Kwajalein Atoll Local Government

Kwajalein Atoll Solid Waste Management Plan

2019 – 2028

(Action Plan: 2019-2023)

Acknowledgements

Kwajalein Atoll is indebted to the accomplishment and endeavor of all those who contributed to the development of the “Kwajalein Atoll Solid Waste Management Plan” (2019-2028) and “Action Plan” (2019-2023). The Kwajalein Atoll Leadership, on behalf of the people and the Kwajalein Atoll Local Government (KALGOV); duly express our utmost gratitude to the Experts from the Japanese Technical Cooperation Project II for the Promotion of Regional Initiatives on Solid Waste Management Strategy in the Pacific Island Countries (J-PRISM II).

The People of Kwajalein would like to express its overwhelming appreciation to the Japan International Cooperation Agency (JICA), and local office JICA MICRONESIA, and in particular to J-PRISM II; the Secretariat of the Pacific Region Environment Program (SPREP); and the Overseas Development Assistance of the Embassy of Japan, for their continuing logistical, financial and professional interventions and collaborations for a “Cleaner Pacific” for our Children.

Foreword

Solid waste management is a major undertaking. Being the largest atoll in the world, Kwajalein is comprised of 97 islets with 8 islands inhabited. Ebeye Island has a population of almost 10,000 people and Ennibur being the second of about 2,000. The geographical layout between both islands alone is a major challenge logistically and financially in regards to waste management.

For the present and future generations, solid waste management will continue to be an ever increasing "Cross-Bearing" endeavor for Kwajalein to subsist. This document generously gifted by Japan International Cooperation Agency (JICA); the Kwajalein Atoll Solid Waste Management Plan and Action Plan will offer KALGOV potential resolves evolving through waste management and facing this challenge head on.

The ambition and expectation for a Cleaner Pacific and a Pristine Kwajalein, our people will take on efforts guided by this Solid Waste Management Plan - beginning now and moving into the future. ***Our Island is our Language, our Custom and our Very Existence. "Aelon Kein ad ej Kajin eo ad, Manit eo ad im Mour eo ad".***

KALGOV will continue to support the Cleaner Pacific Movement coinciding with the Republic of the Marshall Islands (RMI) by continuing to apply the 3 Rs: ***REDUCE, REUSE AND RECYCLE.***

Honorable Mayor Hirata J. Kabua
Kwajalein Atoll Local Government
Kwajalein, Republic of the Marshall Islands

Date 10/18/18

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ACRONYMS

AP	Action Plan
AWP	Annual Work Program
CDL	Container Deposit Legislation
EPA	Environmental Protection Authority
EIA	Environmental Impact Assessment
FY	Financial Year
HH	Household
JEMCO	Joint Economic Management Committee
JICA	Japan International Cooperation Agency
KADA	Kwajalein Atoll Development Authority
KAJUR	Kwajalein Atoll Joint Utility Resource
MRF	Materials Recovery Facility
MWIU	Ministry of Works, Infrastructure and Utility
NGO	Non-governmental Organization
OCS	Office of Chief Secretary
PET	Polyethylene Terephthalate
POPs	Persistent Organic Pollutants
SPREP	Secretariat of the Pacific Regional Environment Program
SWM	Solid Waste Management
UNDP	United Nations Development Program
WACS	Waste Amount and Composition Survey

Executive Summary

Organizations in Kwajalein such as KALGOV, KADA and EPA have been making great efforts to keep the atoll clean and beautiful. Whilst substantial efforts has been made by such organizations named above, and some waste problems has been ameliorated, several challenges remain. The strategic efforts have to be re-directed to focus on the remaining critical issues as well as emerging ones currently faced in the waste sector in Kwajalein.

By considering the above situation, this SWMP-E is formulated by aiming to enable Kwajalein/ Ebeye to establish a technically sound and financially sustainable solid waste management (SWM) system. To do so, this new SWMP-E consists of not only strategic elements but also a mid-term action plan of the first five years with technically, institutionally and financially appropriate options, which will propel realization of the SWMP-E.

SWM issues targeted under the plan

SWM issues targeted under the plan are summarized as follows based on the SWM present situation identified technically and quantitatively through waste flow analysis.

Issue 1: Waste Reduction and Recycling through the CDL Program
The CDL program, a new recycling system, which has commenced in the RMI with Majuro Atoll, will contribute to waste reduction as well as prevention of littering. It also increases peoples' environmental awareness. Thus, the smooth commencement of the program following that of Majuro is indeed of great importance for Ebeye.

Issue 2: Improvement of the Current Final Disposal Site
The current landfill site locates in the north end of Ebeye, where 11.2 tons of waste are disposed every day. The spacious site, which has been in use for more than 10 years, can still be used for quite some time. In recent years, the situation has been improved through installing a fence and a gate as well as the deployment of two gate keepers. However, the site can be improved through constructing a dike boundary and designating the discharge place inside the boundary. It finally eliminates environmental nuisances to the surrounding environment and residents.

Issue 3: Maintenance of Collection Service
KALGOV is well provided with collection vehicles and related equipment, however challenges remain in carrying out appropriate and timely maintenance of such vehicles and equipment by KALGOV workshops. In addition, even with appropriate and timely maintenance, vehicles and equipment will reach the end of their lives before too long in such a harsh operational environment as Ebeye, therefore it is important for KALGOV to formulate a plan to secure the funding for capital equipment replacement well in advance of need. Furthermore, it is quite difficult and time consuming to order spare parts in remote island like Ebeye, so it is more cost effective to order a stock of common spare parts at the time of original purchase of equipment.

Issue 4: Financial Sustainability with Sound Institutional Setting
Consideration of the financial sustainability of SWM is crucial at this juncture with the political and economic situation faced by RMI. There are many ways to secure financial sustainability of SWM, such as the introduction of a collection fee, or imposition of environmental levy. Regardless of the ways to secure financial sustainability, all the stakeholders must gather together, discuss and reach the consensus on how to ensure financial sustainability for SWM on Ebeye after the Compact ends in 2023.

Vision

Pride in what defines are core tradition and existence, “Aelon Kein”.
Ruktokleen, Rukjenleen, Rukwajleen.

Scope

The new SWMP-E covers the 10-year period from 2018 to 2027 with an action plan designed to be implemented for the first half of the period, 2018 to 2022. A general review of the plan will be undertaken in 2022 to update its relevance to current needs, and plan the next activities for the remaining period of the plan.

The new SWMP-E covers solid wastes generated by households, institutional and commercial operations, which is termed Municipal Solid Waste (MSW) in this plan. The Plan does not cover medical waste and hazardous waste.

Key Strategic Actions

The SWMP-E consists following four strategic actions:

- Introduction of the CDL Program
- Improvement of the Final Disposal Site
- Maintenance of Waste Collection Service
- Establishment of Financially Sustainable SWM System

Targets

Table 1 Targets under SWMP-E

Item	Unit	2017	2023	2028
3Rs rate (to generation waste amount)	%	8	10	11
Collection rate (to discharge waste amount)	%	68	68	70
Inappropriate discharge rate (to generation waste amount)	%	0	0	0
Rate of waste transported directly to landfill site	%	32	32	30

Action Plan

By reflecting upon the vision, the guiding principles and the identified SWM issues, the specific activities required to pursue the realization of this plan are articulated and presented in this chapter. This action plan, which defined the priorities for the next five years, is formulated below.

The action plan consists of the following four components:

Component 1: Introduction of CDL program ;
Component 2: Improvement of the final disposal site;
Component 3: Maintenance of waste collection services;
Component 4: Establishment of a financially sustainable SWM system.

For each component (i) the necessary activities, with personnel requirements; (ii) implementation schedule; and (iii) implementation costs, are detailed.

Implementation schedule for the Action Plan (the Project)

Table 2 Schedule of the Action Plan (2019-2023)

Component 1: Introduction of CDL program

	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.1 Provide training to the custom officers to impose deposits on imports																				
1.2 Construct the recycling shed; procure and install material recycling facilities																				
1.3 Provide training to the recycling operator, KALGOV																				
1.4 Conduct awareness raising campaign to the public																				
1.5 Start CDL operation fully in Ebeye																				

Component 2: Improvement of the final disposal site

	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2.1 Develop base map for planning																				
2.2 Formulate improvement plan																				
2.3 Implement improvement plan																				
2.4 Management of incoming wastes																				

Component3: Maintenance of waste collection services

	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
3.1 Formulate investment plan for waste collection services																				
3.2 Replacement of waste collection trucks																				
3.3 Replacement of waste containers																				
3.4 Proper operation and maintenance of waste collection equipment																				

Component4: Establishment of financially sustainable SWM system

	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
4.1 Examine the current cost for Solid Waste Management																				
4.2 Estimate the necessary monthly fee to cover SWM cost																				
4.3 Decide among stakeholders on the method and amount of fee/levy																				
4.4 Formulate municipal ordinance																				
4.5 Inform a new system to residents																				
4.6 Start fee/levy collection																				

*FY: From 1st of October to next year 30th of September

**Q1: Oct.-Dec., Q2: Jan.- Mar., Q3: Apr.-Jun., Q4: Jul.-Sep.

Cost of the Action Plan

Estimated costs to implement the Action Plan are shown in the table below. The entire cost of the Action Plan is estimated at US$2.3 million for five years.

Table 3 Estimated cost of the Action Plan by each component in 5 years.

	FY2019	FY2020	FY2021	FY2022	FY2023	Total
Component 1: Introduction of CDL program	24,240	298,480	48,480	48,480	48,480	468,160
Component 2: Improvement of the final disposal site	82,360	126,360	120,360	120,360	120,360	569,800
Component3: Maintenance of waste collection services	132,720	532,720	132,720	132,720	132,720	1,063,600
Component4: Establishment of financially sustainable SWM system	36,360	42,360	48,360	36,360	36,360	199,800
Total	275,680	999,920	349,920	337,920	337,920	2,301,360

1. Formulation of Solid Waste Management Plan for Ebeye (SWMP-E)

1.1. Objectives

Organizations in Kwajalein such as KALGOV, KADA and EPA have been making great efforts to keep the atoll clean and beautiful. Whilst substantial efforts has been made by such organizations named above, and some waste problems has been ameliorated, several challenges remain. The strategic efforts have to be re-directed to focus on the remaining critical issues as well as emerging ones currently faced in the waste sector in Kwajalein.

By considering the above situation, this SWMP-E is formulated by aiming to enable Kwajalein/ Ebeye to establish a technically sound and financially sustainable solid waste management (SWM) system. To do so, this new SWMP-E consists of not only strategic elements but also a mid-term action plan of the first five years with technically, institutionally and financially appropriate options, which will propel realization of the SWMP-E.

1.2. Structure of SWMP

This Solid Waste Management Plan for Ebeye (SWMP-E) is presented in two parts:

Part One provides the current SWM situation faced by the waste sector in Ebeye. In this part, the current issues are ascertained through a two-step process, through first understanding of the current SWM situation, and then analysis of the current SWM situation. Current waste flow is formulated based on a series of baseline surveys, and then the situation is technically as well as quantitatively understood. Major characteristics unique to Ebeye are identified based on the waste flow.

Part Two presents the main body of the SWMP-E. It consists of (i) major SWM issues which will be targeted under the SWMP-E, (ii) an Action Plan with key strategic actions which tackle identified SWM issues, and (iii) annual implementation plans. Part Two will define the directions which Ebeye should take to improve the environment for the future generation.

PART ONE: CURRENT SWM SITUATION

2. Current Situation and Issues

2.1. General Information

2.1.1. Geography

The Republic of Marshall Islands (RMI) is situated in the Central Pacific Ocean between 4º and 14º North and 160º and 173º East in almost two parallel chains of 31 atolls and islands: the Eastern Ratak (Sunrise) chain with 15 atolls and islands and the Western Ralik (Sunset) chain having 16 atolls and islands. The total number of islands and islets is about 1,225.

The total sea and land area of the country is approximately 1.94 million square kilometers and 181 square kilometers respectively; the land area is less than 0.01% of the total surface area. The climate is tropical - ocean. The temperature averages 27ºC, with little variation throughout the year. The northern atolls receive about 2m of rainfall a year while the annual rainfall in southern atolls is normally higher, about 4m per annum.

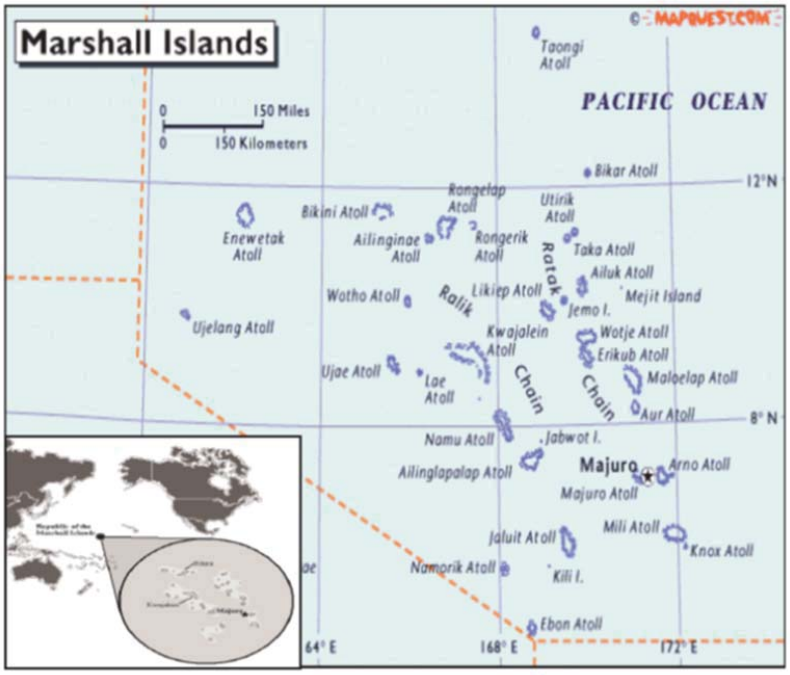


Figure 2-1: Map of the Marshall Islands and Location in the Pacific Ocean

2.1.2. Population

The Table below provides a comprehensive summary account of population size and population density for Majuro and Ebeye for the last 30 years. A key feature of RMI population distribution has been the dominance of Majuro and Kwajalein (largely Ebeye), currently accounting for 74% of the country's population. Expressed differently, three out of every four Marshall Islanders live on these two atolls. This predominance has steadily increased over the years, from 60% in 1980, to 67% and

68 % in 1988 and 1999. This uneven population distribution has been exacerbated over the years by a growing exodus of people from the outer islands to these two population centers, and in recent years overseas destinations for migration have assumed greater importance.

Table 2-1: Population size and density by island in 1980, 1988, 1999 and 2011 census years

	Population				Population Density		
	1980	1988	1999	2011	1988	1999	2011
Marshall	**30,873**	**43,380**	**50,840**	**53,158**	**619**	**726**	**759**
Majuro	11,791	19,664	23,676	27,797	5,244	6,314	7,413
Kwajalein	6,624	9,311	10,902	11,408	1,471	1,722	1,802

Source: *The RMI 2011 Census of Population and Housing Summary and Highlights Only,* Economic Policy, Planning, and Statistics Office, Office of the President

These different growth rates also impact on varying population densities across the Marshall Islands. Majuro, with a total land area of 3.75 square miles (or 9.71 square kilometers) is home to 27,797 residents, which translates into a population density of 7,413/mile², or 2,860/km^2. The highest density in the Marshall is on Ebeye island in Kwajalein Atoll where 9,614 people live on 0.12 square miles (0.31 km^2), resulting in population densities 80,117/mile² or 31,013/km^2). Population densities of this magnitude, when associated with overcrowding, often entail health and other social challenges of varying severity, which should be of interest to policy-makers.

2.1.3. Administration

The government of the Marshall Islands operates under a mixed parliamentary presidential system, which includes a head of state, the President, and a bicameral parliament the Council of Iroiji (the upper house) and Nitijela (the elected low house). Executive power lies with the President, who is elected by the Nitijela, and the Presidential Cabinet. The President appoints cabinet ministers to lead in government departments with the approval of the Nitijela.

Legislative power resides in the Nitijela, which consists of 33 senators, who are elected by 24 electoral districts by universal suffrage of all citizens above 18 years of age. The electoral districts correspond roughly to each atoll of the RMI. Although no legal restrictions exist against the formation of political parties, no formal parties exist. Two ad hoc parties have existed since the mid-1990s. The Council of Iroij is comprised of 12 tribal chiefs who advise the Presidential Cabinet and review legislation regarding customary law and traditional practice.

2.1.4. Land Ownership

The land tenure in the Marshall Islands is based on a matrilineal society. All children inherit lands from their mothers. There are no landless people and their land tenure pattern is the most important single factor of their lives. All children become members of their mother's clan. However, the clan is not a factor in the land ownership pattern. A paramount chief in the Marshalls is not a

clan chief. His powers are associated with specific land parcels and the people that live on them. A land parcel is controlled by a paramount chief, a family head and an undetermined number of commoners, or workers as they are sometimes called. Each land parcel has a name and a history. The relative interests of various owners are seldom determined exactly.

2.1.5. Economic Situation

Latest (2015) economic indicators as supplied by the Asian Development Bank are a GNI of US$209 million, a GNP per capita of US$4,630, and economic growth in 2017 of 4%. This makes the RMI a lower middle income nation, although differences in wealth across urban areas and remote outer islands can be dramatic. The 2011 census revealed that the median annual household income in the Marshall Islands is US$6,476, down from the US$6,840 reported in the 1999 census. The median annual household income varies widely by atoll/island. In Ebon, Jabat, Lae and Mili it is almost nil, whilst Aur, Likiep, Mejit and Namdrik reported a median annual household income of less than 1,000 US dollars. Kwajalein Atoll (where Ebeye is located and has workers at the US Army base) reported the highest median annual household income US$11,640.

Table 2-2: Economic Situation

	2013	2014	2015	2016	2017	2018	2019
GDP Growth Rate, % per year	2.9	-0.8	-0.4	1.9	4.0	2.5	2.5
Growth Rate of Per Capita GDP, % per year	2.5	-1.1	-0.7	1.5	1.7	2.1	-1.4
Per capita GNI, $, 2016				4,630			
Inflation, % per year	1.9	1.1	-2.3	-1.5	0.5	1.0	1.0

Note: 2018 and 2019 are forecasts.
Source: ADB (https://www.adb.org/countries/marshall-islands/economy#tabs-0-0)

The RMI has a Compact of Free Association (CoFA) with the United States of America which provides for a regular – but gradually decreasing – financial assistance package; the CoFA allows for funding in various sectors such as educations and health, but also has funding for SWM. The current Compact is the second, and runs from 2003 to 2023. While the Compact will end in 2023, the financial assistance from the U. S. Government to Kwajalein, including Ebeye, will continue till 2066 by reflecting the geopolitical importance of Kwajalein Atoll.

2.2. Current Situation on Solid Waste Management

2.2.1. Overview of SWM from the Point of View of Waste Flow

Analyzing the waste flow is the very first step to understand the current solid waste management (SWM) situation well. A series of baseline surveys such as the waste generation survey at the household level, and survey on the incoming waste to the public landfill site were carried out in August 2017, and based on these results and data, allowed for analysis of the current waste flow for Ebeye. In this section, the current SWM situation of Ebeye will be presented.

- **Waste generation by source:** Seventy-one percent (71%) of waste generated is from households while the remaining 29% is from sources other than households such as shops, restaurants, businesses, and public institutions. Managing household waste is of great importance.
- **3Rs:** Seven point eight percent (7.8%) of generated waste is re-used as feed or firewood on site. This practice contributes to ***reduce*** the total waste amount. This amount is much lower than that of FSM since keeping pigs is not allowed on Ebeye (pigs are only allowed on Gujeegue Island).
- **Waste collection:** Collection of waste through collection services is 60.8% of the generated waste (approximately 67.8% of the discharged waste). On Ebeye, collection services are provided by KALGOV. KALGOV collects waste from residents on Ebeye and Gujeegue.
- **Final disposal:** As much as 100% of the discharged waste, which is equivalent to 90% of generated waste, is properly discharged to the public landfill site. There is no improper discharge of waste except those dumped on beaches behind houses.

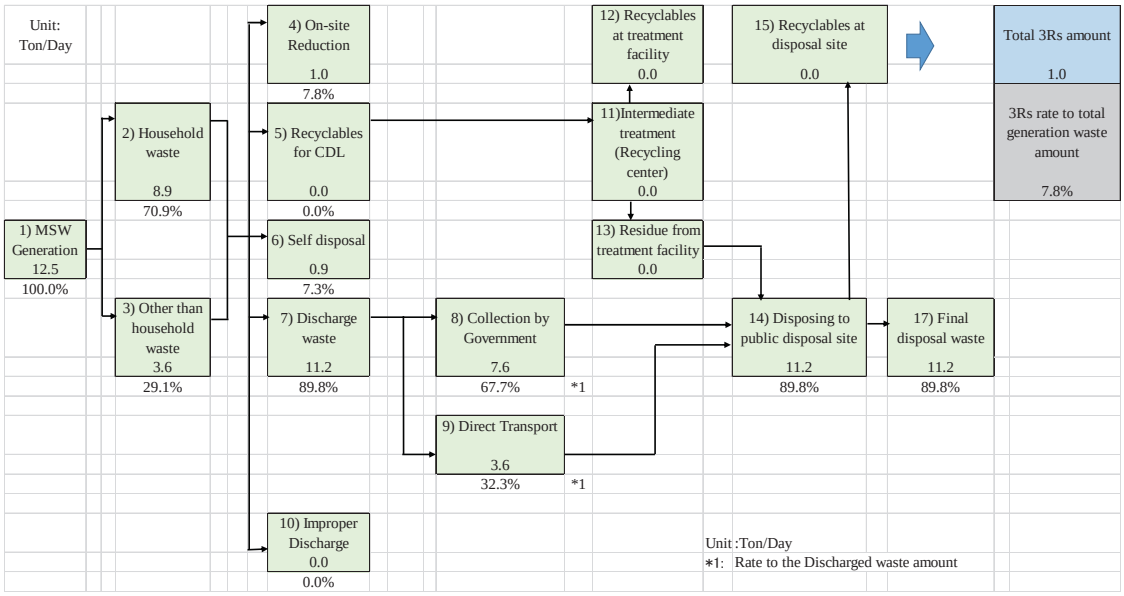


Figure 2-2: Waste flow in Ebeye in 2017

2.2.2. Technical situation of SWM

a. Waste Generation and Composition

As a very first step to understand the current SWM situation, the unit generation rate of household waste (UGRHW[1]), as well as unit generation rate of municipal solid waste (UGRMSW[2]), which includes waste not only from households but from commercial entities and public organizations, are calculated.

a.1. Unit Generation Rate of Household Waste

As seen in the table below, URGHW is 868g/person/day, which consists of (i) unit rate of reuse on site, 96g/person/day, (ii) unit rate of self-disposal, 89g/ person/ day and (iii) unit rate of discharged waste, 683g/ person/ day. In total, approximately 14% of generated wastes are recycled at source, and some of the generated waste is disposed at the generators' premises. The remaining 84% of the generated waste is discharged

Table 2-3: Unit Generation Rate of Household Waste (g/person/day)

Recyclable		Non-recyclable		Waste Generation
Reuse on-site	Recyclable of beverage containers	Self-disposal	Discharged waste	
96	0	89	683	868
11%	0%	10%	79%	100%

a.2. Unit Generation Rate of Municipal Solid Waste (UGRMSW)

Municipal solid waste includes not only household waste but also waste from the tourism industry, waste from commercial entities and public institutions, etc. Waste generated from other than households are calculated as 355g/person/day by dividing the daily amount of waste from other than households by the number of people. By adding UGRHW to this 868g, UGRMWS became 1,223g/person/day.

Table 2-4: Unit Generation Rate of Municipal Solid Waste (g/person/day)

Household waste	Other than household waste	Municipal solid waste
868	355	1,223
71.0%	29.0%	100%

【Outlines of Waste Amount Survey】

- Survey period : Few days in July 2017、
- Number of sample households : 20
- Survey items : Unit generation rates, apparent specific gravity
- Survey Method : Weigh the wheelie bin with waste divided by number of people and days

		
Checking weight of wastes inside wheelie bin	Checking weight of waste in the bag	Questionnaire survey to the house hold

b. Waste Discharge

Households who discharge waste through collection services usually use the 60 gallon (230 liter) wheelie bins. These wheelie bins were purchased by KALGOV through the US Ebeye Special Needs Fund in 2010, and normally several households share one wheelie bin.

Commercial and office wastes are also discharged to larger dumpster containers, and there are several sizes of these dumpsters. Below are photos showing waste from households and commercial premises, loading to the compactor truck.

	
60 gallon wheelie bin for household loading to compactor truck	Big Container used for discharging commercial wastes

c. Waste Collection

The following describes the collection system used in Ebeye:

- Most of the household wastes are collected and transported to the final disposal site by KALGOV free of charge, for both household and commercial users;
- Some household wastes are transported to the final disposal site by private vehicles, but there are no tipping fees;
- Public wastes generated at public institutions such as government offices are also collected by KALGOV;
- Some of the commercial wastes, for example from the big supermarket, are collected and transported to the final disposal site by the company's own truck, but no tipping fee is charged.

Figure 2-3 shows the collection route on Ebeye.

Figure 2-3: Collection Route in Ebeye

c.1. Collection Services Provided by KALGOV

The waste collection services provide by KALGOV are as follows:

【Household Wastes】

- Frequency of collection on Ebeye is once in two days from Monday to Friday. Wheelie bins wastes are placed at the roadside and collected by one of the two compactor trucks owned by KALGOV;
- On Saturday, wastes from Gugeegue are collected;
- Collection area is basically at Ebeye Zone 1 to 5. Collection services to remote areas, such as Gugeegue, are once a week on Saturday;
- A prepaid bag system is being piloted in the remote areas.

	
Yellow US made compactor truck purchased through Ebeye Special Needs fund	White US made compactor truck purchased through Ebeye Special Needs Fund
	
Loading of wastes in wheelie bins with loading device.	Washing machine is loaded to compactor truck.

【Other Wastes】

- Other wastes consist of commercial, institutional, business and from public park areas;
- All the wastes are collected and transported to the landfill site by KALGOV free of charge;
- Some business wastes are transported directly to the landfill site as it is quite near to the generation sources.

	
Some residents from nearby the disposal site were carting wastes themselves -1	Some resident nearby the disposal site were carting wastes themselves with their wheelie bin -2

d. Waste Disposal

d.1. Public Disposal Site

In Ebeye, there is one public disposal site at the north end of Ebeye Island. An outline of the site is as follows:

Item	Contents
Name	Public Final Disposal Site
Address	The end of north camp, Ebeye
Land Owner	Mr. Imada Kabua, older brother of Mike Kabua.
Area	1.6 ha (4 acre) (100m x 160 m)

Commencement of operation and renovation work history	・2003: It was a big mining pond which mining coral might be used for causeway constructions. ・2005: KALGOV started landfilling the site to fill the pond. ・2016: Improvement works, including construction of perimeter fencing, were carried out under JPRISM phase I. ・2017: Hospital waste incinerator was installed through Pac Waste, but still not operational. ・2017: Building for equipment and administration was constructed through KADA ・2017: Improvement works for the segregation of recyclables is under way. ・2017: As of Aug 2017, a security officer is stationed and controlling the entrance to the disposal site.
Operation	KALGOV
Landfill Procedure	• Waste is discharged at a designated area according to the instructions of the officer. • Discharged wastes are spread by heavy machinery periodically. • No compaction work was carried out by heavy equipment. • Aerial photo was taken in Jun 2018 and shown below.
Equipment at Disposal Site	Type of Equipment Capacity Bulldozer Case: 650K Heavy equipment is not stationed permanently. Bulldozer,or wheel shovel, are periodically mobilized from KALGOV workshop nearby to spread wastes.

d.2. Public Disposal Site as of Jun 2018

Figure 2-4 shows an aerial photo of public disposal site.

Figure 2-4: Aerial Photo taken by the Drone as of June 2018

d.3. Incoming Waste to Final Disposal Site

The number of vehicles and the amount of incoming waste to the public disposal site were surveyed and the results are shown in the next figure. The average incoming waste amount is 11.2 ton/day, while the average number of incoming vehicles is 23 per day. The average amount of incoming waste is 487 kg per vehicle. While 68% of the incoming waste is collected by KALGOV, the remaining 32% of the incoming waste are brought to the site directly by households, business entities and so on. Household waste comprises approximately 7.6 ton per day, while the remaining 3.6 ton per day is from sources other than households.

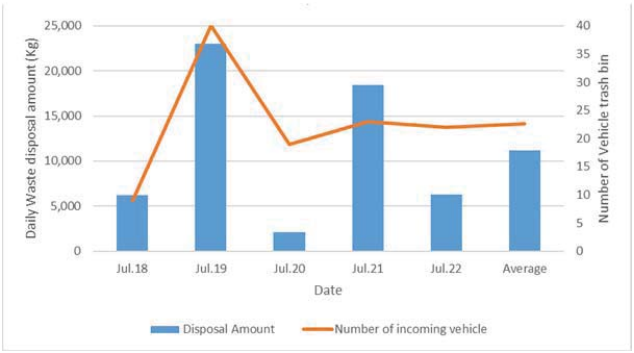


Figure 2-5: Number of vehicles and amount of incoming waste to the final disposal site

e. Reduce, Reuse and Recycling

e.1. On-site Recycling

Kitchen waste are separated to be fed to livestock even in Ebeye

Through the waste generation survey at household level, it became apparent that 7.8% of generated waste at household is reused as feed or firewood on site at source, contributing to reduce waste amount. However, this amount is much lower than that of FSM since keeping pigs is not allowed in Ebeye. Even so, some people in Ebeye keep kitchen waste separately and give it to relatives who own pigs and dogs on Gujeegue Island.

e.2. CDL

The current administration, which considers environmental problems as an important political issue, has been keen to introduce a CDL system. The Nitijela first passed a law named *Styrofoam Cups and Plates, and Plastic Products Prohibition, and Container Deposit Act 2016* in September 2016 to introduce CDL into the RMI, however the law required significant amendment before it could be implemented. Amid such a situation, J-PRISM II provided technical support and helped the Government of the RMI to amend the law, and finally the Nitijela passed the *Styrofoam Cups and Plates, and Plastic Products Prohibition, and Container Deposit (Amendment) Act 2018* in January 2018. J-PRISM II also helped the EPA to formulate the CDL Regulations in accordance with the amended act.

The current CDL system envisaged in the amended act and its regulation is detailed in figure 2-6 below.

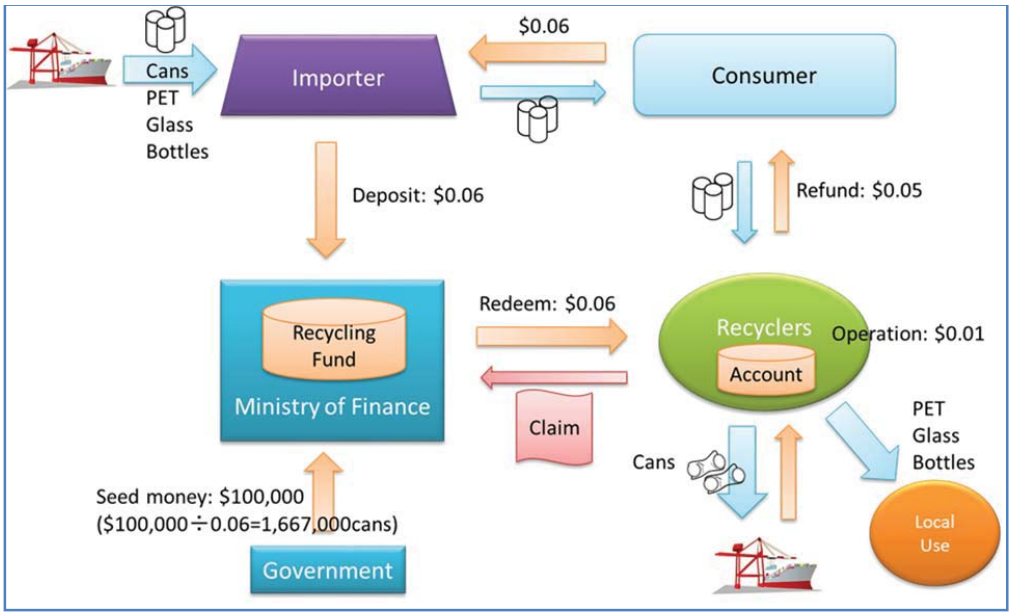


Figure 2-6: CDL system in RMI

A. Target Items

Target items for CDL system detailed in the regulation are;

- Aluminum beverage containers/cans,
- Glass beverage bottles, and
- PET beverage containers.

B. Deposit and Refund

Deposit fee is currently six cents per container; five cents per container is given to the consumer as a refund and one cent per container is paid to the Recycling Program Operator as a handling fee to cover operational costs.

C. Roles of Related Organizations

Roles and responsibilities of the organizations involved in implementing the CDL in the RMI are shown as follows in Table 2-5.

Table 2-5: Outline of roles for CDL entities and offices

Organizations	Roles and Responsibilities
EPA	Regulatory agency responsible for managing and overseeing the recycling program through enforcement of the Styrofoam Cups and Plates, and Plastic Products Prohibition and Container Deposit (Amendment) Act 2018 and the related regulations.
Ministry of Finance	Through its Custom Division, collects deposits on recyclable materials from importers; keeps records and manages the Recycling Fund; and through its Division of Finance issues reimbursement of refunds to Recycling Program Operator (KALGOV in case of Ebeye) upon receipt of claim; provides EPA with monthly copies of all records.
KALGOV	KALGOV is the Recycling Program Operator in Ebeye through a contract executed with EPA. Responsible to operate CDL program as per Regulations.
Importers	Responsible to pay required deposits to the Ministry of Finance through Custom Division.
Consumer	Responsible to participate in the CDL Recycling Program through turning in recyclables to KALGOV following rules and conditions.

D. Key Implementation Steps

As of July 2018 the necessary law and the related regulations are in place; also key stakeholders in Ebeye such as EPA, KALGOV and major importers are aware of the introduction of the new recycling program. The following are key activities remaining in order to actually start up recycling of beverage containers:

- To start the deposit collection by Ebeye custom officials;
- To construct a recycling shed;
- To procure recycling machines and equipment;
- To conclude a contract between EPA as a regulator and KALGOV as the recycling operator;
- To provide technical as well as administrative training to KALGOV staff;
- To raise awareness among citizens.

Once the CDL starts, the quantitative data, such as the amounts of deposits and refunds as well as the number of containers deposited and refunded, will be gathered by EPA. Thus the CDL contribution to waste reduction can be estimated quantitatively.

Public Hearing in Majuro on CDL Regulations (April 2018)

An advertisement of CDL (left) and a press release on CDL (right) in the Marshall Island Journal dated on June 8th 2018

2.2.3. Institutional Situation of SWM

a. Organization for SWM

The following are the main roles and responsibilities of the relevant SWM organizations.

a.1. Kwajalein Atoll Local Government (KALGOV)

KALGOV was established in 1985 as per the Constitution as the Local Government in Kwajalein Atoll. Figure 37 shows the organizational chart of KALGOV

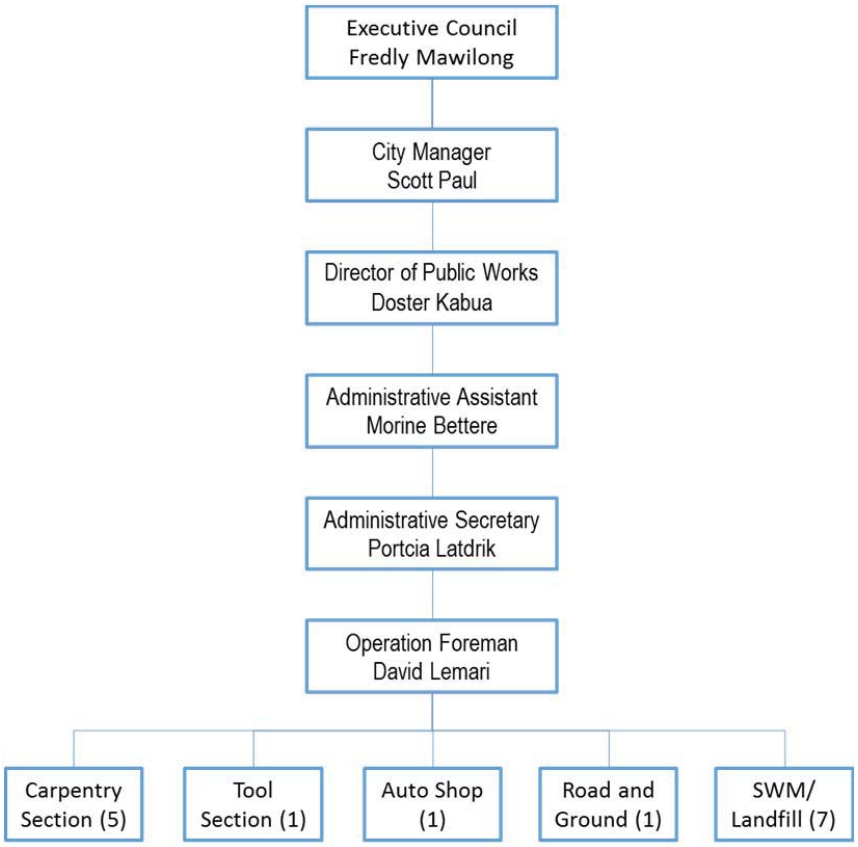


Figure 2-7: Organization chart of KALGOV (Source: KALGOV)

a.2. Environmental Protection Authority (EPA)

The EPA is responsible in the RMI for the formulation of environmental programs, and implementation and supervision of them. EPA is not a service provider but rather a regulator. As for the CDL, the entire system is under the purview of EPA, although the actual operation will be contracted out to KALGOV. In addition, EPA actively organizes environmental & awareness raising campaigns in collaboration with other relevant organizations and local communities. The Office of Environmental Policy and Planning (OEPPC) under the Office of the President, is primarily involved in the development of environmental policy for the RMI government.

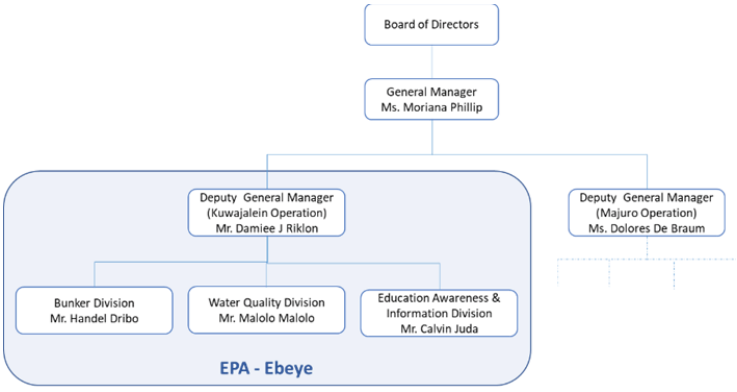


Figure 2-8: Organization chart of EPA - Ebeye

b. Policies and Laws on SWM

There is no comprehensive policy and regulatory framework for solid waste management in the Marshall Islands, as the draft National Solid Waste Management Strategy has not yet been formally approved by Cabinet. The followings are laws and regulations that are related to SWM in the RMI and Kwajalein.

a. National Environmental Act 1984;
b. Solid Waste Regulation 1989;
c. Marine Water Quality Regulation 1992;
d. Ozone Layer Depleting Substances Regulation 2004;
e. Marshall Islands Public Health, Safety and Welfare Act [year?] (MOH responsibility)
f. Marshall Islands Littering Act 1982 (empowers National Police and Local Government to enforce this act);
g. Constitution of the Kwajalein Atoll Local Government (1985);
h. Styrofoam Cups and Plates, and Plastic Products Prohibition and Container Deposit Act 2016;
i. Styrofoam Cups and Plates, and Plastic Products Prohibition and Container Deposit (Amendment) Act 2018.

2.2.4. Financial Situation of SWM

a. Waste Collection Fee

Currently no collection fees or tipping fees are collected at the disposal site on Ebeye.

b. Expenditure for SWM

Table 2-6 shows the budget proposed for FY2019 solely for SWM activities, being the financial request from KALGOV to the RMI government. For the last three years from FY2016, the budget requested for SWM was the same as that of FY2019. For those three years, KALGOV received only US$ 108,000 as a subsidy from RMI (from the general fund), and the remaining amount, nearly US$200,000, has been spent from KALGOV's own sources. It is understood that annual expenditures for those three years were nearly equal to the budget requested, i.e. around US$308,000.

Table 2-6: Total Budget Request for FY2019 (US$)

Items	Waste Collection	Landfill Operation	Recycling	Administration	Total	%
Personnel	90,240	11,520	0	35,520	137,280	44.7%
Fringe	13,988	1,786	0	5,506	21,280	6.9%
Fuel & Oil	30,000	25,000	0	0	55,000	17.9%
Equipment R&M	6,500	4,000	0	0	10,500	3.4%

Recycling	500	500	500	500	2,000	0.7%
Housing	0	0	0	0	0	0.0%
Contingencies	3,000	3,000	0	2,000	8,000	2.6%
Utilities	500	1,000	0	1,000	2,500	0.8%
Office Supplies	1,000	1,000	0	2,500	4,500	1.5%
Taxes & Licenses	7,290	4,793	0	0	12,083	3.9%
Provisions	0	1,200	0	0	1,200	0.4%
Travel	0	2,000	0	7,006	9,006	2.9%
Communication	300	300	0	1,100	1,700	0.6%
Facility R&M	1,000	2,500	0	2,000	5,500	1.8%
Insurance	2,848	1,898	0	0	4,746	1.5%
Uniforms	800	4,331	4,000	350	9,481	3.1%
Sitting Fee	0	0	0	0	0	0.0%
Contractual Services	500	500	500	0	1,500	0.5%
Public Awareness	1,700	1,200	600	1,800	5,300	1.7%
Bank charges	200	200	2,000	300	2,700	0.9%
Land lease	0	4,000	0	0	4,000	1.3%
	160,366	68,729	5,800	72,187	307,082	100.0%

Source: KALGOV

2.3. Major Characteristics of SWM in Ebeye

2.3.1. Waste Generation

While generation rate of household waste is calculated as 868g (1.91lb)/person/day, the generation rate of non-household waste is 355g (0.78lb)/person/day. By summing up these figures, the generation rate of solid waste, 1,223g (2.70lb)/person/day, is obtained. While 71.0% of the generated waste is from households, the remaining 29.0% is non-household, namely from business entities, public institutions, etc. The ratio indicates that management of household waste is very important in the case of Ebeye.

2.3.2. Waste Discharge

While only 7.8% of the generated waste, which is much lower than that of four states of FSM, is reused as feed for livestock or firewood on site, the majority of generated waste, 89.8% of the generated waste is discharged. As much as 60.8% of the generated waste, which is equivalent to 67.7% of the discharged waste, is collected by KALGOV, while some directly bring their wastes to the

final disposal site by themselves. As a result, nearly all of the discharged waste except those discharged beaches behind houses, which is equivalent to 89.8% of the generated waste, is properly disposed at the public disposal site.

2.3.3. Waste Collection System

In Ebeye, both residential wastes and commercial waste are collected for free. As much as 60.8% of the generated waste, which is equivalent to 67.7% of the discharged waste, is collected by KALGOV.

2.3.4. CDL System

The legal framework necessary to inaugurate CDL was properly set through adopting the Styrofoam Cups and Plates, and Plastic Products Prohibition, and Container Deposit (Amendment) Act 2018 in January 2018, and the CDL Regulations were promulgated in June 2018. In order to actually start up recycling of beverage containers, several steps such as financial arrangement, procurement of recycling machines, provision of training to key officials, and awareness raising among citizens must be undertaken.

2.3.5. Management of the Public Disposal Site

The only public disposal site is located at the north end of Ebeye and has been operated by KALGOV since 2005. Before using this area as a landfill site, it was a mining pit for coral sand. It was used as a landfill site more than 10 years and the pit is not yet filled with waste. The surrounding fence and gate were installed in 2014 to control the discharge of wastes. Currently, waste is discharged at any place inside the landfill boundary; improvement works to designate a tipping face and institute regular compaction will be required in order to eliminate environmental nuisance to the surrounding residents.

2.3.6. Maintenance of Waste Collection Service

KALGOV, as the lead agency managing solid waste on Ebeye, owns sufficient collection vehicles and equipment to operate the collection system. Challenges remain in carrying out appropriate and timely maintenance of such vehicles and equipment by KALGOV itself. Moreover, even with appropriate and timely maintenance, vehicles and equipment tend to have short life-spans in this difficult environment; therefore it is preferable for KALGOV to develop plans and arrange finance to renew them in a timely manner.

2.3.7. Institutional Settings

In Ebeye, KALGOV, which was established in 1985 as the Local Government for Kwajalien Atoll, is responsible for waste collection, operation and maintenance of the final disposal site at Ebeye. KALGOV is expected to play a key role for CDL too, as the Kwajalein Recycling Agent. Once the CDL starts, KALGOV will function as the recycling operator to buy CDL target items from the public.

PART TWO: STRATEGIC PLANNING

3. The Solid Waste Management Plan for Ebeye (SWMP-E)

3.1. Background

The SWMP-E is being formulated to establish a roadmap to improve waste management practices in Ebeye for a timeframe of ten years, from 2019 to 2028, based on an understanding of the current state of SWM in Ebeye.

With support extended through the JPRISM II, KALGOV is developing its plan for the next ten years. This plan supports the long-term goals developed within the Cleaner Pacific 2025 Plan developed by SPREP and JICA.

3.2. Purpose

The SWMP-E is developed as a means to understand the current state - and different facets of - waste management in Ebeye; and more importantly, to lay a practical road map to improve the key components of waste management and address the challenges faced with the aim of reaching a sustainable and truly integrated means of waste management in Ebeye. It is also envisioned that this SWMP-E be endorsed, adopted, and used as the guiding document for waste management activities, and as such should be developed in collaboration and agreement with a wide range of stakeholders; and as a formal means of adoption, be endorsed by the Mayor of Kwajalein Atoll.

3.3. Vision

Pride in what defines are core tradition and existence, “Aelon Kein”.

Ruktokleen, Rukjenleen, Rukwajleen.

3.4. Scope

The new SWMP-E covers the 10-year period from 2019 to 2028 with an action plan designed to be implemented for the first half of the period, 2019 to 2023. A general review of the plan will be undertaken in 2023 to update its relevance to current needs, and plan the next activities for the remaining period of the plan.

The new SWMP-E covers solid wastes generated by households, institutional and commercial operations, which is termed Municipal Solid Waste (MSW) in this plan. The Plan does not cover medical waste and hazardous waste.

3.5. Guiding Principles

Principle 1: Establish a Financially Sustainable SWM System with due Consideration of “Post 2023”.

With regard to finance, the current SWM system in Ebeye partially depends on Compact Funds from the U.S. Government. It must be presumed that such financial support will end in 2023 when the

current Compact ends, and so it is very important to start considering the establishment of a self-financing SWM system to be in place for "Post-2023". Possible options will require some type of ***User-pays system,*** involving the introduction of collection fees and landfill tipping fees, or imposing an environmental levy.

Principle 2: Transition to Environmentally Friendly Lifestyle

In RMI, with the strong leadership of the current administration, progress in preparing for the introduction of Container Deposit Legislation (CDL) system has been made. The introduction of this new recycling system is indeed a first step for the transition to a more environmentally friendly lifestyle. Also, CDL prevents recyclables from going into the garbage and reduces littering. Once the CDL is commenced in Ebeye, it is expected to contribute significantly to waste and litter reduction, and the beautification of Ebeye.

Principle 3: Emphasis on Capacity Development

New challenges continuously arise along with social-economic changes, and such challenges need to be tackled on a case-by-case basis; in the field of waste management, capacity development of SWM personnel is particularly important. SWM personnel need to enhance their capacities through implementing key strategic actions, and so enable them to solve the evolving challenges and problems, and eventually establish a sustainable SWM system in Ebeye.

Principal 4: Commitment to the Clean and Beautiful Pacific Region

Wastes are a grave threat to sustainable development in the Pacific Islands. Inadequate management of wastes can affect the health of Pacific Communities, degrade natural ecosystems and reduce their resilience to climate change impacts, and ultimately retard the social and economic development of Pacific Island Countries and territories. Many countries and territories of the Pacific face heightened risks from the impacts of poor waste and pollution management, since their economic bases (tourism, fishing and agriculture) are heavily reliant on an environment relatively free of waste. Furthermore, many waste issues are transboundary in nature, which means that poor control and management in one country (or region) can negatively affect neighboring countries. By considering all these issues, this SWMP-E is well aligned with the aspirations elucidated in the Pacific Regional Waste and Pollution Management Strategy (Cleaner Pacific 2025[1]), which aims to support the Pacific Island Countries to develop practical and sustainable SWM systems.

3.6. SWM Issues Targeted Under the SWMP-E

Issue 1: Waste Reduction and Recycling through the CDL Program

The CDL program, a new recycling system, which has commenced in the RMI with Majuro Atoll, will contribute to waste reduction as well as prevention of littering. It also increases peoples' environmental awareness. Thus, the smooth commencement of the program following that of Majuro is indeed of great importance for Ebeye.

[1] Cleaner Pacific 2025 is the regional SWM strategy which is formulated by SPREP and JICA. Refer to http://www.sprep.org

Issue 2: Improvement of the Current Final Disposal Site

The current landfill site locates in the north end of Ebeye, where 11.2 tons of waste are disposed every day. The spacious site, which has been in use for more than 10 years, can still be used for quite some time. In recent years, the situation has been improved through installing a fence and a gate as well as the deployment of two gate keepers. However, the site can be improved through constructing a dike boundary and designating the discharge place inside the boundary. It finally eliminates environmental nuisances to the surrounding environment and residents.

Issue 3: Maintenance of Collection Service

KALGOV is well provided with collection vehicles and related equipment, however challenges remain in carrying out appropriate and timely maintenance of such vehicles and equipment by KALGOV workshops. In addition, even with appropriate and timely maintenance, vehicles and equipment will reach the end of their lives before too long in such a harsh operational environment as Ebeye, therefore it is important for KALGOV to formulate a plan to secure the funding for capital equipment replacement well in advance of need. Furthermore, it is quite difficult and time consuming to order spare parts in remote island like Ebeye, so it is more cost effective to order a stock of common spare parts at the time of original purchase of equipment.

Issue 4: Financial Sustainability with Sound Institutional Setting

Consideration of the financial sustainability of SWM is crucial at this juncture with the political and economic situation faced by RMI. There are many ways to secure financial sustainability of SWM, such as the introduction of a collection fee, or imposition of environmental levy. Regardless of the ways to secure financial sustainability, all the stakeholders must gather together, discuss and reach the consensus on how to ensure financial sustainability for SWM on Ebeye after the Compact ends in 2023

3.7. Key Strategic Actions and Time Frame

3.7.1. Key Strategic Actions

The plan consists of three strategic actions. These actions are as follows:

- **Introduction of the CDL Program**

  The CDL program has started in Majuro. The Styrofoam Cups and Plates, and Plastic Products Prohibition and Container Deposit (Amendment) Act 2018 was passed in Nitijela in January 2018, and the related CDL regulation came into force in June. In order to implement CDL system into Ebeye, the following steps are required:

  Step1: Provide training to the custom officers to impose deposits on imports;
  Step2: Construct the recycling shed; procure and install material recycling facilities;
  Step3: Provide training to the recycling operator, KALGOV;
  Step4: Conduct awareness raising campaign to the public;
  Step5: Start CDL operation fully in Ebeye.

- **Improvement of the Final Disposal Site**

In recent years, the landfill site has been improved substantially through installation of a fence and gate, construction of an equipment shed, and deployment of two gate keepers. The site can be now be improved by implementing the following steps:

Step1: Prepare 3D map of the landfill site by aerial photos;
Step2: Develop an improvement plan (the location of a recycling shed, layout of dike boundary, etc.);
Step3: Construction of a recycling shed and a dike boundary;
Step3: Management of incoming waste (recording of incoming waste, introduction of tipping fee, etc.).

➢ **Maintenance of Waste Collection Service**

As of 2018, KALGOV provides a waste collection service to all the residents on Ebeye by using two compactor trucks. These trucks are still working well but will reach the end of their useful working lives before too long. An investment plan, that includes replacing waste collection vehicles and equipment, as well as waste containers - wheelie bins and dumpsters - need to be formulated. At the same time, it is necessary for KALGOV to identify and place an order of required spare parts alongside the purchasing of new equipment in order to save time and cost for future operation. This requires the following steps:

Step1: Formulate investment plan for waste collection services;
Step2: Replacement of waste collection trucks;
Step3: Replacement of waste containers;
Step4: Proper operation and maintenance of waste collection equipment.

➢ **Establishment of Financially Sustainable SWM System**

As reiterated previously, consideration of the financial sustainability of SWM is crucial at this juncture of the political and economic situation faced by the RMI. Based on user-pays principles, the following steps are required:

Step1: Examine the current cost for SWM management;
Step2: Estimate the amount that KALGOV needs to collect from service users (from households as well as the business community.);
Step3: Decide among key stakeholders on the methods of income collection, such as collection fees, tipping fees or an environmental levy, along with a determination of the amount of such fees or levy;
Step4: Formulate a municipal ordinance (if necessary, conduct a public hearing);
Step5: Inform residents of the new system;
Step6: Start fee collection.

3.7.2. Time Frame

While some parts of this Plan - such as vision and guiding principles - cover the 10-year period from 2019 to 2028, the section of strategic planning, the main body of this SWMP-E will target the five-year period, from 2019 to 2023. The time frame for key strategic actions is shown in the table below.

Table 3-1: Time frame to conduct strategic actions

Activities	Mid-term plan					Long-term plan				
	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
1. Introduction of the CDL program										
1.1 Provide training to the custom officers to impose deposit s on imports										
1.2 Construct the recycling shed; procure and install material recycling facilities.										
1.3 Provide training to the recycling operator, KALGOV										
1.4 Conduct awareness raising campaign to the public										
1.5 Start CDL operation fully in Ebeye.										
2. Improvement of the final disposal site										
2.1 Develop base map for planning										
2.2 Formulate improvement plan										
2.3 Implement improvement plan										
2.4 Management of incoming wastes										
3. Maintenance of waste collection services										
3.1 Formulate investment plan for waste collection services										
3.2 Replacement of waste collection trucks										
3.3 Replacement of waste containers										
3.4 Proper operation and maintenance of waste collection equipment										
4. Establishment of financially sustainable SWM system										
4.1 Examine the current cost for Solid Waste Management										
4.2 Estimate the necessary monthly fee to cover SWM cost										
4.3 Decide among stakeholders on the method and amount of fee/levy										
4.4 Formulate municipal ordinance										
4.5 Inform a new system to residents										
4.6 Start fee/levy collection										

3.8. Target

Numerical targets for strategic actions are set in order to evaluate progress of actions quantitatively.

Numerical targets for the mid-term target year in 2023, and for final year in 2028, have been set based on the future population projections and future waste amount (waste generation amount per person per day) projected for the island of Ebeye.

3.8.1. Setting Future Targets

Future targets are based on the projected future population, waste amounts and strategic values.

Table 3-2: Targets under SWMP-E

Item	Unit	2017	2023	2028
3Rs rate (to generation waste amount)	%	8	10	11
Collection rate (to discharge waste amount)	%	68	68	70
Inappropriate discharge rate (to generation waste amount)	%	0	0	0
Rate of waste transported directly to landfill site	%	32	32	30

Table 3-3: Planning indices

Item	Unit	2017	2023	2028
Population	person	10,186	10,431	10,663
GDP Growth Rate	%	2.2	3.4	4.4
Waste generation rate - Household waste	g/person/day	868	955	1,063
	lb/person/day	1.9	2.1	2.3
Waste generation rate - MSW	g/person/day	1,228	1,410	1,570
	lb/person/day	2.7	3.1	3.4

3.8.2. Future Waste Flow

Waste flow created based on the numerical targets for mid-term target year in 2023 and for final target year in 2028 are shown below.

Table 3-4: Future waste amount

	Unit	2017	2023	2028
Generation amount	ton/day	12	15	17
Discharge amount	ton/day	11	12	14

Collection amount	ton/day	8	8	10
3Rs amount	ton/day	1	2	2
Final disposal amount	ton/day	11	12	14

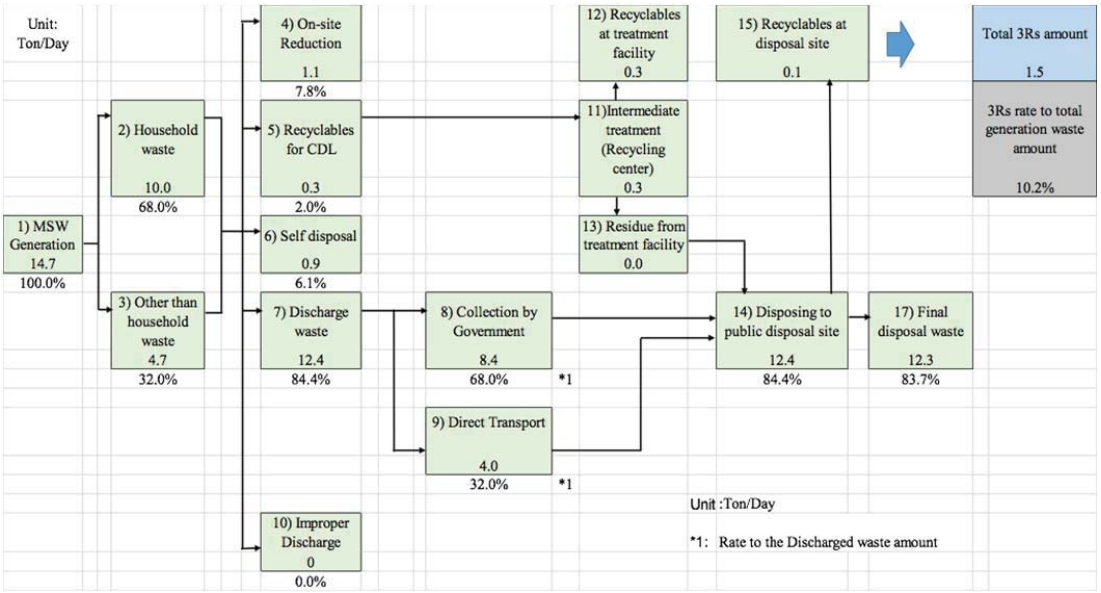


Figure 3-1: Future waste flow in 2023

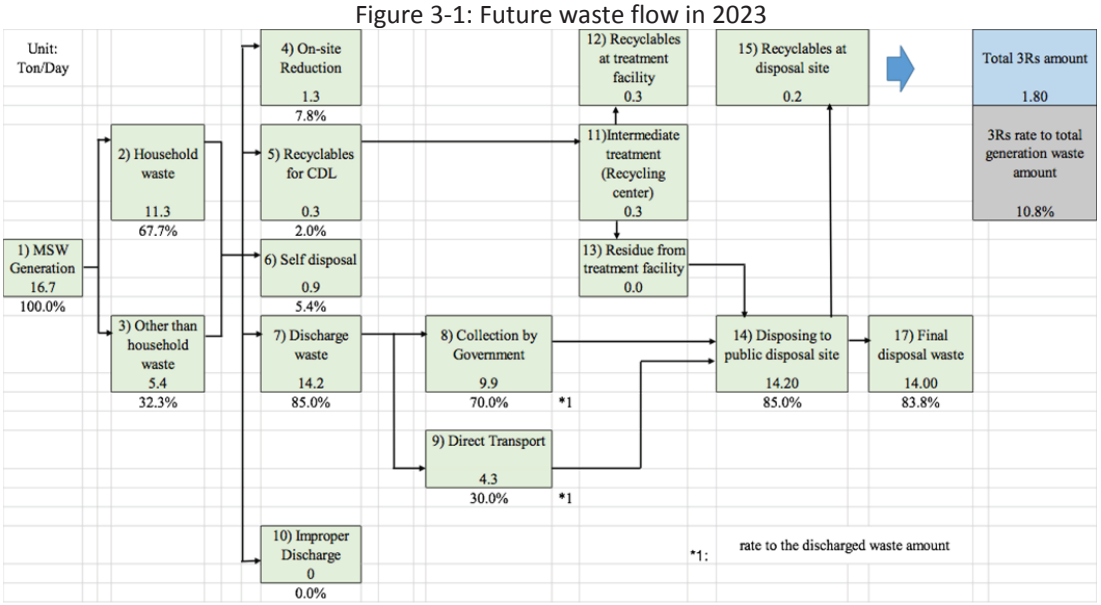


Figure 3-2: Future waste flow in 2028

3.8.3. Setting the Planning Indices

a. Future Population

The population in Ebeye had increased by 363 people between 1999 to 2011 based on the census data. Future population is predicted based on the growth rates between 1999 and 2011 as shown below.

Table 3-5: Future population

	Census		Growth rates (%) 1999-2011	Present	Future estimation	
	1999	2011		2017	2023	2028
Nene	1	1	0.0	1	1	1
Gugeegue	143	241	4.5	327	424	527
Ebwaj	7	15	6.7	23	34	47
North Loi	66	62	-0.5	60	58	56
South Loi	10	2	-12.5	1	0	0
Ebeye	9,345	9,614	0.2	9,774	9,914	10,032
Total	9,572	9,935	0.3	10,186	10,431	10,663

b. Future Waste Generation Amount

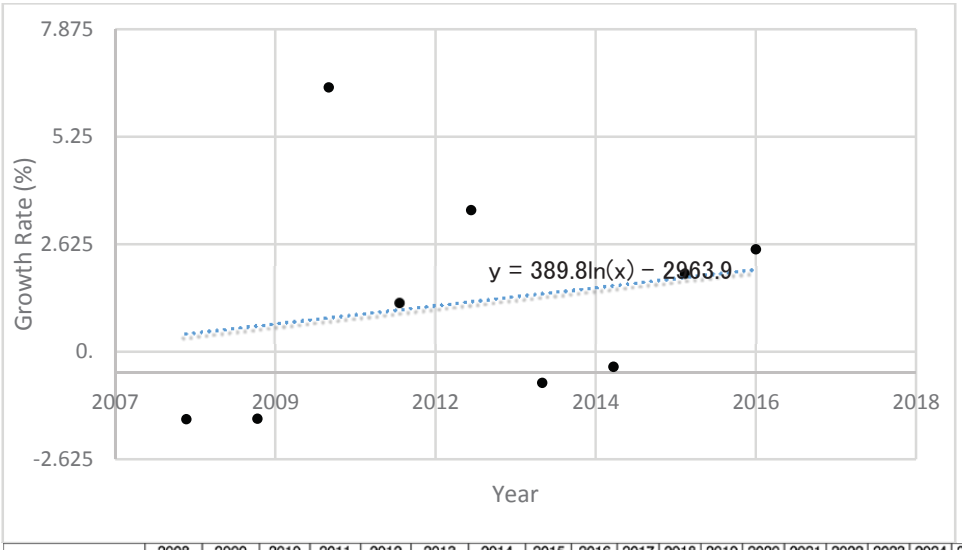
Future waste generation amount in Ebeye is estimated using the following formula;

(Future waste generation rate per person per day) x (Future population) = Future waste generation amount in Ebeye.

Future waste generation rate per person per day is heavily influenced by the economic conditions. Actual GDP growth rate of RMI from 2008 to 2016 as published by the World Bank was used as the economic indicator to estimate future GDP growth rate. Future waste generation rate per person per day was estimated based on the future GDP growth rate.

b.1. GDP Growth Rate

The actual GDP growth rate of the RMI from 2008 to 2016 published by the World Bank was used to estimate the future GDP growth rate. The actual and estimated GDP growth rates up to 2028 are shown in the next table. The GDP growth rate is estimated to be 3.4% and 4.4% in mid-term target year in 2023 and long-term target year in 2028 respectively.



	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028
Actual (%)	-1.645	-1.636	6.454	1.207	3.458	-0.757	-0.365	1.91	2.5												
Projection (%)										2.23	2.42	2.62	2.81	3.00	3.20	3.39	3.58	3.77	3.97	4.16	4.35

Figure 3-3: Future GDP Growth Rate

b.2. Waste Generation Rate

Current waste generation rates for household and non-household are shown in the table below.

Table 3-6: Waste generation rate

Year	Unit	Household waste	Non-household waste	Municipal Solid Waste
2017	g / person / day	868	355	1,228
	lbs /person / day	1.90	0.78	2.70

b.3. Future Waste Generation Rate

The future waste generation rate is deemed to increase in proportion with economic growth. It is necessary to examine the relationship between GDP and the increase in waste generation rate. The waste generation rate of each generation source may increase in proportion to the growth of GDP. The Japanese statistics which were recorded from 1963 to 1988, the only available data of its kind in the world, show the trend of the waste generation rate due to the development of the economy as follows:

- At the time of developing economy (1963 to 1970)
  Increase of Generation Rate = 0.55 of GDP growth rate.
- At the time of developed economy (1975 to 1988)
  Increase of Generation Rate = 0.29 of GDP growth rate.

These metrics have been adopted to make estimates of the future waste generation rate in the plan, based on the above Japanese statistics.

- Generation rate of household and other than household wastes will increase at 55% of the GDP growth rate in each year.

Table 3-7: Future waste generation rate

Year	unit	household wastes	Non-household wastes	Total
2023	g/person/day	955	455	1,410
	lbs/person/day	2.1	1.0	3.1
2028	g/person/day	1,063	507	1,570
	lbs/person/day	2.3	1.1	3.4

4. Action Plan

By reflecting upon the vision, the guiding principles and the identified SWM issues, the specific activities required to pursue the realization of this plan are articulated and presented in this chapter. This action plan, which defined the priorities for the next five years, is formulated below.

The action plan consists of the following four components:

Component 1: Introduction of CDL program;
Component 2: Improvement of the final disposal site;
Component 3: Maintenance of waste collection services;
Component 4: Establishment of a financially sustainable SWM system.

For each component (i) the necessary activities, with personnel requirements; (ii) implementation schedule; and (iii) implementation costs, are detailed.

4.1. Component 1 : Introduction of CDL Program

4.1.1. Necessary activities

Activities required to introduce the CDL program into Ebeye are as follows.

i. Provide Training to the custom officers to impose deposits on imports;
ii. Construct the recycling shed; procure and install material recycling facilities;
iii. Provide training to the recycling operator, KALGOV;
iv. Conduct an awareness raising campaign to the public;
v. Start CDL operation fully in Ebeye.

Table 4-1: Activities required and organizations responsible for introduction of CDL program

Activity	Contents of activity	Organization	
		KALGOV	EPA
1.1 Provide training to the custom officers to impose deposits on imports	Deposit collection in Ebeye shall start at the same time as deposit collection in Majuro in accordance with the CDL law and Regulations. For that purpose, the training shall be provided in a timely manner.	○	◎
1.2 Construct the recycling shed; procure and install material recycling facilities	To actually start CDL in Ebeye, either KALGOV or EPA shall procure and install recycling facilities in the recycling shed. They shall start exploring how to procure them well in advance. Actual procurement and construction of recycling shed are planned in FY2020,	◎	○
1.3 Provide training to the recycling operator, KALGOV	KALGOV is expected to be the recycling operator in Ebeye. Thus, training on how to buy target items, how to measure them and how to pay refunds etc. shall be provided to several KALGOV staff well in advance.	◎	○
1.4 Conduct awareness raising campaign to the public	In collaboration with KALGOV, EPA shall take initiatives on organizing awareness campaign in order to encourage peoples' participation and cooperation.	○	◎
1.5 Start CDL operation fully in Ebeye	KALGOV will actually start buying target items and paying refunds to people.	◎	○

◎: Responsible organization, ○: Supporting organization

4.1.2. Implementation schedule

The implementation schedule for the introduction of CDL is shown below.

Table 4-2: Schedule for Introduction of CDL program

	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.1 Provide training to the custom officers to impose deposits on imports																				
1.2 Construct the recycling shed; procure and install material recycling facilities																				
1.3 Provide training to the recycling operator, KALGOV																				
1.4 Conduct awareness raising campaign to the public																				
1.5 Start CDL operation fully in Ebeye																				

*FY: From 1st of October to next year 30th of September

**Q1: Oct.-Dec., Q2: Jan.- Mar., Q3: Apr.-Jun., Q4: Jul.-Sep.

4.1.3. Implementation Budget

The budget required to implement this component is shown in the table below.

Table 4-3: Budget for introduction of CDL program in 5 years

	FY2019	FY2020	FY2021	FY2022	FY2023	Total
a. Personnel cost	24,000	48,000	48,000	48,000	48,000	216,000
b. Transportation expenses	240	480	480	480	480	2,160
c. Construction and treatment cost	0	200,000	0	0	0	200,000
d. Purchase of equipment/machinery	0	40,000	0	0	0	40,000
e. Operation cost	0	0	0	0	0	0
f. Design and printing cost for material	0	10,000	0	0	0	10,000
Total	24,240	298,480	48,480	48,480	48,480	468,160

4.2. Component 2: Improvement of the final disposal site

4.2.1. Necessary activities

Activities required to improve the final disposal site are as follows:

i. Develop a base map for planning purposes;
ii. Formulate an improvement plan;
iii. Implement an improvement plan;
iv. Manage incoming wastes.

Table 4-4: Activities required and organizations responsible for improvement of the final disposal site

Activity	Contents of activity	Organization	
		KALGOV	EPA
2.1 Develop base map for planning	Developing base map for formulating improvement plan. The Map will be developed based on the aerial photo taken by the drone to have height information.	◎	-
2.2 Formulate improvement plan	Formulating improvement plan including dike construction, installation of fence and gate and phased closure plan.	◎	○
2.3 Implement improvement plan	Implementing improvement plan including timeframe, necessary equipment and estimated budget for the improvement works.	◎	-
2.4 Management of incoming wastes	Management of incoming wastes including collecting data on incoming wastes, controlling discharge point for preparation of collecting future tipping fee.	◎	-

4.2.2. Implementation Schedule

The implementation schedule for improvement of the disposal site is shown below.

Table 4-5: Schedule for improvement of the disposal site

Activities	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2.1 Develop base map for planning																				
2.2 Formulate improvement plan																				
2.3 Implement improvement plan																				
2.4 Management of incoming wastes																				

*FY: From 1st of October to next year 30th of September

**Q1: Oct.-Dec., Q2: Jan.- Mar., Q3: Apr.-Jun., Q4: Jul.-Sep.

4.2.3. Implementation Budget

The budget estimated to be required to improve the disposal site is shown in the table below.

Table 4-6: Budget for improvement of the final disposal site

	FY2019	FY2020	FY2021	FY2022	FY2023	Total
a. Personnel cost	36,000	36,000	36,000	36,000	36,000	180,000
b. Transportation expenses	360	360	360	360	360	1,800
c. Construction and treatment cost	0	0	0	0	0	0
d. Purchase of equipment/machinery	0	0	0	0	0	0
e. Operation cost	36,000	90,000	84,000	84,000	84,000	378,000
f. Design and printing cost for material	10,000	0	0	0	0	10,000
Total	82,360	126,360	120,360	120,360	120,360	569,800

4.3. Component 3: Maintenance of Waste Collection Services

4.3.1. Necessary activities

Activities required to maintain the waste collection service are as follows:

i. Formulate investment plan for waste collection services;
ii. Replacement of waste collection trucks;

iii. Replacement of waste containers;
iv. Proper operation and maintenance of waste collection equipment.

Table 4-7: Activities required and organizations responsible for maintenance of waste collection services

Activity	Contents of activity	Organization	
		KALGOV	EPA
3.1 Formulate investment plan for waste collection services	Investigate current condition of collection truck including operation and maintenance cost for each collection truck.	◎	-
3.2 Replacement of waste collection trucks	Replacement of waste collection trucks based on the investigation results including necessary spaer parts.	◎	-
3.3 Replacement of waste containers	Replacement of waste containers based on the investigation results.	◎	○
3.4 Proper operation and maintenance of waste collection equipment	Keep proper records for maintenance of equipment including order of spare parts to avoid future problems.	◎	-

4.3.2. Implementation Schedule

The implementation schedule for the maintenance of waste collection services is shown below.

Table 4-8: Schedule for maintenance of waste collection services

Activities	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
3.1 Formulate investment plan for waste collection services																				
3.2 Replacement of waste collection trucks																				
3.3 Replacement of waste containers																				
3.4 Proper operation and maintenance of waste collection equipment																				

*FY: From 1st of October to next year 30th of September

**Q1: Oct.-Dec., Q2: Jan.- Mar., Q3: Apr.-Jun., Q4: Jul.-Sep.

4.3.3. Implementation Budget

The budget estimated to be required to maintain waste collection services is shown in the table below.

Table 4-9: Budget for maintenance of waste collection services

	FY2019	FY2020	FY2021	FY2022	FY2023	Total
a. Personnel cost	72,000	72,000	72,000	72,000	72,000	360,000
b. Transportation expenses	720	720	720	720	720	3,600
c. Construction and treatment cost	0	0	0	0	0	0
d. Purchase of equipment/machinery	0	400,000	0	0	0	400,000
e. Operation cost	60,000	60,000	60,000	60,000	60,000	300,000
f. Design and printing cost for material	0	0	0	0	0	0
Total	132,720	532,720	132,720	132,720	132,720	1,063,600

4.4. Component 4: Establishment of financially sustainable SWM system

4.4.1. Necessary activities

Activities required to establish financially sustainable SWM system are as follows:

i. Examine the current cost for solid waste management;
ii. Estimate the necessary monthly fee to cover SWM costs;
iii. Decide among stakeholders on the method and amount of fee/levy;
iv. Formulate municipal ordinance;
v. Inform residents of the new system;
vi. Start levy/fee collection.

Table 4-10: Activities required and organizations responsible for establishment of financially sustainable SWM system.

Activity	Contents of activity	Organization	
		KALGOV	EPA
4.1 Examine the current cost for Solid Waste Management	First, it is necessary to estimate the current cost for SWM as correctly as possible.	◎	-
4.2 Estimate the necessary monthly fee to cover SWM cost	Then, it is necessary to calculate monthly fee either per person or per household which will cover the SWM cost estimated under the Activity 4.1.	◎	-
4.3 Decide among stakeholders on the method and amount of fee/levy	Decide the method to collect as well as the amount of fee/ levy through consultation among key stakeholders incl. political leaders.	◎	○
4.4 Formulate municipal ordinance	Then, a new municipal ordinance which defines the method to collect as well as the amount of fee/ levy decided by key stakeholders shall be formulated.	◎	-
4.5 Inform a new system to residents	The method to collect and the amount of fee/levy shall be informed to the residents well in advance.	◎	○
4.6 Start fee/levy collection	Then, an agency in charge will start fee/ levy collection.	◎	○

◎: Responsible organization, ○ : Supporting organization

4.4.2. Implementation Schedule

The implementation schedule for the establishment of a financially sustainable SWM system is shown below.

Table 4-11: Schedule for establishment of financially sustainable SWM system

	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
4.1 Examine the current cost for Solid Waste Management																				
4.2 Estimate the necessary monthly fee to cover SWM cost																				
4.3 Decide among stakeholders on the method and amount of fee/levy																				
4.4 Formulate municipal ordinance																				
4.5 Inform a new system to residents																				
4.6 Start fee/levy collection																				

4.4.3. Implementation Budget

The budget estimated to be required to establish a financially sustainable SWM system is shown in the table below.

Table 4-12: Budget for establishment of financially sustainable SWM system

	FY2019	FY2020	FY2021	FY2022	FY2023	Total
a. Personnel cost	36,000	36,000	36,000	36,000	36,000	180,000
b. Transportation expenses	360	360	360	360	360	1,800
c. Construction and treatment cost	0	0	0	0	0	0
d. Purchase of equipment/machinery	0	0	0	0	0	0
e. Operation cost	0	0	0	0	0	0
f. Design and printing cost for material	0	6,000	12,000	0	0	18,000
Total	36,360	42,360	48,360	36,360	36,360	199,800

4.5. The Action Plan

4.5.1. Schedule of the Action Plan (2019-2023)

Entire schedule for the Action Plan is shown in the table below.

Table 4-13: Schedule of the Action Plan (2019-2023)

Component 1: Introduction of CDL program

	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.1 Provide training to the custom officers to impose deposits on imports																				
1.2 Construct the recycling shed; procure and install material recycling facilities																				
1.3 Provide training to the recycling operator, KALGOV																				
1.4 Conduct awareness raising campaign to the public																				
1.5 Start CDL operation fully in Ebeye																				

Component 2: Improvement of the final disposal site

	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2.1 Develop base map for planning																				
2.2 Formulate improvement plan																				
2.3 Implement improvement plan																				
2.4 Management of incoming wastes																				

Component3: Maintenance of waste collection services

	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
3.1 Formulate investment plan for waste collection services																				
3.2 Replacement of waste collection trucks																				
3.3 Replacement of waste containers																				
3.4 Proper operation and maintenance of waste collection equipment																				

Component4: Establishment of financially sustainable SWM system

	FY2019				FY2020				FY2021				FY2022				FY2023			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
4.1 Examine the current cost for Solid Waste Management																				
4.2 Estimate the necessary monthly fee to cover SWM cost																				
4.3 Decide among stakeholders on the method and amount of fee/levy																				
4.4 Formulate municipal ordinance																				
4.5 Inform a new system to residents																				
4.6 Start fee/levy collection																				

*FY: From 1st of October to next year 30th of September

**Q1: Oct.-Dec., Q2: Jan.- Mar., Q3: Apr.-Jun., Q4: Jul.-Sep.

4.5.2. Cost of the Action Plan

Main cost items for the Action Plan are shown in the table below.

Table 4-14: List of estimated cost of main items by each component

Components	Personnel cost	OM cost	Construction and treatment cost	Parches cost for Machinery and equipment	Design and printing cost for material

Component 1: Introduction of CDL program	• Preparation for CDL	• Fund for initial capital	• Construction of recycling shed	• Press machine for material targeted CDL system	• Design for MRF
Component 2: Improvement of the final disposal site	• Operators and workers for machinery	• Fuel and lubricant for machinery	• Construction of dike at the final disposal site	-	• Design for layout of disposal site.
Component 3: Maintenance of waste collection services	• Operators and workers for waste collection • Analyze record for spare parts. • Fee collection	•Fuel and lubricant for machinery	-	• Replace two compactor trucks	-
Component 4: Establishment of financially sustainable SWM system	• Preparation for new waste fee collection system	-	-	-	• Preparation for new system

Estimated costs to implement the Action Plan are shown in the table below. The entire cost of the Action Plan is estimated at US$2.3 million for five years.

Table 4-15:Estimated cost of the Action Plan by each component in 5 years.

	FY2019	FY2020	FY2021	FY2022	FY2023	Total
Component 1: Introduction of CDL program	24,240	298,480	48,480	48,480	48,480	468,160
Component 2: Improvement of the final disposal site	82,360	126,360	120,360	120,360	120,360	569,800
Component3: Maintenance of waste collection services	132,720	532,720	132,720	132,720	132,720	1,063,600
Component4: Establishment of financially sustainable SWM system	36,360	42,360	48,360	36,360	36,360	199,800
Total	275,680	999,920	349,920	337,920	337,920	2,301,360

5. Annual Work Program

To implement the Action Plan (AP), an Annual Work Program (AWP) will be prepared. The primary purpose of preparing the AWP is to request the next fiscal year (FY) budget. KALGOV and EPA will produce the AWP and submit it to the RMI Government.

The contents of the AWP will consist of (i) the activities necessary to conduct the Action Plan; (ii) the implementation schedule of the Action Plan; and (iii) the cost of the Action Plan estimated for the next FY, from October 2018 to September 2019. The form for an AWP is shown in this chapter.

Draft AWPs for FY 2019 are attached at Annex 1.

Form for Annual Work Program (FY)

Title: ***Action plan towards technically appropriate and financially sustainable SWM system in Ebeye, RMI***	
Implementation Activity	Cost(US$)
Component 1: Introduction of CDL program Mainly the following activities/works will be implemented;	
Component 2: Improvement of the final disposal site Mainly the following activities/works will be implemented;	
Component 3: Maintenance of waste collection services Mainly the following activities/works will be implemented;	
Component 4: Establishment of financially sustainable SWM system Mainly the following activities/works will be implemented;	
Total	

Form for Annual Work Program (FY) Activities and the Schedule

Component/Activity	Contents	Organization		FY2019												Remarks
		KALGOV	EPA	Q1			Q2			Q3			Q4			
				Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	
Component 1: Introduction of CDL program																
Component 2: Improvement of the final disposal site																
Component 3: Maintenance of waste collection services																
Component 4: Establishment of financially sustainable SWM system																

Form for Annual Work Program (FY) Cost of Component and activities

Component/Activity	Cost (US$)						
	a. Personnel cost	b. Transportation expenses	c. Construction and treatment cost	d. Purchase of equipment/machinery	e. Operation cost	f. Design and printing cost for material	Total
Component 1: Introduction of CDL program							
Component 2: Improvement of the final disposal site							
Component 3: Maintenance of waste collection services							
Component 4: Establishment of financially sustainable SWM system							
Total							

Annex 1:Annual Work Program in FY 2019

Form for Annual Work Program (FY 2019)

Title: ***Action plan towards technically appropriate and financially sustainable SWM system in Ebeye, RMI***

Implementation Activity	Cost(US$)
Component 1: Introduction of CDL program	
Mainly the following activities/works will be implemented;	
1.1 Provide training to the custom officers to impose deposits on imports	24,240
1.2 Construct the recycling shed; procure and install material recycling facilities	0
1.3 Provide training to the recycling operator, KALGOV	0
1.4 Conduct awareness raising campaign to the public	0
1.5 Start CDL operation fully in Ebeye	0
Component 2: Improvement of the final disposal site	
Mainly the following activities/works will be implemented;	
2.1 Develop base map for planning	18,180
2.2 Formulate improvement plan	28,180
2.3 Implement improvement plan	0
2.4 Management of incoming wastes	36,000
Component3: Maintenance of waste collection services	
Mainly the following activities/works will be implemented;	
3.1 Formulate investment plan for waste collection services	72,720
3.2 Replacement of waste collection trucks	0
3.3 Replacement of waste containers	0
3.4 Proper operation and maintenance of waste collection equipment	60,000
Component4: Establishment of financially sustainable SWM system	
Mainly the following activities/works will be implemented;	
4.1 Examine the current cost for Solid Waste Management	24,240
4.2 Estimate the necessary monthly fee to cover SWM cost	12,120
4.3 Decide among stakeholders on the method and amount of fee/levy	0
4.4 Formulate municipal ordinance	0
4.5 Inform a new system to residents	0
4.6 Start fee/levy collection	0
Total	275,680

Form for Annual Work Program (FY 2019) Activities and the Schedule

Component/Activity	Contents	Organization		FY2019												Remarks
		KALGOV	EPA	Q1			Q2			Q3			Q4			
				Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	
Component 1: Introduction of CDL program																
1.1 Provide training to the custom officers to impose deposits on imports	Deposit collection in Ebeye shall start at the same time as deposit collection in Majuro in accordance with the CDL law and Regulations. For that purpose, the training shall be provided in a timely manner.	○	◎													
1.2 Construct the recycling shed; procure and install material recycling facilities	To actually start CDL in Ebeye, either KALGOV or EPA shall procure and install recycling facilities in the recycling shed. They shall start exploring how to procure them well in advance. Actual procurement and construction of recycling shed are planned in FY2020,	◎	○													
1.3 Provide training to the recycling operator, KALGOV	KALGOV is expected to be the recycling operator in Ebeye. Thus, training on how to buy target items, how to measure them and how to pay refunds etc. shall be provided to several KALGOV staff well in advance.	◎	○													
1.4 Conduct awareness raising campaign to the public	In collaboration with KALGOV, EPA shall take initiatives on organizing awareness campaign in order to encourage peoples' participation and cooperation.	○	◎													
1.5 Start CDL operation fully in Ebeye	KALGOV will actually start buying target items and paying refunds to people.	◎	○													
Component 2: Improvement of the final disposal site																
2.1 Develop base map for planning	Developing base map for formulating improvement plan. The Map will be developed based on the aerial photo taken by the drone to have height information.	◎	-													
2.2 Formulate improvement plan	Formulating improvement plan including dike construction, installation of fence and gate and phased closure plan.	◎	○													
2.3 Implement improvement plan	Implementing improvement plan including timeframe, necessary equipment and estimated budget for the improvement works.	◎	-													
2.4 Management of incoming wastes	Management of incoming wastes including collecting data on incoming wastes, controlling discharge point for preparation of collecting future tipping fee.	◎	-													

Form for Annual Work Program (FY 2019) Activities and the Schedule

Component/Activity	Contents	Organization		FY2019												Remarks
		KALOV	EPA	Q1			Q2			Q3			Q4			
				Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	
Component3: Maintenance of waste collection services																
3.1 Formulate investment plan for waste collection services	Investigate current condition of collection truck including operation and maintenance cost for each collection truck.	◎	・													
3.2 Replacement of waste collection trucks	Replacement of waste collection trucks based on the investigation results including necessary spaer parts.	◎	・													
3.3 Replacement of waste containers	Replacement of waste containers based on the investigation results.	◎	○													
3.4 Proper operation and maintenance of waste collection equipment	Keep proper records for maintenance of equipment including order of spare parts to avoid future problems.	◎	・													
Component4: Establishment of financially sustainable SWM system																
4.1 Examine the current cost for Solid Waste Management	First, it is necessary to estimate the current cost for SWM as correctly as possible.	◎	・													
4.2 Estimate the necessary monthly fee to cover SWM cost	Then, it is necessary to calculate monthly fee either per person or per household which will cover the SWM cost estimated under the Activity 4.1.	◎	・													
4.3 Decide among stakeholders on the method and amount of fee/levy	Decide the method to collect as well as the amount of fee/ levy through consultation among key stakeholders incl. political leaders.	◎	○													
4.4 Formulate municipal ordinance	Then, a new municipal ordinance which defines the method to collect as well as the amount of fee/ levy decided by key stakeholders shall be formulated.	◎	・													
4.5 Inform a new system to residents	The method to collect and the amount of fee/levy shall be informed to the residents well in advance.	◎	○													
4.6 Start fee/levy collection	Then, an agency in charge will start fee/ levy collection.	◎	○													

Form for Annual Work Program (FY 2019) Cost of Component and activities

Component/Activity	Cost (US$)						
	a. Personnel cost	b. Transportation expenses	c. Construction and treatment cost	d. Purchase of equipment/machinery	e. Operation cost	f. Design and printing cost for material	Total
Component 1: Introduction of CDL program	24,000	240	0	0	0	0	24,240
1.1 Provide training to the custom officers to impose deposits on imports	24,000	240	0	0	0	0	24,240
1.2 Construct the recycling shed; procure and install material recycling facilities	0	0	0	0	0	0	0
1.3 Provide training to the recycling operator, KALGOV	0	0	0	0	0	0	0
1.4 Conduct awareness raising campaign to the public	0	0	0	0	0	0	0
1.5 Start CDL operation fully in Ebeye	0	0	0	0	0	0	0
Component 2: Improvement of the final disposal site	36,000	360	0	0	36,000	10,000	82,360
2.1 Develop base map for planning	18,000	180	0	0	0	0	18,180
2.2 Formulate improvement plan	18,000	180	0	0	0	10,000	28,180
2.3 Implement improvement plan	0	0	0	0	0	0	0
2.4 Management of incoming wastes	0	0	0	0	36,000	0	36,000
Component3: Maintenance of waste collection services	72,000	720	0	0	60,000	0	132,720
3.1 Formulate investment plan for waste collection services	72,000	720	0	0	0	0	72,720
3.2 Replacement of waste collection trucks	0	0	0	0	0	0	0
3.3 Replacement of waste containers	0	0	0	0	0	0	0
3.4 Proper operation and maintenance of waste collection equipment	0	0	0	0	60,000	0	60,000
Component4: Establishment of financially sustainable SWM system	36,000	360	0	0	0	0	36,360
4.1 Examine the current cost for Solid Waste Management	24,000	240	0	0	0	0	24,240
4.2 Estimate the necessary monthly fee to cover SWM cost	12,000	120	0	0	0	0	12,120
4.3 Decide among stakeholders on the method and amount of fee/levy	0	0	0	0	0	0	0
4.4 Formulate municipal ordinance	0	0	0	0	0	0	0
4.5 Inform a new system to residents	0	0	0	0	0	0	0
Total	168,000	1,680	0	0	96,000	10,000	275,680