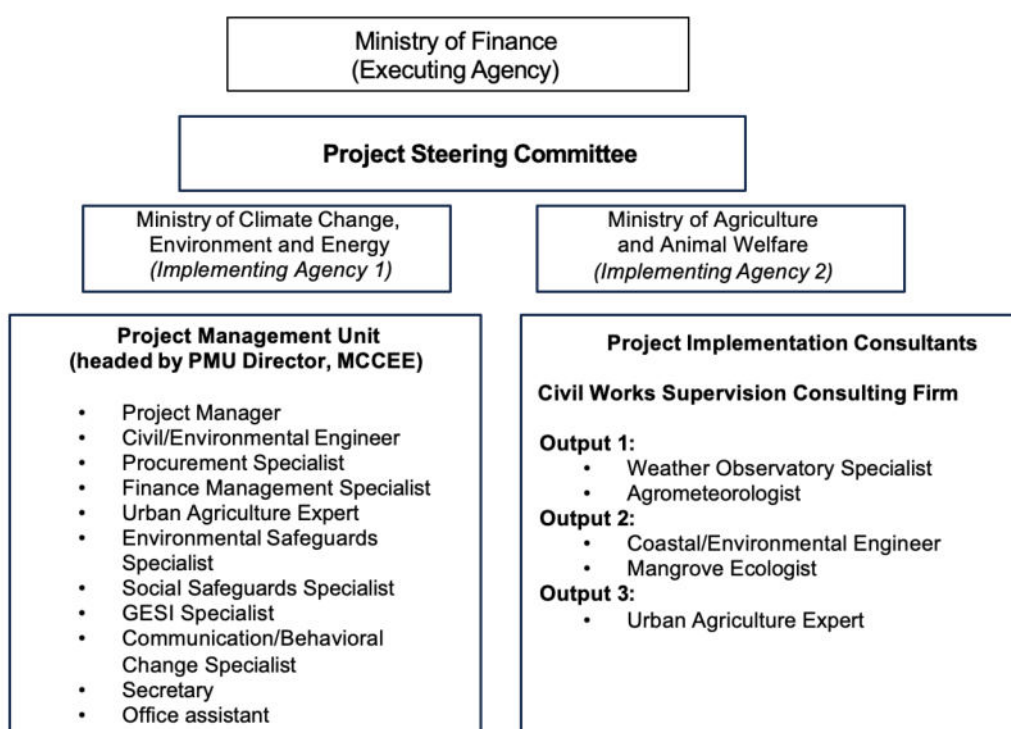
- (i) Be responsible for overall project management, implementation and monitoring.
- (ii) Monitor and ensure compliance with covenants, particularly timely submission of audited project accounts and compliance with safeguard requirements.
- (iii) Maintain project accounts and project financial records.
- (iv) Review the reports submitted by project implementation consultants (PIC).
- (v) Prepare bidding documents, request for proposals, and bid evaluation reports.
- (vi) Serve as point of contact with ADB, maintains project documents, and submit timely reports (quarterly progress reports and project completion report) to ADB by consolidating relevant inputs from project partners and island councils.
- (vii) Consolidate expenditures and prepare withdrawal applications for direct payment, reimbursements and use of advance account.
- (viii) Open and manage an advance account for the ADB Grant.

- (ix) Organize project orientation for participating island councils by informing them of the scope of the project.
- (x) Establish and maintain the project website by disclosing progress reports, safeguard monitoring reports and design reports
- (xi) Collect supporting documents and submit withdrawal applications to ADB via MOF.

115. Several individual PICs will be recruited to support the PMU. A firm will be recruited to provide construction supervision for all civil works under the Project.

116. The Project organizational structure and staffing is shown in Figure 18. The PMU will include two safeguards specialists, one of whom will be an environmental specialist, the other a social safeguards specialist. Expected PMU staff are listed in Table 17.

**Figure 18: Project Organizational Structure and Staffing**



Source: ADB

Table 17: Expected PMU Staffing

<b>PMU Staff</b>	<b>Location</b>	<b>Expected Total Months</b>	<b># Staff</b>
1 Project Director	Malé	36	1
2 Project Manager	Malé	60	1
<b>Procurement Unit</b>			
3 Procurement Specialist	Malé	66	1
4 Financial Management Specialist	Malé	66	1
<b>Safeguard Unit</b>			
5 Environmental Safeguards Specialist	Malé	66	1
6 Social Safeguards Specialist	Malé	36	1
7 Gender and Social Inclusion Specialist	Malé	36	1
<b>Technical Unit</b>			
8 Civil/Environmental Engineer	Malé	66	1
9 Urban Agriculture Specialist	Malé	66	1
10 Communication/Behavioral Change Specialist	Malé	66	1
<b>Support Staff</b>			
11 Secretary	Malé	66	1
12 Office Assistant	Malé	66	1

**I. Schedule**

117. Figure 19 shows the Project’s indicative implementation schedule.

**Figure 19: Project’s implementation schedule**

Indicative Activities		2025				2026				2027				2028				2029				2030			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
<b>Output 1: Capacity and awareness to plan, adapt, and respond to climate change strengthened</b>																									
1.1	Procure and award works and goods contracts																								
1.2	Install weather radar system, improved observation and monitoring instruments and IT infrastructure in Addu for data processing and forecasting																								
1.3	Repair the existing weather radar system in Male and make it operational																								
1.4	Pilot agro-climate forecast and advisories in selected agricultural islands																								
1.5	Design and deliver training program on weather monitoring, forecasting and early warning																								
1.6	Design and deliver community behavior change communication programs on climate change adaptation																								
<b>Output 2: Integrated nature-based and infrastructure solutions for flood and coastal protection and mangrove restoration developed</b>																									
2.1	Conduct ecological surveys, including on marine ecology, coastal modeling to avoid downdrift erosion and groundwater hydrology study and develop detailed designs of pluvial flood and coastal protection investments																								
2.2	Carry out inland drainage network improvements, including bioswale																								
2.3	Carry out measures for the protection of the eastern shoreline																								
2.4	Develop island-level drainage management plan																								
2.5	Develop island-level mangrove management plan																								
2.6	Develop national guidelines and associate training materials on nature based and infrastructure solutions for flood and coastal protection																								
<b>Output 3: Resilience of islands agri-food system enhanced</b>																									
3.1	Sustainable model city farming systems developed (Kulhudhuffushi and Hithadhoo)																								
3.2	Sustainable Model Urban Farming Developed (Nolhivaranfaru, Hulhudhoo, and Meedhoo)																								
3.3	Capacity building of HAC, Island communities, and urban farmers																								
<b>Output 4: Matching grant scheme to support adaptation innovations developed</b>																									



#### IV. ANALYSIS OF ALTERNATIVES

118. The analysis of alternatives has been carried out for the ‘with’ and ‘without’ project alternative, alternate project locations and alternative technologies. These are discussed in the following sections.

##### A. With/Without Project

119. **OP1 Subproject 1.1 – Installation of weather radar system in Addu City.** The presence of a Doppler weather radar in Addu will allow for production of detailed pictures of the intensity of rain cells within a radius of 200 km or more, with images separated by intervals of a few minutes and with a resolution of typically 1 km. This will be a key input for improving the weather forecasters’ understanding of the overall weather situation and preparing more accurate heavy rain and strong winds occurrence predictions. The radar will be most useful if MMS engages in nowcasting<sup>25</sup> (prediction of rain and strong wind from thunderstorms up to one hour in advance) for issuing warnings to the population and other users such as aviation, fishing or marine activities taking place within the radar range. The data could also feed into numerical weather prediction models. If the subproject is not implemented, the accuracy of weather forecasting over the south of Maldives will remain limited. The absence of a ground-based radar means rain intensity estimation will remain variable and low, and wind estimation accuracy will remain poor.

120. **OP1 Subproject 1.2 – Existing weather radar system in Malé upgraded.** The Doppler weather radar in Malé is currently the only one in the country, and is a critical component of the national weather observation system. The radar is suffering from ageing components and parts, and some software needs to be upgraded or replaced for optimal interfacing with the MESSIR NEO system which is expected to provide radar mosaicking with the Addu radar, and nowcasting. If the subproject is not implemented, the country will be without a ground-based weather radar, severely limiting the accuracy of weather observation and forecasting.

121. **OP2 Subproject 2.1 – Inland drainage network improvements, including bioswale.** Stormwater flooding on the island is a major concern, as noted by stakeholder consultation and reported events. Hydraulic rainfall-runoff modelling confirmed three major flooding areas with average ponding depths in the range of 0.43 m to 0.82 m for historic rainfall events, with maximum ponding depths in the range of 0.7 m to 1.23 m.

122. Kulhudhuffushi City currently has a stormwater drainage system in place for certain areas only. These were implemented as part of Phase 1 of the road development project. The stormwater drainage system is being expanded alongside the ongoing Phase 2 road development works. A hydraulic rainfall-runoff model was run for future rainfall events as per the SSP585 climate change scenario, considering completion of the phase 2 road developments and the stormwater drainage system. Even with the additional drainage services provided by the phase 2 drainage system, average ponding depths in the range of 0.25 m to 0.31 m were predicted, with a maximum ponding depth in the range of 0.59 m to 0.67 m for a 10-year return period.

123. Without the project intervention, residential areas including housing, schools, community spaces and government offices (Northern Office Complex: Northern branch of the High Court of the Republic of Maldives, Prosecutor General’s Office Northern branch and MIRA Kulhudhuffushi branch) will continue to be negatively affected by rainfall flooding.

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<sup>25</sup> See for instance WMO, 2017. *Guidelines for nowcasting techniques*. Rep. WMO-1198, 82 pp.



124. **OP2 Subproject 2.2 – Protection of the eastern shoreline.** Coastal erosion poses an ongoing threat for the stability of the eastern coastal ridge which consistently faces year-round waves from the southeast. The eastern coast is the only remaining natural beach on the island. However, this shoreline has experienced severe erosion as indicated by the presence of steep beach scarps and exposed bedrock (*aanugandu*). At the southern end of the island there is a revetment which protects the island's waste management facility; the revetment is poor condition due to lack of proper planning and construction. The revetment has been extended to form a breakwater protecting an artificial beach, which also experiences erosion, albeit not as severely as the eastern shoreline. There are signs of westward sediment movement along the beach.

125. On the eastern shoreline the beach toe has an average depth of 0.4 m and the reef and beach rock in this location has been entirely exposed. Wave heights downscaled using the BEWARE methodology indicate that this shoreline could be energetic year-round, with higher wave heights predicted for the northeast monsoon. For a mean wave direction of 87 degrees that represents the north-eastern monsoon, wave activity from the east results in longshore transport gradients through wave induced currents. Due to shore armoring at either end of the south-eastern shoreline, these currents can be directed offshore and result in loss of sediment from the system.

126. Solutions proposed for the eastern shoreline will address the erosion and loss of trees along the vegetation belt. This vegetation belt and ridge has been key to protecting the island from various hazards including the 2004 tsunami.<sup>26</sup> If the subproject is not implemented, longshore currents driven by easterly waves are likely to transport sediment away from the shoreline. Increased water levels will result in higher wave energy at this location, causing further erosion. The loss of trees will exacerbate erosion and may lead to the transfer of sediment to other locations. Without a continued sediment supply, potentially interrupted by the collapse of reef functions, the ridge will not develop further. Overtopping and eventual overwash will cause additional sediment loss from the eastern ridge. As the ridge recedes, the vegetation belt will flood, threatening key island assets, including all low-lying residential plots behind the coastal ridge and the school.

127. **OP3 Subproject 3.1 – Construct multipurpose facility at HAC campus.** The HAC was established with the intention that it would play a central role as an agriculture advisory center for knowledge generation and dissemination for Maldives. It has been the main residence of most of the agricultural training and extension personnel, serving farmers particularly from the northern atolls who have direct access to the services of HAC. Current activities are aligned to demonstrating a limited range of technology and farming practices, and the HAC does not have the infrastructure and facilities needed to support the development of 'home grown' solutions to climate change adaptation and to increasing food security. Without the subproject, the HAC's potential to effectively fulfil its emerging role in relation to climate resilience will be limited.

## **B. Alternative Locations**

128. **OP1 Subproject 1.1 – Installation of weather radar system in Addu City.** The new radar system has been sited within the perimeter of Gan international airport, which is a secure area where the International Civil Aviation Organization (ICAO) security rules apply. This reduces considerably the risks of theft, vandalism and terrorism. Within this perimeter, options for locating the radar tower are constrained by height and distance limitations from the main runway to allow for safe aircraft movement, by existing facilities, by heritage features (a small ancient mosque and graveyard), by existing mature trees and by considerations of road

<sup>26</sup> Fujima, K., Shigihara, Y., Tomita, T., Honda, K., Nobuoka, H., Hanzawa, M., & Koshimura, S. I. 2006. Survey results of the Indian Ocean tsunami in the Maldives. *Coastal Engineering Journal*, 48(02), 81-97.

access and the provision of services. All these have been considered in selecting options of the new tower's location.

129. **OP1 Subproject 1.2 – Existing weather radar system in Malé upgraded.** The location of the radar tower is fixed, as the tower has been in operation since 2007.

130. **OP2 Subproject 2.1 – Inland drainage network improvements, including bioswale.** The stormwater drainage network is designed to resolve specific localized drainage, water storage and recharge issues and therefore its layout is largely pre-determined. One major option considered was discharge to the sea to the east, but this would have involved pumped rather than gravity flow and was rejected on cost and sustainability grounds. The location of the proposed bioswale, a major central north-south infiltration and drainage feature, is determined by the presence of an existing linear depression following the junction of the original western coastline and the new reclaimed land to its west.

131. **OP2 Subproject 2.2 – Protection of the eastern shoreline.** The north and south limits of the works are determined by a combination of coastal dynamics in relation to the shape of the island, pre-existing shoreline protection revetment around the airport, and the landfall sites of important submarine cables. The eastern shoreline is on the windward side of the island, most exposed to erosion. The western shoreline is the lagoonward side of the island, sheltered from prevailing winds.

132. **OP3 Subproject 3.1 – Construct multipurpose facility at HAC campus.** These activities will be carried out at the existing HAC campus on Hanimaadhoo island (**Error! Reference source not found.**). The location is predetermined.

### C. Alternative Technologies

133. **OP1 Subprojects 1.1 and 1.2 – Installation of weather radar system in Addu City and Existing weather radar system in Malé upgraded.** The new and upgraded radar systems have been specified bearing in mind four design principles: (i) the meteorological observation system shall contribute to the objectives of MMS, including general observation, forecasting and early warning systems; (ii) it shall enable MMS to issue early and accurate warnings and advisories to the authorities, to stakeholders and to the public; (iii) it shall satisfy the national development plan of the Government of Maldives' project targets; and (iv) the size and components of the Project shall be set up to match the technical, operational and maintenance capabilities of MMS. Further, the systems and equipment have to meet 17 general requirements (e.g. robustness and availability of spares) and 14 specific technical requirements (e.g. wavelengths and resolution). There is no practical alternative technology to provide the same real-time forecasting data.

134. **OP2 Subproject 2.1 – Inland drainage network improvements, including bioswale.** A major purpose of this subproject is to provide a demonstration of how stormwater can be managed in the type of urban environment which will become increasingly common across the Maldives in the coming years. The system relies on a suite of 'grey-green' measures or 'nature-based solutions' (NbS) to resolve two main water-related problems: localized flooding in built-up areas after heavy rain, and reduced replenishment of the natural freshwater lens on the island due to increased hardening of surfaces and reduced infiltration. Conventional technologies for reducing the localized flooding include an expanded network of concrete drains and culverts, with pump discharge from collecting sumps at the lowest elevations. This approach is straightforward but more costly to operate and lacks the environmental and social benefits brought by NbS. Increasing infiltration and groundwater recharge can be achieved in multiple ways. The range of solutions selected for this subproject are all passive, rely on gravity, minimize the use of concrete as opposed to natural granular

infiltration media (gravel and sand), and provide multiple opportunities for increasing the amount of green space in the urban area.

135. **OP2 Subproject 2.2 – Protection of the eastern shoreline.** Apart from the do-nothing option, which would result in continued erosion and eventual breaching of the protective ridge, the two technical options available are (i) beach nourishment, with rock groynes at intervals to reduce sand loss due to longshore drift, and (ii) a rock revetment along the entire shoreline (a third option, geobags (large geotextile bags filled with sand) are not considered an appropriate protection technology for exposed shorelines). Option (ii) would be extremely costly, and would effectively prevent any public use of this shoreline. Option (i) is preferred on grounds of cost, social amenity (the beach can still be used) and limited impact on the inshore marine environment.

136. **OP3 Subproject 3.3 – Construct multipurpose facility at HAC campus.** These are ‘soft’ activities (e.g. training, agricultural outreach) and will use a variety of technical approaches.

## V. DESCRIPTION OF THE ENVIRONMENT

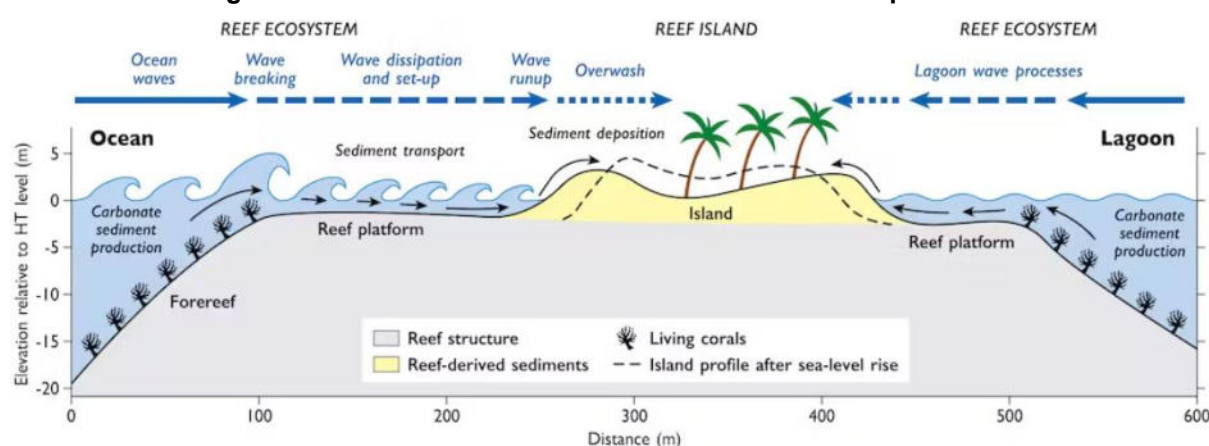
### A. Physical Resources

#### 1. Physiography

137. The Maldivian archipelago is situated in the Indian Ocean, straddling the Equator south-west of India. 23 atolls<sup>27</sup> and three solitary islands are scattered in an area some 860 km from north to south and up to 130 km wide. All the islands are flat and at very low elevation, averaging some 1.8 m above mean sea level, and the total land area of the nation is only some 300 km<sup>2</sup>.

138. Atoll islands are low-lying, usually less than two metres above sea level. Islands are primarily formed from wave action and sedimentation processes (Figure 20). They are composed of the sediment that washes up from the living coral reef platforms around them, with material gradually deposited on the island’s shoreline by wave and tides.

**Figure 20: Atoll island wave action and sedimentation processes**



Source: Masselink, G. and Simon Kench, P. [Coastal flooding could save atoll islands from rising seas – but only if their reefs remain healthy](#). 20 September, 2021 (accessed on 6 December 2023).

<sup>27</sup> Atoll: a reef surrounding a lagoon. Where the reef is exposed, it may form one or more islands.

139. The physical interventions proposed under this project are located on four islands in the north, centre and south of Maldives (respectively Hanimaadhoo, Kulhudhuffushi, Hulhulé, and Gan). Output 4 targets Nolhivaranfaru, Hulhudhoo, Meedhoo and Hithadhoo, but exact locations have not been confirmed. Table 18 shows the principle features of the Project islands.

**Table 18: Main Features of Project Islands**

	<b>Atoll</b>	<b>Island</b>	<b>Land Area (ha)</b>	<b>Distance from Malé</b>	<b>Elevation</b>
1	Haa Dhaalu	Hanimaadhoo	298.29	289	max 2.5 m
2		Nolhivaranfaru	170.30	284	max 2.5 m
3		Kulhudhuffushi	247.22	277	max 2.5 m
4	Kaafu	Hulhulé	332.0	0	max 2.5 m
5	Addu City	Gan	333.05	551	max 2.5 m
6		Hulhudhoo	134.10	531	max 2.5 m
7		Meedhoo	186.48	530	max 2.5 m
8		Hithadhoo	547.70	534	max 2.5 m

## **2. Climate and Natural Hazards**

140. The climate of Maldives is tropical and monsoonal, with two dominating seasons: a December to April dry season associated with the relatively calm northeast monsoon and a May to October rainy season brought by the southwest monsoon, when winds may be stronger. Rainfall is highest in the south, averaging 2,200 mm, and slightly drier in the north, averaging 1,800 mm.

141. Temperatures vary little throughout the year, due to the islands' equatorial and marine location, ranging between 24°C and 33°C with average daily maxima of 30.4°C and minima of 25.9°C. Humidity is relatively high, moderated by constant sea breezes.

142. Air quality is generally excellent due to the rainfall, constant breezes and lack of pollution sources. The exception is on busy streets in highly urbanised areas, specifically in and around Malé.

143. Maldives is subject to a wide variety of natural hazards, principally those arising from the sea and from rainfall. The area is subject to tsunamis from seismic events elsewhere in the Indian Ocean, and to storm surges and high waves (*udha*). The swells and wind waves are typically strongest between April and July, and occur more frequently in the southern regions. Given the very low elevation of the islands, overtopping by tsunamis and storm surges is both physically destructive and results in long-term damage through salinization of the freshwater lens on each island.

144. Heavy rainfall, often associated with thunderstorms, frequently causes localized flooding and may be combined with high winds. Max. precipitation has been recorded as 175 mm/day in Hulhule and 188.3 mm/day at Gan. The northern part of the archipelago may also be affected by weak cyclones.

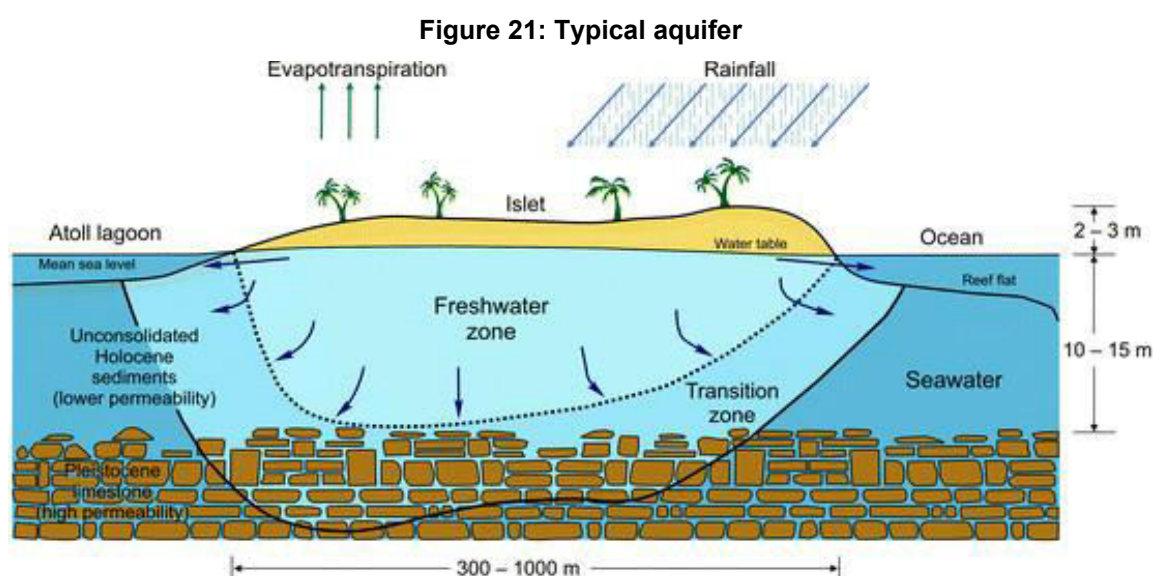
## **3. Geology and Soils**

145. Maldivian atolls have developed through coral growth on a ridge of marine sediments overlying submerged volcanic mountains. The surface and near-surface geology is very simple, being coral rock and sand. Soils are typically coarse in texture and shallow in depth with a top layer of brown soil (0 to 40 cm in depth) followed by a transition zone on top of the underlying parent material of coral reef limestone. In some locations a significant feature is the presence of clay deposits (*kulhi*), especially in lagoon environments. Elsewhere there may

be a calcium carbonate hard-pan which constrains infiltration and root penetration. The soils have a low water-holding capacity and a relatively high pH, 8.0 to 8.8. Phosphate levels are high, but not in a form available for plant growth, and other key nutrients (nitrogen, iron, manganese, potassium and zinc) are low. Consequently, except in the few locations where organic matter levels are high, such as the island of Thoddoo, the soils are not a good medium for plant growth.

#### 4. Water Resources

146. The country's freshwater resources exist as groundwater in the form of unconfined aquifers extending below sea level in the form of a thin freshwater lens. The freshwater supply is rainwater which infiltrates into the permeable coral rock. Essentially the lens floats on the surrounding saline groundwater, itself an extension of the surrounding sea (Figure 21). The water table is very shallow, usually no more than 2 m below the ground surface, and the freshwater lens on each island is usually very thin, averaging 4.6 m. Consequently, it is a very fragile resource, highly vulnerable to over-exploitation, salinization and pollution. Sources of water for domestic consumption include shallow wells, rainwater harvesting and desalination plants.



Source: Terry et al. 2013. *Atoll Groundwater Resources at Risk: Combining Field Observations and Model Simulations of Saline Intrusion Following Storm-Generated Sea Flooding*. In: *In book: Groundwater in the Coastal Zones of Asia-Pacific*. pp.247-270.

#### 5. Bathymetry

147. The tidal range in Maldives is relatively small, at around 1 m. Waves in Maldives are generated by the local monsoonal winds and swells from distant storms, tending to be stronger on the south-west side of islands during the SW monsoon and on the north-east side of islands during the NE monsoon. Marine currents follow the same pattern. The dominant direction of ocean swells is from the south.

#### 6. Baseline Physical Data

148. Baseline data on air, noise and water at the locations of the subprojects described in this IEE are given in the tables below. These data have been extracted from EIA reports for other projects on the three islands, available on the EPA's publicly accessible database.<sup>28</sup>

<sup>28</sup> Accessible at: [https://drive.google.com/drive/folders/1dgvjrMTIzxMzjreInE2D7aT\\_VZZjYnZM](https://drive.google.com/drive/folders/1dgvjrMTIzxMzjreInE2D7aT_VZZjYnZM) (Last accessed July 2024).

### a. Gan (Addu Atoll)

149. **Air:** air quality has been measured on the south-east of the island of Feydhoo, which is immediately to the north-west of Gan (EIA for the Proposed Reclamation of Runway Extension, Gan International Airport, Addu City, Maldives, Sandcays, 2013). The SO<sub>2</sub> levels at Feydhoo Beach appear to exceed WHO standards (Table 11).

**Table 19: Air quality near Addu International Airport (Gan)**

Location	Feydhoo Accomm. Units	Feydhoo Beach
Sulphur dioxide (µg/m <sup>3</sup> )	28.62	488.55
Nitric oxide (µg/m <sup>3</sup> )	0.00	0.00
Nitrogen dioxide (µg/m <sup>3</sup> )	0.00	0.00
Ozone (µg/m <sup>3</sup> )	46.42	18.82
Hydrogen sulphide (µg/m <sup>3</sup> )	77.29	11.91

150. **Noise:** the same EIA report details spot noise measurements at the same two locations. Background noise is low, and well within WHO standards (Table 12), but aircraft noise is high, although short-term.

**Table 20: Noise levels near Addu International Airport (Gan)**

Location	Feydhoo Accomm. Units	Feydhoo Beach
Background noise level	40.5 – 50.1 dB(A)	38.3 – 47.3 dB(A)
Peak noise level (due to aircraft take-off)	71.7 dB(A)	82.2 dB(A)

151. **Water:** for the same impact study, marine water quality was measured at 12 locations around the island of Gan. The minimum and maximum readings across all sites are given below.

**Table 21: Marine water quality around Gan Island**

Parameter	Unit	Min. / Max
Temperature	°C	28.69 / 34.75
Electrical Conductivity	µS/cm	52,200 / 54,210
pH		7.88 / 8.79
Salinity	ppt	34.05 / 35.73
Total Dissolved Solids	mg/l	33,950 / 35,240
Dissolved Oxygen	mg/l	4.93 / 12.46
Turbidity	NTU	0.89 / 1.12
Total Suspended Solids	mg/l	0 / 50

### b. Kulhudhuffushi (Haa Dhaalu atoll)

152. **Air:** air quality data are not presented in any recent EIA report for Kulhudhuffushi.

153. **Noise:** noise levels have been measured in two recent EIA studies (1st EIA Addendum for Development of Road (Phase 2) in Kulhudhuffushi City: Proposed Establishment of the Fire Hydrant and Dewatering Network, Sidco, 2023 and EIA for the Proposed Development of RO Plant Facility at Kulhudhuffushi, CDE Consulting, 2023). There is no explanation for the very high reading of 89 dB(A).

**Table 22: Noise levels at Kulhudhuffushi City**

Location	Minimum	Maximum
5 locations across island (Sidco 2023)	31 dB(A)	89 dB(A)

Residential area (CDE Consulting 2023)	39.9 dB(A)	67.4 dB(A)
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154. **Water:** data on groundwater quality on the island are presented in three recent EIA studies (1st EIA Addendum for Development of Road (Phase 2) in Kulhudhuffushi City: Proposed Establishment of the Fire Hydrant and Dewatering Network, Sidco, 2023; EIA for the Proposed Development of RO Plant Facility at Kulhudhuffushi, CDE Consulting, 2023, and ESIA for the Proposed PEACE Cable Branches in Kulhudhuffushi City, CDE Consulting, 2023). The conductivity data all indicate salinity exceeding recommended standards for drinking water (Table 10), and the total coliforms data indicate some contamination, possibly from septic tanks.

**Table 23: Groundwater quality data Kulhudhuffushi City**

Parameter	Unit	EIA Roads, Sidco 2023 5 sites Min / Max	EIA RO Plant, CDE 2023 2 sites Min / Max	ESIA Cables, CDE 2023 2 sites Min / Max
Conductivity	µS/cm	451 / 1199	1094	1542 / 2510
pH		7.6 / 8.0	7.5 / 8.2	7.5 / 8.0
Salinity	ppt	0.22 / 0.60	0.54 / 0.22	0.77 / 1.29
Total Dissolved Solids	mg/l	226 / 599	230 / 547	-
Dissolved Oxygen	mg/l	6.08 / 6.94	0.053 / 2.4	-
Total Petroleum Hydrocarbons (TPH)	mg/l	-	-	0.34 / 0.746
Total Coliforms		18 / 687	23 / 45	-

155. Data on marine water quality are also presented in all three impact studies (table below).

**Table 24: Marine water quality around Kulhudhuffushi City**

Parameter	Unit	EIA Roads, Sidco 2023 5 sites Min / Max	EIA RO Plant, CDE 2023 2 sites Min / Max	ESIA Cables, CDE 2023 2 sites Min / Max
Conductivity	µS/cm	-	-	-
pH		7.8 / 7.9	8.1	8.1 / 8.2
Salinity	ppt	34.74 / 35.19	35.52 / 35.61	33.81 / 33.92
Total Dissolved Solids	mg/l	26,300 / 26,700	-	-
Total Suspended Solids	mg/l	-	<5	<5
Turbidity	NTU	-	0.117 / 0.164	<0.1 / 0.265
Dissolved Oxygen	mg/l	6.15 / 7.79	-	-
Biological Oxygen Demand	mg/l	-	1 / 2	-
Nitrate	mg/l	-	5.8 / 5.9	-
Nitrite	mg/l	-	<0.002 / 0.003	-
Phosphate	mg/l	-	0.11	-

### c. Hanimaadhoo (Haa Dhaalu atoll)

156. **Air:** air quality data could not be located in any recent EIA report for Hanimaadhoo.

157. **Noise:** noise levels at three locations on the island are reported in a recent environmental monitoring report (Environmental Monitoring Report 2, HDH. Hanimaadhoo Airport Re-Development Project, Up Close Solutions PVT Ltd & Kalapataru Projects Int. Ltd., 2023). One of the locations was in a residential area, and therefore is likely to represent similar conditions in the quiet streets around the Hanimaadhoo Agriculture Center.

**Table 25: Noise levels at Hanimaadhoo**

Location	Daytime (0700-2200)	Night-time (2200-0700)
Residential area	51.4 dB(A)	44.1 dB(A)

158. **Water:** baseline data on groundwater quality at three locations on the island are presented in the same report, but no marine water quality information. The data suggest some salinization of the island's groundwater at Site 1.

**Table 26: Groundwater quality data Hanimaadhoo**

Parameter	Unit	Site 1	Site 2	Site 3
pH		8.0	7.8	7.9
Salinity	ppt	0.60	0.26	0.28
Total Dissolved Solids	mg/l	608	290	267

## B. Ecological Resources

### 1. Terrestrial Biodiversity

159. **Vegetation:** The natural vegetation of Maldives is considered tropical coastal forest.<sup>29</sup> As Maldivian islands are small, low lying and isolated, their limited natural vegetation is distributed relatively uniformly, the pattern being salt tolerant bushes, grasses and sedges at the edge and larger trees and coconut palms further inland. The calcareous nature of soils and salt sprays prevent the existence of dense forests.<sup>30</sup> In the developed areas of the islands, native vegetation has been cleared for coconut plantations, home gardens, villages, and commercial crops.

160. The flora of Maldives has been much altered by the introduction of alien species, either as crops, including coconuts, or more recent invasive species. Of the 583 vascular plant species in Maldives, 260 are native and naturalized and 323 are cultivated.<sup>31</sup> Of the native and naturalized plants, fewer than 100 species can be called indigenous. The flora includes 214 flowering plants and five ferns. Over 300 species may be used in traditional medicine.

161. Plant communities vary based on island type, size and distance from the shore. Native plants of the islands can be ecologically grouped into five categories:<sup>32</sup>

- (i) Beach pioneers – approx. twenty species of plants have been documented on natural beaches, and are highly salt tolerant.
- (ii) Littoral hedge – approx. ten common species, usually scrubby with numerous branches, including *Scaevola sericea* (magoo) and *Pemphis acidula* (kuredi).
- (iii) Sub-littoral thicket – approx. twenty common species, with a distinct community of small trees of more salt sensitive species found behind the beaches, such

<sup>29</sup> Adams, D. 1998. Plant life. In: P. A. Webb. *Maldives people and environment*. Media Transasia Limited. Thailand. pp 107-120.

<sup>30</sup> MFAMR and FAO. 2007. *Trees and shrubs of the Maldives*. RAP Publication No. 2007/12. Malé and Bangkok.

<sup>31</sup> Footnote 29.

<sup>32</sup> Footnote 29.



- as *Cordia subcordata* (kaani), *Guettarda* (uni), *Hibiscus tiliaceus* (diggaa) and *Premna obtusifolia*.
- (iv) Climax forest – mature trees as well as *Hernandia nymphaeifolia* (kandu) and *Terminalia catappa* (midhilli).
  - (v) Mangrove and swamp forest – 13 species of mangroves and six associated species of plants, and 37 species of fungi.

162. Food plants include various root crops, fruit trees such as mangoes, breadfruit, and a variety of citrus and native vegetables.<sup>33</sup> Fruit cultivation includes bananas, papaya, watermelons, mangoes, pineapples, jujubes, custard apples and lime, and vegetables like green chili, small onions, pumpkins, cucumber, tomatoes, brinjals, cabbages and gourds. Some cereals are also grown domestically, such as millet and maize, as well as roots and tubers including taro, yam, sweet potatoes, and cassava. Tropical flowers are found either in the wild or cultivated in gardens. Trees grown for local timber (for houses and boat construction) include *Hibiscus tiliaceus*, *Cordia subcordata*, *Thespesia populnea*, and *Calophyllum inophyllum*.

163. Mangroves have developed in many locations in Maldives, usually but not always as narrow strips in sheltered tidal locations.<sup>34</sup> In a few instances, as on Kulhudhuffushi, mangroves are found in inland depressions (Figure 22 and Figure 23). While there is no direct connection to the sea, saltwater seeps into the mangrove via porous coral rock. Open mangrove bays, such as in GDh. Dhigulaabadhoo are connected to the ocean via larger channels.

**Figure 22: Northern mangrove ecosystem in Kulhudhuffushi City**



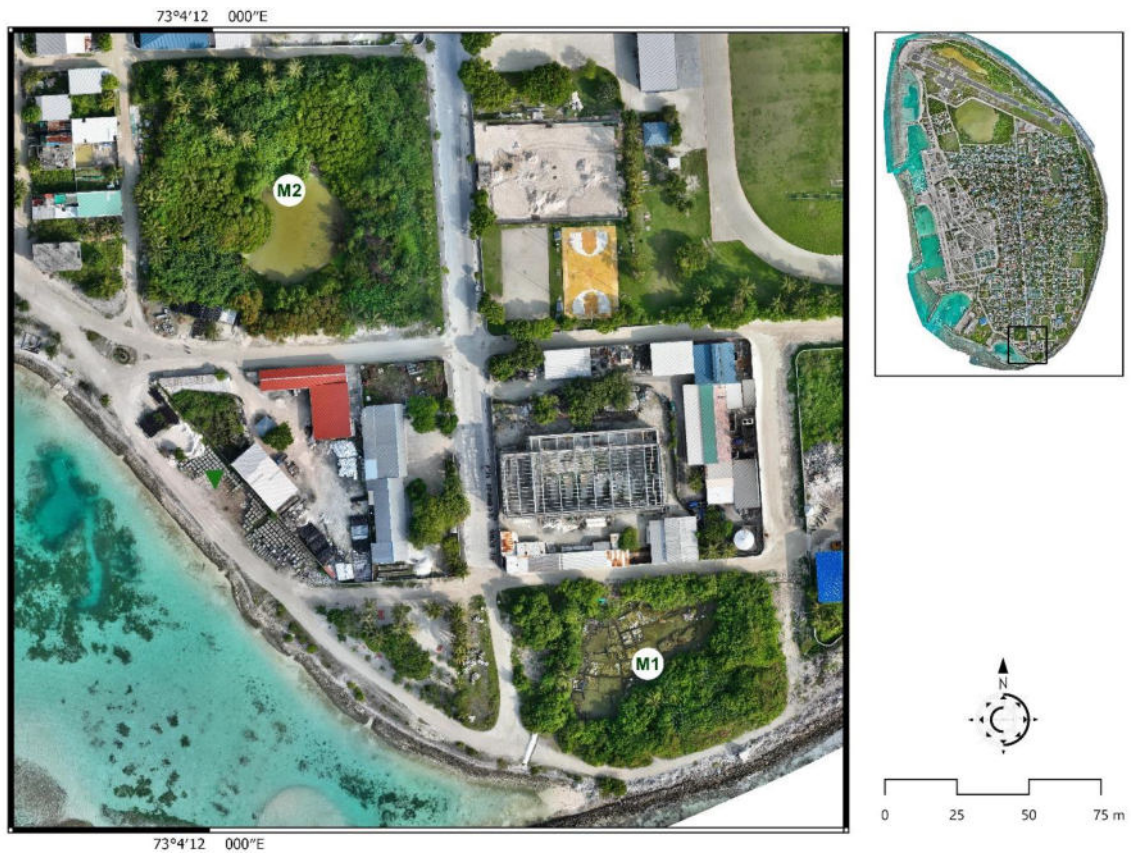
Source: ICEM-Epoch, 2024

<sup>33</sup> Footnote 30.

<sup>34</sup> Dryden, C., A. Basheer, G. Grimsditch, A. Musthaq, S. Newman, A. Shan, and M. Shidha. 2020. *A rapid assessment of natural environments in the Maldives*. Gland, Switzerland: IUCN and Government of Maldives.



Figure 23: Southern mangrove ecosystem in Kulhudhuffushi







Source: ICEM-Epoch, 2024

164. **Fauna:** Tropical regions usually have a rich fauna but, due to their isolation and very small size, the islands of Maldives have few terrestrial mammals, amphibians, and reptiles. Most species are widely distributed throughout the atolls but there are some endemic subspecies (unique to Maldives) including mammals, birds, terrestrial and marine invertebrates and marine fish. Based on the Red List for Maldives, there are five species of marine reptiles (all turtles), one of which is Critically Endangered. Of the 39 species of corals evaluated, seven are Vulnerable, five are Endangered and 23 are Critically Endangered.<sup>35</sup> Maldives also reported two species of mammals and 24 fish species as being threatened. Some birds and various marine species are migratory and/or congregatory.

165. **Birds:** Due to the oceanic location of this Indian Ocean archipelago, the avifauna of Maldives consists mainly of pelagic or seabirds. Approximately 180 different bird species have been recorded, most of which are migratory with few resident. Most seabirds are seen on sandbanks, although mangroves have their own assemblages, notably including several species of heron. In Addu City, the southernmost atoll, the Eedhigali Protected area is famous for its grey herons and has been identified as a hotspot breeding location for many bird species. One Important Bird Area (IBA), Haa Alifu Atoll, has been designated for its colony of lesser noddy (a non-migratory globally Least Concern species), having >1% of the global population. This species nests in mangroves on oceanic islands and forages in the surrounding atoll waters and potentially out to sea. Of the 180 bird species recorded in Maldives, 103 are protected under the Environment Protection and Preservation Act (Law 4/93). The national bird of Maldives is the white-breasted waterhen (*Dhivehi kabili*) which is listed as Vulnerable as per the IUCN Global Red List of Threatened Species.<sup>36</sup> Near

<sup>35</sup> MCCEE. 2022. *Maldives Red List*. Malé.

<sup>36</sup> IUCN. 2024. *IUCN Global Red List of Threatened Species*. Version 24-01.

Threatened species include pallid harrier, flesh-footed shearwater, Eurasian curlew, bar-tailed godwit and curlew sandpiper.

166. **Mammals:** Terrestrial mammals include, notably, two endemic subspecies of fruit bat: a common and widespread subspecies of Indian flying fox (*Pteropus giganteus ariel*), and a subspecies of variable flying fox (*Pteropus hypomelanus maris*) which has only one historic record from Addu Atoll. Both species are listed as Least Concern as per the IUCN Global Red List of Threatened Species, as is the endemic Maldivian garden shrew. With no records since 1936, the variable flying fox could either be extinct, a vagrant or a mislabeled record.<sup>37</sup> Rats, and mice have been introduced by humans, often invading the uninhabited areas of islands, and becoming pests, and it is strictly forbidden to bring domestic dogs to Maldives.

167. **Reptiles and amphibians:** Two species of geckos and two agamid lizards, including the common garden lizard or bloodsucker and the snake skin lizard are found in Maldives. The common wolf snake, a small harmless blind snake, a short-headed frog, and a larger toad are also commonly found, and listed as being of Least Concern as per the IUCN Global Red List of Threatened Species.

168. **Invertebrates including arthropods:** Very little of the local terrestrial invertebrate fauna has been documented.<sup>38</sup> No threatened species have been reported. Land-based arthropods include centipedes, millipedes, scorpions and spiders, such as the brown huntsman spider, lynx spider and black widow.

## 2. Marine Biodiversity

169. Maldives has a rich marine biodiversity, with multiple habitats including coral reefs, seagrass beds and mangroves sustaining a wide array of marine fauna. The outer edges of the reef systems form reef slopes that are dominated by corals (a reported 258 species of hermatypic corals and also 36 species of sponges). Inshore are reef flats ('house reefs'), characterised by a mosaic of habitats, including patches of live coral, sand and seagrass meadows. Along some shorelines, mangroves systems provide nursery habitat for numerous species. The 2015-2016 El Niño event resulted in widespread coral bleaching.

170. **Fish:** 1,100 species of fish have been recorded in Maldives, with the most diverse group being gobies (90 species), followed by wrasses and groupers with 70 and 40 species, respectively. Endangered fish species include the Napoleon wrasse (*Cheilinus undulatus*), sky emperor (*Lethrinus mahsena*) and longfin mako (*Isurus paucus*). The Napoleon wrasse and sky emperor are found in nearshore shallow water environments. Some endemic fish species have only ever been recorded in nearshore waters of Alifu Alifu Atoll and Malé Atoll. Freshwater fishes are limited in Maldives with only six species having been reported.<sup>39</sup>

171. **Sea Turtles:** Maldives is home to five of the world's seven species of sea turtles, two of which are regularly observed, namely the Critically Endangered hawksbill turtle (*Eretmochelys imbricata*), and the Endangered green sea turtle. The islands are important nesting sites for the green turtle, and there are conservation programs in place that protect their nesting sites and the hatchlings that emerge from them. The Olive Ridley turtle is globally Vulnerable but national data is deficient, and is most often found in Maldivian waters after becoming trapped in drifting ghost fishing nets. Two species more rarely spotted are the loggerhead and leatherback turtle which are listed as Vulnerable, but national data is lacking.

<sup>37</sup> Anderson, R. C., R. Chakravary, and S. Raman. 2022. *Bats in the Maldives: A review of historical data and first record of a vagrant Long-winged Tomb Bat*. Journal of Bat Research and Conservation.

<sup>38</sup> Ministry of Home Affairs, Housing and Environment. 2002. *First National Report to the Conference of Parties to the Convention on Biological Diversity*. Malé.

<sup>39</sup> FishBase. [List of Freshwater Fish reported from Maldives](#). (Last accessed June 2024).

172. Altogether there are 285 species of algae, 400 species of molluscs and 350 species of crustaceans and 80 species of echinoderms in these systems (CBD, 2017) (including the Endangered Prickly redfish (*Thelenota ananas*), Golden sandfish (*Holothuria lessoni*) and Black teatfish (*Holothuria nobilis*)). Corals reefs provide food for the Critically Endangered hawksbill turtle. Coral reefs also provide important habitat for Endangered species, including the ornate eagle ray (*Aetomylaeus vespertilio*) and Napoleon wrasse (*Cheilinus undulatus*). The reef areas also provide habitat for other migratory and congregatory species, including four species of sea turtles, whale shark and reef manta ray.

### 3. Critical Habitats – Terrestrial and Marine Ecosystems

173. The presence of critically endangered, endangered, and vulnerable species within 50 km of each island under the Project has been screened using the IBAT tool. A summary of the IBAT screening results for each island is presented in Table 27. IBAT data lists about 1,500 species in the project area, which includes 100 species listed in the globally threatened categories of Critically Endangered; Endangered; Vulnerable and about 1,400 species of near threatened, least concern and data deficient (or non-threatened species). Informed by IBAT, critical habitat assessment for the terrestrial ecosystems on seven islands has been carried out.

174. The key finding is that critical habitat is not triggered at atoll level under Criterion 1 with respect to any terrestrial species. At the island level, mangroves and wetlands are present in six of the project islands (Hanimaadhoo, Nolvhivaranfaru, Kulhudhuffushi, Hithadhoo, Hulhudhoo and Meedhoo) and must be protected from development due to their provision of ecosystem services and support of biodiversity of significant socioeconomic importance to the local communities.

**Table 27: Potential list of threatened species from IBAT analysis near each Island**

Island	Critical	Endangered	Vulnerable	Near Threatened	Total Potential Species	Potential Terrestrial Critical Habitat on Island
	<i>within 50 km of island</i>					
Hanimaadhoo	6	23	64	93	1631	Mangrove
Nolvhivaranfaru	6	23	64	93	1632	Mangrove
Kulhudhuffushi	6	23	64	93	1637	Mangrove
Gan	6	20	66	91	1603	
Hulhudhoo	6	20	66	91	1598	Wetland
Meedhoo	6	20	66	91	1598	Wetland
Hithadhoo	6	20	66	91	1601	Mangrove and wetland

*Source: IBAT Screening Report*

### 4. Protected Areas

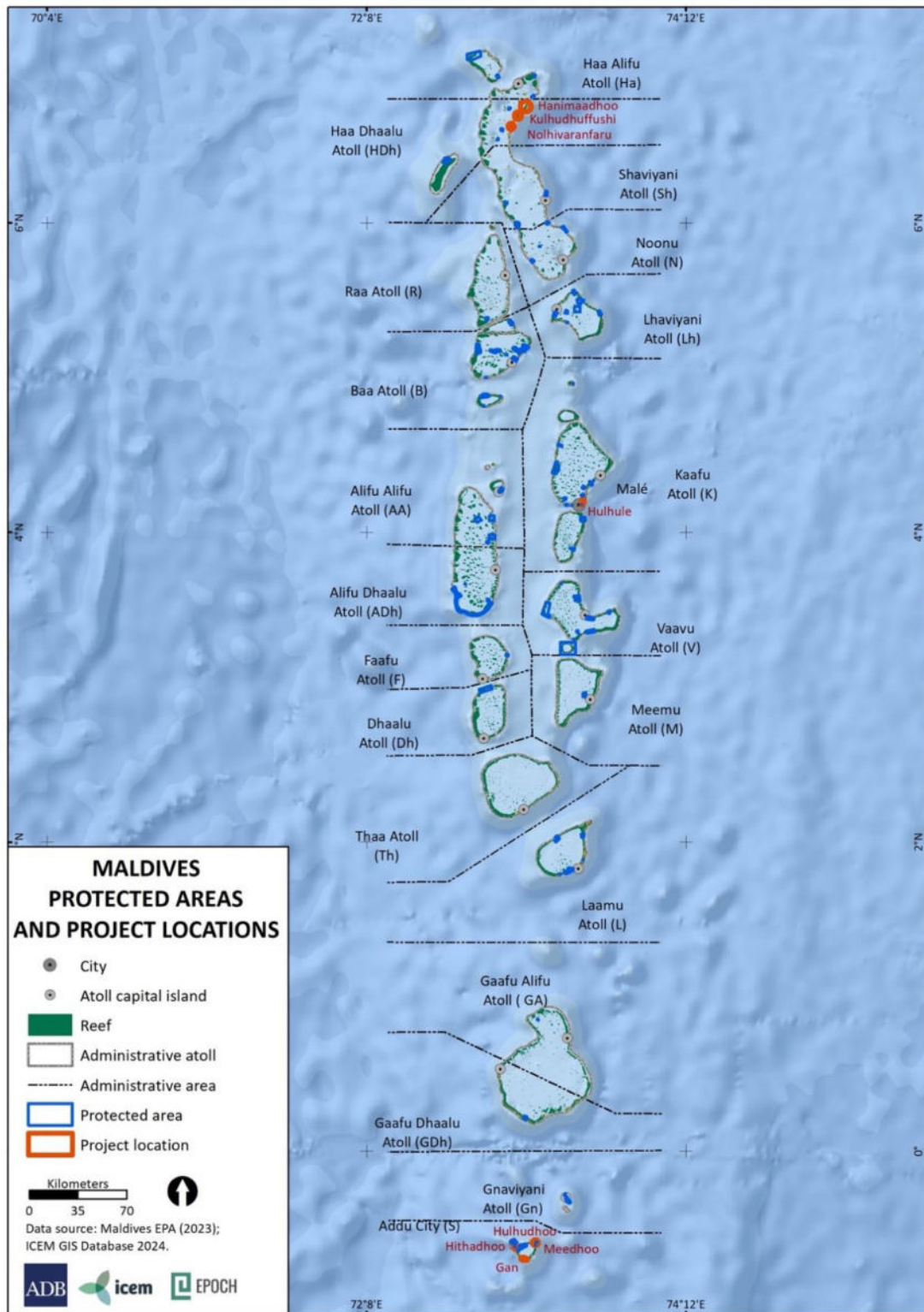
175. The EPA lists 91 protected areas, both terrestrial and marine, including three UNESCO Biosphere Reserves.<sup>40</sup> The majority of the sites are marine protected areas. A full list of all the protected areas is provided in Annex 3. Besides these, the country also has 188 locally designated environmentally sensitive areas, where development is restricted and regulated by the EPA. One Important Bird and Biodiversity Area has been identified on Haa Alifu atoll.<sup>41</sup>

176. Figure 24 shows the map of the protected areas of Maldives and the Project islands. Table 28 and Table 29 describe the number and type of protected areas and Key Biodiversity Areas/Important Bird Areas within 1 and 10 km of the project islands.

<sup>40</sup> EPA. 2023. *Protected Areas of Maldives*. Malé. Last updated 17 December 2023.

<sup>41</sup> BirdLife International. 2024. *Important Bird Area factsheet: Haa Alifu Atoll*. Accessed June 2024.

Figure 24: Locations of Protected Areas and Project islands





**Table 28: Overlap of Project islands with Protected Areas, Key Biodiversity Areas and Important Bird Areas of Maldives**

Atoll	Project Island	Protected Areas		KBA/IBA	
		1 km	10 km	1 km	10 km
Haa Dhaalu	Hanimaadhoo	0	3	0	1
	Nolhivaranfaru	0	3	0	0
	Kulhudhuffushi	0	3	0	0
Kaafu Addu City	Hulhulé	1	5	0	0
	Gan	0	7	0	0
	Hulhudhoo	2	7	0	0
	Meedhoo	2	7	0	0
	Hithadhoo	4	7	0	0

Sources: EPA. 2023. Protected Areas of Maldives. Malé. BirdLife International. 2024. Important Bird Area factsheet: Haa Alifu Atoll.

**Table 29: Details of Protected Areas, Key Biodiversity Area and Important Bird Areas within 10 km of Project islands**

Atoll/Project Island	Protected Area	Habitat Type	Designated	EPA Category of Protection
Haa Dhaalu: Hanimaadhoo, Nolhivaranfaru, Kulhudhuffushi	Finey Thila	Marine	Marine protected area	7: Protected Area with Sustainable Use
	Neykurendhoo	Coastal/terrestrial	Mangrove/wetland	
	Keylakunu	Marine, coastal and terrestrial	Island/mangrove/wetland/marine protected area	6: Habitat/Species Management Area, Category 7: Protected Area with Sustainable Use
Kaafu: Hulhule	Maldives Victory Wreck	Marine	Marine protected area	7: Protected Area with Sustainable Use
	Hans Hass Place (Gulhi Falhu)	Marine	Marine protected area	
	Guraidhoo Kanduolhi	Marine	Marine protected area	
	Giravaru Kuda Haa	Marine	Marine protected area	
	Thanburudhoo Region	Marine	Island, marine protected area	
Addu City: Gan, Hulhudhoo, Meedhoo, Hithadhoo	Eedhigali Kilhi	Coastal	Mangrove, marine protected area	Not assigned
	Koathey Area			
	British Loyalty Shipwreck	Marine	Marine protected area	
	Kandihera-Maakandu Channel	Marine	Sandbank, marine protected area	
	Kuda Kandu Area	Marine	Marine protected area	7: Protected Area with Sustainable Use
	Maafishi Kilhi	Coastal	Mangrove/wetland	
	Mathi kilhi	Coastal/terrestrial	Wetland	
	Maa Killhi and Feheli Kilhi Area	Coastal/terrestrial	Wetland	
Island	KBA/IBA	Habitat Type	Designated	EPA Category of Protection

<b>Atoll/Project Island</b>	<b>Protected Area</b>	<b>Habitat Type</b>	<b>Designated</b>	<b>EPA Category of Protection</b>
Haa Dhaalu: Hanimaadhoo	HA. Filadhoo	Marine and coastal	Congregations >1% global population; Lesser Noddy (least concern species)	n/a

*Sources: EPA. 2023. Protected Areas of Maldives. Malé. BirdLife International. 2024. Important Bird Area factsheet: Haa Alifu Atoll.*

177. Figure 25 to Figure 31 show the project island maps and locations of mangroves, wetlands, and environmentally sensitive areas.



Figure 25: Hanimaadhoo: Mangroves, wetlands, and environmentally sensitive areas

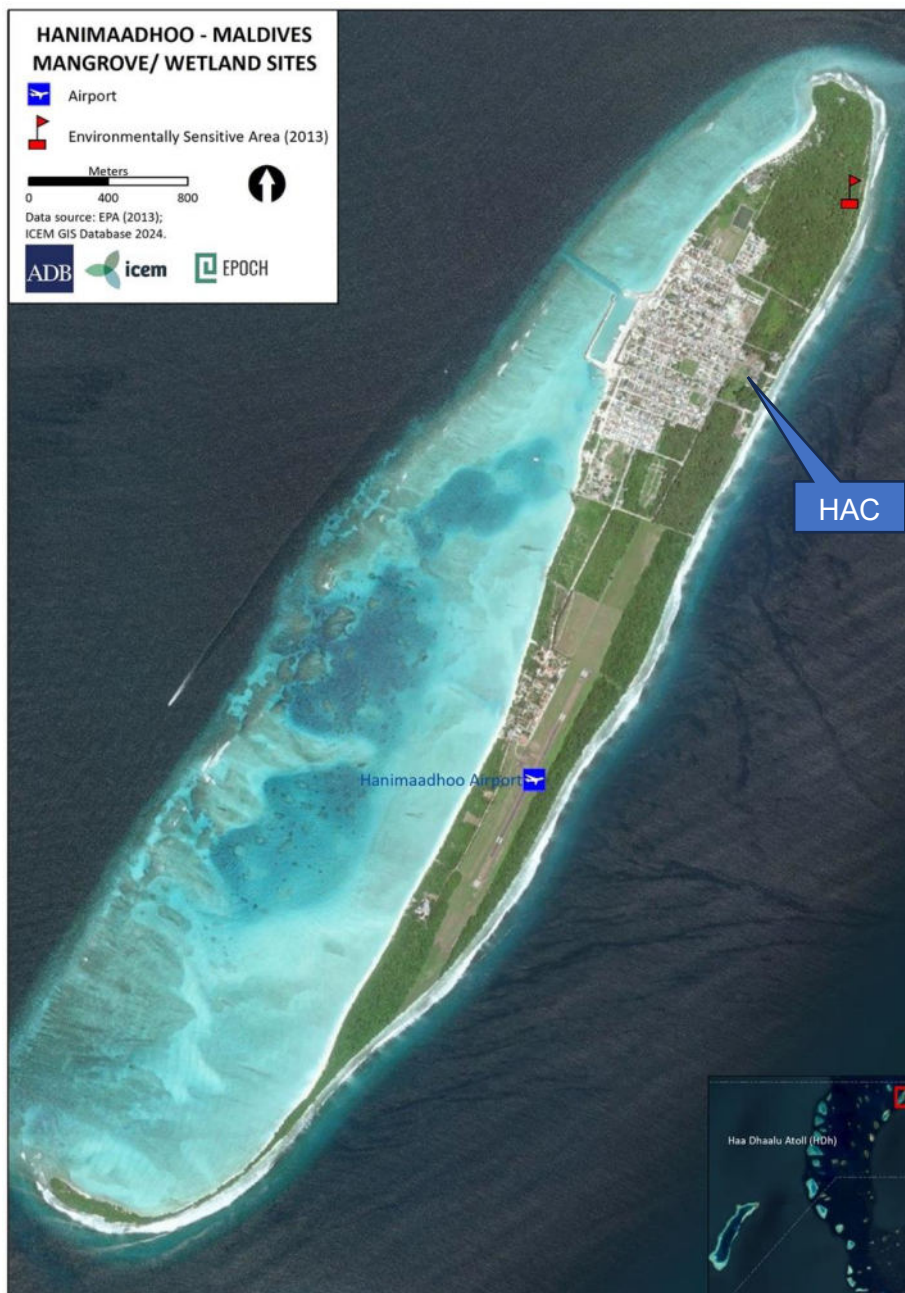


Figure 26: Nolvivaranfaru: Mangroves, wetlands, and environmentally sensitive areas

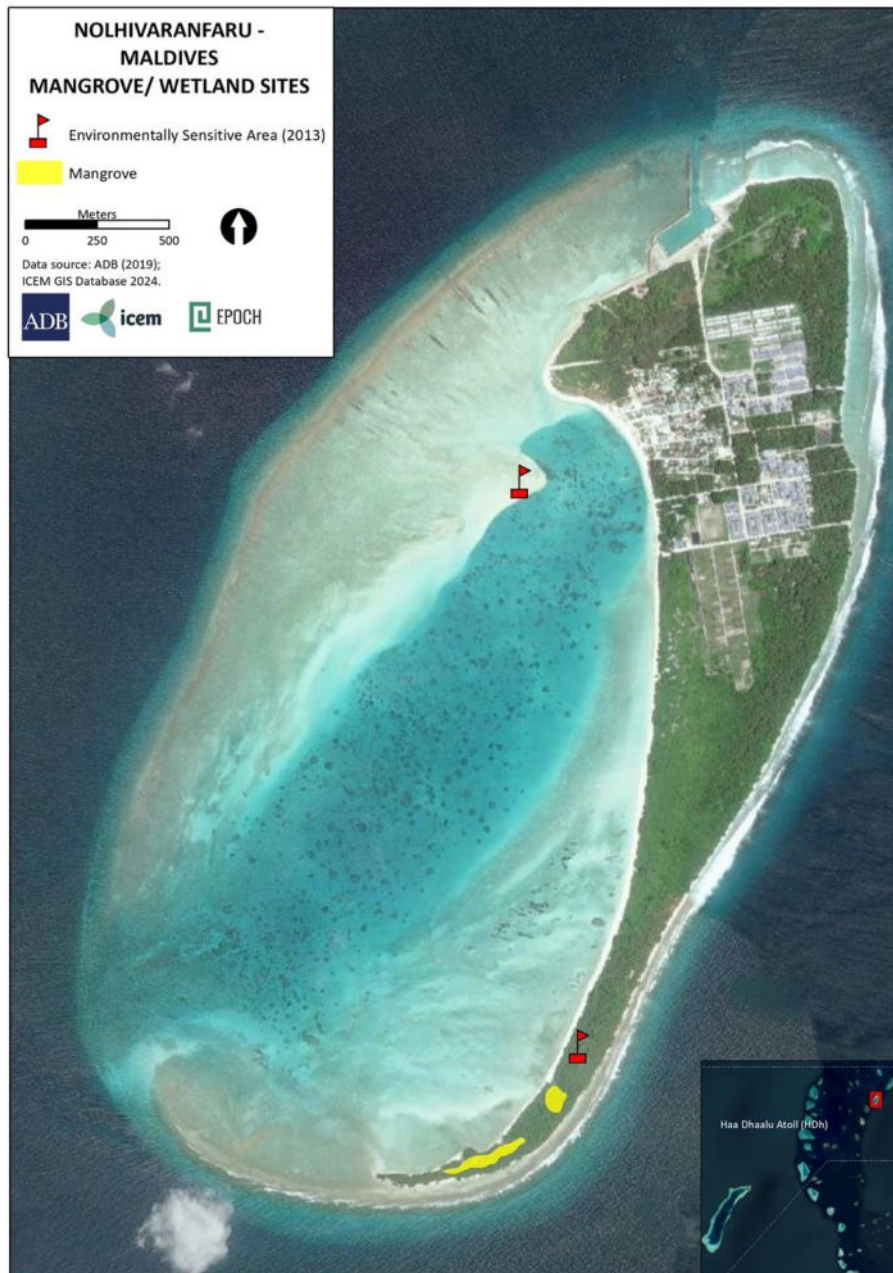




Figure 27: Kulhudhuffushi: Mangroves, wetlands, and environmentally sensitive areas



Figure 28: Hithadhoo: Mangroves, wetlands, and environmentally sensitive areas

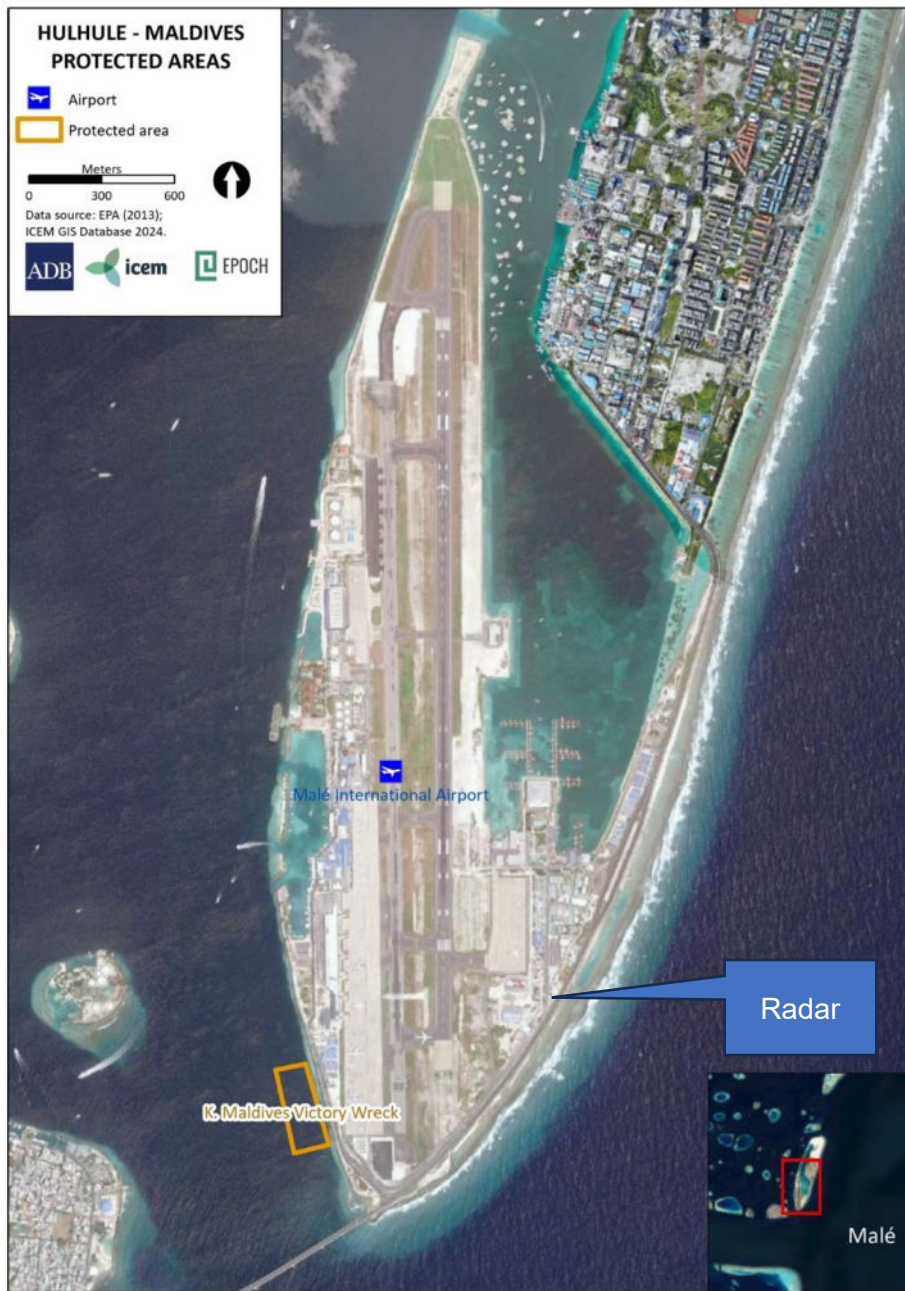


Figure 29: Hulhudhoo and Meedhoo: Mangroves, wetlands, and environmentally sensitive areas





Figure 30: Hulhule: Mangroves, wetlands, and environmentally sensitive areas





**Figure 31: Gan: Mangroves, wetlands, and environmentally sensitive areas**



## C. Socio-economic Context

### 1. Land Use

178. Maldives counts 1,192 islands across 26 atolls, of which 189 islands are inhabited. The 2010 Decentralisation Act mandates island councils to prepare a land use plan to allocate land for social and economic purposes. Due to technical and resource constraints as well as the absence of a coherent land use planning framework, many councils were not able to prepare their land use plan in the required timeframe.<sup>42</sup> However, many islands have made progress recently, with the government reporting that 139 land use plans have now been approved, and a further 21 are pending approval.<sup>43</sup>

179. The interventions proposed under the investment project are located on eight islands on three atolls: on Haa Dhaalu atoll, Kulhudhuffushi City, Hanimaadhoo and Nolhivaranfaru; on Malé, Hulhule; on Addu City, Hithadhoo, Gan, Hulhudhoo and Meedhoo. Land use on each island is different. Available land use plans are provided in Annex 2.

180. In December 2023 the draft **Kulhudhuffushi City** land use plan was shared by the City Council. The land use plan indicates the island will expand from 196.5 ha to a total land area of 276.7 ha by 2030, including the port areas. The largest existing land use types are 92 ha of transportation, and 67.5 ha of residential plots, proposed to be expanded by an additional 11.5 ha and 1.2 ha respectively. The plan proposes four new land use categories, including environmental protection zone (6.0 ha), mixed use zone (2.2 ha), open/green buffer area (6.6 ha), and reserved for future non-residential purposes (1.1 ha)

<sup>42</sup> Maldives Institute of Local Governance and Local Government Authority. 2023. *Decentralization Framework in the Maldives – Policy Brief*. Malé.

<sup>43</sup> PSM News. 2024. *Land-use plan for more than 130 islands approved*. 13 March.

181. The **Hanimaadhoo** land use plan was approved in 2022, and shows additional public housing is planned for the east side as well as on the north edge of the current residential area. A green buffer area forms the northeastern side of the island, with a section in the northeast for a city hotel, reducing the overall current vegetated cover. A nature park is planned to be designated at the northernmost tip of the island. Additional areas for commercial purposes (wholesale shops, retail and cafes) have been allocated in front of the harbor area. A significant plot of land in the centre of the island adjacent to the airport is designated for the Maldives National Defence Force. Land is also reserved for airport expansion.

182. The **Nolhivaranfaru** land use plan was approved in 2023. It shows that a slipway and boat workshop are planned for the northern part of the island, and a fish processing and storage area is planned on the northeastern side where there is currently a green buffer zone. An expansion of the tourism area is planned for the southwestern side, which is vegetated cover at present. The agriculture area remains consistent, in the centre of the island. Land on the far northwest corner has been allocated to a regional defence centre. A football stadium is designated on the north side, in front of the harbor.

183. The **Hithadhoo** land use plan was approved in 2024, showing the large conservation area on the north of the island, as well as a protection zone around the southern shoreline. Land has been allocated for a cultural village in the centre of the island, where there is currently vegetation. In addition to the commercial areas next to the harbor on the east side, land has been allocated for a fuel shed and fish market and extended harbor complex. An area further south from the harbor on the east side has been dedicated for a water park and beach.

184. The **Meedhoo** land use plan approved in 2023 shows a proposed environmental protection zone around the majority of the island's shoreline. Land for a solar project is allocated on the southeast side, south of the waste management centre. A children's park, open space, park (*maizaan*), and sports court are planned for the northwestern side.

185. The **Hulhudhoo** land use plan has been developed but has not yet been approved.<sup>44</sup> No land use plan has been published for **Gan**, as this is an industrial island solely intended for aviation purposes (Gan International Airport). A Land Use Strategy was prepared in 2009 to establish the strategic direction for the efficient and economic development of land in Gan, Addu Atoll over the next 20 years.<sup>45</sup> Similarly for **Hulhulé**, no land use plan has been developed as the island is designated for industrial purposes.

## 2. Demography

In 2022, 515,122 people live in Maldives, up 26.4% from the 2014 Census (Table 30)

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<sup>44</sup> Communication to the project team via email by the Physical Planning and Urban Development Department, Ministry of Housing Land and Urban Development. 10 June 2024. Available upon request.

<sup>45</sup> Gan International Airport. 2009. *Land Use Strategy – Draft for Consultation*. Malé.

186. Table 30). The average growth rate of the resident Maldivian population between 2014–2022 was 1.5% per year. A large share of the population lives in Malé (212,138 people) on less than 2 km<sup>2</sup> of land, followed by other administrative islands (236,747 people), resort islands (52,396 people) and industrial and other islands (13,841 people).<sup>46</sup> Approximately 26% of the population are foreigners.<sup>47</sup>

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<sup>46</sup> Maldives Bureau of Statistics. 2022. *Maldives Population and Housing Census. Provisional Results Summary*. Malé.

<sup>47</sup> Footnote 46.

**Table 30: Population by place of enumeration by nationality, sex and locality**

Resident Population	Republic		Malé		Atolls	
	2022	2014	2022	2014	2022	2014
<b>Both sexes</b>	<b>515,132</b>	402,071	211,908	153,904	303,224	248,167
Maldivian	382,639	338,434	160,187	129,381	222,452	209,053
Foreigners	132,493	63,637	51,721	24,523	80,772	39,114
<b>Female</b>	<b>203,138</b>	<b>174,322</b>	<b>87,014</b>	<b>68,466</b>	<b>116,124</b>	<b>105,856</b>
Maldivian	188,077	166,472	80,852	64,938	107,225	101,534
Foreigners	15,061	7,850	6,162	3,528	8,899	4,322
<b>Male</b>	<b>311,994</b>	<b>227,749</b>	<b>124,894</b>	<b>85,438</b>	<b>187,100</b>	<b>142,311</b>
Maldivian	194,562	171,962	79,335	64,443	115,227	107,519
Foreigners	117,432	55,787	45,559	20,995	71,873	34,792

Source: Maldives Bureau of Statistics. 2023. Table P1: Resident Population by Place of Enumeration by Nationality, Sex and Locality, 2014 and 2022. Malé.

187. Most islands (72) have a population between 500-999. After the Greater Malé area, the two atolls with the largest population are Addu City (formerly Seenu Atoll) with 5% of the population in six inhabited islands, and Haa Dhaalu atoll with 4% of the population in 13 inhabited islands. Malé, Hithadhoo and Kulhudhuffushi City are the only islands with a population greater than 10,000 people.

188. The average national household size decreased from 5.24 people in 2014 to 4.7 in 2022. Children from 0–14 years make up 26% of the population, followed by the working age population of 15–64 years (69%) and elderly over 65+ years (5%). The sex ratio is 100:104 women to men.

189. Table 31 presents the demographic features of the investment project islands.

**Table 31: Demographic characteristics of Project islands**

No.	Atoll	Island name	Type	Registered population (2022)	Male	Female
1	Haa Dhaalu (HDh.)	Hanimaadhoo	Residential	2,352	1,181	1,171
2	Haa Dhaalu (HDh.)	Nolhivaranfaru	Residential	1,980	971	1,009
3	Haa Dhaalu (HDh.)	Kulhudhuffushi	Residential	10,541	5,362	5,179
4	North Malé (K.)	Hulhulé	Industrial	n/a	n/a	n/a
5	Addu City (S.)	Gan	Industrial	n/a	n/a	n/a
6	Addu City (S.)	Hulhudhoo	Residential	3,668	1,908	1,760
7	Addu City (S.)	Meedhoo	Residential	3,056	1,568	1,488
8	Addu City (S.)	Hithadhoo	Residential	16,650	8,461	8,189

Source: Maldives Bureau of Statistics. 2023. Statistical Pocketbook 2023. Table 3.3: Registered Population, 2022. Malé.

### 3. Livelihoods

190. The main source of household income is wage/salary employment, followed by assistance from government (e.g. 65+ allowance, single parent allowance), family or own

business, assistance from household members (incl. those not residing in the house), family farming/fishing, income from rent, income from interest or dividends, and non-state pension.<sup>48</sup>

191. In 2022 the average labor force participation rate for resident Maldivians was 64.2%. Women in Malé had a labor force participation rate of 51.5%, and men 81.0%, compared to 78.3% of men and 45.9% of women in atolls (Table 32).<sup>49</sup>

**Table 32: Employment rates for Maldivian resident population, 2022**

Item	Malé			Atolls		
	Total	Male	Female	Total	Male	Female
Unemployment rate	5.6	5.0	6.5	4.7	4.1	6.0
NEET rate (15-24 years)	16.0	16.2	15.8	22.7	18.0	28.3
Inactivity rate	34.0	19.0	48.5	37.3	21.7	54.1
Labor force participation rate	66.0	81.0	51.5	62.7	78.3	45.9

*NEET = neither in employment nor in education*

*Source: Maldives Bureau of Statistics. 2023. Island & Atoll Level Indicator Sheets: Employment: Atoll Level Indicator Sheet. Malé.*

192. The employment rates for the inhabited project islands are presented in Table 33 and Table 34.

**Table 33: Employment rates for Project islands in Haa Dhaalu atoll 2022**

Item	Hanimaadhoo			Kulhudhuffushi City			Nolhivaranfaru		
	Total	M	F	Total	M	F	Total	M	F
Unemployment rate	0.9	0.7	1.3	4.2	3.6	5.2	14.0	7.9	22.4
NEET rate (15-24 years)	22.0	17.9	24.9	18.8	13.8	22.9	27.0	18.2	34.3
Inactivity rate	29.6	13.4	52.3	41.1	20.4	59.6	34.4	20.0	47.2
Labor force participation rate	70.4	86.8	47.7	58.9	79.6	40.4	65.6	80.0	62.8

*F = female, M = male, NEET = neither in employment nor in education*

*Source: Maldives Bureau of Statistics. 2023. Island & Atoll Level Indicator Sheets: Employment: Atoll Level Indicator Sheet. Malé.*

**Table 34: Employment rates for Project islands in Addu City 2022**

Item	Hithadhoo			Hulhudhoo			Meedhoo		
	Total	M	F	Total	M	F	Total	M	F
Unemployment rate	5.5	4.3	8.8	9.7	9.0	11.8	7.4	8.0	6.2
NEET rate (15-24 years)	21.6	19.6	24.1	23.2	20.3	26.8	28.4	24.6	33.7
Inactivity rate	36.3	19.6	59.1	39.9	25.4	60.9	43.5	27.0	61.0
Labor force participation rate	63.7	80.4	40.9	60.1	74.6	39.1	56.5	73.0	39.0

*F = female, M = male, NEET = neither in employment nor in education*

*Source: Maldives Bureau of Statistics. 2023. Island & Atoll Level Indicator Sheets: Employment: Atoll Level Indicator Sheet. Malé.*

193. On average, 17% of the population works in the informal sector (any business which is not registered with the relevant authority or any person who works in living quarters, no fixed premises or agricultural plots who is not an employee and has no social security). The highest group in the informal sector are women (27%) in the atolls (37%), meaning they are often excluded from social protection such as pension and paid sick leave.

<sup>48</sup> National Bureau of Statistics. 2023. *Rapid Assessment of The Impact of Covid-19 on HIES 2019*. Malé.

<sup>49</sup> Maldives Bureau of Statistics. 2023. *Island & Atoll Level Indicator Sheets: Employment: Atoll Level Indicator Sheet*. Malé.

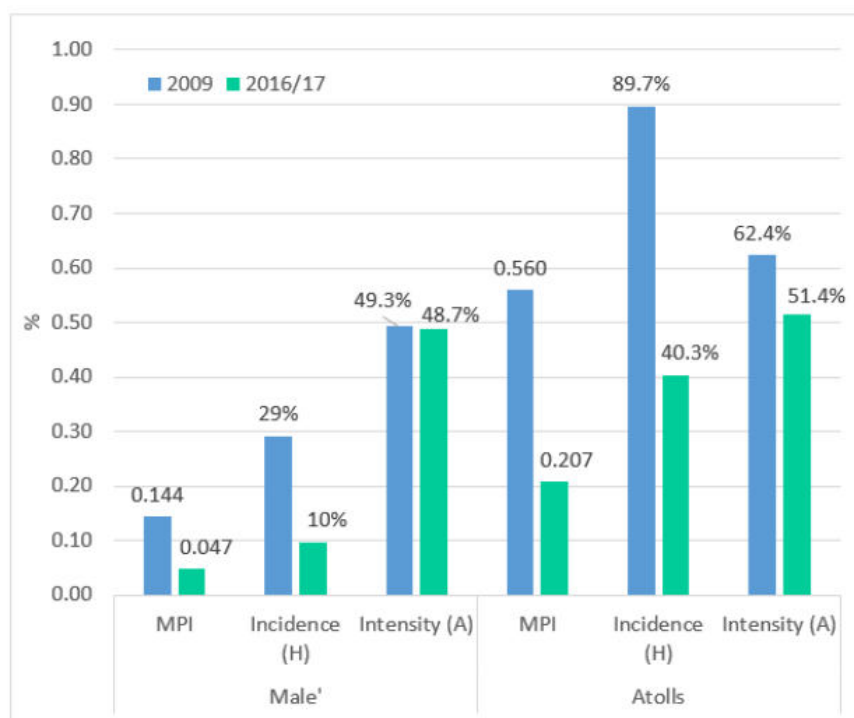
194. On average, men spend around 9 hours a day at their main job, and women 7 hours. Women spend 4 hours a day on unpaid and domestic work for their own household, compared to 2 hours a day among men. Monthly earnings of employees were MVR10,747 in 2019, higher among men (MVR 12,169) than women (MVR 10,010), and almost half in atolls (MVR 7,716) compared to Malé (MVR 13,014). Average monthly household income was MVR 23,500 per household in 2019. The average household income was double in Malé (MVR 32,575) compared to the atolls (MVR 15,000).

195. The limited sex-disaggregated data available on income shows that for all industries, including those dominated by women (such as agriculture and forestry, education and health sector), the average monthly earnings for women lag behind those of men. This difference in wages is most pronounced in the agriculture and forestry industry, where men earn 77.8% more than women.<sup>50</sup>

#### 4. Poverty and Marginalization

196. In Maldives, poverty is unequally distributed with higher poverty rates in the atolls than in Malé. According to Maldives' national poverty line of MVR 71.4 or US\$4.64 purchasing power parity (PPP) per person per day, about 10% of individuals in atolls are considered poor, compared to less than 1% of individuals in Malé. This means that a majority of the poor (93%) live in atolls.<sup>51</sup> However, multidimensional poverty has reduced over the years in both Male' and the atolls, with especially the multidimensional poverty headcount ratio reducing in the atolls by more than half (Figure 32).

**Figure 32: Multidimensional Poverty by Malé and Atolls, 2009–2016/17**



Source: National Bureau of Statistics, OPHI and UNICEF Maldives. 2020. *National Multidimensional Poverty in Maldives 2020. Malé.*

<sup>50</sup> J. El-Horr and R.P. Pande. 2016. *Understanding Gender in Maldives: Toward Inclusive Development.* Washington, DC: The World Bank.

<sup>51</sup> International Bank for Reconstruction and Development/The World Bank. 2022. *Poverty and Inequality in Maldives.* Washington, DC.



197. At the national poverty line, the national poverty rate in 2019/20 was 5.4%. The poverty rate climbs to 9.5% among atoll residents, while in Malé the poverty rate is 0.9%.<sup>52</sup> 8.2% of women (9,022 people) live in households below the national poverty line.<sup>53</sup> At the international poverty line for upper-middle-income countries, which is US\$5.5 per person per day, Maldives' poverty rate is 1.7%, driven entirely by atolls, where the poverty rate is 3.2%; there are no poor in Malé for the international poverty benchmark.<sup>54</sup> Covid impacted the poverty rates but a strong recovery has occurred since.

198. Poverty commonly correlates with larger household sizes and in Maldives around 5% of households have 10 members or more.<sup>55</sup> Based on the analysis of the HIES 2019, the national poverty rate in such households is 12%, whereas only 3% of households with fewer members than 10 are poor.

199. The literacy rate in Dhivehi of the resident population over the age of 10 years on Kulhudhuffushi is 98.8%.<sup>56</sup> Of those older than 15 years who attended school or training, the most common highest educational attainment is secondary school (44.9%), followed by primary school (23.2%). Only 4.6% proceed to higher secondary education, while 7.6% obtain a degree.<sup>57</sup>

200. Of the total population in Haa Dhaalu atoll, 8.4% were persons with disability in 2022, above the national average of 6.9%.<sup>58</sup> Walking impairments were the most common form of disability (3.9%), followed by lack of sight (2.9%) and memory loss (2.5%).<sup>59</sup> No specific data on persons with disability are available at the island level.

201. The remote islands and atolls face constraints in accessing health care, education, employment opportunities, and other services. The islands further away from Malé generally are not able to offer the same quality and availability of public services, and transport links are costly. Girls in remote atolls may also be at a disadvantage as many islands do not offer higher education. Parents from outer islands may be less willing to send daughters than sons to Malé to continue their higher or technical education.<sup>60</sup>

## 5. Gender

202. The 2008 Constitution of Maldives guarantees the same rights and freedoms to both women and men, and has removed the constitutional barrier for women to be able to compete for the highest political office of the State. The legal framework for gender equality in Maldives was further strengthened through the enactment of the Gender Equality Act (Law No. 18/2016), which prohibits both direct and indirect gender-based discrimination, and specifies the duties and responsibilities of State institutions and other relevant parties to achieve gender quality in the country. The 2019 amendment to the Decentralization Act (Law No. 7/2010) established a 33% electoral quota for women in local councils, setting a precedent and

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<sup>52</sup> Footnote 51.

<sup>53</sup> National Bureau of Statistics. 2020. *I am Generation Equality: Realizing Women's Rights*. Malé.

<sup>54</sup> Footnote 51.

<sup>55</sup> Footnote 51.

<sup>56</sup> Maldives Bureau of Statistics. 2023. *Census 2022 Results Summary – Table ED16: Literate Population 10 Years of Age and over in Mother Tongue, Sex and Island- 2022*. Malé.

<sup>57</sup> Maldives Bureau of Statistics. 2023. *Census 2022 Results Summary – Table ED19: Resident Maldivian Population 15 Years of Age and over who has ever Attended School or Training Institution by Highest Educational Attainment, and Island-2022*. Malé.

<sup>58</sup> Maldives Bureau of Statistics. 2024. *Disability in the Maldives – Analysis from Census 2022*. Malé.

<sup>59</sup> Footnote 58.

<sup>60</sup> Footnote 50.

facilitated increased meaningful participation in public life and governance of women. Women judges were appointed as Supreme Court justices for the first time ever in 2019.<sup>61</sup>

203. Even though gender parity has been largely achieved in education, gender gaps in economic and political indicators persist. There is a wide gender gap between the percentage of seats held by women (4.6%) and men in Parliament,<sup>62</sup> and in labor force participation rates (49% versus 80%).<sup>63</sup> Women's gross national income per capita of \$7,454 was 48% of men's gross national income per capita of \$15,576 in 2018. This gap reflects the large percentage of women outside the labor force and the gender division in the labor market itself. Due to these disparities, Maldives had a Gender Inequality Index of 0.348 in 2021, ranking 83 out of 162 countries placing it between medium and high human development countries.<sup>64</sup>

## 6. Social and Economic Infrastructure

204. All atolls have social infrastructure such as health facilities, post offices, schools, shops, mosques, and cafes/restaurants. Social infrastructure is most developed in atoll capitals, which serve as hubs for the surrounding islands. For example, Kulhudhuffushi City is the central hub for education in the northern region. Educational facilities on the island are available from pre-school to secondary level through three public schools. The National University of Maldives has a Kulhudhuffushi City campus, and there are also several private education providers including MI College, Villa College, private pre-schools, Quran classes and tuition centers. In the south of Maldives, Hithadhoo is home to the Hithadhoo Regional Hospital, serving neighboring atolls.

205. Presence of social and economic infrastructure on the Project islands is presented in Table 35.

**Table 35: Social and economic infrastructure on Project islands**

No	Island Name	Health Facility	Education Facility	Harbor/ Jetty	Airport	Mosque	Comm-unity Centre
1	HDh. Hanimaadhoo	✓	✓	✓	✓	✓	✓
2	HDh. Nohivaranfaru	✓	✓	✓		✓	✗
3	HDh. Kulhudhuffushi	✓	✓	✓	✓	✓	✓
4	K. Hulhulé	n/a	n/a	✓	✓	n/a	n/a
5	S. Gan	n/a	n/a	✓	✓	n/a	n/a
6	S. Hulhudhoo	✗	✓	✓	✗	✓	✗
7	S. Meedhoo	✓	✓	✓	✗	✓	✓
8	S. Hithadhoo	✓	✓	✓	✗	✓	✓

Sources: Ministry of Environment and ADB. 2020. *Multihazard Risk Atlas of Maldives*. Manila.; Updated until 2024 by ICEM from available online resources.

206. Piped water supply systems are in operation on 66 islands.<sup>65</sup> The Government has adopted principles of integrated water resource management for water supply systems, which includes blending in rainwater and desalinated water to reduce costs.<sup>66</sup> Desalination was introduced in the 1980s and is common in highly populated islands. Seawater is abstracted

<sup>61</sup> Republic of Maldives, Ministry of Gender, Family and Social Services. *National Gender Equality Action Plan 2022–2026*. Malé.

<sup>62</sup> UNDP. 2022. *Human Development Report 2021/22: Uncertain Times, Unsettled Lives: Shaping Our Future in a Transforming World*. New York, USA

<sup>63</sup> Maldives Bureau of Statistics. 2023. *Census 2022: Combined Summary*. Malé.

<sup>64</sup> National Bureau of Statistics. 2020. *Assessment of Gender Statistics in the Maldives*. Malé.

<sup>65</sup> Water and Sanitation Department, provided by email on 22 September 2023.

<sup>66</sup> National Bureau of Statistics. 2018. *Review Report on Water and Waste Accounts*. Malé.

via sea or boreholes below the groundwater lens. Brine is disposed into sea via an outfall pipeline. Approximately 43% of the total population has access to a desalination plant.<sup>67</sup>

207. The installation of centralized sewerage systems began in 1992. Sewerage systems are now operational in 99 islands.<sup>68</sup> Several types of sewerage systems are used, including bore sewerage, conventional gravity systems, and vacuum sewerage systems. Septic tanks are common in the outer atolls where no centralized systems are in place. Once water supply and sewerage systems are constructed by the MCCEE, they are handed over to state-owned enterprises for operation and management.

208. While official statistics are lacking, it is estimated that more than 1,000 tonnes of solid waste is generated in the country per day.<sup>69</sup> Waste is largely left untreated before being dumped into the ocean or dumped at uncontrolled sites where it is burned periodically. A 10 ha dump site was established 6 km from Malé on the artificially created Thilafushi island in 1992, with 330 t of waste dumped on the island every day without leachate- or treatment systems in place. State-owned operator Waste Management Corporation Limited was contracted in 2016 to manage the dump site.

## 7. Cultural Resources

209. One historical or cultural site has been identified at an investment project site. This is on Gan island in Addu, where a mosque and graveyard are located (Figure 33, and Figure 34, building number 4). Based on consultations with MMS and the airport authority, the site is protected but not visited. The site should be left intact.<sup>70</sup> The site will not be impacted by construction of the radar, and has its own separate access.

**Figure 33: Mosque and burial place located near the main site proposed for the radar tower**



Source: Google Maps, 2024

<sup>67</sup> United Nations Economic and Social Commission for Asia and the National Bureau of Statistics. 2021. [Maldives National Water Accounts 2018 and 2019](#). Malé.

<sup>68</sup> ADB. 2023. *Preparing the Climate Change Adaptation and Resilience Project. Inception Report*. Consultant's report. Manila (TA 6977-REG).

<sup>69</sup> Ministry of Environment. 2018. *Feasibility Study for an Integrated Solid Waste Management System for Zone III and Preparation of Engineering Design of the Regional Waste Management Facility at Thilafushi*. Malé.

<sup>70</sup> MMS provided answer in environmental and social screening checklist, July 2025. Available upon request.



**Figure 34: Existing structures south of the runway at Gan**



210. On Kulhudhuffushi the inland mangroves are associated with the cultural livelihood tradition of rope-making from coconut coir (Figure 35). This will not be affected by the stormwater drainage system or the eastern shoreline protection works. Other features of note with historical interest are the coral compound walls still found in many areas (Figure 36) and the old harbor wall, now nearly invisible since reclamation of land to the west (Figure 37).

**Figure 35: Coir rope making by households in Kulhudhuffushi**



Source: ICEM-EPOCH, 2024



**Figure 36: Traditional coral compound walls in Kulhudhuffushi**



Source: ICEM-Epoch, 2024

**Figure 37: Old harbour wall between the reclaimed and old land, Kulhudhuffushi**



Source: ICEM-Epoch, 2024

#### **D. Environmental and Social Profile of Project Islands**

211. The environmental and social profile of the project islands has been compiled based on published data, field visits and consultations with stakeholders. The details are presented in Table 36 to Table 43. Data sources are listed in Table 44.

**Table 36: HDh. Hanimaadhoo**

<b>Island description</b>	Residential island with a length of 6.7 km and width of 0.8 km at its widest parts, with an average width of 0.5 km. The majority of the land is used for the airport. The western part of the island has residential areas, whereas agricultural land is in the center, with a few plots allocated on the eastern
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	side. The shoreline remains largely natural except the harbor development.
<b>Location coordinates</b>	6° 45' 14.115" N; 73° 10' 10.768" E
<b>Registered population</b>	2,644
<b>Population density per km<sup>2</sup></b>	875
<b>Land area</b>	298.29 ha
<b>Distance from Malé</b>	289 km
<b>Nearest airport</b>	Hanimaadhoo International Airport (0 km)
<b>Harbor/jetty</b>	Yes
<b>Total installed power capacity</b>	3,492 kW
<b>Protected area by EPA</b>	No
<b>Mangrove/waterbody on island</b>	Mangrove and marshy areas
<b>Natural area (%)</b>	67.2
<b>Built-up area (%)</b>	32.8
<b>Coral reef – thermal stress</b>	Low
<b>Critical habitat (terrestrial/marine)</b>	Terrestrial: Yes Marine: Yes
<b>Harbor/jetty available</b>	Yes
<b>PCR on island</b>	Mosques
<b>Multi-hazard risk</b>	Very high

**Table 37: HDh. Nohivaranfaru**

<b>Island description</b>	3.8 km long and 0.9 km wide residential island close to Hanimaadhoo, with a predominantly agricultural community. Its population grew from 260 to 1,254 between 2006 to 2022. Short green buffer areas surround the shoreline, which remains untouched except for the harbor development where groynes have been constructed.
<b>Location coordinates</b>	6° 41' 43.036" N; 73° 7' 6.716" E
<b>Registered population</b>	1,254
<b>Population density per km<sup>2</sup></b>	722
<b>Land area</b>	170.30 ha
<b>Distance from Malé</b>	284
<b>Nearest airport</b>	Hanimaadhoo International Airport (9 km)
<b>Harbor/jetty</b>	Yes
<b>Total installed power capacity</b>	460 kW
<b>Protected area by EPA</b>	No
<b>Mangrove/waterbody on island</b>	Yes, mangrove
<b>Natural area (%)</b>	65.5
<b>Built-up area (%)</b>	34.5
<b>Coral reef – thermal stress</b>	Very low
<b>Critical habitat (terrestrial/marine)</b>	Marine: Yes
<b>Harbor/jetty available</b>	Yes
<b>PCR on island</b>	Mosques
<b>Multi-hazard risk</b>	Medium

**Table 38: HDh. Kulhudhuffushi City**

<b>Island description</b>	Oval-shaped residential island of 2.9 km in length and 1.8 km in width. The island is the atoll capital and serves as the regional hub of the north of the country. The island is known for its Saturday market, and its mangroves. The north of the island has been allocated to the airport, opened in 2019, whereas the other parts of the island are residential. The eastern shoreline remains the only natural beach on the island, and the western shoreline is used for harbors.
<b>Location coordinates</b>	6° 37' 23.613" N; 73° 4' 8.002" E
<b>Registered population</b>	10,131
<b>Population density per km<sup>2</sup></b>	4,018



<b>Land area</b>	247.22 ha
<b>Distance from Malé</b>	277 km
<b>Nearest airport</b>	Kulhudhuffushi Airport (0 km)
<b>Harbor/jetty</b>	Yes
<b>Total installed power capacity</b>	4,441 kW
<b>Protected area by EPA</b>	No
<b>Mangrove/waterbody on island</b>	Yes, mangroves in north and south
<b>Natural area (%)</b>	26.0
<b>Built-up area (%)</b>	74.0
<b>Coral reef – thermal stress</b>	High
<b>Critical habitat (terrestrial/marine)</b>	Terrestrial: Marine: Yes
<b>Harbor/jetty available</b>	Yes
<b>PCR on island</b>	Mosques
<b>Multi-hazard risk</b>	Very high

**Table 39: K. Hulhule**

<b>Island description</b>	Industrial island between Male and Hulhumale allocated for Velena International Airport, ferry transportation, and other businesses. MMS has its headquarters on the island, and the island is home to the only Doppler radar in the country. No permanent population resides on the island.
<b>Location coordinates</b>	4° 11' 0" N, 73° 32' 0" E
<b>Registered population</b>	0
<b>Population density per km<sup>2</sup></b>	0
<b>Land area</b>	
<b>Distance from Malé</b>	0 km
<b>Nearest airport</b>	Velana Airport (0 km)
<b>Harbor/jetty</b>	Yes
<b>Total installed power capacity</b>	From Hulhumale plant
<b>Protected area by EPA</b>	No
<b>Mangrove/waterbody on island</b>	No
<b>Natural area (%)</b>	n/a
<b>Built-up area (%)</b>	n/a
<b>Coral reef – thermal stress</b>	n/a
<b>Critical habitat (terrestrial/marine)</b>	No
<b>Harbor/jetty available</b>	Yes
<b>PCR on island</b>	No

**Table 40: S. Gan**

<b>Island description</b>	Industrial island allocated to Gan International Airport, the most southern airport in the country. The island is connected by bridge to the neighboring island of Feydhoo. A soccer field and small park are located in the south of the island, but there are no permanent residents registered.
<b>Location coordinates</b>	0° 41' 39.605" S; 73° 9' 9.919" E
<b>Registered population</b>	0
<b>Population density per km<sup>2</sup></b>	0
<b>Land area</b>	333.05 ha
<b>Distance from Malé</b>	551
<b>Nearest airport</b>	Gan International Airport (0 km)
<b>Harbor/jetty</b>	Yes
<b>Total installed power capacity</b>	From STELCO plant in Hithadhoo
<b>Protected area by EPA</b>	Yes, British Loyalty Shipwreck (marine protected area) – category not assigned, since 2018, 64.73 ha
<b>Mangrove/waterbody on island</b>	No
<b>Natural area (%)</b>	n/a
<b>Built-up area (%)</b>	n/a
<b>Coral reef – thermal stress</b>	n/a

<b>Critical habitat (terrestrial/marine)</b>	Marine: Yes
<b>Harbor/jetty available</b>	Yes
<b>PCR on island</b>	Mosques

**Table 41: S. Hulhudhoo**

<b>Island description</b>	Located on the northeastern point of the atoll, forming one half of the two administrative constituencies of Hulhumeedhoo. Residential development is concentrated in the southwestern part of the island including the ferry terminal, with a wetland and vegetation on the eastern side. The shoreline has been engineered around the jetty and ferry terminal, but remains untouched on the other sections of the coast.
<b>Location coordinates</b>	0° 35' 50.413" S; 73° 13' 41.196" E
<b>Registered population</b>	1,182
<b>Population density per km<sup>2</sup></b>	876
<b>Land area</b>	134.1.00 ha
<b>Distance from Malé</b>	531 km
<b>Nearest airport</b>	Gan International Airport (14 km)
<b>Harbor/jetty</b>	Yes
<b>Total installed power capacity</b>	995 kW
<b>Protected area by EPA</b>	Yes, <i>mathii kilhi</i> – Category 7: Protected Area with Sustainable Use (since 2020)
<b>Mangrove/waterbody on island</b>	Yes, <i>mathi kilhi</i> wetland, 56.12 ha (across Hulhudhoo and Meedhoo)
<b>Natural area (%)</b>	26.6
<b>Built-up area (%)</b>	73.4
<b>Coral reef – thermal stress</b>	Low
<b>Critical habitat (terrestrial/marine)</b>	Terrestrial: Yes Marine: Yes
<b>Harbor/jetty available</b>	Yes
<b>PCR on island</b>	Mosques
<b>Multi-hazard risk</b>	Medium

**Table 42: S. Meedhoo**

<b>Island description</b>	Located on the northeastern point of the atoll, forming one half of the two administrative constituencies of Hulhumeedhoo. It is the oldest populated island in Addu City, with residential development concentrated in the western part of the island. The island features marshy areas, a wetland and beaches, with most of the shoreline untouched.
<b>Location coordinates</b>	0° 35' 3.781" S; 73° 13' 49.154" E
<b>Registered population</b>	1,892
<b>Population density per km<sup>2</sup></b>	1,008
<b>Land area</b>	186.48 ha
<b>Distance from Malé</b>	530 km
<b>Nearest airport</b>	Gan International Airport (14 km)
<b>Harbor/jetty</b>	Yes
<b>Total installed power capacity</b>	218 kW
<b>Protected area by EPA</b>	Yes, <i>mathi kilhi</i> – Category 7: Protected Area with Sustainable Use (since 2020)
<b>Mangrove/waterbody on island</b>	Yes, <i>mathi kilhi</i> wetland, 56.12 ha (split across Hulhudhoo and Meedhoo), and two marshy areas in the north
<b>Natural area (%)</b>	62.4
<b>Built-up area (%)</b>	37.6
<b>Coral reef – thermal stress</b>	Low
<b>Critical habitat (terrestrial/marine)</b>	Terrestrial: Yes

<b>Harbor/jetty available</b>	Marine: Yes Yes
<b>PCR on island</b>	Mosques
<b>Multi-hazard risk</b>	Medium

**Table 43: S. Hithadhoo**

<b>Island description</b>	Located on the northwestern point of the atoll, measuring 6.8 km in length and 1.8 km in width at its widest point, making it one of the largest islands in the country. Most services in the atoll are located on the island, with a bridge linking the southern islands. Hithadhoo is mostly developed with residential areas, and is home to the Addu Equatorial Hospital. A mangrove and protected area (terrestrial and marine) form the northern part of the island. The upper half of the shoreline remains untouched, whereas groynes have been constructed near the southern port and a section of the link road.
<b>Location coordinates</b>	0° 36' 43.677" S; 73° 5' 30.321" E
<b>Registered population</b>	13,759
<b>Population density per km<sup>2</sup></b>	2,496
<b>Land area</b>	547.70 ha
<b>Distance from Malé</b>	534 km
<b>Nearest airport</b>	Gan International Airport (13 km)
<b>Harbor/jetty</b>	Yes
<b>Total installed power capacity</b>	3,170 kW
<b>Protected area by EPA</b>	<ol style="list-style-type: none"> <li>1. <i>Maafishi Kilhi</i> – Category 7: Protected Area with Sustainable Use (since 2020)</li> <li>2. <i>Eedhigali Kilhi</i> and <i>Koathey</i> area (mangrove and marine protected area) – category not assigned (since 2004)</li> </ol>
<b>Mangrove/waterbody on island</b>	<ol style="list-style-type: none"> <li>1. <i>Maafishi Kilhi</i> mangrove and wetland (5.86 ha)</li> <li>2. <i>Eedhigali Kilhi</i> (770.62 ha incl. marine area)</li> </ol>
<b>Natural area (%)</b>	26.8
<b>Built-up area (%)</b>	73.2
<b>Coral reef – thermal stress</b>	Medium
<b>Critical habitat (terrestrial/marine)</b>	Terrestrial: Yes Marine: Yes
<b>Harbor/jetty available</b>	Yes
<b>PCR on island</b>	Mosques
<b>Multi-hazard risk</b>	Medium

**Table 44: Data Sources for Social and Environmental Island Profiles**

<b>Parameter</b>	<b>Data source</b>
Location coordinates	Google Earth
Registered population	Maldives Bureau of Statistics. 2023. <i>Census 2022: Combined Summary</i> . Malé.
Population density per km <sup>2</sup>	Maldives Bureau of Statistics. 2023. <i>Island &amp; Atoll Level Indicator Sheets: Population: Atoll Level Indicator Sheet</i> . Malé.
Land area	ESRI Sentinel-2 <a href="#">Land Cover Explorer</a>
Distance from Malé	Google Earth
Nearest airport	Google Earth satellite imagery
Harbor/jetty	Google Earth satellite imagery
Total installed power capacity	<a href="#">Island Electricity Databook 2019</a> , Ministry of Environment and Energy MCCEE 2019
Protected area by EPA	Environmental Protection Agency. 2023. <i>Protected Areas of Maldives</i> . Malé. Last updated 17 December.
Mangrove/waterbody on island	Google Earth satellite imagery
Natural area (%)	ESRI Sentinel-2 <a href="#">Land Cover Explorer</a>
Built-up area (%)	ESRI Sentinel-2 <a href="#">Land Cover Explorer</a>

Coral reef – thermal stress	Ministry of Environment and Energy <a href="#">Maldives Bleaching Risk Assessment Tool</a> <sup>71</sup>
Critical habitat (terrestrial/marine)	Google Earth satellite imagery
Harbor/jetty available	Google Earth satellite imagery
PCR on island	Google Earth satellite imagery
Multi-hazard risk	Asian Development Bank. 2024. <i>Preparation of the Climate Change Adaptation and Resilience Project in Maldives. Climate Change Assessment</i> . Consultant's Report. Manila

## VI. ANTICIPATED ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

### A. Overview

212. This section of the IEE describes the potential impacts of the proposed activities and their mitigation by project phase: design, construction and operation. It covers the four major physical activities: upgrading and construction of the radar systems, construction of the stormwater drainage network, installation of the coastal protection measures and construction of the new facilities for the HAC. Impacts are broadly grouped by environmental receptor: the physical environment, the biological environment and the social environment. Within these broad groups, impacts are discussed by topic: air, water, waste, health, etc., together with the respective mitigation measures.

213. The mitigation approach used for the subproject follows standard practice in a mitigation hierarchy: if impact assessment identifies a potential significant impact, then steps are taken in the project planning and design process in the following order:

- (i) Avoid: change the location, design or timing of the activity so that the impact does not occur.
- (ii) Minimize: change the location, design or timing of the activity so as to reduce the severity of the impact to an acceptable level.
- (iii) Compensate: if residual impacts after minimization are still significant, then arrange compensation. Socio-economic compensation is often financial; environmental compensation may involve, for example, the improvement of habitat at a different location to offset the habitat negatively affected by the project.

214. The subject of cumulative effects is discussed at the end of the section.

215. This section of the IEE should be confirmed and/or revised to reflect the detailed designs when they become available and resulting additional design features incorporated into the IEE, detailed ecological and marine ecology surveys findings as well as coastal modeling results to assess potential erosion impacts on the coast

### B. Design Phase (Pre-Construction)

216. During the planning and feasibility design phase of the subproject, a number of impacts were identified and mitigation actions taken, as noted below.

- (i) **Selection of Risk Management Option:** three options were considered for coastal protection at Kulhudhuffushi. The no-action option might result in breaching of the protective ridge in the short-term (5-10 years) with associated

<sup>71</sup> Tool developed by the Marine Spatial Ecology Lab, University of Queensland, Australia, as part of the World Bank-funded *Wetlands Conservation and Coral Reef Monitoring for Adaptation to Climate Change Project for Maldives*.

damage and intervention requirements. Hardening the shoreline with a rock revetment is a very expensive structural solution to prevent further erosion and overtopping. The recommended option, beach nourishment, is intended to provide a medium-term solution to coastal erosion and sea-level rise (10-30 years, mean water level increase of less than 0.50 m), at acceptable cost.

- (ii) **Piloting:** the stormwater drainage measures to be installed throughout Kulhudhuffushi include a range of nature-based solutions which, in addition to reducing problems from rainfall-induced flooding on this highly built-up island, will promote the infiltration of rainwater into the freshwater lens and enhance street-level biodiversity. The measures are intended to be a model, demonstrating how water can be better managed on other rapidly urbanizing islands in the archipelago.

217. The following four actions are part of the normal project planning and design process, but need emphasis because of their importance in both identifying and avoiding negative impacts, and ensuring effective implementation of all mitigation measures:

- (i) **Environmental Impact Assessment:** The Project has undergone environmental assessment in line with ADB policy, resulting in this IEE. The environmental assessment process has been carried out in parallel with social safeguards assessment and the production of respective social safeguard document, specifically a Resettlement Framework (RF). Both the IEE and the RF will be updated to reflect any subproject changes during detailed design, particularly ensuring that all ecological aspects as well as coastal erosion aspects are assessed in detail through thorough field-based surveys and modeling exercises. In addition, the project requires approval through normal Maldivian procedures which include environmental assessment. The IEE and RF provide a good basis for the necessary documents and will be adapted accordingly. The impact assessment process has resulted in environmental and social management and monitoring plans (see Section VII) listing the various practical actions to be taken to manage the subproject's environmental and social risks.
- (ii) **GRM:** Preparation of the project has included the design of a GRM, as described in Section VI of this IEE and also in the RF.
- (iii) **Construction-related Requirements:** Preparation of the project has included the identification of various environmental and social safeguard actions to be undertaken by the contractors for the civil works. These focus on development and implementation of Site Environmental Management Plans (SEMP: see Section VII).
- (iv) **Arrangements for Supervision and Monitoring:** The last key item during project planning has been development of arrangements for environmental supervision, monitoring and reporting (see Section VII).

## C. Construction Phase

### 1. Impacts on the Physical Environment

218. **Air:** The Addu radar is in a remote location with good air quality. Field based monitoring has yet to be conducted through engaging an accredited laboratory but will be conducted during the detailed design stage to obtain the ambient air quality results for the pre-project scenario. Some dust may be generated by construction traffic and excavation. This will be on a small scale with no significant impact outside the immediate vicinity of the worksite. The Malé system is in a distant corner of the international airport compound with a busy road on each side. No significant impacts on air quality are expected from the upgrade works.

Construction of the drainage measures on Kulhudhuffushi will create localised dust on dry days from construction traffic and earthworks. Both will be small scale, and easily controllable by watering, if necessary. Installation of the coastal protection measures on the eastern shoreline will involve around 3,500 tipper-truck movements over a maximum 3-year period, but the access roads are all paved until the final few metres at the shoreline ridge. No dust nuisance is expected. Construction of the buildings at HAC may result in some localised dust from machinery and earthworks (excavation for foundations), but again on a small scale with no nuisance or hazard expected. In all cases equipment needs to be in good condition and well maintained to avoid emitting black smoke. Standard controls are (i) use of equipment in good condition; (ii) correct engine maintenance; (iii) contract provisions allowing the Employer to ban vehicles emitting black smoke; and (iv) effective community liaison and grievance procedures, so that polluting vehicles can be reported, identified and sanctioned.

219. **Noise:** The project sites are mostly in quiet locations, the exceptions being (i) the radar system at Malé which is adjacent to two busy roads (Figure 7) and also exposed to noise from aircraft movements, (ii), the radar system at Addu International Airport which is also subject to aircraft noise (Table 20), and (iii), to some extent, the streets of Kulhudhuffushi: most of the streets where the drainage measures will be installed are residential, but some have commercial activities and are busier, with associated traffic noise (Table 22). Field based monitoring has yet to be conducted through engaging an accredited laboratory but will be conducted during the detailed design stage to obtain the ambient noise levels results for the pre-project scenario. Noise will be generated by all construction vehicles and by some stationary construction equipment such as generators and cement mixers. Standard controls are (i) use of effective silencers on all vehicles and machinery; (ii) contract provisions allowing the Employer to ban machinery causing excess noise; and (iii) effective community liaison and grievance procedures, so that excessively noisy vehicles and equipment can be reported, identified and sanctioned.

220. **Vibration:** The civil works will not involve vibration-inducing activities such as blasting or pile-driving. The two sources of vibration foreseen are (i) possibly, vibro-compaction of base layers for the access road for the Addu radar and around the new HAC buildings, and (ii) construction traffic, specifically laden dump trucks on Kulhudhuffushi. The dump trucks will be running on public roads across the island for a typical distance of 1.0 km. Although it is not expected that vibrations from the trucks will cause any damage to nearby structures, some buildings have little set-back from the carriageway. If any structures close to roads used by haul traffic are considered fragile, a condition survey should be carried out as early as possible. If any problem occurs or is perceived, it can be reported and followed up through the standard measure of an effective community liaison and grievance procedure.

221. **Surface water and groundwater:** Work on the radar systems, coastal protection and HAC will not affect surface water because this does not exist in those locations. During the detailed design stage, groundwater and surface water sampling, as applicable, will be conducted to establish a robust baseline prior to commencement of works. Appropriate surface drainage will be provided along the various short lengths of paved roads required to service these facilities. The drainage works on Kulhudhuffushi are designed to intercept and channel surface water arising from heavy rainfall on impermeable surfaces - roofs, yards and roads, encouraging it to infiltrate and providing channels for surplus to flow safely to outfalls on the perimeter of the island. No impacts on groundwater are anticipated from construction.

222. **Soils, erosion and sedimentation:** All construction works are expected to be small scale and should take place on essentially flat surfaces. There is no possibility of erosion in the form of gullying. However, if heavy rain falls on excavated surfaces such as trenching for foundations, there may be a small overflow of sediment-laden runoff. Any such impact will be very short-term and localized. Mitigation includes sequencing works so as to minimize the



area of ground exposed and constructing silt-traps at the lower edge of work sites so as to detain runoff and promote settlement.

223. **Site access:** All the construction sites are accessible from existing paved roads, for example in Addu (Figure 38), except for the coastal protection works on the eastern side of Kulhudhuffushi. Here, short lengths of unpaved track cut through the ridge vegetation to provide access to the shoreline at several points (Figure 39). It is anticipated that it will be possible to carry out the works along the shore by using the three existing access points (north, centre and south). Minor vegetation clearance may be required for construction vehicle access, and will be mitigated through the EMP.

**Figure 38: Paved Access Roads Along the Runway in Gan International Airport, Addu City**



Source: ICEM-Epoch, 2024

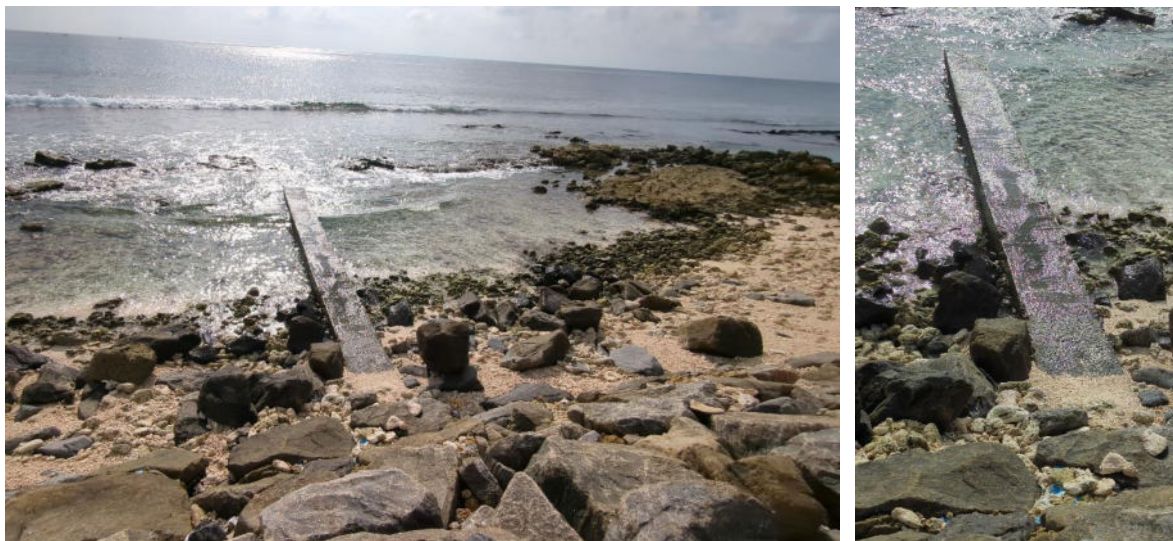
**Figure 39: Kulhudhuffushi: Central Access to Eastern Shoreline**



Source: ICEM-Epoch, 2024

224. **Existing services:** Local consultations and fieldwork have identified various services that might be affected by the works, including sewage outfalls and marine internet cables on the eastern Kulhudhuffushi coast (Figure 40). The existence and exact locations of all services will be checked during detailed design through coordination with utility providers. As the measures are proposed at intervals, it will be possible to avoid disruption to existing services. Any temporary disruption will be mitigated through the EMP.

**Figure 40: Submarine communications cable entering the island, under the revetment**



Source: ICEM-Epoch, 2024

225. **Construction materials:** The radar systems and HAC will have very small requirements for bulk construction materials since these subprojects are physically small. The largest demand in volumetric terms will be for sand for beach nourishment on Kulhudhuffushi, where an estimated 52,500 m<sup>3</sup> of sand will be needed for the initial installation. This will be sourced from the existing very large stockpile on the west side of the island, created during reclamation and harbor dredging works. Rock for the groynes will be imported from existing quarries in India, by barge.

226. Excavation of the drainage trenches and bioswale on Kulhudhuffushi will be done by tracked or wheeled excavator. It is expected that the installation of perforated drains, filter-wrap and backfill of filter material will all be done from the surface, avoiding any need for trench-support timber.

227. **Waste management, pollution and site housekeeping:** All construction operations generate a variety of solid and liquid wastes, ranging from inert substances such as rubble and bricks through wood waste from formwork, plastics, metal in various forms, workshop wastes, wastewater from worker accommodation, staff offices and site sanitation, office waste, and kitchen wastes if there are canteens. For the project, the most important category of waste will be used engine oils and filters from vehicle maintenance, because these have the potential to create both soil and water contamination. The physical works are not expected to generate any other wastes in any significant quantities. Waste management, pollution prevention and site housekeeping will be ensured by standard provisions in the tender documents which will require the contractor to develop and implement a site waste management plan. This will cover identification of all waste types; separation of all wastes into different waste streams; collection and storage of wastes; disposal of all wastes by approved methods in the hierarchy re-use, recycle, safe disposal; record keeping; specific requirements in relation bulk fuel storage and vehicle maintenance, including by subcontractors on the site; emergency response in case of spills or soil contamination; and worker awareness and training.

## 2. Impacts on the Biological Environment

228. No important ecological habitats or environmentally sensitive areas have been identified in the vicinity of the radar systems (Subprojects 1.1, 1.2) or HAC (Subproject 3.1) (Figure 25, Figure 30, Figure 31).

229. On Kulhudhuffushi, some elements of the drainage interventions (Subproject 2.3) run close to the remnant inland mangroves in the north and south of the island (Figure 8, Figure 27). Careful design is necessary to ensure no interference between the two systems. This will be achieved by a detailed study of the island's hydrology and the mangroves before finalizing the detailed designs (Subproject 2.1). The study will also determine if it is possible to improve the functioning of the mangrove systems by reconnecting them with the sea, as a minor extension to the civil works, and will develop a mangrove management plan. Note that any works affecting the mangroves, even if positively, may require a critical habitat assessment (CHA). This will be undertaken as part of the detailed study and associated Maldivian environmental permitting process, and the results incorporated in a revision to this IEE which will be submitted to ADB for review and clearance prior to commencement of works.

230. On the east side of the island, the coastal ridge and its vegetation provide habitat for a wide variety of wildlife from bats to crabs. Part has been cleared recently for road construction. Care will need to be taken to identify, mark and protect the remaining vegetated locations during construction activities, including limiting vehicle access to the pre-existing beach access points (Figure 15). The ecological status and value of the ridge and shoreline will be assessed during the 15 month-long study (Subproject 2.2) that will precede detailed design which will consist of detailed ecological surveys including marine ecology surveys. As with the drainage works, the coastal protection measures may require a CHA which will be carried out in the same way along with coastal modeling to assess potential erosion impacts. Note that the recent (2023) ESIA for the Proposed PEACE Cable Branches making landfall on the eastern shoreline describes the live coral cover in this location as 'Very Poor' and found no Threatened or Protected fish species in their surveys.

### 3. Impacts on the Social Environment

231. **Construction traffic and disturbance:** Construction and upgrading of the radar systems is not expected to result in any significant negative impact from construction traffic since the projects are small and there will only be a limited number of vehicle movements. On Hanimaadhoo, construction of the new HAC facilities will be on the existing HAC site and subject to limits on working hours and control of traffic movements to and from the nearby harbor, disturbance should be minimal. On Kulhudhuffushi, installation of the drainage measures may require blocking off short lengths of street for key activities. However, the island's road network is laid out as a grid, and diversions are easily arranged. The most significant volume of construction traffic will be the dump trucks taking sand from the existing stockpile across the island to the eastern shoreline for beach nourishment. However, even with an estimated 3,500 truckloads required, over a construction period of three years this is only three round trips per day, and therefore negligible.

232. Note that infiltration trenches and connections to existing aquacells are proposed for a sports field (Figure 41). Construction should be arranged to minimize interruptions to use of the field.



**Figure 41: Zigzag Stadium in Kulhudhuffushi, with an aquacell field underneath**



*Source: ICEM-Epoch, 2024*

233. **Public health:** Apart from possible road traffic accidents, no impacts on public health are foreseen from the project activities. There may be some interaction between local residents and the contractors' staff and workers, but the number of workers will be small and Maldives are socially conservative and alcohol-free. Consequently, the issue transmissible diseases, especially Covid-19 and sexually-transmitted diseases (STDs), is not considered to be high-risk. Covid-19 will be handled by the regulations and procedures in force at the time. Prevention of STD transmission is a public health issue, and will be managed as (i) a specific item in the residents' awareness program, and (ii) a specific item in the contractor's induction health, safety and environment training for all staff and workers.

234. **Occupational health and safety (OHS):** All construction work has health and safety risks. The project works are relatively simple although they will involve working at a height, in confined spaces, with electricity, and with heavy machinery. There will also be the usual minor risks associated with vehicle maintenance and small-scale construction work. All these risks can be mitigated by standard measures, including (i) using equipment in good condition, and properly maintaining it; (ii) ensuring all equipment operators are fully qualified, and also experienced; (iii) including a full range of health and safety requirements in the tender documents, including the need for at least one site engineer to have health and safety qualifications; first aid equipment and a minimum number of qualified first aiders amongst site workers; risk assessment procedures; and procedures in case of accidents; (iv) a requirement for the contractor to develop and implement a health and safety plan (including community health and safety); (v) ensuring that the contractor provides health insurance for all staff and workers as well as complying with relevant Maldivian regulations on worker health and safety; and (vi) including OHS expertise in the supervision PIC.

235. **Land, compensation and resettlement:** Based on the social safeguards screening presented in the due diligence reports, no land acquisition or resettlement is currently foreseen. Activities will be undertaken on government owned land. For the expansion of the Hanimaadhoo Agriculture Centre, the current building may be temporarily inaccessible, which will be restored upon completion of the construction. Obstruction to farming plots should be avoided. Output 4 has not been assessed in detail as the activities are still being defined at the time of preparing this IEE.

#### **D. Impacts and Mitigation: Operational Phase**

236. **Radar stations:** Operation of the new and upgraded radar stations will not involve any unusual activities beyond the normal requirements for maintenance of sensitive electro-mechanical equipment and protection of the structures in tropical coastal environments characterized by salt spray, frequent rain and occasional high winds. Any electronic

components and used batteries will need to be returned to suppliers for recycling until such time as appropriate recycling facilities become available, and in all cases handled and disposed of in compliance with the Waste Management Policy and Regulations (2013).

237. **Drainage:** on Kulhudhuffushi, drainage measures including drain pits and PVC pipes are proposed along a combined length of 8.4 km of unpaved sand roads. These will be liable to reductions in capacity and blocking unless regularly cleared of silt and sand. A comprehensive operation and maintenance plan should be developed, detailing tasks, schedules, and responsible parties to ensure the proposed interventions work as intended. This plan should include regular inspections to detect issues such as pest infestations or clogged drainage systems early, facilitating cost-effective and straightforward resolutions, and regular preventative maintenance regimes, particularly at the beginning and following monsoon periods.

238. The required machinery such as jetting and suction combined trucks, drain augers and safety equipment should be provided. At the end of construction, training should be provided to the caretakers of the drainage system, Kulhudhuffushi Council, by the contractors on how to use the necessary machinery and equipment. This should be followed by a 3-month commissioning period where the contractor oversees the operation and maintenance procedures to be undertaken by the City Council.

239. **Coastal protection:** Maintenance of the eastern ridge will be an ongoing activity involving both sand nourishment and planting. An appropriate monitoring and maintenance regime will be developed as part of the detailed design study (Subproject 2.2).

240. **HAC:** Operation of the upgraded HAC will not involve any unusual activities beyond the normal requirements for management of laboratory chemicals and the use of small quantities of artificial fertilizers in agricultural trials.

#### **E. Impacts and Mitigation: Decommissioning Phase**

241. Please refer to section III.

#### **F. Cumulative and Induced Impacts of Project Components**

242. No cumulative negative impacts are anticipated as a result of the subprojects under the Project since (i) environmental Category A subprojects are excluded; (ii) the physical works will be localized and involve simple construction activities - small buildings, drainage, coastal protection - which are easily mitigable using standard procedures and measures and are themselves designed to bring environmental benefits; and (iii) the agriculture sector support activities will improve agricultural productivity and food security in a climate sensitive manner, including water-saving technologies. Overall, because the project investments will reduce or avoid future negative impacts including those from weather events, waves, sea-level rise and freshwater quality and availability, they will not add to the negative impacts arising from other projects and activities.

243. The project is intended to increase Maldives' resilience to climate change. As such, it may increase economic activity by providing more stable and predictable conditions in terms of weather forecasting, coastal protection, urban stormwater and groundwater management, agricultural water use, and wetland restoration. Increased economic activity has many benefits but is also associated with increased resource use, emissions and waste, and needs to be managed by government through a wide range of policies and regulations.

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

## A. Consultations

### 1. Overview

244. **ADB requirements:** ADB's Safeguard Policy Statement (2009) requires public consultation meetings (PCM) at an early stage of the IEE process for environment Category B investments. Adequacy of public consultation and information disclosure is one of the criteria used to determine compliance with ADB safeguard policies. Requirements for Category B subprojects are documented here. Category A subprojects are excluded from Project financing.

245. **Category B:** PCM will be undertaken both during the early stages of subproject planning, during the IEE process and throughout project implementation, addressing any environmental issues of concern to local communities, NGOs, government bodies, and other interested parties.

246. **Category C:** PCM are not required but may be held if warranted by the nature of the subproject, its environmental and social issues, or stakeholder interest.

247. **Objectives:** PCMs seek to (i) explore genuine local demand for the proposed works; (ii) foster participatory, comprehensive, and accurate preparation of the works, (iii) strengthen local community groups and their commitment and participation in subproject implementation, (v) contribute to effective and transparent communication between implementing agencies and local residents, and (vi) provide opportunities for both men and women to participate and contribute to planning of interventions beneficial to them.

248. All consultations and information disclosure will combine, as far as possible, the requirements of both ADB safeguards processes and the national environmental assessment and review process.

### 2. Consultations

249. After the shortlisting of the project activities, consultations for the environmental safeguards took place by the consultants on behalf of the MCCEE with key stakeholders. This included ministries and line agencies at national and local level (Table 45) as well as community leaders, non-government organizations, and project beneficiaries and members of the public likely to be affected by various aspects of the Project (Table 46). Although limited consultations have been conducted at present, additional consultations will be conducted at the detailed design stage to ensure all comments and feedback from concerned stakeholders are incorporated into the updated version of this IEE study. A selection of photos are provided in Annex 4.

**Table 45: Consultation with key stakeholders**

No.	Agency/Date	Officials met	Issues discussed
1	Ministry of Climate Change, Environment and Energy, Climate Change Department – several times including during ADB fact finding mission May/June 2024	Mr. Ahmed Waheed Ms. Aishath Reesha Suhail	Priorities and focus for the investment project, mangrove restoration in Kulhudhuffushi City, safeguards categorization, implementation arrangements for environmental management



No.	Agency/Date	Officials met	Issues discussed
2	Hanimaadhoo Agriculture Centre – 9 May 2024	Mr. Abdul Latheef Mr Ali Waheed Mr. Aboobakuru Mohamed Dr. Ms. Nijamuddin	Current HAC land area, vision for adaptive research of the HAC, capacity building, international partnerships, climate resilient technologies, farmer field schools, environmental safeguards and current environmental site conditions
3	Kulhudhuffushi City Council –12 May 2024	Mr. Ahmed Abdulla Ms. Athifa Ali Ms. Aminath Majeeda Mr. Abdulla Adam Ms. Aishath Afa Ali Mr. Mohamed Athif	Activities and subprojects considered under Output 2, lessons learned and experience with previous investment projects, planned reclamation for the harbor, status of the northern mangroves, ongoing erosion and sedimentation, coral restoration, safeguards process
4	Environmental Protection Agency – 16 May 2024	Mr. Riffath Naeem Mr. Hashim Nabeel	Mangrove systems and road runoff, lack of overall drainage plan, bioswale, planned dockyard, sand nourishment, avoidance of major rock works, support for holistic approach
5	Ministry of Agriculture and Animal Welfare – 23 May 2024	Mr. Ismael Rasheed, Mr. Mohamed Anees, Mr. Ali Amir Mr. Mohamed Rihvaan	Priority activities, the role of HAC in disseminating urban farming best practices and promoting viable agribusiness in the project area, and the scope of required multi- facility building; and confirmed that the construction will take place on government-owned land
6	Maldives Meteorological Service – 12 June 2024	Mr. Abdulla Wahid Mr. Ahmed Rasheed Mr. Ahmed Muslim	Site selection for the Addu radar, existing structures, biodiversity of the site,

**Table 46: Summary of community consultations**

No.	Name of Island	Organization/Stakeholder	Date	Participants	
				Male	Female
1	HDh.	Coir rope making group	12 May 2024	2	8
2	Kulhudhuffushi City	Women’s Development Committee	12 May 2024	2	6
3		Boat owners and fishermen	13 May 2024	12	1
4		Youth and Beleaf NGO		9	2
5	HDh.	Youth group	14 May 2024	3	1
6	Hanimaadhoo	Farmers and home gardeners	14 May 2024	4	2
7	S. Gan and S.	Maldives Red Crescent Addu	6 March 2024	3	2
8	Hithadhoo	Addu Airport Aviation Authority	6 March 2024	8	1

## B. Findings of Consultation Meetings

250. A summary of key findings of the consultation meetings is provided in Table 47.

**Table 47: Summary of consultation meeting findings**

Island	Finding
HDh. Kulhudhuffushi City	<ul style="list-style-type: none"> <li>The erosion on the north beach area and the eastern shoreline is visible. Erosion on the airport side has significantly increased, so comprehensive</li> </ul>

Island	Finding
	<p>reef management is needed. Coral reef bleaching and sedimentation near the area is observed.</p> <ul style="list-style-type: none"> <li>• Northern Harbor reclamation area will happen soon, Maldives Ports will implement the reclamation. Access roads are also proposed on the eastern side of the runway. A nature park may be developed, under the City Council. The North and South harbor are also under the council jurisdiction, as will be the dockyard.</li> <li>• The mangrove is slowly being reclaimed by invasive species. It is a sensitive area but interventions are needed.</li> <li>• Fishermen and boat owners observed waves are crashing above the revetment, breakwater design is too low, sediment and sand accretion in the new harbor, color changes in harbor water, harbor competition is disrupted due to water contamination.</li> <li>• Drainage in the harbor is no longer connected to sea.</li> </ul>
<p>HDh. Hanimaadhoo</p>	<ul style="list-style-type: none"> <li>• Vegetation has already been cleared at the HAC site.</li> <li>• Water is supplied using groundwater. There is an interest to use water saving technologies.</li> <li>• Diesel is used for energy, solar pumps for watering the fields. Electric pumps are only used as a backup.</li> <li>• The island has no proper mechanism for managing inorganic waste. All landfill, without separation.</li> <li>• HAC has a need for solar water pumps, micro irrigation. Some areas that can be looked into include water measurement, quality of freshwater lens and different methods of rainwater harvesting.</li> <li>• It is challenging to deal with expired chemicals. So far only being stored. There is a dependency on chemicals in farming.</li> <li>• Most of the native cultivars have already disappeared. Most farmers are growing hybrids from Thailand and Vietnam which require a lot of fertilizer.</li> <li>• No air pollution measurements are taken by HAC. Climate Observatory does take measurements but the data is not shared</li> <li>• Youth observed there is little urban farming undertaken on the island.</li> <li>• Bats are an issue for locals.</li> <li>• Farmers worry about infestation of palms, whiteflies and scooty mold (<i>koodi</i>) and hispid beetle (<i>ruku madi</i>)</li> <li>• A better understanding of monsoon patterns would aid crop harvesting.</li> </ul>
<p>S. Gan and S. Hithadhoo</p>	<ul style="list-style-type: none"> <li>• There have been no observations of habitat used by wildlife on the island.</li> <li>• Tree height is limited by the airport authority to 18 m.</li> <li>• There is a cemetery with burial places from the Second World War, which should be respected and kept intact.</li> <li>• Salt spray on radar equipment should be avoided.</li> <li>• Flood maps become outdated when land reclamation takes place.</li> <li>• There is no conflict between the allocated area and the area MNDF uses.</li> </ul>
<p>K.Hulhule</p>	<ul style="list-style-type: none"> <li>• Salt spray is leading to corrosion of the radar tower and equipment.</li> <li>• There have been no issues with birds nesting on the tower.</li> <li>• Hazardous waste is handed over to the waste management company.</li> </ul>

### C. Information Disclosure

251. Information disclosure will follow the procedure for ADB environment category B projects. It is ADB policy to have environmental assessment reports made available and/or accessible to the general public.

252. All environmental documents are subject to public disclosure, and therefore, will be made available to the public. This IEE will be disclosed on ADB's website upon receipt and also on the website of MCCEE. This executive summary of this IEE translated into local language will be made available for perusal at the MCCEE head office in Malé and at Island

council offices, and at other locations accessible to stakeholders (to be determined by MCCEE). If requested the entire IEE will be translated to local language free of charge by MCCEE.

253. All EMPs will include an implementation phase Public Consultation plan, to be supervised by the PMU as part of the implementation program. Its purpose is to advise stakeholders about project activities and monitoring results.

#### **D. Grievance Redress Mechanism**

254. As soon as the Project commences, the PMU will establish a project specific simple and acceptable, transparent and effective GRM, stipulating the required level and number of GRCs. The GRM will provide time-bound and transparent mechanism to effectively manage and resolve any social or environmental concerns that may arise during the pre-construction, construction and operation of the Project, such as regarding negotiated/voluntary land donation or involuntary land acquisition, relocation, income restoration, environmental management and other related issues.

255. It is the responsibility of the PMU to provide information on the GRM to project affected communities, i.e. all locations where the project is undertaken. This information should be provided within three months of the project commencement. Multiple means should be utilized to provide this information, including community meetings, public notices, mainstream media and social media.

256. The GRM will ensure that AP's concerns and complaints are promptly addressed, using an understandable and transparent process that is gender responsive, culturally appropriate and readily accessible to all segments of the AP at no costs and without retribution. It will be accessible to members of the community but also workers upon approval of the Project by ADB. The mechanism is not impeding access to the Maldivian judicial or administrative remedies.

257. PMU, Island/City Councils and contractors will inform the AP about the GRM on approval of the project. Through public consultations and distribution of the public information booklet, APs will be informed that they have a right to file complaints to the GRC. For issues pertaining to sexual exploitation and abuse and sexual harassment the grievance form and board should give direction on the appropriate contact numbers of Ministry of Gender, Family and Social Services to contact regarding such cases. Confidentiality of the aggrieved party should be maintained in such cases.

258. The GRC will be free to act independently and ensure equitable treatment of women and men in all decision making. The GRM will take effect immediately after loan/grant effectiveness or award of contract, whichever is earlier. The GRC will mediate conflict and avoid lengthy litigation that is inconvenient to APs.

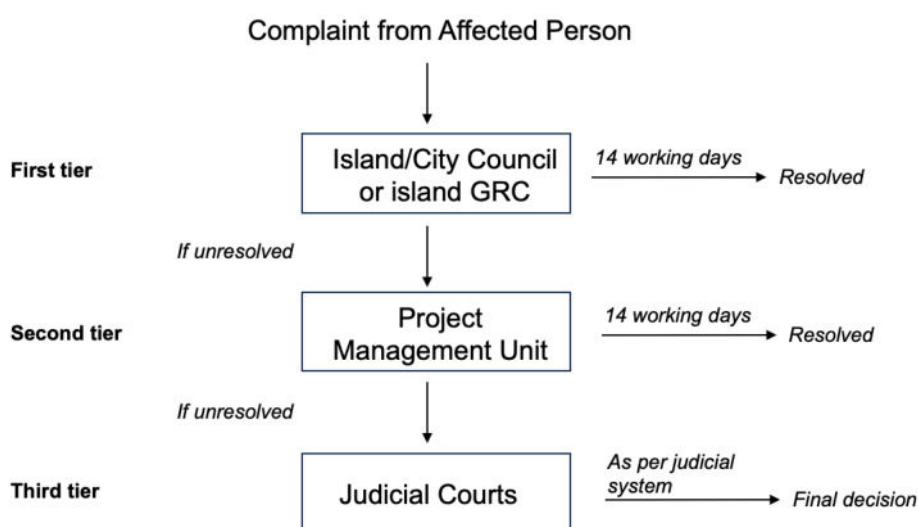
259. A GRC does not possess any legal mandate or authority to resolve any issue, rather acts as an advisory body or facilitator to try to resolve issues between the affected household/person and the IAs. Any complaints of ownership or other suits, to be resolved by Maldivian legislation, will not be resolved in GRC. The AP always has final recourse through Maldives legal channels. However, every effort will be made to avoid this by applying traditional conflict resolution procedures in negotiating resolutions to complaints.

260. Should the AP want to pursue legal recourse, the Project will ensure that the support is given to the AP to prepare a case. The PMU will provide the contact details of the Attorney General's office, and will assist aggrieved persons(s) in accessing the Attorney General's

office. No fees will be charged on the AP for such assistance. Similarly, no financial payments will be required for APs to have their grievances addressed.

261. A three-tier mechanism is proposed for grievance redress of environmental and social matters in regards to the installation and operation of various project components using existing island council administrative structures for APs, organizations, community groups, and workers, any of which can be complainants. Should the grievance not be resolved and/or the AP is not satisfied with the outcome, the complaint will be referred to the next tier. The mechanism is visualised in Figure 42 and detailed in Table 48. The grievance recording form is provided in Annex 9.

**Figure 42: Flow chart of Grievance Redress Mechanism**



**Table 48: Grievance Redress Mechanism**

<b>Focal Person for Contact</b>	<b>Contacts, Communication and Other Facilitation by Project</b>	<b>Timeframe to address grievance</b>
<b>First Tier: Island/City Council and Contractor / Island-level GRC</b>		
Designated contact persons should be established within the Council with a designated contact number.	<ul style="list-style-type: none"> <li>In the island/city council office, contractor office and the project site there will be an Information Board providing details of the GRM listing the names, sex and contact telephones/emails.</li> <li>Grievances will be registered informally by contacting the designated island/city council or GRC member. If the grievance cannot be resolved informally, a formal complaint can be registered through phone/email or by submitting the complaint form. The form must be available online (digital form) on the websites of all implementation partners and physical forms should be available from the contractor's office, at the council offices and at PMU, including drop boxes to submit physical forms. A hotline will be established to receive grievances via phone call and mobile message.</li> <li>For those who cannot properly write, a staff will assist in filling the complaint form and get it signed by the aggrieved party.</li> <li>The council or island GRC will screen the grievance to determine if the issues and concerns raised in the complaint falls within the mandate of the project.</li> <li>If it is related to the project, the council will inform the aggrieved party in writing (copied to PMU) how the case will be processed</li> </ul>	14 working days

Focal Person for Contact	Contacts, Communication and Other Facilitation by Project	Timeframe to address grievance
	<p>as per this GRM. This should occur within 03 working days of receiving the complaint. If the aggrieved party is unable to read (for whatever reason) the issued letter will be read to the person in presence of a witness and the witness should declare their witness to this event.</p> <ul style="list-style-type: none"> <li>• Alternatively, if it is not related to the project, the council or island GRC will inform the aggrieved party that it is not related to the project in writing (copied to PMU) and will inform how the case will be handled. This communication will occur within 03 working days of receiving the complaint. If the aggrieved party is unable to read (for whatever reason), the issued letter will be read to the person in presence of a witness and the witness should declare their witness to this event.</li> <li>• Where the grievance is related to the project, the council or island GRC will come up with a solution either by (i) discussing within the council; (ii) joint problem solving with the aggrieved parties, PMU and the contractor or; (iii) a combination of both options.</li> <li>• The council or island GRC will communicate the final decision in writing, in terms of how the grievance was handled to the aggrieved party within 14 working days of receiving the complaint. If the aggrieved party is unable to read (for whatever reason) the issued decision will be read to the person in presence of a witness and the witness should declare their witness to this event.</li> <li>• The aggrieved party must acknowledge the receipt of decision and submit their agreement or disagreement with the decision within 10 days.</li> <li>• If no acknowledgement is submitted from the aggrieved party, then the decision will be considered as accepted.</li> <li>• If the grievance is not resolved to the satisfaction of the aggrieved party within 14 working days of submission of the grievance to tier 1 then the aggrieved party may notify the MCCEE, in writing, of the intention to move to tier 2.</li> <li>• The council or GRC will maintain records of all complaints received.</li> </ul>	
<b>Second Tier:</b> Ministry of Climate Change Environment and Energy (Project Management Unit)		
The social and environmental safeguards specialist of the PMU or the designated contacts for the PMU.	<ul style="list-style-type: none"> <li>• Where the aggrieved party is not satisfied with the outcome of the decision by the council or GRC or where the aggrieved party is of the view that the council or GRC is not capable of justly solve the issue or where the grievance is not resolved within 14 working days the grievance can be upgraded to tier 2.</li> <li>• The Island Council or GRC will forward the grievance to the MCCEE. MCCEE will forward the grievance to the PMU.</li> <li>• A formal receipt of the complaint will be provided to the aggrieved party.</li> <li>• The PMU will come up with a solution either by (i) discussing in the project steering/technical committee; (ii) joint problem solving with the aggrieved parties, the council and the contractor (iii) undertaking site visits and holding onsite discussions or; (iii) a combination of all these options.</li> <li>• The PMU will be responsible to ensure that there is no cost imposed on the aggrieved person, due to the GRM at the third tier.</li> <li>• MCCEE will communicate the final decision in writing, in terms how the grievance was handled to the aggrieved party within 14 working days of receiving the complaint. If the aggrieved party</li> </ul>	14 working days



<b>Focal Person for Contact</b>	<b>Contacts, Communication and Other Facilitation by Project</b>	<b>Timeframe to address grievance</b>
	<ul style="list-style-type: none"> <li>is unable to read (for whatever reason) the issued letter should be read to the person in presence of a witness and the witness should declare their witness to this event.</li> <li>The aggrieved party must acknowledge the receipt of decision and submit their agreement or disagreement with the decision within 10 days.</li> <li>If no acknowledgement is submitted from the aggrieved party then the decision will be considered as accepted.</li> </ul>	
<b>Third Tier: Judiciary Power / Court system</b>		
The social and environmental safeguards specialist of the PMU provides assistance in accessing the judicial power	<ul style="list-style-type: none"> <li>The legal system is accessible to all aggrieved persons.</li> <li>Assistance from the PMU is available to all aggrieved persons as per this GRM.</li> <li>In cases where aggrieved persons have no means to access the legal system, the Attorney General's office will provide legal support to the vulnerable person(s). The PMU must provide the contact details of the Attorney General's office. The verdict of the Courts will be final.</li> </ul>	As per established Judicial Procedure

262. At the first tier, a GRC is proposed to be set up in Kulhudhuffushi City due to the extent and duration of the proposed Project activities on this island. On the other Project islands, where the measures are smaller in nature and of shorter duration, the island council and contractor will jointly form the first tier, and will solicit views of other stakeholders (WDC, farmers, fishermen, youth, NGOs, etc.) as appropriate and needed.

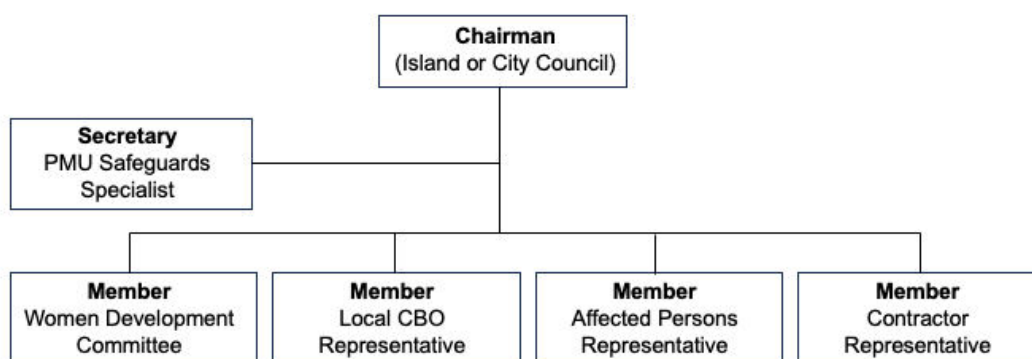
263. Specifically for the measures under SP1.1 at Addu International Airport (Gan) and SP1.2 on Velana Airport (Hulhulé), due to the nature of these islands being industrial managed by the airports authority rather than inhabited and managed by a council, a GRC will not be formed. The relevant airports authority (Addu International Airport and Maldives Airports Company Limited, respectively), MMS and a representative from the construction contractor will jointly form the first tier, and the three-tier system remains in place. Any aggrieved party can lodge grievances, despite not residing on the islands.

264. The GRC at Kulhudhuffushi City is proposed to be composed of a 6-member body, formed at the project area to facilitate the timely resolution of APs' concerns, complaints, and grievances about the project's environmental and social performance.

265. The PMU safeguards team will organize the required training program to brief the GRC members about their responsibilities and the operation of the GRC. The proposed composition of a GRC membership is presented in Table 49 and visualized in Figure 43.

**Table 49: Composition of Island Grievance Redress Committee**

<b>Member</b>	<b>Number</b>	<b>Position</b>
Chairperson	1	Representative from Island/City Council
Member	1	Concerned Women Development Committee
Member	1	Representative from local CBO/NGO
Member	1	Representative from the Construction Contractor
Member	1	Representative of Affected Persons
Secretary	1	Project Safeguards Specialist

**Figure 43: Composition of Island Grievance Redress Committee**

266. If the aggrieved person is a female, then the GRC must include at least one female member (ideally a representative from the local WDC) to participate in the hearings. In case of the absence of any of the members during the decision-making process, an appropriate candidate will be nominated by the original representative.

267. At the second tier, the MCCEE PMU will be based in Malé and have two designated staff members (the Social Safeguards Specialist and Environmental Safeguards Specialist) to address all potential complaints from the public, workers and other APs for the pre-construction, construction and operation of the Project. They will liaise regularly with the island councils, contractors and site supervisors regarding any grievances received. They will also liaise with national agencies and line departments as required.

268. At the third tier, the AP can access the judicial power through Attorney General's office. The PMU will provide the contact details of the Attorney General's office, and will assist aggrieved persons(s) in accessing the Attorney General's office.

269. The AP at any time can access the national judicial system irrespective of the result of project-level grievance redress mechanism.

270. For issues pertaining to gender-based violence, sexual exploitation and abuse, and sexual harassment all grievances need to be forwarded to the hotline number of Ministry of Social and Family Development (1421). Confidentiality of those who submit such grievances should be ensured. This information should be provided in the grievance information boards.

271. For the workforce at the PMU and other contractors the employment contracts should define the grievance redress mechanism to follow. The Human Resource Committee or department of the organization can look into general grievances and the SEA/SH committee of the Ministry for those pertaining to such cases.

272. The AP have the right to submit their complaint at any time directly to the respective Project Officer at ADB headquarters, writing in any of the official languages of ADB's Developing Member Countries. The PMU Social Safeguard Specialist will support the AP in providing the following contact information of ADB:

Mr. Takeshi Ueda  
Officer-in-Charge  
Telephone No.: +63 2 8632 6973  
E-mail address: [taueda@adb.org](mailto:taueda@adb.org)  
Asian Development Bank  
Emerging Areas Team, Agriculture, Food, Nature, and Rural Development Sector Office  
Sectors Group (SG-AFNR).

## **VIII. ENVIRONMENTAL MANAGEMENT AND MONITORING PLANS**

273. Environmental management of the project will be carried out at two levels: overall, and by the contractors. This section of the IEE describes the approach to be taken by the project in relation to (i) the measures to be taken for environmental management, and (ii) the environmental monitoring and implementation arrangements.

### **A. Environmental Management**

#### **1. Project Environmental Management Plan**

274. The project's EMP lists the potential impacts identified, the measures to be taken to mitigate the impacts, and respective responsibilities for implementation. It is presented in Table 50.

**Table 50: Environmental Management Plan**

<b>Activity / Topic</b>	<b>Impact</b>	<b>Mitigation Measure</b>	<b>Responsibility</b>
<b>Planning &amp; Design Phase</b>			
Subproject concepts	If Output 2 subprojects are not treated as learning processes, potentially useful knowledge might not be gained	Treat Output 2 subprojects as trials to maximize learning applicable to subsequent subprojects	PMU
Impact assessment	If no assessment, potential for significant unmitigated negative impacts	Undertake impact assessment in line with ADB policy and Maldives procedures	PMU
Environmental management	If no environmental management plan, identified impacts will not be mitigated	Prepare EMP as part of safeguard documentation Update IEE during detailed design phase by incorporating findings of detailed ecological surveys, including marine surveys, as well as coastal modeling to assess downdrift erosion impacts and propose required mitigation measures. PMU Environmental Safeguards Specialist to review updated IEE and submit to ADB for approval Include approved, updated IEE in tender documents Include comprehensive safeguard provisions within tender documents	PMU
Grievance redress	If no system for submitting and solving complaints, subproject may be delayed and government suffers reputational damage	Design accessible and effective grievance redress mechanism	PMU
Heritage site	If not avoided, heritage site on Gan becomes disrupted by subproject 1.1	Heritage site will be avoided and not be impacted by the radar tower construction, access will remain open and structures will not be touched	PMU
Environmental supervision and monitoring	If unclear or under-resourced arrangements for environmental monitoring & supervision, implementation of EMP may be sub-standard	Prepare Environmental Monitoring Plan as part of safeguard documentation	PMU
<b>Construction Phase</b>			
Air quality	Excessive dust from earthworks and construction traffic	Dust suppression by watering at sensitive locations when required Sheet loads on trucks	Contractors
Noise	Disturbance of residents	Ensure all equipment is properly silenced Limit working hours	Contractors

<b>Activity / Topic</b>	<b>Impact</b>	<b>Mitigation Measure</b>	<b>Responsibility</b>
Vibration	Damage to structures from passage of heavy trucks	Condition survey of any structures considered fragile close to roads used by haul traffic Repair/compensation for any damage	Contractors
Surface water and sedimentation	Mobilization of sediment from earthworks during rainstorms	Minimize duration of exposed, non-hardened earthworks Silt traps at edge of work sites	Contractors
Site access	Loss of vegetation and habitat on east side of Kulhudhuffushi to provide shoreline access	Limit access to existing tracks and beach access points to avoid or minimize disturbance	PMU / Contractor
	Temporary disruption to work when Malé radar is upgraded	Announce disruption in a timely manner Plan works outside government working hours	Contractors
	Temporary reduced site access when monitoring equipment is installed at weather stations	Announce planned works in a timely manner	Contractors
	Temporary reduced access to facilities on roads	Temporary bypasses will be provided to support traffic flow Public notices will be provided on planned works Phased approach to construction to avoid multiple works at the same time	Contractors
Public roads and bridges	Damage to public roads from heavy construction traffic	Condition survey prior to start of operations Monitor road conditions Repair any damage or deterioration	Contractors
	Temporary increased traffic congestion	Temporary bypasses will be provided to support traffic flow Public notices will be provided on planned works Phased approach to construction to avoid multiple works at the same time	Contractors
Existing services	Damage or cutting of existing services, potentially including sewer pipes, internet cables and other services	Check location of all services before start of any physical works, and integrate measures around existing utilities	PMU / Contractors
Construction materials	Supply from unauthorized sources	Ensure all construction materials (aggregates and rock) are sourced from authorized locations and in accordance with the permit conditions	Contractors

Activity / Topic	Impact	Mitigation Measure	Responsibility
Waste management & pollution prevention	Contamination of soil and water by liquid and solid wastes from contractor's activities	Include standard provisions in the tender documents which will require the contractor to develop and implement a site waste management plan. This will cover identification of all waste types; separation of all wastes into different waste streams; collection and storage of wastes; disposal of all wastes by approved methods in the hierarchy re-use, recycle, safe disposal; record keeping; specific requirements in relation bulk fuel storage and vehicle maintenance, including by subcontractors on the site; emergency response in case of spills or soil contamination; and worker awareness and training.	Contractors
Ecological impacts	Damage to or removal of established woody vegetation to make way for physical activities (site access) or installations (structures)	Detailed ecological surveys including marine surveys as well as vegetation surveys prior to final design decisions which should avoid or minimize damage to existing vegetation Removal and replanting of mature vegetation, where feasible.	PMU / Contractors
	Change in coastal habitat (tidal zone) due to beach nourishment and construction of groynes	Detailed coastal modeling to assess downdrift erosion impacts and habitat surveys prior to final design decisions, and adjustment of design if indicated	PMU / Contractors
Construction traffic	Dust, delays to public road users, safety hazards from excessive speed and bad driving, road deterioration	(i) sheet loads; (ii) limit speeds; (iii) water locations creating dust nuisance; (iv) driver training; (v) limit working hours/days; (vi) tender document provisions to ensure compliance; (vii) community awareness including safety training for children; (viii) an effective community liaison and grievance reporting and redress mechanism.	Contractors
Public health	Importation of transmissible diseases by construction workers	Covid-19 will be handled by the regulations and procedures in force at the time. Prevention of STD transmission is a public health issue, and will be managed as (i) a specific item in the residents' awareness program, and (ii) a specific item in the contractor's induction health, safety and environment training for all staff and workers.	Contractors



<b>Activity / Topic</b>	<b>Impact</b>	<b>Mitigation Measure</b>	<b>Responsibility</b>
Occupational health and safety	A variety of risks associated with both small-scale construction and operating heavy machinery	These risks can be mitigated by standard measures, including (i) using equipment in good condition, and properly maintaining it; (ii) ensuring all equipment operators are fully qualified and experienced; (iii) including a full range of health and safety requirements in the tender documents, including the need for at least one site engineer to have health and safety qualifications; first aid equipment and a minimum number of qualified first aiders amongst site workers; on-site nurse or health assistant and basic health point for significant works on any island without a hospital or health centre; risk assessment procedures; and procedures in case of accidents; (iv) a requirement for the contractors to develop and implement a health and safety plan; and (v) ensuring that the contractors provides health insurance for all staff and workers as well as complying with relevant Maldivian regulations on worker health and safety.	Contractors
Compensation for loss of or access to assets	Temporary restrictions on use of or access to public property (e.g. the eastern beach on Kulhudhuffushi) or private property due to construction works, e.g., closure of streets	For private property, financial compensation using procedures detailed in the project's RF. For public property, information for users and guidance on alternatives.	PMU
<b>Operation Phase</b>			
Surface and groundwater	Impacts will be beneficial, by design	Inspect and maintain drains	PMU / City Council
Coastal ecology	Reduced erosion and stable rock (groynes) improving coastal habitat	Monitor	PMU / City Council
Waste	Solid waste from expanded HAC will exceed local waste management capacity	Develop and implement an institutional waste management plan maximizing waste separation, re-use and recycling	HAC

## 2. Site Environmental Management Plan

275. Most of the measures to be taken to protect the environment, workers and the public during construction will be the responsibility of the construction contractors. The precise requirements will be set out in the tender documents in the form of conditions and specifications, with related bill of quantities items. The core requirement will be for the contractor to prepare and implement a Site Environmental Management Plan (SEMP). This will cover, in detail, each contractor's policy and principles in relation to the environment, and will be built up of sub-plans covering the many topics which need to be considered on a civil works project. These will include, for example, a Waste Management Plan, a Construction Traffic Plan, a Site Restoration Plan, and a Community Liaison Plan. Also, as part of the SEMP, the contractor will be required to develop and implement a Health and Safety Plan (HSP) to protect both his own workers and the public

276. A template for the SEMP is attached in Annex 5.

277. In addition to the SEMP, the contractor will prepare Method Statements for each proposed engineering activity in the usual way, covering such procedures as site access and security, topsoil handling, excavations for unloading, and soil disposal.

278. Standard environmental safeguard clauses for inclusion in the tender documents are attached in Annex 6.

## B. Supervision, Monitoring and Reporting

### 1. Supervision

279. Supervision of each subproject's environmental management measures will be carried out at several levels:

- (i) **Construction supervision:** on site, the contractor's activities will be directed by the on-site supervisory staff, led by a resident engineer. At least one on-site supervisor (senior engineer) will have professional qualifications in health, safety and environment (HSE), or the staff may have separate environmental and health & safety specialists. In turn, the contractor will be supervised by a construction supervision specialist on behalf of the PMU. S/he, or a colleague, will make frequent visits to the site to check the technical progress of the works. At the same time, the specialist will note any non-conformance with approved HSE practices and procedures, as established in the approved SEMP.
- (ii) During construction, it is likely that the concerned office of the environmental regulatory authority (EPA) will visit the work sites to check on compliance with any conditions established through the environmental permitting process.
- (iii) **Implementation of overall subproject EMP:** the PMU will check on the progress of implementation of the subproject's overall EMP (Table 50), in all three phases of design, construction and operation.
- (iv) **ADB:** the funding agency, ADB, will carry out supervision missions for the overall project twice per year. From time to time these may include a safeguards specialist, who is likely to inspect ongoing subprojects such as the civil works on Kulhudhuffushi.

### 2. Monitoring

280. **On-site monitoring:** during construction, the contractors will be responsible for monitoring specific parameters and general conditions in relation to 10 topics, as noted in the Environmental Monitoring Plan (Table 51). The PMU will be empowered to independently

check any data and measurements made by the contractor. The PMU will check on site clean-up by the contractors, before the start of the defects liability period (DLP) and again at the end of the DLP.

281. **Monitoring during Subproject Operation:** Three different monitoring systems are expected to be implemented for the Output 2 subprojects: the first one will check the condition of the drainage systems to guard against blockages due to siltation and to identify damage from traffic or unauthorized construction activities; the second will monitor groundwater quality and depth to check what effects the enhanced infiltration enabled by the drainage system are having; the third will monitor sediment movement along and loss from the eastern coast to determine when and where further beach nourishment is required.

**Table 51: Environmental Monitoring Plan**

<b>Topic</b>	<b>Parameter to be Monitored</b>	<b>Location</b>	<b>Method</b>	<b>Frequency</b>	<b>Responsibility</b>
<b>Construction Phase</b>					
Air quality	Airborne dust	Earthworks sites Along all haul routes on unpaved roads	Particulate measurement to establish pre-works background levels Visual inspection during active operations Dust meters	Pre-construction baseline under typical range of traffic, wind and rain Daily  Use meters if controls (watering) ineffective or complaints received	Contractors
	Vehicle and equipment emissions	At fixed and mobile equipment, including trucks	Visual inspection for excessive smoke	Daily	Contractors
Noise	Ambient noise	Fixed location next to residential receptors on eastern coast Other locations if complaints received	Noise meter app on smartphone	Prior to start of excavation work Daily, if noise is considered a problem by local residents	Contractors
Vibration	Condition of fragile properties adjacent to access roads	At any pre-identified locations	Visual inspection	Prior to start of haul traffic Weekly or as alerted by property owners	Contractors
Surface water quality	Turbidity	Drainage outlets from work sites if problem observed visually	Visually; if required, use turbidity tube	During all heavy rain events	Contractors
Vegetation / habitat (onshore)	Damage or degradation of established woody vegetation	All areas adjacent to haul routes and work sites	Visual inspection, with time-stamped photos	Prior to start of all works Daily	Contractors
Habitat (tidal zone)	Ecological condition	Representative locations adjacent to work site	Repeat survey of ecological conditions	Prior to start of works Monthly during construction	PMU (through service contract)

Topic	Parameter to be Monitored	Location	Method	Frequency	Responsibility
Fuel & oil storage & handling	Bulk fuel storage facilities and arrangements Refuelling procedures Vehicle maintenance procedures, specifically collection & disposal of engine and hydraulic oils and used oil filters	Contractor's compound / workshop On-site locations where equipment is refuelled (e.g. excavators)	Visual inspection, with time-stamped photos	Weekly	Contractors
Waste management & site housekeeping	All aspects of waste management & site housekeeping: separation, storage, disposal	Contractor's compound / workshop Construction sites	Visual inspection, with checklist, time-stamped photos	Weekly	Contractors
Labor camp <sup>72</sup>	Facilities Physical condition Sanitation & hygiene	All labor camps	Visual inspection, with checklist, time-stamped photos	Weekly	Contractors
Worker safety & health	Use and condition of PPE Safe working practices First aid equipment Fire extinguishers	All active work sites All vehicles including subcontractors	Visual inspection, with checklist, time-stamped photos	Informally, every day Formally, with checklist, every week	Contractors
	Transmissible diseases	Staff and workers, local community	Health records	Monthly	Contractors, in liaison with local health authorities
Community safety & health	Disturbance, accidents, health impacts from construction activities	Next to and near all work sites and access routes	Reports from local health authorities Liaison with local government Complaints through GRM	Continuous	Contractors
Construction materials	Condition of stockpiles, compliance with operating plans and conditions	Stockpiles used to supply construction aggregates	Visual inspection, with checklist, time-stamped photos	Prior to first use of stockpile Weekly during use	Contractors

<sup>72</sup> Labor camps are not anticipated since worker numbers will be small and are likely to be sourced from and/or accommodated in existing facilities in the local community.

<b>Topic</b>	<b>Parameter to be Monitored</b>	<b>Location</b>	<b>Method</b>	<b>Frequency</b>	<b>Responsibility</b>
Construction traffic	Driver qualifications Driver training & awareness Vehicle condition Correct loading and sheeting Driving behavior	Site access tracks Public roads	Check of documents Check of attendance at induction / safety training Vehicle inspection Visual observation Review of grievances	Before start of work for the subproject Daily	Contractors
Public roads	Restricted use, temporary closure Condition	Haul routes, work sites Routes used by heavy construction traffic	Record of times and locations Visual inspection	Every time restrictions needed Prior to start of haul traffic Weekly	Contractors Contractors
Community liaison	Existence of community liaison mechanism and plan Effectiveness of liaison and grievance redress mechanism	All communities affected by construction: Kulhudhuffushi, Hanimaadhoo	Check of documentation Meetings with designated community contact persons Review of grievances & their resolution	Prior to start of operations Weekly Continuous review of grievances	PMU Contractors
Site clean-up	Condition of all locations and facilities used by contractor	All work sites All site access tracks All roads and bridges used by heavy construction traffic Contractors' camps, compounds and workshops	Visual inspection with time-stamped photos	Prior to start of operations (condition survey) After site clean-up	Contractors PMU
<b>Operation Phase</b>					
Drains	Condition and performance	Outfalls and inspection pits All open drainage facilities, e.g. bioswale	Visual inspection with time-stamped photos	After all major rainfall events	PMU / local government
Groundwater	Depth to watertable Water quality (salinity) at different depths	Representative wells and boreholes on Kulhudhuffushi (locations t.b.d.)	Electrical conductivity (EC) of samples from different depths	Monthly	PMU / local government
Coastal protection	Beach profile	Representative sections of coastal protection works	Repeat measurements of profiles perpendicular to the shoreline	At least quarterly	PMU / local government



<b>Topic</b>	<b>Parameter to be Monitored</b>	<b>Location</b>	<b>Method</b>	<b>Frequency</b>	<b>Responsibility</b>
	Tidal zone habitat	Representative locations in tidal zone adjacent to reconstructed beach	Repeat survey of ecological conditions	Annually	PMU / local government

### 3. Reporting

282. Environmental reporting will take place at several levels. During construction:

- (i) The contractors will include a dedicated section on site environmental management, health and safety and community liaison in each monthly progress report to the PMU. The data and information in the report will be collated from the contractor's day to day work on site and regular weekly inspections and monitoring of HSE topics (see Table 51).
- (ii) The PMU will review each monthly report from the contractors, and extract data for their six-monthly progress report to ADB.
- (iii) The PMU will also carry out independent checks on SEMP implementation on site, with each inspection generating a site inspection report.
- (iv) The project's GRM will be operational throughout the construction period. Information on the number and type of grievances, solutions and outstanding cases will be included in the PMU's six-monthly progress reports to ADB.

### C. Implementation Arrangements

283. The PMU will have a full-time Environmental Safeguards Specialist who will be responsible for ensuring that the EMP is properly implemented. The PMU will coordinate with the EPA to seek advice on regulatory requirements for the project. If required the PMU, with support from the Construction Supervision Consultant, will update this IEE and EMP to meet the EPA requirements to obtain necessary approvals as per national requirements.

284. The responsibilities of the Environmental Safeguards Specialist are as follows:

- (i) Lead the overall management and implementation of environmental safeguard policies of ADB and Government of Maldives.
- (ii) Provide technical support to the PMU/MCCEE to ensure that all environmental requirements of ADB including occupational health and safety requirements of the Government of Maldives are complied with by the project.
- (iii) Ensure the IEE and EMP are included in the bid documents and civil works contracts and they are followed during construction.
- (iv) Implement a system for monitoring the environmental safeguards.
- (v) In coordination with the PMU, conduct regular site visits at the construction sites to verify/check compliance to IEE and EMP.
- (vi) Together with the PMU-designated staff and the representative of the contractor, conduct stakeholder consultations, as appropriate, to determine if there is any concern during construction.
- (vii) Assist in obtaining associated government permits (if any) prior to start of construction works.
- (viii) Take immediate action in the event of unexpected adverse impact or ineffective mitigation measures identified during implementation and in preparing the corrective action plan.
- (ix) Provide technical support to the PMU-designated staff in drafting the environmental monitoring reports required by ADB, and in monitoring compliance of contractor to the environmental, health, and safety requirements.
- (x) Address any grievances through the GRM in a timely manner, and prepare record of such grievances for inclusion in the environmental monitoring report.
- (xi) Prepare the semi-annual environmental monitoring reports to be submitted to ADB, and upon ADB review, address any comments raised (if any).

285. All contractors will be informed of their responsibility to comply with the EMP and the requirements of ADB. There are specific responsibilities for EMP compliance during the construction phase that will rest with the contractors who will be supervised and monitored by

the PMU safeguards team. The contractors will be required to have one staff with experience in environmental management and one staff with experience of health and safety to supervise and monitor day-to-day EMP implementation, and to be responsible for preparing plans such as the CEMP, CHSMP, etc.

#### **D. Implementation Schedule and Budget**

286. The project's overall implementation schedule is outlined in chapter 3.

287. Costs required for implementing the IEE will cover the following activities:

- (i) Conducting environmental assessments of new subprojects, preparing and submitting reports, and public consultation and disclosure;
- (ii) Application for government regulatory consents and approvals; and
- (iii) Implementation of EMPs.

288. For budgeting purposes, it is assumed that all Output 2 subprojects will be classified by ADB as category B (requiring IEE). It is assumed that all Output 1, 3 and 4 subprojects will be classified as category C (requiring environmental due diligence and a simplified EMP).

289. Environmental supervision during construction will be straightforward and will involve periodic site inspections and interviews with workers and others, plus checks of monitoring reports and other documents. This will be conducted by PMU and the PIC's construction supervision firm and liaising with the environmental regulator.

290. Subproject mitigation measures and environmental monitoring tasks during construction will be specified in the SEMP. These will be implemented by the contractors and the associated costs included in their bids, which will be binding for implementation.

291. In the case of mitigation and monitoring measures for a particular subproject being identified but not suitable for inclusion in the tender document as a contractual responsibility, their costs will be included in the overall subproject budget.

292. All environmental monitoring during the operation and maintenance phase will be conducted by the PMU in cooperation with local government agencies and self-government bodies, therefore no additional costs are anticipated.

293. A total of 3% of the total project cost has been allocated for the implementation of subproject EMPs. Indicative costs of environmental and social safeguards implementation are provided in Table 52.

**Table 52: Indicative cost of Environmental and Social Safeguards implementation**

<b>Component</b>	<b>Description</b>	<b>Number</b>	<b>Cost per Unit (USD)</b>	<b>Cost (USD)</b>	<b>Source of Funds</b>
<b>Staff Costs</b>					
PMU specialist	Environmental Safeguards Specialist (National)	66 mo	1,823/mo	120,318	Project
	Social Safeguards Specialist (National)	36 mo	1,823/mo	65,628	Project

Component	Description	Number	Cost per Unit (USD)	Cost (USD)	Source of Funds
Permits and fees	EPA Review	5	1,500	7,500	PMU
<b>Environmental Management Costs</b>					
Assessment & pre-works documentation	Update of IEE when full details of all subprojects are available	1	15,000	15,000	Project
	Surveys, modeling, impact assessment, prep. environmental safeguards documentation to meet Maldivian standards	5	12,000	60,000	Project
Mitigation measures	Measures to mitigate predicted impacts during construction: standard best practice, most effective if pay items in BoQ	<i>All sub-projects involving construction works.</i>	3% of investment cost	335,250	Project
Monitoring measures	Environmental monitoring during construction: costs considered a contractor's overhead		-	-	-
	Independent oversight of environmental aspects of construction by PMU / PIC	<i>All sub-projects involving construction works (5)</i>	PIC costs	2,014,000	Project
	Environmental monitoring during project operation on Kulhudhuffushi: (i) coastal, (ii) inland hydrology, (iii) mangroves	<i>(i) 6-monthly, (ii) monthly 72 mo, (iii) quarterly based on initial 15-mo study</i>	5,000 1,000 1,000	50,000 72,000 20,000	Project
<b>Other Costs</b>					
Public consultations and information disclosure	Information disclosure and consultations during pre-construction and construction phases	10	1,000	10,000	Project
Institutional and public capacity development in environmental safeguards	Awareness and training programs - venue and other arrangements	<i>Min. 2 per construction sub-project</i>	5,000	50,000	Project
GRM implementation	Costs involved in resolving complaints (meetings, consultations, communication, and reporting/information dissemination)	30	1000	30,000	Project

<b>Component</b>	<b>Description</b>	<b>Number</b>	<b>Cost per Unit (USD)</b>	<b>Cost (USD)</b>	<b>Source of Funds</b>
Any unanticipated impact due to project implementation	Mitigation of any unanticipated impact arising during construction phase, defect liability period and project operation	<i>tbd</i>	<i>tbd</i>	<i>tbd</i>	Contingency
<b>Subtotal</b>				<b>2,849,696</b>	
Contingency	10%			284,970	
<b>Total (USD)</b>				<b>3,134,666</b>	

## Annex 1: REA checklist

## Rapid Environmental Assessment (REA) Checklist

<b>Country/Project Title:</b>	Maldives / Enhancing Climate Resilience and Food Security Project
<b>Sector Division:</b>	Water and other urban infrastructure and services, Agriculture, natural resources and rural development

Screening Questions	Yes	No	Remarks
<b>A. PROJECT SITING</b> IS THE PROJECT AREA ADJACENT TO OR WITHIN ANY OF THE FOLLOWING ENVIRONMENTALLY SENSITIVE AREAS?			
▪ CULTURAL HERITAGE SITE		X	
▪ LEGALLY PROTECTED AREA (CORE ZONE OR BUFFER ZONE)		X	
▪ SPECIAL AREA FOR PROTECTING BIODIVERSITY	X		The project will re-establish marine and hydrological connectivity for degraded mangrove systems in the north and south of Kulhudhuffushi
▪ WETLAND	X		
▪ MANGROVE	X		
▪ ESTUARY		X	
▪ BAY		X	
IS THE PROJECT AREA ...			
▪ DENSELY POPULATED?	X		Kulhudhuffushi is densely populated with increasing commercial activity; the project will introduce nature-based solutions to hydrological issues in an urban environment
▪ HEAVY WITH DEVELOPMENT ACTIVITIES?	X		
▪ WITH A HIGH PERCENTAGE OF I. WOMEN-HEADED HOUSEHOLDS; II. PERSONS WITH DISABILITY; III. OLDER PERSONS; IV. INCOME POOR POPULATION GROUPS?		X	No indication at this time; also, the project's activities are gender-sensitive and inclusive, with specific attention to the needs of different social sectors
<b>B. POTENTIAL ENVIRONMENTAL IMPACTS</b> WILL THE PROJECT CAUSE...			
▪ degradation of cultural property, and/or loss of cultural heritage and tourism revenues?		X	
▪ degradation of land and ecosystems (e.g. loss of wetlands and wild lands, coastal zones, watersheds and forests)?		X	The project is designed to protect and restore ecosystems, hydrological functioning and coastal processes
▪ encroachment on precious ecology resulting in loss or damage to fisheries and fragile coastal habitats such as coral reefs, mangroves, and seagrass beds?		X	The project will restore mangrove ecosystem functions; the inshore zone subject to coastal protection works is significantly modified and the works are designed to restore nature coastal dynamics
▪ short-term increase in turbidity and sunlight penetration as well as changes in sediment pattern and flows at dredging sites?	X		The project may involve localized small-scale turbidity increase during construction of the coastal protection works; any seawater quality changes would be short-term; the project does not involve dredging
▪ removal and disturbance of aquatic flora and fauna at dredging sites?		X	



Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>▪ alteration of bottom surface and modifications to bathymetry, causing changes in tidal bore, river circulation, species diversity, and salinity?</li> </ul>		<b>X</b>	
<ul style="list-style-type: none"> <li>▪ changes in sediment pattern and littoral drift that may cause beach erosion of neighboring areas?</li> </ul>		<b>X</b>	The coastal protection works are designed to restore natural coastal processes and retain sediment, taking into account the whole island (Kulhudhuffushi)
<ul style="list-style-type: none"> <li>▪ modification of terrestrial habitat by upland disposal of dredged material or covering of potential archaeological sites with dredge spoil?</li> </ul>		<b>X</b>	
<ul style="list-style-type: none"> <li>▪ alteration of surface water hydrology?</li> </ul>	<b>X</b>		On Kulhudhuffushi the project will increase infiltration of surface water to recharge the non-saline groundwater lens
<ul style="list-style-type: none"> <li>▪ deterioration of surface water quality due to silt runoff and sanitary wastes from labour camps and chemicals used in construction?</li> </ul>		<b>X</b>	
<ul style="list-style-type: none"> <li>▪ poor sanitation and solid waste disposal in construction camps and work sites, and impacts on water, groundwater and/or related urban services?</li> </ul>		<b>X</b>	
<ul style="list-style-type: none"> <li>▪ possible transmission of communicable diseases (such as STI's and HIV/AIDS) from workers to local populations?</li> </ul>		<b>X</b>	The local culture is conservative; alcohol and prostitution are not issues
<ul style="list-style-type: none"> <li>▪ noise, dust and vibration due to project construction or operation?</li> </ul>	<b>X</b>		There will be localized noise and dust from construction activities; dust is suppressed by frequent rainstorms; noise from coastal protection activities is some distance from residences and will be attenuated by intervening topography and vegetation; working hours will be limited
<ul style="list-style-type: none"> <li>▪ traffic disturbances due to construction material transport and wastes?</li> </ul>	<b>X</b>		Traffic on all islands is minimal and urban areas have grid road layouts where alternative routes are easily available
<ul style="list-style-type: none"> <li>▪ creation of temporary breeding habitats for diseases such as those transmitted by mosquitoes and rodents?</li> </ul>		<b>X</b>	
<ul style="list-style-type: none"> <li>▪ involuntary resettlement of people? (physical displacement and/or economic displacement)</li> </ul>	<b>X</b>		Commercial agricultural developments may affect land users on some islands, but areas and numbers will be small due to the very small size of all Maldivian islands
<ul style="list-style-type: none"> <li>▪ social conflicts if workers from other regions or countries are hired?</li> </ul>		<b>X</b>	
<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>		<b>X</b>	
<ul style="list-style-type: none"> <li>▪ disproportionate impacts on the poor, women and children, Indigenous Peoples or other vulnerable groups?</li> </ul>		<b>X</b>	
<ul style="list-style-type: none"> <li>▪ negative impacts on women's decision-making authority and existing social status or marginalize people of disadvantaged groups?</li> </ul>		<b>X</b>	The project is designed to promote women's participation as decision-makers and to ensure disadvantaged people are engaged in project processes
<ul style="list-style-type: none"> <li>▪ increased challenges for persons with disabilities?</li> </ul>		<b>X</b>	All project infrastructure investments will consider disability guidelines

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>risks and vulnerabilities related to occupational health and safety due to physical, chemical, biological, and radiological hazards during project construction and operation?</li> </ul>	X		All construction activities have inherent risks which can be minimized through implementation of standard health and safety plans and procedures; the project's civil works are all straightforward with no unusual hazards; operation of the Hanimaadhoo Agric. Centre will involve normal laboratory procedures in a controlled lab. environment; commercial agricultural developments may use pesticides (see below)
<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>		X	
<ul style="list-style-type: none"> <li>deterioration of surrounding environmental conditions due to rapid urban population growth, commercial and industrial activity, and increased waste generation to the point that both manmade and natural systems are overloaded and the capacities to manage these systems are overwhelmed?</li> </ul>		X	
<ul style="list-style-type: none"> <li>community safety risks due to both accidental and natural causes, especially where the structural elements or components 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>		X	The coastal protection works are designed to protect the population of Kulhudhuffushi from anticipated sea-level rise and will improve on the existing sub-standard measures
<ul style="list-style-type: none"> <li>social conflicts if construction depletes local fishery resources on which communities depend for subsistence?</li> </ul>		X	
<ul style="list-style-type: none"> <li>social concerns relating to local inconveniences associated with port operation (e.g. increased volume of port traffic, greater risk of accidents, communicable disease transmission)?</li> </ul>		X	
<ul style="list-style-type: none"> <li>generation of wastewater during construction or operation?</li> </ul>		X	
<ul style="list-style-type: none"> <li>generation of solid waste and/or hazardous waste?</li> </ul>		X	
<ul style="list-style-type: none"> <li>use of chemicals?</li> </ul>		X	
<ul style="list-style-type: none"> <li>overconsumption of groundwater, leading to land subsidence, lowered ground water table, and salinization?</li> </ul>	X		On Kulhudhuffushi the project will improve groundwater recharge; on other islands agricultural development may increase groundwater consumption – on agricultural islands the project is introducing multiple technologies to make water use more efficient and sustainable in combination with groundwater monitoring systems
<ul style="list-style-type: none"> <li>pollution of receiving waters resulting in amenity losses, fisheries and marine resource depletion, and health problems?</li> </ul>		X	
<ul style="list-style-type: none"> <li>deterioration of water quality due to ship (e.g. ballast water, oil waste, lubricant and fuel spills, sewage) and waterfront industry discharges?</li> </ul>		X	
<ul style="list-style-type: none"> <li>increased noise and air pollution resulting from airborne emissions (e.g. gas, smoke, fumes) from maneuvering and berthing ships and the waterfront industry?</li> </ul>		X	

Screening Questions	Yes	No	Remarks
<ul style="list-style-type: none"> <li>▪ pollution due to improper disposal of expired batteries from weather stations?</li> </ul>	<b>X</b>		Rehabilitation of the Malé radar station may involve replacement of expired lithium-ion batteries; due to lack of local recycling facilities, these will have to be sent offshore for appropriate disposal
<ul style="list-style-type: none"> <li>▪ loss of indigenous crop varieties due to agricultural intensification?</li> </ul>	<b>X</b>		Commercial agricultural developments may displace existing crop varieties on some islands; mitigation requires development and implementation of an agrobiodiversity protection program
<ul style="list-style-type: none"> <li>▪ environmental contamination by agrochemicals (fertilizers and pesticides)?</li> </ul>	<b>X</b>		Commercial agricultural developments and intensification of home farms may increase use of artificial fertilizers and pesticides; surface water, groundwater and inshore marine pollution from nitrates and phosphates can be avoided through training, monitoring and the promotion of organic systems; pesticide use can be managed through integrated pest management

## A Checklist for Preliminary Climate Risk Screening

**Country/Project Title: Maldives / Enhancing Climate Resilience and Food Security Project**

**Sector:** Water and other urban infrastructure and services, Agriculture, natural resources and rural development

Screening Questions		Score	Remarks <sup>73</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?	2	See Feasibility Study reports for details
	Would the project design (e.g. the clearance for bridges) need to consider any hydrometeorological parameters (e.g., sea-level, peak river flow, reliable water level, peak wind speed etc)?	2	“
<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)?	2	“
	Would weather, current and likely future climate conditions, and related extreme events likely affect the maintenance (scheduling and cost) of project output(s)?	2	“
<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. hydropower generation facilities) throughout their design life time?	2	“

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): High**

**Other Comments:** The project is a response to existing and anticipated climate change and will increase resilience in four separate areas – weather forecasting, urban infrastructure, coastal protection, and agriculture

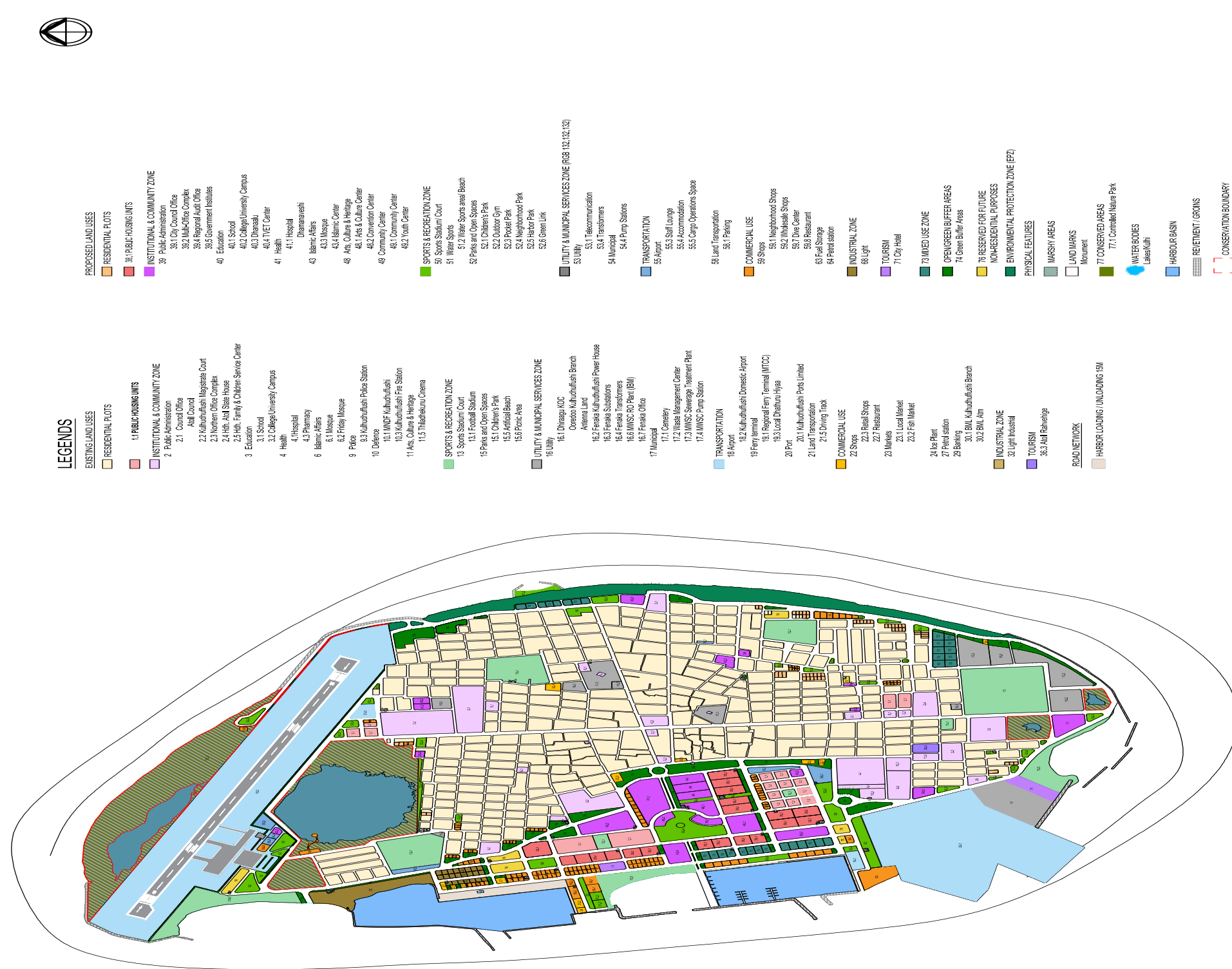
**Prepared by:** William James Hope Ramsay



<sup>73</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.

Annex 2: Project Island Land Use Plans

Figure 44: Kulhudhuffushi draft Land Use Plan 2023



LEGENDS

- EXISTING LAND USES**
- RESIDENTIAL PLOTS
  - PUBLIC HOUSING UNITS
  - INSTITUTIONAL & COMMUNITY ZONE
  - Public Administration
  - City Council Office
  - Municipal Office Complex
  - Regional Audit Office
  - Government Institutes
  - Education
  - School
  - College/University Campus
  - Hospital
  - Pharmacy
  - Islamic Affairs
  - Mosque
  - Friday Mosque
  - Police
  - Multifunctional Police Station
  - Defence
  - MINDF Kulhudhuffushi
  - Multifunctional Fire Station
  - Arts, Culture & Heritage
  - Theatre/Arts Cinema
- SPORTS & RECREATION ZONE**
- Sports Stadium Court
  - Water Sports
  - Water Sports area Beach
  - Parks and Open Spaces
  - Children's Park
  - Outdoor Gym
  - Pool/Play Park
  - Neighborhood Park
  - Harbour Park
  - Green Link
- UTILITY & MUNICIPAL SERVICES ZONE (RGB 192,192,192)**
- Telecommunication
  - Transformers
  - Municipal
  - Pump Stations
  - Transportation
  - Airport
  - Staff Lounge
  - Accommodation
  - Cargo Operations Space
  - Land Transportation
  - Parking
  - Commercial Use
  - Shops
  - Neighborhood Shops
  - Wholesale Shops
  - Dive Center
  - Restaurant
  - Fuel Storage
  - Refuel station
  - Industrial Zone
  - Light
  - Tourism
  - City Hall
  - Mixed Use Zone
  - Open Green Buffer Areas
  - Green Buffer Areas
  - Reserved for Future
  - Non-Residential Purposes
  - Environmental Protection Zone (EPZ)
  - Physical Features
  - Marshy Areas
  - Land Marks Monument
  - Conserved Areas
  - Controlled Nature Park
  - Water Bodies Lakes/Kulhi
  - Harbour Basin
  - Retirement / Groins
  - Conservation Boundary
- EXISTING LAND USES**
- Public Administration
  - City Council Office
  - Municipal Office Complex
  - Regional Audit Office
  - Government Institutes
  - Education
  - School
  - College/University Campus
  - Hospital
  - Pharmacy
  - Islamic Affairs
  - Mosque
  - Friday Mosque
  - Police
  - Multifunctional Police Station
  - Defence
  - MINDF Kulhudhuffushi
  - Multifunctional Fire Station
  - Arts, Culture & Heritage
  - Theatre/Arts Cinema
- SPORTS & RECREATION ZONE**
- Sports Stadium Court
  - Water Sports
  - Water Sports area Beach
  - Parks and Open Spaces
  - Children's Park
  - Outdoor Gym
  - Pool/Play Park
  - Neighborhood Park
  - Harbour Park
  - Green Link
- UTILITY & MUNICIPAL SERVICES ZONE**
- Dhiraagu VCC
  - Ooredoo Kulhudhuffushi Branch
  - Alema Land
  - Fenaa Kulhudhuffushi Power House
  - Fenaa Substations
  - Fenaa Transformers
  - MINSI RO Plant (BM)
  - Fenaa Office
  - Municipal
  - Company
  - Vehicle Management Center
  - MINSI Sewerage Treatment Plant
  - MINSI Pump Station
  - Airport
  - Kulhudhuffushi Domestic Airport
  - Ferry Terminal
  - Regional Ferry Terminal (MTC)
  - Local Dhiraagu Office
  - Port
  - Multihubush Post Limited
  - Land Transportation
  - Driving Track
  - Commercial Use
  - Shops
  - Retail Shops
  - Restaurant
  - Markets
  - Local Market
  - Fish Market
  - Ice Plant
  - Fuel station
  - Banking
  - Local Market
  - Branch
  - Industrial Zone
  - Light Industrial
  - Tourism
  - AM Revolving
  - Road Network
  - Harbour Loading / Unloading ISM


<b>KULHUTHUFFUSHI CITY</b>	Drawing Name: Land Use Plan		Drawing Stage: Proposed Map		Scale: 1:15	
						
<b>PLANNERS</b>		Drawn by: Hananu Hyala	Revised by:	Drawn date: 17th Dec 2023	Revised date:	Checked by: Ahmed Shuhud Zuhair
<b>SURVEYORS</b>		Surveyed by:	Revised by:	Surveyed date:	Revised Date:	Approved by:

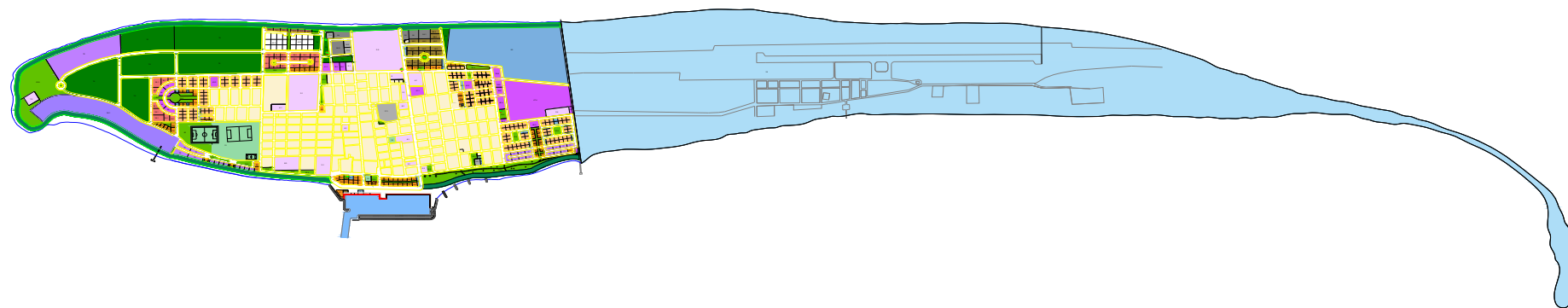
Figure 45: Hanimaadhoo Land Use Plan 2022

**APPROVED**

Reference to letter number 471/DNPS2/258/2022/16

PHYSICAL PLANNING DIVISION

MINISTRY OF NATIONAL PLANNING HOUSING AND INFRASTRUCTURE



**LEGEND**

**EXISTING LAND USES**

- RESIDENTIAL 203
- INSTITUTIONAL AND COMMUNITY
- 2. Public Administration
  - 2.1. Council Office
  - 2.2. Judicial warehouse
  - 2.2. Court
  - 2.4. Customs
  - 2.5. Agricultural center.
- 3. Education
  - 3.1. Schools
  - Secondary School
- 4. Health
  - 4.1. Health center
- 6. Islamic Affairs
  - 6.1. Mosque
- 7. Private Organization.
  - 7.2. Observatory
- 8. Social service
  - 8.1. Children homes
  - 8.5. Social center
- 9. Police
  - 9.4. Island police station.
- SPORTS AND RECREATIONAL
- 13. Sports stadium/court
- 15. Park and Open Spaces

- UTILITY AND MUNICIPAL SERVICES
- 16. Utility
  - 16.1. Telecommunication
- 16.2. Power House
- 17. Municipal
  - 17.1. Cemetery
  - 17.2. Waste
  - 17.5. Feneka
  - 17.6. Water production facilities.

- TRANSPORTATION
- 18. Airport
- 19. Ferry terminal
- TOURISM
- 36.1 City hotel

**PROPOSED LAND USES**

- RESIDENTIAL
- 38.1. Public Housing
  - Flats
  - Rowhouse
- 38.2. Plots for sale
- INSTITUTIONAL AND COMMUNITY
- 39. Public Administration
  - 39.1. Council block
  - 39.5. Immigration
  - 39.6. Reserved Institutional land

- 41. Health
  - 41.1. Hospital extension
- 43. Islamic Affairs
  - 43.3. Mosque
- 44. Private Organizations
  - 44.1. Club Office
- 46. Police
  - 46.4. Island Police Station
- 47. Defense
  - 47.4 MNDF

- SPORTS AND RECREATIONAL
- 50. Sports area
- 52. Parks and Open Spaces
  - 52.3. Pocket Park
  - 52.4. Green Corridor
  - 52.5. Heritage Park
  - 52.6. Neighborhood park
  - 52.7. Visitors park
  - 52.8. Picnic Park
  - 52.9. Nature Park
  - 52.91. Boulevard park

- UTILITY AND MUNICIPAL SERVICES
- 54. Municipal land
  - 54.1 Cemetery
  - 54.5 Proposed Feneka

- TRANSPORTATION
- 55. Airport extension
- 58. Land Transport
  - 58.1 Parking

- COMMERCIAL USE
- 59. Shops
  - 59.2. Wholesale Shops
  - 59.3. Retail Shops
  - 59.4. Souvenir Shops
  - 59.5. Grocery Shops
  - 59.6. Super Markets
  - 59.7. Cafe Restaurant
- 60. Market
  - 60.1. Local Market
- 61. Ice plant
- 66. Banking
  - 66.1. Bank Branch

- INDUSTRIAL ZONE
- 67. Heavy
- 68. Light
  - 68.1. Storage/Warehouse
  - 68.2. Workshop
  - 68.3. Dingy Repair
  - 68.4. Fish Factory

- AGRICULTURE AND MARICULTURE
- 69. Light
- 69.2. Farmland

- TOURISM
- 71. Guest House
- 72. City Hotel

- OPEN/GREEN BUFFERS AREAS
- 74. Green buffer area
- ENVIRONMENTAL PROTECTION ZONE
- PHYSICAL FEATURES
- LAND MARKS
  - Monuments
  - Gate
  - Tower
  - Light house
- HARBOR BASIN
- REEF LINE
- SHORE LINE
- JETTY
- SIGNIFICANT TREE
- JURISDICTION
- ROAD NETWORK
- HARBOR LOADING / UNLOADING
  - 17M PRIMARY ROAD
  - 13.25 M PRIMARY ROAD
  - 9M SECONDARY ROAD
  - 2M-3M PEDESTRIAN ACCESS

NOTE: ALL MEASUREMENTS SHOULD BE CHECKED PHYSICALLY ON THE GROUND BEFORE LAND ALLOCATION.

**LAND USE PLAN**  
LUP + ROADS

PROJECT: H.DH.HANIMADHOO LUP (PAGE 1 OF 2)	PLANNING & URBAN DESIGN
CLIENT: H.DH.HANIMADHOO ISLAND COUNCIL	HUSSAIN ZIYATH
DATE: DECEMBER 2021	MAUMAN RASHEED
DO NOT SCALE THE DRAWING	MOHAMED IBRAHIM (BP04206)

DWG NO:  
A - 01/02





Figure 46: Nohivaranfaru Land Use Plan 2023

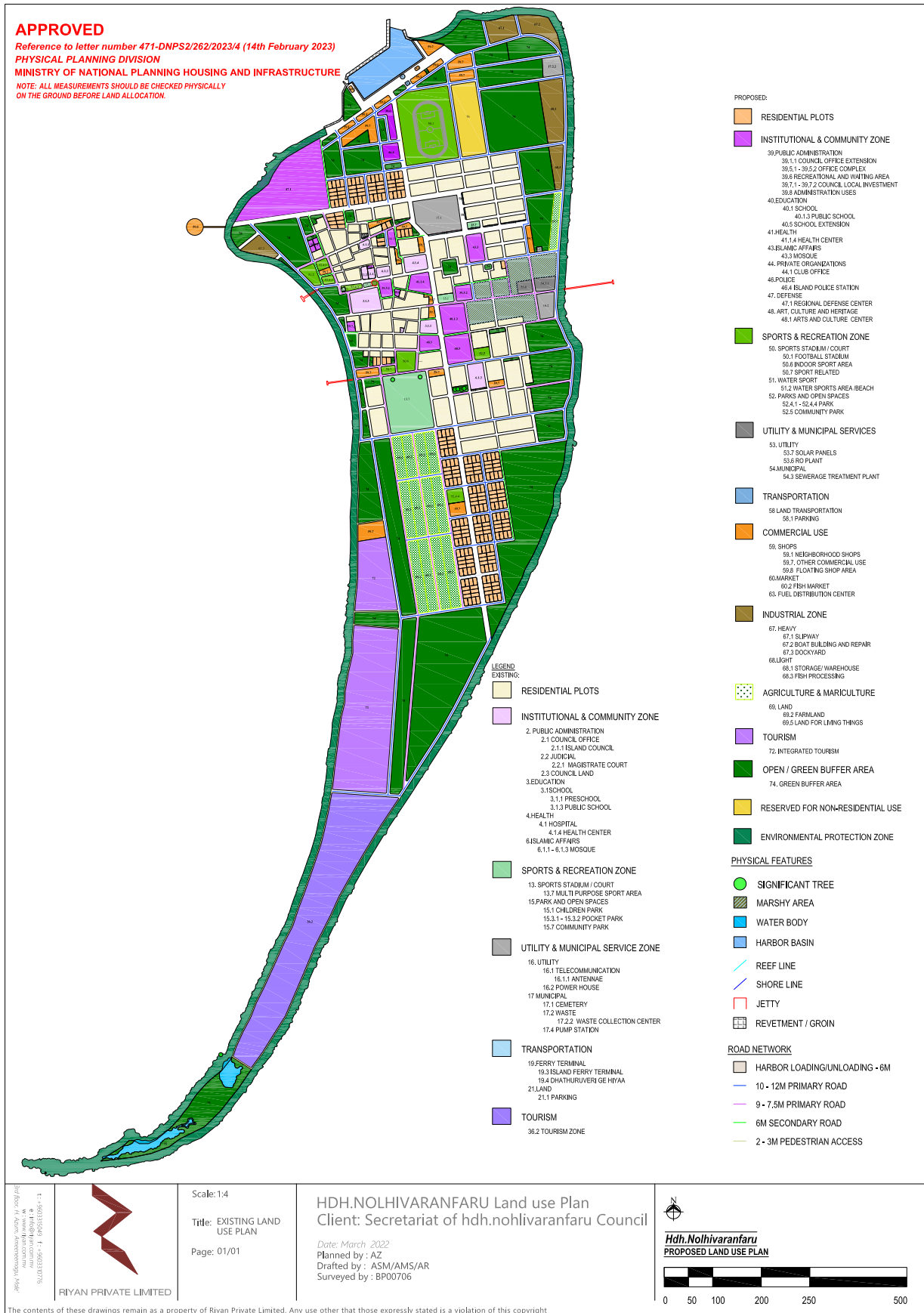


Figure 47: Hithadhoo Land Use Plan 2024

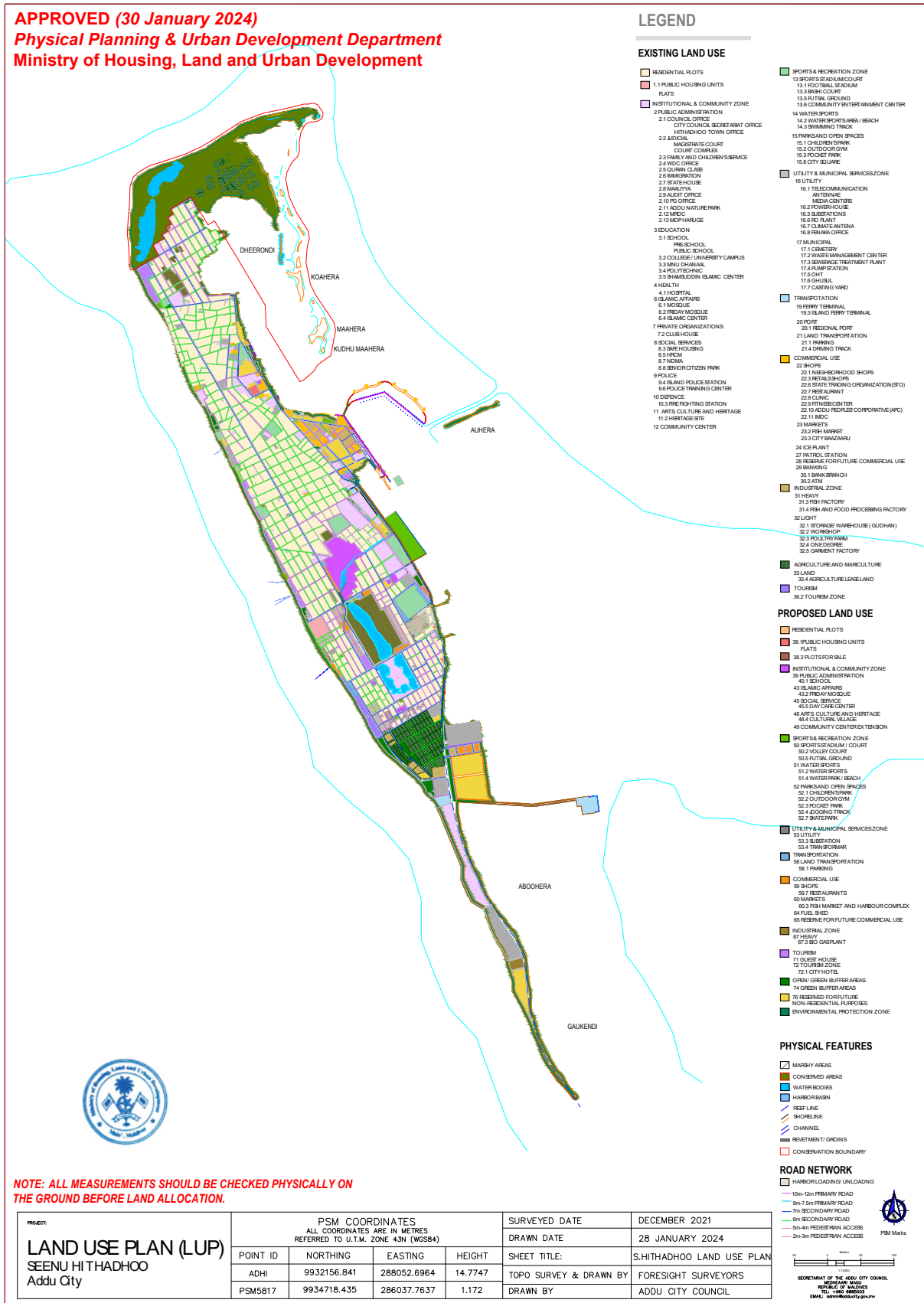
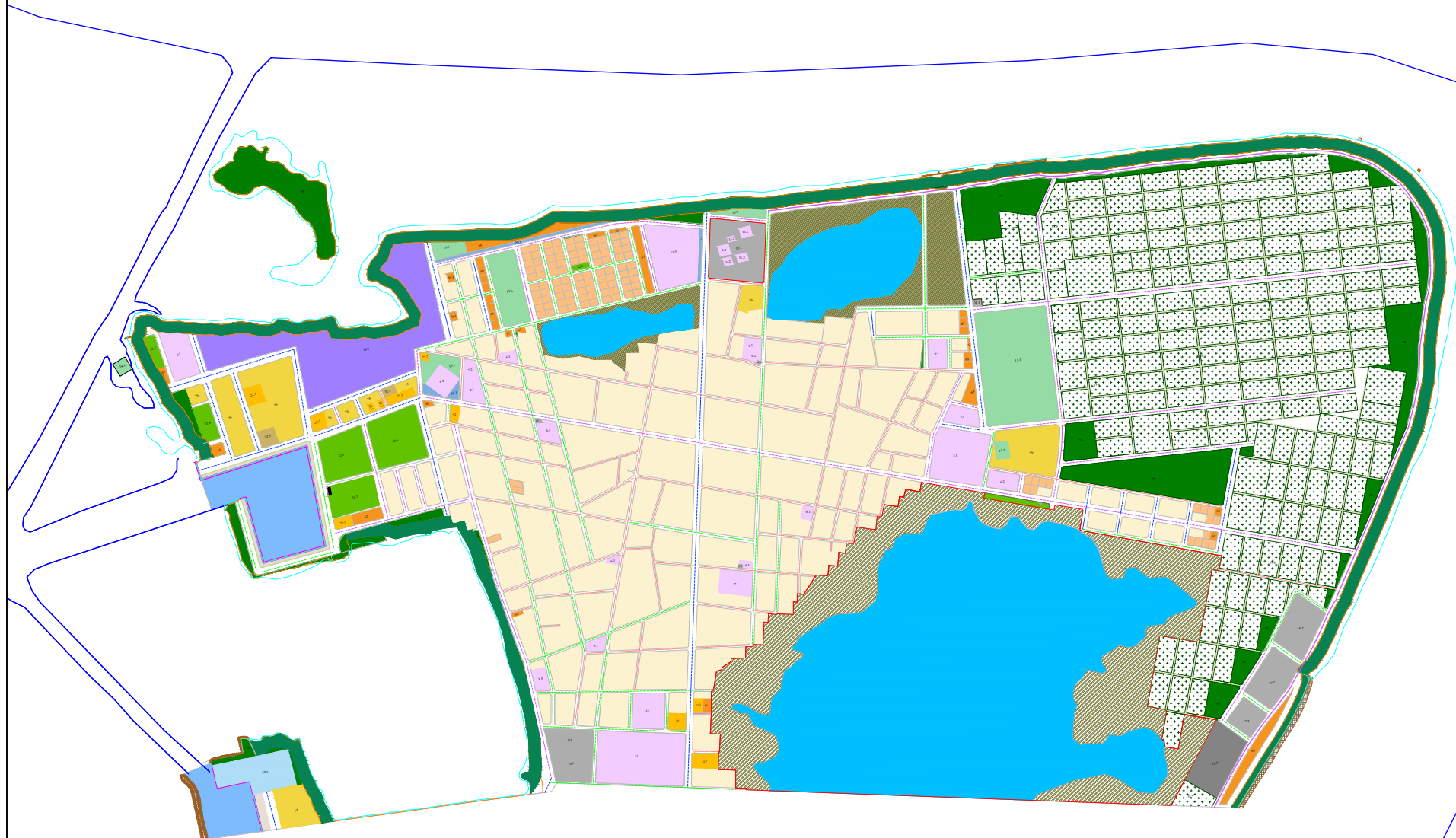


Figure 48: Meedhoo Land Use Plan 2023

**APPROVED**  
 Reference to letter number 471-DNPS2/426/2023/68 (26 SEPTEMBER 2023)  
 PHYSICAL PLANNING DIVISION  
 MINISTRY OF NATIONAL PLANNING HOUSING AND INFRASTRUCTURE



**LAND USE PLAN (LUP)**  
**SEENU MEEDHOO**  
 Addu City

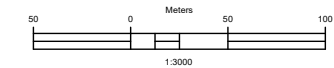
SURVEYED DATE	DECEMBER 2021
DRAWN DATE	06 SEPTEMBER 2023

PSM COORDINATES			
ALL COORDINATES ARE IN METRES REFERRED TO U.T.M. ZONE 43N (WGS84)			
POINT ID	NORTHING	EASTING	HEIGHT
PSM5819	9935451.529	303303.470	+1.047
-			

**LEGEND**

- |   |   |
|---|---|
| <p><b>EXISTING LAND USE</b></p> <ul style="list-style-type: none"> <li>RESIDENTIAL PLOTS</li> <li>INSTITUTIONAL &amp; COMMUNITY ZONE</li> <li>2 PUBLIC ADMINISTRATION</li> <li>2.1 COUNCIL OFFICE</li> <li>2.2 JUDICIAL</li> <li>3 EDUCATION</li> <li>3.1 SCHOOL</li> <li>4 HEALTH</li> <li>4.1 HOSPITAL</li> <li>6 ISLAMIC AFFAIRS</li> <li>6.1 MOSQUE</li> <li>6.2 FRIDAY MOSQUE</li> <li>11 ARTS, CULTURE AND HERITAGE</li> <li>11.2 HERITAGE SITE</li> <li>11.3 MUSEUM</li> <li>12 COMMUNITY CENTER</li> <li>SPORTS &amp; RECREATION ZONE</li> <li>13 SPORTS STADIUM/COURT</li> <li>13.1 FOOTBALL STADIUM</li> <li>13.5 FUTSAL GROUND</li> <li>13.6 MUMMATHI SPORTS GROUND</li> <li>14 WATER SPORTS</li> <li>14.3 SWIM TRACK</li> <li>15 PARKS AND OPEN SPACES</li> <li>15.1 CHILDREN'S PARK</li> <li>15.7 ELHEDEH HARU MAZAN</li> <li>15.8 LULLY BEACH MAZAN</li> <li>UTILITY &amp; MUNICIPAL SERVICES ZONE</li> <li>16 UTILITY</li> <li>16.1 TELECOMMUNICATION ANTENNA</li> <li>16.2 POWER HOUSE</li> <li>16.3 SUBSTATIONS</li> <li>16.6 WATER SUPPLY TANKS</li> <li>17 MUNICIPAL</li> <li>17.1 CEMETERY</li> <li>17.2 WASTE MANAGEMENT CENTER</li> <li>17.3 SEWERAGE TREATMENT PLANT</li> <li>TRANSPORTATION</li> <li>19 FERRY TERMINAL</li> <li>19.3 ISLAND FERRY TERMINAL</li> <li>COMMERCIAL USE</li> <li>22 SHOPS</li> <li>22.1 NEIGHBORHOOD SHOPS</li> <li>22.3 RETAIL SHOPS</li> <li>22.7 RESTAURANTS</li> <li>29 BANKING</li> <li>30.1 BANK BRANCH</li> <li>INDUSTRIAL ZONE</li> <li>32 LIGHT</li> <li>32.1 STORAGE WAREHOUSE</li> <li>32.3 ROOFING SHEETS MANUFACTURING FACTORY</li> <li>AGRICULTURE AND MARCULTURE</li> <li>33 LAND</li> <li>33.4 AGRICULTURE LEASE LAND</li> <li>TOURISM</li> <li>36.2 TOURISM ZONE</li> </ul> | <p><b>PROPOSED LAND USE</b></p> <ul style="list-style-type: none"> <li>RESIDENTIAL PLOTS</li> <li>INSTITUTIONAL &amp; COMMUNITY ZONE</li> <li>43 ISLAMIC AFFAIRS</li> <li>43.2 FRIDAY MOSQUE</li> <li>SPORTS &amp; RECREATION ZONE</li> <li>50 SPORTS STADIUM / COURT</li> <li>50.3 KULHURU BN</li> <li>51 WATER SPORTS</li> <li>51.2 WATER SPORTS AREA / BEACH</li> <li>52 PARKS AND OPEN SPACES</li> <li>52.1 CHILDREN'S PARK</li> <li>52.3 POCKET PARK</li> <li>52.4 MASERINJE PARK</li> <li>52.5 OPEN SPACE (MAZAN)</li> <li>52.6 MATHIKULHI PARK AND BOTANICAL GARDEN</li> <li>UTILITY &amp; MUNICIPAL SERVICES ZONE</li> <li>53 UTILITY</li> <li>53.1 LARGE SOLAR</li> <li>TRANSPORTATION</li> <li>58 LAND TRANSPORTATION</li> <li>58.1 PARKING</li> <li>COMMERCIAL USE</li> <li>59 SHOPS</li> <li>59.3 RETAIL SHOPS</li> <li>65 RESERVED FOR FUTURE COMMERCIAL USE</li> <li>OPEN GREEN BUFFER AREAS</li> <li>74 GREEN BUFFER AREAS</li> <li>76 RESERVED FOR FUTURE NON-RESIDENTIAL PURPOSES</li> <li>ENVIRONMENTAL PROTECTION ZONE</li> </ul> <p><b>PHYSICAL FEATURES</b></p> <ul style="list-style-type: none"> <li>MARSHY AREAS</li> <li>CONSERVATION BOUNDARY</li> <li>MONUMENT</li> <li>HARBOR BASIN</li> <li>OFFSHORE LINE</li> <li>COASTLINE</li> <li>TUNNEL</li> <li>CITY</li> <li>SETBACKMENT / GROINS</li> <li>ROAD NETWORK</li> <li>HARBOR LOADING / UNLOADING</li> <li>10m-12m PRIMARY ROAD</li> <li>5m-7.5m PRIMARY ROAD</li> <li>7m SECONDARY ROAD</li> <li>6m SECONDARY ROAD</li> <li>5m-4m PEDESTRIAN ACCESS</li> <li>2m-3m PEDESTRIAN ACCESS</li> </ul> <p style="text-align: center;">PSM Marks</p> |
|---|---|

PROJECT:	ADDU CITY LAND USE PLAN
SHEET TITLE:	PROPOSED WITHOUT RECLAMATION PLAN FOR S.MEEDHOO LAND USE PLAN MAP
TOPOGRAPHIC SURVEY:	FORESIGHT SURVEYORS
DRAWN BY:	ADDU CITY COUNCIL



SECRETARIAT OF THE ADDU CITY COUNCIL  
 MIDHAYAN MAGU  
 REPUBLIC OF MALDIVES  
 TEL: +960 4880003  
 EMAIL: info@adducity.gov.mv



NOTE: ALL MEASUREMENTS SHOULD BE CHECKED PHYSICALLY ON THE GROUND BEFORE LAND ALLOCATION.

### Annex 3: Maldives Protected Areas

Environmental Protection Agency



#### Protected Areas of the Maldives - List

(updated on 17/12/23)

#	Name_label	މަނިފު	Atoll	Type	Category of Protection	Original Decree	Declared Date	Area in Ha	Amended Date	Amended Decree
1	K. Kaashidhoo Wetland Area	ކ. ބަނިފު ބަނިފު ސަރަޙައްދު	K	Wetland	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2021/24	13/02/2021	42.74		-
2	K. Maldives Victory Wreck	ކ. ދިވެހިރާއްޖޭގެ ބަނިފު ބަނިފު ސަރަޙައްދު	K	MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2021/24	13/02/2021	4.75		-
3	K. Lions Head (Thilafalhu Miyaruvani)	ކ. ބަނިފު ބަނިފު ސަރަޙައްދު (މިއަރުވަނި)	K	MPA	Not Assigned	E/95/32	27/09/1995	149.77		-
4	K. Guraidhoo Kanduolhi	ކ. ބަނިފު ބަނިފު ސަރަޙައްދު	K	MPA	Category 7: Protected Area with Sustainable Use	E/95/32	27/09/1995	351.18	03/09/2020	(IUL)438-ENV/438/2020/150
5	K. Hans Hass Place (Gulhi Falhu)	ކ. ބަނިފު ބަނިފު ސަރަޙައްދު (ގުލިފަލު)	K	MPA	Category 7: Protected Area with Sustainable Use	E/95/32	27/09/1995	10.78	05/05/2020	(IUL)438-ENV/438/2020/102
6	K. Giravaru Kuda Haa	ކ. ބަނިފު ބަނިފު ސަރަޙައްދު	K	MPA	Not Assigned	E/95/32	27/09/1995	257.92		-
7	K. Embudhoo Kanduolhi	ކ. ބަނިފު ބަނިފު ސަރަޙައްދު	K	MPA	Not Assigned	E/95/32	27/09/1995	630.66		-
8	K. Banana Reef (Gaathu Giri)	ކ. ބަނިފު ބަނިފު ސަރަޙައްދު (ގާތު ގިރި)	K	MPA	Not Assigned	E/95/32	27/09/1995	177.48		-
9	K. Nassimo Thila (Lankan Thila)	ކ. ބަނިފު ބަނިފު ސަރަޙައްދު (ލަންކަން ތިލާ)	K	MPA	Not Assigned	10-C/99/38	21/10/1999	263.83		-
10	K. Makunudhoo Kanduolhi	ކ. ބަނިފު ބަނިފު ސަރަޙައްދު	K	MPA	Not Assigned	E/95/32	27/09/1995	308.37		-
11	K. Huraa Mangrove	ކ. ބަނިފު ބަނިފު ސަރަޙައްދު	K	Mangrove	Not Assigned	174-AB1/2006/13	14/06/2006	5.34		-





#	Name_label	މަނިފަރ	Atoll	Type	Category of Protection	Original Decree	Declared Date	Area in Ha	Amended Date	Amended Decree
12	K. Rasfari Region	ކ. ރާސަފަރީ ސަރަޙައްދު	K	Island/MPA	Not Assigned	E/95/32	27/09/1995	2424.46		-
13	K. Thanburudhoo Region	ކ. ތަންބުރުދޯ ސަރަޙައްދު	K	Island/MPA	Category 7: Protected Area with Sustainable Use	E/95/32	27/09/1995	316.29	05/11/2020	(IUL)438-ENV/438/2020/209
14	Lh. Kuredhi Kanduolhi (Kuredhu Express)	ލ. ޤުރެދީ ޤަންދޯލީ (ކުރެދު ޕްރެކްސް ޤަންދޯލީ)	Lh	MPA	Not Assigned	10-C/99/38	21/10/1999	393.44		-
15	Lh. Fushifaru Region	ލ. ފުޝިފަރު ސަރަޙައްދު	Lh	MPA	Not Assigned	E/95/32	27/09/1995	1390.90		-
16	Lh. Sehlhifushi - Hiriyadhoo Region	ލ. ސެލްހިފުޝީ - ހިރިއްޔަދޯ ސަރަޙައްދު	Lh	Island/Mangrove /MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2020/179	08/10/2020	492.00		-
17	Lh. Vavvaru, Dhandifalhu Finolhu and Dhandifalhu Kanduolhi	ލ. ވަވްވަރު، ދަންދިފަލްހު ފިނޯލްހު ޕްރޮޓެކްޓެޑް ޤަންދޯލީ ސަރަޙައްދު	Lh	Island/MPA	Category 6: Habitat/Species Management Area	(IUL)438-ENV/438/2020/179	08/10/2020	687.47		-
18	Lh. Dhashugiri Finolhu	ލ. ދަޝަޅުގީރީ ފިނޯލްހު ސަރަޙައްދު	Lh	Sandbank /MPA	Category 2: Strict Nature Reserve	(IUL)438-ENV/438/2020/179	08/10/2020	330.37		-
19	Lh. Anemone Thila	ލ. ޤަނަމަނީ ތިލާ (އަނަމަނީ ތިލާ) ސަރަޙައްދު	Lh	MPA	Category 6: Habitat/Species Management Area	(IUL)438-ENV/438/2020/179	08/10/2020	1556.47		-
20	Lh. Maakoa	ލ. ޖަވާ	Lh	Island/Mangrove /Wetland	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2020/179	08/10/2020	61.54		-
21	S. Eedhigali Kilhi Koatthey Area	ސ. ޔީދިޅުގަލީ ޤިލްހީ ޤޯޓްތީ ސަރަޙައްދު	S	Mangrove /MPA	Not Assigned	20-H3/2004/67	07/12/2004	770.62	13/09/2018	2018/R-105
22	S. British Loyalty Shipwreck	ސ. ބްރިޓިޝް ލޮޔަލްޓީ ޕްރޮޓެކްޓެޑް ޕްރޮޓެކްޓެޑް ޕްރޮޓެކްޓެޑް	S	MPA	Not Assigned	2018/R-105	13/09/2018	64.73		-
23	S. Kandihera-Maakandu Channel (Manta Point Addu)	ސ. ޤަންދިހެރާ - ޖަވާ ޤަނަދު ޤަނަދު (މަންޓާ ޕޮއިންޓް އަދު) ސަރަޙައްދު	S	Sandbank /MPA	Not Assigned	2018/R-105	13/09/2018	735.01		-



#	Name_label	اسم	Atoll	Type	Category of Protection	Original Decree	Declared Date	Area in Ha	Amended Date	Amended Decree
24	S. Kuda Kandu Area	س. کڈا کڈا سکر	S	MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2020/162	22/09/2020	462.06		-
25	S. Maafishi Kilhi	س. مافیشی کیلی	S	Mangrove /Wetland	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2020/162	22/09/2020	5.86		-
26	S. Mathi kilhi	س. مٹی کیلی	S	Wetland	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2020/162	22/09/2020	56.12		-
27	Gn. Farikede Area	ج. فریکڈ سکر	Gn	MPA	Category 6: Habitat/Species Management Area	(IUL)438-ENV/438/2020/129	22/07/2020	636.75		-
28	Gn. Bandaara kilhi and sorrounding wetlands	ج. بنداارا کیلی اور سکر	Gn	Mangrove /Wetland	Not Assigned	2018/R-106	13/09/2018	41.32		-
29	Gn. Dhandimagu Kilhi	ج. ڈھانڈیماگی کیلی	Gn	Mangrove /Wetland	Not Assigned	2018/R-106	13/09/2018	69.04		-
30	Gn. Thoondi Area	ج. ٹونڈی سکر	Gn	Terrestrial	Not Assigned	2018/R-106	13/09/2018	31.78		-
31	ADh. Hurasdhoo	ادھ. ہراسڈھو سکر	ADh	Island/ MPA	Not Assigned	174-AB1/2006/13	14/06/2006	21.56		-
32	ADh. South Ari Marine Park (SAMPA)	ادھ. سوتھ اری مارین پارک (سامپا)	ADh	MPA	Category 6: Habitat/Species Management Area, Category 7: Protected Area with Sustainable Use	138-EE/2009/19	05/06/2009	5143.41	11/07/2019	(IUL)438-ENV/438/2019/175
33	ADh. Rangali Kandu (Madivaru)	ادھ. رانگالی کڈا (مڈیوارو)	ADh	MPA	Not Assigned	10-C/99/38	21/10/1999	861.38		-





Environmental Protection Agency



#	Name_label	ስም	Atoll	Type	Category of Protection	Original Decree	Declared Date	Area in Ha	Amended Date	Amended Decree
47	B. Anga Faru Area	ጋ. ላንጋ ፋሩ ስጦት	B	MPA	Not Assigned	138-EE/2009/19	05/06/2009	768.86		-
48	B. Hanifaru Area	ጋ. ስንግሊ ፋሩ ስጦት	B	Island/MPA	Not Assigned	138-EE/2009/19	05/06/2009	528.95	05/06/2011	138-FS2/1/2011/35
49	B. Olhugiri	ጋ. ሳሊካ ስጦት ጋ. ሳሊካ ስጦት ጋ. ሳሊካ ስጦት	B	Island/MPA	Not Assigned	174-AB1/2006/13	14/06/2006	51.84		-
50	HDh. Finey Thila	ሲ. ፊናይ ቲሊያ ስጦት	HDh	MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2019/150	17/06/2019	97.49		-
51	HDh. Innafushi	ሲ. ከናፍሽ ስጦት ሲ. ከናፍሽ ስጦት	HDh	Island/MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2019/150	17/06/2019	1361.71		-
52	HDh. Neykurendhoo	ሲ. ኔይኪረንዲካው ስጦት ሲ. ኔይኪረንዲካው ስጦት	HDh	Mangrove/Wetland	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2018/322	30/12/2018	74.22		-
53	HDh. Keylakunu	ሲ. ካይላኪኒ ስጦት	HDh	Island/Mangrove/Wetland/MPA	Category 6: Habitat/Species Management Area, Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2018/322	30/12/2018	235.26		-
54	HA. Gallandhoo	ሲ. ጋላንዲካው ስጦት ሲ. ጋላንዲካው ስጦት	HA	Island/Mangrove/Wetland/MPA	Category 2: Strict Nature Reserve	(IUL)438-ENV/438/2019/150	17/06/2019	250.58		-
55	HA. Bileydhoo Thila	ሲ. ቢይላይዲካው ቲሊያ ስጦት	HA	Island/MPA	Category 6: Habitat/Species Management Area	(IUL)438-ENV/438/2019/150	17/06/2019	4337.70		-



Environmental Protection Agency



#	Name_label	މަތި	Atoll	Type	Category of Protection	Original Decree	Declared Date	Area in Ha	Amended Date	Amended Decree
56	HA. Kelaa Kandoofaa	ހ. ޤަލާއާ ޕްލާޓް ސަލާފުޅު	HA	Mangrove /Wetland	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2019/150	17/06/2019	111.56		-
57	HA. Baarah	ހ. ބާރާހު ޖަދު، ފ. ސަލާފުޅު	HA	Mangrove /Wetland	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2018/322	30/12/2018	50.81		-
58	Sh. Bolissafaru	ހ. ބޮލިސާފަރު ސަލާފުޅު، ފަލުޅު	Sh	Island/MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2019/150	17/06/2019	950.32		-
59	Sh. Naalaa Huraa Finolhu	ހ. ނާލާއާ ހޫރާއާ ފިނޮލްހު ސަލާފުޅު	Sh	Sandbank /MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2019/150	17/06/2019	158.66		-
60	Sh. Farukolhu	ހ. ފަރުކޯލްހު ސަލާފުޅު	Sh	Island/ Wetland/ Mangrove /MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2018/262	07/10/2018	509.20		-
61	GDh. Dhigulaabadhoo	ގ. ދިޔުލާބަދްހު	GDh	Island/ Wetland/ Mangrove /MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2018/262	07/10/2018	485.39		-
62	Dh. Fushi Kandu	ދ. ފުޝީ ޕްލާޓް	Dh	MPA	Not Assigned	10-C/99/38	21/10/1999	2357.52		-
63	B. Dhigali Giri & Dhigali Haa	ބ. ދިޔުލާބަދްހު ގިރީ ޔަބްލިޔު ސަލާފުޅު	B	MPA	Not Assigned	10-C/99/38	21/10/1999	88.93	05/06/2011	138-FS2/1/2011/35
64	N. Bodulhaimendhoo	ނ. ބޯދުލްހައިމަންދްހު ސަލާފުޅު، ފަލުޅު	N	Island/ Mangrove /Wetland/ MPA	Category 2: Strict Nature Reserve	(IUL)438-ENV/438/2019/150	17/06/2019	320.11		-
65	N. Orimas Thila	ނ. ޕްލާޓް ޕްލާޓް ސަލާފުޅު	N	MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2019/150	17/06/2019	46.08		-





#	Name_label	اسْمُ	Atoll	Type	Category of Protection	Original Decree	Declared Date	Area in Ha	Amended Date	Amended Decree
66	N. Kendhikulhudhoo Mangrove Area	سر. ناسرہ کڈھو سسکڑھو	N	Mangrove /Wetland	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2019/150	17/06/2019	509.64		-
67	N. Fohdhipparu Finolhu	سر. فوڈھپارو فینولھو سسکڑھو	N	Island/ MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2019/150	17/06/2019	321.08		-
68	R. Villingilee Thila	سر. ویلینگیلے تھلا	R	MPA	Not Assigned	10-C/99/38	21/10/1999	263.36		-
69	V. Miyaru Kandu Region	سر. میارو کاندو سسکڑھو	V	MPA	Not Assigned	E/95/32	27/09/1995	1382.54		-
70	V. Vattaru	سر. واتارو	V	MPA	Not Assigned	10-C/99/38	21/10/1999	9718.50		-
71	M. Lazikuraadi	سر. لازیکوراادی (رڈھو)	M	MPA	Not Assigned	10-C/99/38	21/10/1999	486.97		-
72	F. Filitheyo Kandu	سر. فیلیتھو کاندو	F	MPA	Not Assigned	10-C/99/38	21/10/1999	167.34		-
73	L. Gaadhoo Turtle Nesting Area, Mangrove and Seagrass Area	سر. گادھو ٹورٹل ناسٹنگ ایریا، سسکڑھو، سسکڑھو، سسکڑھو، سسکڑھو، سسکڑھو	L	Mangrove /Wetland/ MPA	Category 6: Habitat/Species Management Area	(IUL)438-ENV/438/2021/371	23/12/2021	614.88		-
74	L. Gan Boda Fengan'du Area	سر. گن بڈا فنگن'ڈو سسکڑھو	L	Mangrove /Wetland/ MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2021/371	23/12/2021	15.03		-
75	L. Bodu Finolhu and Vadinolhu Kandu Olhi Area	سر. بڈو فینولھو، وادینولھو کاندو اولھی سسکڑھو	L	Sandbank /MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2021/371	23/12/2021	706.02		-
76	L. Maabaidhoo Koaru and Fushi Kan'du Area	سر. ماابایدھو کوارو، فوشی کان'ڈو سسکڑھو	L	Island/ Mangrove /Wetland/ MPA	Category 6: Habitat/Species Management Area, Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2021/371	23/12/2021	521.08		-





#	Name_label	اسم	Atoll	Type	Category of Protection	Original Decree	Declared Date	Area in Ha	Amended Date	Amended Decree
83	B. Huraafaru Area	ب. هورافارو	B	Sandbank /MPA	Category 1: Internationally Recognized Area, Category 6: Habitat/Species Management Area	(IUL)438-ENV/438/2023/485	02/11/2023	694.36		-
84	V. Huraafalhu Area	و. هورافالھو	V	MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2023/494	01/11/2023	8.84		-
85	V. Fussarufaru Region	و. فوساروفارو	V	Sandbank /MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2023/493	01/11/2023	3690.38		-
86	V. Rakeedhoo Corner	و. راکیدھو کورنر	V	MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2023/492	01/11/2023	6.34		-
87	V. Ruh huri huraa	و. رھھریھرا	V	Island/MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2023/491	01/11/2023	106.49		-
88	V. Thun'duhuraa	و. تھنڈھرا	V	Island/MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2023/490	01/11/2023	3.57		-
89	V. Hingaakulhee Finolhu Area	و. ہنگاکولھے فینولھو	V	Sandbank /MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2023/489	01/11/2023	1175.80		-
90	V. Kashavaru Falhu Area	و. کاشاوارو فالھو	V	MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2023/487	01/11/2023	978.62		-
91	V. Huralhu Kandu Area	و. ہرالھو کاندو	V	Sandbank /MPA	Category 7: Protected Area with Sustainable Use	(IUL)438-ENV/438/2023/488	01/11/2023	257.73		-



## Annex 4: Photographs of Consultations

Meeting with MMS in Malé on 4 March 2024



Meeting with Gan Airport authority and MMS in Gan 6 March 2024





Meeting with Addu Maldives Red Crescent 6 March 2024



Meeting at Hanimaadhoo Agriculture Centre 9 May 2024



Meeting with coir rope making group Kulhudhuffushi City 12 May 2024



Meeting with Kulhudhuffushi City Women's Development Committee 12 May 2024





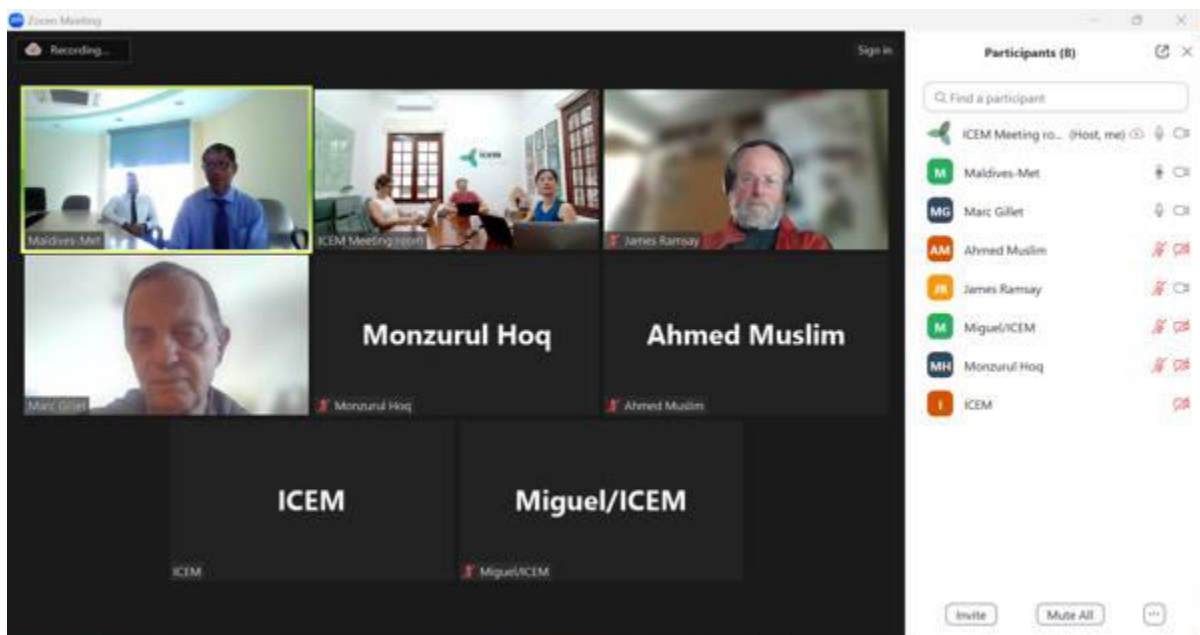
Meeting with fishermen and boatowners Kulhudhuffushi City 13 May 2024



Meeting with farmers and home gardeners in Hanimaadhoo 14 May 2024



Virtual meeting with MMS on 12 June 2024



## **Annex 5: Template for Site Environmental Management Plan**

### **Site Environmental Management Plan (SEMP) for Civil Works**

This document serves as a Site Environmental Management Plan (SEMP) template for low-risk civil works projects, capturing the typical Environmental and Social (E&S) impacts and associated mitigation measures that need to be considered at minimum for such construction activities.

A civil works project is considered as low risk if its potential adverse risks, impacts, and issues on human populations and/or the environment are likely to be minimal or negligible. This takes into account project type and scale, sensitivity of site, the nature, significance, magnitude and duration of its potential E&S impacts, complexity of issues raised and ease reliability of mitigation.

The impacts of these types of projects can be easily and fully mitigated through routine measures and implementation of best practices.

The scope of application of the SEM is low risk construction projects; small infrastructure works and emergency response projects including projects which are implemented under time constraints in the context of natural disaster, crisis, or conflict settings (i.e. Category C projects according to the ADB classification, and simpler Category B projects). Such projects include basic social infrastructure, building rehabilitation, water supply works and other infrastructure activities such as:

- Road rehabilitation
- Drainage works
- Ponds and trenched earthworks, e.g. for rainwater retention
- Terracing
- Erosion control, e.g. gabions check dams in gullies, simple slope stabilization
- Tree planting
- Construction of simple water distribution and sanitation infrastructure;
- Rehabilitation or construction of buildings for which no specific impacts are expected, such as classrooms, rural health centers, community centers, markets.

These works typically take place at community level, may involve labor-intensive work, and do not make use of complex construction processes and equipment.

#### **What is the intention of this ESMP Guidance document?**

The intention of this SEM Guidance is to:

- Assist the project implementing agency, which is usually a government department. For this project, it will be the PMU.
- Guide the entities responsible for a specific civil works project in avoiding/mitigating negative E&S impacts during the planning and implementation phases of the works.

A project implementing agency will typically engage a construction contractor to undertake civil works. For this project, this SEM template should be included as an annex in the contracts between the PMU and the Contractors for the various subprojects, forming a contractual obligation for the Contractors to develop and implement an SEM during the works.

**Who needs to follow the SEMP?**

The implementation of this SEMP will be a mandatory part of the contract between the Contractors and the PIU. The Contractors will be obliged to finalize their SEMP and submit them for approval by the PMU, and subsequently to ensure implementation of the SEMP and respective reporting. The PMU will oversee and monitor SEMP implementation.

The mitigation measures, responsibilities and monitoring requirements need to be further conveyed to any sub-contractors engaged by the Contractors and/or any suppliers associated with their operations. It is the responsibility of the Contractors that every worker and subcontractor on the ground needs to be aware of the contents of the relevant SEMP and their specific responsibilities under it.

**How to use this SEMP Guidance document?**

Each Contractor will use this SEMP template as guidance and amend it as appropriate to the project specifications, characteristics and risks, for approval by the PMU. The final SEMP should be commensurate with the relevant E&S risks and expected impacts of the subproject.

The main body of this guidance document serves as a template to be amended with project specific information on project activities, mitigation measures and roles and responsibilities.

The topics/potential impacts included in the SEMP table are based on the standard specifications and bidding documents for small works with international financing.

**A template for the SEMP is provided below.**





**Table 53: Template for Site Environmental Management Plan**

Topic/ Potential Impact	Mitigation, Management and Enhancement Measures	Means of Verification	Responsi bility	Monitoring Procedure
<b>A. Environmental, Social, Health and Safety Management</b>				
1. Responsibilities and liabilities	Adjust this SEMP to the specific project, define the frequency of the monitoring procedure and share it with PMU and ADB. Identify if further Management Plans have to be prepared.	Final project specific SEMP	Contractor	Monitor and record the management of the Environmental, Social, Health and Safety (ESHS) topics periodically
	Ensure that all workers, suppliers and subcontractors are familiar with and comply with the requirements and specifications of this SEMP.	Induction performed and recorded	Contractor	Report the induction event (participants, information shared etc.)
2. ESHS Management	Define all organizational and technical provisions to satisfy and follow up the specifications of the SEMP (e.g. resources, documentation)	Requirements for the ESHS management are defined	Contractor	Once, prior to finalization of project specific SEMP
	Make sure that the Site Manager/Supervisor has experience in dealing with ESHS management. Give authority for stopping of works if non-conformities are identified. Appoint qualified EHS officer. Communicate with the relevant authorities the ESHS staff responsible.	The Site Manager has experience in dealing with ESHS issues of similar projects; Qualified EHS officer on site	Contractor	Once, prior to selection of Site Manager. Weekly inspection reports.
3. Code of Conduct	Establish a Code of Conduct taking into consideration safety rules, substance abuse, environmental sensitivity, communicable diseases, gender issues (sexual harassment), respect for local beliefs and customs, community interactions etc.	Code of Conduct in place and rules shared with personnel	Contractor	Punishable or misconduct behaviors are reported and communicated Check grievance records
4. ESHS Training	Provide Health and Safety (H&S) Induction and Training to the workforce regarding H&S risks and mitigation measures (including indirect workers) tailored to project scope.	Training performed and recorded	Contractor	Check training records
	Awareness raising regarding community health and safety to the local communities through campaigns (e.g. schools)	Awareness raising campaigns performed and recorded	Contractor	Check information material produced
<b>B. Protection of the Environment and People</b>				
5. Protection	Restrict excavation activities during periods of intense rainfall. Use silt	No excavation during intense rainfall and	Contractor	Site inspection

Topic/ Potential Impact	Mitigation, Management and Enhancement Measures	Means of Verification	Responsibility	Monitoring Procedure
of adjacent areas	traps to reduce the risk of sediment moving off site.	when site is slippery		
	Create cutoff ditches to prevent water from entering excavations, if needed.	No surface water entering excavations	Contractor	Random site inspection
	Ensure that means of protection are in place to avoid or minimize adverse effects on vegetation, soils, groundwater and surface water, biodiversity, natural drainage and the water quality in areas within the works area. Construction methods to minimize impacts to the extent possible.	No impacts identified in the adjacent environment	Contractor	Regular (e.g. monthly) monitoring of adjacent natural resources.
	Ensure that work site boundaries and limits are in accordance with plans agreed in advance. All construction activities should be carried out within boundaries.	Site boundaries and limits on site	Contractor	Site inspections
	Ensure no works in wetland areas.	Site not in wetland areas	Contractor	Once during site selection
6. Selection of stockpile sites and access road	Select specific, limited areas for stockpiling and construction of access tracks, and obtain full authorization before construction.	Designated areas selected	Contractor	Once during site selection
7. Pollution prevention	Ensure all works carried out minimize pollution risk (e.g. liquid effluents; air emissions; noise and vibration management; vehicle and equipment maintenance and selection; fuel, oil and chemical storage and handling.) including the whole duration of the project.	No pollution identified	Contractor	Weekly inspection reports
8. Effluents	Ensure appropriate containment and storage of construction wastewater, including sanitary water. No untreated effluent is discharged.	No untreated wastewater discharge	Contractor /PIA	Regular site inspection
9. Atmospheric emissions and dust	Use only vehicles in appropriate technical condition. Provide emissions control equipment where applicable (e.g. filters).	Technical Specification Sheet	Contractor	Prior to commencement of works and each time new equipment/vehicle is used at the site.
	Ensure vehicles are switched off when not in use. Sensitize drivers.	Engines switched off	Contractor	Site inspection
	Best practice to ensure minimization of dust emissions (e.g. proper stockpiling, watering etc.) during dry and windy conditions and transportation.	Watering conducted, no dust emissions are observed, no workers' or residents' grievances	Contractor	Regular site inspection

Topic/ Potential Impact	Mitigation, Management Enhancement Measures	and Means Verification	of Responsi bility	Monitoring Procedure
	Ensure speed limits on site. Sensitize drivers.	Speed signs installed; residents' grievances	Contractor	Random site inspection
10. Noise and vibration	Avoid operations and vehicle movements at night. Sensitize drivers.	No work conducted between 10pm and 7 am/ no grievances received	Contractor	Random site inspection, review of filed grievances, interaction with community
	Set traffic speed limits. Sensitize drivers.	Speed limit signs Driver Training Records as part of Induction training	Contractor	Random site inspection, Review of training records
	Locate stationary equipment (such as power generators) as far as possible from nearby receptors (e.g. worker resting areas, populated areas and environmentally sensitive areas).	Distances between equipment and receptors are kept	Contractor	Once prior to commencemen t of works Monitor noise levels in case equipment is used
11. Waste	Identify waste management facilities and waste management contractors. Ensure disposal through waste contractors licensed for treatment/removal/recycling of each of the waste types.	Waste management through licensed contractors, if feasible Waste Management Plan	Contractor	Inspect waste management facilities Proof of contractors' certifications
	Ensure that all wastes produced are properly collected, segregated, stored, transported and re-used, recycled or disposed of.	Waste collection areas existent, waste inventories	Contractor	Random site inspection, Review of waste inventories
	Minimize waste production to the extent possible.	Records of waste production are kept	Contractor	Monitor (e.g. monthly) the amount of waste produced
	Document all waste related operations (type of wastes, quantities produced etc.).	Storage, transport and treatment of waste is documented	Contractor	Document inspection
	Appropriate and safe storage of fuels, construction materials, wastes and any other potentially polluting materials.	Safe storage of materials, Spill remediation equipment in place	Contractor	Random site inspection Weekly site inspection reports
12. Vegetation clearing	Limit vegetation clearing to areas within the site boundary where it is strictly necessary.	Vegetation clearing minimal	Contractor	Random site inspection

Topic/ Potential Impact	Mitigation, Management and Enhancement Measures	Means of Verification	Responsibility	Monitoring Procedure
	Describe the methods of vegetation clearance.	No use of fires or chemicals on site	Contractor	Site inspection during site clearance
	Avoid clearing mature trees and any protected species.	No mature trees cleared	Contractor	Visual inspection
	Avoid off-road vehicle traffic. Use existing roads. Sensitize drivers	No off-road traffic	Contractor	Random site inspection
13. Biodiversity	Avoid disturbance of natural habitats.	Disturbance of habitats avoided	Contractor	Inspection of construction practices.
14. Erosion and sediment transport	Ensure preventive erosion control measures are applied (e.g. plan to retain grass and other vegetation, use of natural contours for roads and drainage networks, create drainage channels).	Preventive erosion control measures in place	Contractor	Random site inspection to check if measures where applied
	Ensure appropriate storage of topsoil. After construction, use topsoil as backfill for restoration of the area according to detailed Site Restoration Plan.	Site Restoration Plan Topsoil stored and re-used	Contractor	Monitor if topsoil is properly stored
	Optimal stockpiling.	Stockpile height limited and free from erosion and contamination	Contractor	Random site inspection
15. Site rehabilitation	Ensure revegetation and restoration of cleared areas after construction.	Revegetation completed	Contractor / PIA	One-time inspection after construction
	Ensure that rehabilitated areas do not pose health and safety risks (e.g. holes, ponds).	Reinstatement completed	Contractor / PIA	One-time inspection after construction
	Reinstate construction working area after construction activities are completed.	Reinstatement completed	Contractor / PIA	One-time inspection after construction
	Rehabilitate storage sites and access roads, where applicable.	Rehabilitation completed	Contractor	One-time inspection after construction
<b>C. Health and Safety</b>				
16. Health and Safety Plan	Develop a Health and Safety Plan.	HS Plan in place	Contractor	Monitoring of Contractor's measures
17. Accident reporting procedure	Ensure all H&S related incidents (e.g. observations, accidents) on site are recorded and followed up effectively.	Incident recording process in place	Contractor	Check incident/accident records
18. Personal protective equipment	Ensure the provision of Personal Protective Equipment (PPE) for workers (hardhats, masks, safety glasses, safety boots etc. as appropriate).	PPE used by everyone on site	Contractor / Site Manager	Random site inspection

Topic/ Potential Impact	Mitigation, Management Enhancement Measures	and Means Verification	of Responsi bility	Monitoring Procedure
19. Emergency scenarios prevention	Ensure immediate cleaning of any spills and remediation of contaminated areas after construction.	Workers trained	Contractor / PIA	Random site inspection after spill events One-time inspection after construction
	Provide necessary prevention equipment on site in line with applicable regulations to respond to emergency scenarios, e.g. fire, floods, natural hazards etc.	Prevention equipment in place	Contractor	Regular site inspection
	Maintain high standard in housekeeping on site. Construction materials and light equipment should be stored properly.	Visual verification of good housekeeping on-site	Contractor	Random site inspection
20. First-aid	Ensure minimum first aid provisions on site. (suitably stocked first-aid kits; at least one person trained in first aid at each work site, respectively an adequate number of first-aid helpers; ensure that staff and workers are informed about first-aid arrangements)	Suitable first aid kits on site Ensure the presence of first aid helpers in all shifts	Contractor	Regular monitoring of first aid kits
21. Access to health care and training	Ensure the workforce has access to primary healthcare on site, providing prescriptions and vaccinations.	Healthcare available on site	Contractor	Random site inspection
	In all cases, determine the location and access routes to the nearest functional hospital, medical clinic or health center and establish an evacuation plan for casualties.	Medical centers in the proximity of the site.	Contractor	Medical centers in the proximity of the site identified once prior the commencement of works
22. Hygiene, accommodation and food	Ensure provision of H&S and hygienic and sanitary facilities at the site, including shaded welfare areas, showers, changing rooms and potable water. Ensure toilets and changing rooms are separated between male and female employees.	Appropriate H&S and sanitary facilities provided at site	Contractor	Random site inspection
	Ensure the provision of adequate space, supply of water, adequate sewage and garbage disposal system, appropriate protection against heat, cold, damp, fire and disease-carrying animals, adequate sanitary and washing facilities, adequate lighting, and basic medical services, in accordance with all applicable health and safety regulations and norms.	Appropriate conditions for workers on site	Contractor	Random site inspection Grievance mechanism log



Topic/ Potential Impact	Mitigation, Management and Enhancement Measures	Means of Verification	Responsibility	Monitoring Procedure
	Report any occurrence of any communicable diseases amongst the workforce (Covid-19, STDs, Tuberculosis and Hepatitis B and C). Sensitize workers.	Communicable Diseases Register	Contractor	Review of diseases register and disease prevention program if available.
<b>D. Local labour and relations with local communities</b>				
23. Labor conditions	Ensure minimum legal labor standards as per the International Labor Organization regulations (child/forced labor, sexual assault, no discrimination, equal opportunities, working hours, minimum wages) are met.	Grievance Mechanism Records, Training recorded	Contractor	Inspection reports (also from labor authorities), Review of grievance register and training record
	Ensure that all direct and indirect workers have access to and are aware about the Grievance Mechanism where they can raise workplace relevant complaints anonymously.	Grievance Mechanism in place and grievances recorded	Contractor / PIA	Review of grievance register
	Ensure all workers have the same rights and are treated equally.	Non-discrimination policy in place	Contractor	Random site inspection Grievance mechanism log
24. Local recruitment	Ensure local communities are preferred for the supply of goods and services to the subproject and subproject personnel, where appropriate.	Local Procurement and Employment Records	Contractor	Review procurement and employment rules and records
25. Transport	Organize carpools/buses for worker transportation where feasible.	Carpools/ buses used	Contractor	None
26. Community interaction	Engage / communicate / inform affected communities. Ensure good communication and consultation with local authorities and communities regarding all activities.	Minutes of Meetings Grievance Mechanism	Contractor / PIU	Review of grievance register Minutes of consultation meetings
	Initiate an efficient Grievance Mechanism to allow potentially affected individuals to raise their concerns.	Grievance Mechanism in place, grievances recorded	Contractor / PIU	Review of grievance register

Topic/ Potential Impact	Mitigation, Management and Enhancement Measures	Means of Verification	Responsibility	Monitoring Procedure
	Engage with the local community and potential affected households to understand their needs and identify the risk of damage to their livelihoods by subproject activities (e.g. exclusion from pasture land, lack of access to water, slope failure risk during excavation). Should impacts be unavoidable, a timely and fair compensation should be given to all affected persons in accordance with project's Resettlement Framework (RF).	Minutes of Meetings Grievance Mechanism records. Management Plan for Land Acquisition and Compensation if needed	Contractor / PIU	Review of grievance register and meeting minutes
27. Damage to people and property	Ensure all contractors implement codes of conduct concerning employment and workforce behavior (including but not limited to safety rules, zero tolerance for substance abuse, environmental sensitivity of the area, dangers of sexually transmissible diseases and HIV/AIDS, gender equality and sexual harassment, respect for the beliefs and customs of the populations and community relations in general).	Workers Code of Conduct Grievance Mechanism records	Contractor	Worker interviews, Review of grievance log
	Ensure that site areas are provided with appropriate security, fencing, signage and lighting. Use hazard notices / signs / barriers to protect children and other vulnerable people from harm and prevent access to non-workers.	H&S planning of construction site approved, items installed	Contractor	Random site inspection
28. Land acquisition and land take	Engage with the local community to understand local land ownership and land use. Avoid to the extent possible land take of both formal and informal land owners/land users. If land take is inevitable, no forced eviction should take place. Should impacts be unavoidable, a timely and fair compensation should be given to all affected persons in accordance with project's Resettlement Framework (RF). Owners should be compensated prior to access to land.	Grievance Mechanism Management Plan for Land Acquisition and Compensation if needed	PIU / Contractor	Once during site selection Review of grievance log Follow up of land acquisition/compensation process
29. Traffic management	Ensure safe driving by subproject personnel (e.g. through training/induction).	Driver Training Records as part of Induction training	Contractor	Review of training records

Topic/ Potential Impact	Mitigation, Management and Enhancement Measures	Means of Verification	Responsibility	Monitoring Procedure
	Target signage and outreach activities to improve public awareness of traffic changes and potential hazards for high-risk sections of public roads, including near the site and contractor's compounds.	Warning signs Minutes of Meetings	Contractor	Inspection if traffic routes, Review of grievance register
30. Fossils/ Archaeological Chance Finds	Establish specific procedures to manage the protection of archaeological and historical sites, chance finds and fossils. Ensure all finds of physical cultural heritage (e.g. graves, old ceramic, old building fragments) are reported immediately to the relevant authority and avoid excavation in the ultimate neighborhood of a chance find, fence the chance find and await instructions from the competent authority.	Training records, records about chance finds	Contractor	Site inspection

## **Annex 6: Standard Construction Contract Environmental Safeguard Clauses**

The following standard construction contract environmental clauses will be incorporated in tender documents for all subprojects with IEE-EMP. They will be included and operationalized in the SEMP to be produced by successful bidders to provide the required construction-phase mitigation and monitoring measures.

### **1. Environmental Protection and Control of Pollution**

#### **a. General**

The Contractor shall observe and comply with all National Laws, Government Regulations, and Presidential Decrees.

Except where otherwise agreed or provided for by the Employer or expressly stipulated in Particular Specifications or Technical Specifications forming part of the Contract Documents, no separate payment will be made for complying with the provisions of this Clause and attendant sub-clauses; and all costs shall be deemed to be included in the prices for the Contractor's mobilization for construction, and the various rates and lump sum items for the works included in the priced Bill of Quantities.

#### **b. Pollution of watercourses and streams**

The emission of polluting liquids or other waste into drains, water courses, or groundwater shall not be permitted.

No concrete or cement washings from the works or drainage from the Contractor's concrete batching and mixing areas, asphalt (hot mix) plants, or other manufacturing or production facilities shall be allowed to discharge into streams or drains without passing through an adequate system of settling ponds.

Storage of fuels, fueling and maintenance of plant and vehicles, etc. shall take place only on sites and under conditions that do not allow spilt fuels to be discharged to water bodies. Fuel storage and fueling areas shall be equipped with adequate protective measures to confine and retain accidental spillages. No drainage from fuel store and plant maintenance depots shall be allowed to be discharged without passing through an adequate arrangement of oil traps and separators.

Washing of vehicles shall not be permitted in streams but only in specially designated and equipped areas.

Operations in quarries and borrow areas shall be carried out in such a way as to minimize any possible pollution from particulate matter entering the streams. Adequate sanitary waste control facilities shall be provided in site offices and workers camps, and sewage waste shall be collected regularly and disposed in accordance with relevant environmental legislation.

The Contractor shall accordingly be responsible for the installation, operation and maintenance of a comprehensive drainage system to all areas of the Works. The system shall be constructed such that no discharges of oil, cement, silt or other liquid or solid waste matter can enter the streams and water courses at the site; and it shall have all necessary solid waste and sediment traps, settling ponds, oil separators, etc., required to ensure that pollution of streams watercourses and natural bodies of water does not occur. The Contractor shall be responsible for maintaining the system to the satisfaction of the Employer's Construction Supervisor and all costs of providing the system shall be deemed to be included in the various rates and lump sum items for the works included in the priced Bill of Quantities.

**c. Air pollution**

The Contractor shall take all necessary steps to minimize air pollution resulting from his/her operations.

Except where stipulated in these Specifications for the disposal of natural vegetation and organic materials from clearing operations, the burning of waste materials for disposal, particularly oil and petroleum wastes, rubber, plastics and similar materials will not be permitted.

During the performance of the work required under the Contract or of any operations appurtenant thereto, whether on the Project Site or elsewhere, the Contractor shall take all steps necessary, and shall furnish all labor, equipment, materials and means, required to reduce dust nuisance from the Works, and to prevent dust originating from his/her operations from damaging crops, orchards, cultivated fields, and dwellings; or causing a nuisance to persons. The Contractor shall be held liable for any damage resulting from dust originating from his operations including on Government roads, rights-of-way or elsewhere.

The emission of dust into the atmosphere shall not be permitted during the manufacture, handling and storage and handling of cement and of concrete aggregates, and the Contractor shall use such methods and equipment as are necessary for the prevention, or the collection and disposal, of dust during such operations. All truckloads of loose materials shall be covered during transportation.

Concrete batching and mixing areas, asphalt (hot mix) plants, or other manufacturing or production facilities shall be sited at least 500m from the nearest habitation. Emission outlets shall be fitted with pollution control devices in compliance with relevant current Government emission control legislation.

The cost of spraying water on haul roads, access roads, government roads, aggregate stockpiles, etc.; or of any other methods of reducing the formation of dust; and the cost of furnishing and applying materials to maintain the works areas, adjacent areas, and roads, in a dustless condition, shall be deemed to be included in the various rates and lump sum items for the works included in the priced Bill of Quantities.

**d. Noise pollution**

The Contractor shall take all necessary precautions to minimize the amount of noise and vibrations coming from construction activities.

The Contractor shall ensure that all plant and equipment is properly maintained in good operating condition, and that noisy construction activities shall be effectively sound reduced by means of silencers, mufflers, acoustic linings or shields, acoustic sheds or screens or other means, to avoid disturbance to any nearby noise sensitive receivers. All plant and equipment shall comply with relevant Government legislation covering sound emissions.

Quarry operations and blasting shall be undertaken so as to minimize blasting and disturbance during the night and, insofar as possible, noise, vibration and dust. Operation of trucks and heavy vehicles and machinery shall be restricted to the hours of 06:00 to 21:00.

All necessary measures shall be undertaken to protect schools, hospitals and other adjacent noise sensitive receptors, including the use of noise barriers.

**e. Damage to property, crops, and vegetation**

The Contractor shall limit the movement of his/her employees and equipment within the project area and on adjacent land, including access routes approved by the Employer's Construction Supervisor, so as to minimize damage to natural vegetation, crops and property, and shall endeavor to avoid any damage to land.

The Contractor shall strictly ensure employees and equipment do not enter any sensitive environmental areas that are demarcated as "no-entry" zones.

The Contractor shall preserve existing trees, plants and other vegetation that are to remain within or adjacent to the Works and shall use every precaution necessary to prevent damage or injury thereto. Trees or shrubs shall only be felled or removed where such impinge directly on the permanent works or necessary temporary works areas; and where such is approved by the Employer's Construction Supervisor.

On completion of the Works all areas disturbed by the Contractor's construction activities shall be restored by the Contractor to their original condition, or as may be acceptable to the Employer.

The Contractor shall be responsible directly to the Employer for any excessive or unnecessary damage to crops or lands arising from his/her operations, whether within the project area, on lands adjacent thereto, or adjacent to approved access roads: and deductions will be made from the payment due to the Contractor to cover the cost of such excessive or unnecessary damage, as determined by the Employer.

**2. Reporting**

The Contractor shall maintain a record of all emissions and spills of liquid, solid and gaseous matter which occur at the site, whether into water courses, streams, on land, or into the air. This record shall be compiled daily and shall include details of date, time and nature of the event, along with details of the remedial and clean-up measures carried out.

Copies of these records shall be given to the Employer monthly.

The Contractor shall also maintain a record of any complaints made by any Governmental or Community Organization or by the public, regarding his/her operations. This record shall contain the date and time of receipt of the complaint, the name and address of the complainant and the action taken to remedy the situation. Copies of these records shall be given to the Employer monthly.

**3. Environmental Management Plan**

The requirements of this clause and attendant sub-clauses on Environmental Protection and Pollution Control notwithstanding; the Contractor shall observe and comply with all relevant environmental protection and mitigation, monitoring, and reporting requirements in the Environmental Management Plan (EMP) as stipulated in the Particular Specifications. In the event of any conflict between the foregoing sub-clauses and the environmental protection and mitigation measures and pollution control requirements of the EMP, the EMP shall take precedence.

The Contractor shall prepare and submit to the Employer's Construction Supervisor a SEMP demonstrating the manner in which the Contractor will comply with the requirements of the foregoing subclauses on Environmental Protection and Pollution Control, the EMP, and any



particular environmental mitigation measures as stipulated in the Particular Specifications or Technical Specifications forming part of the Contract Documents.

The SEMP shall be submitted within 15 working days of the Contractor receiving the Notice to Proceed with the Works, and shall include the set of management plan listed as part of the EMP (e.g. waste management plan, dust management plan, noise management plan, surface water management plan, emergency management plan, health and safety management plan, or any other management plan as stated in the EMP). Training shall be provided to workers about the appropriate implementation of the SEMP. Construction or rehabilitation works at the sites cannot start until the SEMP is approved by the EA.

Where stipulated in the Particular Specifications or Technical Specifications forming part of the Contract Documents, and provision has been made in the Bill of Quantities; payment for the implementation of the SEMP will be made in accordance with the Unit Rates, Lump Sum or Provisional Sum Items included in the Priced Bill of Quantities.

## **Annex 7: Template of Environmental Monitoring Report**

### **ENVIRONMENTAL MONITORING REPORT**

#### **Abbreviations**

Include list of abbreviations used in the report

#### **Introduction**

#### **Preamble**

This report represents the Semi - Annual Environmental Monitoring Review (SAEMR) for *INSERT PROJECT NAME*.

This report is the (*insert number of report, i.e. 1<sup>st</sup>, 2<sup>nd</sup> etc.*) EMR for the project.

#### **Headline Information**

Include a brief summary of significant outcomes of the project construction process and any specific areas of concern of which ADB should be informed.

#### **Project Description**

Provide a brief description of the project. – this should not vary from one report to the next.

#### **Project Contracts and Management**

Provide a list or table of main organizations involved in the project and relating to Environmental Safeguards. This should include lender, borrower, PIU, Main Contractor/s and significant sub-contractors, environmental staff of various organizations should be named, and contact details provided.

Provide a description of how the contracts are being managed and names of key personnel.

#### **Project Activities During Current Reporting Period**

Provide an outline of major activities which have been carried out during the current reporting period. Provide adequate information so the reader can understand what has been taking place on site. Include photographs (with date stamp) of activities where possible and relevant. Place bulk photographs into an annex to the main report or a separate photographic record.

Where multiple work sites are involved provide information on which work sites have been active during the current reporting period. Provide map of work site areas if relevant.

Provide details (chart) of worker numbers (maximum, Minimum) in the current reporting period and anticipated changes in staff in following period

Highlight any significant new activities commenced during the current reporting period.

For the above make maximum use of charts, images and tables.

#### **Description of any Changes to Project Design**

Describe any changes to the project design from that which was assessed in the Impact Assessment phase of the project and is set out in the Initial Environmental Examination/ Environmental Impact Assessment. If none have taken place, please state – No changes.

Note if significant changes have occurred the PMU should have already informed ADB of this and made a decision on the need for updates to the Initial Environmental Examination/ Environmental Impact Assessment and/or Environmental Management Plans

### **Description of any Changes to Agreed Construction Methods**

Provide a description and reason for changes to any construction processes, for example, blasting of rock rather than excavation, open channel rather than thrust boring at road crossings.

### **Environmental Safeguard Activities**

#### *General Description of Environmental Safeguard Activities*

Please provide a summary of the routine activities undertaken by environmental safeguard staff during the current reporting period. This should include the work undertaken by the contractor's environmental manager, the Environmental Supervisor and any informal visits by the PIU environmental staff.

#### *Site Audits*

Please provide details (table form preferred) of any formal audits undertaken by environmental safeguard process staff during the current reporting period. This would include Contractors Environmental Manager, Environmental Supervisor, PMU Staff and ADB staff during review missions. Information required includes:

Date of Visit

Auditors Name

Purpose of Audit

Summary of any Significant Findings

Cross reference to Audit Report which should be included as an annex.

Summarise Findings of Audits undertaken in the current period, compare with previous periods and identify any trends or common issues.

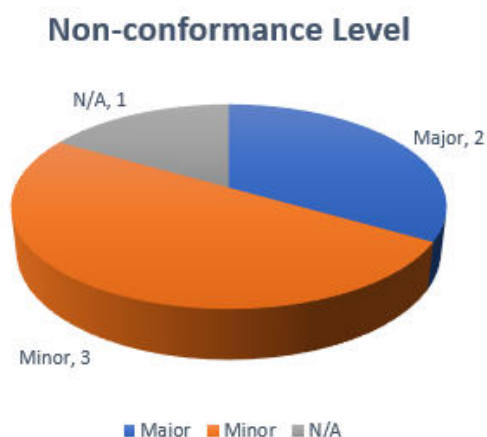
#### *Issues Tracking (Based on Non-Conformance Notices)*

Provide an overview and description of issues tracked during the current period.

Provide commentary on key statistics based on graphs and tables which can be copied from the Environmental Safeguards Issues Tracing Workbook. For example:

**Table 54: Summary of Issues-Tracking Activity for Current Period**

<b>Summary Table</b>	
Total Number of Issues for Project	6
Number of Open Issues	1
Number of Closed Issues	5
Percentage Closed	17%
Issues Opened This Reporting Period	5
Issues Closed This Reporting Period	4

**Figure 49: Summary of Issues by Non-Conformance**

Use data from workbook as required.

### *Trends*

Use information from previous period reports and the current period information to identify trends in issues. For example:

Quarterly Report No	Total No of Issues	% issues Closed	% issues closed late
1	5	87	0
2	18	56	15
3	59	23	26

Provide a commentary on the trends, explain why they may be occurring and in the case of negative trends explain what steps have been taken to make corrections.

Provide a copy of all NCN's for all major Non-Conformances in an annex. If none state this.

### *Unanticipated Environmental Impacts or Risks*

Document any unanticipated environmental impacts and risks which have been identified in the current period (as a reminder, these are impacts or risks which were not identified in the Impact Assessment process). State what actions were taken to mitigate the impacts and risks, were these successful.

### **Overview of Monitoring Conducted during Current Period**

Provide a commentary on what environmental measurements have been undertaken during the current reporting period. Highlight any areas where agreed monitoring has not taken place.

Include sub sections for the report on those environmental media which have been measured, for example:

- Noise
- Air Quality
- Water Quality

The sections should present highlights of the outcomes of the monitoring focusing on a comparison of the results with the agreed standards as set out in the Specific Environmental Management Plan and/or Monitoring Plan. In particular make clear where exceedances in the

standards have occurred and provide reasons and actions which have been implemented to correct – refer to relevant NCN as appropriate.

Detailed monitoring results should be presented as an annex.

### *Trends*

Based on the current and past periods of monitoring identify and discuss any trends which may be developing.

### **Summary of Monitoring Outcomes**

Provide any recommendations on the need for additional monitoring, or requests for ceasing/altering monitoring if activities have been completed or monitoring is showing no significant effects over long period.

### *Material Resources Utilisation*

#### Current Period

Provide values (tables, graphs etc) for current reporting period of utilisation of electricity, water and any other materials which have been include in the SEMP for monitoring.

#### Cumulative Resource Utilisation

Provide values (tables, graphs etc) for cumulative resource utilisation of power water etc, for whole project life. Identify trends or significant changes and provide reasons for any such changes.

### *Waste Management*

Provide summary of waste management activities during the current period. Provide waste contractors/s names and location of waste sites.

#### Current Period

Provide breakdown using graphs, table etc, of waste streams during current reporting period. This information should include

- Type of Waste (description and classification – e.g. hazardous – non-hazardous;
- Waste Source – what activity generated the waste and where;
- Quantity of waste generated;
- Treatment/disposal route – provide information on quantities of waste reused, recycled and sent to landfill or incineration; and
- Final disposal sites for waste.

Provide commentary on results.

#### Cumulative Waste Generation

Using the above bullet points for waste develop cumulative waste generation results. Discuss trends and provide suggestions for waste reduction, increase in reuse and recycling if possible.

## **Health and Safety**

### *Community Health and Safety*

Provide information on any incidents which have occurred during the reporting period which resulted in or could have resulted in Community Health and Safety issues. Include within this section traffic accidents.

### *Worker Safety and Health*

Provide detailed statistics on accident rates, including Lost Time Incidents, Accidents and near misses.

Provide information on safety campaigns conducted during the reporting period.

## **Training**

Provide information on all environmental safeguard related training activities undertaken in this period and cumulatively for project life to date. These may include specific training of environmental staff, HSE inductions of site workers etc.

Discuss the need for additional training and what training is planned for coming quarter. functioning of the SEMP

## **SEMP Review**

Provide a commentary on the SEMP in terms of the ability of the contractor to implement fully the requirements set out. Highlight any areas where the contractor has not been able to implement mitigation or monitoring measures.

Is the SEMP effective, are mitigation measures set out still appropriate and are they working as intended – do they need changing?

Are there better alternative mitigation measures?

Can some mitigation measures be reduced or removed as the specific risk identified in the IEE/EIA and/or SEMP has not materialised?

Provide a table of requests for changes to the current mitigation measures for consideration by ADB. Note you can send these at any time during the project, there is no need to wait until the quarterly reporting period to be completed. If PIU has supplied requests to ADB, these should be listed along with ADB response. Where changes (additions/deletions and modifications) of mitigation or monitoring measures have been approved, the PIU shall ensure that the SEMP is updated to reflect these changes.

## **Good Practice and Opportunity for Improvement**

### *Good Practice*

Provide an overview with charts, images etc of examples of continuing good practice for the project. State why these have been implemented and how they are reducing environmental impacts or risks.

### *Opportunities for Improvement*



Identify any areas which may be outside of the formal NCN process, but which changes to construction techniques, mitigation etc would result in an improvement in environmental, health and safety performance of the project.

### **Summary and Recommendations**

#### *Summary*

Provide a summary of the effective implementation of Environmental Safeguards during the reporting period and for the overall project construction period to date.

#### *Recommendations*

Provide any recommendations for consideration by the ADB for changes to the Environmental Safeguarding process for the project.

## Annex 8: Worker's Camp Specification

The contractors are responsible to provide a standard accommodation for the workers. The camp should ensure structural safety and reasonable levels of decency, hygiene and comfort. The camp should be made of durable construction material, taking into account local conditions such as flood and landslides. The camp should comply with the following minimum standards:

1. Camps should be secured/fenced, and guarded;
2. Camps (including kitchen, dining, and toilets) shall avoid using CGI sheet and bamboo frames, and shall be constructed using pre-fabricated material or colored CGI sheet constructed on iron frame, as approved by the Engineer;
3. The camp shall have minimum headroom of 203 centimeters, and have impervious and raised floor above flood level or at least 60 centimeters.
4. The camp premises shall be kept clean using concrete blocks or gravel, drainage, and flood light. Also use security camera as required locations outside the buildings;
5. The cabin floor area should not be less than 7.5 m<sup>2</sup> in rooms accommodating two persons; 11.5 m<sup>2</sup> three persons; or 14.5 m<sup>2</sup> accommodating four persons. The area of cabin should be at least 3.6 m<sup>2</sup> per person;
6. A separate bed with proper bedding material shall be provided for each worker;
7. If a double decker bed is used, the minimum clearance between lower and upper bunk shall be more than 700, height of 168, and headroom of 203 centimeters;
8. Provide separate accommodation and toilets for male and female workers with adequate privacy;
9. Provide adequate light and ventilation in the camp area and cabins. Provide safe electric plugs to charge mobile or listen radio. Arrange light and fan;
10. Restrict use of heaters for cooking or heating within the cabins;
11. Provide adequate supply of safe and clean water for drinking and washing/bathing;
12. Provide at least one toilet, one washing basin and one shower for every six persons, and separate facility for male and female workers with sufficient privacy;
13. Provide stormwater and wastewater drainage with sump pits before discharging in open;
14. Arrange solid waste collection from camps for safe disposal. Restrict burning of waste;
15. Provide locker for each worker to secure their valuable belongings.
16. Provide common kitchen and dining room located away from cabins. Restrict individual cooking and eating meals in the cabins;
17. The accommodations should be kept free of rats, mice, insects and vermin. In areas where mosquitoes are prevalent, workers should be provided mosquito net;
18. Provide a separate medical room serviced by a medical worker for regular health checks and general type of treatment and emergency facility. Also keep first aid box at easy access of workers and train a few workers to use first aid;
19. Keep fire alarm system and sufficient numbers of fire extinguishers in the camp. Train few workers to operate fire extinguisher;
20. Keep emergency evacuation details, contact number in case of emergency;
21. Keep standby vehicle for emergency evacuation or transportation to hospital;
22. Arrange recreation facility for the workers. Restrict use of alcohol, gambling, and other unsocial activities within the camp, and any person found guilty shall be dealt with required penalty measures. Restrict workers going out of camp after 7pm. A workers Code of Conduct shall be prepared and orientation provided during induction and on regular basis.
23. Restrict use of firewood for cooking and heating.

Reference: Labor Camp Standard of ILO (<https://www.ilo.org/publications/workers-housing>)

**Annex 9: Grievance Recording Form***(to be made available in Dhivehi)*

The Enhancing Climate Resilience and Food Security Project welcomes suggestions, complaints, queries and comments regarding the project. We encourage persons with grievance to provide their name and contact information to enable us to get in touch for clarification and feedback.

Should you opt to include your personal details but want that information to remain confidential, please inform us by writing 'CONFIDENTIAL' above your name.

No.	GRIEVANCE RECORDING FORM	
1	Date of Grievance Reporting	
2	Location of Grievance Reporting	
<b>CONTACT INFORMATION AND GRIEVANCE</b>		
3	Name	
4	Gender	Male <input type="checkbox"/> Female <input type="checkbox"/>
5	Age	
6	Home address	
7	Atoll, Island, Community	
8	Phone	
9	Email	
10	Complaint, comment or question – please provide details (who, what, where, how)	
11	How do you want to be reached for updates?	
12	Signature	
<b>FOR OFFICIAL USE</b>		
11	Registered by: (Name, position, phone number of the official registering the grievance)	
12	Mode in which grievance is received:	<input type="radio"/> Note/Letter <input type="radio"/> E-mail <input type="radio"/> Verbal/telephone
14	Signature and date of the official recording grievance:	
15	Has AP/Complainant been handed over a copy of the grievance form?	Yes <input type="checkbox"/> No <input type="checkbox"/>
16	Reviewed by: (Name, position, phone number of the official reviewing the grievance)	
17	Action taken:	
18	Whether action taken disclosed:	Yes <input type="checkbox"/> No <input type="checkbox"/>
19	Means of disclosure:	

## Grievances Record and Action Taken

<b>Record Number</b>	<b>Date</b>	<b>Name and Contact Number of Complainant</b>	<b>Type of Complaint</b>	<b>Place</b>	<b>Status of Redress</b>	<b>Remarks</b>