Data Collection Survey on Maritime Transportation in the Maldives

Final Report

August 2024

Japan International Cooperation Agency (JICA)

Pacific Consultants Co., Ltd.
PADECO Co., Ltd.

4R
JR
24-031

Table of Contents

Abbreviation

Abbreviation	Definitions
ADB	Asian Development Bank
EIA	Environmental Impact Assessment
EPA	Environmental Protection Agency
HPL	Hithadhoo Port Limited
INPFNP	Integrated National Public Ferry Network Project
JICA	Japan International Cooperation Agency
MBS	Maldives Bureau of Statistics
MMS	Maldives Meteorological Service
MCI	Ministry of Construction and Infrastructure
MoE	Ministry of Education
MoF	Ministry of Foreign Affairs
MoH	Ministry of Health
MTCA	Ministry of Transport and Civil Aviation
MPL	Maldives Port Limited
MTCC	Maldives Transport Contracting Company
MoCLGPW	Ministry of Cities, Local Government and Public Works
NSP	National Spatial Plan
RTL	Raajje Transport Link
WB	World Bank

1. Summary

1-1. Outline of the Survey

1-1-1 Background

Through the Integrated National Public Ferry Network Project (INPFNP), the Maldivian government is working to expand efficient, inexpensive, and convenient public ferry services connecting all 188 inhabited islands in the country. The project was prioritized in the national plan in 2019, and the service began rolling out in four of the six zones since 2021. However, the service has not yet been fully extended to all the island residents by 2023, which was the initial target, mainly due to fiscal challenges caused by COVID-19.

As a result of this situation, the Maldivian government has requested the assistance of the Japanese government for the procurement of vessels for the RTL ferry service and the construction of a passenger terminal building.

1-1-2 Objective

The purpose of this survey is to comprehensively understand and analyze the situation of the maritime transportation sector, and the current status of infrastructure and services related to maritime passenger transportation, including INPFNP, throughout the Maldives. The aim is to identify key issues, and prioritize candidate projects that will contribute to strengthening this sector and to formulate an implementation plan, considering the possibility of JICA's cooperation, assumed to be based mainly on Grant Aid.

1-2. Current Situation of Maldivian Maritime Transportation in General

1-2-1 Situation of Policies Related to Maritime Passenger Transportation

The introduction of the RTL ferry service follows a policy to initiate operations connecting the northern and southern ends of the country to Male, the centrally located capital. Phase 1 began in 2022 with Zone 1 in the north, followed by Phase 2 in 2023 with Zones 5 and 6 in the south. Additionally, services were launched earlier than planned in Lhaviyani Atoll (Zone 2) in 2022, with partial services starting in Noonu Atoll in 2024.

Currently, the Maldivian government aims to begin services in partial Zone 2 (Raa and Baa Atolls) that still need to be implemented in Phase 2, as well as Zone 3 and 4 by 2025 as part of Phase 3.

1-2-2 Implementation Structure of RTL Ferry Service

The schedule, routes, and fares of the RTL ferry service are determined by the

Steering Committee which includes the MTCA (Ministry of Transport and Civil Aviation) and holds full authority over these decisions.

The MTCC (Maldives Transportation and Contracting Company), which has been contracted as the operator of the RTL ferry service by the Steering Committee, was initially required under the contract to make investments in the vessels and passenger terminal buildings using its own funds and to provide the service. However, it does not have the authority to change the operating schedule, routes, or fares. The plan is for the difference between the fares and operational costs to be covered by government subsidies.

1-2-3 RTL Ferry Budget Status

Subsidies for RTL ferry operations are funded through the Public Sector Investment Program (PSIP) budget and have been increasing as the service expands. Therefore, the Steering Committee has been conducting a review for revising the fares based on the actual operation in the past to control the total subsidy amount. In addition, since MTCC is facing difficulties in procuring RTL ferries due to its worsening financial condition, a separate loan has been allocated from the PSIP budget to MTCC for ferry procurement (Financed by own funds as stated in the original contract).

MTCC has also selected and signed a contract with Al Shaari to procure the remaining 65 vessels for Phase 2 and 3 of the RTL ferry service. The contract outlines construction and payment in batches, with ten vessels already completed as the first batch. However, further construction has been suspended due to MTCC’s ongoing financial difficulties.

1-3. RTL Ocean Transportation Service

The RTL ferry service was launched in 2022 as part of the Integrated National Public Ferry Network Project (INPFNP). MTCC provides a comprehensive range of maritime transportation services, including vessel operation and maintenance.

1-3-1 Outline of MTCC

MTCC was established in 1980 as the first publicly listed company in the Maldives, with the Maldivian government holding 64.2% of its shares. MTCC's revenue in 2023 was MVR 3,202 million, a significant 30% increase compared to the previous year. The breakdown shows that revenue from the construction and dredging segment was the largest, amounting to MVR 2,752 million, which accounts for approximately 85% of the total. The transportation segment contributed MVR 145 million, making up less than 5% of the overall revenue.

1-3-2 Relevant Economic, Social and Natural Conditions Data

(1) Economic and Social Data

Major statistical data on the geography, industry, and environment of each zone in the Maldives are shown in Table 1-1. As for the regional population, Zone 3, which includes the capital city of Male has the highest population, followed by Zone 1, Zone 2, Zone 4, Zone 6, and Zone 5.

Table 1-1 Major Statistical Data for Each District (Geographical, Industrial, and Environmental aspects)11

Zone	Total Population (Person)	Number of Islands (Area in ha)	Number of Inhabited Islands (Area in ha)	Number of Agricultural islands (Area in ha)	Number of Islands Resort (Area in ha)	Number of Airports (Domestic flight: D) (International Flight: I)
Zone 1	61,074	132 (5,895)	41 (4,038)	7 (517)	21 (397)	D:3 I:1
Zone 2	49,670	384 (4,738)	45 (2,136)	23 (335)	100 (1,337)	D:2 I:1
Zone 3	250,376	300 (3,112)	35 (1,938)	3 (23)	109 (729)	D:1 I:1
Zone 4	41,848	329 (4,440)	43 (2,894)	10 (170)	51 (496)	D:4
Zone 5	21,949	258 (3,228)	18 (1,279)	4 (151)	32 (327)	D:3
Zone 6	34,219	37 (1,960)	7 (1,508)	0 (-)	9 (140)	D:1 I:1

Source: Prepared by JICA Survey Team based on Population Data of Maldives Bureau of Statistics (2022)

Medical facilities in the Maldives are categorized into four levels in descending order according to the heath care standards: Tertiary Hospital, Regional Hospital, Atoll Hospital, and Health Center.

If a health center on an island cannot provide the necessary medical services, patients can still visit an Atoll Hospital, Regional Hospital or Tertiary Hospital for more advanced care. Currently, there are Tertiary Hospitals (including projections). In addition, patients may be transferred to Tertiary Hospitals in Male or to hospitals in Sri Lanka or India if required.

Table 1-2 Number of Medical Facilities in Each Region1-2

Zone	Total population (Person)	Number of inhabited islands	Tertiary Hospital (Facility)	Regional Hospital (Facility)	Atoll Hospital (Facility)	Health Center (Facility)
Zone 1	61,074	41	1	-	2	38
Zone 2	49,670	45	1	-	3	43
Zone 3	250,376	35	2	-	3	32
Zone 4	41,848	43	1	1	2	38
Zone 5	21,949	18	1	-	2	16
Zone 6	34,219	7	1	-	1	4

Source: Prepared by JICA Survey Team based on Population Data of Maldives Bureau of Statistics (2022)

(2) Natural Conditions Data

1) Tide Level

According to data from The Ministry of Environment and Energy (2016), tidal levels measured at three observatories in the Maldives show that the average tidal range in the Maldives is less than 1 m, indicating a relatively small tidal range.

2) Ocean Waves

In a marine area with coral reef topography like in the Maldives, there is a significant difference in wave characteristics between the open sea side (ocean side) and the inland side (lagoon side).

On the ocean side, wave heights fluctuate depending on the meteorological disturbances, and wave heights vary with meteorological disturbances, typically ranging from H1/3 = 0.5 m under normal conditions to H1/3 = 2 m during high waves. On the other hand, there is no obvious variation observed in wave height and wave period at the lagoon side with H1/3 = 0.4 m.

1-3-3 Current Situation and Issues of INPFNP Vessels and Terminals

(1) Issues and Requests Related to Vessels

As for the vessels, the following issues and requests are raised.

Table 1-3 Issues Related to Vessels13

Item	Issues and Requests
Passenger Capacity	The current passenger capacity of 50 is considered reasonable based on the day of high number of passengers. Operators share this view. However, some opinions suggest that reducing the number of passengers might improve speed and punctuality in certain routes between atolls (between Z5 and Z6), in response to passengers' demand.
Vessel Size	A vessel made by Al Shaari is one size larger than the one made by Gulf Craft. Operators commented that Gulf Craft has high operability in rough seas, but there was no specific request for additional passenger seating space.
Baggage Area	There is a storage space for hand baggage under the deck in front of the vessel's operation seat. If tourists are expected to board the vessel, it will be necessary to address issues related to securing this space or establishing rules to manage it.
Engine Room	Vessel engines and other equipment are located under the deck in the passenger area; however, the confined space makes maintenance challenging for engineers difficult. Regarding the vessel design, it requires improvement to facilitate easier inspection of equipment and simpler replacement of engine oil.
Propulsion method, Engine etc.	The on-board engine (made by Yanmar) is highly reliable and has performed well through periodic inspections. However, defects are occasionally found in the waterjet system.
Others	In some cases. cleaning and removal of attached materials from the vessel's bottom have not been conducted, which may affect operational efficiency.

Source: Prepared by JICA Survey Team Based on Field Interviews

(2) Issues and Requests Regarding the Terminal

As for the terminal, the following issues and requests have been raised.

Table 1-4: Issues related to terminals4

Item	Issues and Requests
Building Design	a uniform design for terminals is preferred.
Durability, Maintenance	The use of durable, maintenance-free materials is preferred.
Waiting Area	There are no walls at the waiting area in Funadhoo, leaving passengers exposed to rain and wind completely. This compromises passenger comfort.
Walkway to Vessels	Onboarding may be problematic during torrential rain as the walkway between the vessel and waiting area is not covered.
Building Entrance	It is used as a space for getting on/off taxis or motorcycles for pick-up/drop-off, should ideally be covered by a roof.
Kiosk Cafe	When establishing kiosk/cafes, it is necessary to thoroughly assess the demand.

Source: Prepared by JICA Survey Team Based on Field Survey

Source: Survey team

Figure 1-1 Heavy Rainfall during Embarkation/Disembarkation of RTL Ferry, Funadhoo11

1-4. Utilization Situation of Vessels and Infrastructure

(1) Utilization of Vessel and Issues

In addition to the RTL ferry, private ferries are in operation. Private ferries are also used for cargo transport, however, they experience delays due to the time required for loading/unloading, which affects their punctuality compared to passenger vessels.

(2) Terminal Utilization and Issues

A large number of vessels which are similar in size to the RTL ferries are moored at the ports, with no significant issues reported regarding vessel arrival/departure and mooring. However, many ports lack waiting areas, which reduces comfort, especially for the elderly or children.

Source: Survey team

Figure 1-2 Utilization Situation of Terminal (Kulhudhuffushi)1-2

1-5. Environmental and Social Considerations

The maintenance plan for priority projects (refer to Chapter 6 for details) includes the construction of a hub terminal and connecting terminals to improve passenger services and maintenance of a service center (maintenance store) to ensure safe and stable vessel navigation.

The construction of the hub and connecting terminals requires to have a short access to the ferry mooring quay and to ensure a site where a one- or two-story building can be constructed in the port.

For maintaining the service center, a facility capable of raising and lowering vessels is needed. Based on interviews with MTCC, which handles vessel maintenance, a crane installed on land is preferred. As a result, since no development activities are planned over the ocean in the priority project proposals, an Initial Environmental Examination (IEE) is not required for the priority project. However, it is necessary to access the EIA platform and report the outline and scale of the plan in advance. Based on this, EPA will determine the necessity of EIA. After receiving the preliminary report, the EPA will notify the need for an EIA process within 5 business days.

1-6. Recommendations Pertaining to Priority Candidate Projects

(1) Selection of Candidate Projects

Based on priority by zone and functional categories, as well as the ranking of maintenance tasks considering their sequences, the following priority candidate projects were selected for potential support as Grant Aid.

Table 1-5: Priority Candidate Projects15

Case	Target Zone	Project Summary
1	Zone 2	RTL ferry service has already started in two of the four atolls, Expansion in Zone 2 will be supported through the introduction of new ferries to the remaining two atolls and by enhancing the maintenance of a main terminal building (one location) as well as a service center (one location) at each atoll.
2	Zone 2	RTL ferry service has already started in two of the four atolls, Expansion in Zone 2 of ferry service will be supported by the introduction of new ferries to the remaining two atolls and by enhancing the maintenance of main terminal buildings (two locations) and service center (one location) at each atoll.
3	Zone 4	The start of the RTL ferry service is planned after the completion of Zone 2 project and the expansion of the ferry service in Zone 4. It will be supported by the introduction of new ferries in all five atolls and by enhancing the maintenance of main terminal buildings at each atoll.

1) Priority Candidate Project 1 (Zone 2)

As for Priority Candidate Project 1, RTL ferries and back-up vessels will be introduced to Raa and Baa atolls, where RTL ferry service has not yet begun in Zone 2. Furthermore, backup vessels will be introduced to Noonu Atoll (Noonu), where partial service began in July 2024. Some of the vessels introduced to each atoll will also support inter-atoll routes.

In addition, a service center, including a hub terminal (passenger terminal building) and vessel maintenance facilities, etc. will be established in Ungoofaaru, which serves as the hub for Zone 2.

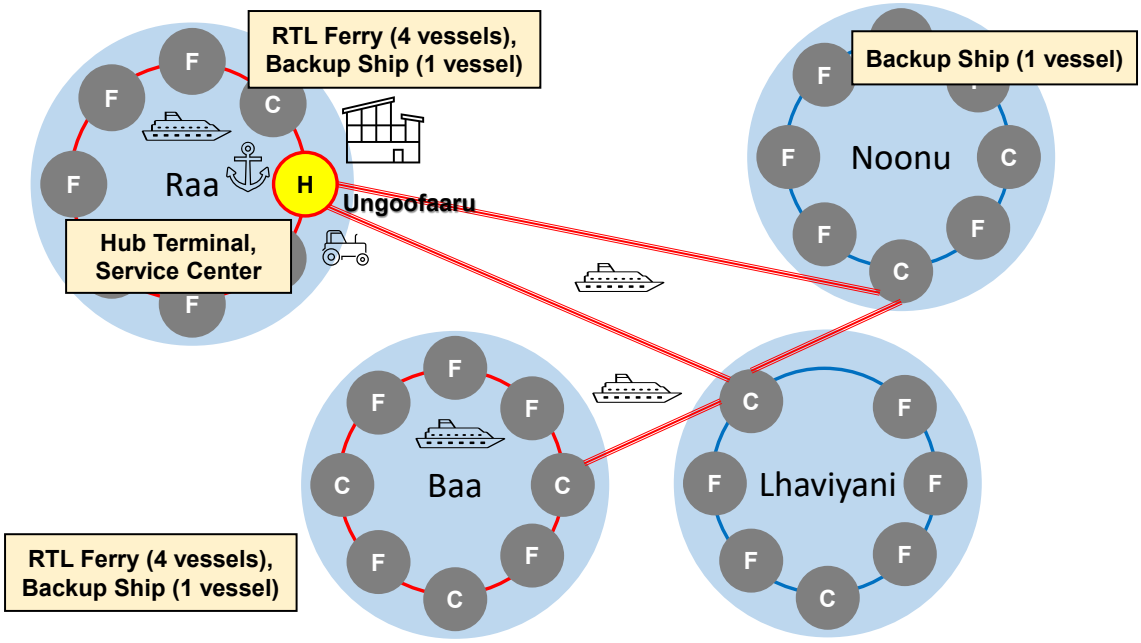


Figure 1-3: Priority Candidate Project 1- Development Image (Zone 2)1-3

2) Priority Candidate Project 2 (Zone 2)

As for Priority Candidate Project 2, RTL ferries and back-up vessels will be introduced to Raa and Baa atolls, where RTL ferry service has not yet begun in Zone 2. Some of the vessels introduced to each atoll will also support inter-atoll routes.

Furthermore, a service center will be established in Ungoofaaru, serving as the hub for Zone 2. This will include a hub terminal (passenger terminal building) and facilities for vessel maintenance. A connecting terminal will also be developed in Manadhoo to enhance RTL ferry services across a broader area and to support the future development of a nationwide highway link.

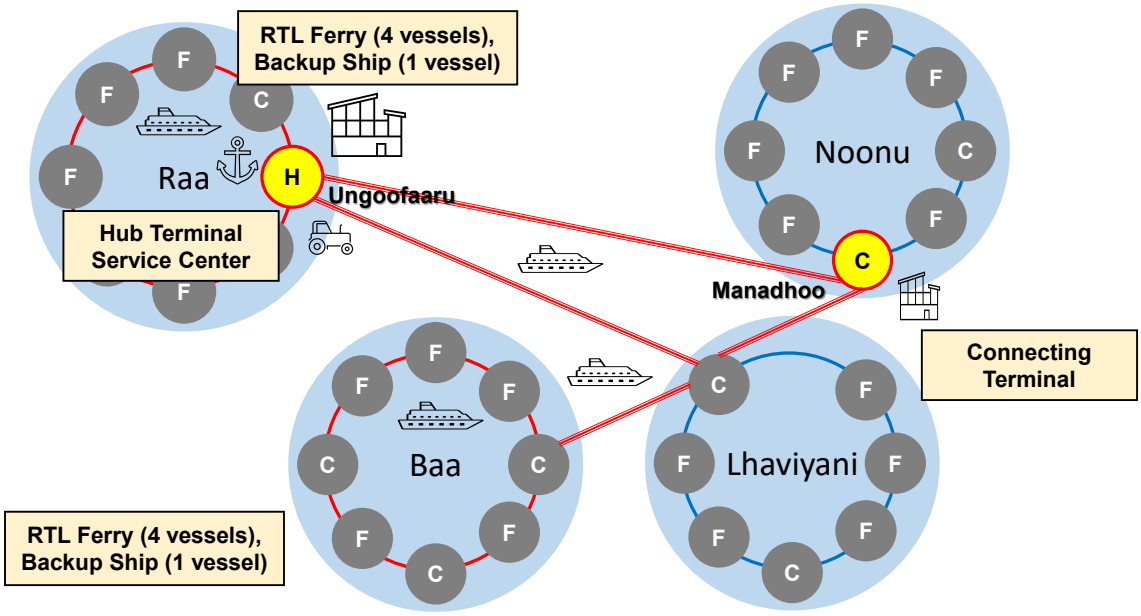


Figure 1-4: Priority Candidate Project 2 - Development Image (Zone 2)1-4

3) Priority Candidate Project 3 (Zone 4)

As for Priority Candidate Project 3, RTL ferries and backup vessels will be introduced to all atolls in Zone 4, where RTL ferry service has not yet begun. Some of these vessels will also facilitate inter-atoll routes.

Furthermore, a service center, including a hub terminal (passenger terminal building) and vessel maintenance facilities, will be established in Gan, which will serve as the central hub for Zone 4.

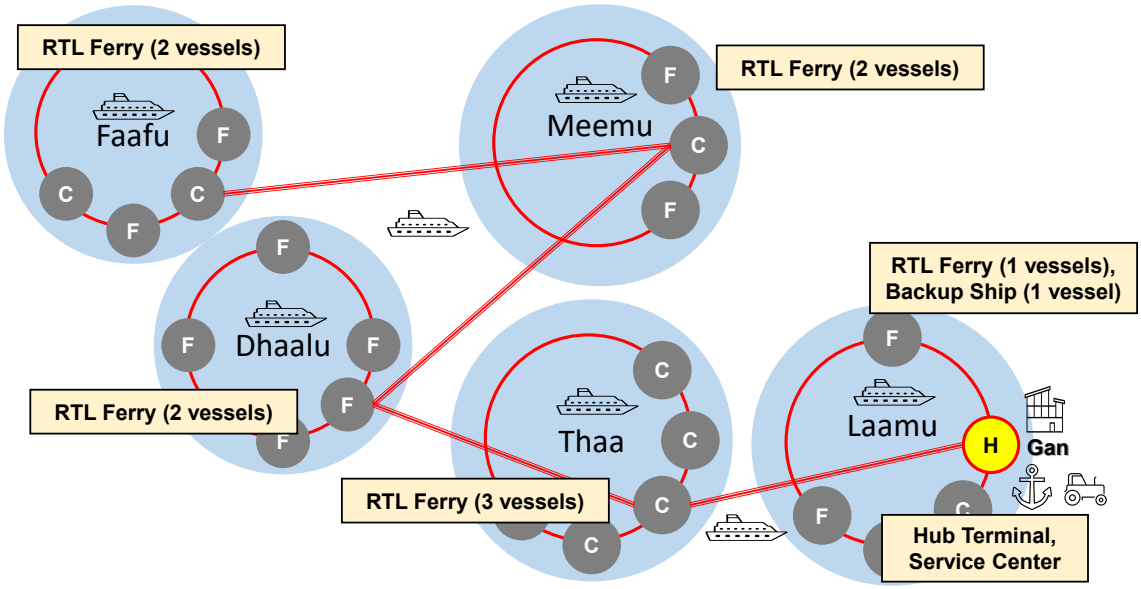


Figure 1-5: Priority Candidate Project 3 - Development Image (Zone 4)1-5

(2) Implementation Plan for Priority Projects

The facilities to be introduced for the priority projects are outlined in the following table, based on the field survey results.

Table 1-6 Facilities to be introduced6

	Facilities introduced	Summary
1	New RTL Ferry	• High-speed ferry, designated by Japanese standards to enhance operational efficiency and passenger comfort. • There are two types of passenger capacity: 50 passengers (within atolls) and 30 passengers (between atolls).
2	Passenger terminal	• Hub and connecting terminals based on actual local usage need. • Maintenance of facilities: Improvements to enhance usage patterns based on current service conditions and user comfort.
3	Service Center - Maintenance Shop - Lifting and lowering facilities equipment (cranes, etc.) - Forklifts, etc.	• Maintenance facility for vessels with maintenance store, lifting and lowering facilities, forklifts, etc. • Workspace to be designed for the safe navigation of vessels, improvement of operational efficiency, and safe execution of maintenance work. • The maintenance shop functions consist of visually inspecting the bottom of the vessel for damage, etc., providing cleaning, painting, maintenances for the propulsion system, and replacements of consumable parts. • Facilities for unloading vessels. • Space-saving and efficient cranes are installed close to the wharf. • Versatile forklift for transporting berths for landing ships, carrying ship's equipment, and moving lifts and berths within the workshop.

Source: JICA Survey Team

(3) Estimated cost of Priority Candidate Projects

The estimated costs of the Priority Candidate Projects are shown in the Table below.

Table 1-7: Estimated Costs of Priority Candidate Projects1-7

(Unit: Millions of yen)

Classification		Equipment / Facilities		Approximate Estimated Unit Price	Project 1		Project 2		Project 3	
					Quantity	Price	Quantity	Price	Quantity	Price
1. Construction / Equipment Costs						1,685		1,669		1,685
	Vessels	F	RTL Ferry	98	8	780	8	780	10	975
		B	Backup Ship	98	3	293	2	195	1	98
	Terminals	HT	Hub Terminal	196	1	196	1	196	1	196
		CT	Connecting Terminal	81			1	81		
		FS	Ferry Stop	24						
	Service Center	JC	Jib Crane	225	1	225	1	225	1	225
		WS	Workshop	191	1	191	1	191	1	191
2. Detailed Design Costs					1	189	1	261	1	189
3. Bidding and Construction Supervision Costs					1	111	1	163	1	111
Total						1,986		2,093		1,986

(4) Project Schedule for Priority Candidate Projects

The project schedule for priority candidate projects is shown in the table below, categorized by Vessel, Hub terminal, and service center.

Table 1-8 Project Schedule

Vessel

	Item	Period (Month)	6	12	18	24	30
1	Detailed design (including the preparation of bidding design drawings)	12					
2	Bidding/Contract Negotiations	2					
3	Contract Authentication	1					
4	Construction of facilities and execution of equipment procurement	12					

Hub Terminal

	Item	Period (Month)	6	12	18	24	30
1	Detailed design (including the preparation of bidding design drawings)	6					
2	Bidding/Contract Negotiations	2					
3	Contract Authentication	1					
4	Construction of facilities and execution of equipment procurement	14					
	- Civil engineering works	3					
	- Construction work	12					
	- Material Procurement	6					

Connecting Terminal

	Item	Period (Month)	6	12	18	24	30
1	Detailed design (including the preparation of bidding design drawings)	6					
2	Bidding/Contract Negotiations	2					
3	Contract Authentication	1					
4	Construction of facilities and execution of equipment procurement	13					
	- Civil engineering works	3					
	- Construction work	11					
	- Material Procurement	6					

Service Center

	Item	Period (Month)	6	12	18	24	30
1	Detailed design (including the preparation of bidding design drawings)	6					
2	Bidding/Contract Negotiations	2					
3	Contract Authentication	1					
4	Construction of facilities and execution of equipment procurement	12					
	- Civil engineering works	3					
	- Construction work	6					
	- Material Procurement	12					

1-7. Issues and Recommendations for Implementation

Issues and recommendations for implementing the priority candidate projects are listed below.

(1) Possibility of RTL Ferry Assistance

The Government of the Maldives is particularly keen on building RTL ferries in preparation for the nationwide rollout of RTL ferry service by the end of 2025. For this reason, they are particularly requesting Japan's expertise in developing the RTL ferries.

Currently, all the vessels involved in the RTL ferry service, are built in the Maldives. Gulf Craft and Al Shaali are already well established and experienced in this field. MTCC, the operator of the vessels, has highlighted several areas for improvement, such as ease of maintenance for safe daily operation and installation of equipment necessary for the safety of passengers and emergency medical care, and has high expectations for Japanese-designed vessels. However, due to recent surge in material and transportation costs and the relative high cost of shipbuilding in Japan, building a ship in Japan is expected to be more expensive than in the Maldives.

To mitigate these costs, it is recommended to design the vessels in Japan with a focus on barrier-free and safety features, use reliable Japanese products for key components, and engage Maldivian shipbuilding companies for the construction.

(2) Expansion of Passenger Terminal Building Functions

Although passenger terminal buildings are essential facilities for RTL ferry service, they are currently suffering from inadequate maintenance. Many users, especially in areas where service has already begun, are requesting prompt improvements. In addition, ferry stops already maintained by MTCC are being considered for transfer to the Island Council due to MTCC's inability to maintain them properly.

In Zone 1, with support from ADB, a terminal building has been developed with certain considerations such as barrier-free accessibility, which contributes to the enhancement of user comfort. However, the passageway connecting the passenger terminal building to the boarding area and the porte-cochere (entrance area) lack roofing and eaves. According to the MTCC site manager, installing roofs and eaves is necessary, given the frequent torrential downpours and the fact that many users travel from rural areas for hospital visits.

In addition, the RTL ferry service operates only during the day, leaving the terminal building unused in the evening. Consideration of measures such as renting out part of the facility to the private sector businesses, such as restaurants, cafes, etc., could generate additional income.

The Maldivian government is promoting the introduction of renewable energy to residents and others, and the MTCA and island councils are supportive of installing solar panels on passenger terminal buildings, which could be considered during the design phase. In addition, with the use of Japanese technology, it is necessary to consider improving durability, reducing environmental impact, and saving energy when planning passenger terminal buildings.

(3) Public Use of Service Centers

RTL ferry services are integral to daily life for residents, making daily maintenance and periodic inspections of the vessels are crucial to safe operations. Currently, simple maintenance tasks are handled by engineers in each zone, while major repairs and routine inspections are carried out at the MTCC dockyard in Male (Thilafushi). Many MTCC staff in zones with active RTL ferry services have already expressed the need for at least one facility in each zone for vessel lifting and lowering, as well as a workshop for simple repairs and spare parts storage.

There are also many private speedboats active on each island, each requiring maintenance. Therefore, it is expected that the lifting and lowering facilities will be used for servicing other small vessels on and around each island, though RTL ferries will have priority. To address potential issues with securing landing sites, it is important to plan for future expandability, taking into consideration both the situation of the construction site of the priority candidate project and its surrounding area.

(4) Expansion of Tourist Use

The RTL ferry service is designed to provide essential public transportation for residents of island communities and does not include connections to resort islands, which are primarily tourist destinations. However, a connection to the airport island, which serves both residents and tourists, is part of the plan.

The Maldives Fifth Tourism Master Plan 2023-2027 (5TMP), developed by the Ministry of Tourism, aims to position the Maldives as the world’s leading sustainable tourism destination. The Maldives was awarded Travel Award's "World Leading Destination" for three consecutive years, including 2022. The tourism industry is expected to grow rapidly over the next five years, supporting the domestic economy significantly. In 2019, just before the COVID-19 pandemic, approximately 1.7 million out of 2 million visitors came for tourism. Although tourist numbers fell to around 560,000 in 2020 due to border closures, they rebounded to about 1.3 million in 2021.

In addition to improving the level of service on the resort islands, etc., The 5TMP strategy includes enhancing services on resort islands and promoting resident islands as new tourist destinations. In connection with this strategy, a dedicated website (island.mv) has been launched to provide information on resident islands.

Currently, RTL ferries are planned to operate with at least one round trip per day from local islands to regional hub islands and atoll capitals, serving as public transportation for resident islanders. However, should the number of foreign tourists increase in the future, it may be necessary to reassess and potentially adjust the number of vessels and the frequency of operations. At present, passengers are allowed to check in one piece of cargo weighing up to 20 kg in addition to their baggage. With a possible rise in international tourism, managing the transportation and storage of luggage such as suitcases could become challenging. To facilitate ticket purchasing for overseas tourists, all boarding tickets are available online through the website or mobile app, with credit card payment options.

(5) Position of RTL Ferries in Domestic Migration

Current domestic transportation in the Maldives includes a range of options: airplanes (both traditional and seaplanes), ships (dhoni ferries, RTL ferries, speedboats), and vehicles (buses, taxis, etc.). Fares vary based on factors such as travel time, transportation capacity, frequency, and convenience.

There are 18 airports across the country, including 6 international ones. While regular air travel routes are generally well-secured, tourists primarily travel from Male (Velana International Airport) to resort islands via seaplane.

Dhoni ferries are used for transporting cargo from Male to various zones and also offer passenger services. Although this mode is time-consuming, it provides an inexpensive alternative for travel between provinces and the capital, Male.

RTL ferries aim to offer essential public transportation services at low fares, supported by government subsidies. The service is being rolled out gradually, with a planned route across zones known as the Highway Link. This initiative focuses on improving access to regional islands within each zone and regional hub islands with atoll capitals. According to MTCA, the goal is to facilitate nationwide travel by connecting ferries, though some details remain unclear. MTCC reports a decrease in dhoni ferry passengers in areas where RTL ferry services have been introduced, indicating a shift towards RTL ferries.

However, some local islands are still reliant on chartered speedboats, leading to relatively high travel costs. In regional hub islands, the lack of public transportation options like buses forces residents to walk or use taxis.

While a comprehensive transportation network has been established, addressing the timely introduction of RTL ferries to terminal regional islands and improving overland movement on base islands remain key issues.

(6) Provide Sustainable RTL Ferry Service

Currently, the government subsidizes RTL ferry services to keep fares low. However, to manage the increasing financial burden associated with expanding the service, the government is considering shifting from a fare system based solely on origin and destination to one based on the boarding route, which would likely result in higher fares.

In areas where RTL ferry services are already operational, users have expressed a need for more cargo capacity, even if it incurs additional fees. However, due to space constraints necessary for timely passenger service, the current allowance (one piece of hand luggage per passenger and up to 20 kg of checked luggage) does not meet this demand.

In addition, RTL ferries are used to transport medical specimens from local island hospitals to regional base hospitals as part of government medical services, and this transport is provided free of charge.

Thus, While the plan is to enhance profitability through fare revisions, major changes are unlikely as subsidized operations will continue for the foreseeable future. Future measures to improve profitability may include: 1) **Differentiated Fares:** Implementing varying fares for residents and other passengers (foreigners, tourists, business travelers, etc.), potentially charging 2-4 times or half of airfares for different

categories., 2) **Seat Classification:** Introducing different seat types, such as business class with 1.5 times more space and fares 3 times higher than standard seats., 3) **Containerized Luggage Services:** Providing containerized (standardized) luggage services such as express mail, small parcels, etc., involves allocating container space on the RTL ferries and installing locker spaces at the terminals for receiving and delivering containers. This should be designed with user convenience in mind, allowing payment through smartphones and enabling easy deposit and retrieval of containers. Additionally, transportation services for containerized cargo should include efficient handling, such as loading and unloading within a limited stop of 5 to 10 minutes. For example, container space should be provided on the RTL ferries, and locker space should be provided at the terminals to facilitate the receipt and delivery of containers.

(7) Strengthening Cooperation with Community Services

One of the main purposes of the RTL ferry service is to facilitate trips to the main hospital in the area. Since outpatients visit the hospital with pre-scheduled appointments, any delays in ferry operations necessitate notifying the hospital and taking appropriate measures. Additionally, if a flight is delayed, passengers may need to stay overnight to catch their return flight.

To address this situation, it is conceivable that streamlining medical service times at hospitals could be achieved by providing real-time information on RTL ferry operations, such as delays, arrival times, and changes in departure schedules, to hospitals and other relevant organizations. Sharing operational information with these parties could help passengers make efficient use of their time until their return flight.

A shuttle bus service between the ferry terminal and destinations such as hospitals would further enhance convenience. However, according to the island council and MTCC, there is currently opposition from local taxi companies and others, making it challenging to implement this service. In Zone 6, an RTL bus stop adjacent to the RTL ferry terminal provides transportation to the downtown area where the hospital is located.

2. Survey Summary

2-1. Background

The Maldives is an island nation consisting of 1,192 islands stretching approximately 1,000 km from north to south, with a population of approximately 520,000 people scattered among 26 atolls, 188 inhabited islands, and other resort islands (Census, 2022). Public ferry service between the regional islands has been developed between some atolls. However, traditional wooden vessels are still largely used, resulting in slow speeds and limited routes. In addition, although private ferry services are operated by individuals and companies, high fares limit transportation options for the general public. Particularly on rural islands, public ferry services are underdeveloped, creating barriers to accessing basic social services such as medical care.

In light of this situation, the Maldivian government, through the Integrated National Public Ferry Network Project (INPFNP), is working to expand an efficient, inexpensive, and convenient public ferry service (RTL ferry service) that connects all 188 inhabited islands in the country. The INPFNP is working to expand the efficient, inexpensive, and convenient public ferry service (RTL ferry service) that connects all 188 inhabited t islands in the country. The project was prioritized in the national plan in 2019, and services have gradually been introduced in four of the six zones since 2021. However, due to the deteriorating financial situation caused by the COVID-19 pandemic and other factors, the initial goal of starting service to all inhabited islands by 2023 has not yet been achieved.

The Maldivian government intends to standardize the specifications to reduce costs and improve brand recognition for the future development of ferries and terminal buildings. In addition, although the terminal buildings on each island, developed with the support of MTCC and ADB, the operators of the RTL ferry service, have taken universal design into consideration to some extent, there is also a need to further promote the usage by a wider range of passengers while ensuring their safety and comfort.

The Maldivian government is also working to reduce the environmental impact of the transportation sector, particularly in the bus sector, and hopes to move away from its dependence on diesel fuel, which is financially and environmentally burdensome, in the medium to long term under the INPFNP.

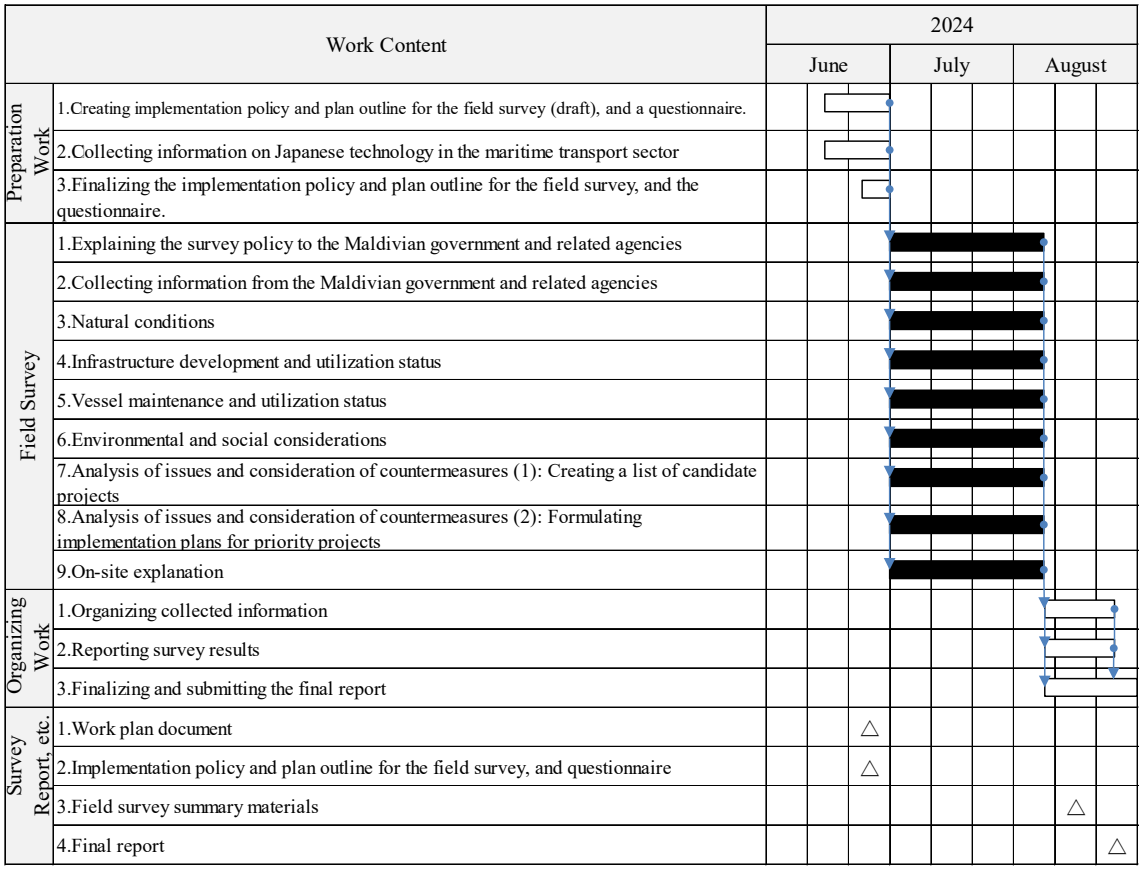
2-2. Objective

The purpose of this survey is to comprehensively understand and analyze the situation of the maritime transport sector as well as the current status of infrastructure and services related to maritime passenger transport, including the INPFNP,

throughout the Maldives. It aims to identify issues, and determine high priority candidate projects that will contribute to strengthening this sector and formulating an implementation plan, considering the possibility of JICA's cooperation, assumed to be based mainly on Grant Aid.

2-3. Survey Process

The process of this survey is shown in the figure below.



2-4. Survey Contents

2-4-1 Preparatory Work (mid-June to late June 2024)

(1) Creating the implementation policy and plan outline for the field survey (draft), and questionnaire

Information was collected and analyzed from existing materials and literature (including research institute materials and JICA reports), providing a summary of maritime transportation in the Maldives as well as the positioning and background of the INPFNP. A draft policy, plan outline and questionnaire for the field survey were prepared, with the intention of presenting the plan to MTCA (Ministry of Transport and Civil Aviation) and relevant agencies at the start of the field survey. The document includes the field survey policy, the survey implementation structure, methodology,

and work plan.

(2) Collecting information on Japanese technology in the marine transport sector

Information on Japanese technologies that can be used to support the maritime transportation sector, including details and estimates, was collected and reviewed during the work period before and after the trip.

As a result of this survey, candidate projects for future JICA's cooperation were proposed. Proposals include the possibility of utilizing Japanese technologies to create value-added products unique to Japan. These technologies are applicable to various areas, including construction methods for vessel and terminal maintenance, improving convenience through the introduction of universal design, and contributing to solving energy issues through green technology and other innovative solutions. In addition, support needs for vessels and terminal maintenance that were presented by the recipient were reviewed, confirming relevant budget and technical details, and other relevant information on Japanese companies and technologies during the work period before and after the trip.

(3) Finalizing the implementation policy and plan outline for the field survey and questionnaire

Based on (1) and (2) above, a policy, plan outline and questionnaire for the field survey were completed.

2-4-2 Field Survey (early July to early August 2024)

(1) Explaining the survey policy to the Maldivian government and related agencies

Based on the policy and plan for the field survey prepared during the aforementioned preparatory work period, we presented the survey policy to the Maldivian government and related agencies, and obtained their approval for the content of the survey.

(2) Collecting information from the Maldivian government and related agencies

Information on the following matters was collected from the aforementioned related organizations and others.

(Contents of information collected)

① The Maldivian government's development plan for the country as a whole and for the Greater Malé Region

② The Maldivian government's policies, regulations, plans, laws and regulations,

budgetary situation, and the latest ministry-by-ministry jurisdiction and authority in the field of maritime transport.

③ Implementation and maintenance systems for current marine transportation services, demand and future demand forecasts, and characteristics and differences for each service (including both public and private).

④ Overview of MTCC (including organizational structure, technical capacities, and financial revenues and expenditures, grant details, size, and projections)

⑤ Data held by the Maldivian government and others (latest socio-economic data, natural condition data related to each maritime transportation infrastructure (waves, tides, water depths, wind, storm surge, climate, etc.), climate change impacts and future projections, disaster risks)

⑥ Laws, regulations, standards, and relevant organizations related to environmental and social considerations of the Maldivian government, and social and natural environmental data relevant to environmental and social considerations (including location of protected areas, coral reef ecosystems, etc.)

⑦ INPFNP's project progress, operational structure, future plans, issues, and budget status

⑧ Detailed specifications, design plans, and issues (including perspectives on gender, universal design, etc.) for INPFNP vessels and terminals

⑨ Overview of the maritime transport services related industries in the Maldives (shipbuilding, terminal maintenance, etc.)

⑩ Data from surveys of related organizations, donors, and past support results, etc.

(3) Natural conditions

Based on the information collected in (2) above, the following items were confirmed through on-site surveys, mainly in areas related to vessel and terminal development that have been identified as requirement by the counterparty.

(Contents of information collected)

① Topography and seafloor conditions, coastal topography

② Water depth

③ Surrounding ground

(4) Infrastructure development and utilization status

Information on the following matters was collected through interviews with related parties and users, on-site inspections, etc.

(Contents of information collected)

① Specifications of INPFNP's terminal (building and berthing facilities) and their suitability for current demand
② Structures around the terminal
③ Detached breakwaters, mooring and navigation facilities
④ Quay conditions near the terminal
⑤ Ferry and land transportation connections
⑥ Status of efforts to improve convenience through gender consideration, universal design, etc., and safety measures
⑦ Terminal operation and maintenance management system, processing capacity (to handle vessels, passengers, cargo volume, etc.)

(5) Vessel maintenance and utilization status

Information on the following matters was collected through interviews with related parties and users, and on-site survey, etc.

(Contents of information collected)

① Suitability of INPNFP vessels for specification requirements
② Public and private ferry operations and usage situation
③ Cargo transportation status (distinction between cargo and passenger vessels, volume of cargo transportation at passenger terminals and impact of cargo transport maintenance status on ferry service users)
④ Collection of information and interviews with local residents regarding changes in benefits and issues before and after the introduction of INPFNP
⑤ Status of efforts to improve convenience through gender consideration, universal design, etc., and safety measures
⑥ Fuel supply points and fuel usage situation

(6) Environmental and social considerations

Based on the information on environmental and social considerations collected in (2) above, we clarify the environmental and social considerations to be taken into account for the candidate projects.

(7) Analysis of issues and consideration of countermeasures (1) (Creating a list of candidate projects)

Based on the results of the above study, JICA's cooperation policy and candidate projects in the field of maritime transport in the Maldives (mainly assuming grant aid), and recommendations for projects that should be prioritized (priority projects). The selection criteria used for considering candidate projects are listed in the table below.

The estimated project cost, consideration for operation and maintenance, environmental and social considerations, and risks based on the financial situation of the project sponsor are also included for each candidate project. The estimated project cost is based on previous grant aid scales provided to the Maldives, with the cost including transportation expenses if shipbuilding and equipment manufacturing occur in Japan.

(Candidate Selection Criteria)

Classification.	Selection Criteria	Concrete Example
Project effect	(① Benefit effects (direct beneficiaries)	Number of beneficiaries and development effects, such as reduced travel costs for users. Increased tourism opportunities and increased tax revenues
	② Urgency of the project	Reduction of regional disparities (income by region.) and support for socially vulnerable groups
	③ Effects on the environment	Emissions reduction
Ripple effect	④ Contribution to the lives of residents	Formation of a stable and secure living environment and increased visibility
	⑤ Impact on the local economy	Expansion of employment and income in the tourism industry and promotion of the maritime industry
	⑥ Contribution to local communities	Improved access to basic social services, such as education and healthcare
Implementation environment	⑦ Feasibility of the project	Local needs, stakeholder consent, and environmental and social considerations
	⑧ Viability of the project	Size of the project, relevance to higher-level plans, and relevance to other projects
Japan's cooperation in Necessity/effectiveness	Comparative advantage of Japanese technology and knowledge Benefits for Japanese companies, etc.	
Improvement in presences through Japan's cooperation	Providing high quality infrastructure through the use of Japanese technology Contributing to the development of a domestic passenger transportation network that is the lifeline of people's lives	

(8) Analysis of issues and study of countermeasures (2) (formulating implementation plans for priority projects)

Based on the list of candidate projects and the selection criteria, we identified the priority projects (at least 3 projects) and developed an implementation plan after consultation with the client.

(Organizational items in the implementation plan)

- Project Schedule
- Estimated project cost
- Information on locally available materials, equipment, and vendors
- Ownership of subject land
- Specific application of Japanese technology
- Specifications of natural conditions, land survey required for project implementation.

• Environmental and social considerations and gender equality

(9) On-site explanation

The above information was compiled into a summary report (in Japanese and English) of the field survey results, and the survey results were reported to the counterpart government.

2-4-3 Organizing Work (mid- to late-August 2024)

(1) Organizing collected information

(2) Reporting survey results

(3) Finalizing and submitting final report

2-5. Work Flowchart

The work flowchart for this study is shown in Figure 2-1.Figure 2-1 Work Flowchart2-1

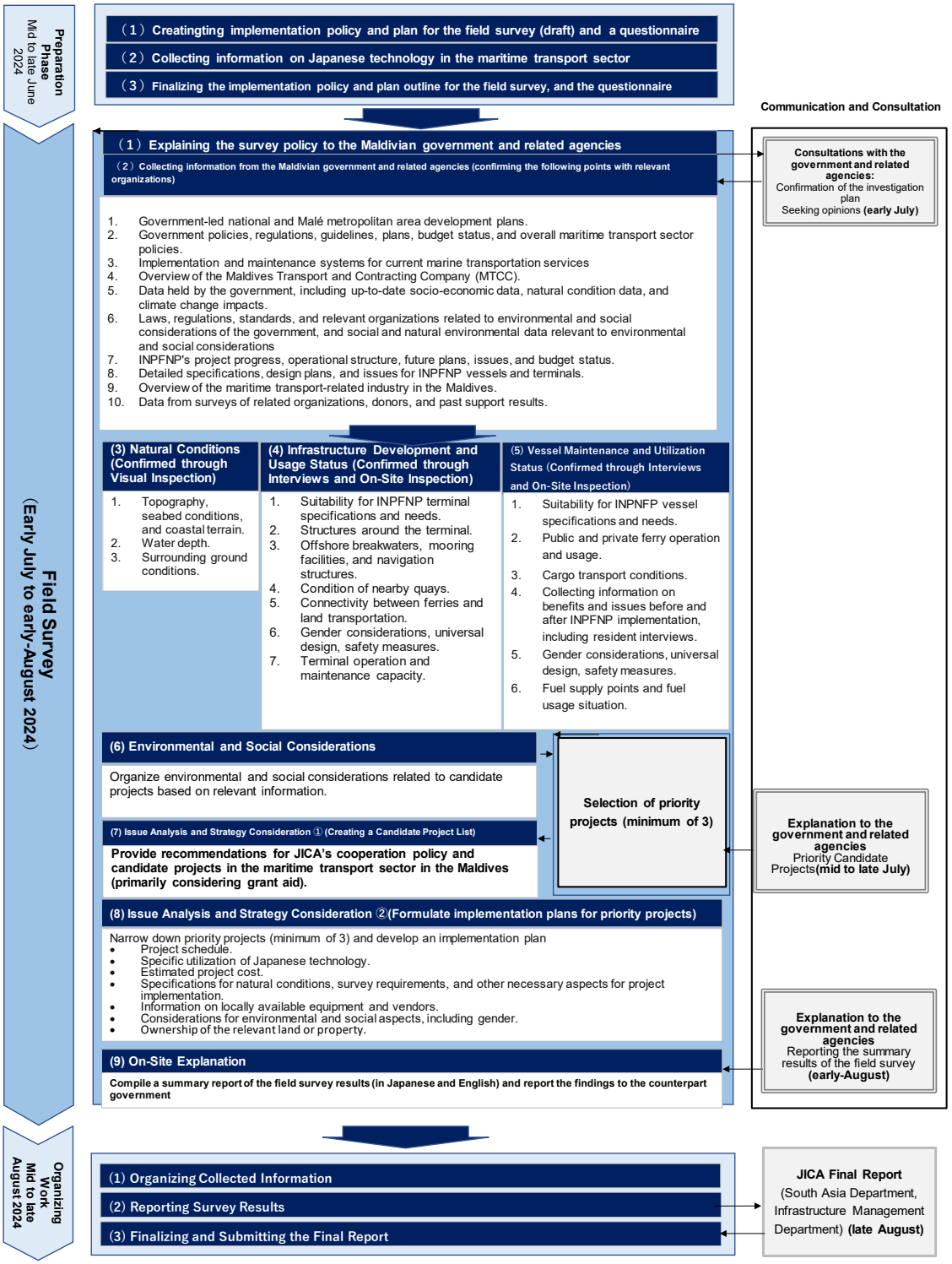


Figure 2-1 Work Flowchart2-1

2-6. Key Interviewees

(1) Embassy of Japan in Maldives

No.	Name	Affiliation / Position
1	Midori Takeuchi	Ambassador Extraordinary and Plenipotentiary
2	Shuto Fukuoka	Second Secretary (Economic and Development Cooperation)

(2) JICA Maldives Office

No.	Name	Affiliation / Position
1	Motoo Taki	Resident Representative
2	Hideyuki Yamasaki	Project Formulation Adviser

(3) Ministry of Transport and Civil Aviation (MTCA)

No.	Name	Affiliation / Position
1	Mohamed Ameen	Minister
2	Abdul Latheef Mohamed	State Minister
3	Ibraham Yasir	Deputy Minister
4	Ahmed Shameem	Director General
5	Rugiyya Nubla Nafiu	Project Officer
6	Zeeniya Riyaz	Portfolio Officer
7	Maldha Majidh	Legal Associate
8	Arif Rajheed	Financial Specialist
9	Mariyam Shahana	-
10	Zeeniya Rmaz	-

(4) Ministry of Foreign Affairs (MoF)

No.	Name	Affiliation / Position
1	Mohamed Shujau	Assistant Director
2	Hussain Niyaaz	Secretary

(5) Ministry of Cities and Local Government and Public Works (MoCLGPW)

No.	Name	Affiliation / Position
1	Adam Shareef Umar	Minister
2	Ahmed Rasheed	State Minister
3	Yamin Abdul Wahhab	Deputy Minister

(6) Ministry of Construction and Infrastructure (MCI)

No.	Name	Affiliation / Position
1	Mohamed Riyaz	Project Coordinator
2	Asrar	Project Engineer
3	Sayyaf Ahmed Ashraf	Engineer

(7) Environmental Protection Agency (EPA)

No.	Name	Affiliation / Position
1	Nashwa Ahmed Manik	Assistant Director
2	Safa Ahmed	Assistant Director
3	Aminath Yamanee Shareef	Assistant Environment Officer

(8) Ministry of Health (MoH)

No.	Name	Affiliation / Position
1	Mohamed Meezen	Director General
2	Hussain Rihshaan Mohamed	-
3	Khathuma Abdula	-

(9) Maldives Transport and Contracting Company (MTCC)

1) MTCC HQ (Zone 3)

No.	Name	Affiliation / Position
1	Ahmed Zameer	General Manager
2	Abdulla Farish Hossain	Department Manager
3	Zaid Amjad	Assistant General Manager
4	Zain Waleed	Engineering Manager

2) MTCC Kulhudhuffushi (Zone 1)

No.	Name	Affiliation / Position
1	Ahmed Jinah	Senior Manager
2	Ashraf Hussain	
3	Hassaan Abdul Sattar	Manager
4	Azzam Abdulla	Administrative Officer

3) MTCC Funadhoo (Zone 1)

No.	Name	Affiliation / Position
1	Ashraf Hussain	
2	Mohamed Waheed	-

4) MTCC Gan (Zone 4)

No.	Name	Affiliation / Position
1	Mohamed Faio	Customer Relation Officer
2	Mohamed Maahil Abdolla	Customer Relation Officer
3	Hussain Ramerz	Supervisor

5) MTCC Thinadhoo (Zone 5)

No.	Name	Affiliation / Position
1	Ibrahim Abdul Hayyu	Manager
2	Ibrahim Mohamed	Senior Operations Coordinator
3	Aminath Afsheena	Administrative assistant
4	Asma Afeef	Administrative officer

6) MTCC Vilingili (Zone 5)

No.	Name	Affiliation / Position
1	Hussain Hamed	Customer relation Officer
2	Ahmed Shuau Shameem	Assistant customer relation Officer

7) MTCC Feydhoo (Zone 6)

No.	Name	Affiliation / Position
1	Ahmed Nabeel	-
2	Hussain Rasheed	-
3	Mohamed Naeem	-
4	Hussain Zhad	-
5	Mohamed Saud	-
6	Ali Alim	-

(10) Island Council

1) Kulhuduffushi City Council (Zone 1)

No.	Name	Affiliation / Position
1	Ali Ahmed	Deputy Mayor
2	Adam Mohamed	Engineer
3	Ahmed Emaan	-

2) Funadohoo Council (Zone 1)

No.	Name	Affiliation / Position
1	Ahmed Ibrahim Fullui	President
2	Ali Khalid	Vice President
3	Aminath Yumna	Council Member
4	Zulfa Hamid	Council Member
5	Hussain Areif	Council Member

3) Manadhoo Council (Zone 2)

No.	Name	Affiliation / Position
1	Abdulrahman Sabyh	President
2	Ahmed Rimzad	Mayor
3	Wasma Yoosuf	Executive
4	Moomina Solih	Officer
5	Ibrahim Ali	Officer
6	Azza Abdul Ghafoor	Officer

4) Ungoofaru Council (Zone 2)

No.	Name	Affiliation / Position
1	Yosshau Naseem	Vice President
2	Mohamed Waseem	Council Affairs
3	Nazeera Rasheed	-
4	Abdulla Rasheed	-
5	Niha Hussain	-

5) an Council (Zone 4)

No.	Name	Affiliation / Position
1	Ahmed Zaky	Council President
2	Hussain Moosn	Secretary General
3	Mohamed Ahmed	Legal Officer
4	Afsal Jaufar	Council Member
5	Abdulla Shuaau	Councilor

6) Veymando Council (Zone 4)

No.	Name	Affiliation / Position
1	Faisal Yoones	Council Vice President
2	Siyadha Ali	Secretary General
3	Nabila Ahmed	Council Member
4	Thaha Meehaar Mohamed	Council Member

7) Thinadhoo Island Council (Zone 5)

No.	Name	Affiliation / Position
1	Saudu Ali	Mayor
2	Mohamed Shareef	Secretary General
3	Ahmed Nashid	Council excutive
4	Ibrahim Ali	Council excutive
5	Hassan Rasheed	Assistant Council excutive
6	Aminath Naseema	C.M.

8) Vilingili Island Council (Zone 5)

No.	Name	Affiliation / Position
1	Vishal Mohamed	Council Presient
2	Ibrahim Hackim	Council executive
3	Mugeeth Mohamed	Council Excecutive
4	Madhaniyya Naseer	Senior Council Officer
5	Mohamed Auzamm	Council Officer
6	Azeema	Council Officer
7	Shaheehc Hassan	Council Member
8	Zainudheen Mohamed	Council Member
9	Ibrahim Rasheed	Council Member
10	Sheeba Ahmed	Council Member

9) Addu Council (Zone 6)

No.	Name	Affiliation / Position
1	Ali Nizar	Mayor
2	Ahmed Saeed	Councilor
3	Mariyam Azleema	Council Executive
4	Aminath Nuzuha	Council Officer (Projects)
5	Acp onliner	-

(11) Al Shaali Marine Maldives Pvt ltd (Zone 3)

No.	Name	Affiliation / Position
1	Ismail Shareef	General Manager

(12) Maldives Ports Limited (MPL) (Zone 3)

No.	Name	Affiliation / Position
1	Hassan Muzni Mohamed	Chief Commercial Officer
2	Ahmed Inaan	Chief Techinical Officer
3	Hussain Naeem	Port Consultant

(13) Hithadhoo port Limited, Addu (Zone 6)

No.	Name	Affiliation / Position
1	Hussain Nizam	COO
2	Jeneeh Rasheed	COO
3	Pholhath Jalee	COC
4	Mariyam Zaaiar Naseer	Assistant executive
5	Cape-Hassan Xauio	-

(14) Vilingili Hospital (Zone 5)

No.	Name	Affiliation / Position
1	Fathimath Nashtha	Assistant Director
2	Ali Shameem	Manager
3	Fathmath Nattasha	Admin Officer
4	Shinae Ahmed	HR Officer
5	Aroom Ibrahim	ACCT- Customer corner

3. Current Status of Maldivian Maritime Transportation in General

3-1. Maldives Development Plan

3-1-1 National Spatial Development Plan

The National Spatial Development Plan 2020-2030 (NSP) aims to improve the management and allocation of resources for comprehensive and sustainable regional development. It serves as the foundation for the country's future plans, including those for regional, island, local development, and urban areas. The main components of the NSP are as follows:

- Urban Development: Enhance urban infrastructure and services to improve living standards and support economic growth.
- Environmental Sustainability: Protect natural resources and promote sustainable practices to mitigate the effects of climate change.
- Diversification of the economy: Encourage the development of various sectors, such as fisheries and agriculture, as well as tourism, to create a more resilient economy.
- Social Development: Improve access to education, health care, and social services to ensure equitable development across all regions.

3-1-2 Related Plans

(1) Greater Male Connectivity Project (GMCP):

The project involves the construction of 6.74 km long bridge and road connecting the capital, Male, with the adjacent islands of Villingili, Gulhifalhu, and Thilafushi. Construction was initially planned to begin in August 2022, with Phase 1, extending to Villingili Island, expected to be completed in 2023 and the entire project by 2026. However, the construction of the piers for phase 1 is underway, and the overall project completion is also expected to be delayed. The Government of India has provided a grant of $100 million and a loan of $400 million for this project.

Source: Indian Ministry of External Affairs

Figure 3-1 Greater Male Connectivity Project-1

(2) Expansion of Velana International Airport

To accommodate the growing number of tourists, the expansion of Velana International Airport began in 2016 with the goal of handling 7.5 million passengers per year by 2030. The expansion involves progressive development of the runway, passenger terminal, and cargo facilities, with completion scheduled for 2025. In addition, the Saudi Fund for Development (SFD) is financing this expansion project for $100 million.

(3) Thilafushi Port Development

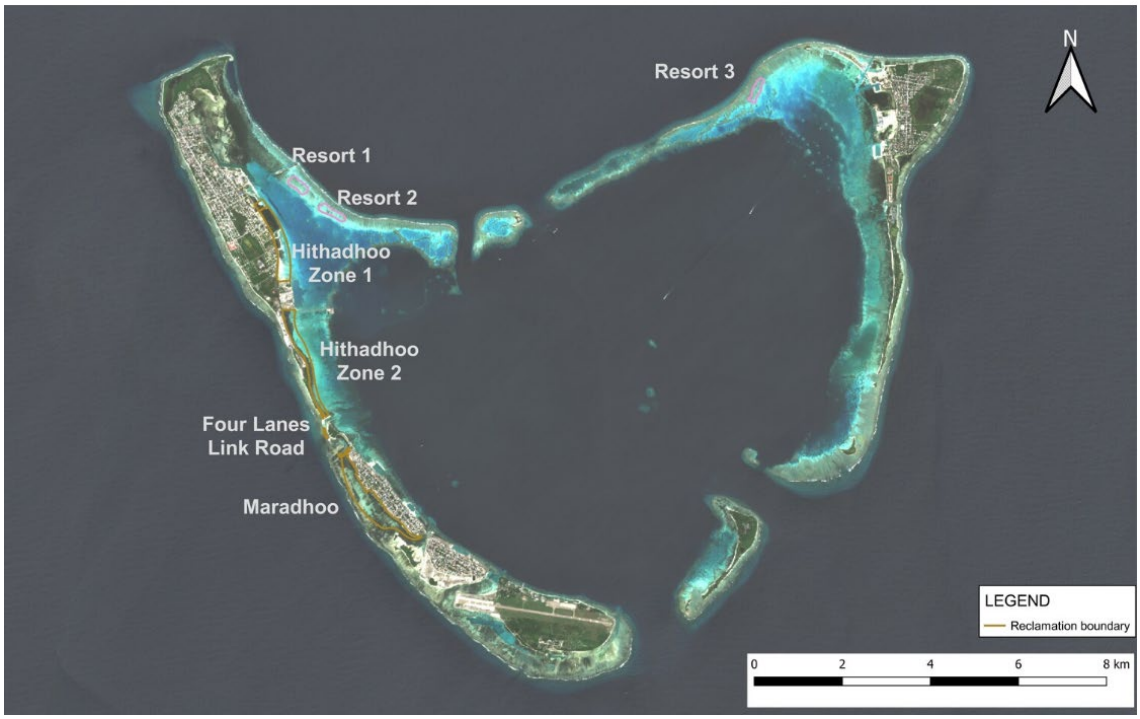
In December 2023, the Maldivian government announced plans to relocate the container functions of the port of Male, which handles foreign trade, to Thilafushi Island. The project is currently seeking investors to explore options for proceeding with the project on either a contractor-financed basis or through a joint venture model with Maldives Ports Limited (MPL). Furthermore, although no formal decision has been made on the use of the current port of Male, it is expected that commercial, residential, and recreational zones will be established to improve the lives of the residents of Male Island.

(4) Hulhumale Island Development Project

To alleviate congestion in Male, residential, commercial, and recreational development projects (homes, schools, hospitals, parks, etc.) are underway on Hulhumale Island. Hulhumale Island Development Project is also financed by the Saudi Fund for Development (SFD) for $80 million.

(5) Addu Development Project

The Addu city reclamation Project is aiming to create approximately 190 hectares of land for coastal protection and residential, commercial, and industrial development. Specifics include: (1) land development of 76 hectares in Maradhoo and 90 hectares in Zone 1 and Zone 2 in Hithadhoo, (2) land development of 3.3 hectares for a four-lane connecting road, and (3) creation of three island resorts covering an area of 8.3 hectares.



Source: Addu Development Project HP

Figure 3-2 Overview of the Addu Development Project-2

3-2. Status of Policies Related to Maritime Passenger Transport

3-2-1 RTL Ferry Service Introduction Trends

Through the Integrated National Public Ferry Network Project (INPFNP), the Maldivian government is working to expand an efficient, affordable, and convenient public ferry service (RTL ferry service) that connects all 188 inhabited islands in the country. However, due to deteriorating financial conditions caused by the COVID-19 pandemic, the Ministry of Transport and Civil Aviation ("MTCA"), responsible for the RTL ferry service, and Maldives Transport and Contracting Company ("MTCC"), the operator of the RTL ferry, have not been able to start service to all the inhabited islands by 2023, as initially targeted. In response to this situation, the Maldivian government has requested support from the Japanese government for vessels and passenger terminal buildings to be used for the RTL ferry service.

The introduction of the RTL ferry service is planned from both the north and south ends of the country toward the capital city of Male, located in the center of the country. As Phase 1, service was initiated in Zone 1 in the north in 2022, and as Phase 2, in Zones 5 and 6 in the south in 2023. Service was also launched in Zone 2, Lhaviyani Atoll, earlier in 2022, followed by Noonu Atoll in 2024.

The Maldivian government is now targeting to start providing services in parts of Zone 2 (Raa and Baa Atolls) that have not yet been implemented in Phase 2, Zone 4 and Zone 3 in Phase 3 by 2025.

Table 3-1 RTL Ferry Service Operations Status1

Phase	Zone	Atoll		Operation	RTL Ferry			Backup			2022				2023				2024				2025			
					P	E	R	P	E	R	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q	1Q	2Q	3Q	4Q
Phase 1	Zone 1	HA	Haa Alifu	2022/07/03~	5	5	0	3	3	0																
		HDh	Haa Dhaalu	2022/06/12~	4	4	0																			
		Sh	Shaviyani	2022/09/06~	5	5	0																			
Phase 2	Zone 5	GDh	Gaaf Dhaalu	2023/07/20~	5	6	-3	2	2	0																
		GA	Gaaf Alif	2023/07/20~	4																					
	Zone 6	Gn	Gnaviyani	2023/10/08~	1	1	0	1	1	0																
		S	Seenu	2023/10/08~	1	1	0																			
	Zone 2	N	Noonu	2024/7/25~	4	2	-2	3	0	-3																
		R	Raa	Late 2024	4	0	-4																			
		B	Baa	Late 2024	4	0	-4																			
		Lh	Lhaviyani	2022/12/11~	2	2	0																			
Phase 3	Zone 4	M	Meemu	2025	3	0	-3	3	0	-3																
		F	Faafu	2025	2	0	-2																			
		Dh	Dhaalu	2025	3	0	-3																			
		Th	Thaa	2025	3	0	-3																			
		L	Laamu	2025	3	0	-3																			
	Zone 3	K	Kaafu	2025	4	0	-4	3	0	-3																
		AA	Alif Alif	2025	4	0	-4																			
		Adh	Alif Dhaalu	2025	4	0	-4																			
		V	Vaavu	2025	2	0	-2																			
Total					67	26	-41	15	6	-9																

*P: planned vessels, E: deployed vessels, R: not deployed vessels
* The green hatches in the table indicate the assumed timing of vessel launch.
Source: Prepared by JICA Survey Team from MTCA data.

3-2-2 RTL Ferry Service Implementation Structure

The RTL ferry service is operated by a steering committee, including the MTCA, which has full authority to determines the schedule, routes, fares.

MTCC, contracted by the steering committee to operate the RTL ferry service, is responsible for running the service as the operator. Although the initial contract requires MTCC to invest in the vessels and passenger terminal buildings with its own funds and provide the service, the company does not have the authority to alter the schedule, routes, or fares. The difference between fares and operating costs is planned to be covered by government subsidies.

Table 3-2 RTL Ferry Service Implementation Structure-2

Steering committee		Operator
1 President Office	sailing instructions →	MTCC
2 Ministry of Finance (MoF)	subsidiary	
3 Ministry of Housing, Land and Urban Development (MHLUD)		
4 Ministry of Economic Development and Trade (MoEDT)		
5 Local Government Authority (LGA)	← subsidiary application	
6 Ministry of Transport and Civil Aviation (MTCA)		

Source: Prepared by JICA Survey Team from MTCA data.

3-2-3 Budget Status of RTL Ferry Service

Subsidies for RTL ferry operations are funded from the Public Sector Investment Program (PSIP) budget and have been increasing as the service expands. Therefore, the steering committee is considering revising the fares based on the actual operations to date in order to reduce the total subsidy. Furthermore, due to MTCC's financial difficulties in procuring RTL ferries, a separate loan from the PSIP budget has been provided to MTCC for their procurement.

MTCC has selected and signed a contract with Al Shaali for the procurement of the remaining 65 vessels for Phase 2 and Phase 3 of the RTL ferry project. The contract involves instructing and paying for the construction of the vessels in batches. Currently, 10 vessels from the first batch have been built, but the contract has been temporarily suspended due to MTCC's deteriorating financial situation.

3-3. Marine Transportation Services

3-3-1 Maldives Marine Transportation Services

Dhoni, ferries, and speedboats have been widely used for transportation between atolls and islands in the Maldives. The characteristics of the use of each vessel are shown below.

Table 3-3 Main Small Passenger Vessels Operating in the Maldives

Vessel Type	Feature	Remarks
Dhoni	It is mainly used for passenger and cargo transport between atolls. Inexpensive but slow sailing speed.	Freight transportation (small)
Ferry (private) Cargo and passenger vessels (private)	Cargo transportation is the main business. Inferior to the regular schedule due to freight priority.	Cargo transportation volume (medium) to large)
Speedboat	They are used for transportation from the airport to the resort islands and for inter-island transfers of tourists. It is very expensive and is mainly used by tourists.	No cargo transportation Residents also use them for emergency (urgent care) transportation.
Lifeboat	They are used to transport containerized cargo imported at Male to the provinces.	

The RTL ferry is a project promoted by the Maldivian government aimed at providing a fast, reliable, efficient, and affordable public transportation network connecting the entire country. While dhoni and ferry vessels are also used for cargo transport, their primary purpose differs from that of the RTL ferries, which are designed for fast inter-island travel for residents. However, there is some competition for passengers between these transportation options.

Dhoni

Ferry (private)

Source: JICA Survey Team

Figure 3-3 Major Small Passenger Vessels Operating in the Maldives

3-3-2 Service Operation Structure

The RTL ferry service launched in 2022 as part of Integrated National Public Ferry Network Project (INPFNP), operates on routes depicted in Figure 3-5~Figure 3-7.

MTCC (Maldives Transportation and Contracting Company) provides a comprehensive range of marine transportation services, including vessel operation and maintenance. Specific details of service implementation are as follows:

(1) Onboard Operations

Basically, each vessel is operated by a captain, a co-captain, and one crew member.

(2) Land Operations

On land, three customer service representatives assist with operational support, including takeoff and landing. The captain and crew also provide passenger guidance and manage cargo loading into the designated cargo space.

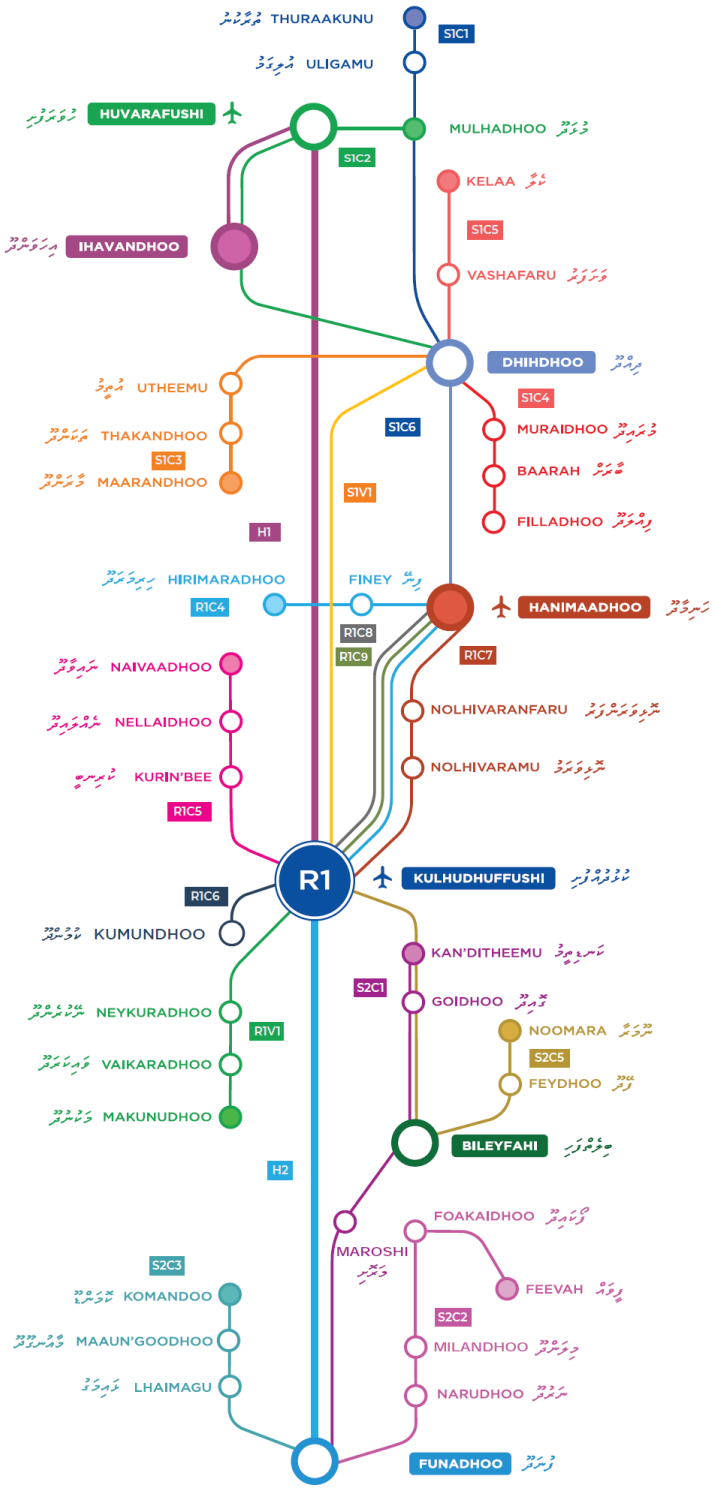
Source: JICA Survey Team

Figure 3-4 Onshore Operations3

(3) Sales operations

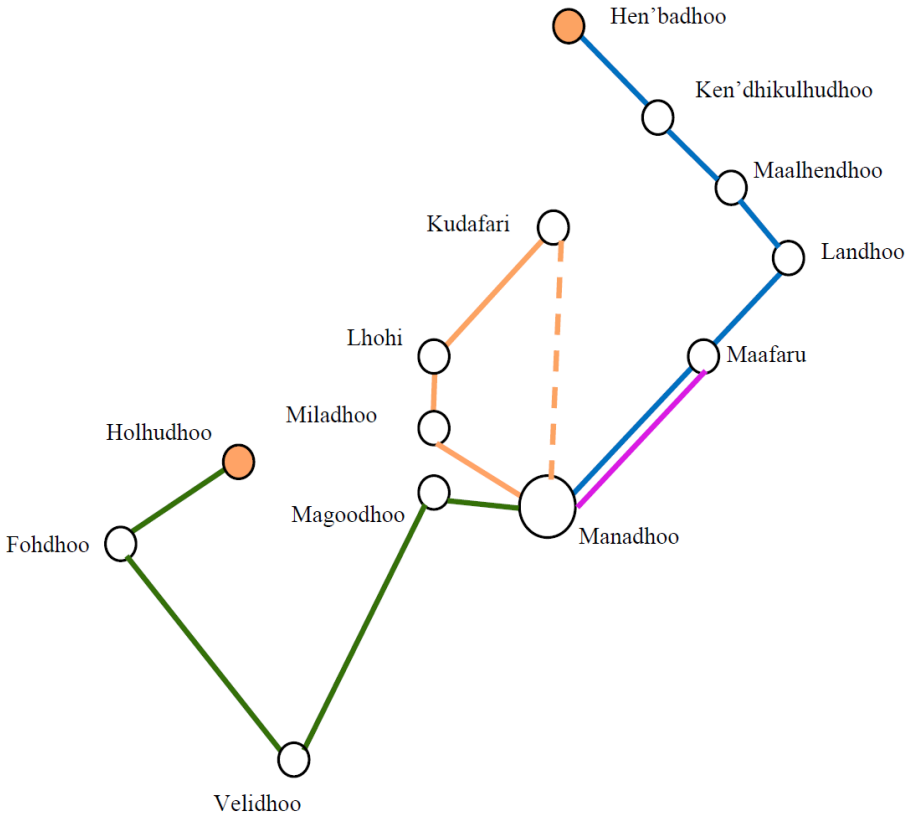
Ticket sales are only available through MTCC's website and app. Passengers can purchase tickets for themselves as well as for family members and others.

MTCC staff are responsible for checking tickets as passengers board the vessel.



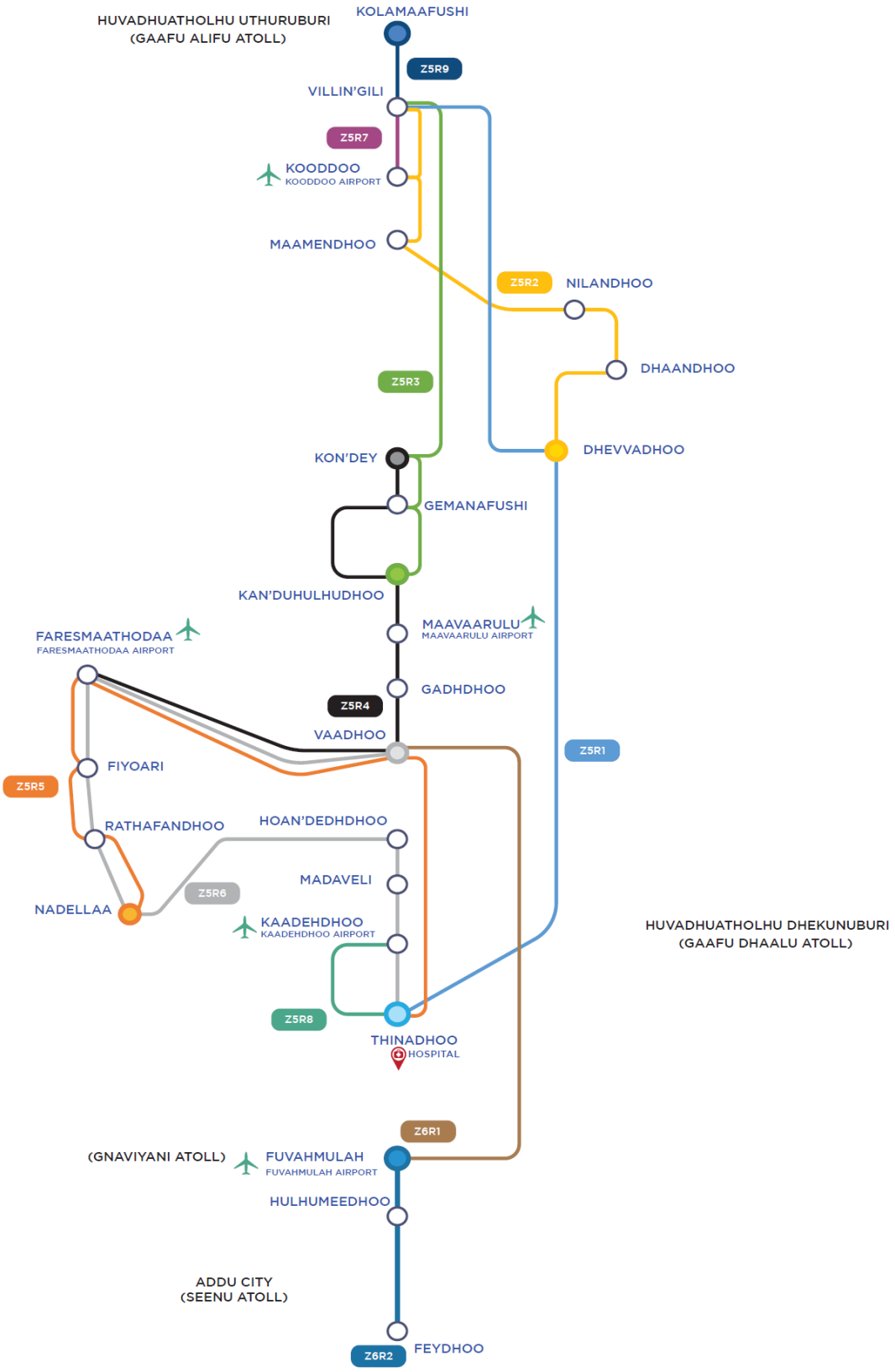
Source: Materials provided by MTCC

Figure 3-5 RTL Ferry Routes (Zone 1)-4



Source: Materials provided by MTCC

Figure 3-6 RTL Ferry Routes (Zone 2)-5

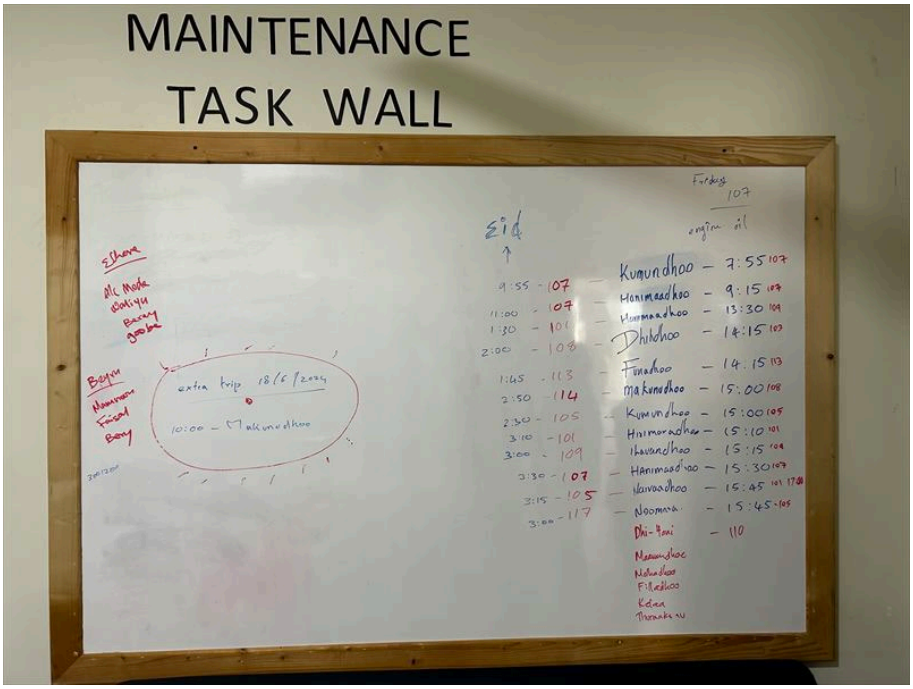


Source: Materials provided by MTCC

Figure 3-7 RTL Ferry Routes (Zones 5 and 6)-6

(4) Maintenance and Management System

The maintenance of the RTL ferries and terminals fall under the responsibility of MTCC, the operator. Basically, daily inspections and light maintenance are conducted by technical staff stationed at the hub terminal where vessels operating on the route are concentrated.



Source: JICA Survey Team

Figure 3-8 Maintenance Task Wall-7

(5) Daily inspections, minor repairs (Hub Terminals)

Every day before sailing, the technical staff perform an inspection based on a checklist and report the results to the captain. The timing of weekly inspections and engine oil changes are also determined according to regulations within MTCC to ensure effective safety management.

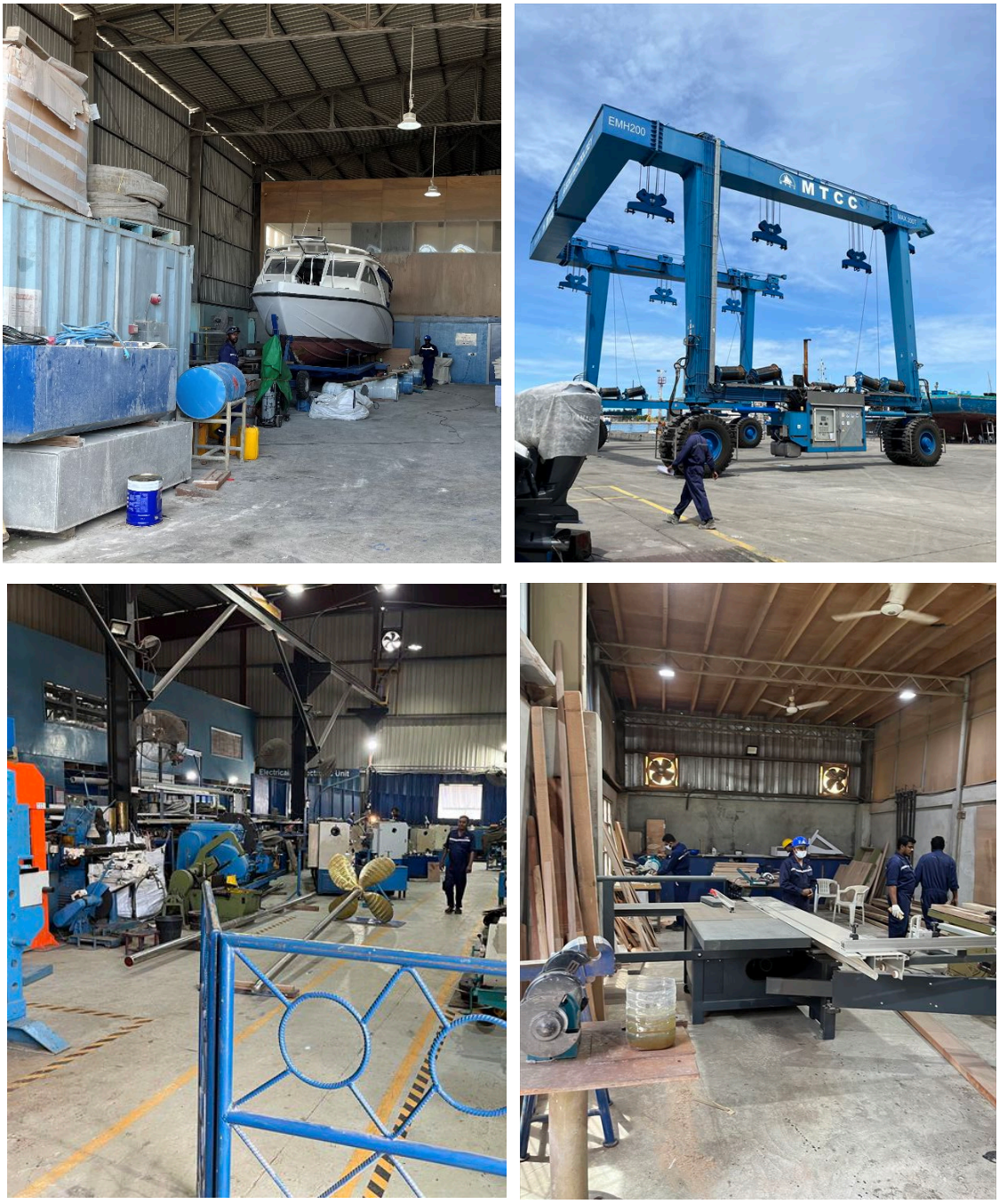
Currently, six maintenance staff (three ship mechanics, one HVAC technician, and two electricians) are assigned to Zone 1, as well as Zones 5 and 6, where RTL ferries operate. This staffing level is deemed insufficient, and for Zones 5 and 6, technical staff are flexibly assigned to ensure safe navigation.

Source: JICA Survey Team

Figure 3-9 Vessel Inspection Status (Kulhudhuffushi)-8

(6) Overhaul and heavy repair (MTCC Shipyard)

The MTCC shipyard utilizes slipways and boat cranes to land vessels and offers a range of engineering services, including welding, painting, electrical and mechanical processing, FRP processing, and woodworking. Overhauls and heavy repairs requiring RTL ferries to be landed are conducted at the MTCC shipyard in Thilafushi. Moreover, periodic inspections are performed at the Thilafushi dry docks every 18 months (approximately 3,000 hours of use). For this reason, the shipyard in Thilafushi is staffed by engineers from various fields, including marine engineers, mechanics and electrical engineers. The field survey also confirmed that many vessels undergo maintenance at these docks, and that guidance and training of technicians is provided through actual work.



Source: JICA Survey Team

Figure 3-10 Inside the MTCC shipyard (Thilafushi)-9

(7) Demand Forecast

It is unclear from the planning documents for the RTL ferry service whether the projected future passenger demand was considered. However, the MTCA annually obtains documents regarding MTCC's projected demand for the following year. MTCC's demand forecast for the following year is calculated based on actual passenger patterns, as shown in Table 3-3. Therefore, future demand in areas where RTL ferry service is to be introduced remains uncertain.

MTCC estimates the growth rate of passenger demand from 2023 to 2024 as follows: a daily average increase of 5% per year for Zone 1, 1% per year for Zone 5, and 2% per year for Zone 6.

Table 3-4 Passenger Demand Forecast Results-3

	2023 Actual Results		2024 Projected Value		Growth Rate	
	Daily Average	Number of Passengers	Daily Average	Number of Passengers	Daily Average	Number of Passengers
Zone 1	985	359,489	1,034	377,463	4.97%	5.00%
Zone 2	61	24,555	64	25,783	4.92%	5.00%
Zone 5	311	48,218	314	114,681	0.96%	137.84%
Zone 6	136	5,589	139	50,751	2.21%	808.05%
Total		437,851		568,678		29.88%

Source: Prepared by JICA Survey Team from MTCA data.

3-4. MTCC Overview

3-4-1 Organizational Structure and Personnel

(1) Organizational Structure and Personnel

As of December 31, 2023, MTCC employs a total of 4,507 staff members. The organizational structure is detailed in Figure 3-11.

The employees composition includes 47.1% Maldivian nationals, 28.2% Indian nationals, 18.9% Bangladeshi nationals, 5.5% Sri Lankan nationals, and 0.2% other nationalities.

Source: MTCC data

Figure 3-11 MTCC Organizational Structure-10

(2) Shareholder Composition

MTCC, established in 1980 as the first publicly traded company in the Maldives, is 64.2% owned by the Maldivian government. As of December 2023, the company has a total number of 8,037,749 shares.

Table 3-5 Current Stock Details (December 31, 2023)-4

Type	Name	Percentage
Government	Government of Maldives	64.2%
Public	General public	31.15%
State-run business	Maldives National Shipping Limited (NSL)	4.65%

Source: MTCC Annual Report

3-4-2 Main Business Fields

MTCC's main business areas are listed below.

(1) Construction and Dredging

MTCC provides comprehensive infrastructure development services (both government and private). Their services include dredging, reclamation, coastal protection, port and airport construction, building and road construction, water and wastewater management, electrification, surveying, environmental consulting, and architectural design.

(2) Trading (sales of marine equipment)

MTCC also engages in the trading of marine equipment, offering a range of products including outboard motors, GENSETS, steering systems, and high-quality marine accessories. Their current product lines feature Yanmar inboard engines, Suzuki outboard engines, Castrol lubricants, PPG protective coatings, Scott Bader fiber composites, Donaldson filters, and Marol steering systems.

(3) Transportation Services

It provides comprehensive transportation services (passenger and cargo) within the Maldives.

Marine transportation serves the majority of inhabited islands through the RTL ferry network, along with private ferry and speedboat services. For land transportation, MTCC operates RTL buses in the Greater Male region, Addu, Fuvahmulah, Kulhudhuffushi, Gan, and other major regions.

(4) Shipbuilding and Repair

The shipbuilding and repair department is based at the Thilafushi shipyard, which has the capacity to accommodate up to 20 vessels. The facility is fully equipped with a 200-ton boat hoist and offers a wide range of services, including welding, metal processing, painting, engine installation, overhaul, gear repair, and GENSET maintenance.

(5) Fiscal Balance

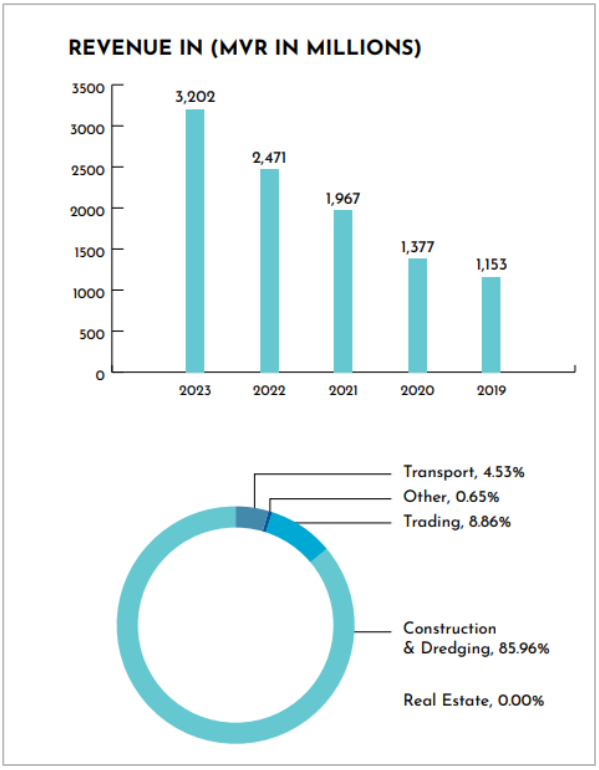
1) Revenues

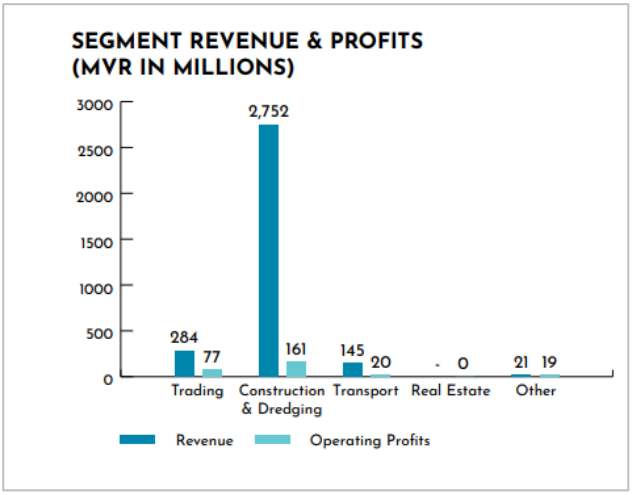
MTCC's sales in 2023 reached MVR 3,202 million, making a significant 30% increase compared to the previous year. The growth is primarily driven by significant expansion in the construction and dredging segments. However, revenues from the transportation sector accounted for less than 5% of the total, at MVR 145 million.

- Construction and dredging: MVR 2,752 million (2022: MVR 2,039 million)
- Trading: MVR 284 million (2022: MVR 297 million)

- Transportation: MVR 145 million (2022: MVR 110 million)
- Real estate segment: No revenues (2022: None)
- Other: MVR 21 million (2022: 24 million)

The transportation division's operating income in 2023 was MVR 20 million, making it the smallest contributor among the major divisions.



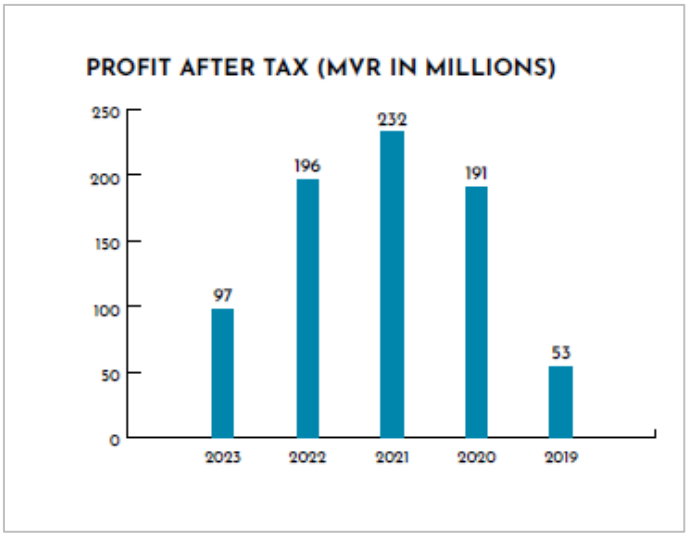


Source: MTCC 2023 Annual Report

Figure 3-12 Revenue and Operating Income in FY2023-11

2) Net income

The Maldives Transportation and Contracting Company (MTCC) reported a profit after tax (PAT) of MVR 97 million for the fiscal year 2023, a 50% decrease from the previous year. This decrease is primarily attributed to higher provisions and increased financing costs in 2023.



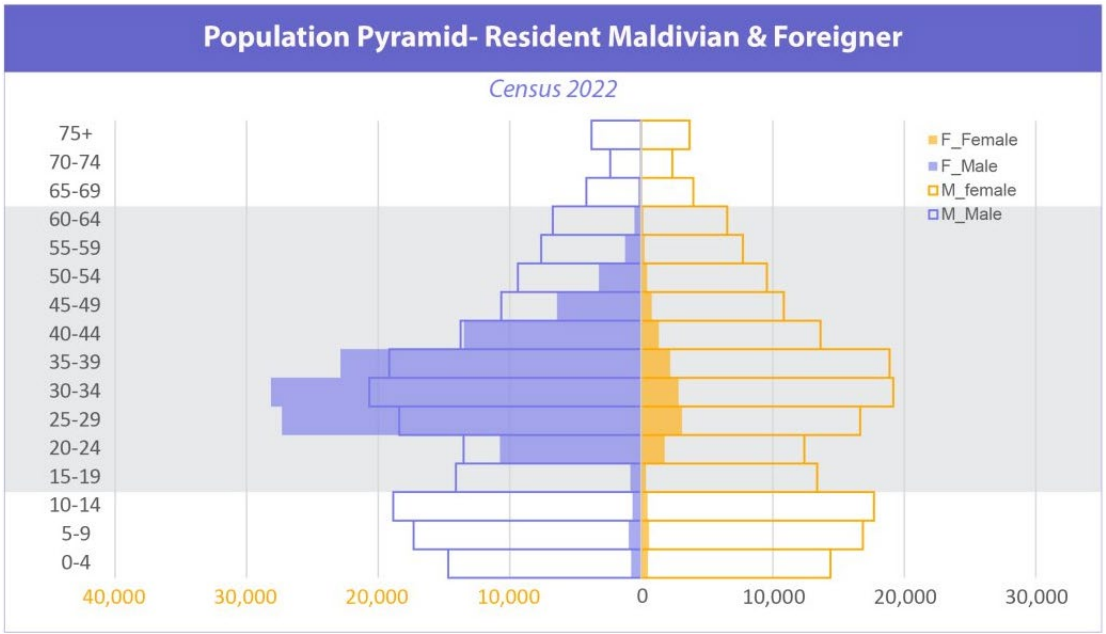
Source: MTCC 2023 Annual Report

Figure 3-13 Net Revenues in FY2023-12

3-5. Relevant Economic and Social Data, Natural Condition Data

3-5-1 Population

In 2022, the population of the Maldives was approximately 520,000, with around 130,000 being foreigners. The country has a youthful demographic and a substantial working-age population. Moreover, the population density (1,746 people/km^2 in Maldives and 19,000 people/km^2 in Male) is very high, especially in the capital city of Male.



Source: Maldives Bureau of Statistics

Figure 3-14 Maldives Population Pyramid-13

3-5-2 Key Industries

The Maldives' economy is primarily driven by the service sector, including tourism, which accounts for 70% of the GDP, making it the largest contributor. This is followed by the industrial sector, which includes construction, and the agricultural sector, which includes fisheries. Looking at the GDP from 2017 to 2021, it showed a gradual increase starting in 2017, but the global outbreak of COVID-19 in 2020 led to a sharp decline in tourism revenue due to travel restrictions and reduced tourism demand in many countries. Since then, the GDP has recovered to the 2019 levels.

Table 3-6 Key Economic Indicators for the Maldives-5

Indicator	2017	2018	2019	2020	2021	2022
GDP (million US$)	4.82	5.40	5.73	3.71	5.25	6.17
GDP growth rate (%)	7.1	8.7	7.3	-32.9	37.7	13.9
GNI per capita (US$)	9,120	9,880	10,400	6,890	9,350	10,880
Ratio of industry to GDP (%)						
Agricultural sector (including fisheries)	5.3	5.1	4.5	7.6	5.3	4.9
Industrial Sector (including construction)	11.4	13.1	11.9	12.6	9.2	10.3
Manufacturing Sector	2.2	2.2	2.1	2.7	2.1	2.0
Service Sector (e.g., tourism)	69.5	68.4	71.3	70.8	73.2	73.3
Other	11.6	11.2	10.2	6.4	10.2	9.5

Source: prepared by JICA Survey Team from data of the World Bank (WB).

3-5-3 Natural Condition

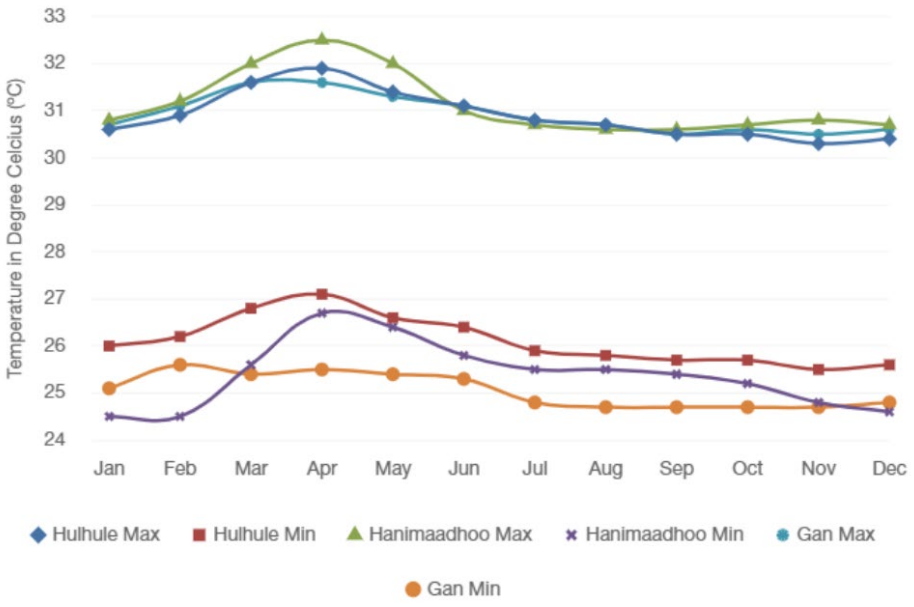
(1) Meteorological Conditions

In the Maldives, observations of temperature, wind conditions, rainfall, and tide levels are conducted at three locations: Hanimaadhoo in the northern Haa Dhaalu Atoll, Hulhule in the central North Male Atoll, and Gan in the southern Laamu Atoll.

The Maldives experiences two seasons: the southwest monsoon (rainy season) from mid-May to November, and the northeast monsoon (dry season) from January to March.

1) Temperature

The Maldives has a mild climate throughout the year. Temperatures are moderated by the presence of vast oceans and seas surrounding the small islands, with average temperatures ranging from 24°C to 33°C. The warmest period extends from March to mid-May (when the southwest monsoon begins). The highest temperature ever recorded in the Maldives was 36.0°C at Kadhdhoo Meteorological Station (Gan) on September 12, 1991, while the lowest temperature recorded was 18.2°C at Hanimaadhoo Meteorological Station on December 23, 2002.

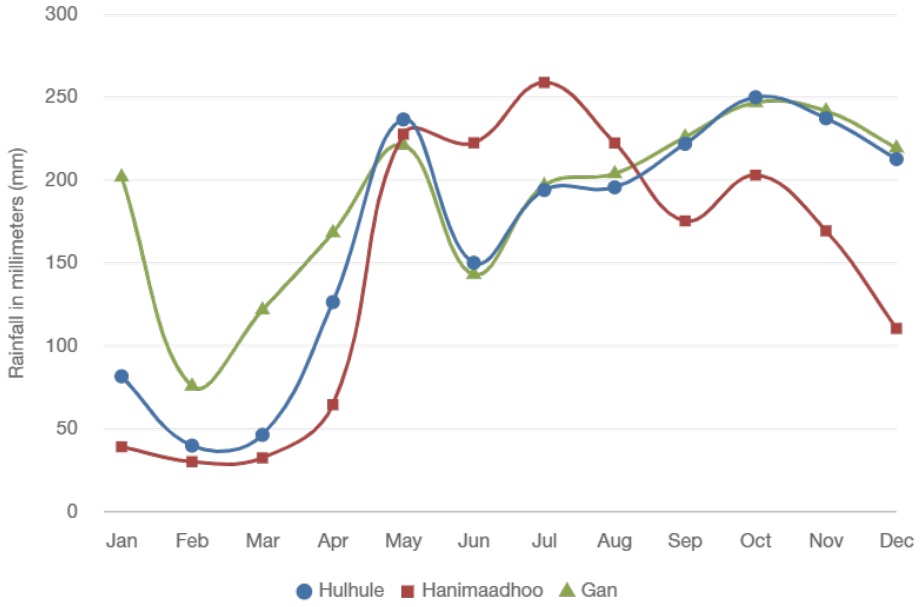


Source: Taken from MMS (Maldives Meteorological Service) website.

Figure 3-15 Maximum and minimum temperatures recorded in Hanimaadhoo, Hulhule and Gan Island14

2) Precipitation

Rainfall in the Maldives varies significantly between the two monsoon seasons. The southwest monsoon season (mid-May to November) brings the most rain, with monthly precipitation ranging from 150 to 250 mm. Annual rainfall is highest in the southern atolls, averaging about 2,218 mm. The central atolls receive approximately 1,966 mm annually, while the northern atolls experience the least rainfall at around 1,779 mm per year. Precipitation generally increases toward the south. Rainfall is typically heavy but brief, falling in the form of showers.

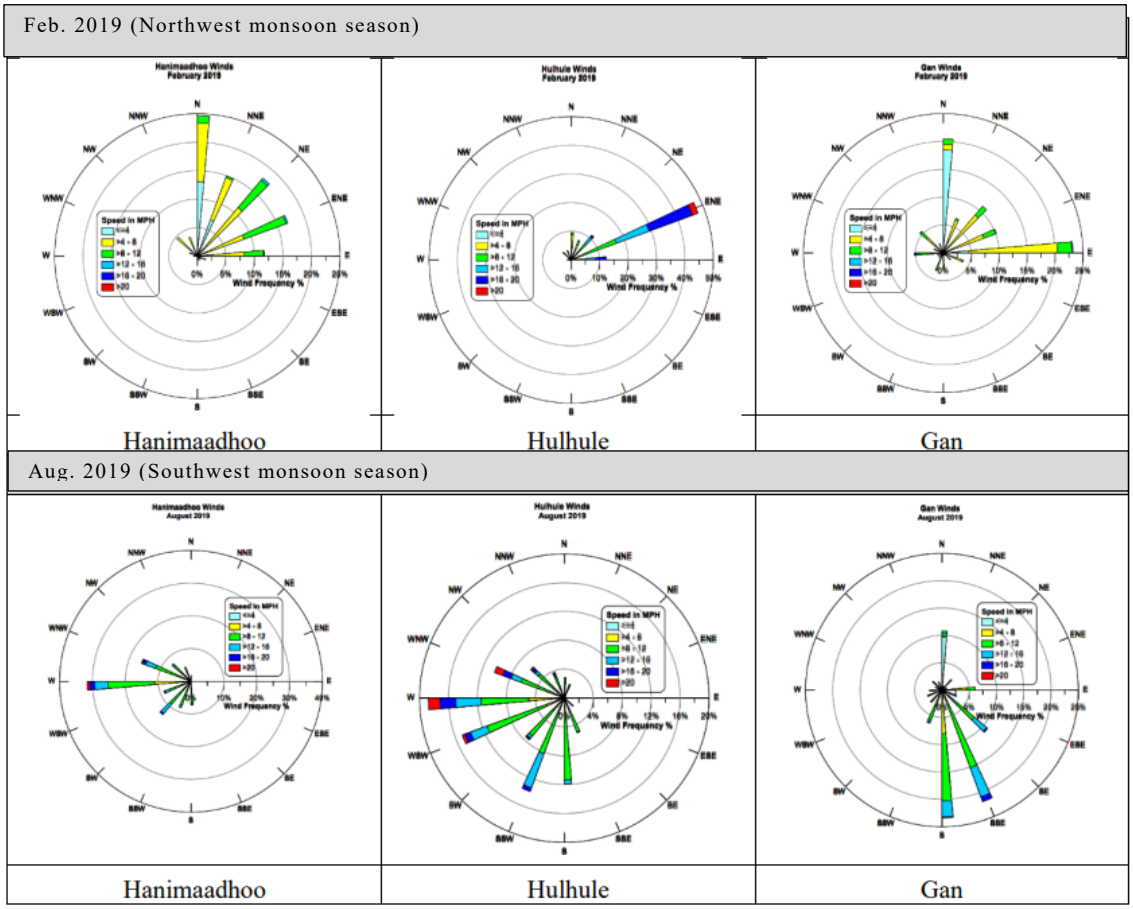


Source: Citation from Maldives Meteorological Service website

Figure 3-16 Annual precipitation in Hanimaadhoo, Hulhule, and Gan Island-15

3) Wind conditions

Northeast winds dominate during the dry season (November to April), while southwest winds prevail during the rainy season (May to November). This wind pattern is consistent across all monitoring sites in the Maldives.

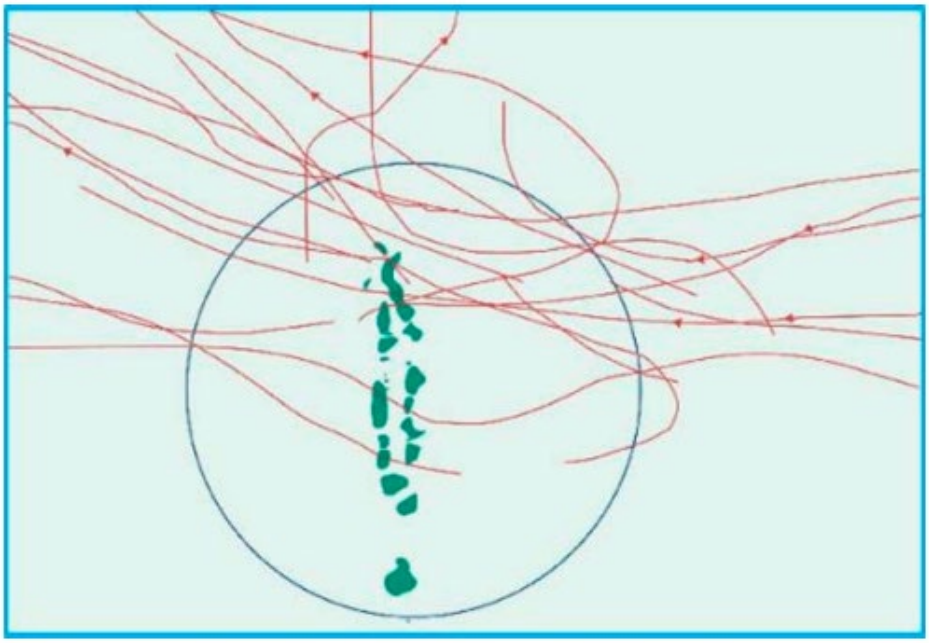


Source: The Project for Building Climate Resilient Safer Islands in the Maldives Detailed Planning Survey

Figure 3-17 Wind rose for different monsoon seasons at Hanimaadhoo, Hulhule, and Gan Island16

4) Cyclone

In the 117 years from 1877 to 2004, only 11 cyclones have passed through the Maldives, with most occurring north of 6°N. Consequently, the occurrence of unusually high waves in the Maldives is considered extremely rare.



Source: Maldives Male Metropolitan Area Meteorological Disaster Information Collection / Confirmation Survey

Figure 3-18 Cyclone passage around the Maldives from 1877 to 2004.-17

(2) Sea Conditions

1) Tide level

According to data from The Ministry of Environment and Energy (2016), tidal levels measured at three observatories in the Maldives show that the average tidal range in the Maldives is less than 1 m, indicating a relatively small tidal range.

Table 3-7 Tide level data at 3 observatories (Hanimaadhoo, Hulhule, Gan Island)-6

Water Level from MSL(m)	Hanimaadhoo (2010-2011)	Male (2007-2011)	Gan (1992-1998)
Highest High Water (HHW)	0.62	0.62	0.79
Mean Highest High Water (MHHW)	0.36	0.34	0.39
Mean High Water (MHW)	0.35	0.33	0.38
Mean Low Water (MLW)	-0.41	-0.36	-0.4
Mean Lowest Low Water (MLLW)	-0.42	-0.37	-0.41
Lowest Low Water (LLW)	-0.8	-0.72	-0.78

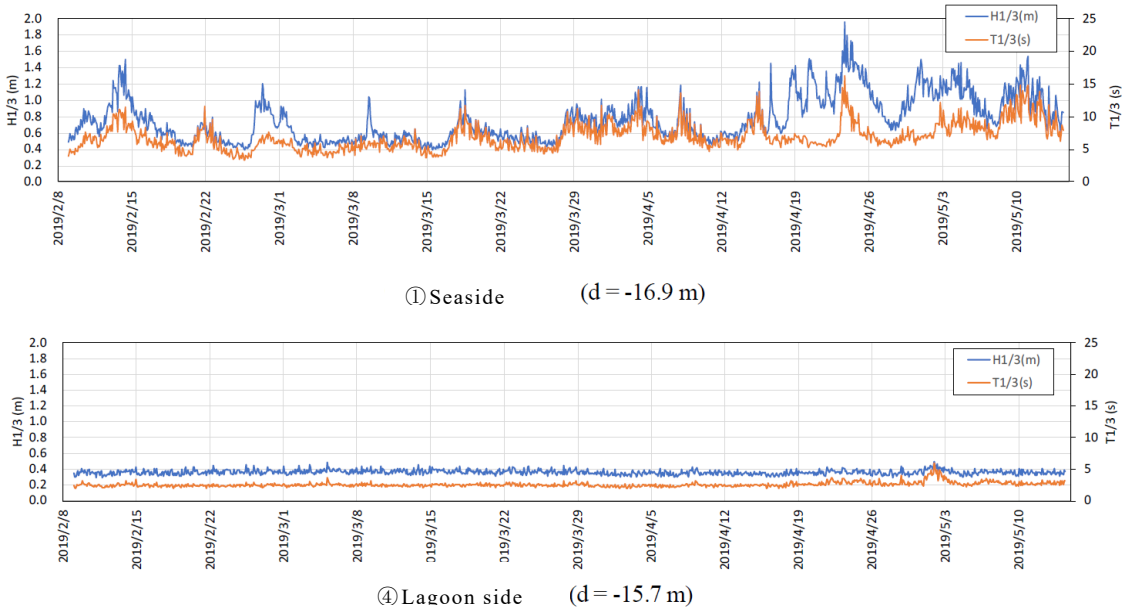
Source: Second National Communication of Maldives (2016)
University of Hawaii Sea Level Center database.

2) Ocean Waves

In a marine area with coral reef topography like in the Maldives, there is a significant difference in wave characteristics between the open sea side (ocean side) and the inland side (lagoon side).

According to the "Project for Building Climate Resilient Safer Islands in the Maldives Detailed Planning Survey Report (January 2023)," the temporal changes (from February to May 2019) in significant wave height (H1/3) and significant wave period (T1/3) outside the reef on both the ocean and lagoon sides are illustrated in the figure below.

On the ocean side, wave heights fluctuate depending on the meteorological disturbances, and wave heights vary with meteorological disturbances, typically ranging from H1/3 = 0.5 m under normal conditions to H1/3 = 2 m during high waves. On the other hand, there is no obvious variation observed in wave height and wave period at the lagoon side with H1/3 = 0.4 m.



Source: The Project for Building Climate Resilient Safer Islands in the Maldives Detailed Planning Survey Report, January 2023.

Figure 3-19 Change over time of significant wave height (H1/3) and significant wave period (T1/3)-18

3) Ground elevation and water depth

In the Maldives, the ground level in inhabited areas varies with geographic location. In the northern islands, the elevation is between 1.0 and 2.0 meters above average sea level, while in the central and southern islands, it ranges from 0.6 to 1.6 meters. The lagoon depth also varies regionally, with depths ranging from 30-40 meters in the north, 40-60 meters in the central region, and 60-80 meters in the south.

Beyond the reef, the seafloor descends dramatically, with depths reaching hundreds

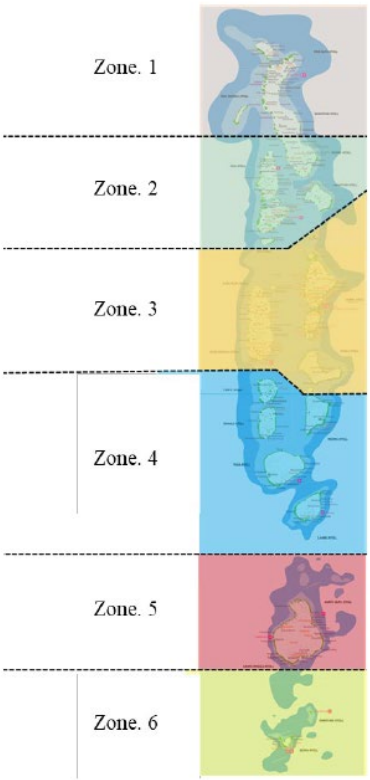
to thousands of meters. In the waters surrounding the Maldives, depths can exceed 3,000 meters, particularly in the southern regions.

3-5-4 Characteristics by Zone

(1) Zone Classification

The Maldives is one of the Small Island Developing State (SIDS) with an area of 115,300 km^2, located in the Indian Ocean and extending from north to south. It is composed of 26 atolls and approximately 1,200 islands.

The local administrative division consists of 26 atolls in the Maldives divided into the capital Male and 20 atoll districts. The regional divisions and administrative districts in each zone are shown in Figure 3-20.



Geographic Segment		Administrative District
Zone 1	Upper North	3 Atolls Haa Alifu, Haa Dhaalu, Shaviyani
Zone 2	Lower North	4 Atolls Noonu, Raa, Baa, Lhaviyani
Zone 3	Upper Central	4 Atolls Kaafu, Alifu Alifu, Alifu Dhaalu, Vaavu
Zone 4	Lower Central	5 Atolls Meemu, Faafu, Dhaalu, Thaa, Laamu
Zone 5	Upper South	2 Atolls Gaaf Alifu, Gaafu Dhaalu
Zone 6	Lower South	2 Atolls Gnaviyani, Seenu

Source: The Project for Building Climate Resilient Safer Islands in the Maldives (January 2023)

Figure 3-20 Maldives Regional Divisions and Administrative Districts-19

(2) Population and Major Industries

Major statistical data on the geography, industry, and environment of each zone in the Maldives are shown in Table 3-8. As for the regional population, Zone 3, which includes the capital city of Male, has the highest population, followed by Zone 1, Zone 2, Zone 4, Zone 6, and Zone 5.

Table 3-8 Major Statistical Data for Each District (Geographical, Industrial, and Environmental aspects)78

Zone	Total Population	Number of Islands (Area in ha)	Number of Inhabited Islands (Area in ha)	Number of Agricultural Islands (Area in ha)	Number of Island Resort (Area in ha)	Number of Airports (Domestic flight: D) (International flight: I)
Zone 1	61,074	132 (5,895)	41 (4,038)	7 (517)	21 (397)	D:3 I:1
Zone 2	49,670	384 (4,738)	45 (2,136)	23 (335)	100 (1,337)	D:2 I:1
Zone 3	250,376	300 (3,112)	35 (1,938)	3 (23)	109 (729)	D:1 I:1
Zone 4	41,848	329 (4,440)	43 (2,894)	10 (170)	51 (496)	D:4
Zone 5	21,949	258 (3,228)	18 (1,279)	4 (151)	32 (327)	D:3
Zone 6	34,219	37 (1,960)	7 (1,508)	0 (-)	9 (140)	D:1 I:1

Source: Prepared by JICA Survey Team based on Population Data of Maldives Bureau of Statistics (2022)

(3) Medical Facilities

Medical facilities in the Maldives are categorized into four levels in descending order according to the health care standards: Tertiary Hospital, Regional Hospital, Atoll Hospital, and Health Center.

If a Health Center on an island cannot provide the necessary medical services, patients can still visit an Atoll Hospital, Regional Hospital, and Tertiary Hospital for more advanced care. Currently, there are Tertiary Hospitals (including projections). In addition, patients may be transferred to the Tertiary Hospitals in Male or to hospitals in Sri Lanka, India, and other countries.

Table 3-9 Number of Medical Service Facilities in Each Region-9

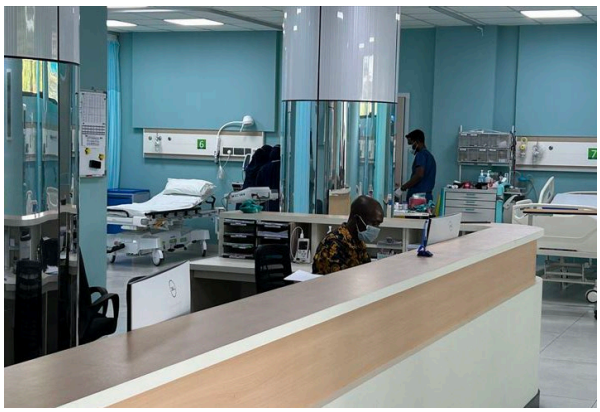
Area	Total Population (Person)	Number of Inhabited Islands	Number of Tertiary Hospitals	Number of Regional Hospitals	Number of Atoll Hospitals	Number of Health Centers
Zone 1	61,074	41	1	-	2	38
Zone 2	49,670	45	1	-	3	43
Zone 3	250,376	35	2	-	3	32
Zone 4	41,848	43	1	1	2	38
Zone 5	21,949	18	1	-	2	16
Zone 6	34,219	7	1	-	1	4

Source: Prepared by JICA Survey Team based on population data from Maldives Bureau of Statistics (2022)

(Hospitals planning or in the process of upgrading from community hospitals to tertiary hospitals)

- Zone 1: HDh. Kulhudhuffushi Regional Hospital,.
- Zone 2: R. Ungoofaaru Regional Hospital,.
- Zone 4: L. Gan Regional Hospital,.
- Zone 5: GDh. Thinadhoo Abdul Samad Memorial Hospital,.
- Zone 6: Addu Equatorial Hospital

R. Ungoofaaru Regional Hospital



Addu Equatorial Hospital

Source: JICA Survey Team

Figure 3-21 Tertiary Hospital-20

(4) Educational facilities (schools)

The number of schools and students in each region is shown in Table 3-10. Students basically attend schools on their respective islands. According to interviews, when students need to commute to schools on other islands, they stay with relatives or other family members and do not use vessels for daily commuting.

Table 3-10 Number of School Facilities in Each Region-10

Area	Total Population	Residents Number of Islands	Number of Students				Number of Schools
			Primary	Lower Secondary	Secondary	Higher Secondary	
Zone 1	61,074	41	6,899	2,032	1,676	212	48
Zone 2	49,670	45	6,271	1,820	1,589	239	56
Zone 3	250,376	35	19,819	5,094	5,253	2,253	74
Zone 4	41,848	43	5,283	1,714	1,417	194	48
Zone 5	21,949	18	2,580	853	755	84	23
Zone 6	34,219	7	3,695	1,227	992	429	22

Source: Prepared by JICA Survey Team based on Ministry of Education data (2022).

3-6. Current Situation and Issues of INPFNP Vessels and Terminals

3-6-1 RTL Ferry

(1) Vessel Characteristics

RTL ferries are currently operated using two types of vessels, one built by Al Shaali and the other by Gulf Craft. Vessel specifications for each type are shown in Table 3-11.

The construction of these vessels adheres to performance requirements defined by the MTCA, which include passenger capacity, vessel specifications (such as propulsion system, main engine, and onboard equipment), and sailing speed. The vessels are designed with features such as passenger seating, two wheelchair spaces, space for patient stretchers, restrooms, and air conditioning.

Table 3-11 Main Vessel Specifications of RTL Ferries-11

Shipyard	Vessel length	Vessel Width	Water Draft	Passenger Capacity
Al Shaali	16.76m (55 ft)	4.89m (16.05 ft)	1.04m (3.05ft)	Passenger seating 50 +4 crew
Gulf Craft	15.56m (51 ft)	3.92m (12.11ft)	0.87m (2.10ft)	Passenger seating 50 +4 crew

Source: Materials provided by Al-Shaali

Figure 3-22 Images of Al Shaali vessels

Source: Materials provided by Gulf Craft

Figure 3-23 Images of Gulf Craft Vessel21

(2) Issues

Issues related to vessels and vessel maintenance were summarized based on the interviews. There were no significant requests for changes in vessel specifications for the INPNFP.

Table 3-12 Issues Related to Vessels

Item	Issues and Requests
Passenger Capacity	The current passenger capacity of 50 is considered reasonable based on the day of high number of passengers. Operators share this view. However, some opinions suggest that reducing the number of passengers might improve speed and punctuality in certain routes between atolls (between Z5 and Z6), in response to passengers' demand.
Vessel Size	A vessel made by Al Shaari is one size larger than the one made by Gulf Craft. Operators commented that Gulf Craft has high operability in rough seas, but there was no specific request for additional passenger seating space.
Baggage Area	There is a storage space for hand baggage under the deck in front of the vessel's operation seat. If tourists are expected to board the vessel, it will be necessary to address issues related to securing this space or establishing rules to manage it.
Engine Room	Vessel engines and other equipment are located under the deck in the passenger area; however, the confined space makes maintenance challenging for engineers difficult. Regarding the vessel design, it requires improvement to facilitate easier inspection of equipment and simpler replacement of engine oil.
Propulsion method, Engine etc.	The on-board engine (made by Yanmar) is highly reliable and has performed well through periodic inspections. However, defects are occasionally found in the waterjet system.
Others	In some cases. cleaning and removal of attached materials from the vessel's bottom have not been conducted, which may affect operational efficiency.

Source: Prepared by JICA Survey Team Based on Field Interviews

3-6-2 Terminal

(1) Facility Details

1) Facility in Details

Table 3-13 shows the main facilities of the existing hub terminal and connecting terminal which precede the operation of RTL ferries.

Table 3-13 Facilities at each terminal-12

Terminal	Facility Details
Hub terminal	- Waiting area for arriving and departing passengers - Storage Area - Ferry Schedule Showing Facilities - Route Map Display - Separate restrooms for men and women, handicapped-accessible restrooms - Kiosk Commercial Area - Cafe/Restaurant Area - Operations/Administrative Office - Prayer Room, Parent Room - Office Space, - Storage of Maintenance and Replacement Parts
Connecting Room・Terminal	- Waiting room for arriving and departing passengers - Storage Area - Separate restrooms for men and women, handicapped-accessible restrooms - Route Map Display - Kiosk/Commercial Area - Parent Room
Ferry Stop	- Waiting room for arriving and departing passengers - Separate restrooms for men and women

2) Gender considerations and Universal design

The existing terminal has been designed with gender considerations and universal design principles in mind, as detailed in the facility information. In Kulhudhuffushi, there is an information board outside the building and a barrier-free ramp leading to the vessel boarding area.

Additionally, space for taxis and motorcycles is provided in front of the terminal. Similarly, Funadhoo features a ramp leading to the ship boarding area.

3) Effects and Issues of RTL ferry Introduction

A survey of RTL ferry users was conducted in Zone 1, the first zone to begin operations, by the Ministry of Housing, Land, and Urban Development. Users expressed satisfaction with all aspects of the RTL service, including accessibility, affordability, comfort, security, connectivity, timeliness, and ease of making reservations.

Field interviews revealed that while the reservation application can be challenging for the elderly to use, it is gradually becoming more widespread and user-friendly.

Panoramic View of Kulhudhuffushi (hub terminal)

Waiting Area

Terminal Ceiling (blower fan)

Cab stand and Motorcycle Parking in front of the Terminal

RTL Bus

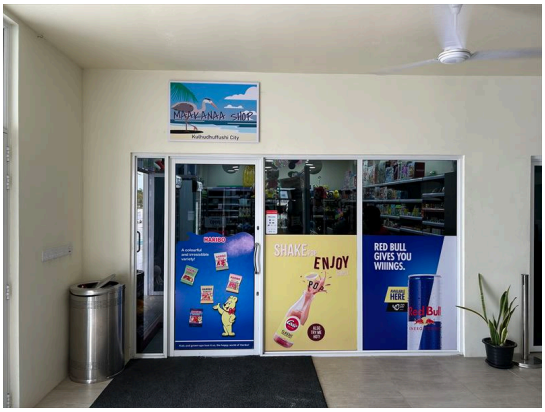
Source: JICA Survey Team

Slope (from terminal to boarding area)

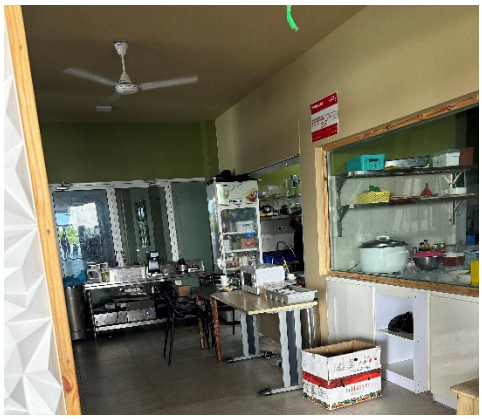
Signage in the Terminal (English and Tibetan)

Prayer Space

Accessible Restroom



Kiosk

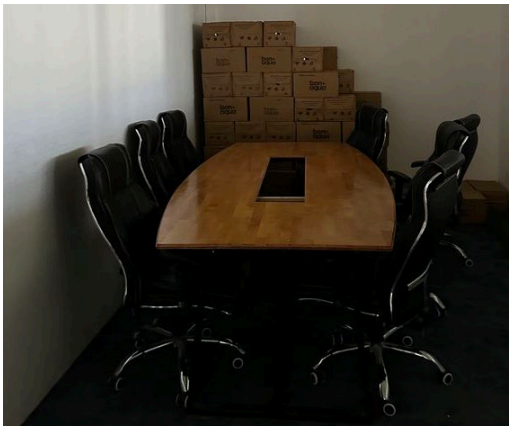


Restaurant in the Terminal

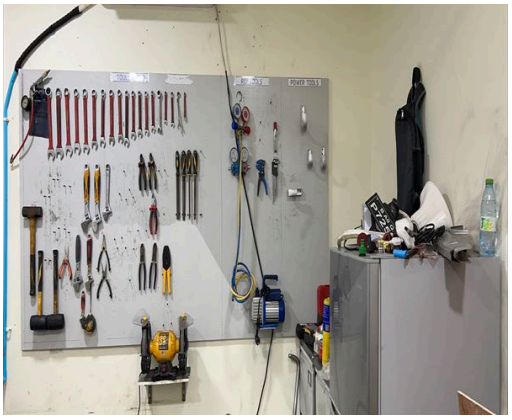
Source: JICA Survey Team

Cafe Space (outside)

Cafe Space (exterior)



Staff Meeting Space



Maintenance Staff Room (tool storage area)

Stock Space for engine oil, etc.

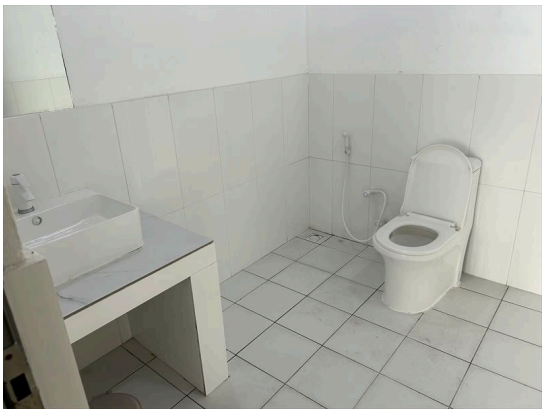
Multi-purpose Warehouse in Terminal

Source: JICA Survey Team

Figure 3-24 Hub Terminal (Kulhudhuffushi)-22

Funadhoo (connecting terminal) Panoramic View

Passenger Waiting Area



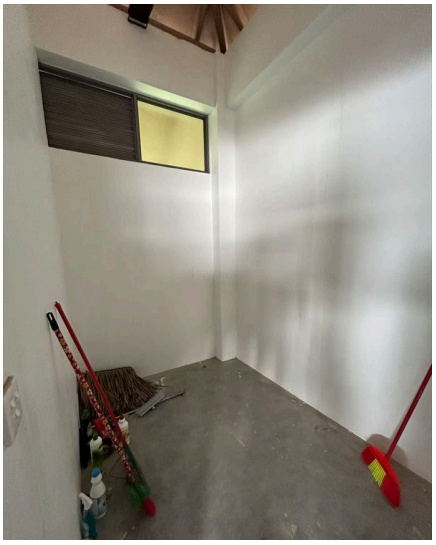
Restrooms (separate for men and women, handicapped accessible)

Source: JICA Survey Team

Cab Stand and Motorcycle Parking in front of the Terminal

Road behind the Terminal

Baby Care Room



Luggage Space

Kiosk space

Source: JICA Survey Team

Figure 3-25 Connecting Terminal (Funadhoo)-23

(2) Issue

Issues related to terminal development were summarized based on interviews with local stakeholders.

Table 3-14 Issues related to terminals

Item	Issues and Requests
Building Design	a uniform design for terminals is preferred.
Durability, Maintenance	The use of durable, maintenance-free materials is preferred.
Waiting Area	There are no walls at the waiting area in Funadhoo, leaving passengers exposed to rain and wind completely. This compromises passenger comfort.
Walkway to Vessels	Onboarding may be problematic during torrential rain as the walkway between the vessel and waiting area is not covered.
Building Entrance	It is used as a space for getting on/off taxis or motorcycles for pick-up/drop-off, should ideally be covered by a roof.
Kiosk Cafe	When establishing kiosk/cafes, it is necessary to thoroughly assess the demand.

Source: Prepared by JICA Survey Team Based on Field Survey

Source: JICA Survey Team

Figure 3-26 Heavy rainfall during boarding and disembarking of an RTL ferry, (Funadhoo)-24

3-7. Data from Surveys of Related Organizations and Other Donors, and Past Support Results

3-7-1 Status of Japanese Support

Japan's assistance to the Maldives in the field of maritime transport and related areas is shown in the table. Starting with a seawall construction project in the capital city of Male in 1987, various cooperative efforts are still underway.

Table 3-15: Japan's Assistance Status-13

Project Name	Scheme	Period	Remarks
The Project for Constructing Breakwaters on Southern Coast of Male' in the Republic of Maldives	Grant Aid	1987-1989	
The Project for the Seawall Construction in Male' Island (Phase 1 - Phase4)	Grant Aid	1994-2002	
Maldives Tsunami Reconstruction Project	Japanese ODA Loan	2006-2012	
Data collection survey on climate-related disasters in the Male's region in the Republic of Maldives	Data Collection Survey	2021-2022	
SDGs Business Needs Confirmation Survey for High Purity Bio Diesel Fuel (ReESEL) Production in the Maldives	SDGs Business Supporting Surveys	2023-2024	In progress
The Preparatory Survey for the Project for Disaster Resilience Enhancement in Male	Preparatory Survey	2022-2023	
The Project for Disaster Resilience Enhancement in Male	Grant Aid	2024 - 2026	Scheduled
Strengthening Nation-wide Ferry Transport System	Expert	2024-2026	Scheduled

Source: JICA Survey Team

3-7-2 Status of Support from Other Donors

Various international organizations and other donors have implemented passenger maritime transport and transportation projects in the Maldives. The following is a description of the related projects.

Table 3-16 Status of support by other donors

Project	Period	Donor	Remarks
Second Male Port Project	1993-1998	ADB	Male Port Extension
Domestic Maritime Transport Project	2007-2010	ADB	Maintenance of Male North Port
Establishing a National Geospatial Database for Mainstreaming Climate Change Adaptation into Development Activities and Policies in Maldives	2013-2018	ADB	Geospatial database construction for coastal and marine ecosystems
Kulhudhuffushi Harbor Expansion Project	2016-2021	ADB	Expansion plans for Kulhudhuffushi
Greater Male Connectivity Project (GMCP)	2021- 2026	Government of India	
Addu Reclamation and Shore Protection Project	2022-2024	Government of India	In progress
Hulhumale Island Development Project	2024-	The Saudi Fund for Development	

Source: JICA Survey Team

4. Utilization Situation of Vessel and Infrastructure

4-1. Utilization Situation of Vessel and Issues

4-1-1 Utilization Situation of Vessel

(1) RTL Ferry

Although there is a slight difference in elevation between the vessel's platform and the quay when boarding the RTL ferry, MTCC onshore staff assist passengers with embarking and disembarking. Additionally, there are also no level differences inside the vessel. Therefore, movement of passengers is generally smooth and without any particular problems. Furthermore, boarding rates are relatively high on the route from Kulhudhuffushi to Funadhoo in zone 1.

Before Embankment

Inside the Vessel

Source: JICA Survey Team

Figure 4-1 Utilization Situation of RTL Ferry (Kulhudhuffushi)1

(2) Private Ferry

Private ferries are used to transport both passengers and cargo. Since cargo loading and unloading take priority, their punctuality is inferior compared to RTL ferries. There is a consistent demand for transport between the islands, as evidenced by the number of passengers using these routes. Although passenger-cargo vessels are operated between Male from Kulhudhuffushi or Ungoofaaru, these are mainly for cargo transportation. Additionally, their transportation speed is slower compared to RTL ferries, resulting in longer travel times.

At the Time of Embarkation

Mooring

Source: JICA Survey Team

Figure 4-2 Private Ferries-2

4-1-2 Issues of Vessel (RTL Ferry)

(1) Emergency Evacuation

The vessels are equipped with passenger seats, a wheelchair seating area, a space for patient transport stretchers, and toilets. A wheelchair seating area, the space for patient transport stretchers, and a toilet (a vessel made by Al Shaali includes an accessible toilet) are located immediately after entering from the stern platform of the RTL ferry. Passenger seats are arranged with three seats on each side across the aisle, and the captain's room is located in the front. Life jackets are stored under the seats or near the pillars, depending on the seat layout.

RTL ferries made by Gulf Craft, which were deployed in the first phase of the RTL ferry vessel introduction, feature two emergency exits: one at the stern platform and another at the bow side of the vessel where crew members embark and disembark. In addition to those two emergencies exits, the ferries made by Al Shaali which were deployed in the second phase, also include a sliding window next to seats to facilitate evacuation.

According to MTCC, there is concern that emergency broadcasts may not reach all passengers in case of an emergency, as the inboard broadcasting speaker is located only on the bow side of the vessel.

(2) Small Storage Area for Checked Baggage

Passengers are allowed to carry a small bag, which must fit on their lap or under the seat, and checked baggage is restricted to 20 kg or less and approximately 24 inches (61 cm) in width, depth, and height, as outlined in the RTL Baggage Guideline. Prohibited items include petroleum products and unpackaged perishable food.

Checked baggage is stored below deck on the bow side of the vessel (in front of the

wheelhouse). Passengers must hand their baggage to the onshore staff before boarding, and the crew then loads the baggage onto the vessel. According to MTCC, there have been no instances of baggage being left unloaded; however, the storage area for checked baggage is small, and with an increase in the number of residents, tourists, and other passengers increase, there is a risk that the storage space may become insufficient.

(3) Lack of Transport Capacity during Peak Periods

The main purpose of using RTL ferries include visiting hospitals in the hub islands where the atoll capital is located to receive advanced medical services from the regional islands, going to banks, shopping, or renewing licenses. Peak passenger demand occurs on Thursdays and Saturdays, especially around Fridays which is a holiday, as well as during long school vacation or national holidays. With a capacity of 50 seats, the transportation capacity is running out as a situation. According to the MTTC interview, it was confirmed that there was a demand to increase the number of vessels during the peak period with many tourists in zone 6 and other areas.

(4) Operation

1) Ensure Operational System

Each RTL ferry operates with a team of six members, including two captains and four crew members per vessel. At least three team members must be on board during operation. For example, if there is only one captain, then at least two crew members are required. If there are two captains, then at least one crew member is needed.

Currently, RTL ferries operate only during the daytime, from sunrise to sunset, and typically make one round trip per day from a regional island to a hub island. Therefore, it is preferable to hire captains and crew members from the regional island, which serves as the departure point.

2) Ensure Punctuality

According to MTCC, existing RTL ferry services require a voyage speed of 25-27 knots, even when fully loaded, to ensure on-time operation of the schedule; however, with a high number of passengers, the necessary voyage speed may not be achieved, leading to delays in arrival. Additionally, insufficient maintenance of the RTL ferry's water jets has resulted in a decrease in voyage speed compared to when the ferries were first introduced.

3) Decision on Operation Availability

The decision to operate the vessel is typically made by the captain and the Operations Management Department of the MTCC local office, based on sea conditions and warnings (e.g., Orange Alert, Yellow Alert) issued by the meteorological bureau, in consultation with the MTCC headquarters in Male. While no significant issues have been reported under these conditions, special attention must be given to high waves in the deep waters between atolls. It is also crucial to hire experienced captains or provide adequate training for them.

(5) Ensure Vessel Inspections

Currently, RTL ferries operate 365 days a year without any holidays, therefore, making daily inspections before operation, as well as periodic inspections are extremely important. Before each operation, maintenance staff and the vessel's captain use a checklist to inspect the equipment for any defects. Inspections are also conducted daily, weekly, and monthly as well as based on the operating hours set for each facility and piece of equipment. Periodic inspections are conducted every 18 months (approximately 3,000 hours of use) at the dry dock at MTCC Ship Yard in Male.

MTCC operations staff have requested the establishment of at least one facility in each zone where medium-scale maintenance can be performed in order to ensure daily safe operations of the vessels.

(6) Reduction of the Refueling Time

Currently, fuel for RTL ferries is supplied from small- to medium-sized tankers onshore while the ferries are moored at the hub terminal or connecting terminal. No significant issues related to fueling have been reported; however, MTCC operations staff have requested the installation of a fuel pump facility to speed up the refueling process, as many RTL ferries require daily refueling.

4-2. Situation of Port Infrastructure Maintenance and Issues

The maintenance and usage situation of Kulhudhuffushi (hub terminal) and Funadhoo (connecting terminal), where RTL ferries operate, are shown below.

4-2-1 Maintenance Status

Based on the field survey, the condition of the port infrastructure was summarized. A large number of vessels which are similar in size to the RTL ferries are moored in either of the ports, and there are no particular issues in terms of vessel arrival/departure or mooring.

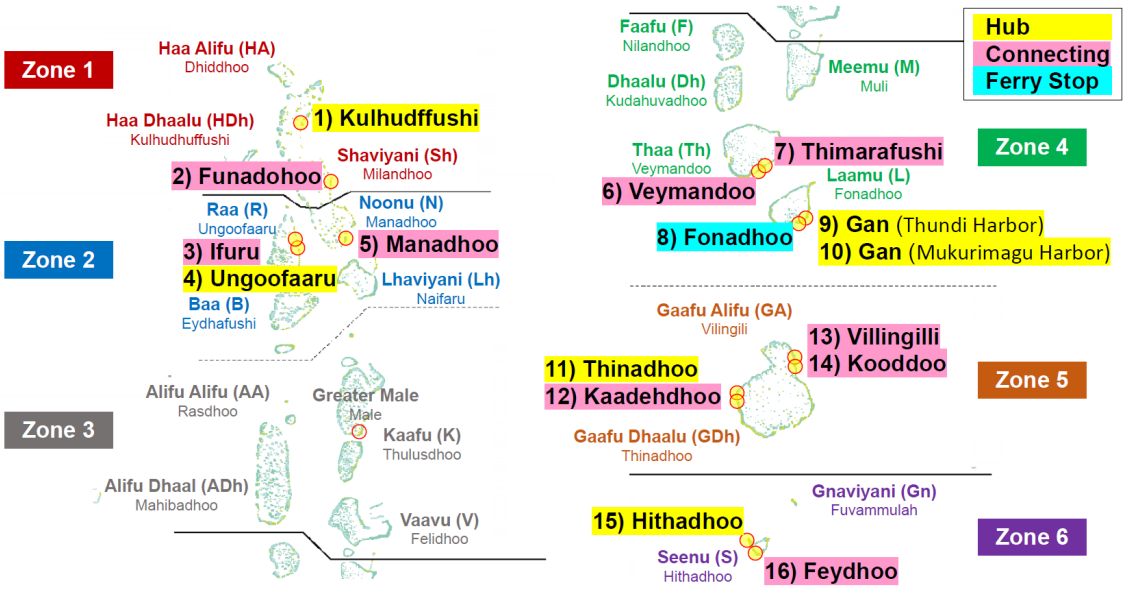


Figure 4-3: Port Location Map where Field Surveys were Conducted3

Table 4-1 Infrastructure Development Status-1

Zone	Port Name	Terminal Classification	Location Map of Infrastructure Maintenance	Remarks
Zone 1	1) Kulhudhuffushi	Hub Terminal	Terminal facilities available, toilets, baggage cart storage, etc.	Airport, advanced medical care
	2) Funadhoo	Connecting Terminal	Terminal facilities available	Airport
Zone 2	3) Ifuru	Connecting	Terminal facilities	Airport

Zone	Port Name	Terminal Classification	Location Map of Infrastructure Maintenance	Remarks
		Terminal	available, toilets, baggage cart storage, etc.	
	4) Ungoofaaru	Hub Terminal	No RTL ferry service, no terminal facilities	Advanced medical care
	5) Manadoo	Connecting Terminal	RTL ferry service (July 2024) No terminal facilities	Airport
Zone 4	6) Veymandoo	Connecting Terminal	No RTL ferry service, no terminal facilities Sunshade facilities available along the quay	Advanced medical care
	7) Thimarafushi	Connecting Terminal	No RTL ferry service, no terminal facilities	Airport
	8) Fonadhoo	Ferry Stop	No RTL ferry service, other passenger terminals available. Commercial facilities and event space nearby	
	9) Gan Thundi harbor	Hub Terminal	No RTL ferry service, other passenger terminals available (Currently under construction)	Advanced Medical Care
	10) Gan Mukurimagu harbor	Hub Terminal	No RTL ferry service, no terminal facilities	Advanced Medical Care

Zone	Port Name	Terminal Classification	Location Map of Infrastructure Maintenance	Remarks
Zone 5	11) Thinadhoo	Hub Terminal	No RTL ferry service, no terminal facilities (Operates using MPL terminal)	Advanced medical care
	12) Kaadehdhoo	Connecting Terminal	RTL ferry service, no terminal facilities	Airport
	13) Villingili	Connecting Terminal	RTL ferry service, no terminal facilities	Advanced medical care
	14) Kooddoo	Connecting Terminal	RTL ferry service, no terminal facilities (Sunshade facilities available)	Airport
Zone 6	15) Hithadhoo	Hub Terminal	No RTL ferry service, no terminal facilities	Advanced medical care
	16) Feydhoo	Connecting Terminal	RTL ferry service, terminal facilities available (Using MTCC-owned terminal)	Advanced medical care

*Remarks show the reason for placing hub terminal or connecting terminal.

Source: JICA Survey Team

The condition of the port infrastructure, as observed during the field survey, is presented below (photographs provided by the JICA Survey Team).

1) Kulhudhuffushi (Zone 1)

Complete view of Kulhudhuffushi (Hub terminal)

*For details of terminal facilities, please refer to "3. Current Status of Maldivian Maritime Transport in General".

2) Funadhoo (Zone 1)

*For details of terminal facilities, please refer to "3. Current Status of Maldivian Maritime Transport in General".

3) Ifuru (Zone 2)

Mooring Facilities
(Revetment with Steps)

Waiting Area

Waiting Area

Waiting Area (Inside)

4) Ungoofaaru (Zone 2)

Mooring Facility

Candidate site for Terminal

Rear of Terminal Candiate Site

Situation of Apron Subsidence

5) Manadoo (Zone 2)

Mooring Facility

Usage Situaiton of Apron

6) Veymandoo (Zone 4)

Mooring Facility

Freight Handling Facility with Solar Power Generation

7) Thimarafushi (Zone 4)

Mooring Facility

8) Fonadhoo (Zone 4)

Terminal Building

Marche Area

9) Gan Thundi Harbor (Zone 4)

Mooring Facility 1

Mooring Facility 2

Terminal Building (Front)

Terminal building (Side View)

10) Gan Mukurimagu Harbor (Zone 4)

Mooring Facility, Gas station

Mooring Facility

11) Thinadhoo (Zone 5)

Mooring Facility (temporary)

Confirmation of Boarding (temporary)

Waiting Area (temporary)

Equipment Storage (temporary)

12) Kaadehdhoo (Zone 5)

Mooring Facility

Airport Road Access

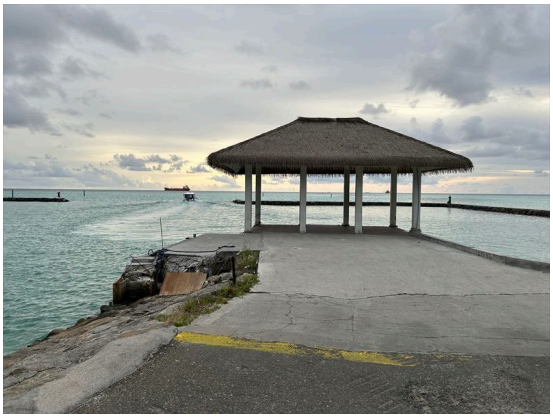
13) Villingili (Zone 5)

Mooring Facility

Rear Area of Terminal Candidate Site

14) Kuddu (Zone 5)

Mooring Facility



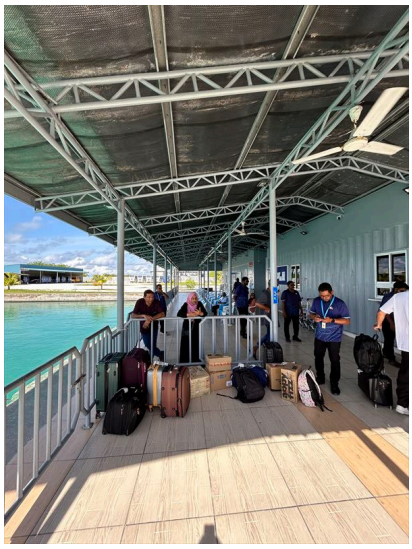
Area for Embarkigng/Disembarking

15) Hithadhoo (Zone 6)

Mooring Faciltiy 1

Mooring Faciltiy 2

16) Feydhoo (Zone 6)



Boarding Area

Ticket Counter

Waiting area, Office space

Toilet

4-2-2 Issues of Port Infrastructure (including terminals)

Based on the field surveys and the assessment of the maintenance and utilization status at Kulhudhuffushi (hub terminal) and Funadhoo (connecting terminal), where RTL ferries operate, the port infrastructure issues are summarized below.

(1) Extrusion of Mooring and Apron Paving

The terminal buildings at Kulhudhuffushi and Funadhoo are located directly behind the mooring facilities dedicated to RTL ferries and are separated from other private ferry moorings. These mooring facilities are located in calm waters surrounded by breakwaters, with a water depth in the harbor and at the wharf generally exceeding 3 meters—well above the draft of the RTL ferries (less than 1 meter). In addition, the harbor entrance provides a sufficiently wide vessel route. Therefore, unless high waves or strong winds occur, there should be no significant issues when entering or leaving the port.

As RTL ferry, equipped with two water-jet propulsion units, has excellent manoeuvrability. During field observations, it was confirmed that the vessel can easily change direction in an area with a turning space equivalent to slightly more than its length (1L).

However, the drainage from the RTL ferry's water jets caused extrusion of sand from the joints of the quay wall, resulting in sinking of the interlocking pavement apron in some areas. Therefore, in order to enhance pedestrian safety and walking comfort, it is necessary to fill the settled areas with crushed stone to level the uneven surfaces. If the settlement becomes more pronounced, the apron should be opened to check for hollowing, and measures such as installation of joint plates should be implemented.

Source: JICA Survey Team

Figure 4-4: Situation of Apron Subsidence (Funadhoo)4

(2) Lack of Technical Staff

MTCC, as the administrator, is responsible for the maintenance of RTL ferries and RTL ferry terminal buildings (including the dedicated sites). The current number of technical staff assigned to RTL ferries in each zone is shown in the table below.

MTCC has requested the establishment of maintenance stores to support efficient maintenance and management operations. Additionally, there are requests to implement natural energy sources, such as solar power generation.

Table 4-2: Current Number of Technical Staff2

Area	Number of Technical Staff	Remarks
Zone 1 (Kulhudhuffushi)	3	• AC, electrical systems, and mechanical personnel, totaling three staff members • At least 5 people are required
Zone 5 (Thinadhoo)	3	• No technical staff at Villingili
Zone 6	0	• Maintain RTL ferries operating in Zone 6 using the same formula as Zone 5, which employs one technical staff member. • Additional technical staff from Male will provide support as needed.

Source: Prepared by JICA Survey Team based on interviews.

(3) Introduction of Gender Considerations and Universal Design

The terminal building at Kulhudhuffushi (hub terminal) includes men's and women's toilets, accessible toilets (e.g., for people with physical disabilities) and a slope on the walkway from the road to the terminal entrance and from the waiting area to the boarding area. It is advisable to provide wheelchairs in the terminal for the elderly or people with physical disabilities to use. Besides this, it was confirmed that rooms for worship, nursing rooms, etc. have been provided.

However, the floor material inside the terminal becomes slippery when wet, which requires caution on rainy days. Although there are information boards in English and Tibetan, the small lettering makes them difficult for elderly individuals to read.

Overall, while the terminal has incorporated some gender considerations and universal design features, there is still room for improvement.

(4) Improvement of Comfort in Terminal Building

Passengers use the terminal building according to the departure schedule of the RTL ferries. At the hub terminal in Kulhudhuffushi, the terminal is often used by passengers for several hours after completing their hospital visits, shopping, banking, and other activities in the city. Therefore, a high level of comfort is required for the terminal.

At Funadhoo (connecting terminal), the building features an open waiting area without walls to reduce constructions cost, though gender considerations, universal design, etc. are taken into account.

However, passengers—including those visiting hospitals, pregnant women, and children—may get wet during torrential downpours when arriving at the terminal or getting off the RTL ferry or cabs. Thus, a covered walkway is needed to connect the entrance (porch), waiting area, and RTL ferry. Additionally, both MTCC and users have expressed a desire for a secured indoor space in the waiting area at Funadhoo.

(5) Improved Land Transportation Connections

At Kulhudhuffushi (hub terminal), there are a space (porch) connected to the terminal building to enable getting on/off taxis and motorcycles. there is a parking where the passengers can get on/off or the residents can park their motorcycles to pick up passengers in accordance with the arrival and departure times of RTL ferries.

At Funadhoo (connecting terminal), passengers use the road behind the terminal building for getting on and off.

On each island, key destinations such as hospitals, banks, and commercial facilities are within a 10-minute walking distance, so many users travel on foot. While there are no major issues with land transportation connections, it is necessary to create a stopping lane on the road near the terminal building.

5. Environmental and Social Considerations

5-1. Local Laws and System Pertaining to Environmental and Social Considerations

5-1-1 Outline of the Project

The priority projects are vessels construction and maintenance of passenger terminals and service centers (maintenance store) behind the quay. Maintenance is expected to be done in the port in any case. Details of the priority projects are described in Chapter 6.

5-1-2 Local Laws and Regulations on Environmental and Social Considerations

The laws and regulations pertaining to environmental considerations in the Maldives are shown in Table 5-1.

Table 5-1 Laws and Regulations Pertaining to Environmental and Social Considerations51

Regulations
Environmental Protection and Preservation Act (Act No. 4/1993) First amendment (2014)
Environmental Assessment Regulation (2012) First amendment (2013/R-18) Second amendment (2015/R-174) Third amendment (2016/R-66) Fourth amendment (2017/R-7) Fifth amendment (2018/R-131)
Regulation for the Determination of Penalties and Obtaining Compensation for Damages Caused to the Environment (2011/R-9)
Waste Management Regulation (2013/R-58)
Dredging and Reclamation Regulation (Regulation 2013/R15) First amendment (2014)
Cultural and Historical Places and Object Act (Act No. 27/1979)
Regulation on Cutting Down and Export of Trees and Coconut Palms (Regulation 7-R/2014)
Coral and Sand Mining Regulation (2000)
Regulation on Protected Areas (2018/R78)
Protected Species Regulation (2021R-25)

Source: "The Project for Building Climate Resilient Safer Islands in the Maldives, January 2023 (JICA)"

Moreover, environment-related process based on interviews with Environmental Protection Agency (EPA) are described below.

5-1-3 Protected Areas and Species

(1) Protected Areas

Protected areas in the Maldives are governed by the Environmental Protection and Preservation Act which were enacted in 1993. The protected areas revised in August 202,4 are shown in Table 5-1Table 5-2.

Table 5-2 Protected Areas in the Maldives52

Zone	No	Name of protected Area	Atoll	Type	Declared Date	Area in ha
Zone 3	32	K. Maldives Victory Wreck	K	MPA	13/02/2021	4.75
	33	K. Lions Head (Thilafalhu Miyaruvani)	K	MPA	27/09/1995	149.77
	34	K. Guraidhoo Kanduolhi	K	MPA	27/09/1995	351.18
	35	K. Hans Hass Place (Gulhi Falhu)	K	MPA	27/09/1995	10.78
	36	K. Giravaru Kuda Haa	K	MPA	27/09/1995	257.92
	37	K. Embudhoo Kanduolhi	K	MPA	27/09/1995	630.66
	38	K. Banana Reef (Gaathu Giri)	K	MPA	27/09/1995	177.48
	39	K. Nassimo Thila (Lankan Thila)	K	MPA	21/10/1999	263.83
	40	K. Makunudhoo Kanduolhi	K	MPA	27/09/1995	308.37
	41	K. Rasfari Region	K	Island/MPA	27/09/1995	2424.46
	42	K. Thanburudhoo Region	K	Island/MPA	27/09/1995	316.29
	43	K. Boduhithi Thila Area	K	MPA	01/08/2024	127.48
	44	K. Okkobe Thila Area	K	MPA	01/08/2024	379.24
	45	AA. Fish Head (Mushimasmigili Thila)	AA	MPA	27/09/1995	269.25
	46	AA. Karibeyru Region	AA	MPA	21/10/1999	1317.35
	47	AA. Orimas Thila Region	AA	MPA	27/09/1995	1306.72
	48	AA. Maaya Thila	AA	MPA	27/09/1995	1024.08
	49	AA. Rasdhoo Madivaru Area	AA	MPA/Sandbank	07/10/2018	552.69
	50	ADh. Hurasdhoo	ADh	Island/MPA	14/06/2006	21.56
	51	ADh. South Ari Marine Park (SAMPA)	ADh	MPA	05/06/2009	5143.41
	52	ADh. Rangali Kandu (Madivaru)	ADh	MPA	21/10/1999	861.38
	53	ADh. Kudarah Thila	ADh	MPA	27/09/1995	269.24
	54	V. Miyaru Kandu Region	V	MPA	27/09/1995	1382.54
	55	V. Vattaru	V	MPA	21/10/1999	9718.50
	56	V. Huraafalhu Area	V	MPA	01/11/2023	8.84
	57	V. Fussarufaru Region	V	Sandbank/MPA	01/11/2023	3690.38
	58	V. Rakeedhoo Corner	V	MPA	01/11/2023	6.34
	59	V. Ruh huri huraa	V	Island/MPA	01/11/2023	106.49
	60	V. Thun'duhuraa	V	Island/MPA	01/11/2023	3.57
	61	V. Hingaakulhee Finolhu Area	V	Sandbank/MPA	01/11/2023	1175.80
	62	V. Kashavaru Falhu Area	V	MPA	01/11/2023	978.62
	63	V. Huralhu Kandu Area	V	Sandbank/MPA	01/11/2023	257.73
Zone 4	64	M. Lazikuraadi	M	MPA	21/10/1999	486.97
	65	F. Filitheyo Kandu	F	MPA	21/10/1999	167.34
	66	Dh. Fushi Kandu	Dh	MPA	21/10/1999	2357.52
	67	L. Gaadhoo Turtle Nesting Area, Mangro	L	Mangrove/Wetland/MPA	23/12/2021	614.88
	68	L. Gan Boda Feangan'du Area	L	Mangrove/Wetland/MPA	23/12/2021	15.03
	69	L. Bodu Finolhu and Vadinolhu Kandu Ol	L	Sandbank/MPA	23/12/2021	706.02
	70	L. Maabaidhoo Koaru and Fushi Kan'du A	L	Island/Mangrove/Wetland/MPA	23/12/2021	521.08
	71	L. Gaadhoo -Hithadhoo Kan'du Area	L	MPA	23/12/2021	776.03
	72	L. Hithadhoo Wetland and Surrounding M	L	Mangrove/Wetland/MPA	23/12/2021	43.30
Zone 5	73	GA. Hithaadhoo Island	GA	Island/MPA	14/06/2006	52.97
	74	GDh. Dhigulaabadhoo	GDh	Island/Mangrove/Wetland/MPA	07/10/2018	485.39
Zone 6	75	Gn. Farikede Area	Gn	MPA	22/07/2020	636.75
	76	S. Eedhigali Kilhi Koattey Area	S	Mangrove/MPA	07/12/2004	770.62
	77	S. British Loyalty Shipwreck	S	MPA	13/09/2018	64.73
	78	S. Kandihera-Maakandu Channel (Manta P	S	Sandbank/MPA	13/09/2018	735.01
	79	S. Kuda Kandu Area	S	MPA	22/09/2020	462.06

Source: EPA's Protected Areas List as of August 16, 2024.

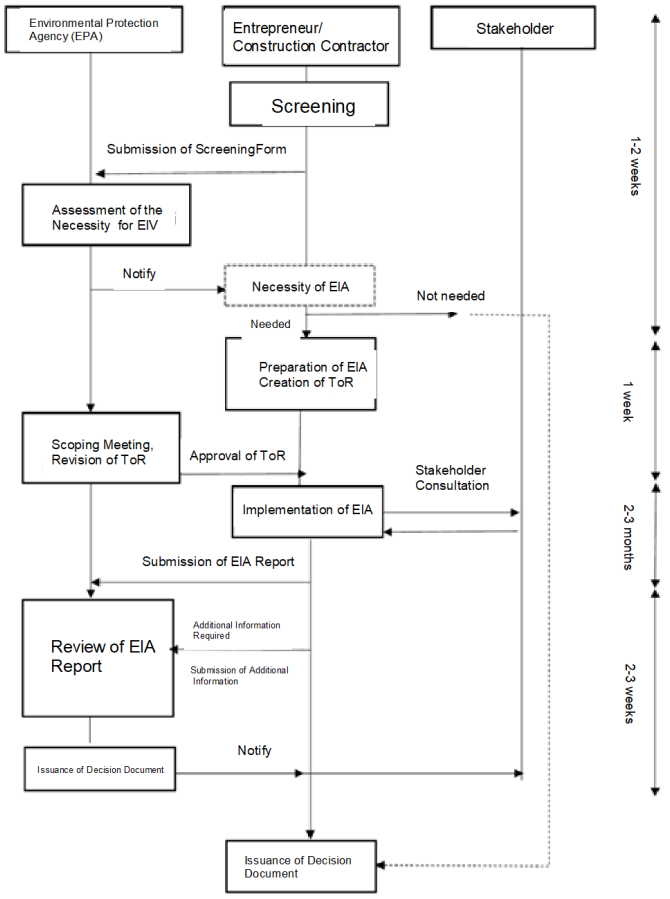
(2) Protected Species

In the Maldives, protected species, such as birds and marine life, are regulated in the protected species regulation; however, it is not anticipated that these regulations will have a significant impact on the maintenance of the priority projects.

5-2. General Considerations for Project Implementation

5-2-1 Flow of EIA Process

Surveys were conducted with Environmental Protection Agency (EPA) to gather environment-related information pertaining to the project. As a result, it was revealed that EIA process is required if reclamation or dredging is involved in the construction of new facilities within an already developed port area or in the construction to improve an existing port. The flow of the EIA process is shown in Figure 5-1.



Source: Maldivian Environmental Impact Assessment Regulation 2012, Report on the Preparatory Survey for the Cooperative Resilience Enhancement Plan for the Male Island Disaster, Republic of Maldives.

Figure 5-1 Flow of EIA process51

5-2-2 Application of Priority Projects

The maintenance content for priority projects (refer to Chapter 6 for details) suggest the construction of a hub terminal and connecting terminal to improve passenger service, as well as the maintenance of a service center (maintenance store) to ensure safe and stable navigation for vessels.

The construction of a hub terminal and connecting terminal requires proximity to the ferry mooring quay and a site where a one- or two-story building can be constructed within the port.

Upkeeping of maintenance store requires facilities to raise and lower vessels; however, based on the interviews with MTCC, which performs vessel maintenance, a land-based crane type is preferable.

As a result, since no development activities will occur in the ocean as part of the priority project proposals (passenger terminal and service center), an Initial Environmental Examination (IEE) is not required. However, it is necessary to access the EIA platform and report the outline and scale of the plan in advance. Based on this information, EPA will determine the necessity of an EIA. After receiving the report in advance, the EPA will notify whether an EIA process is required within 5 business days.

5-2-3 Considerations

Proper processing and recycling are required for the disposal of FRP (fiber-reinforced plastic). Since FRP has high strength and resistance to corrosion, it requires special disposal methods. Because of this, it is also necessary to consider the "cement manufacturing" method, where FRP waste is reused as fuel and material in cement manufacturing.

5-2-4 Confirmation of Natural Conditions

The areas targeted in priority projects for maintenance in Ungoofaaru and Manadhoo in Zone 2 and Gan in Zone 4, are within ports where development has already been conducted.

All islands are located on atolls, and the soil consists of a sand layer formed by crushed coral. Therefore, ground subsidence can be avoided by using methods such as vibratory rollers, and there are no technical problems anticipated for constructing buildings (terminals and service centers).

(1) Water Depth etc.

Speedboats and dhoni vessels are moored in the harbor, and there are no issues with water depth for vessels entering or leaving the port, as confirmed by interviews with

the Island Council. Water depth requirements for vessel moorings were verified using a simple ultrasonic depth finder during field measurements.

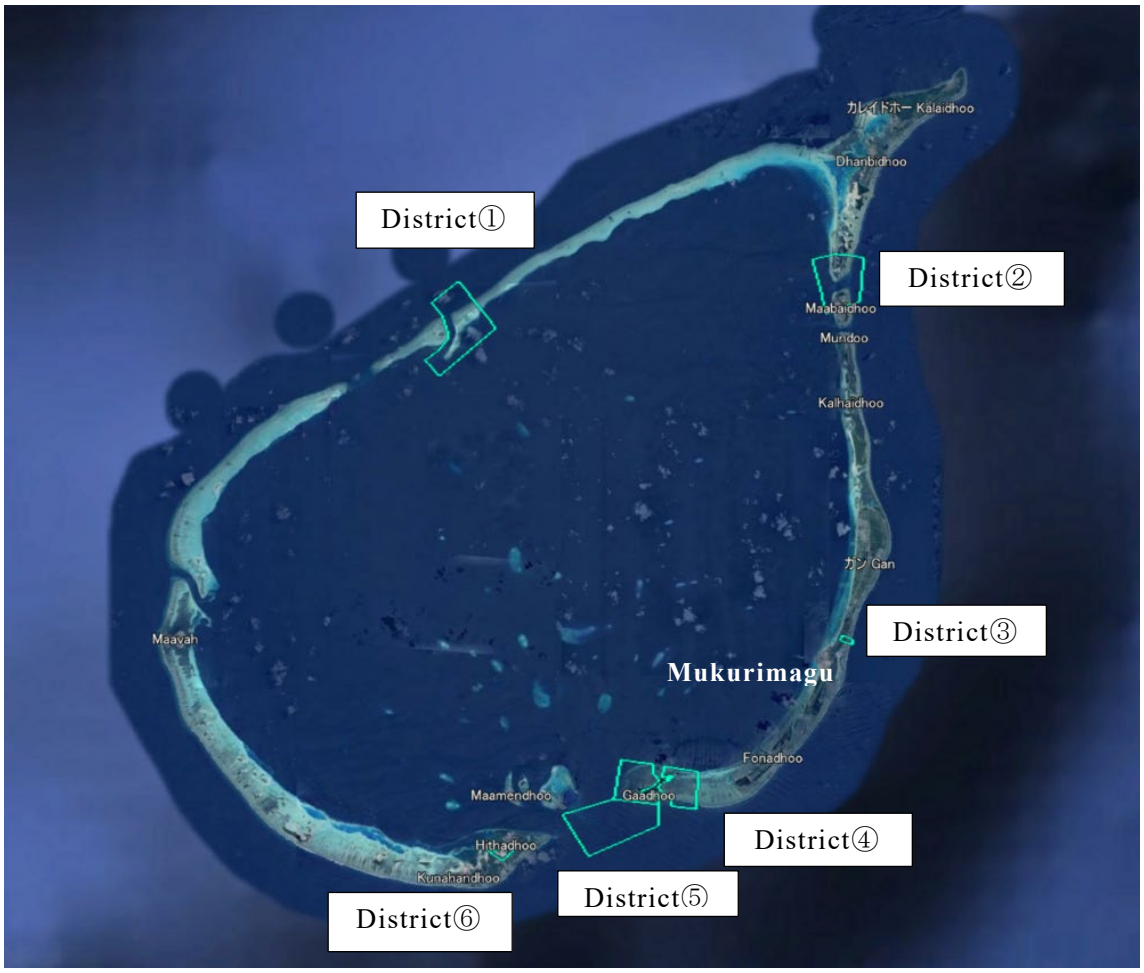
The water depth in the harbor ranges from 3 to 5 meters. Variations in water depth are due to dredging specific water areas to obtain the necessary amount of reclaimed material, balancing the quantities of dredged and reclaimed material.

(2) Protected Areas

The protected areas around Ungoofaaru and Manadhoo in Zone 2, and Gan in Zone 4, which are the targets of priority projects, are shown in Figure 5-2 through Figure 5-6. Protected areas have been established in Gan, however, no protected areas have been established in the vicinity of Mukurimagu, the proposed target site of the plan.

Source: Materials provided by EPA

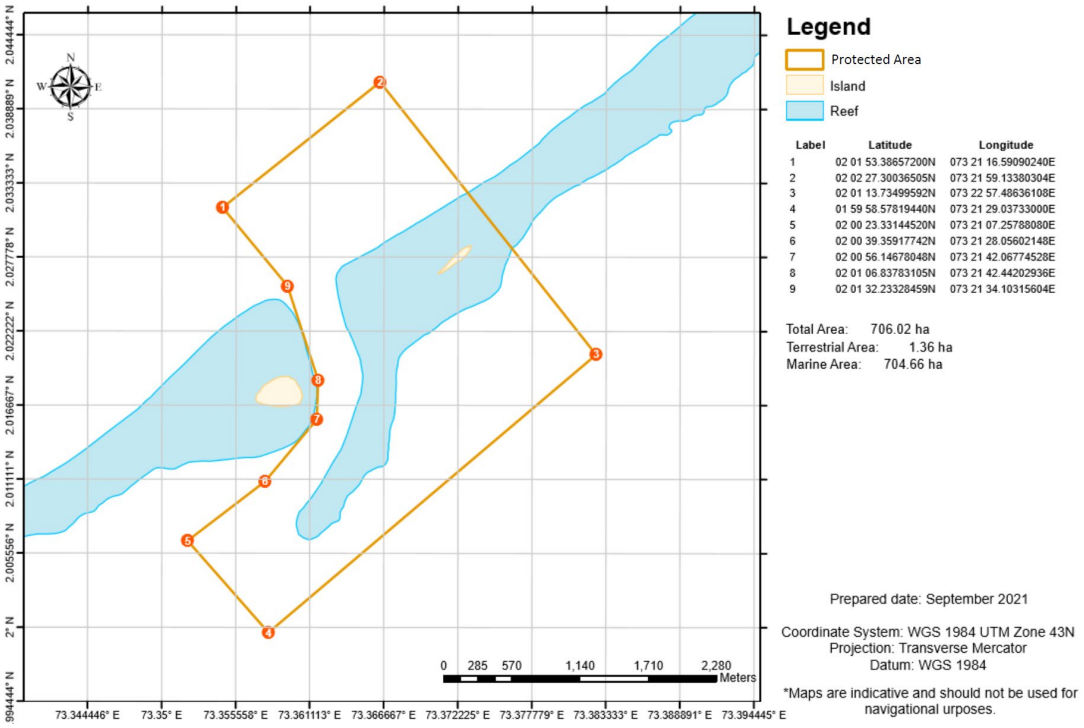
Figure 5-2 Protected Area (Zone 2)52



Source: Materials provided by EPA

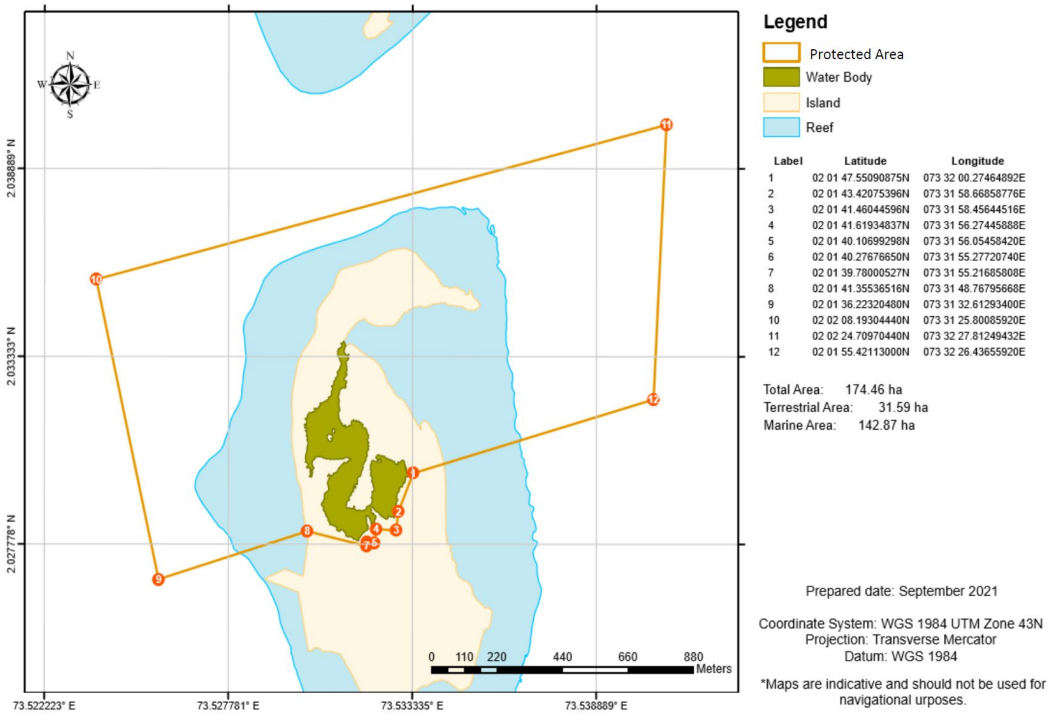
Figure 5-3　(Overall) Protected Area around Gan (Zone 4)53

L. Bodu Finolhu and Vadinolhu Kandu Olhu Area



Protected Area around Gan (District①)

L. Maabaidhoo Koaru Area

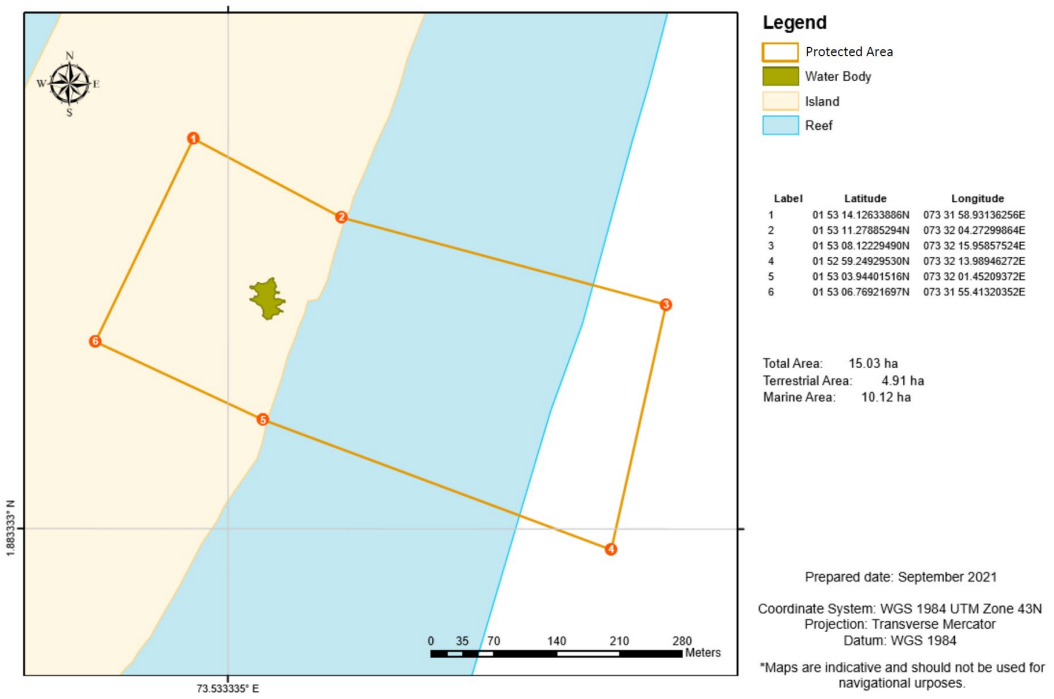


Protected Area around Gan (District②)

Source: Materials provided by EPA

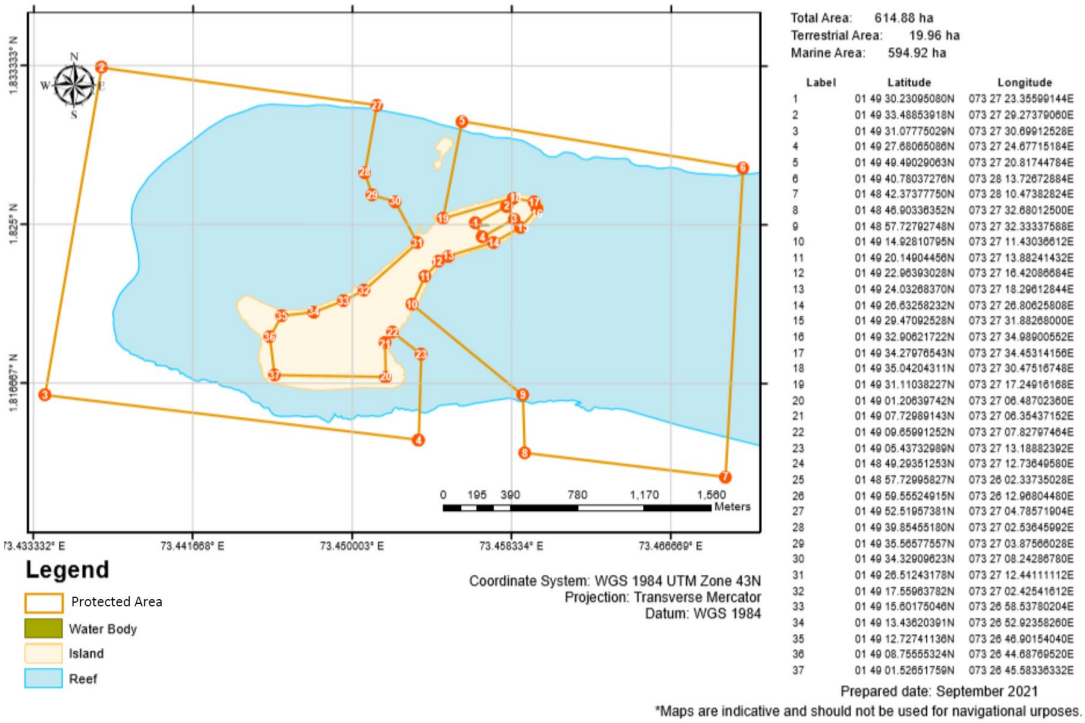
Figure 5-4 Protected Area around Gan by District (Zone 4)54

L. Gan Boda Fengan'du Area



Protected Area around Gan (District③)

L. Gaadhoo Turtle Nesting Area, Mangrove and Seagrass Area

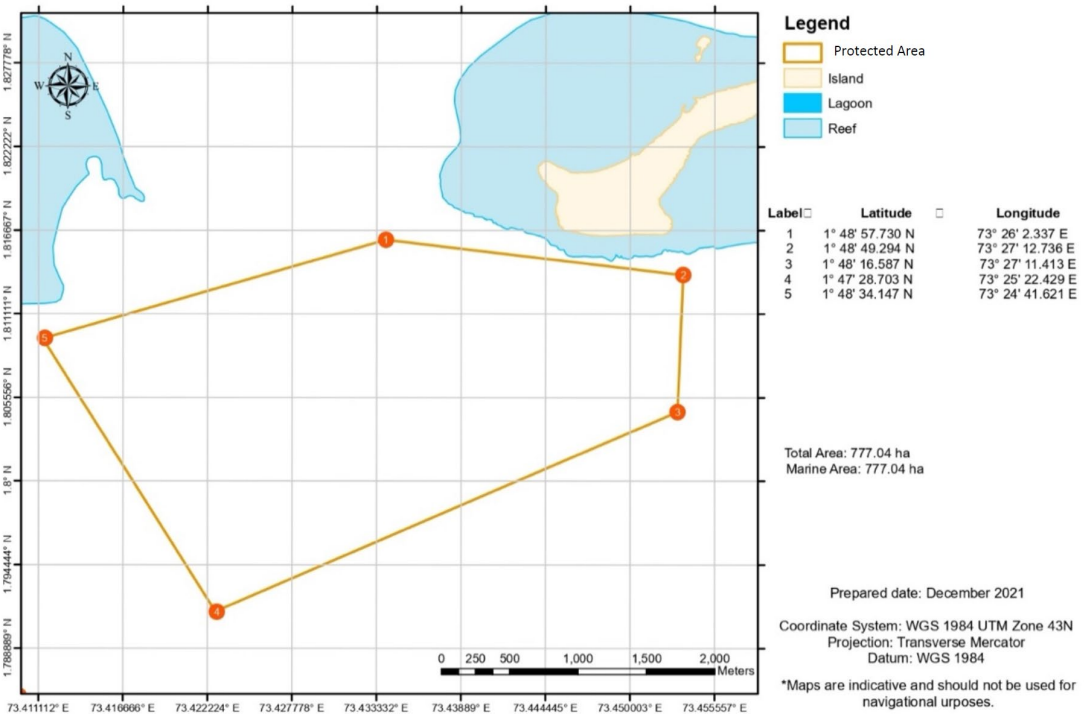


Protected Area around Gan (District④)

Source: Materials provided by EPA

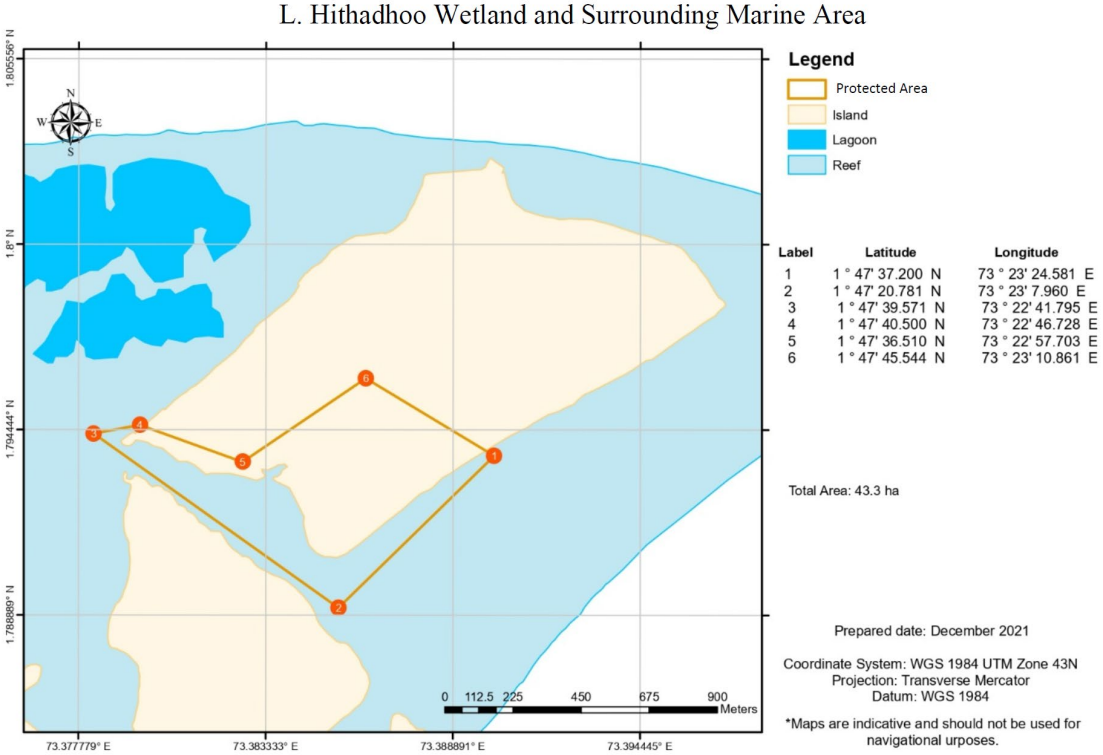
Figure 5-5 Protected Area around Gan by District (Zone 4)55

L. Gaadhoo – Hithadhoo Gan'du Area



Protected Area around Gan (District⑤)

L. Hithadhoo Wetland and Surrounding Marine Area



Protected Area around Gan (District⑥)

Source: Materials provided by EPA

Figure 5-6 Protected Area around Gan by District (Zone 4)56

6. Recommendations Pertaining to Priority Candidate Projects

Based on the results of the studies up to the previous sections, the followings are recommendations for priority candidate projects.

6-1. List of Candidate Projects

6-1-1 Establishment of Selection Criteria

The evaluation index for identifying priority candidate projects is detailed in the table below. Prioritization of candidate projects was based on this table; however, due to limitations in specific data availability, not all items listed in the criteria examples were covered.

Table 6-1 Selection Criteria for Priority Projects

Classification.	Selection Criteria	Example
Business effect	(1) Benefit effects (direct beneficiaries)	Number of beneficiaries, development effects such as reduced travel costs for users, etc. Increased tourism opportunities, increased tax revenues
	(2) Urgency of the project	Reduction of regional disparities (income by region, etc.), support for socially vulnerable groups
	(3) Effects of the environment	Reduction of emissions
Ripple effect	(4) Contribution to the lives of residents	Formation of a stable and secure living environment, visibility
	(5) Impact on local economy	Expansion of employment and income in the tourism industry and promotion of the maritime industry
	(6) Contribution to local communities	Improve access opportunities to basic social services such as education and healthcare
Implementation environment	(7) Realization of the project	Local needs, stakeholder consent, environmental and social considerations
	(8) Feasibility of the project	Size of the project, relevance to higher-level plans, relevance to other projects
Japan's cooperation necessity/ effectiveness	Comparative advantage of Japanese technology and knowledge Benefits for Japanese companies, etc.	
Presence Improvement with the cooperation of Japan	Provide high quality infrastructure using Japanese technology Contribute to the construction of a domestic passenger transportation network that is the lifeline of people's lives	

6-1-2 Priority by Zone

Based on the evaluation items shown in the previous section, the priority of each zone is rated on a 5-point scale, and the order in which the zones are developed is set according to the total score.

The order of maintenance by zone is as follows: Zone 2, Zone 4, Zone 1, Zone 5, Zone 6, and Zone 3, as shown in Table 6-2. Details of the priority ratings for each

evaluation indicator are provided in Table 6-3.

Table 6-2 Priority Assessment Results by Zone and Order of Maintenance

Category	Selection Criteria	Zone1	Zone2	Zone3	Zone4	Zone5	Zone6
Project Effects	①Benefit Effects	5	4	3	4	3	3
	②Project Urgency	3	5	1	4	3	3
	③Environmental Effects	3	5	4	4	3	3
Ripple Effects	④Contribution to Residents' Lives	3	5	3	5	3	3
	⑤Impact on Local Economy	3	5	3	5	3	3
	⑥Contribution to Local Communities	2	5	2	5	3	3
Implementation Environment	⑦Project Effectiveness	4	5	3	5	4	4
	⑧Project Feasibility	4	5	3	5	4	4
Total		27	39	22	37	26	26
Order of Development		3	1	6	2	4	4

Table 6-3 Priority Assessment Results by Zone and Item (Details)

Category	Selection Criteria	Assessment	Zone	Assessment Summary
Project Effect	①Benefit Effects	5	Zone1	・RTL ferries are already in operation and residents in the zone are enjoying the benefits of RTL ferries. [Resident island population in 2022 is approximately 53,000.】
				・The use of RTL ferries has reduced travel time and travel costs for residents. 【In 2023, a total of 294,000 people will use RTL ferries.】
		4	Zone2,4	・RTL ferries are already operating in some areas, and residents in the zone are enjoying the benefits of RTL ferries.【The inhabited island population in 2022 will be approximately 53,000 in Zone 2 (approximately 23,000 in Raviyani and Noonu Atolls, which are serviced, and approximately 30,000 in Raa and Baa Atolls, which are not serviced) and approximately 44,000 in Zone 4.】
				・Timeliness will be ensured and travel time will be reduced compared to the existing dhoni ferry.
				・Compared to the existing speed ferries, this will almost double the transportation capacity and at the same time ensure a low-cost method of transportation.【Total number of RTL ferry passengers in Lhaviyani Atoll in Zone 2 in 2023 is about 24,000】
		3	Zone6,5	RTL ferries are already operating in some areas, and residents in the zone are enjoying the benefits of RTL ferries.【Inhabited island population in 2022: approximately 25,000 in Zone 6 and 35,000 in Zone 5】
			Zone6,5	・The use of RTL ferries has reduced travel time and travel costs for residents.【In 2023, RTL ferries will have a total of approximately 11,000 passengers in Zone 6 and 51,000 passengers in Zone 5】
			Zone3	・Although the RTL Ferry does not operate, there is a direct passenger route to and from Malé, and certain benefits from the maritime transportation network are already being enjoyed.
	②Project Urgency	5	Zone2	・Improved access to advanced medical care, such as Tertiary Hospital.【The population of the inhabited islands is about 53,000 and that of the non-inhabited islands is about 21,000.】
		4	Zone4	・Improved access to advanced medical care, such as Tertiary Hospital.【The population of the inhabited islands is about 44,000 and that of the non-inhabited islands is about 8,000.】
			Zone4	・As a government policy, Zone 4 operations are planned after the start of operations in Zone 2.
		3	Zone1,6,5	・Although already in operation, stable access to advanced medical care is required. (In order to maintain a safe and sustainable operation system, the maintenance function of vessels must be strengthened.) 【Population: approximately 53,000 on Zone 1 inhabited islands and 4,000 on non-inhabited islands; approximately 35,000 on Zone 6 inhabited islands and 2,000 on non-inhabited islands; approximately 25,000 on Zone 5 inhabited islands and 5,000 on non-inhabited islands.】
		1	Zone3	・A direct passenger route to and from Malé has been established, and accessibility to advanced medical care and other services is guaranteed to some extent. 【The population of the inhabited islands is about 283,000 and that of the non-resident islands about 46,000.】
	③Environmental Effects	5	Zone2	・Conversion from existing dhoni ferries, speedboats to RTL ferries is expected to reduce environmental impact. (Reduction of CO2 emissions and fuel costs by converting from gasoline to diesel engines)
		4	Zone4,3	・In Zone 4, conversion of existing dhony ferries, speedboats to RTL ferries is envisioned to reduce environmental impact. (Population is less than Zone 2.)
				・In Zone 3, conversion of existing dhony ferries, speedboats to RTL ferries is envisioned to reduce environmental impact.
		3	Zone1,6,5	・Since RTL ferries are already in service, the reduction in environmental impact is not significant.
Ripple Efects	④Contribution to Residents' Lives	5	Zone2,4	・The introduction of RTL ferries within and between atolls will significantly improve regional disparities in living conditions. (Public transportation to the capital of the atoll and other hub cities will be secured, reducing travel costs for administrative procedures and bank access.)
		3	Zone1,6,5,3	・Low-cost public transportation services have already been developed, and a certain degree of living environment has been ensured.
	⑤Impact on Local Economy	5	Zone2,4	・The introduction of RTL ferry service is expected to reduce restrictions on intra- and inter-atoll travel and stimulate economic activity.
		3	Zone1,6,5,3	・Low-cost public transportation services are already in place and, to a certain extent, support economic activity in the zone.
	⑥Contribution to Local Communities	5	Zone2,4	・The introduction of RTL ferries within and between atolls will greatly improve access to local healthcare.
		3	Zone6,5	・Some intra- and inter-atoll operations have begun, and to a certain extent, access to local medical care is available.
		2	Zone1,3	・Affordable public transportation services have already been developed and access to local health care is available.
Implementation Environment	⑦Project Effectiveness	5	Zone2,4	・Government policy gives high priority to the introduction of RTL ferries (Zone 2 operations begin at two atolls.)
		4	Zone1,6,5	・Since the vessel is already in operation, there are many requests for maintenance facility improvements for safe daily operation.
				・The route connecting Zones 6 and 5 is not a good operating environment during rough weather, and a new type of RTL ferry is expected to be introduced.
		3	Zone3	・Existing similar services are in place to a certain extent and are not a priority in government policy.
	⑧Project Feasibility	5	Zone2,4	・Highest current priority as INPFNP project.
		4	Zone1,6,5	・The maintenance facility is expected to provide business opportunities, including RTL ferries and regional marine transportation services.
		3	Zone3	・At this time, it has the lowest priority.

6-1-3 Functional Priority

Similar to the prioritization of zones outlined in the previous section, each function is rated on a 5-point scale based on the evaluation items, and the order of maintenance for each function is determined by the total score.

The development sequence by function is as follows: ferries, boarding and disembarking facilities, hub terminals, connecting terminals and workshops, ferry stops, and backup vessels, as shown in Table 6-4. Details of the priority ratings for each evaluation indicator are also shown in

Table 6-5.

Table 6-4 Functional Priority Assessment Results and Order of Maintenance

Category	Selection Criteria	Vessel		Terminal Building			Service Center	
		Ferry	Backups	Hub	Connecting	Ferry・Stop	Equipment for lifting/lowering vessels	Workshop
		F	B	HT	CT	FS	JC	WS
Project Effects	Benefit Effects	5	3	5	4	3	5	4
	Project Urgency	5	4	5	4	2	5	4
	Environmental Effects	5	4	3	3	3	5	5
Ripple Effects	Contribution to Residents' Lives	5	4	5	5	5	4	4
	Impact on Local Economy	5	4	4	4	4	5	4
	Contribution to Local Communities	5	4	4	4	4	5	4
Implementation Environment	Project Effectiveness	5	3	5	5	4	4	4
	Project Feasibility	5	3	5	5	4	4	4
Necessity and effectiveness of Japanese cooperation	Comparative advantage of Japanese technology and knowledge	3	2	4	4	3	4	4
	Benefits for Japanese companies	3	2	4	4	3	4	4
Enhancing Japan's Presence through Cooperation	Provide high quality infrastructure through the use of Japanese	4	3	4	4	3	4	4
	Contribute to the construction of a domestic passenger transportation network that is the lifeline of people's lives	5	4	4	4	4	5	5
Total		55	40	52	50	42	54	50
Order of Development		1	7	3	4	6	2	4

Table 6-5 Functional Priority Assessment by Item (Details)

F: RTL Ferry, B: Backup Ship, HT: Hub Terminal, CT: Connecting Terminal, FS: Ferry Stop, JC: Jib Crane, WS: Workshop

Category	Selection Criteria	Evaluation	Function	Evaluation Overview
Project Effects	(1) Benefit Effects	5	F, HT, JC	・From the government, the RTL Ferry (F) has the highest need for assistance. The introduction of RTL ferries will reduce travel costs.
				・The need to develop a hub terminal (HT) where many users arrive/depart is very high (government, MTCC, Island Council).
				・MTCC has a high demand for the maintenance of equipment for lifting/lowering vessels (JC) from the viewpoint of safe daily operations. (It is also expected to increase revenues
		4	CT, WS	・There is a great need for the development of connecting terminals (CT) to serve as hubs for the region (government, MTCC, Island Council).
				・Workshops (WS) are highly requested by MTCC in terms of daily safe operations. (It is also expected to increase revenues of MTCC)
		3	B, FS	・The introduction of a backup vessel (B) as a rescue/replacement vessel in the event of RTL ferry breakdowns will contribute to reduce additional costs and time for users.
				・The regional ferry stop (FS) that will be developed at the departure point will be transferred from MTCC to the Island Council, although there is a need for it.
	(2) Project Urgency	5	F, HT, JC	・Maintenance of the RTL ferry, hub terminal, and ramp are urgently needed to provide and maintain low-cost public services and to ensure the comfort of users.
		4	B,CT,WS	・In order to maintain safe daily operations and ensure the safety, security, and comfort of users, the development of backup vessels, workshops, and connecting terminals are urgently needed.
		2	FS	・Although there is a need, it is less urgent than other maintenances due to the limited number of users.
	(3) Environmental Effects	5	F, JC, WS	・The introduction of RTL ferry and proper maintenance using ramps and workshops will reduce environmental impact (CO2 emissions will be reduced by switching from gasoline engines to diesel engines, fuel costs will be reduced, and fuel consumption will be improved and CO2 emissions reduced by proper engine output).
		4	B	・The introduction of backup vessels will avoid vessel cancellations and additional stays, and reduce environmental impact to a certain extent by curbing the use of speedboats and other vessels.
		3	HT, CT, FS	・This will be a new source of emissions such as CO2 compared to the current situation, but the introduction of environmental technologies such as photovoltaic power generation and storm water recycling is expected to have a positive effect.

F: RTL Ferry, B: Backup Ship, HT: Hub Terminal, CT: Connecting Terminal, FS: Ferry Stop, JC: Jib Crane, WS: Workshop

Category	Selection Criteria	Evaluation	Function	Evaluation Overview
Ripple Effects	(4) Contribution to Residents' Lives	5	F, HT, CT, FS	・The introduction of RTL ferries will provide a means of transportation within and between atolls, contributing significantly to the improvement of living environment. (Public transportation to base cities such as atoll capitals will be ensured, reducing travel costs for visiting administrative offices and banks).
				・The development of the passenger terminal building will greatly contribute to the comfort, security, and safety of passengers before their departure.
		4	B, JC, WS	・The introduction of backup vessels will help reduce the burden on users, such as avoiding cancellations and additional overnight stays.
				・The development of ramps and workshops will enable higher quality maintenance and contribute significantly to the creation of a safe and secure operating environment.
	5) Impact on Local Economy	5	F, JC	・The introduction of RTL ferries is expected to stimulate economic activity within and between atolls.
				・The development of the ramp is expected to create local employment opportunities and new business opportunities.
		4	B, HT, CT FS, WS	・The introduction of backup vessels is expected to avoid vessel cancellations, and reduce opportunity losses.
				・The passenger terminal building is expected to create new employment opportunities as well as a place of relaxation for the local community.
				・The development of workshops is expected to create local employment opportunities and new business opportunities.
	6) Contribution to Local Communities	5	F, JC	・The introduction of RTL ferries will greatly improve access to local healthcare.
				・The maintenance of ramps will improve maintenance environment contributing to the maintenance and improvement of the operating environment.
		4	B, HT, CT FS, WS	・The introduction of backup vessels will ensure access to local healthcare in the event of vessel breakdown.
				・The development of the passenger terminal building will greatly improve the waiting environment for users of local healthcare.
				・The development of workshops will ensure a more adequate maintenance environment and contribute significantly to improving the operating environment.
Implementation Environment	(7) Project Effectiveness	5	F, HT, CT	・The introduction of RTL ferries and the development of passenger terminal buildings (especially HT and CT) are greatly required as top priorities (operations have started at two atolls in Zone 2).
		4	FS, JC, WS	・Although there is a high need for users of the ferry stop, it is difficult for MTCC to manage and operate the ferry stop, so it will be transferred to the Island Council.
				・The ramp and workshop are extremely important facilities from the view of safe operation, and MTCC's needs for them are extremely high.
		3	B	・Backup vessels, although highly needed, are somewhat less prioritized than RTL ferries.
	(8) Project Feasibility	5	F, HT, CT	・The project size can be adjusted by considering the combination of introduction of RTL ferry and passenger terminal building, which are highly necessary and urgent as a matter of government policy.
		4	FS, JC, WS	・User demand for ferry stops is high, and they are relatively inexpensive to maintain.
				・In addition to the perspective of safe operation of RTL ferries, the ramp/workshop will also support safe navigation of vessels in the region, thus contributing as a new source of revenue for the sustainable provision of RTL ferry services.
		3	B	・Although the need and importance of backup vessels is high, it is possible to replace with chartering existing speedboats and other vessels.
Necessity and effectiveness of Japanese cooperation	(9) Comparative advantage of Japanese Technology and Knowledge	4	HT, CT, JC, WS	・By using universal design (barrier-free, gender-sensitive) architectural planning and design that allows everyone who uses the passenger terminal building to use it safely and comfortably, and by utilizing green technologies such as solar power generation and storm water recycling, it is possible to develop facilities that can function independently even in the event of a disaster.
				・In addition to the development of ramps and workshops, the simultaneous training of maintenance personnel can contribute to the continued operation of RTL ferries.
		3	F, FS	・By conducting human resource development including the improvement of vessel engines, safe navigation, and operational services simultaneouslsimultaneously, it is possible to contribute to the sustainable operation of the RTL Ferry.
		2	B	・For backup vessels, Japan's comparative advantage is limited due to the high possibility of replacements.
	(10) Benefits for Japanese companies	4	HT, CT, JC, WS	・The passenger terminal building is expected to serve as a prototype that will be deployed nationwide in the future, including architectural planning and design, construction materials, construction methods, storm water reuse, etc., to meet the needs of users, and is expected to benefit Japanese companies and others.
				・Use of products of Japanese companies, and sales of spare parts will be expected for some of the equipment and facilities to be installed in the ramps and workshops.
		3	F, FS	・The RTL ferries are expected to use Japanese engines, as it is currently the case.
				・The design and construction of a new type of RTL ferry (30 passengers, 30 knots or more) is expected to benefit Japanese companies.
		2	B	・For backup vessels, the benefits to Japanese firms are limited due to the high possibility of replacements.

F: RTL Ferry, B: Backup Ship, HT: Hub Terminal, CT: Connecting Terminal, FS: Ferry Stop, JC: Jib Crane, WS: Workshop

Category	Selection Criteria	Evaluation	Function	Evaluation Overview
Enhancing Japan's Presence through Cooperation	Providing high quality infrastructure through the use of Japanese	4	F, HT, CT,. JC, WS	・Japanese shipbuilding technology is expected to be utilized in a new type of RTL ferry (30 passengers, 30 knots or more).
				・In the development of the passenger terminal building, Japanese technology is expected to be utilized in construction materials, construction methods, storm water reuse, and other areas.
				・In the development of the passenger terminal building, it is expected that Japanese technologies, including Japan's meticulous universal designs (barrier-free and gender-neutral), will be utilized in the architectural planning and design stages.
				・It is expected that a high quality maintenance and management system will be established through technical guidance on the operation of ramps and workshops.
		3	B, FS	・For backup vessels, the use of Japanese technology is limited due to the high possibility of replacements.
				・Ferry stops are expected to be simple structures that can be built quickly and inexpensively, but are not a priority for development.
	Contribute to the construcion of a domestic passenger transortaton network that is the lifeline of people's lives	5	F, JC, WS	・The support of RTL Ferries will directly contribute to building a domestic passenger transportation network.
				・The development of ramps and workshops will contribute to the establishment of an appropriate maintenance system and directly contribute to the construction of a domestic passenger transportation network.
		4	B, HT, CT, FS	・Backup vessels are important for maintaining a safe and secure domestic passenger network.
				・The passenger terminal is one of the most important elements in achieving a comfortable user environment.

6-1-4 Candidate Project

(1) Weighting of Evaluation Indicators

In addition to the zone-specific and function-specific priorities outlined in the previous sections, the order of maintenance for each zone and functional item was considered. The priority by zone was weighted as 3, priority by function as 2, and order of maintenance as 1. The total score was used to calculate the overall maintenance priority. The functional priorities for each zone are detailed below. Zone 3 was excluded from this evaluation, as it is scheduled to be addressed after the other five zones are completed and its relationship to the other developments has not yet been determined.

Table 6-6 Weighting Settings

	Priority by Zone	Priority by Function	Order of Maintenance
Weighting	3	2	1

(2) Weighted Maintenance Priorities by Zone

For the support expected in each zone, weighted maintenance priorities by zone were calculated. Some ferries within each atoll include routes that connect the atolls.

Table 6-7 Weighted Maintenance Priorities (Zone 1)

No.	Atoll	Maintenance Details		Number of Maintenance						Priority				
				Ferry	Backup	Terminal Building			Others	Zone	Function	Order	Weighting Score	Rank
						Hub	Connection	Stop						
		Total					5		5	3	2	1		
1	Haa Dhaalu (HDh)	JC	Port Facility(Jib Crane) (Kulhudhuffshi HT)						1	5	2	1	20	1
2	Haa Dhaalu (HDh)	WS	Port Facility(Workshop) (Kulhudhuffshi HT)						1	5	4	2	25	2
3	Haa Dhaalu (HDh)	O	Port Facility(Ponping Station) (Kulhudhuffshi HT)						1	5	8	5	36	9
4	Haa Dhaalu (HDh)	O	Port Facility(Dock) (Kulhudhuffshi HT)						1	5	8	5	36	9
5	Haa Dhaalu (HDh)	O	Port Facility(Crane) (Kulhudhuffshi HT)						1	5	8	5	36	9
6	Haa Alifu (HA)	CT	RTL Connecting Terminal (Huvarafushi)				1			5	4	4	27	7
7	Haa Alifu (HA)	CT	RTL Connecting Terminal (Ihavandhoo)				1			5	4	3	26	3
8	Haa Alifu (HA)	CT	RTL Connecting Terminal (Dhihdhoo)				1			5	4	3	26	3
9	Haa Dhaalu (HDh)	CT	RTL Connecting Terminal (Hanimaadhoo)				1			5	4	3	26	3
10	Shaviyani (Sh)	CT	RTL Connecting Terminal (Bileyfahi)				1			5	4	3	26	3
11	Haa Dhaalu (HDh)	B	RTL Backup Boat		-					5	7	4	33	8

Table 6-8 Weighted Maintenance Priorities (Zone 2)

No.	Atoll	Maintenance Details		Number of Maintenance						Priority				
				Ferry	Backup	Terminal Building			Others	Zone	Function	Order	Weighting Score	Rank
						Hub	Connection	Stop						
		Total		10	3	1	8		2	3	2	1		
1	Noonu (N)	F	RTL Ferry	2						1	1	4	9	4
2	Raa (R)	F	RTL Ferry	4						1	1	1	6	1
3	Baa (B)	F	RTL Ferry	4						1	1	1	6	1
4	Raa (R)	JC	Port Facility(Jib Crane) (Ungoofaaru HT)						1	1	2	1	8	3
5	Raa (R)	WS	Port Facility(Workshop) (Ungoofaaru HT)						1	1	4	1	12	6
6	Raa (R)	HT	RTL Hub Terminal (Ungoofaaru)			1				1	3	1	10	5
7	Lhaviyani (Lh)	CT	RTL Connecting Terminal (Naifaru)				1			1	4	1	12	6
8	Noonu (N)	CT	RTL Connecting Terminal (Manadhoo)				1			1	4	1	12	6
9	Baa (B)	CT	RTL Connecting Terminal (Eydhafushi)				1			1	4	1	12	6
10	Noonu (N)	CT	RTL Connecting Terminal (Maafaru)				1			1	4	2	13	10
11	Raa (R)	CT	RTL Connecting Terminal (Ifuru)				1			1	4	2	13	10
12	Raa (R)	CT	RTL Connecting Terminal (Dhuvaafaru)				1			1	4	5	16	12
13	Baa (B)	CT	RTL Connecting Terminal (Dharavandhoo)				1			1	4	5	16	12
14	Baa (B)	CT	RTL Connecting Terminal (Ghulhaadhoo)				1			1	4	5	16	12
15	Raa (R)	B	RTL Backup Boat		1					1	7	1	18	15
16	Noonu (N)	B	RTL Backup Boat		1					1	7	2	19	16
17	Lhaviyani (Lh)	B	RTL Backup Boat		1					1	7	2	19	16
18	Baa (B)	B	RTL Backup Boat		-					1	7	3	20	18

Table 6-9 Weighted Maintenance Priorities (Zone 4)

No.	Atoll	Maintenance Details		Number of Maintenance						Priority				
				Ferry	Backup	Terminal Building			Others	Zone	Function	Order	Weighting Score	Rank
						Hub	Connection	Stop						
		Total		14	3	1	8	1	2	3	2	1		
1	Laamu (L)	F	RTL Ferry	3						2	1	1	9	1
2	Thaa (Th)	F	RTL Ferry	3						2	1	2	10	2
3	Dhaalu (Dh)	F	RTL Ferry	3						2	1	3	11	4
4	Faafu (F)	F	RTL Ferry	2						2	1	2	10	2
5	Meemu (M)	F	RTL Ferry	3						2	1	3	11	4
6	Laamu (L)	JC	Port Facility(Jib Crane) (Gan HT)						1	2	2	1	11	4
7	Laamu (L)	WS	Port Facility(Workshop) (Gan HT)						1	2	4	2	16	8
8	Laamu (L)	HT	RTL Hub Terminal (Gan: Mukurimagu)			1				2	3	1	13	7
9	Thaa (Th)	CT	RTL Connecting Terminal (Thimarahushi)				1			2	4	3	17	11
10	Dhaalu (Dh)	FS	RTL Ferry Stop (Kudahuvadhoo)					1		2	6	3	21	17
11	Faafu (F)	CT	RTL Connecting Terminal (Magoodhoo)				1			2	4	3	17	11
12	Meemu (M)	CT	RTL Connecting Terminal (Muli)				1			2	4	2	16	8
13	Laamu (L)	CT	RTL Connecting Terminal (Kadhdhoo)				1			2	4	4	18	13
14	Thaa (Th)	CT	RTL Connecting Terminal (Veymandoo)				1			2	4	2	16	8
15	Thaa (Th)	CT	RTL Connecting Terminal (Guraidhoo)				1			2	4	4	18	13
16	Thaa (Th)	CT	RTL Connecting Terminal (Vilufushi)				1			2	4	4	18	13
17	Faafu (F)	CT	RTL Connecting Terminal (Nilandhoo)				1			2	4	4	18	13
18	Laamu (L)	B	RTL Backup Boat		1					2	7	1	21	17
19	Thaa (Th)	B	RTL Backup Boat		1					2	7	2	22	20
20	(Dh)~(F)	B	RTL Backup Boat		-					2	7	3	23	21
21	Meemu (M)	B	RTL Backup Boat		1					2	7	1	21	17

Table 6-10 Weighted Maintenance Priorities (Zone 5)

No.	Atoll	Maintenance Details		Number of Maintenance						Priority				
				Ferry	Backup	Terminal Building			Others	Zone	Function	Order	Weighting Score	Rank
						Hub	Connection	Stop						
		Total		3	2	1	4	1	4	3	2	1		
1	Gaafu Dhaalu (GDh)	F	RTL Ferry	1						4	1	4	18	3
2	Gaafu Alifu (GA)	F	RTL Ferry	2						4	1	1	15	1
3	Gaafu Dhaalu (GDh)	JC	Port Facility(Jib Crane) (Thinadhoo HT)						1	4	2	1	17	2
4	Gaafu Alifu (GA)	JC	Port Facility(Jib Crane) (Villingilli CT)						1	4	2	4	20	5
5	Gaafu Dhaalu (GDh)	HT	RTL Hub Terminal (Thinadhoo)			1				4	3	1	19	4
6	Gaafu Alifu (GA)	CT	RTL Connecting Terminal (Villingilli)				1			4	4	3	23	7
7	Gaafu Dhaalu (GDh)	FS	RTL Ferry Stop (Vaadhoo)					1		4	6	1	25	8
8	Gaafu Dhaalu (GDh)	CT	RTL Connecting Terminal (Kaadehdhoo)				1			4	4	5	25	8
9	Gaafu Alifu (GA)	CT	RTL Connecting Terminal (Kooddoo)				1			4	4	5	25	8
10	Gaafu Alifu (GA)	CT	RTL Connecting Terminal (Maavaarulu)				1			4	4	5	25	8
11	Gaafu Dhaalu (GDh)	WS	Port Facility(Workshop) (Thinadhoo HT)						1	4	4	2	22	6
12	Gaafu Alifu (GA)	WS	Port Facility(Workshop) (Villingilli CT)						1	4	4	5	25	8
13	Gaafu Dhaalu (GDh)	B	RTL Backup Boat		2					4	7	1	27	13

Table 6-11 Weighted Maintenance Priorities (Zone 6)

No.	Atoll	Maintenance Details		Number of Maintenance						Priority				
				Ferry	Backup	Terminal Building			Others	Zone	Function	Order	Weighting Score	Rank
						Hub	Connection	Stop						
				2		1	3		2	3	2	1		
1	Seenu (S)	F	RTL Speed Ferry (30 pax)	2						4	1	1	15	1
2	Seenu (S)	JC	Port Facility(Jib Crane) (Fuvammular CT)						1	4	2	3	19	2
3	Seenu (S)	WS	Port Facility(Workshop) (Fuvammular CT)						1	4	4	4	24	5
4	Seenu (S)	HT	RTL Hub Terminal (Hithadhoo)			1				4	3	2	20	3
5	Gnaviyani (Gn)	CT	RTL Connecting Terminal (Fuvammular)				1			4	4	3	23	4
6	Seenu (S)	CT	RTL Connecting Terminal (Hulhumeedhoo)				1			4	4	4	24	5
7	Seenu (S)	CT	RTL Connecting Terminal (Feydhoo)				1			4	4	5	25	7
8	Seenu (S)	B	RTL Backup Boat		-					4	7	1	27	8

(3) Weighted Maintenance Priority

The overall maintenance priorities based on the above weighted maintenance priorities for each zone are shown below in the Table 6-12.

Table 6-12 Weighted Maintenance Priorities (Overall)

Serial No.	Zone	No.	Atoll	Contents		Number of Maintenance						Priority				
						RTL Ferry	Backup Boat	Terminal Building			Others	Zone	Function	Order	Weighted score	Rank
								Hub	Connecting	Stop						
					Total	28	1	2	12		5	3	2	1		
1	2	2	Raa (R)	F	RTL Ferry	4						1	1	1	6	1
2	2	3	Baa (B)	F	RTL Ferry	4						1	1	1	6	1
3	2	4	Raa (R)	JC	Port Facility(Jib Crane) (Ungoofaaru HT)						1	1	2	1	8	3
4	2	1	Noonu (N)	F	RTL Ferry	2						1	1	4	9	4
5	4	1	Laamu (L)	F	RTL Ferry	3						2	1	1	9	4
6	2	6	Raa (R)	HT	RTL Hub Terminal (Ungoofaaru)			1				1	3	1	10	6
7	4	2	Thaa (Th)	F	RTL Ferry	3						2	1	2	10	6
8	4	4	Faafu (F)	F	RTL Ferry	2						2	1	2	10	6
9	4	3	Dhaalu (Dh)	F	RTL Ferry	3						2	1	3	11	9
10	4	5	Meemu (M)	F	RTL Ferry	3						2	1	3	11	9
11	4	6	Laamu (L)	JC	Port Facility(Jib Crane) (Gan HT)						1	2	2	1	11	9
12	2	5	Raa (R)	WS	Port Facility(Workshop) (Ungoofaaru HT)						1	1	4	1	12	12
13	2	7	Lhaviyani (Lh)	CT	RTL Connecting Terminal (Naifaru)				1			1	4	1	12	12
14	2	8	Noonu (N)	CT	RTL Connecting Terminal (Manadhoo)				1			1	4	1	12	12
15	2	9	Baa (B)	CT	RTL Connecting Terminal (Eydhafushi)				1			1	4	1	12	12
16	2	10	Noonu (N)	CT	RTL Connecting Terminal (Maafaru)				1			1	4	2	13	16
17	2	11	Raa (R)	CT	RTL Connecting Terminal (Ifuru)				1			1	4	2	13	16
18	4	8	Laamu (L)	HT	RTL Hub Terminal (Gan: Mukurimagu)			1				2	3	1	13	16
19	5	2	Gaafu Alifu (GA)	F	RTL Ferry	2						4	1	1	15	19
20	6	1	Seenu (S)	F	RTL Speed Ferry (30 pax)	2						4	1	1	15	19

Serial No.	Zone	No.	Atoll	Contents		Number of Maintenance						Priority				
						RTL Ferry	Backup Boat	Terminal Building			Others	Zone	Function	Order	Weighted score	Rank
								Hub	Connecting	Stop						
				Total		28	1	2	12		5	3	2	1		
21	2	12	Raa (R)	CT	RTL Connecting Terminal (Dhuvaafaru)				1			1	4	5	16	21
22	2	13	Baa (B)	CT	RTL Connecting Terminal (Dharavandhoo)				1			1	4	5	16	21
23	2	14	Baa (B)	CT	RTL Connecting Terminal (Ghulhaadhoo)				1			1	4	5	16	21
24	4	7	Laamu (L)	WS	Port Facility(Workshop) (Gan HT)						1	2	4	2	16	21
25	4	12	Meemu (M)	CT	RTL Connecting Terminal (Muli)				1			2	4	2	16	21
26	4	14	Thaa (Th)	CT	RTL Connecting Terminal (Veymandoo)				1			2	4	2	16	21
27	4	9	Thaa (Th)	CT	RTL Connecting Terminal (Thimarahushi)				1			2	4	3	17	27
28	4	11	Faafu (F)	CT	RTL Connecting Terminal (Magoodhoo)				1			2	4	3	17	27
29	5	3	Gaafu Dhaalu (GDh)	JC	Port Facility(Jib Crane) (Thinadhoo HT)						1	4	2	1	17	27
30	2	15	Raa (R)	B	RTL Backup Boat		1					1	7	1	18	30
31	4	13	Laamu (L)	CT	RTL Connecting Terminal (Kadhdhoo)				1			2	4	4	18	30
32	4	15	Thaa (Th)	CT	RTL Connecting Terminal (Guraidhoo)				1			2	4	4	18	30
33	4	16	Thaa (Th)	CT	RTL Connecting Terminal (Vilufushi)				1			2	4	4	18	30
34	4	17	Faafu (F)	CT	RTL Connecting Terminal (Nilandhoo)				1			2	4	4	18	30
35	5	1	Gaafu Dhaalu (GDh)	F	RTL Ferry	1						4	1	4	18	30
36	2	16	Noonu (N)	B	RTL Backup Boat		1					1	7	2	19	36
37	2	17	Lhaviyani (Lh)	B	RTL Backup Boat		1					1	7	2	19	36
38	6	2	Seenu (S)	JC	Port Facility(Jib Crane) (Fuvammular CT)						1	4	2	3	19	36
39	5	5	Gaafu Dhaalu (GDh)	HT	RTL Hub Terminal (Thinadhoo)			1				4	3	1	19	36
40	2	18	Baa (B)	B	RTL Backup Boat		-					1	7	3	20	40
41	5	4	Gaafu Alifu (GA)	JC	Port Facility(Jib Crane) (Villingilli CT)						1	4	2	4	20	40
42	6	4	Seenu (S)	HT	RTL Hub Terminal (Hithadhoo)			1				4	3	2	20	40
43	1	1	Haa Dhaalu (HDh)	JC	Port Facility(Jib Crane) (Kulhudhuffshi HT)						1	5	2	1	20	40
44	4	10	Dhaalu (Dh)	FS	RTL Ferry Stop (Kudahuvadhoo)					1		2	6	3	21	44
45	4	18	Laamu (L)	B	RTL Backup Boat		1					2	7	1	21	44
46	4	21	Meemu (M)	B	RTL Backup Boat		1					2	7	1	21	44
47	4	19	Thaa (Th)	B	RTL Backup Boat		1					2	7	2	22	47
48	5	11	Gaafu Dhaalu (GDh)	WS	Port Facility(Workshop) (Thinadhoo HT)						1	4	4	2	22	47
49	4	20	(Dh)~(F)	B	RTL Backup Boat		-					2	7	3	23	49
50	5	6	Gaafu Alifu (GA)	CT	RTL Connecting Terminal (Villingilli)				1			4	4	3	23	49
51	6	5	Gnaviyani (Gn)	CT	RTL Connecting Terminal (Fuvammular)				1			4	4	3	23	49
52	6	3	Seenu (S)	WS	Port Facility(Workshop) (Fuvammular CT)						1	4	4	4	24	52
53	6	6	Seenu (S)	CT	RTL Connecting Terminal (Hulhumeedhoo)				1			4	4	4	24	52
54	5	8	Gaafu Dhaalu (GDh)	CT	RTL Connecting Terminal (Kaadehdhoo)				1			4	4	5	25	54
55	5	9	Gaafu Alifu (GA)	CT	RTL Connecting Terminal (Kooddoo)				1			4	4	5	25	54
56	5	10	Gaafu Alifu (GA)	CT	RTL Connecting Terminal (Maavaarulu)				1			4	4	5	25	54
57	5	12	Gaafu Alifu (GA)	WS	Port Facility(Workshop) (Villingilli CT)						1	4	4	5	25	54
58	6	7	Seenu (S)	CT	RTL Connecting Terminal (Feydhoo)				1			4	4	5	25	54
59	5	7	Gaafu Dhaalu (GDh)	FS	RTL Ferry Stop (Vaadhoo)					1		4	6	1	25	54
60	1	2	Haa Dhaalu (HDh)	WS	Port Facility(Workshop) (Kulhudhuffshi HT)						1	5	4	2	25	54
61	1	7	Haa Alifu (HA)	CT	RTL Connecting Terminal (Ihavandhoo)				1			5	4	3	26	61
62	1	8	Haa Alifu (HA)	CT	RTL Connecting Terminal (Dhihdhoo)				1			5	4	3	26	61
63	1	9	Haa Dhaalu (HDh)	CT	RTL Connecting Terminal (Hanimaadhoo)				1			5	4	3	26	61
64	1	10	Shaviyani (Sh)	CT	RTL Connecting Terminal (Bileyfahi)				1			5	4	3	26	61
65	5	13	Gaafu Dhaalu (GDh)	B	RTL Backup Boat		2					4	7	1	27	65
66	6	8	Seenu (S)	B	RTL Backup Boat		-					4	7	1	27	65
67	1	6	Haa Alifu (HA)	CT	RTL Connecting Terminal (Huvarafushi)				1			5	4	4	27	65
68	1	11	Haa Dhaalu (HDh)	B	RTL Backup Boat		-					5	7	4	33	68
69	1	3	Haa Dhaalu (HDh)	O	Port Facility(Ponping Station) (Kulhudhuffshi HT)						1	5	8	5	36	69
70	1	4	Haa Dhaalu (HDh)	O	Port Facility(Dock) (Kulhudhuffshi HT)						1	5	8	5	36	69
71	1	5	Haa Dhaalu (HDh)	O	Port Facility(Crane) (Kulhudhuffshi HT)						1	5	8	5	36	69

(4) Selection of Priority Candidate Projects

Based on priority by zone and functional categories, as well as the ranking of maintenance tasks considering their sequences, the following priority candidate projects were selected for potential support as Grant Aid.

Table 6-13: Priority Candidate Projects

Project	Target Zone	Project Summary
1	Zone 2	RTL ferry service has already started in two of the four atolls, Expansion in Zone 2 will be supported through the introduction of new ferries to the remaining two atolls and by enhancing the maintenance of a main terminal building (one location) as well as a service center (one location) at each atoll.
2	Zone 2	RTL ferry service has already started in two of the four atolls, Expansion in Zone 2 of ferry service will be supported by the introduction of new ferries to the remaining two atolls and by enhancing the maintenance of main terminal buildings (two locations) and service center (one location) at each atoll.
3	Zone 4	The start of the RTL ferry service is planned after the completion of Zone 2 project and the expansion of the ferry service in Zone 4. It will be supported by the introduction of new ferries in all five atolls and by enhancing the maintenance of main terminal buildings at each atoll.

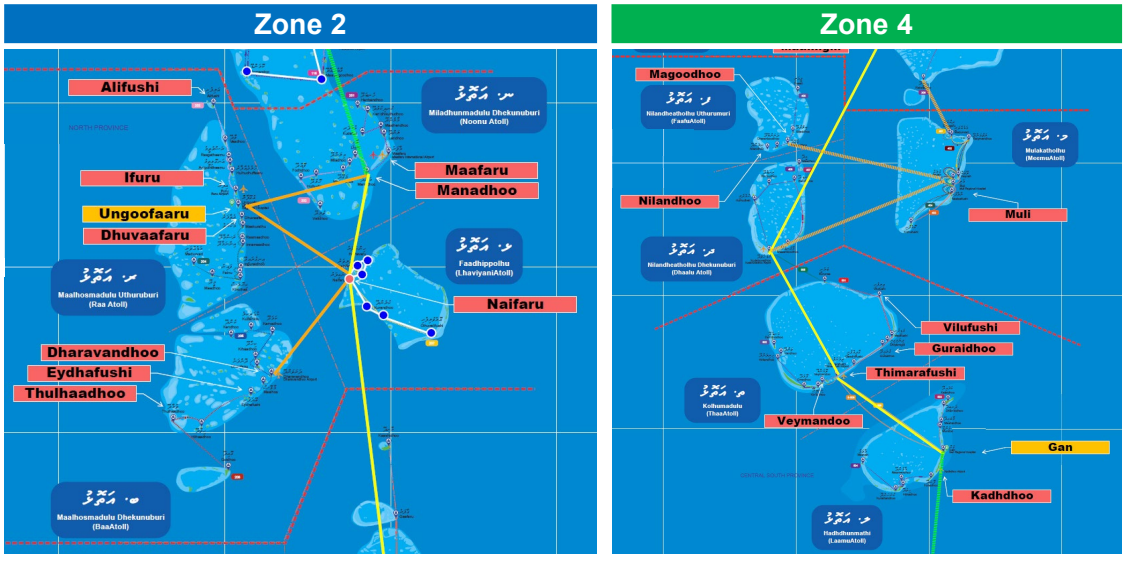


Figure 6-1 Status of RTL ferry service in each zone

1) Priority Candidate Project 1 (Zone 2)

As for Priority Candidate Project 1, RTL ferries and back-up vessels will be introduced to Raa and Baa atolls, where RTL ferry service has not yet begun in Zone 2. Furthermore, backup vessels will be introduced to Noonu Atoll (Noonu), where partial service began in July 2024. Some of the vessels introduced to each atoll will also support inter-atoll routes.

In addition, a service center, including a hub terminal (passenger terminal building) and vessel maintenance facilities, etc. will be established in Ungoofaaru, which serves as the hub for Zone 2.

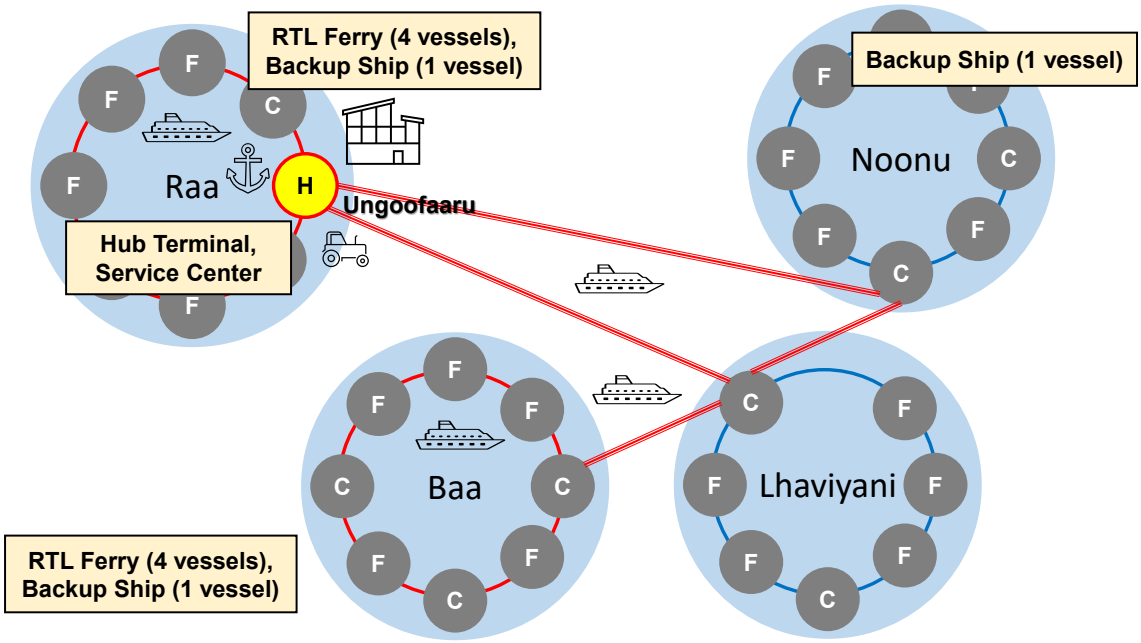


Figure 6-2 Priority Candidate Project 1 - Development Image (Zone 2)

2) Priority Candidate 2 (Zone 2)

As for Priority Candidate Project 2, RTL ferries and back-up vessels will be introduced to Raa and Baa atolls, where RTL ferry service has not yet begun in Zone 2. Some of the vessels introduced to each atoll will also support inter-atoll routes.

Furthermore, a service center will be established in Ungoofaaru, serving as the hub for Zone 2. This will include a hub terminal (passenger terminal building) and facilities for vessel maintenance. A connecting terminal will also be developed in Manadhoo to enhance RTL ferry services across a broader area and to support the future development of a nationwide highway link.

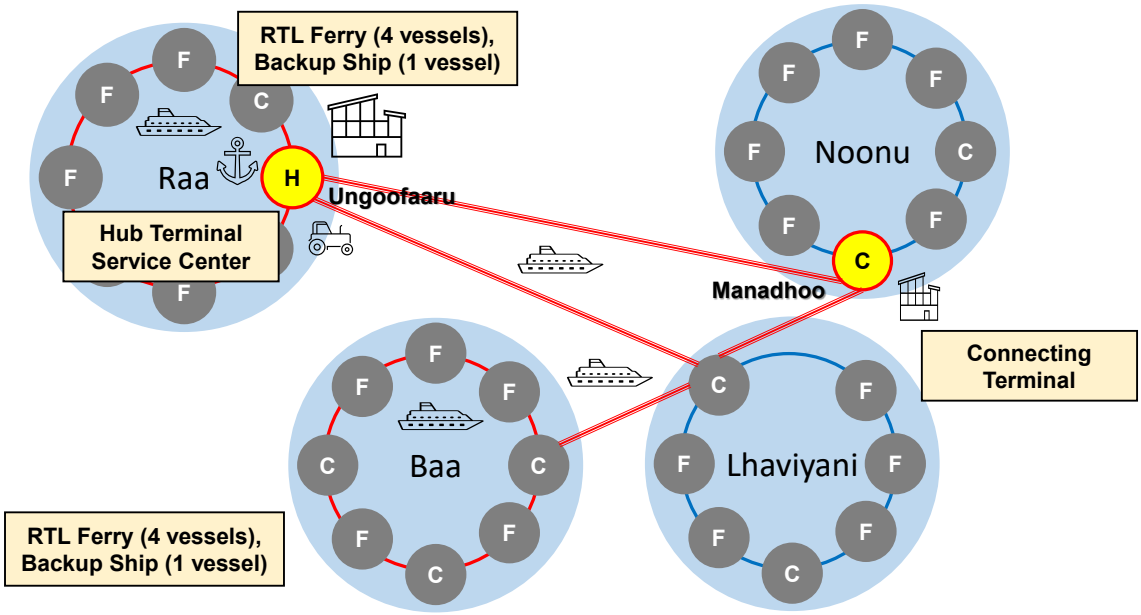


Figure 6-3 Priority Candidate Project 2 - Development Image (Zone 2)

3) Priority Candidate Project 3 (Zone 4)

As for Priority Candidate Project 3, RTL ferries and backup vessels will be introduced to all atolls in Zone 4, where RTL ferry service has not yet begun. Some of these vessels will also facilitate inter-atoll routes.

Furthermore, a service center, including a hub terminal (passenger terminal building) and vessel maintenance facilities, will be established in Gan, which will serve as the central hub for Zone 4.

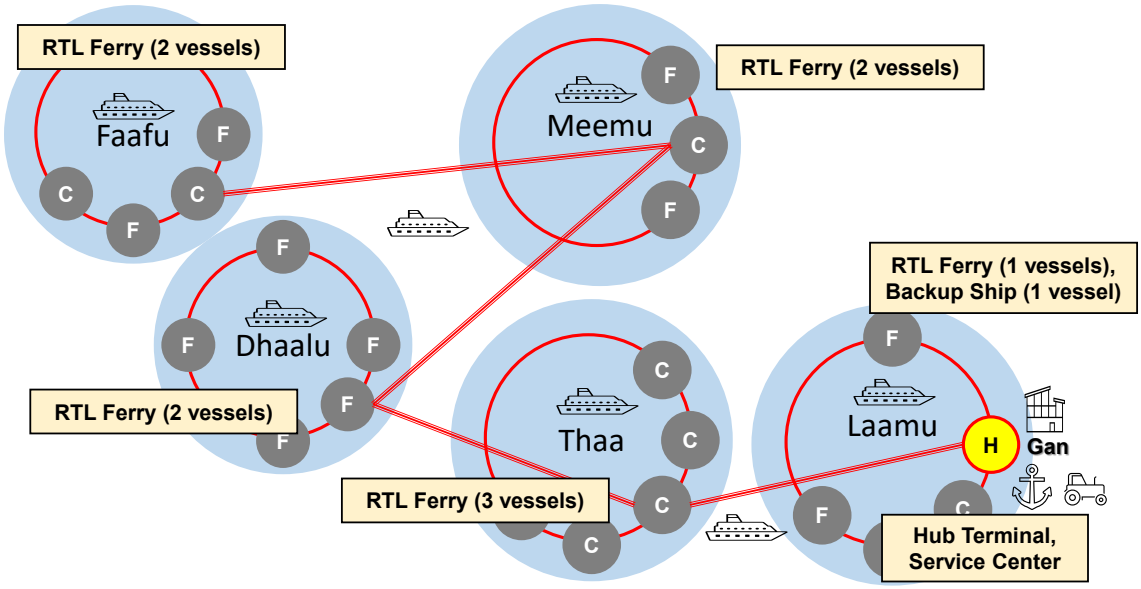


Figure 6-4 Priority Candidate Project 3 - Development Image (Zone 4)

6-2. Implementation Plan for Priority Projects

6-2-1 Facility Planning

(1) Facilities Introduced

The facilities to be introduced for the priority projects are outlined in the following table, based on the field survey results.

Table 6-14 Facilities to be Introduced

	Facilities Introduced	Summary
1	New RTL Ferry	• High-speed ferry, designated by Japanese standards to enhance operational efficiency and passenger comfort. • There are two types of passenger capacity: 50 passengers (within atolls) and 30 passengers (between atolls).
2	Passenger terminal	• Hub and connecting terminals based on actual local usage need. • Maintenance of facilities: Improvements to enhance usage patterns based on current service conditions and user comfort.
3	Service Center	• Maintenance facility for vessels with maintenance store, lifting and lowering facilities, forklifts, etc.
	− Maintenance Shop	• Workspace to be designed for the safe navigation of vessels, improvement of operational efficiency, and safe execution of maintenance work. • The maintenance shop functions consist of visually inspecting the bottom of the vessel for damage, etc., providing cleaning, painting, maintenances for the propulsion system, and replacements of consumable parts.
	− Lifting and lowering facilities equipment (cranes, etc.)	• Facilities for unloading vessels. • Space-saving and efficient cranes are installed close to the wharf.
	− Forklifts, etc.	• Versatile forklift for transporting berths for landing ships, carrying ship's equipment, and moving lifts and berths within the workshop.

Source: JICA Survey Team

(2) New RTL Ferry

1) Vessel Specifications, etc.

① Navigation Zone

The new RTL ferry will be a coastal passenger vessel, similar to the current design, and will operate within and between atolls in the Maldives.

② Passenger Capacity

According to field interviews, there are no specific requests for a review of passenger capacity, except for the inter-atoll routes in Zones 5 and 6. Therefore, the new ferries will maintain the current passenger capacity: 50 passengers, 4 crew members, space for 2 wheelchairs, and space for 1 stretcher.

However, for the inter-atoll routes in Zones 5 and 6, there is a confirmed demand for smaller ferries (with a 30-passenger capacity) that offer improved sailing speed and better meet passenger demand and punctuality. Consequently, vessels with a capacity of 30 passengers, 4 crew members, space for 2 wheelchairs, and space for 1 stretcher will also be considered.

③ Main Specifications (length, width, draft)

Vessel specifications will be based on two types with different passenger capacities, referring to the current vessels. The final hull form will be determined through detailed ship design, considering factors such as weight reduction and hydrodynamic design. In this section, the main specifications, shown in the following table, were established for facility planning and project cost estimation, based on the current RTL ferry (manufactured by Al Shaali).

The hull form of the new RTL ferry for inter-atoll routes (30 passengers) will be designed for high-speed navigation. It is required to feature a high wave-resistant design and stable, safe engines suitable for open sea conditions (to be discussed further in the future).

Table 6-15 New RTL Ferry Main Specifications (Assumption)

	Length (m)	Width (m)	Draft (m)
New RTL Ferry (within the atoll)	16.8m	4.9m	1.0m

Source: JICA Survey Team

④ Sailing Speed

The speed requirement set by the Government of the Maldives for RTL ferries is 25-30 knots with a full load. This requirement was relaxed from 30 knots in Phase 1 to 25-30 knots in Phases 2 and 3. Field interviews confirmed that sailing speeds of 25-27 knots are necessary to maintain punctuality of the operating schedule. However,

speeds can be reduced when the vessel is heavily loaded with passengers. Therefore, for the new RTL ferry designed for inter-atoll routes (30 passengers), it is essential that the vessel can maintain a sailing speed of 25-27 knots even when fully loaded.

⑤ Hull Material

Hull materials for small passenger vessels are generally either FRP (Fiber Reinforced Plastic) or aluminum, both of which are relatively inexpensive to manufacture and lightweight. FRP vessels are already being constructed in shipyards in the Maldives, with readily available materials and relatively easy maintenance. Therefore, the hull material for the new RTL ferries will be FRP, consistent with the current RTL ferries.

Table 6-16 Comparison of FRP and Aluminum Vessels

Item	Contents	FRP ship	Aluminum ship
Material characteristic	Characteristics of Craft Methods	Integral molding by form	Welded connections
	Freedom of structural design *1	Flexible strength orientation and partial reinforcement	Uniformity is fundamental (same thickness)
Economic element	Ship Price *2	◎Less expensive than an aluminum ship	○More expensive than a FRP vessel
	Durability	◎Relatively little deterioration	○Regular maintenance required
	Recycling *3	△There is a problem of disposal	◎Recyclable aluminum material
From the operational point of view df	Draft	○Almost equal to an aluminum ship	○Almost equivalent to a FRP vessel
	Weight	○Heavy than an aluminum ship	◎Lighter than a FRP ship
	Engine *4	○Need engines with more power than an aluminum ship	○Fine with a smaller engine with less power than that of a FRP vessel
Maintenance side	Hull Strength	○Hull is flexible and strong.	△Possible hull damage in rough seas
	Hull maintenance *5	○No need for electric corrosion of the hull itself	△Periodic docking is required.
Design	Designability	◎Flexible molding of curved surfaces	○Restrictions are imposed due to the folding of the board material.
Evaluation		◎	○

Note: Draft, hull weight, and speed are based on hull design.

*1: FRP vessels can be made lighter by applying the required thickness to necessary areas.
*2: Ship prices may fluctuate depending on market conditions.
*3: Both vessels require removal of interior materials, glass, etc. FRP can be crushed and mixed with asphalt
*4: Due to the hull weight, the output of the engine of an aluminum ship may be larger.
*5: Both vessels need to remove seaweed and other debris from hull surfaces. Aluminum vessels require periodic electrical corrosion and rust removal.

Source: JICA Survey Team based on manufacturer interviews, etc.

⑥ Main Machine and Propulsion Method

The main engines of the RTL ferries currently in operation are diesel engines, which are widely used in the Maldives. To facilitate maintenance by technical staff, the new ferries will also use diesel engines. Manufacturer interviews confirm that these diesel engines can be co-fired with biofuels. If a biofuel supply system is established within the Maldives in the future, biofuels could be utilized.

For propulsion, the water jet propulsion system is considered the most appropriate due to its suitability for shallow water and high-speed operations.

Table 6-17 Comparison of Ship Propulsion Methods

Driving Method	Summary	Evaluation
Screw Propeller	The most commonly used method, which excels in terms of efficiency and cost, is widely employed but has limitations in maneuverability and use in shallow waters.	○
Water Jet Propulsion	This method involves drawing water in and expelling it backward at high pressure to generate thrust. It is suitable for operating in shallow waters and areas with many obstacles and is commonly used in high-speed boats and recreational vessels. However, it is less efficient at low speeds compared to propeller-driven systems.	◎
Electric Propulsion	This method involves using an electric motor to rotate the propeller, with power supplied from batteries or fuel cells. Electric propulsion is environmentally friendly and quieter, leading to increased use in urban waterways and tourist boats. However, it requires the development of charging infrastructure and the integration of batteries into vessel design, which can impact ship design.	△
Hybrid Propulsion	This method combines internal combustion engines with electric motors. During regular operations, the internal combustion engine is used, while the electric motor is employed for low-speed navigation and operations within ports. This approach improves fuel efficiency and reduces environmental impact. However, it results in a more complex system due to the need to accommodate both internal combustion engines and electric motors.	△

Source: JICA Survey Team

⑦ Marine Fuel

Currently, the general types of fuel used for vessels in the Maldives are as follows: diesel for vessels equipped with diesel engines, such as RTL ferries; gasoline for speedboats with outboard engines; and heavy oil for cargo ships and dhoni ferries.

For next-generation marine fuels, hydrogen, ammonia, and biofuels are being explored. Hydrogen and biofuels are considered suitable for small vessels. However, hydrogen requires development of supply and storage systems and secure placement of hydrogen tanks on vessels. At present, as shown in Table 6-18, , biofuels are a more practical option as they are available at usable levels for co-firing, can utilize existing fuel tanks, and do not require special supply infrastructure. Nevertheless, the current situation, especially in rural areas, lacks a stable and low-cost system for collecting and supplying sufficient biofuel. Therefore, it is suggested to reconsider the use of biofuels once a supply system has been demonstrated and socially implemented through pilot projects and other initiatives.

Table 6-18 Current Status and Issues of Biofuels

Current Situation	✓ Biofuels are at commercial levels in co-firing. ✓ Current fuel tanks can be used, and there is no need to place tanks or other equipment for new fuel. ✓ It can be supplied from land and does not require special supply infrastructure.
Issues	✓ The use of biofuels presents challenges in terms of combustibility, mixing stability, component corrosion, fuel quality variability, supply infrastructure, and system development.

Source: JICA Survey Team

⑧ Utilization of Japanese Technology

Examples of the use of Japanese technology for vessels are shown below.

Currently, engines from Japanese manufacturers are used on RTL ferries, and they are very reliable from locals. Recently, engines have been delivered to local shipbuilding companies upon requests.

According to consultations with Japanese manufacturers, integrating engine and hull design can enable the proposal of more operationally efficient vessels. Additionally, in Japan, there is the "Passenger Ship Barrier-Free Guidelines - 2021, Ministry of Land, Infrastructure, Transport and Tourism, Maritime Bureau, Safety Policy Division." Although there are spatial constraints for small passenger vessels, design in accordance with these guidelines is also possible.

Table 6-19 Japanese Technologies Expected to be Used in Small Passenger Vessels

Product		Summary
Engine		Japanese engines are widely used on vessels throughout the world because of their superior durability and fuel efficiency.
Air Conditioner	Air Conditioners, etc.	Japanese air conditioning equipment is energy-efficient and highly reliable.
Marine Electronics	Ship Radar	It uses radio waves to detect other vessels and obstacles to assist safe navigation during night and in bad weather. Japanese manufacturers are highly reliable and durable.
	GPS Navigation System	Receives signals from satellites to accurately determine the position of its own ship. Japan's GPS navigation systems are highly claimed throughout the world.
Painting Material	Antifouling paint	Antifouling paints prevent fouling of the ship's bottom and improve fuel efficiency. This is expected to reduce maintenance costs and environmental impact. Japanese products are characterized by long-term maintenance of antifouling performance.
	High heat-reflective type paint	The use of paint that reflects the sun's heat can reduce the temperature rise inside the vessel and reduce the use of air conditioning. Japanese products can maintain their thermal barrier performance over a long period of time.
	Environmentally friendly paint	Japan is strictly compliant with environmental regulations and is developing paints that do not contain toxic substances.
Design	Design for lighter weight	Fuel efficiency will be improved, and operating costs will be reduced due to the lighter weight of the hull. Achieve weight reduction while maintaining strength.
	Fluid dynamic design	By optimizing the shape of the hull, the design will reduce water resistance and improve fuel efficiency.
Others	Weather routing	It is a technique to select the best route (minimum time and minimum fuel consumption) based on weather forecasts and oceanographic data. Contribute to improved vessel operating efficiency, reduced fuel consumption, and safer navigation. It is particularly effective on long-distance routes, such as intercontinental crossings.
	System for autonomous ship	A system that automates vessel maneuvering and is used even when crew members are on board. There is no shortage of crews, and the situation is not of high importance.

Source: JICA Survey Team

2) Shipbuilding Costs

Current RTL ferries are constructed with FRP hulls built domestically in the Maldives, while equipment such as engines and generators are imported from abroad and assembled locally. Therefore, the cost of building vessels is calculated based on local shipbuilding prices.

On the other hand, for construction in Japan, the cost is expected to vary significantly depending on vessel design, interior specifications, and the equipment used. Hence, the cost will be estimated based on general domestic construction records.

① Shipbuilding Costs (Local Production)

According to local consultations, MTCC is designing a new RTL ferry and estimates the construction cost at 65 million yen. On the other hand, domestic FRP boat manufacturers report that construction costs have surged in recent years, increasing by approximately 50% compared to a few years ago. Considering similar trends abroad, this survey assumes that the construction cost for new vessels locally will be 98 million yen, which is 1.5 times the estimated price of the new vessel.

② Shipbuilding costs (Produced in Japan)

・Shipbuilding costs

Based on the "Reinforced Plastic (FRP) Ship Construction Statistics" from the Ministry of Land, Infrastructure, Transport and Tourism in Japan, construction costs are set. According to these statistics, there have been no recent passenger ship construction records, with the latest being from 2018. Previously, construction costs ranged from 4.13 million yen/GT to 6.17 million yen/GT, with some variation. Using the higher figure of 6.17 million yen/GT for the new RTL ferry, the estimated construction cost would be 120 million yen. Considering a 1.5 times increase compared to that period, the construction cost in Japan is estimated to be 176 million yen.

・Circular expenses

Vessels produced in Japan will require transportation to overseas locations. According to consultations with domestic FRP manufacturers, vessels of this size cannot be transported by container ships or RORO (Roll-on/Roll-off) ships and must be loaded onto the deck of general cargo ships for transport.

Transportation costs are estimated to be between 15 million and 20 million yen. However, with recent trends showing high shipping costs, 20 million yen is assumed as the transportation cost..

(3) Passenger Terminal

1) Facility Size and Specifications

① Introductory Function

Based on the field survey, the functions to be implemented at the hub terminal, connecting terminal, and ferry stop shall be as follows

Table 6-20 Passenger Terminal Introduction Features

classification	Introductory function
Hub regional terminal	Internal passenger area: waiting area (120 seats), luggage storage, men's and women's restrooms, multipurpose restroom, nursing room, kiosk/commercial area, prayer room, cleaning room Internal office area: offices, conference room, break room, hot water supply room, warehouse External Passenger Area: Porte-cochere (Taxi, etc.)
Connecting terminal	Internal passenger area: waiting area (80 seats), luggage storage, men's and women's restrooms, multipurpose restroom, nursing room, kiosk/commercial area, cleaning room Internal office area: offices, conference room, break room, hot water supply room, warehouse External Passenger Area: Porte-cochere (Taxi, etc.)
Ferry stop	Internal passenger area: waiting area (30 seats), men's and women's restrooms, multipurpose restroom, kiosk Internal office area: - Internal office area: - Internal office area: - Internal office area External Passenger Area: - External Passenger Area

Source: JICA Survey Team based on MTCC's conceptual design documents.

② Facility Scale

The size of the facility shall be comparable to the MTCC concept design documents. All waiting areas at the connecting terminal will be indoors, taking into account that users have requested indoor waiting areas to avoid torrential rain.

Table 6-21 Facility Size

Classification	structural form	MTCC proposal	review bill
Hub regional terminal	Reinforced concrete construction	Single-storied house Floor area 518 m^2 (including courtyard area)	same as on the left
Connecting terminal	Reinforced concrete construction	Single-storied house Floor area 127.86 m^2 Outdoor waiting area 63.26 m^2	Floor area 191.12 m^2 *Including outdoor waiting facilities in the building.
Ferry stop	Reinforced concrete construction	Single-storied house Floor area 81.64 m^2	same as on the left

Source: JICA Survey Team based on MTCC's conceptual design documents.

③ Utilization of Japanese Technology

The Japanese technologies that could be adopted for the development of passenger terminals have been selected based on recent trends and background in Japanese architectural technology. The facilities anticipated for adoption include hub terminals and connecting terminals. Since ferry stops have simpler specifications and limited functions, it is considered that the range of Japanese technologies applicable to these facilities is narrower.

Table 6-22 Anticipated Japanese Technologies (Hub/Connecting Terminals)

Classification	Japanese technology	Objective.
Roofing	Metal roof (galvalume steel sheet with integrated heat insulation)	Improved durability, longer service life, reduced environmental impact, etc.
Glasswork	Low-E double-glazing glass	energy-saving
Painting work	Thermal insulation coating (roof section)	Reduction of environmental impact
Thermal insulation works	Insulation (ceilings, walls, etc.)	Reduction of environmental impact
Mechanical equipment construction	Air conditioner (automatic control)	energy-saving
	Ventilation (total heat exchanger)	energy-saving
Electrical equipment construction	Lighting (LED)	energy-saving
	Lighting control (Motion Sensors)	energy-saving
	Daylight Control	energy-saving
Water supply and drainage Sanitary facilities construction	Water saving toilet	water conservation
	Hand wash basin with automatic faucet	water conservation
Other construction	Photovoltaic Generator Equipment	Utilization of renewable energy

Table 6-23 Anticipated Japanese Technologies (Ferry Stops)

Classification	Japanese technology	Objective
Mechanical equipment construction	Air conditioner (automatic control)	energy-saving
	Ventilation (total heat exchanger)	energy-saving
Electrical equipment installation	Lighting (LED)	energy-saving
	Lighting control (Motion Sensors)	energy-saving
	Daylight Control	energy-saving
Water supply and drainage Sanitary facilities construction	Water saving toilet	water conservation
	Hand wash basin with automatic faucet	water conservation

2) Construction costs

① Construction costs

Based on the concept design materials from MTCC, the construction costs using the Japanese technologies shown in Table 6-22 and Table 6-23 were calculated.

The Japanese technologies under consideration are adopted as standard specifications in recent Japanese facilities, so their construction costs and unit costs per square meter were used. The construction costs for Japan were estimated based on recent data from the past three years (2021-2023) from the JBCI database, using buildings with similar functions to passenger terminals as references.

For the Hub Terminal and Connecting Terminal, construction costs also include the installation of solar power facilities, which are strongly requested locally, and the provision of covered walkways from the terminal to the vessels. The calculated results are as follows

Table 6-24 Terminal Construction Costs

Hub terminal

Section	Assumed unit construction cost (yen/m2)	Area (m2)	Construction cost (yen)	Transportation and other costs (yen)	Total construction cost (yen)
Terminal construction cost	305,000	518	157,990,000	7,500,000	165,490,000
Solar power generation facilities	65,000	200	13,000,000	3,000,000	16,000,000
Covered walkways	60,000	200	12,000,000	3,000,000	15,000,000
Total					196,490,000

Connecting terminal

Section	Assumed unit construction cost (yen/m2)	Area (m2)	Construction cost (yen)	Transportation and other costs (yen)	Total construction cost (yen)
Terminal construction cost	305,000	191	58,291,600	3,000,000	61,291,600
Solar power generation facilities	65,000	100	6,500,000	1,500,000	8,000,000
Covered walkways	60,000	150	9,000,000	2,500,000	11,500,000
Total					80,791,600

Ferry stop

Section	Assumed unit construction cost (yen/m2)	Area (m2)	Construction cost (yen)	Transportation and other costs (yen)	Total construction cost (yen)
Terminal construction cost	219,000	82	17,879,160	1,500,000	19,379,160
Solar power generation facilities	-	-	-	-	0
Covered walkways	60,000	50	3,000,000	1,500,000	4,500,000
Total					23,879,160

Source: JICA Survey Team

(4) Service Center (Ship Repair Facility)

1) Facility Size and Specifications

i) Workshop

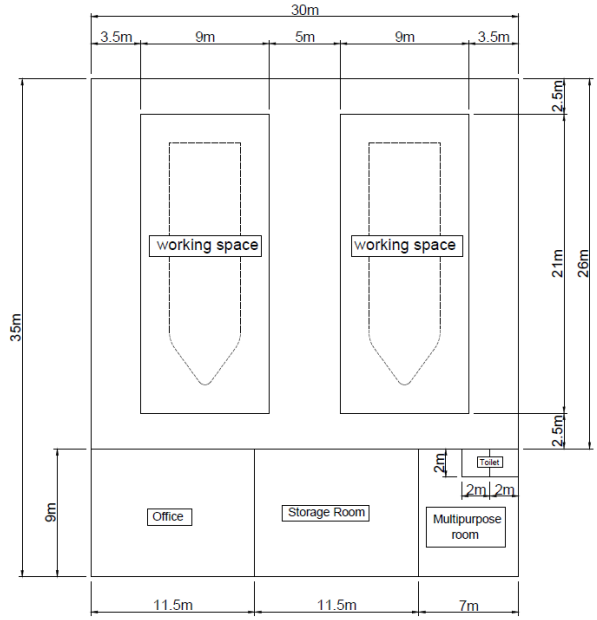
① Introductory Function

Secure workspace for ship repairs, storage for tools, replacement parts, engine oil, etc., office space, and restrooms.

② Facility Size and Layout

The service center will be prioritized for RTL ferries. In anticipation of situations where emergency offloading of vessels is required during regular maintenance of RTL ferries, space will be allocated for a workshop sufficient to accommodate two vessels.

The required area will be 1,050 square meters to include working space near the hull, space for cargo handling equipment (5-ton forklift) within the workshop, and passageways for workers. The basic layout plan is shown below.



Source: JICA Survey Team

Figure 6-5 Proposed workshop layout

ii) Lifting and lowering Crane

① Structural Form

The Lifting and lowering facilities, options include fixed cranes, self-propelled hoists, and ramps. Considering local requests and conditions, the installation of a fixed (slewing) crane is anticipated. This type of crane can be installed in a small space and allows for the rapid offloading of vessels.

Source: Courtesy of crane manufacturer

Figure 6-6 Slewing crane image

② Facility Specification

A crane capable of lifting vessels equivalent to the weight of the current RTL ferry (20 tons) will be installed. From interviews with the crane manufacturer, it was decided to install the crane close to the quay (a few meters away) and considering the working radius (about 10 to 15 meters), an upper and lower crane with a lifting load of 40 to 50 tons will be installed.

iii) Forklift

① Intended Use

It is used for tasks such as bringing offloaded vessels to the workshop and lifting ship engines for maintenance purposes. Similar operations are carried out using forklifts at MTCC-Shipyard.

② Rated Capacity

The rated load of the forklift shall be 5 tons according to the hearing.

iv) Shipbuilding Berth

① Purpose of Use

A berth for moving and transporting landed vessels.

② Specification

The berth shall be available for 20-ton vessels.

2) Construction Costs

The workshop used MTCC's conceptual design documents as a reference to calculate construction costs.

The lifting and lowering cranes, forklifts, etc. were set based on interviews with manufacturers.

Table 6-25 Service Center Construction Costs

Section	Unit cost (yen/m2)	Width（m）	Length（m）	Amount (m2)	Construction cost (yen)
Workshop construction cost	155,500	30	35	1,050	163,275,000
Pavement	20,000	30	20	600	12,000,000
Berth	3,000,000			2	6,000,000
Mobile Crane（5t）	10,000,000			1	10,000,000
Total					191,275,000

*The pavement is the section from the front of the workshop to the quay.

Source: JICA Survey Team

6-2-2 Ownership of Land, etc.

The owner of the land and mooring facilities for the RTL ferry terminal is the island council. Similar to the zones 1, 2, 5, and 6 where the service is currently provided, the RTL ferry service dedicated area will be leased free of charge. Among the priority projects, the landowner for the terminal building is as shown in the table below.

Table 6-26 Land Ownership

zone	terminal	Land Owner
Zone 2	Ungfar Hub Terminal	Ungfar Island Council
	Manadu Connecting Terminal	Manadu Island Council
Zone 4	Gun Hub Terminal	Ganjima Council

6-2-3 Natural Conditions, Surveying Studies, etc.

The specifications for natural conditions, surveying studies, etc. required for the implementation of the project are shown in the table below.

Table 6-27 Natural Conditions and Survey Investigations

Survey classification	Item	Specification
Topographical survey	Scope of Survey	• Site for RTL Ferry Terminal Building • Service Center Site • RTL Ferry Mooring Facility Area (Apron)
	Property boundary	• To be confirmed
Boring survey	Survey site	• Apron side (onshore), 2 locations • Terminal side (on land) 2 locations
	Depth	• Assumed to be about 15m
	CBR Test	• 2 locations

6-2-4 Environmental and Social Considerations and Gender Equality

(1) Environmental and Social Considerations

The EPA has indicated that an Environmental Impact Assessment (EIA) is not required for the priority candidate projects, as all work will be conducted onshore with no offshore activities involved. However, it is necessary to verify the latest environmental and social laws, regulations, and standards in the Maldives at the time of implementation and to fully discuss these with the EPA.

(2) Gender Equality

The RTL ferry service is essential for public transportation, providing access to advanced medical care and checkups, especially for pregnant women. It is crucial to discuss with MTCC, MTCA, and the steering committee how to ensure private spaces, such as nursing rooms, are available for safe use during boarding or while waiting at the ferry terminal.

Furthermore, the nationwide expansion of the RTL ferry service will require various personnel, including administrative and operational staff, technical staff, captains, crew, and ground staff. It is important to develop the organization with a focus on promoting gender equality and women's empowerment.

6-2-5 Estimated Cost of Priority Candidate Projects

Based on the results of the above study, the estimated costs of the Priority Candidate Projects are shown in the Table below.

Table 6-28 Estimated Costs of Priority Candidate Projects

(Unit: Millions of yen)

Classification		Equipment / Facilities		Approximate Estimated Unit Price	Project 1		Project 2		Project 3	
					Quantity	Price	Quantity	Price	Quantity	Price
1. Construction / Equipment Costs						1,685		1,669		1,685
	Vessels	F	RTL Ferry	98	8	780	8	780	10	975
		B	Backup Ship	98	3	293	2	195	1	98
	Terminals	HT	Hub Terminal	196	1	196	1	196	1	196
		CT	Connecting Terminal	81			1	81		
		FS	Ferry Stop	24						
	Service Center	JC	Jib Crane	225	1	225	1	225	1	225
		WS	Workshop	191	1	191	1	191	1	191
2. Detailed Design Costs					1	189	1	261	1	189
3. Bidding and Construction Supervision Costs					1	111	1	163	1	111
Total						1,986		2,093		1,986

6-2-6 Project Schedule for Priority Candidate Projects

The project schedule for the priority candidate projects is shown in the table below, categorized by Vessel, Hub terminal, and service center.

Table 6-29 Project Schedule

Vessel

	Item	Period (Month)	6	12	18	24	30
1	Detailed design (including the preparation of bidding design drawings)	12					
2	Bidding/Contract Negotiations	2					
3	Contract Authentication	1					
4	Construction of facilities and execution of equipment procurement	12					

Hub Terminal

	Item	Period (Month)	6	12	18	24	30
1	Detailed design (including the preparation of bidding design drawings)	6					
2	Bidding/Contract Negotiations	2					
3	Contract Authentication	1					
4	Construction of facilities and execution of equipment procurement	14					
	- Civil engineering works	3					
	- Construction work	12					
	- Material Procurement	6					

Connecting Terminal

	Item	Period (Month)	6	12	18	24	30
1	Detailed design (including the preparation of bidding design drawings)	6					
2	Bidding/Contract Negotiations	2					
3	Contract Authentication	1					
4	Construction of facilities and execution of equipment procurement	13					
	- Civil engineering works	3					
	- Construction work	11					
	- Material Procurement	6					

Service Center

	Item	Period (Month)	6	12	18	24	30
1	Detailed design (including the preparation of bidding design drawings)	6					
2	Bidding/Contract Negotiations	2					
3	Contract Authentication	1					
4	Construction of facilities and execution of equipment procurement	12					
	- Civil engineering works	3					
	- Construction work	6					
	- Material Procurement	12					

6-3. Issues and Recommendations for Implementation

Issues and recommendations for implementing the priority candidate projects are listed below.

(1) Possibility of RTL Ferry Assistance

The Government of the Maldives is particularly keen on building RTL ferries in preparation for the nationwide rollout of RTL ferry service by the end of 2025. For

this reason, they are particularly requesting Japan's expertise in developing the RTL ferries.

Currently, all the vessels involved in the RTL ferry service, are built in the Maldives. Gulf Craft and Al Shaali are already well established and experienced in this field. MTCC, the operator of the vessels, has highlighted several areas for improvement, such as ease of maintenance for safe daily operation and installation of equipment necessary for the safety of passengers and emergency medical care, and has high expectations for Japanese-designed vessels. However, due to recent surge in material and transportation costs and the relative high cost of shipbuilding in Japan, building a ship in Japan is expected to be more expensive than in the Maldives.

To mitigate these costs, it is recommended to design the vessels in Japan with a focus on barrier-free and safety features, use reliable Japanese products for key components, and engage Maldivian shipbuilding companies for the construction.

(2) Expansion of Passenger Terminal Building Functions

Although passenger terminal buildings are essential facilities for RTL ferry service, they are currently suffering from inadequate maintenance. Many users, especially in areas where service has already begun, are requesting prompt improvements. In addition, ferry stops already maintained by MTCC are being considered for transfer to the Island Council due to MTCC's inability to maintain them properly.

In Zone 1, with support from ADB, a terminal building has been developed with certain considerations such as barrier-free accessibility, which contributes to the enhancement of user comfort. However, the passageway connecting the passenger terminal building to the boarding area and the porte-cochere (entrance area) lack roofing and eaves. According to the MTCC site manager, installing roofs and eaves is necessary, given the frequent torrential downpours and the fact that many users travel from rural areas for hospital visits.

In addition, the RTL ferry service operates only during the day, leaving the terminal building unused in the evening. Consideration of measures such as renting out part of the facility to the private sector businesses, such as restaurants, cafes, etc., could generate additional income.

The Maldivian government is promoting the introduction of renewable energy to residents and others, and the MTCA and island councils are supportive of installing solar panels on passenger terminal buildings, which could be considered during the design phase. In addition, with the use of Japanese technology, it is necessary to consider improving durability, reducing environmental impact, and saving energy when planning passenger terminal buildings.

(3) Public Use of Service Centers

RTL ferry services are integral to daily life for residents, making daily maintenance and periodic inspections of the vessels are crucial to safe operations. Currently, simple maintenance tasks are handled by engineers in each zone, while major repairs and routine inspections are carried out at the MTCC dockyard in Male (Thilafushi). Many MTCC staff in zones with active RTL ferry services have already expressed the need for at least one facility in each zone for vessel lifting and lowering, as well as a workshop for simple repairs and spare parts storage.

There are also many private speedboats active on each island, each requiring maintenance. Therefore, it is expected that the lifting and lowering facilities will be used for servicing other small vessels on and around each island, though RTL ferries will have priority. To address potential issues with securing landing sites, it is important to plan for future expandability, taking into consideration both the situation of the construction site of the priority candidate project and its surrounding area.

(4) Expansion of Tourist Use

The RTL ferry service is designed to provide essential public transportation for residents of island communities and does not include connections to resort islands, which are primarily tourist destinations. However, a connection to the airport island, which serves both residents and tourists, is part of the plan.

The Maldives Fifth Tourism Master Plan 2023-2027 (5TMP), developed by the Ministry of Tourism, aims to position the Maldives as the world’s leading sustainable tourism destination. The Maldives was awarded Travel Award's "World Leading Destination" for three consecutive years, including 2022. The tourism industry is expected to grow rapidly over the next five years, supporting the domestic economy significantly. In 2019, just before the COVID-19 pandemic, approximately 1.7 million out of 2 million visitors came for tourism. Although tourist numbers fell to around 560,000 in 2020 due to border closures, they rebounded to about 1.3 million in 2021.

In addition to improving the level of service on the resort islands, etc., The 5TMP strategy includes enhancing services on resort islands and promoting resident islands as new tourist destinations. In connection with this strategy, a dedicated website (island.mv) has been launched to provide information on resident islands.

Currently, RTL ferries are planned to operate with at least one round trip per day from local islands to regional hub islands and atoll capitals, serving as public transportation for resident islanders. However, should the number of foreign tourists increase in the future, it may be necessary to reassess and potentially adjust the number of vessels and the frequency of operations. At present, passengers are allowed to check in one piece of cargo weighing up to 20 kg in addition to their baggage. With a possible rise in international tourism, managing the transportation and storage of luggage such

as suitcases could become challenging. To facilitate ticket purchasing for overseas tourists, all boarding tickets are available online through the website or mobile app, with credit card payment options.

(5) Position of RTL Ferries in Domestic Migration

Current domestic transportation in the Maldives includes a range of options: airplanes (both traditional and seaplanes), ships (dhoni ferries, RTL ferries, speedboats), and vehicles (buses, taxis, etc.). Fares vary based on factors such as travel time, transportation capacity, frequency, and convenience.

There are 18 airports across the country, including 6 international ones. While regular air travel routes are generally well-secured, tourists primarily travel from Male (Velana International Airport) to resort islands via seaplane.

Dhoni ferries are used for transporting cargo from Male to various zones and also offer passenger services. Although this mode is time-consuming, it provides an inexpensive alternative for travel between provinces and the capital, Male.

RTL ferries aim to offer essential public transportation services at low fares, supported by government subsidies. The service is being rolled out gradually, with a planned route across zones known as the Highway Link. This initiative focuses on improving access to regional islands within each zone and regional hub islands with atoll capitals. According to MTCA, the goal is to facilitate nationwide travel by connecting ferries, though some details remain unclear. MTCC reports a decrease in dhoni ferry passengers in areas where RTL ferry services have been introduced, indicating a shift towards RTL ferries.

However, some local islands are still reliant on chartered speedboats, leading to relatively high travel costs. In regional hub islands, the lack of public transportation options like buses forces residents to walk or use taxis.

While a comprehensive transportation network has been established, addressing the timely introduction of RTL ferries to terminal regional islands and improving overland movement on base islands remain key issues.

(6) Provide Sustainable RTL Ferry Service

Currently, the government subsidizes RTL ferry services to keep fares low. However, to manage the increasing financial burden associated with expanding the service, the government is considering shifting from a fare system based solely on origin and destination to one based on the boarding route, which would likely result in higher fares.

In areas where RTL ferry services are already operational, users have expressed a need for more cargo capacity, even if it incurs additional fees. However, due to space constraints necessary for timely passenger service, the current allowance (one piece

of hand luggage per passenger and up to 20 kg of checked luggage) does not meet this demand.

In addition, RTL ferries are used to transport medical specimens from local island hospitals to regional base hospitals as part of government medical services, and this transport is provided free of charge.

Thus, While the plan is to enhance profitability through fare revisions, major changes are unlikely as subsidized operations will continue for the foreseeable future. Future measures to improve profitability may include: 1) Differentiated Fares: Implementing varying fares for residents and other passengers (foreigners, tourists, business travelers, etc.), potentially charging 2-4 times or half of airfares for different categories., 2) Seat Classification: Introducing different seat types, such as business class with 1.5 times more space and fares 3 times higher than standard seats., 3) Containerized Luggage Services: Providing containerized (standardized) luggage services such as express mail, small parcels, etc., involves allocating container space on the RTL ferries and installing locker spaces at the terminals for receiving and delivering containers. This should be designed with user convenience in mind, allowing payment through smartphones and enabling easy deposit and retrieval of containers. Additionally, transportation services for containerized cargo should include efficient handling, such as loading and unloading within a limited stop of 5 to 10 minutes. For example, container space should be provided on the RTL ferries, and locker space should be provided at the terminals to facilitate the receipt and delivery of containers.

(7) Strengthening Cooperation with Community Services

One of the main purposes of the RTL ferry service is to facilitate trips to the main hospital in the area. Since outpatients visit the hospital with pre-scheduled appointments, any delays in ferry operations necessitate notifying the hospital and taking appropriate measures. Additionally, if a flight is delayed, passengers may need to stay overnight to catch their return flight.

To address this situation, it is conceivable that streamlining medical service times at hospitals could be achieved by providing real-time information on RTL ferry operations, such as delays, arrival times, and changes in departure schedules, to hospitals and other relevant organizations. Sharing operational information with these parties could help passengers make efficient use of their time until their return flight.

A shuttle bus service between the ferry terminal and destinations such as hospitals would further enhance convenience. However, according to the island council and MTCC, there is currently opposition from local taxi companies and others, making it challenging to implement this service. In Zone 6, an RTL bus stop adjacent to the RTL ferry terminal provides transportation to the downtown area where the hospital is located.