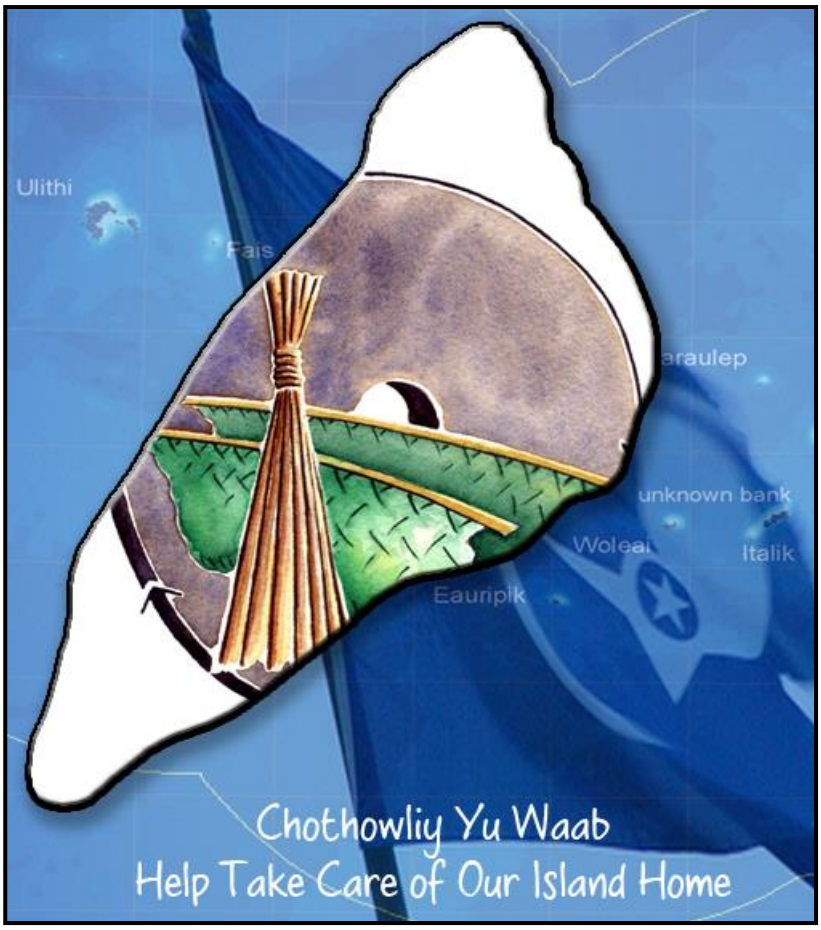
Yap State

Solid Waste Management Strategy

2018 – 2027

(Action Plan: 2018-2022)



Acknowledgements

This strategy could not have been made possible without the participation and input from relevant offices, agencies, and organizations of Yap State. Individuals, community members, nongovernmental organizations, and government officials have all contributed with their time, input, and effort in helping to make this strategy practical and most reflective of the wants and needs of Yapese to benefit and protect the environment today and for future generations. Special thank you and recognition is given to the J-PRISM 2 Expert Team who has directly facilitated the revision of this Strategy, the Secretariat of the Pacific Regional Environment Program (SPREP) for guidance provided with the Cleaner Pacific Regional Strategy, namely through Ms. Bella Guinto, and the FSM National Government Department of Environment, Climate Change & Emergency Management (DECCEM).

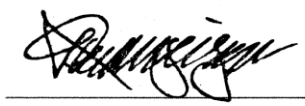
Foreword

Yap State aims to improve and enhance overall solid waste management to operate as an integrated and sustainable waste management system benefitting all of Yap's citizens and residents. Solid waste management is a priority for Yap State both as a sector and as a cross-cutting issue with impacts not only on the environment of Yap, but on all other sectors including the economy, social, health, etc. Solid waste management remains a pressing issue and challenge for the entirety of Yap State, inclusive of Yap Main Island and its 15 neighboring atolls and islands, but it is this administration's goal to continue to address this challenge through this revised Strategy for 2018 – 2022 in improving the lives and livelihoods of all residents and citizens of Yap State.

My administration is pleased to endorse this Yap State Solid Waste Management Strategy as its guiding document, laying out prioritized components to be improved in a coordinated, systematic way, along with its corresponding Action Plan to guide implementation of activities and help gauge our progress. We call on all sectors of our society, from our communities to our private and public sectors, to help us in achieving the goals we have laid out for ourselves in this Strategy. We will only be successful in meeting our objectives if we move forward together and in a concerted manner, working hand in hand with our partners.

My administration wishes to acknowledge these many partners who have continued to assist Yap State with regards to solid waste management, namely the Japan International Cooperation Agency (JICA) through the J-PRISM 2 Project, the Embassy of Japan in the FSM, and the FSM Department of Environment, Climate Change, and Emergency Management (DECEM) for their invaluable funding and technical support and expertise. This Strategy would not have been successfully revised, and our way forward laid out without our many partners' continued support and assistance.

This Yap State Solid Waste Management Strategy of 2018 – 2022 is hereby endorsed,



Honorable Tony Ganngiyan,
Governor, State of Yap,
Federated States of Micronesia

SEP 14 2018
Date

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ACRONYMS

YSG	Yap State Government
CC	Chamber of Commerce
CDL	Container Deposit Legislation
COP	Council of Pilung
COT	Council of Tamol
DAF	Division of Agriculture & Forestry (Dept. of R&D)
DHS	Department of Health Services
DOE	Department of Education
EH	Division of Environmental Health/Sanitation
ESC	Environmental Stewardship Consortium
ESP	Environment Sector Plan
FSMPC	FSM Petroleum Corporation
IPMC	Island Paradise Metal Company
JICA	Japan International Cooperation Agency
NFI	FSM National Food Inspectors Office
OAG	Office of the Attorney General
OEEM	Office of Environment & Emergency Management - FSM
OG	Office of the Governor
OPB	Office of Planning & Budget
PO	Planning of Operation document
PPP	Public-Private Partnership
PW&T	Department of Public Works & Transportation
R&D	Department of Resources & Development
SDP	Strategic Development Plan - FSM
SSW	State Solid Waste
SSWMS	State Solid Waste Management Strategy
SWDMG	Safe Waste Disposal Management Group
SWM	Solid Waste Management
YEPA	Yap State Environmental Protection Agency
YEWS	Yap Environmental Waste Solutions
YSPSC	Yap State Public Service Corporation

Executive Summary

This new State Solid Waste Management Strategy (SSWMS) is formulated with the aim of enabling Yap State to establish a technically sound and financially sustainably solid waste management (SWM) system. To do so, this SSWMS 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 SSWMS.

SWM issues targeted under the strategy

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

Issue 1: Expansion of collection services along with step-by-step closure of community dump site

The collection services are provided mainly by the contractor of DPW&T and in Tomil community on a trial basis. Thus the rate of households who receive collection service is as low as 16%. This low collection rate is the reason why (i) community dump sites are dotted around the entire island, and (ii) the rate of direct haulage of waste to the public disposal site is so high in Yap. Expansion of collection services through both or either public-private partnerships and/or community participation, and step-by-step closure of community dump sites shall be considered in close collaboration with each community.

Issue 2: Further efforts to minimize waste

The container-deposit legislation (CDL) system in Yap, which contributes tremendously to reducing littering and to increasing peoples' environmental awareness, is one of the best-functioning CDL systems among the many Pacific Island Countries. Even such a well-functioning system can be improved further to contribute more to waste minimization by adding new items. Not only CDL but composting of green waste is also an effective way of minimizing waste. It is a good time to think about introducing composting as a means of reducing green waste by utilizing a wood chipper provided by EOJ.

Issue 3: Financial sustainability with sound institutional setting

Last but not least, considering financial sustainability of SWM is crucial at this juncture of the political economic situation faced by FSM. Both activities for expansion of collection services as well as minimization of waste shall be carried out with special attention to financial sustainability. There are many ways to secure financial sustainability of SWM such as privatization of certain activities, and introduction of fee collection. Moreover, regardless of the methods of securing financial sustainability, the responsible organizations must also be determined and appointed to ensure financial sustainability.

Strategy

The Vision, Scope, Key Strategic Actions and Targets are set up to formulate the Strategy, the new Yap State Solid Waste Management Strategy (SSWMS).

Vision

"An integrated system of safely and effectively managing waste in Yap State for the benefit of current and future generations."

Scope

This SSWMS 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 Strategy will be undertaken in 2022 to update its relevance to the current needs and plan for the next activities for the remaining period of the Strategy.

The Strategy covers solid wastes generated in the household, institutional and commercial waste streams of the main island, and those wastes are called State Solid Waste (SSW) in this strategy. The Strategy does not cover medical waste or hazardous waste except those included in the CDL system.

Key Strategic Actions

- Expansion of waste collection service beyond Colonia
- Privatization (PPP) of waste collection service provided in Colonia
- Enhancement of CDL system
- Proper management of public disposal site
- Green waste recycling
- Proper management of inappropriate disposal waste such as waste oil and tires

Targets

Table 1 Targets of strategy

Item	Unit	2017	2022	2027
Recycling rate (to generation waste amount)	%	22.3	23.0	25.0
Collection rate (to discharge waste amount)	%	19.6	40.0	80.0
Inappropriate discharge rate (to generation waste amount)	%	9.7	6.0	1.3
Number of community dump sites	place	6	4	0
Rate of waste transported to disposal site directly	%	46.1	36.0	12.0

Action Plan

The specific activities to pursue realization of the strategy are articulated. This action plan, which defined the priorities in the next five years, is formulated based on the following assumptions.

Assumptions

- Looking firmly ahead to "post-2023", SWM sector in Yap has to depart from the dependency on the Compact Fund from the U. S. Government, and pursue the establishment of self-financing system.
- By responding to an immediate financial challenge, which is the Small Sector Grant of the US Compact Fund will no longer finance recurring costs, this action plan is formulated just like **a stand-alone project**. The **Semiautonomous Unit,** which will be established to implement the action plan will be an apex responsible agency for every component.
- The Unit can be established either inside or outside of the DPW&T, depending on the result of further discussions within the state departments.

Title and components of the action plan

The tentative name for the five-year action plan is ***"Action plan (Project) towards technically appropriate and financially sustainable SWM system in Yap State"***.

The action plan consists of the following six components;

- Component 1: Expansion of waste collection service beyond Colonia
- Component 2: Privatization (PPP) of waste collection service provided in Colonia
- Component 3: Enhancement of CDL system
- Component 4: Proper management of public disposal sites
- Component 5: Green waste recycling
- Component 6: Proper management of inappropriate disposal waste such as waste oil and tires

Implementation schedule for the Action Plan (the Project)

Table 2 A schedule of the Action Plan (the Project)

	Mid-term plan					Long-term plan				
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1. Expansion of waste collection service to rural area										
1.1 Planning, preparation, implementation and monitoring of PP for waste collection										
1.2 Expand PP to other communities										
1.3 Establish collection system for out of Colonia area										
2. Privatization(PPP) of waste collection service provided in Colonia area										
2.1 Review of contract for waste collection service										
2.2 Commencement of revised collection service										
3. Enhancement of CDL system										
3.1 Establish additional category(s) to CDL system										
3.2 Prepare area and construct new recycling center										
3.3 Commencement new CDL system										
4. Proper management of public disposal site										
4.1 Planning for O&M of disposal site										
4.2 Planning for O&M of equipment										
4.3 Data management system such as incoming data, O&M data and cost										
4.4 Examination for tipping fee collection system at disposal site										
5. Green waste recycling										
5.1Planning for promotion on green waste recycling										
5.2 Trial of promotion activity										
5.3 Implementation										
6. Proper management of inappropriate disposal waste such as waste oil and tires										
6.1 To grasp present situation for waste oil and tires numerically in Yap										
6.2 To collect information at island countries and states in FSM about those waste issues and treatment so on.										
6.3 Exchange with related countries, states and institutions										

Implementation cost for project

Table 3 Project cost by components (US$)

	FY2018	FY2019	FY2020	FY2021	FY2022	Total
Component 1: Expansion of waste collection service to out of Colonia	8,500	16,600	60,900	60,900	63,400	210,200
Component 2: Privatization(PPP) of waste collection service provided in Colonia	6,400	18,200	19,400	19,300	15,300	78,600
Component 3: Enhancement of CDL system	20,200	581,700	36,400	31,400	27,100	696,700
Component 4: Proper management of public disposal site	4,200	23,100	23,100	22,500	30,300	103,100
Component 5: Green waste recycling	800	10,100	6,900	6,100	9,100	33,100
Component 6: Proper management of inappropriate disposal waste such as waste oil and tires	3,800	13,100	16,100	17,600	12,600	63,200
Total	43,900	662,800	162,800	157,800	157,700	1,184,900

1 Formulation of State Solid Waste Management Strategy

1.1 Objectives

The previous State Solid Waste Management Strategy (SSWMS) of Yap, which covered the period of 2012 to 2017, defined certain strategic elements of managing wastes with due consideration to the issues at that time. While there were a number of initiatives undertaken and some challenges were overcome, several others remain challenges. The strategic efforts has to be re-directed to focus on the remaining critical issues as well as emerging ones currently faced in the waste sector in Yap.

By considering the above situation, this new SSWMS is formulated by aiming to enable Yap to establish a technically sound and financially sustainably solid waste management (SWM) system. To do so, this SSWMS 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 SSWMS.

1.2 Structure of SSWMS

The National Solid Waste Management Strategy is presented in two parts:

Part one provides the current SWM situation currently faced in the waste sector in Yap. In this part, the current issues are ascertained through a two-step process, through first understanding of current SWM situation and then analysis of current SWM situation. As a first step, a current waste flow is formulated based on a series of baseline surveys, and the situation is technically as well as quantitatively understood. Then, the issues and challenges are identified based on the waste flow.

Part Two presents the main body of SSWMS. It is consisted of (i) the strategy which sets out the policy directions for next 10 years along with numerical targets, and (ii) a mid-term action plan of the first five years to steadily make strides to reach numerical targets of SSWMS, and (iii) annual implementation plans. Part Two will define the direction Yap should take to address the key issues presented in Part One.

PART ONE: CURRENT SWM SITUATION

2 Current Situation and Issues

2.1 State Information

2.1.1 Geography

Yap is one of four states of the Federated States of Micronesia (FSM). Yap State, with the strongest traditional culture of the four, is located in the Western Caroline Islands between latitudes 7-10 N, and longitudes 137-148E. Yap State consists of four closely associated high islands known as "Waab" and about 134 low coralline atolls and islands, 22 of them populated, spread over 100,000 square miles of ocean. Yap State's land area is about 49.7 square miles with about 78% located in the high islands of Waab. The 2010 census reported a population of about 11,373 for the State.

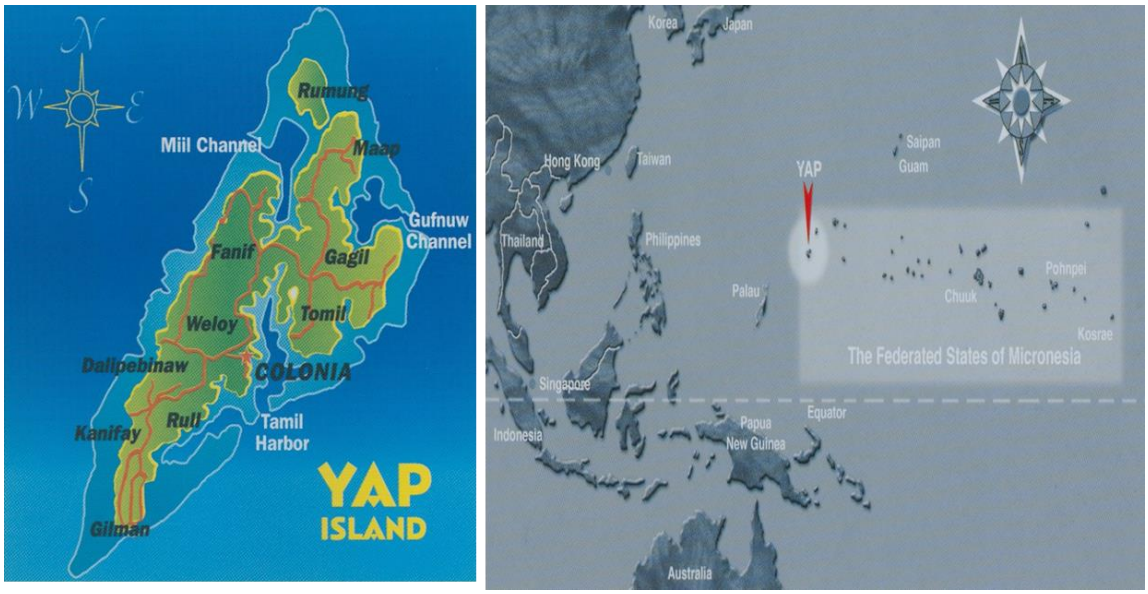


Figure 2-1 Location of Yap State

2.1.2 Administration

The Yap State Government was established when its Constitution took effect on December 24, 1982. While much of its structural setup and constitutional mandate is modelled on the US democratic system of government, Yap State Government, in addition to the three branch system of government, has a fourth branch of traditional power; the Councils of Pilung (Yap Main Island) and Tamol (Yap's Neighboring Islands). The executive power of the State is vested in the Governor who is the head of government. The Executive Branch consists of five departments and three offices. The departments and offices are headed by Directors and the Attorney General, who are politically appointed by the Governor with advice and consent of the Legislature.

2.1.3 Population

During the periods of heaviest population, the Yapese recognized over 180 separate villages. In recent years 91 of those villages contain at least one resident household, and the largest villages have forty to fifty households with up to 300 people in residence. Most of the inhabited villages lie in close proximity to the sea, and households are dispersed over a fairly large area along the shoreline. Estimated population figures based on the recent 2010 census are shown below:

Table 2-1 Estimation of population based on the recent census data

Estimated and Projected Yap Population*: 2001-2015											
State	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2015
Total	**11,322**	**11,395**	**11,469**	**11,533**	**11,595**	**11,647**	**11,697**	**11,736**	**11,780**	**11,810**	**11,863**
0-14	4,102	4,114	4,129	4,144	4,175	4,172	4,173	4,177	4,187	4,211	4,213
15-59	6,488	6,549	6,605	6,644	6,655	6,682	6,699	6,701	6,696	6,663	6,418
60+	732	732	735	745	765	793	825	858	897	936	1,232
Males	**5,530**	**5,552**	**5,574**	**5,594**	**5,615**	**5,627**	**5,638**	**5,642**	**5,649**	**5,649**	**5,600**
0-14	2,103	2,107	2,111	2,117	2,132	2,127	2,124	2,122	2,124	2,135	2,124
15-59	3,089	3,110	3,130	3,139	3,133	3,132	3,125	3,109	3,090	3,058	2,859
60+	338	335	333	338	350	368	389	411	435	456	617
Females	**5,792**	**5,843**	**5,898**	**5,939**	**5,980**	**6,020**	**6,059**	**6,094**	**6,131**	**6,161**	**6,263**
0-14	1,999	2,007	2,018	2,027	2,043	2,045	2,049	2,055	2,063	2,076	2,089
15-59	3,399	3,439	3,475	3,505	3,522	3,550	3,574	3,592	3,606	3,605	3,559
60+	394	397	402	407	415	425	436	447	462	480	615

Source: FSM Statistics Unit

Note: * Assumes the following: moderate improvements in fertility; moderate improvement in mortality; and net out-migration increased 50% first 5-year period following the census then remained constant thereafter.

2.1.4 Infrastructure

All of Yap Main Island and several island groups in the Neighboring Islands have electricity provided by the Yap State Public Service Corporation. The electricity rate for businesses is 17 cents per kwh for the first 5,000 kwh and 20 cents per kwh thereafter. There are three main public water systems on Yap Main Island, which service most of the island's population. A waterline extension project was recently completed, which extended the Northern Water System which services Gagil and Tomil municipalities, to Maap municipality.

The FSM Telecommunications Corporation provides all necessary telecommunication facilities for all of Yap Main Island and Ulithi Atoll. It has lines for telephone, fax, telex and the Internet for both local and international use, 24 hours a day. It also provides such features as direct dialling, caller ID and pager. FSMTC also has a cellular phone system network that has both domestic and international calling and messaging capabilities.

2.1.5 Land Ownership

Special importance is attached to land in Yap both because of its short supply and its traditional importance. Leasing of private lands in particular can be time-consuming, due to fractional ownership and lack of clear boundaries and levels of ownership and access. Many parcels of land are held by families or clans. Almost all land in Yap and aquatic areas are owned or managed by individual

estates and usage is subject to traditional control. Land cannot be sold to non-citizens of the FSM, thus these land and aquatic ownership patterns greatly influence the strategies and actions required to sustainably manage and protect the environment. Most property is held as family trusts and land use rights are passed down from generation to generation within the extended family system. Subsurface rights are synonymous with surface rights. As such, public administration and ownership of land has been the result of a lease or use agreement between the landowner(s) and State government or outright purchase of property based on an agreed value, but this process has been known to be protracted and lengthy. Government owned land is minimal with competing uses based on all prioritized development sectors.

2.1.6 Economic and Financial situation

Economic and financial situation in FSM in 2016 are summarized as follows.

Table 2-2 Economic and Financial situation

FY2016			Population	GDP per capita
GDP current prices ($ million):	329.9	Chuuk:	46,688	1,994
Population:		Kosrae:	6,227	3,376
102,453		Pohnpei:	37,893	4,313
GDP per capita ($):	3,220	Yap:	11,645	4,495
GNI per capita ($):	3,715			
GNDI per capita ($):	4,785			

FY2016 GDP estimates are "Interim" until administrative data on business gross revenues becomes available

	2010	2016
GDP, % growth	2.0	-0.1
Prices (annual percent change)		
- Consumer price index	3.6	-1.0
- CPI Domestic items	5.7	-0.1
- CPI Imported items	3.0	-1.3
Employment and Wages		
- Number of employees	15,702	15,339
- Average annual wage	7,704	8,299
- Average annual real wage (less inflation)	5,728	5,067
Government Finance Statistics, $ millions		
- Revenue	200.3	226.6
- Expense	135.8	163.3

Source: FSM FY2016 Economic Brief August 2017

2.2 Current Situation on Solid Waste Management

2.2.1 Overview of SWM from the point of view of Waste Flow

Creation of 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, survey on incoming waste to the public landfill site and survey on community dump sites were carried out in June 2017 and based on these results and data, allowed for the creation of a current waste flow for Yap Main Island. In this section, the current SWM situation of Yap will be presented. As for the details how the waste flow was created, please see Annex 1.

- **Waste generation by source:** Sixty-five percent (65%) of waste generated is from households while the remaining 35% is from sources other than households such as shops, restaurants, businesses, and public institutions. Managing household waste is of great importance.
- **Recycling:** As much as 20.6% of generated waste is recycled on site. Also, 1.7% of the generated waste, which is 160 kg (355lbs per day) per day, is recycled under a Container Deposit Legislation (CDL) Recycling Program. Although it is only 1.7% by weight, CDL tremendously contributes to the State's beautification, as well as helps to save space at the public landfill site.
- **Waste collection:** Collection of waste through collection services or a company is only 13.7% of the generated waste (approximately 20% of the discharged waste). In Yap, collection services are provided mainly by the contractor, who provides such services through a contract executed with the Department of Public Works & Transportation (DPW&T) and collectors who collect waste in Tomil Municipality on a pilot basis.
- **Final disposal:** As much as 86% of the discharged waste, which is equivalent to 60% of generated waste, is properly discharged to the public landfill site. The remaining 14%, which is equivalent to 10% of generated waste, is dumped at community dump sites.
- **Final disposal:** Only 23% of the incoming waste to the public landfill site is brought by collectors, while the remaining 77% is brought directly by households and business entities.

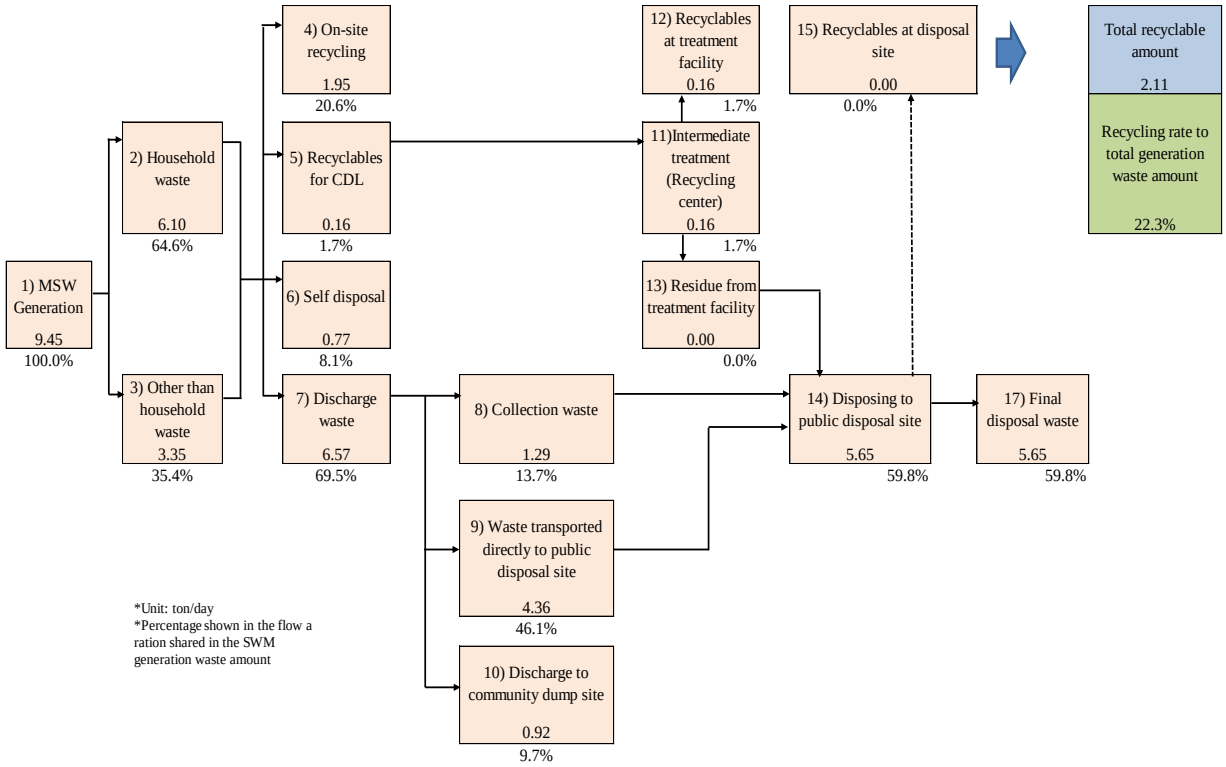


Figure 2-2 Waste flow in Yap State in 2017

2.2.2 Technical situation of SWM

a. Waste Generation and Composition

In order to understand the complete picture of waste generation, generation rates are estimated[1].

a.1 Generation rate of household waste

As shown in Table 2-4, waste generation rates of households is calculated by summing up (i) waste that is eventually recycled on-site, (ii) waste that goes to CDL, (iii) self-disposed waste, and (iv) discharged waste. These figures were estimated based on the household survey on waste generation of 2017 and the waste amount and composition survey of 2015.

Table 2-3 Composition of generated household waste and data source

Composition of generated household waste		Data source
Recyclable	Waste that is recycled on-site	Household survey on waste generation (June 2017)
	Waste that goes to CDL	
Non-recyclable	Self- disposed waste	
	Discharged waste	Waste amount and composition survey (WACS) (2015)

As seen in Table 2-5, generation rate of household waste is 834g (1.84lb)/person/day. The rate breaks down into (i) 266g (0.59lb)/person/day for on-site recycling, (ii) 10g (0.02lb)/person/day for CDL, (iii) 105g (0.23lb)/person/day for self-disposal, and (iv) 453g (1.00lb)/person/day of discharged waste. As many as 33% of generated waste at household level is recycled at source, and also partially disposed of at their premises, and then the remaining 54% is discharged as waste.

Table 2-4 Generation rate of household waste

Unit	Recyclable		Non-recyclable		Generation rate of household waste
	On-site recycling	Recyclable for CDL	Self-disposal	Discharged waste	
g/person/day	266	10	105	453	834
lb/person/day	0.59	0.02	0.23	1.00	1.84
%	31.9	1.2	12.6	54.3	100

(Source) Household survey on waste generation (2017) and Waste amount and composition survey (2015)

The following presents an outline and results of the waste amount and composition survey (WACS) carried out in 2015.

[1] (i) Generation rate of household waste = waste generated per person per day (g(lb)/person/day)

(ii) Generation rate of state solid waste (g(lb)/person/day) = Average generated waste amount of households per day + average generated waste amount of other than households per day) / population

【Outlines of WACS】

- Survey period : Eight days in April to May of 2015 (including a trial day)
- Number of sample households : 20
- Survey items : Unit generation rates, waste composition, apparent specific gravity
- Categories of waste composition : 14 categories i.e. paper, cardboard, plastic bags, recyclable plastic container, Styrofoam, other plastics, glass, steel, aluminum cans, tin cans, other metals, kitchen and grass/woods, textile and others

【Result of WACS】

By weight ratio, that of kitchen waste and grass/wood account for 64%. By volume ratio, that of kitchen waste and grass/woods account for as high as 46%, and those of plastics (plastic bags, recyclable plastic container, Styrofoam and other plastics in total) and cardboard account for 23% and 13% respectively.

Table 2-5 Waste composition of household waste

Composition	Percentage	
	Weight (%)	Volume (%)
1. Kitchen waste and Grass/Woods	64.1%	46.3%
2. Cardboard	7.2%	13.0%
3. Paper	1.8%	3.4%
4. Plastic bag	0.1%	0.4%
5. Recyclable plastic container	1.3%	2.7%
6. Styrofoam	0.2%	1.7%
7. Other plastic	7.6%	18.2%
8. Aluminum	0.5%	1.1%
9. Steel	3.0%	0.5%
10. Tin can	1.9%	3.9%
11. Other metal (gas canister)	1.0%	2.5%
12. Glass	0.4%	0.4%
13. Textile	2.0%	2.5%
14. Others	8.8%	3.3%
Total	100.0%	100%
Apparent Specific Gravity （ASG)	0.10	

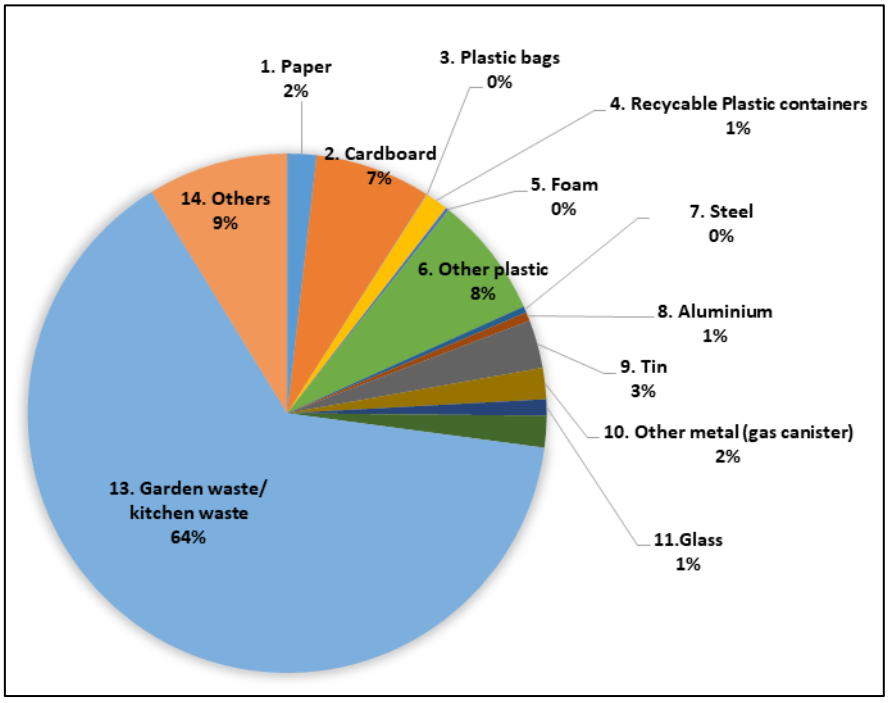


Figure 2-3 Waste composition (Weight %)

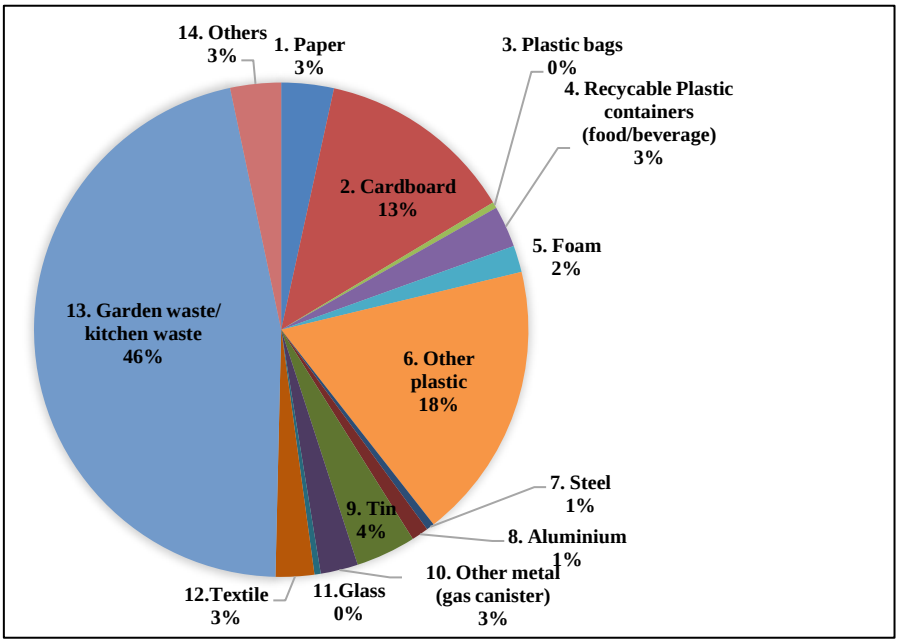


Figure 2-4 Waste composition (Volume%)

a.2 Generation rate of SSW

Waste is generated not only from households but also from business entities and public institutions. Generation rate of other than household waste, 458g (1.01lb)/person/day, is calculated by dividing waste generated from other than households by population. By summing up generation rate of household waste and that of other than household waste, generation rate of solid waste in Yap State, 1,292g (2.85lb)/person/day, is finally obtained.

Table 2-6 Generation rate of State Solid Waste

Unit	Household waste	Other than household waste	State solid waste
g/person/day	834	458	1,292
lb/person/day	1.84	1.01	2.85
%	64.6	35.4	100

(Source) Current waste flow of Yap

b. Waste Discharge

General households who discharge waste through collection services usually use 55-gallon drums. Most households place waste into some kind of bag and place them into the drums. Some shops and hotels in Colonia use other containers such as wheelie bins and buckets with lids. Other shops that contract with private collectors use even larger containers.

c. Waste Collection

The following are collection systems used in Yap Main Island:

- Public waste generated at public institutions such as schools and government offices is collected by a private company contracted with DPW&T.
- Commercial waste and household waste are collected by private companies for a charge or fee, mainly in Colonia area.
- Waste collection system which charge a fee along with closure of community dump sites have started in Tomil municipality from 2017.
- Household waste collected by collection services in Colonia area is 0.5t/day through a contracted waste collector and 0.02t/day from Tomil community. In total, only 15.7% of discharged household waste is collected.

c.1 Collection services provided by the contractor (a private collection company)

DPW&T contracts out a collection service for a year in Colonia to a company selected through a bidding process, and the selected company provides the following services[2] under the current contract of FY2018:

- Collect waste from 36 public institutions and buildings such as schools and hospital in Colonia as well as from 12 households who preferred to have waste collection from the selected contractor.
- Collect waste by using their own truck such as 2-ton dump truck or 2-ton flatbed truck.
- Collect waste from Monday to Friday with collection frequency differing from customer to customer. Typically, collection service is provided from once to three times per week or when drums become full.

c.2 Collection services provided by private companies other than the contractor

Several private companies and individuals provide collection services to their own customers (among households, stores and super markets).

c.3 Waste collection in Tomil

A new collection system has been initiated as a trial in Tomil municipality. Along with introducing the new collection system, community dump sites in Tomil were closed down. More details are as follows:

- Started waste collection in 2017.
- 10 collection stations (garbage sheds) were built basically in every village[3] with the financial help from Department of Health Services.
- Households who decide to receive newly introduced collection service pay a certain amount

[2] Clean-up activities which include grass cutting, drainage and culvert cleaning and road sweeping are also contracted out to 11 individuals, and these contracts are handled by the Division of Contracts and Engineering Management of DPW&T.

[3] There are 11 villages with residents in Tomil. Two villages out of 11 share one collection station.

of monthly fee to discharge their waste to collection stations in their villages, and the accumulated waste in the stations are collected and transported to the public landfill site.

- Waste from four collection stations is collected on the last Tuesday of every month by Island Paradise Metal Company (IPMC). Those who participate in the collection system amongst the villages of Tomil pay US$2.50 per household as a collection fee. IPMC uses a 4-ton Truck with Crane which it utilizes as the State Recycling Program Operator.

	
A collection station installed in one of 11 villages.	Waste discharged to the station. From this collection station, waste is collected once a month. (Last Tuesday of every month.)
	
A community dump site which was closed down.	Island Paradise Metal Co. uses 4-ton Truck with Crane for collection, provided by EOJ.

d. Waste Disposal

In Yap, there is one public landfill site in Colonia which was constructed with financial support from EOJ. There are several community dump sites in almost all municipalities in the main island of Yap. While 60% of generated waste, which is equivalent to 86% of discharge waste, is disposed at the public landfill site, 10% of generated waste, which is equivalent to 14% of discharged waste, is disposed at community dump sites.

d.1 Public disposal site

A. Outline of the public disposal site and the status of O&M

Outline of the public landfill site and the current status of O&M is shown in Table 2-7.

Table 2-7 Outline of the public disposal site and the O&M status

Item	Contents
Name of the site	Yap main public landfill
Location	Colonia area
Land owner	Yap state government
Area	8,370m^2
Outline of the final landfill site	• Treatment method : Semi-aerobic • Operation: In the landfill site, there are three sections; one is the old cell that has been filled up, and the remaining two are new cells which have been developed with financial support from the Embassy of Japan. One of new cells has been used since 2014, and the water quality of the leachate pond is regularly monitored by Yap EPA. As for the old cell, the final soil covering was completed in 2015 with gas ventilation pipes (only hard pipes for ventilation) for safe and stabilized closure. • Ancillary facilities: gas ventilation pipes, leachate collection and circulation facilities, leachate collection pond • Management of incoming waste: installation of gate, designated areas for certain types of waste, records of incoming waste, no tipping fee • Heavy equipment: one excavator
Management staffs	Four (4) officers of Refuse Collection Program Section of DPW&T (one manager, two operators and one administration staff) are engaged in operation and management of the final landfill site. In addition, night security guards are hired.

(Source) DPW&T

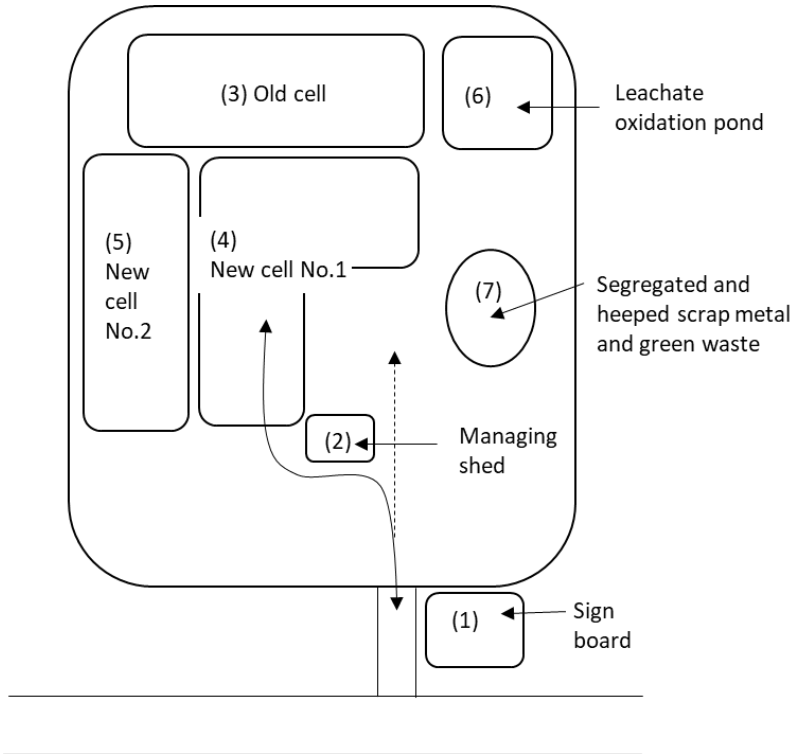


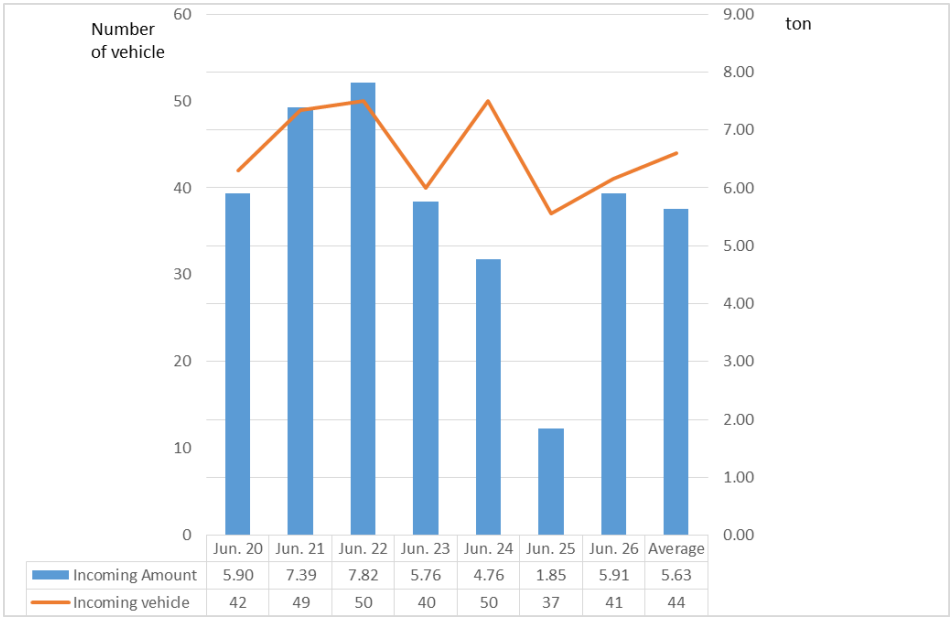
Figure 2-5 Layout of landfill site

	
Sign board	Security shed
	
An old cell	A new cell in use
	
Waste is pushed into the current cell by an excavator.	Leachate oxidation pond
	
Segregated green waste	Segregated scrap metal

B. Incoming waste

In order to estimate the amount of waste as well as the number of vehicles coming to the public landfill site, the incoming waste survey was carried out in June 2017. The result of the survey is shown in Figure 2-5, while the current practice is summarized in Figure 2-6. As shown in Figure 2-5, the average amount of incoming waste per day is 5.63 ton, and the average number of incoming vehicles per day is 44, while the average amount of incoming waste per vehicle is calculated as 128kg (282lbs).

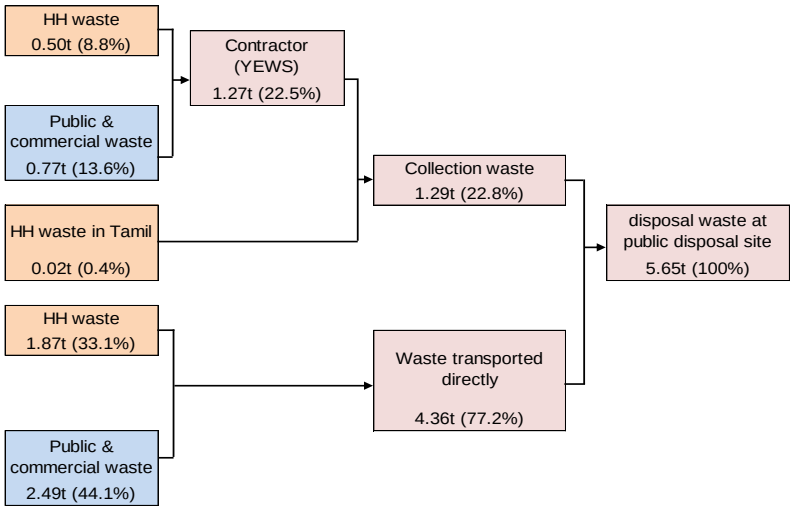
Only 23% of incoming waste are collected through collection services with the remaining 77% of waste being brought directly from shops, households, etc. As much as 43% of incoming waste is directly brought by households. In short, the limited collection services result in the current situation that many households frequently bring their small quantity of waste into the public landfill site by themselves.



	Jun. 20	Jun. 21	Jun. 22	Jun. 23	Jun. 24	Jun. 25	Jun. 26	Average
Incoming Amount	5.90	7.39	7.82	5.76	4.76	1.85	5.91	5.63
Incoming vehicle	42	49	50	40	50	37	41	44

Figure 2-6 Number of incoming vehicles & disposal waste amount

(Source) The incoming waste survey in June 2017



(Source) The incoming waste survey in June 2017

Figure 2-7 Disposal waste amount by source and collection/direct transportation

d.2 Community dump sites

As revealed in the current waste flow, 10% of generated waste, which is equivalent to 14% of discharged waste, is disposed at community dump sites. Major community dump sites, identified as of June 2017, are as follows.

1. Fanif municipality Rumuu village
2. Tomil municipality Dechmur village
3. Gagil municipality Makiy village
4. Gagil municipality Gachpar village
5. Gagil municipality Wanyan village

e. Reduce, Reuse and Recycling

e.1 On-site recycling

Through the waste generation survey at household level, it became apparent that as much as 33.1% of generated waste at household is recycled at source. In detail, 31.9% is recycled within their premises, i.e. kitchen waste used as feed to livestock or dried coconut fiber/husks as firewood, while 1.2% is containers set aside at each household for CDL.

	
On-site Recycling: Kitchen waste to be fed to livestock	On-site Recycling: Coconut shells being dried for firewood
	
On-site Recycling: Compost of garden waste	Beverage containers for CDL: These are brought to Recycling Center for a refund.

e.2 Compost

A wood chipper which EPA had requested to the Embassy of Japan was provided in May 2016, and the chipper is now safely stored in a store shed built at the public disposal site. Currently, the chipper is being used to reduce the green waste piled up in the disposal site by DPW&T.

	
Situation of operation of wood tipper provided by EOJ	Wood chip produced by shredding.

e.3 CDL

CDL in Yap was initiated with the support from UNDP through a Technical Advisor in 2003. The regulations related to the CDL were amended in December 2009, and the refund was increased from 3 cents to 5 cents per container. Also the same amendment enabled the Recycling Program Operator or agent to pay refunds directly to customers upon turning in of materials/containers. Flow chart of CDL in Yap is shown as Figure 2-7, The detailed mechanism of CDL system is as follows.

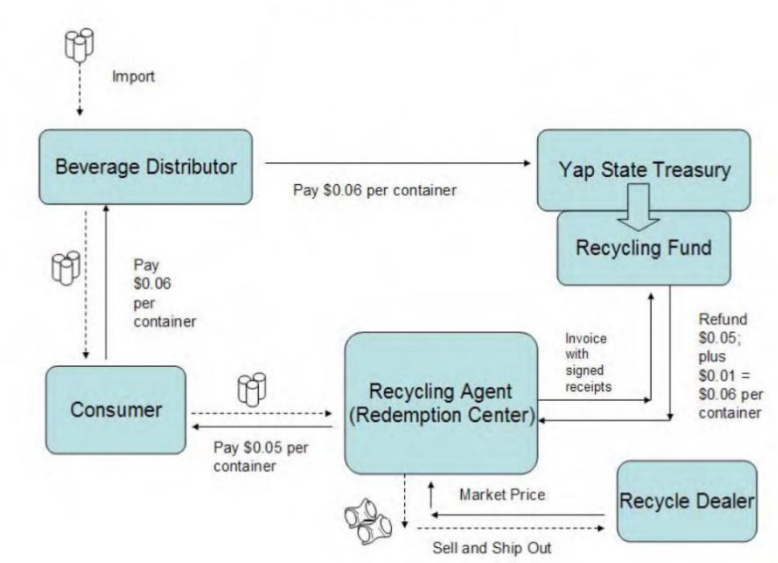


Figure 2-8 Flow chart of CDL in YAP

A. Target Items

Target items for CDL system are;

- Aluminum Beverage containers/cans,
- Glass Beverage bottles,
- PET Beverage Containers and Cooking Oil Containers.

B. Deposit amount

Deposit fee is currently 6 cents per container; 5 cents per container is given to the consumer as a refund and 1 cent per container is used by the Recycling Program Operator as operation cost and handling fee.

C. Roles of related organizations

Roles and responsibilities of organizations for CDL are shown as follows.

Table 2-8 Outline of roles for CDL entities and offices

Organizations		Roles and Responsibilities
State Organization	EPA	Regulatory agency responsible for managing and overseeing the State Recycling Program through enforcement of the Recycling Program Act and Regulations.
	Office of Administrative Services	Through its Division of Tax and Revenue, 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 upon receipt of claim; provides Yap EPA with monthly copies of all records.
The recycling company (operator)		Island Paradise Metal Company (better known as Island Paradise Company) is the State Recycling Program Operator through contract executed with Yap State Government. Responsible to operate Program per Regulations, maintain operations and utilize and maintain equipment as provided by Yap EPA, and shipment and recycling of 3 of 4 categories of recyclables off island.
Business entities	Importers	Responsible to pay required deposits to the State Government specifically through Division of Tax and Revenue.
Consumer		Responsible to participate in the CDL Recycling Program through turning in of recyclables to the Recycling Center following Program rules of condition of recyclables.

D. Outline of CDL by IPC (Island Paradise Company)

The current CDL Recycling Program Operator, Island Paradise Company (IPMC), signed a five-year contract with the state government in 2015. IPMC has carried out recycling activities since 2003. The outline of CDL by IPMC is as follows.

- Employees engaged in recycling activities are 4 in total (three workers and one clerk)
- Individual households, schools, and collection groups directly bring CDL items to IPMC. Bulky recyclables such as scrap metal are collected using a truck with crane/boom.
- Brought containers targeted for CDL are put into wired basket and the number of containers is roughly counted. In case of aluminum cans, the amount of refund for a full basket (approximately 500 cans) will be 25 USD. Right after measurement, IPC will pay the refund in cash to the customers, and later IPC will claim the amount to the state government on a weekly basis.
- Recycled aluminum cans are pressed by middle size press machine. Around 1,500 cans are pressed at one press. And the weight of pressed aluminum block is around 22kg (48.4 lb).

- Recycled PET bottles are crushed into flaky pieces by a crush machine donated by EOJ. When aluminum is sold, at the same time PET bottle flakes are given to buyer free of charge. The volume of PET bottles crushed into flakes is reduced by 1/20th compared to the original volume of bottles.
- Recycled glass bottles are crushed by crushing machine donated by Australia.
- Citizens are requested to bring in clearer containers after removing product labels.

E. CDL Financial Status

Deposits paid by importers and refund paid to consumers are shown in the table and figure below. Deposit paid was higher than refund paid until 2012, however, these have become mostly equal since 2013.

Table 2-9 Deposits paid by importers and refund paid to consumers

Year	Deposit(US$)		Refund(US$)	
	Yearly	Total	Yearly	Total
2009	144,463.56	144,463.56		0.00
2010	179,671.69	324,135.25	213,834.78	213,834.78
2011	174,265.02	498,400.27	225,002.52	438,837.30
2012	158,490.49	656,890.76	204,687.89	643,525.19
2013	151,156.38	808,047.14	150,924.48	794,449.67
2014	143,608.20	951,655.34	149,171.88	943,621.55
2015	167,582.34	1,119,237.68	151,961.82	1,095,583.37
2016	175,663.68	1,294,901,36	169,386.24	1,264,969.61

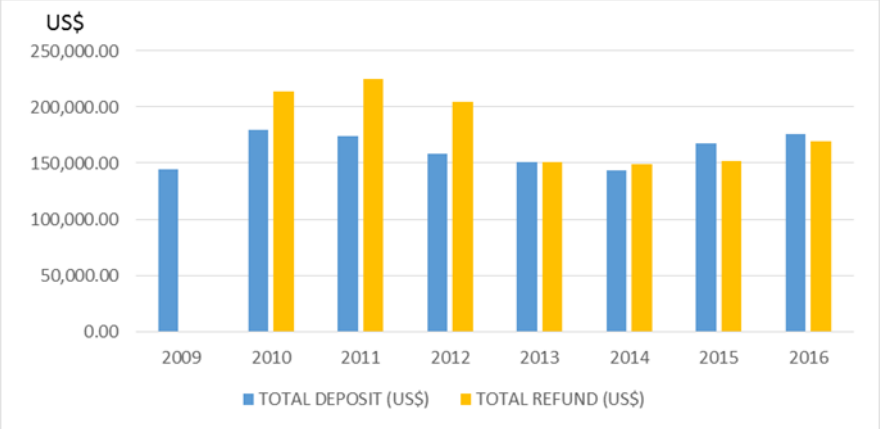


Figure 2-9 Deposit and refund paid for CDL

F. Amounts of collected containers

Number of containers that deposits were paid by importers and number of containers that were collected in exchange of payment of refund. Number of containers imported and refunded are shown as table and figure below. In the same way as the tendency of deposits and refunds paid, refunded (recycled) containers was higher than imported containers until 2012, however, these figures have

become mostly equal since 2013.

Table 2-10 Number of containers imported and refunded

Year	IMPORTS(piece)		REFUND(piece)	
	Yearly	Total	Yearly	Total
2009	2,407,726	2,407,726	0	0
2010	2,994,528	5,402,254	2,705,923	2,705,923
2011	2,904,417	8,306,671	3,188,380	5,894,303
2012	2,641,418	10,948,089	3,413,380	9,307,683
2013	2,519,273	13,467,362	2,515,288	11,822,971
2014	2,393,470	15,860,832	2,559,955	14,382,926
2015	2,656,739	18,517,571	2,489,545	16,872,471
2016	2,927,728	21,445,299	2,823,104	19,695,575

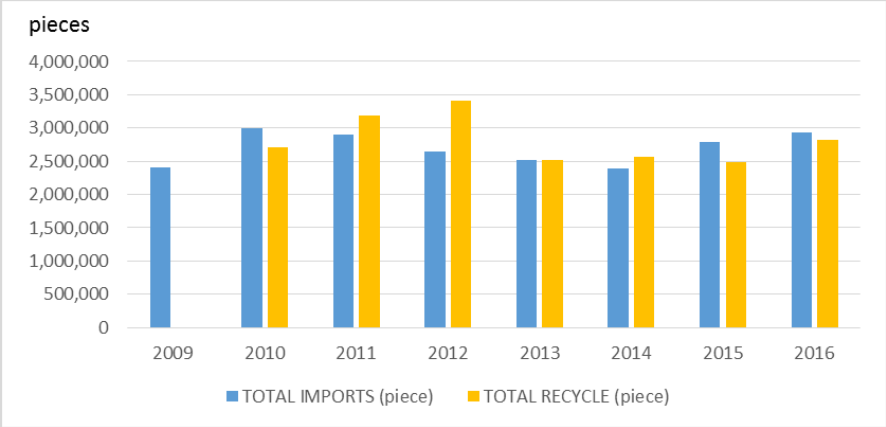


Figure 2-10 Number of containers imported and refunded

IPC Recycling Center

Middle size of press machine for aluminum cans

Aluminum blocks pressed by press machine

Shredding machine for PET bottles donated by EOJ

PET bottle flakes

Sacks of PET bottle flakes waiting to be given to a “buyer”

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 Department of Public Works and Transportation (DPW&T)

Under the Director and Deputy Director, four officers in the Refuse Collection Program Section are in charge of solid waste management. Major duties of the department are as follows;

- Management of waste collection services (the service is contracted out to a private company.)
- Management and maintenance of the final landfill site
- Operation and maintenance of the heavy equipment and collection vehicles

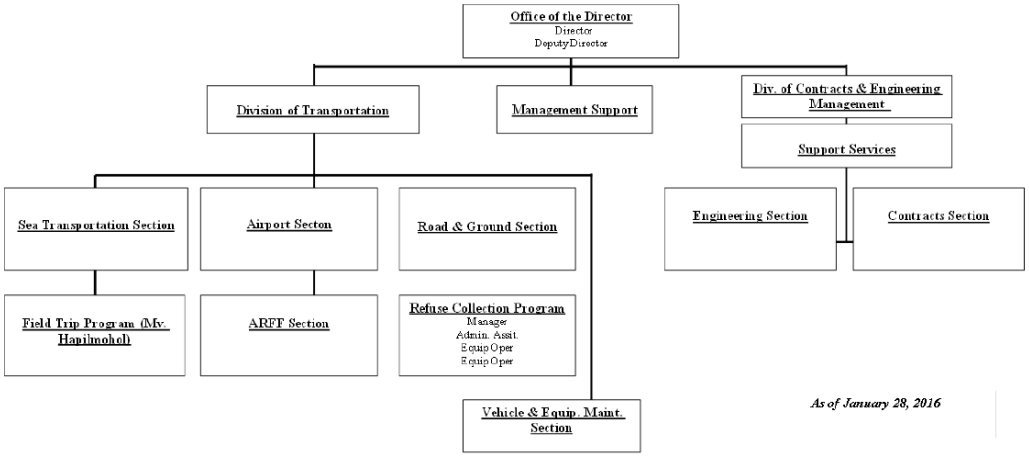
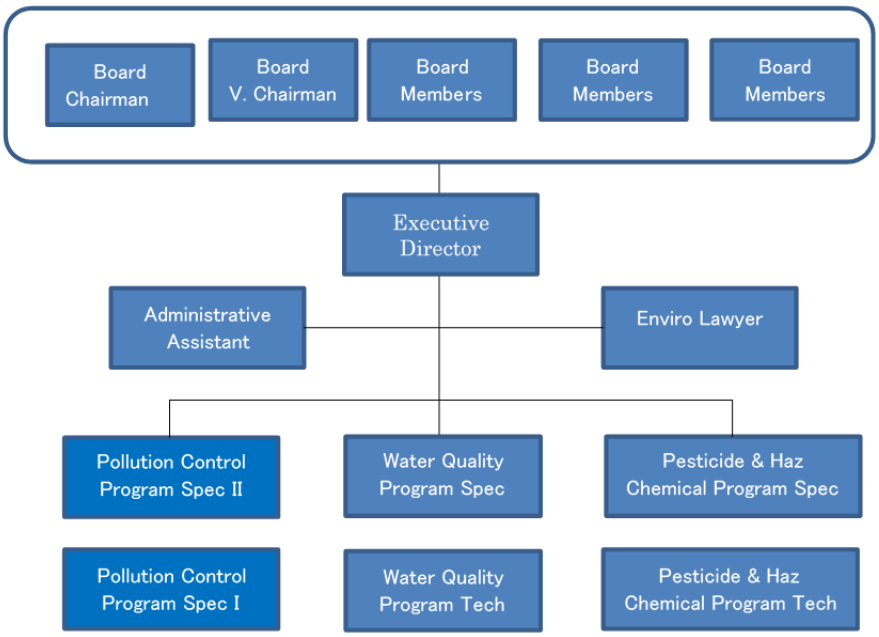


Figure 2-11 Organization chart of DPW&T (Source: DPW&T)

a.2 Yap Environmental Protection Agency (EPA)

EPA in Yap is responsible for formulation of environmental policies and programs, and implementation and supervision of them. EPA is not a service provider but rather a policy maker cum regulator. In fact, EPA took a good initiative to formulate a state SWM strategy. There is no particular section designated for SWM within EPA, but the officer-in-charge periodically monitors the environmental status of the final landfill site, and shares the monitoring results with DPW&T, and provides recommendations whenever necessary. As for the CDL, the entire system is under the purview of EPW, although the actual operation has been contracted out to a private company. In addition, EPA actively organizes environmental & awareness raising campaign in collaboration with DPW&T, the recycling company that operates CDL, communities and other relevant organizations.

Figure 2-12 Organization chart of Yap EPA



a.3 Role of municipalities

In the main island of Yap, there are 10 municipalities. All municipalities have created a municipal council for planning of activities and budgets for the villages within the municipality. After finalizing all activity for each village, each member of the council shall be assigned to deliver the activity to a village that needs activity improvement.

The way of electing members for the municipal council is, each village chief and elders within the municipal shall select a responsible person to represent their village in the municipal council.

Of course, there are also other activities in the municipality that are related to the culture, which is regularly implemented to improve the culture of the state, for example, dance practice, fishing, gardening, beautification of the villages, road cleaning, taro-patch planting and cleaning, sea shore cleaning.

And other activities such as community projects that need funding shall also be planned by the municipal council and seek funding from the state and other donors overseas. All funded projects will be inspected by the state inspector and government representative to the projects.

b. Policies and Laws on SWM

The followings are the main laws which are related to SWM.

a. Recycling Program Regulations (2014)
b. Solid Waste Management Regulations (2015)
c. Hazardous Substance Regulations (2015)
d. Plastic Bag Prohibition Regulations (2014)
e. Oil Spill Reporting Regulations (2014)
f. Burning Regulations (2014)
g. Environmental Requirements for Transportation vessels Regulations (2014)

h. Persistent organic/Pollutants Regulations (2014)
i. Recycling Regulations (2008)

2.2.4 Financial Situation of SWM

a. Waste collection fee

SWM-related income is collection fee only. Previously, Yap State Public Service Corporation (YSPSC) had collected collection fee as a part of electricity bill, and 10% of the amount charged to each household was secured for waste management. This collection system has stopped, and therefore the relevant organization have to employ another collection method as soon as possible.

b. Expenditure for SWM and total state expenditure

Based on the financial data submitted by DPW&T, expenditure for SWM is summarized as follows. Average of expenditure for three years was approximately 73,600 US$.

Table 2-11 Total State expenditure and expenditure for SWM

	FY2014	FY2015	FY2016	Average
A. Total State expenditure	21,609,165	21,086,130	20,137,544	-
B. Total expenditure for SWM	63,552	67,735	89,323	-
Ratio of SWM expenditure (B) / (A)	0.29%	0.32%	0.44%	-
Breakdown of expenditure for SWM				
1.Personnel cost	14,882	21,303	21,030	19,071
2.Contractual service cost	20,863	16,050	46,999	27,971
2.1 Security of dump site	3,675	3,495	4,950	4,040
2.2 Refuse collection (Colonia area)	14,700	14,700	10,200	13,200
2.3 Installation of collection stations	-	-	5,590	5,590
2.4 Leachate pond improvement	0	0	0	0
2.5 Construction of security house extension and street lights	0	0	4,846	1,615
2.6 Construction of Dumpsite Shower/Restroom	0	0	8,925	2,975
3.Dump site operational cost	17,530	17,530	7,005	14,115
3.1 Fuel for excavator	14,916	14,916	5,742	11,858
3.2 Fuel for other equipment	2,614	2,614	1,123	2,117
3.3 Electricity	-	-	140	140
4.Equipment maintenance	9,723	10,550	13,772	11,348
4.1 Repair parts (excavator L320)	9,723	10,550	13,772	11,348
5.Office supplies	555	2,303	517	1,125
Total	63,552	67,735	89,323	73,630

Source: Total State expenditure is by Assistance, Yap State Investment Trust, Gov. Fund, and breakdown of expenditure for SWM is by DPW&T

2.3 Major Characteristics of SWM in Yap

2.3.1 Waste generation

While generation rate of household waste is calculated as 834g (1.84lb)/person/day, generation rate of other than household waste is 458g (1.01lb)/person/day. By summing up these figures, generation rate of state solid waste, 1,292g (2.85lb)/person/day, is finally obtained. This rate is almost same as those of other states of FSM.

2.3.2 Waste discharge

While 45.7% of total waste is prevented of becoming waste by either recycling at source or self-disposing within their premises, the remaining 54.3 % of the generated waste at households is discharged. The recycling rate, the amount of recycled waste as on-site recycling and under CDL system as well divided by the generated amount from both households and other than households, is proudly as high as 22.3%.

While as many as 86% of the discharged waste is appropriately disposed at the public disposal site, the remaining 14% are disposed at the community dump sites without much environmental considerations.

2.3.3 Waste collection system

In Colonia, several households and shops who contracted with private collectors use private collection services, while the contractor who made a contract for collection service provision with DPW&T provides services mainly to public institutions such as schools, hospitals and government offices. In general, no collection service is available in other municipalities, except Tomil community, which has inaugurated a trial of waste collection. As a whole, the rate of households who use collection services in Yap State is only approximately 16%.

2.3.4 Improper disposal

Approximately 9.7% of the generated waste is disposed either to the community dump sites or somewhere in the community by rather inappropriate manner. As of June 2017, six major community dump sites, which are just big pits, were identified. DPW&T helps communities to dig holes based on their requests, however most of these community dump sites are not managed properly.

2.3.5 CDL system and export of recyclable items collected under CDL

Approximately 1.7% of the generated waste is recycled under CDL system. By weight, it accounts only for 1.7% of the generated waste, however the system tremendously contributes to the reduction of littering and beautification of the island. Currently, recyclables collected under CDL system except aluminum haven’t been exported since the transportation cost exceeds the sale price of such recyclables.

2.3.6 Management of the public disposal site

At the public disposal site, persons who ensure security are stationed 24 hours a day, seven days a week. (The operators of heavy equipment during day time and the security guard during night time.) Incoming vehicles are recorded but such records are not properly analyzed. Due to the limited collection coverage, many shops and households directly bring their waste into the public disposal site. It reaches 77% of the entire incoming waste to the public disposal site. No tipping fees are imposed.

2.3.7 Waste collection fee

Waste collection fees had been collected before by Yap State Public Service Corporation (YSPSC) as a part of electricity bill. Once YSPSC stopped collecting collection fees, waste collection fees have not been collected.

2.3.8 Institutional Settings

There is uniqueness as well as advantages to the institutional settings in Yap compared with other states of FSM. Firstly, the uniqueness. Municipalities have limited roles and responsibilities with little or no municipal budgets, and therefore the state government has more roles and responsibilities, especially DPW&T and EPA. Secondly, the advantages. There is a designated section for SWM, i.e. the Refuse Collection Program Section, in DPW&T, which will lead the realization of this SSWMS along with other important stakeholders such as EPA and municipal leaders.

PART TWO: STRATEGY

3 The State Solid Waste Management Strategy (SSWMS)

3.1 Purpose

As in many Pacific islands and cultures, the concept of waste management is an integral part of the identity, forethought, and culture of Yapese society. The native word used on Yap Main Island for 'trash' or 'waste' is known as 'dow', also the root word for the Yapese term for 'body' (dowef) as waste is a concept akin to the importance of one's body or person. Therefore its careful management and care are considered equally important to taking care of one's own body.

This strategy is developed as a means to understand the current state and different facets of waste management in the State and more importantly, to lay a practical road map to improve the key components of waste management and address the challenges faced in the aim of reaching a sustainable and truly integrated means of waste management in Yap State. It is also envisioned that this strategy be endorsed, adopted, and used as the guiding document for waste management activities for the State 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 Yap State Governor.

3.2 Vision

"An integrated system of safely and effectively managing waste in Yap State for the benefit of current and future generations."

3.3 Scope

This SSWMS 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 Strategy will be undertaken in 2022 to update its relevance to the current needs and plan for the next activities for the remaining period of the Strategy.

The Strategy covers solid wastes generated in the household, institutional and commercial waste streams of the main island, and those wastes are called as State Solid Waste (SSW) in this strategy. The Strategy does not cover medical waste, hazardous waste except those that are included in the CDL system. Also, liquid and gaseous wastes are excluded, although greenhouse gas (GHG) emissions resulting from waste activities are included.

3.4 Guiding Principles

Principle 1: Establish financially sustainable SWM system with due consideration of "Post 2023".

Financially speaking, the current SWM system in Yap heavily depends on the Compact Fund from the U.S. Government just like all other states of FSM. Since it is known that such financial support will end in 2023, it is rather appropriate to start considering establishing a self-financing SWM system with due consideration of "Post-2023". ***User-pays system,*** (re)introduction of collection fee and/or tipping fee

is one option, while ***Public-Private Partnership (PPP)*** such as contracting out further SWM-related activities to the private sector could also be options.

Principle 2: Waste reduction through maintaining current practices as well as by expanding CDL system

Practices rooted in Yapese lifestyle such as using kitchen waste as feed to livestock and dried coconut shell as firewood are widely observed in Yap. Appreciating and maintaining such practices greatly contributes to ***waste reduction***. Also, the ever-improving CDL system in Yap that prevents recyclables from going into the garbage will further contribute to waste reduction by expanding target items.

Principal 3: Commitment to a clean and beautiful pacific region

Wastes is 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, this SSWMS is basically well aligned with the aspirations elucidated in the Pacific Regional Waste and Pollution Management Strategy (Cleaner Pacific 2025[4]), which aims to support the pacific island countries to develop practical and sustainable SWM systems.

3.5 SWM issues targeted under the strategy

Issue 1: Expansion of collection services along with step-by-step closure of community dump site

As reiterated in pervious sections, the collection services are provided mainly by the contractor of DPW&T and in Tomil community as a trial basis. Thus the rate of households who receive collection service is as low as 16%. This low collection rate is the reason why (i) community dump sites are dotted around the entire island, and (ii) the rate of direct haulage of waste to the public disposal site is so high in Yap. Expansion of the collection service is envisaged through both or either public-private partnership and/or community participation. Along with the expansion of collection service, step-by-step closure of community dump site shall be considered in close collaboration with each community.

Issue 2: Further efforts to minimize waste

CDL system in Yap, which contributes tremendously to reduce littering and to increase peoples' environmental awareness, is one of the best-functioning CDL systems among many Pacific Island Countries. Even such well-functioning system can be improved further to contribute more to waste minimization by adding new items. Not only CDL but composting of green waste is also an effective way of minimizing waste. It is an appropriate time to think about introducing composting as a means of reducing green waste by utilizing a wood tipper provided by EOJ.

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

Issue 3: Financial sustainability with sound institutional setting

Last but not least, considering financial sustainably of SWM is crucial at this juncture of the political economic situation faced by FSM. Both activities for expansion of collection services as well as minimization of waste shall be carried out with special attention to financial sustainability. There are many ways to secure financial sustainability of SWM such as privatization of certain activities, introduction of fee collection, etc., and also regardless of the ways of securing financial sustainability, the responsible organization(s) has to be set and appointed to ensure financial sustainability.

3.6 Key Strategic Actions and Time Frame

In order to achieve strategic targets steadily, firstly, action plans targeting SWM issues were formulated, and secondly they will be implemented in a step by step approach.

3.6.1 Key strategic actions

Action Plan consists of six strategic actions. These actions and their brief contents are shown below;

- Expansion of waste collection service beyond Colonia

  In areas besides Colonia, waste collection services are not provided regularly. A waste collection system in those area will be established according to capacity to pay. The collection system evaluated by pilot project will be expanded to all areas outside of Colonia. In parallel, community dump sites dotted in rural areas will be closed according to the collection area expansion.

- Privatization(PPP) of waste collection service provided in Colonia

  Present collection service at Colonia provided by private company contracted-out with DPW&T will be changed as follows. First of all, collection service provided to private customers will be stopped and private customers will newly contract collection service with private collection company for a fee. Collection service provided to public institutions will be contracted-out to a public corporation, which will be newly established to implement this project.

- Enhancement of CDL system

  Number of vehicles imported in FY2016 was 225, and 263 in FY2017. And the number of batteries for cars and dry cells imported was 511 in total for these two years.

  In order to promote reduction of disposal waste amount, disused vehicles and car batteries will be added to items for CDL system. Several steps will be taken to realize this, such as construction of a recycling facility, procurement of machinery and efforts to gain the cooperation of residents.

- Proper management of public disposal site

In order to manage public disposal site more premeditatedly, first of all plan for O&M shall be developed. And date for disposal site such as incoming waste data, O&M data and cost will be recorded, input to computer, analyzed and reported and/or shared. Finally, a possibility to collect tipping fee will be examined while giving consideration to expansion of collection service.

- Green waste recycling

  In Yap state, organic waste generated at household is recycled well within their premises, i.e. kitchen waste for feeding livestock or dried coconut fiber as firewood. And the recycling rate is higher than other countries. However, to further reduce waste currently ending up at landfill or dump sites, especially green waste, ways of collaborating with actors outside of the waste management sector such as DAF (Division of Agriculture and Forestry) will be investigated.

- Proper management of inappropriate disposal waste such as waste oil and tires

  For proper management of inappropriate-disposal waste faced by island countries including Yap State, useful information and appropriate treatment systems will be investigated.

3.6.2 Time Frame

This SSWMS 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.

Time frame for six strategic actions are shown in the below table. The first five years (2018-2022) will be a period mainly to establish technical and institutional system and the second half of the strategy (2023-2027) will be a period to expand and promote the established system.

Table 3-1 Time frame to progress strategic actions

	Mid-term plan					Long-term plan				
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1. Expansion of waste collection service to rural area										
1.1 Planning, preparation, implementation and monitoring of PP for waste collection										
1.2 Expand PP to other communities										
1.3 Establish collection system for out of Colonia area										
2. Privatization(PPP) of waste collection service provided in Colonia area										
2.1 Review of contract for waste collection service										
2.2 Commencement of revised collection service										
3. Enhancement of CDL system										
3.1 Establish additional category(s) to CDL system										
3.2 Prepare area and construct new recycling center										
3.3 Commencement new CDL system										
4. Proper management of public disposal site										
4.1 Planning for O&M of disposal site										
4.2 Planning for O&M of equipment										
4.3 Data management system such as incoming data, O&M data and cost										
4.4 Examination for tipping fee collection system at disposal site										
5. Green waste recycling										
5.1Planning of promotion plan on organic waste recycling										
5.2 Preparation of trial for promotion										
5.3 Implementation										
6. Proper management of inappropriate disposal waste such as waste oil and tires										
6.1 To grasp present situation for waste oil and tires numerically in Yap										
6.2 To collect information at island countries and states in FSM about those waste issues and treatment so on.										
6.3 Discussion with related sections										

3.7 Target

Numerical targets for strategic actions are established to evaluate the progress of actions quantitatively.

Numerical targets for mid-term target year in 2022 and for final target year in 2027 have been established based on the future population projections and future waste amount (waste generation amount per person per day) projected for the main island in Yap State.

3.7.1 Setting future targets

Future targets have been established based on the projections of future population and waste amounts and strategic values.

Table 3-2 Targets of strategy

Item	Unit	2017	2022	2027
Recycling rate (to generation waste amount)	%	22.3	23.0	25.0
Collection rate (to discharge waste amount)	%	19.6	40.0	80.0
Inappropriate discharge rate (to generation waste amount)	%	9.7	6.0	1.3
Number of community dump sites	place	6	4	0
Rate of waste transported to disposal site directly	%	46.1	36.0	12.0

Table 3-3 Planning indices

Item	Unit	2017	2022	2027
Population	person	7,351	7,220	7,070
GDP Growth Rate	%	1.11	0.50	0.07
Waste generation rate	g/person/day	834	864	874
- Household waste	lb/person/day	1.84	1.90	1.93
Waste generation rate	g/person/day	1,292	1,339	1,354
- SSW	lb/person/day	2.85	2.95	2.99

3.7.2 Future waste flow

Waste flow created based on the numerical targets for mid-term target year in 2022 and for final target year in 2027 are shown below.

Table 3-4 Future waste amount

	Unit	2017	2022	2027
Generation amount	ton/day	9.45	9.76	9.71
Discharge amount	ton/day	6.57	6.81	6.80
Collection amount	ton/day	2.11	2.69	5.46
Recycle amount	ton/day	1.29	2.24	2.43
Final disposal amount	ton/day	5.65	6.13	6.36

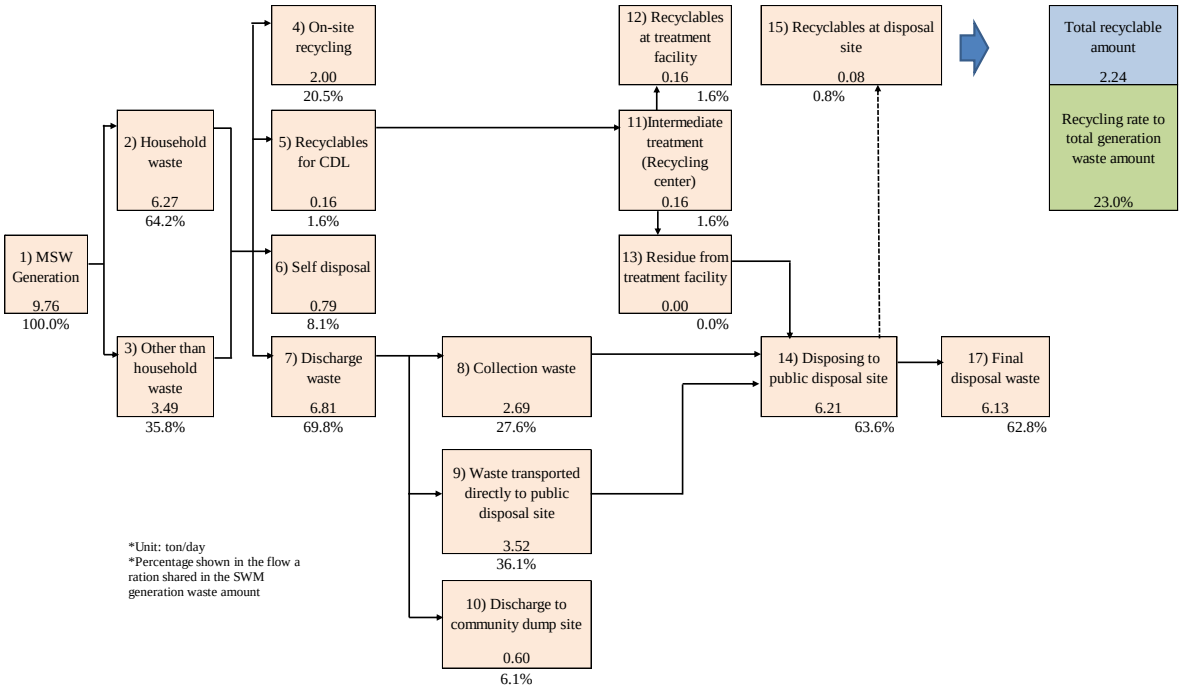


Figure 3-1 Future waste flow in 2022

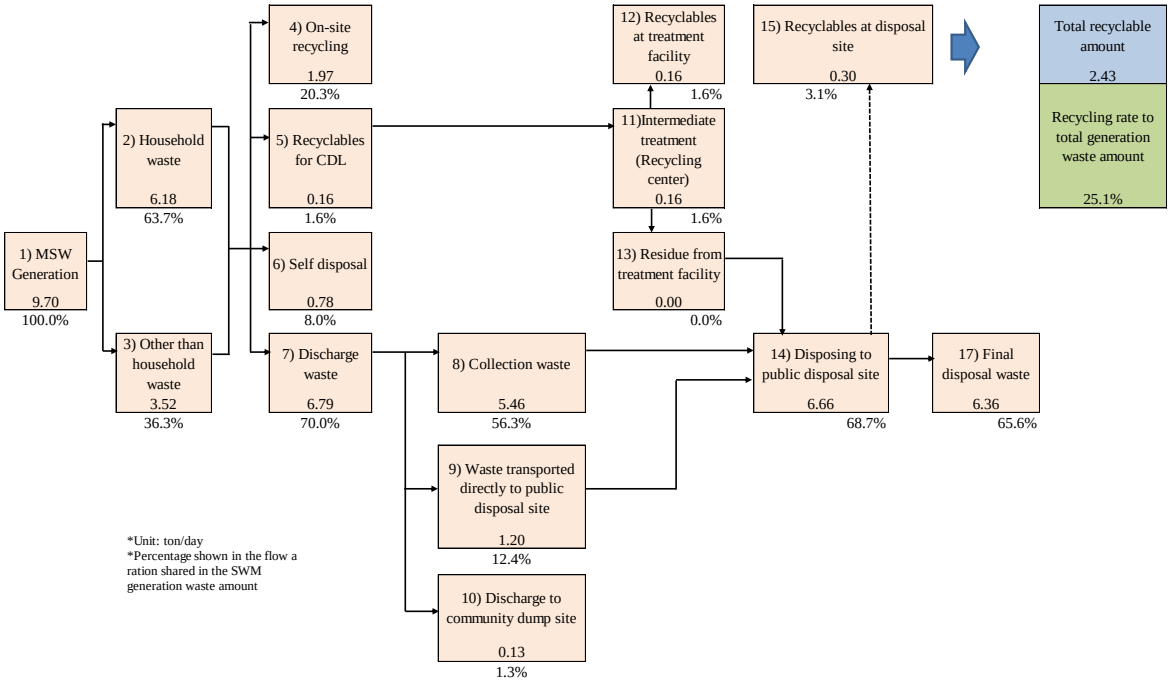


Figure 3-2 Future waste flow in 2027

3.7.3 Setting the planning indices

Planning indices established targets are shown below;

a. Future Population

Present population in 2017 and future population in 2022 and 2027 have been projected based on the census population data in 2000 and 2010. According to the results, the population in 2027, which is the target year of the strategy, will decrease by about 240 persons (over ten year period from 2018 to 2027).

Table 3-5 Future population

	Census		Growth rates 2000-2010	Present	Future projection	
	2,000	2,010		2,017	2,022	2,027
Yap Proper	7,391	7,371	-0.03%	7,315	7,216	7,071
Rumung	126	58	-5.40%			
Map	592	621	0.49%			
Gagil	734	863	1.76%			
Tomil	1,023	1,231	2.03%			
Fanif	547	509	-0.70%			
Weloy	1,197	1,031	-1.39%			
Dalipebinaw	645	397	-3.85%			
Rull	2,019	2,095	0.38%			
Kanifay	275	314	1.42%			
Gilman	233	252	0.82%			
Outer Islands	3,850	4,006	0.41%	4,436	5,268	6,599
Total	11,241	11,377	0.12%	11,751	12,484	13,670

b. Future waste generation amount

Future waste generation amount in Yap State was projected as per the following formula;

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

Future waste generation rate per person per day is heavily influenced by the economic conditions. Actual GDP growth rate from 2008 to 2016 published by WB was used as economic indices 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 Actual GDP Growth Rate

Actual GDP growth rate published by institutions, i.e. ADB, UN, CIA, WB are shown in the figure below. Actual GDP growth rate published by WB was used as economic indices to estimate future GDP growth rate.

Estimation Agency	2008	2009	2010	2012	2013	2014	2015	2016
ADB				-1.70%	-3.00%	-2.40%	3.70%	3.00%
UN	2.50%	6.40%	5.90%	4.70%	5.00%	-3.10%	0.60%	-1.00%
CIA						-2.40%	3.70%	2.00%
WB	0.00%	7.70%	3.60%	6.90%	3.20%	0.00%	0.00%	-1.33%

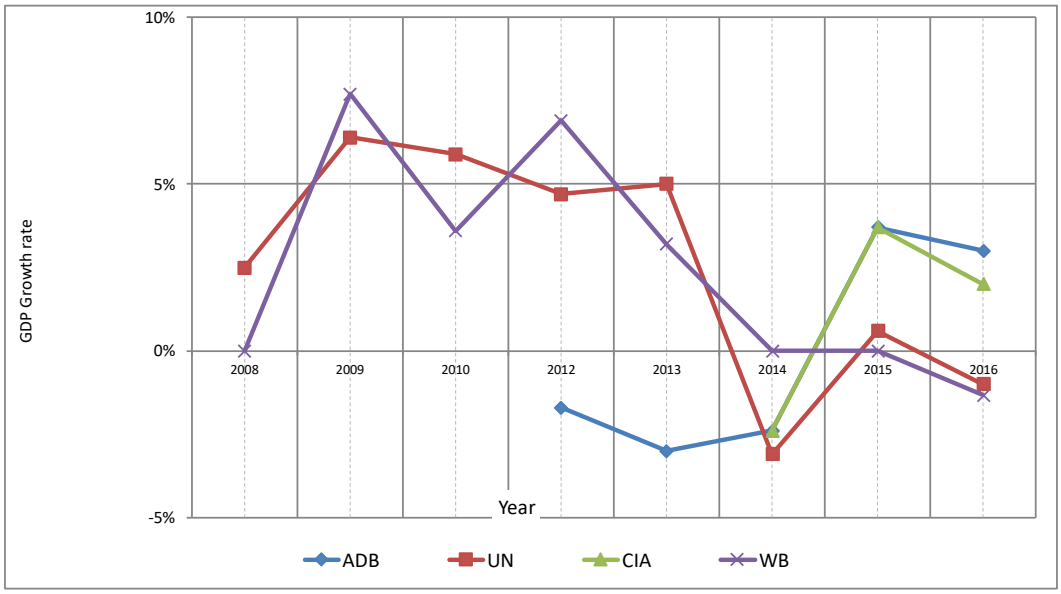
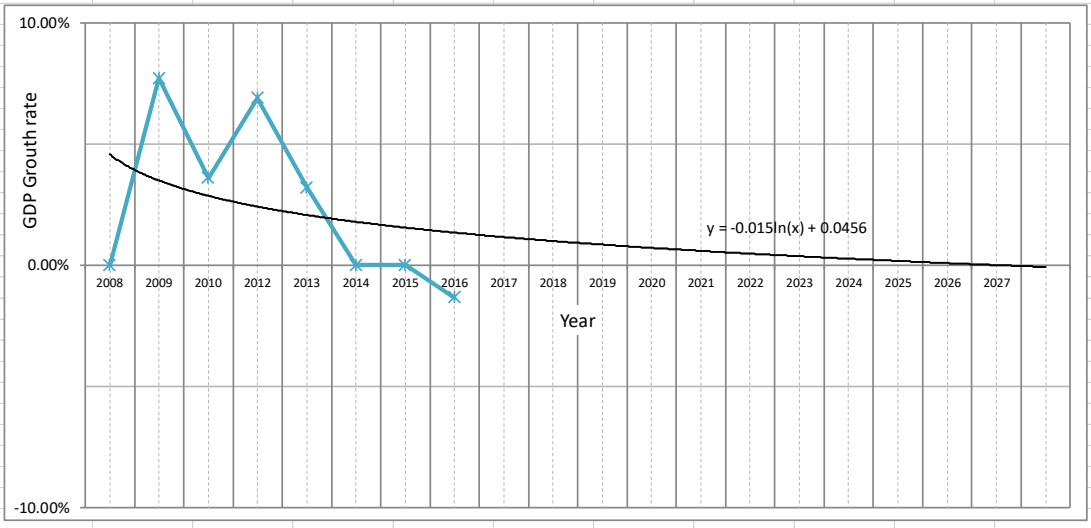


Figure 3-3 Actual GDP Growth Rate

b.2 Estimated GDP Growth Rate

Result of estimation for future GDP growth rate in FMS is shown in the figure below. GDP growth rate was estimated to be decreasing, the rate will be 0.5% and 0.07% in mid-term target year in 2022 and long-term target year in 2027 respectively.



	2008	2009	2010	2011	2012	2013	2014	2015	2016
Actual	0.00%	7.70%	3.60%	6.90%	3.20%	0.00%	0.00%	-1.33%	0.00%
Projection	-	-	-	-	-	-	-	-	-

	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Actual	-	-	-	-	-	-	-	-	-	-
Projection	1.11%	0.96%	0.83%	0.71%	0.60%	0.50%	0.40%	0.31%	0.22%	0.14%

	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036
Actual	-	-	-	-	-	-	-	-	-	-
Projection	0.07%	-0.01%	-0.08%	-0.14%	-0.21%	-0.27%	-0.33%	-0.38%	-0.44%	-0.49%

Figure 3-4 Estimated GDP Growth Rate

b.3 Waste generation rate

Current waste generation rate for household and other than household are shown in the following table.

Table 3-6 Waste generation rate

Year	Unit	Household waste	Other than household waste	State solid waste
2017	g / person / day	834	458	1,292
	lb /person / day	1.84	1.01	2.85

b.4 Future waste generation rate

Future waste generation rate is estimated as per the following formula;

(Waste generation rate) x (Estimated GDP growth rate) = Future waste generation rate

Future waste generation rate for mid-term target year in 2022 and long-term target year in 2027 are shown in the following table.

Table 3-7 Future waste generation rate

Year	Unit	Household waste	Other than household waste	State solid waste
2022	g / person / day	864	475	1,339
	lb /person / day	1.90	1.05	2.95
2027	g / person / day	874	480	1,354
	lb /person / day	1.93	1.06	2.99

4 Action plan

By reflecting upon the vision, the guiding principles and the identified SWM issues, the specific activities to pursue realization of the strategy are articulated and presented in this chapter. This action plan, which defined the priorities in the next five years, are formulated based on the following assumptions.

Assumptions

- Looking firmly ahead to "post-2023", SWM sector in Yap has to depart from the dependency on the Compact Fund from the U.S. Government, and pursue the establishment of a self-financing system.
- By responding to an immediate financial challenge, which is that the Small Sector Grant of the U.S. Compact Fund will no longer finance recurring costs, this action plan is formulated just like **a stand-alone project**. The **Semiautonomous Unit** which will be established to implement the action plan will be an apex responsible agency for every component.
- The Unit can be established either inside or outside of the DPW&T, depending on the result of further discussions within the state departments.

Title and components of the action plan

The tentative name for the five-year action plan is ***"Action plan (Project) towards technically appropriate and financially sustainable SWM system in Yap State"***. (this name is just tentative, and stakeholders can rename it)

The action plan consists of the following six components;

- Component 1: Expansion of waste collection service to beyond Colonia
- Component 2: Privatization (PPP) of waste collection service provided in Colonia
- Component 3: Enhancement of CDL system
- Component 4: Proper management of public disposal site
- Component 5: Green waste recycling
- Component 6: Proper management of inappropriate disposal waste such as waste oil and tires

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

4.1 Component 1: Expansion of waste collection services to areas outside of Colonia

4.1.1 Necessary activities

As roads inside villages outside of Colonia are very narrow, unlike state roads, municipal roads and

approach roads to villages, vehicles cannot enter villages and provide usual waste collection services using collection vehicles.

As a result of public opinion survey (POS) carried out to five households of each of the nine municipalities in Yap main island, more than 84% of households requested waste collection services and almost all of those households requesting collection services were willing to pay for waste collection services.

Under such circumstances, Component 1 will aim to expand waste collection services to areas beyond Colonia by implementing and evaluating a waste collection pilot project (PP).

The component will be progressed through the following three steps;

- Step 1: Planning, preparation, implementation and monitoring of PP for waste collection
- Step 2: Expand PP to other communities
- Step 3: Establish collection system for areas outside of Colonia

Table 4-1 Contents, sections and staff for activities to be implemented

Activity	Contents of activity	Project Manager	SWM Section			Environmental Section		
			Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk
Step1: Planning, preparation, implementation and monitoring of PP for waste collection								
1.1.1 Select PP village/community	Villages will be selected where installed collection house in Tomil and Fanif municipality. In case of Tomil municipality, village(s) that do not have a well-established waste fee collection system will be selected.	◎	○					
1.1.2 POS at the selected PP community	POS on waste collection, willingness to pay etc. will be carried out to all households in targeted villages in order to make a plan for waste collect system.		○	○		◎		○
1.1.3 Design collection system	Collection system such as discharge method, place, container and collection frequency, waste fee, etc. will be examined and/or reviewed.	◎	○					
1.1.4 Establish waste fee collection / payment system	Waste fee payment and collection system will be established to provide fair service to residents (paying for collection).	◎	○					
1.1.5 Prepare tools for community meeting	Leaflet on proper waste discharge manner for the collection service will be designed and printed		○			◎		○
1.1.6 Community meeting	Leaflet will be distributed and explained to residents at community meetings. Willingness to participate in the collection service will be confirmed.		◎	○		○		○

1.1.7 Select waste collector and make agreement	Waste collection company and/or collector for PP will be selected based on the vehicle, equipment and other conditions. Villages will contract waste collection service with collection company/collector.		◎					
1.1.8 Existence of collection station	Villages that already have a collection station will be selected for PP.	◎	○	○				
1.1.9 Implementation and monitoring	Contents for monitoring such as situation of discharge, collection and payment of collection fee and issues to be resolved will be decided. Implementation staff and method will be decided. Recording and reporting of results		◎	○		○		○
Step2: Expand PP to other communities								
1.2.1 Invite and select villages / communities which will demand waste collection	Villages targeted for expansion of collection service will be selected based on the following conditions; Demand for waste collection services in the village and households, willingness to pay, and availability of a location to construct a collection station	◎	○					
1.2.2 Community meeting	Leaflet will be distributed and explained to residents at community meetings. Willingness to participate in collection services will be confirmed.		◎	○		○		○
1.2.3 Decide waste fee collection / payment system	Waste fee payment and collection method will be decided in the selected villages.	◎	○					
1.2.4 Select waste collector and make agreement	Waste collection company and/or collector for PP will be selected based on the vehicle, equipment and other conditions. Villages will contract waste collection service with collection company/collector.	◎	○					
1.2.5 Install collection house	Installation of collection houses will be contracted according budget.		◎	○				
1.2.6 Commencement collection service	Expansion of collection service based on the evaluation of PP		◎	○				
Step3: Establish collection system for areas outside of Colonia								
1.3.1 Establish regulation for waste collection	Establish registration of collectors, collection fee standard for construction of a collection station.	◎	○					
1.3.2 Expansion plan for waste collection area	Plan and schedule for expansion of collection villages	◎	○					
1.3.3 Installation plan for collection houses installation	Plan and schedule for installation of collection house based on the expansion plan	◎	○					

4.1.2 Implementation schedule

Preparation and implementation of pilot project for collection service will be carried out in FY2018 and 2019. After FY2020, PP village will be expanded gradually. Moreover, an institutional system

necessary to provide collection services to the entire area outside of Colonia will also be established.

Table 4-2 Schedule for expansion of waste collection service to outside of Colonia

	FY2018				FY2019				FY2020				FY2021				FY2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
1.1 Planning, preparation, implementation and monitoring of PP for waste collection																				
1.1.1 Select PP village/community																				
1.1.2 POS at the selected PP community																				
1.1.3 Design collection system																				
1.1.4 Establish waste fee collection/payment system																				
1.1.5 Prepare tools for community meeting																				
1.1.6 Community meeting																				
1.1.7 Select waste collector and make agreement																				
1.1.8 Install collection house																				
1.1.9 Implementation and monitoring																				
1.2 Expand PP to other communities																				
1.2.1 Invite and select villages/communities which will demand waste collection																				
1.2.2 Community meeting																				
1.2.3 Decide waste fee collection/payment system																				
1.2.4 Select waste collector and make agreement																				
1.2.5 Install collection house																				
1.2.6 Commencement collection service																				
1.3 Establish collection system for out of Colonia area																				
1.3.1 Establish regulation for waste collection																				
1.3.2 Expansion plan for waste collection area																				
1.3.3 Installation Plan for collection houses installation																				

4.1.3 Implementation cost

Mainly, personnel cost for activities to expand collection service was estimated. Installation cost for collection houses were estimated after FY2020 based on the expansion schedule of PP.

Table 4-3 Cost for expansion of waste collection service to outside of Colonia (US$)

	FY2018	FY2019	FY2020	FY2021	FY2022	Total
a. Personnel	7,290	16,020	10,530	10,500	12,960	57,300
b. Construction	0	0	50,000	50,000	50,000	150,000
c. Purchase of equipment/machinery	0	0	0	0	0	0
d. Transportation expenses	174	384	252	255	306	1,371
e. Operation cost	0	0	0	0	0	0
f. Maintenance of equipment	0	0	0	0	0	0

g. Maintenance of facility	0	0	0	0	0	0
h. Tool/material	1,000	0	0	0	0	1,000
i. Utility	0	0	0	0	0	0
j. Office supply	69	156	102	102	129	558
Total	8,533	16,560	60,884	60,857	63,395	210,229

Main conditions for cost estimation

- Personnel cost was estimated based on the allowance of position and number of staffs engaged the component.
- Transportation expenses and office supply were estimated according to the number of the staffs engaged the component.
- Leaflet on expansion of collection service designed and printed to carry out awareness raising will be calculated as a cost for tool/material.

4.2 Component 2: Privatization (PPP) of waste collection service provided in Colonia

4.2.1 Necessary activities

Present waste collection service at Colonia provided by private company contracted-out with DPW&T will be changed as follows. Firstly, collection service provided to private customers will be stopped and private customers will newly contract collection service with private collection company for a fee. Collection service provided to public institutions will be contracted–out to a public corporation which will be newly established to implement this project.

Public corporation which will be establish as an implementing agency for this project, will contract waste collection services to public institutions and related work with State Government.

The component will be progressed through the following two steps;

- Step 1: Review of contract for waste collection services
- Step 2: Commencement of revised collection services

Table 4-4 Contents, sections and staff for activities to be implemented

Activity	Contents of activity	Project Manager	SWM Section			Environmental Section		
			Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk
Step1: Review of contract for waste collection service								
2.1.1 Revise of collection service provided private sectors	Explanation and understanding for commencement of waste fee collection to present private customers		◎	○				
2.1.2 Establishment of appropriate collection fee for institutions	Establishment waste collection fee for institutions based on the discharged waste amount.		◎	○				
2.1.3 Revive of contract document	Review of present contract for waste collection service	◎	○					
Step2: Commencement of revised collection service								
2.2.1 Contract with State Government for institutional waste collection	New contract on waste collection service with State Government	◎	○					
2.2.2 Contract with private waste collection company	Contract-out waste collection work to private company	◎	○					
2.2.3 Commencement of new collection service	Commencement to provide collection service to public institutions		◎	○				

4.2.2 Implementation schedule

Contents of present contract will be reviewed in FY2018 and new contract to provide collection service to institutions will be started from FY2019.

Table 4-5 Schedule for privatization (PPP) of waste collection service provided in Colonia

	FY2018				FY2019				FY2020				FY2021				FY2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
2.1 Review of contract for waste collection service																				
2.1.1 Revise of collection service provided private sectors																				
2.1.2 Examination of appropriate collection fee to institutions																				
2.1.3 Revise of contract document																				
2.2 Commencement of revised collection service																				
2.2.1 Contract with State Government for institutional waste collection																				
2.2.2 Contract with private waste collection company																				
2.2.3 Commencement of new collection service																				
*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 cost

Personnel cost to review contract was estimated in FY2018 and from FY2019 cost for collection service and personnel cost for related work were estimated.

Table 4-6 Cost for privatization (PPP) of waste collection service provided in Colonia (US$)

	FY2018	FY2019	FY2020	FY2021	FY2022	Total
a. Personnel	6,150	4,860	6,030	5,940	1,980	24,960
b. Construction	0	0	0	0	0	0
c. Purchase of equipment/machinery	0	0	0	0	0	0
d. Transportation expenses	147	120	147	144	48	606
e. Operation cost	0	13,200	13,200	13,200	13,200	52,800
f. Maintenance of equipment	0	0	0	0	0	0
g. Maintenance of facility	0	0	0	0	0	0
h. Tool/material	0	0	0	0	0	0
i. Utility	0	0	0	0	0	0
j. Office supply	63	48	63	60	24	258
Total	6,360	18,228	19,440	19,344	15,252	78,624

Main conditions for cost estimation

- Personnel cost was estimated based on the allowance of position and number of staffs engaged the component.
- Transportation expenses and office supply were estimated according to the number of the staffs engaged the component.
- Average actual cost for collection service provided to Colonia was used as a cost for operation.

4.3 Component 3: Enhancement of CDL system

4.3.1 Necessary activities

In order to promote to reduce disposal waste amount, disused vehicles and car batteries will be added to items for CDL system. Several steps will be undertaken to realize this such as construction of a recycling facility, procurement of machinery and measures to ensure cooperation of residents.

The component will be progressed through the following three steps;

- Step 1: Establish additional category(s) to CDL system

  Main activities in the step will be establishment of institutional CDL system for disused vehicles and batteries, i.e. deposit and refund amount, accounting system, legal system. Further, before starting the new CDL system, further efforts to clean up disused vehicles abandoned around the island should be undertaken.

- Step 2: Prepare area and construct new recycling center

  In parallel with Step 1, construction of recycling center and installation of a compression machine will be undertaken.

- Step 3: Commencement new CDL system

  Compulsory payment of a deposit for all imported vehicles and batteries will be commenced in Step 3. After a certain period, payment of a refund for return of vehicles and batteries will also be started.

Table 4-7 Contents, sections and staff for activities to be implemented

Activity	Contents of activity	Project Manager	SWM Section			Environmental Section		
			Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk
1. Establish additional category(s) to CDL system								
1.1 Assess additional category(s) through survey	Firstly, disused vehicles and batteries will be targeted for CDL. Further target items for expanding the CDL will be examined based on the survey.					◎		○
1.2 Clean up activity for existing material on main island	A preliminary survey of locations and number of disused vehicles will be implemented. The following matters shall be decided; Period to clean-up, clean-up system, cost estimation, ensuring space for collected disused vehicles, etc.					◎		○

1.3 Set up deposit and refund schedule based on the operation cost	Cost estimation for treatment of disused vehicles and batteries Establish deposit and refund amount Establish a period for commencement of refunding of deposit for returning imported vehicles and batteries					◎		○
1.4 Conduct outreach and awareness activity	Leaflet on CDL system for disused vehicles and batteries will be designed and printed. Distributing leaflet and explaining system.					◎		○
1.5 Conduct training with Tax Office & Recycling Operator	Training for accounting system will be conducted to tax officers. Training for operation of compaction machine and for treatment procedure of disused vehicles and batteries.					◎	◎	○
1.6 Propose and enact amendment to Recycling Regulations	Following legal procedures will be necessary; Prepare draft recycling regulation, propose it and enact amendment					◎		○
2. Prepare area and construct new recycling center									
2.1 Acquisition of space at Public Landfill site	Procedures to acquire the land for recycling center construction will be progressed.					◎	○	
2.2 Construction of recycling center	Contractual procedures for construction of recycling center					◎	○	
2.3 Ensure space for used cars and compressed scrap metal and associated materials/machinery	The following procedures will be necessary to ensure the space; Estimation of required space for temporary storage of used cars and compressed scrap metal, site selection, and procedures of land acquisition and securement					◎	○	
2.4 Procurement supporting method	Specifications and the price of press machine to treat disused vehicles will be investigated. Research donation agency and request donation of press machine according to the above procedures.					◎	○	
3. Commencement of new CDL system									
3.1 Start to collect containers and refund under CDL	Deposit system for imported vehicles and batteries will be commenced in this step, and, after a certain period, refunds will be started					◎	○	○
3.2 Monitoring and evaluation	Following monitoring items will be set; i.e. actual amount of deposit and refund, number of imported and refunded items, recycling cost and issues. New CDL system will be evaluated based on the monitoring results from viewpoints of financial, technical, institutional and systematic situation.					◎	○	○

4.3.2 Implementation schedule

Recycling center will be constructed and press machine will be installed in FY 2019. Deposit for disused vehicles and batteries will be commenced in FY2020 and refund will be started after 1 year in FY2021. Moreover, a clean-up operation for disused vehicles left on the island will be carried out once every year from FY 2018 to 2020.

Table 4-8 Schedule for enhancement of CDL system

	FY2018				FY2019				FY2020				FY2021				FY2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
3.1 Establish additional category(s) to CDL system																				
3.1.1 Assess additional category(s) through survey																				
3.1.2 Clean up activity for disused vehicle left in main island																				
3.1.3 Set up deposit and refund schedule based on the operation cost																				
3.1.4 Conduct outreach and awareness activity																				
3.1.5 Conduct training with Tax Office & Recycling Operator																				
3.1.6 Propose and enact amendment to Recycling Regulations																				
3.2 Prepare area and construct new recycling center																				
3.2.1 Acquisition of space at Public Landfill site																				
3.2.2 Construction of recycling center																				
3.2.3 Ensure space for disused vehicle and scrap metal pressed																				
3.2.4 Material/machinery procurement supporting method																				
3.3 Commencement new CDL system																				
3.3.1 Start to collect CDL and refund																				
3.3.2 Monitoring and evaluation																				

*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 cost

Recycling center construction cost was estimated in FY2019. And cost for clean-up disused vehicles was estimated every year from FY 2018 to 2020.

Table 4-9 Cost for enhancement of CDL system (US$)

	FY2018	FY2019	FY2020	FY2021	FY2022	Total
a. Personnel	18,660	25,800	30,360	30,360	26,160	131,340
b. Construction	0	50,000	0	0	0	50,000
c. Purchase of equipment/machinery	0	500,000	0	0	0	500,000
d. Transportation expenses	447	615	732	720	627	3,141
e. Operation cost	5,000	5,000	5,000	0	0	15,000
f. Maintenance of equipment	0	0	0	0	0	0
g. Maintenance of facility	0	0	0	0	0	0
h. Tool/material	0	0	0	0	0	0
i. Utility	0	0	0	0	0	0

j. Office supply	189	255	303	315	264	1,326
Total	24,296	581,670	36,395	31,395	27,051	700,807

Main conditions for cost estimation

- Personnel cost was estimated based on the allowance of position and number of staffs engaged the component.
- Transportation expenses and office supply were estimated according to the number of the staffs engaged the component.
- Construction cost for recycling center was estimated roughly at 50,000US$ based on the building area.
- Cost for clean-up of waste vehicles was calculated as operation cost. A cost to pick-up and transport was estimated 50US$/vehicle. Number of waste vehicles to pick-up and transport waste estimated at 300 vehicles/year from 2018-2020 for three years.
- Installation cost was not estimated in the project.
- Leaflet on expansion of collection service designed and printed to carry out awareness raising will be

4.4 Component 4: Proper management of public disposal site

4.4.1 Necessary activities

In order to manage public disposal site more premeditatedly, firstly, a plan for O&M shall be developed. And data for disposal site such as incoming waste data, O&M data and cost will be recorded, input to computer, analyzed and reported and/or shared. Finally, possibility of collecting tipping fee will be examined while giving consideration to expansion of collection service.

The component will be progressed through following 4 steps;

- Step 1: Planning for O&M of disposal site

  To keep the disposal site in a satisfactory condition, premeditated operation and maintenance plan will be prepared and implemented.

- Step 2: Planning for O&M of equipment

  To keep the excavator and wood chipper operated at disposal site in a satisfactory condition, premeditated operation and maintenance plan will be prepared and implemented.

- Step 3: Data management system such as incoming data, O&M data and cost

  Data management system included incoming waste data, O&M data and cost for disposal site and equipment will be established and used.

- Step 4: Examination for tipping fee collection system at disposal site

  The possibility of collecting a tipping fee at the disposal site will be examined based on the above mentioned management system.

Table 4-10 Contents, sections and staff for activities to be implemented

Activity	Contents of activity	Project Manager	SWM Section			Environmental Section		
			Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk
Step 1: Planning for O&M of disposal site								
4.1.1 Planning	To manage and operate disposal site premeditatedly, operation plan for disposal, and maintenance plan for facility i.e. leachate oxidation pond, gas ventilation pipes approach road and management house, etc. will be prepared.	◎	○					
4.1.2 Operation and maintenance	Disposal site will be operated based on the plan.		◎		○			
Step 2: Planning for O&M of equipment								
4.2.1 Planning	To manage and operate excavator and wood chipper operated at disposal site premeditatedly, O&M plan, i.e. daily and periodical maintenance, will be prepared.	◎	○					
4.2.2 Operation and maintenance	Equipment will be operated and maintained based on the plan.		◎		○			
Step3: Data management system such as incoming data, O&M data and cost								
4.3.1 Establishment of system	Data management system included incoming waste data, O&M data and cost for disposal site and equipment will be established and used.	◎	○	○	○			
4.3.2 Examination and evaluation of system (recording, input to computer, analyzing and reporting)	Data management system will be used, examined and improved.	◎	○					
4.3.3 Implementation of system	Management system for disposal site will be built and operated it.	◎	○	○	○			
Step 4: Examination for tipping fee collection system at disposal site								
Examination for tipping fee collection system at disposal site	Possibility of collecting a tipping fee at disposal site will be examined based on the above mentioned management system.	◎	○					

4.4.2 Implementation schedule

Management system for O&M plan of disposal site and equipment and data management system will be established in FY2018. After FY2019, the system will be implemented.

Table 4-11 Proper management of public disposal site

	FY2018				FY2019				FY2020				FY2021				FY2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
4.1 Planning for O&M of disposal site																				
4.1.1 Planning																				
4.1.2 Operation and maintenance																				
4.2 Planning for O&M of equipment																				
4.2.1 Planning																				
4.2.2 Operation and maintenance																				
4.3 Data management system such as incoming data, O&M data and cost																				
4.3.1 Establishment of system																				
4.3.2 Examination and evaluation of system (recording, input to computer, analyzing and reporting)																				
4.3.3 Implementation of system																				
4.4 Examination for tipping fee collection system at disposal site																				
*FY: From 1st of October to next year 30th of September																				
**Q1: Oct.-Dec., Q2: Jan.- Mar., Q3: Apr.-Jun., Q4: Jul.-Sep.																				

4.4.3 Implementation cost

Personnel and O&M cost for disposal site and equipment was estimated based on the actual cost for 2014-2016 after FY2019.

Table 4-12 Cost for proper management of public disposal site (US$)

	FY2018	FY2019	FY2020	FY2021	FY2022	Total
a. Personnel	4,050	12,480	12,480	11,880	19,440	60,330
b. Construction	0	0	0	0	0	0
c. Purchase of equipment/machinery	0	0	0	0	0	0
d. Transportation expenses	96	288	291	276	456	1,407
e. Operation cost	0	1,000	1,000	1,000	1,000	4,000
f. Maintenance of equipment	0	1,200	1,200	1,200	1,200	4,800
g. Maintenance of facility	0	8,000	8,000	8,000	8,000	32,000
h. Tool/material	0	0	0	0	0	0
i. Utility	0	0	0	0	0	0
j. Office supply	39	132	129	120	192	612
Total	4,185	23,100	23,100	22,476	30,288	103,149

Main conditions for cost estimation

- Personnel cost was estimated based on the allowance of position and number of staffs engaged the component.
- Transportation expenses and office supply were estimated according to the number of the staffs engaged the component.
- Average of actual cost for operation of disposal site, O/M for excavator/wood chipper and maintenance of facilities were used as an estimation.

4.5 Component 5: Green waste recycling

4.5.1 Necessary activities

In Yap State, organic waste generated at households is recycled well within their premises, i.e. kitchen waste for feed to livestock or dried coconut fiber as firewood. And the recycling rate is higher than other countries. However, to reduce more discharge waste especially green waste, collaboration with actors outside of the waste management sector such as DAF (Division of Agriculture and forestry) will be investigated.

The component will be progressed through following three steps;

- Step 1: Planning for promotion on green waste recycling
  In order to examine a utilization of wood chip produced from green waste disposed at disposal site, a present situation of organic material recycling promoted by other sectors will be grasped

- Step 2: Trial of promotion activity
  Possibility of recycling of wood chips will be examined.

- Step 3: Implementation
  Recycling of wood chips will be promoted.

Table 4-13 Contents, sections and staff for activities to be implemented

Activity	Contents of activity	Project Manager	SWM Section			Environmental Section		
			Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk
Step1: Planning for promotion on green waste recycling								
5.1.1 Discuss with DAF on collaboration of compost program	Possibility of collaboration between composting dissemination program promoted by DAF and green waste produced at disposal site will be discussed.	◎	○					
5.1.2 Grasp and observe current situation of utilization of organic waste	The present situations of the following will be observed and the information and data will be collected. Observe present composting program promoted by DAF Arrangement of contents and schedule for awareness rising activity in the project i.e. component1 for expansion of collection service and component3 introduction of new CDL system and so on. Operation frequency of wood chipper and amount of chip produced and distributed.	◎	○	○				

5.1.3 Policy decision	Policy to collaborate and/or recycle green waste will be established.	◎	○					
5.1.4 Establish promotion method	The following promotion method of green waste recycling will be established; Recycling method, promotion system with awareness rising implemented in the project.	◎	○			○		
5.1.5 Creating promotion tool	Leaflet on green waste recycling will be designed and printed.		○			◎		○
Step2: Trial of promotion activity								
5.2.1 Preparation of trial	Trial of green waste recycling will be prepared i.e. schedule, executing system, etc.	◎	○					
5.2.2 Implementation of trial	Trial will be implemented and results will be monitored.		◎	○	○			
5.2.3 Evaluation of trial	Monitoring results will be evaluated and utilization for wood chip will be established.	◎	○					
Step3: Implementation								
5.3.1 Promotion in collaboration with expansion of collection area	Promotion of green waste recycling will be progressed through collaboration with expansion of collection service.	◎	○	○		○		○
5.3.2 Promotion in collaboration with strengthening of CDL system	Promotion of green waste recycling will be progressed through collaboration with introduction of new CDL system.	○	○	○		◎		○

4.5.2 Implementation schedule

Utilization methods for green waste will be examined in FY2018 and 2019. The possibility of recycling green waste will be challenged in FY2020, 2021 and after FY 2022, green waste recycling will be progressed.

Table 4-14 Schedule for green waste recycling

	FY2018				FY2019				FY2020				FY2021				FY2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
5.1Planning for promotion on green waste recycling																				
5.1.1 Discuss with DAF on corroboration of compost program																				
5.1.2 Grasp and observe current situation of utilization of organic waste																				
5.1.3 Policy decision																				
5.1.4 Promotion method																				
5.1.5 Creating promotion tool																				
5.2 Trial of promotion activity																				
5.2.1 Preparation of trial																				
5.2.2 Implementation of trial																				
5.2.3 Evaluation of trial																				
5.3 Implementation																				
5.3.1 Promotion corroborated with expansion of collection area																				
5.3.2 Promotion corroborated with strengthen of CDL system																				
*FY: From 1st of October to next year 30th of September																				
**Q1: Oct.-Dec., Q2: Jan.- Mar., Q3: Apr.-Jun., Q4: Jul.-Sep.																				

4.5.3 Implementation cost

Mainly personnel cost for promote activities was estimated.

Table 4-15 Cost for green waste recycling (US$)

	FY2018	FY2019	FY2020	FY2021	FY2022	Total
a. Personnel	780	9,780	6,660	5,940	8,832	31,992
b. Construction	0	0	0	0	0	0
c. Purchase of equipment/machinery	0	0	0	0	0	0
d. Transportation expenses	18	240	162	144	216	780
e. Operation cost	0	0	0	0	0	0
f. Maintenance of equipment	0	0	0	0	0	0
g. Maintenance of facility	0	0	0	0	0	0
h. Tool/material	0	0	0	0	0	0
i. Utility	0	0	0	0	0	0
j. Office supply	6	96	57	48	84	291
Total	804	10,116	6,879	6,132	9,132	33,063

Main conditions for cost estimation

- Personnel cost was estimated based on the allowance of position and number of staffs engaged the component.
- Transportation expenses and office supplies were estimated according to the number of staff engaged in the component.

4.6 Proper management of inappropriate disposal waste such as waste oil and tires

4.6.1 Necessary activities

For proper management of inappropriate disposal of waste faced by island countries including Yap state, useful information and appropriate treatment systems will be investigated.

The component will be progressed through the following three steps;

- Step1: To grasp present situation for waste oil and tires numerically in Yap
- Step2: To collect information at island countries and states in FSM about those waste issues, treatment and so on.
- Step3: Exchange with related countries, states and institutions

Table 4-16 Contents, sections and staff for activities to be implemented

Activity	Contents of activity	Project Manager	SWM Section			Environmental Section		
			Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk
Step1: To grasp present situation for waste oil and tires numerically in Yap								
6.1.1 Examine and finalize survey contents and selection of survey sectors	Survey contents will be prepared to carry out a survey of the situation of waste oil and tires generated in Yap main island. And offices and factories generating waste will be selected as samples.					◎		○
6.1.2 Implement survey	The survey will be carried out periodically.					◎		○
6.1.3 Analysis of the survey data	The survey data will be input to computer and analyzed					◎		○
Step2: To collect information at island countries and states in FSM about those waste issues, treatment and so on.								
To collect information about those waste issues, treatment and so on.	Topics for those waste and effective treatment method will be collected.					◎		○
Step3: Exchange with related countries, states and institutions								
Information exchange	Information and discussion related those waste will be exchanged with other island countries, other states in FSM and institutions.					◎		○

4.6.2 Implementation schedule

An investigation and analysis of the current situation of waste oil and tires in Yap main island will be

carried out continuously, and collaboration with related sectors will be undertaken.

Table 4-17 Schedule for proper management of inappropriate disposal waste such as waste oil and tires

	FY2018				FY2019				FY2020				FY2021				FY2022			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
6.1 To grasp present situation for waste oil and tires numerically in Yap																				
6.1.1 Examine and finalize survey contents and selection of survey sectors																				
6.1.2 Implement survey																				
6.1.3 Analysis of the survey data																				
6.2 To collect information at island countries and states in FSM about those waste issues and treatment so on.																				
6.3 Exchange with related countries, states and institutions																				
*FY: From 1st of October to next year 30th of September																				
**Q1: Oct.-Dec., Q2: Jan.- Mar., Q3: Apr.-Jun., Q4: Jul.-Sep.																				

4.6.3 Implementation cost

Mainly personnel cost to progress activities was estimated.

Table 4-18 Cost for proper management of inappropriate disposal waste such as waste oil and tires (US$)

	FY2018	FY2019	FY2020	FY2021	FY2022	Total
a. Personnel	3,690	12,660	15,540	16,980	12,228	61,098
b. Construction	0	0	0	0	0	0
c. Purchase of equipment/machinery	0	0	0	0	0	0
d. Transportation expenses	90	300	372	408	288	1,458
e. Operation cost	0	0	0	0	0	0
f. Maintenance of equipment	0	0	0	0	0	0
g. Maintenance of facility	0	0	0	0	0	0
h. Tool/material	0	0	0	0	0	0
i. Utility	0	0	0	0	0	0
j. Office supply	42	120	156	168	108	594
Total	3,822	13,080	16,068	17,556	12,624	63,150

Main conditions for cost estimation

- Personnel cost was estimated based on the allowance of position and number of staffs engaged the component.
- Transportation expenses and office supply were estimated according to the number of the staffs engaged the component.

4.7 The Action Plan (The Project)

4.7.1 Schedule of the Action Plan (the Project)

Entire schedule for the project is shown in the below table.

Table 4-19 Entire project schedule

	Mid-term plan					Long-term plan				
	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1. Expansion of waste collection service to rural area										
1.1 Planning, preparation, implementation and monitoring of PP for waste collection										
1.2 Expand PP to other communities										
1.3 Establish collection system for out of Colonia area										
2. Privatization(PPP) of waste collection service provided in Colonia area										
2.1 Review of contract for waste collection service										
2.2 Commencement of revised collection service										
3. Enhancement of CDL system										
3.1 Establish additional category(s) to CDL system										
3.2 Prepare area and construct new recycling center										
3.3 Commencement new CDL system										
4. Proper management of public disposal site										
4.1 Planning for O&M of disposal site										
4.2 Planning for O&M of equipment										
4.3 Data management system such as incoming data, O&M data and cost										
4.4 Examination for tipping fee collection system at disposal site										
5. Green waste recycling										
5.1Planning for promotion on green waste recycling										
5.2 Trial of promotion activity										
5.3 Implementation										
6. Proper management of inappropriate disposal waste such as waste oil and tires										
6.1 To grasp present situation for waste oil and tires numerically in Yap										
6.2 To collect information at island countries and states in FSM about those waste issues and treatment so on.										
6.3 Exchange with related countries, states and institutions										

4.7.2 Cost of the Action Plan (the Project)

Cost required to implement the project is shown in the below table. Entire project cost was estimated at 1.19 million US$ for five years.

Table 4-20 Entire project cost by components (US$)

	FY2018	FY2019	FY2020	FY2021	FY2022	Total
Component1: Expansion of waste collection service to out of Colonia	8,500	16,600	60,900	60,900	63,400	210,200
Component2: Privatization(PPP) of waste collection service provided in Colonia	6,400	18,200	19,400	19,300	15,300	78,600
Component3: Enhancement of CDL system	20,200	581,700	36,400	31,400	27,100	696,700

Component4: Proper management of public disposal site	4,200	23,100	23,100	22,500	30,300	103,100
Component5: Green waste recycling	800	10,100	6,900	6,100	9,100	33,100
Component6: Proper management of inappropriate disposal waste such as waste oil and tires	3,800	13,100	16,100	17,600	12,600	63,200
Total	43,900	662,800	162,800	157,800	157,700	1,184,900

Table 4-21 Entire project cost by expenses items (US$)

	FY2018	FY2019	FY2020	FY2021	FY2022	Total
a. Personnel	36,700	81,600	81,600	81,600	81,600	363,100
b. Construction	0	50,000	50,000	50,000	50,000	200,000
c. Purchase of equipment/machinery	0	500,000	0	0	0	500,000
d. Transportation expenses	900	2,000	2,000	1,900	1,900	8,700
e. Operation cost	5,000	19,200	19,200	14,200	14,200	71,800
f. Maintenance of equipment	0	1,200	1,200	1,200	1,200	4,800
g. Maintenance of facility	0	8,000	8,000	8,000	8,000	32,000
h. Tool/material	1,000	0	0	0	0	1,000
i. Utility	0	0	0	0	0	0
j. Office supply	400	800	800	800	800	3,600
Total	43,900	662,800	162,800	157,800	157,700	1,184,900

5 Annual Work Program

To implement the Action Plan (AP), an Annual Work Program (AWP) will be prepared. A primary purpose of preparing the AWP is to request the next physical year (FY) budget. Semiautonomous Unit (SU), which will be responsible for implementing the project, will produce the AWP and submit it to DPW&T

The contents of AWP will consist of (i) activities necessary to progress the project, (ii) implementation schedule, and (iii) cost estimated for next FY, from October to September. Forms of AWP are shown this chapter.

Moreover, draft AWPs for FY 2018 and 2019 are attached as Annex 2 and 3.

Form for Annual Work Program

Form for Annual Work Program (FY)

Title: ***Action plan towards technically appropriate and financially sustainable SWM system in Yap State***	
Implementation Activity	Cost(US$)
Component1: Expansion of waste collection service to out of Colonia Mainly the following activities/works will be implemented;	
Component2: Privatization(PPP) of waste collection service provided in Colonia Mainly the following activities/works will be implemented;	
Component3: Enhancement of CDL system Mainly the following activities/works will be implemented;	
Component4: Proper management of public disposal site Mainly the following activities/works will be implemented;	
Component5: Green waste recycling Mainly the following activities/works will be implemented;	
Component6: Proper management of inappropriate disposal waste such as waste oil and tires Mainly the following activities/works will be implemented;	
Total	

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

Component/Activity	Contents	Responsible section/staff							FY2018													Remarks
			SWM Section			Environmental Section			Q1			Q2			Q3			Q4					
		Project Manager	Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.		
Component1: Expansion of waste collection service to out of Colonia																						
Component2: Privatization(PPP) of waste collection service provided in Colonia																						
Component3: Enhancement of CDL system																						
Component4: Proper management of public disposal site																						
Component5: Green waste recycling																						
Component6: Proper management of inappropriate disposal waste such as waste oil and tires																						

Annex 1 : Current Waste flow in Yap

1 Current Waste flow in Yap

1.1 Purpose

Waste flow is mainly formulated for the following purpose;

- To figure out current situation of waste management and recycling quantitatively in Yap
- To set target figures for future waste management in Yap
- To formulate practicable strategy and action plan on waste management in Yap

1.2 Outline of Waste Flow

Concept of waste flow is shown as follows.

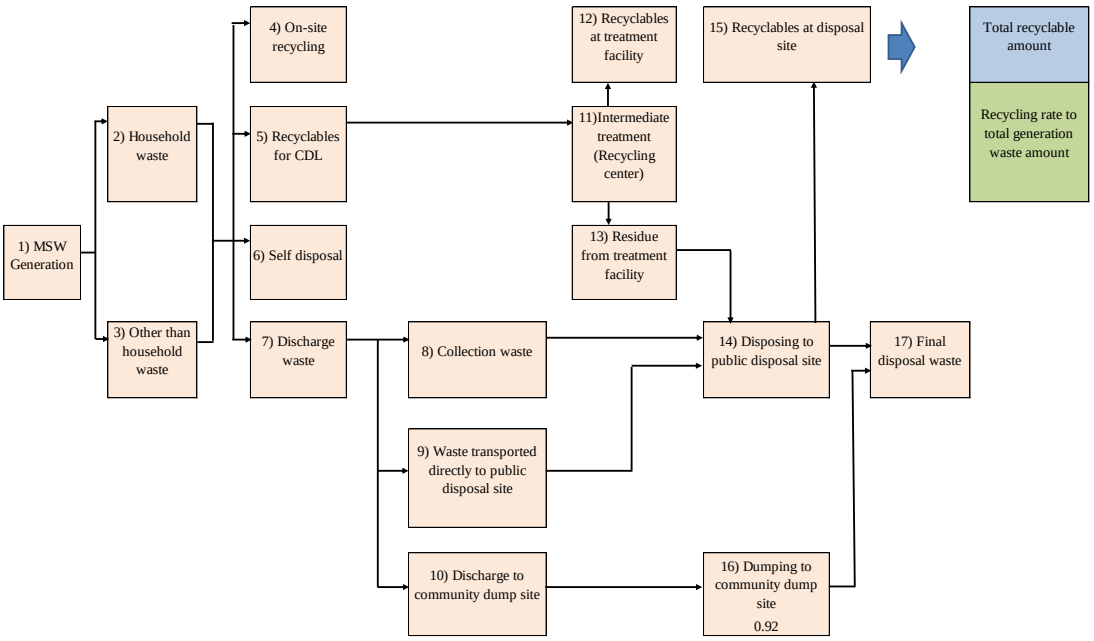


Figure 1-1 Concept of Waste Flow

Definition of each component in waste flow is as follows.

- [MSM Generation (1)] is consisted of [Household waste (2)] and [Other than household waste (3)].
- [On-site Recycling (4)] is recycling at generation sources such as composting of green waste and

kitchen waste, using kitchen waste as feed for livestock and pets and using green waste as fire-wood.

- ☐ [Recyclables for CDL (5)] refers to beverage containers returned to and refunded at the recycling center.
- ☐ [Self-disposal (6)] refers to burying or open burning of waste in their own property.
- ☐ [Discharged waste (7)] refers to waste excluding [On-site Recycling (4)], [Recyclables for CDL (5)] and [Self-disposal (6)] from [MSM Generation (1)]
- ☐ [8) Collection waste] refers to waste collected by collection service.
- ☐ [9) Waste transported directly to public disposal site] refers to waste transported by households, shops, super markets, restaurants, hotels and public office, etc. to disposal site directly.
- ☐ When waste collection services are not provided, [Discharge to community dump sites (10)] will take place. Discharge to community dump sites refers to discharge of waste to dump sites in communities. The amount can be estimated according to discharge waste amount for household excluding collection waste and waste transported directly to public disposal site.
- ☐ [Intermediate Treatment (Recycling center) (11)] refers to the redemption center of recyclables for CDL.
- ☐ [Recyclables at a treatment facility (12)] refers to the recyclables separated and counted at the above-mentioned facility.
- ☐ [Intermediate residue (13)] refers to residue generated at [intermediate treatment facility (11)].
- ☐ [Disposing to public disposal site (14)] refers to collection waste and the transportation waste directly to public disposal site.
- ☐ [Recyclables at disposal site (15)] refers to the recyclables picked up at the public disposal site.
- ☐ [Disposing to community dump sites(16)] refers to the same waste of [Discharging to community dump sites (10)]
- ☐ [Final disposal waste (17)] refers to [Disposing waste to public disposal site (14)] and [Disposing waste to community dump sites (16)] excluding [(Recyclables at disposal site (15))

1.3 Methodology

1.3.1 Baseline Survey

The waste flow in Yap was formulated based on the result of baseline survey as follows.

1. Waste amount and composition survey (from existing data)
2. Questionnaire survey on waste generation from household
3. Incoming waste survey at public disposal site (hereinafter; disposal site)

4. Analysis of CDL data in recycling center

a. Waste amount of household waste

Waste amount generated from household was calculated using the following formula; unit waste amount (g/person/day) multiplied by population.

The Generated waste is composed of the following;

- Recyclable at generation source
  - ✓ On-site recyclables: compost, feed for livestock, fire-wood, etc.
  - ✓ Recyclables for CDL: PET bottle, Aluminum can, steel can, glass bottle
- Non-recyclables
  - ✓ Self-disposal waste: Burning of garden waste, etc.
  - ✓ Discharge waste: discharging to collection service, transporting to disposal site individually ,etc.

Questionnaire survey was conducted to each household as a part of baseline survey. The amount of on-site recyclables, recyclables for CDL and self-disposal waste was estimated based on the result of the household survey. Unit amount of discharged waste was referred to the result of waste amount and composition survey conducted in 2015.

Questionnaire survey on waste generation from household

a.1 Unit waste amount (g/person/day)

Unit waste amount calculated based on the survey is 834g (1.84lb)/person/day. Of this amount, 33.1% is recycled at generation source such as on-site recyclables, recyclables for CDL and so on. A break down of the unit waste amount is presented in Table 1-1.

Table 1-1 Unit waste amount generated from household

Generation waste	Unit waste amount		%	Source
	(g/person/day)	(lb/person/day)		
1. Recyclable waste(a+b)	276	0.61	33.1	
a. On-site recycling waste	266	0.60	31.9	J-PRISM II, 2017
b. Recyclable waste for CDL	10	0.02	1.2	J-PRISM II, 2017
2. No-recyclable waste	558	1.23	66.9	
c. Self- disposal waste	105	0.23	12.6	J-PRISM II, 2017
d. Discharge waste(2-c)	453	1.00	54.3	J PRISM I, 2015
Total(1+2)	834	1.84	100	

a.2 Population

Population of Yap excluding outer islands in 2017 was estimated at 7,315 based on the increase-decrease rate of population from 2000 to 2010.

Table 1-2 Estimated population of Yap state in 2017

	Population in census		Growth rates	Population in 2017 (estimate)
	2000	2010		
Yap Proper	7,391	7,371	-0.03%	7,315
Rumung	126	58	-5.40%	13
Map	592	621	0.49%	709
Gagil	734	863	1.76%	1,382
Tomil	1,023	1,231	2.03%	2,120
Fanif	547	509	-0.70%	422
Weloy	1,197	1,031	-1.39%	708
Dalipebinaw	645	397	-3.85%	138
Rull	2,019	2,095	0.38%	2,317
Kanifay	275	314	1.42%	460
Gilman	233	252	0.82%	313
Outer Islands	3,850	4,006	0.41%	4,468
Total	11,241	11,377	0.12%	11,751

a.3 Generation amount of household waste

Generation amount of household waste was calculated as 6.10t/day on the formula below. Unit generation amount and population in the formula was referred to the data mentioned above.

(Generation amount of household waste) ＝(Unit waste amount) × (Population)

Breakdown of the generation amount is shown as Table 1-3.

Table 1-3 Unit generation amount and waste amount generated from household

Item	Unit waste amount (g/capita/day)	Population	Waste amount (ton/day)
4) On-site recycling waste	266.00	7,315	1.95
5) Recycling waste for CDL	10.00	7,315	0.07
6) Self- disposal waste	105.00	7,315	0.77
7)+8) Discharge waste	453.00	7,315	3.31
2) Generation waste	834.00	7,315	6.10

*The number attached beside each type of waste corresponds to the number in the chart of waste flow.

b. Disposal waste amount

Disposal waste amount in Yap was calculated based on the amount of incoming waste and net specific weight of each type of waste.

Daily average amount of incoming waste is 5.63t/day, breakdown of which is 1.27t/day of the collected waste and 4.36t/day of the waste transported directly by each household, small business, hotel and restaurant.

Incoming waste survey at disposal site

Table 1-4 Number of incoming vehicles and disposal waste amount (ton/day)

	Jun.20	Jun.21	Jun.22	Jun.23	Jun.24	Jun.25	Jun.26	Average
Number of incoming vehicle	42	49	50	40	50	37	41	44
Incoming waste amount	5.90	7.39	7.82	5.76	4.76	1.85	5.91	5.63
8)Collected waste amount	2.13	2.40	0.64	1.33	0.38	0.00	1.97	1.27
9)Waste amount transported directly	3.77	4.99	7.18	4.43	4.38	1.85	3.94	4.36

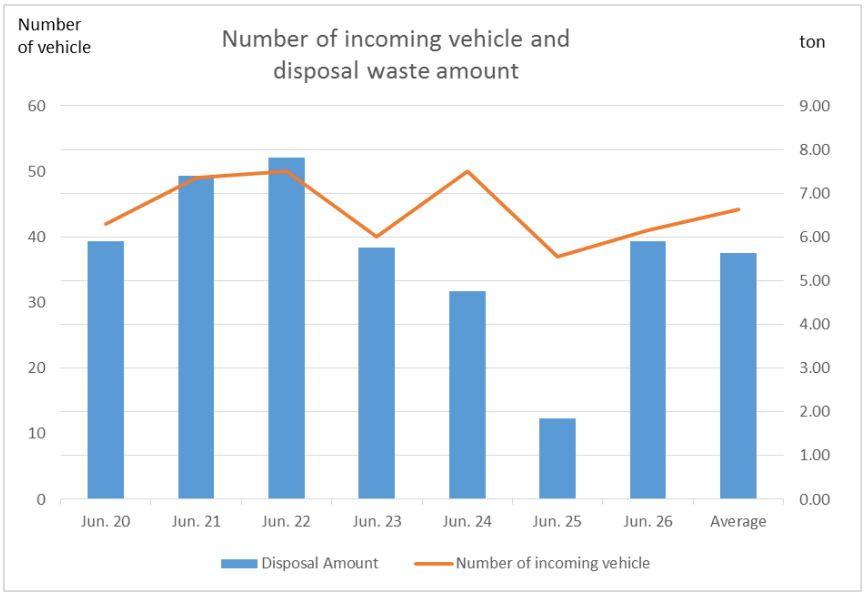


Figure 1-2 Number of Incoming vehicles and disposal waste amount

Breakdown of disposal waste at disposal site is shown as Figure 1-3, which includes the data on the amount of disposal waste transported from Tomil to disposal site measured on June 27th.

Disposal amount of household waste accounts for 42% (2.39ton/day) of total disposal waste. The other 58% accounts for public waste and commercial waste such as from small businesses and restaurants.

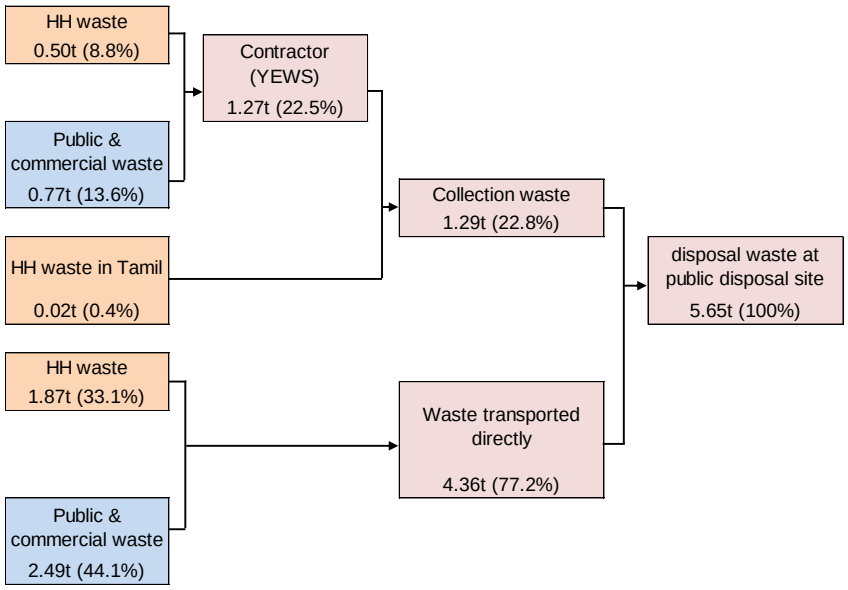


Figure 1-3 Breakdown of disposal waste at disposal site

c. Recycling amount at disposal site

Although scrap and green waste are segregated and stored, recycling of them is not conducted at disposal site so far.

d. Final disposal waste amount

Final disposal waste amount was calculated as the following formula;

16) Final disposal waste amount =14) Disposal waste amount－15) Recycling amount at disposal site ＝5.63 – 0.00 = 5.63

e. Recycling amount of beverage container for CDL

Island Paradise Company (IPC) is the only company contracted with Yap State to conduct CDL activities. Target containers for CDL such as aluminum can, beverage plastic bottle, cooking oil container and glass bottle are brought into the IPC recycling center. IPC pays those bringing containers to the center a refund in cash after being counted/weighed by IPC. Then IPC reports and charges weekly amount of the refund they paid to the state government.

Recycling amount of beverage container for CDL at recycling center from 2014 to 2016 is shown as Table 1-5. The recycling amount for CDL was calculated as 0.16t/day on daily average according to the table.

11) Intermediate treatment [Recycling at recycling center]＝12) Recyclables at treatment facility = 5) Recyclables for CDL = 0.16t/day

Table 1-5 Recycling amount of beverage container for CDL

Quantity of recyclables (piece/year)

FISCAL YEAR:	QUANTITY - RECYCLED			
	Alum. Cans	Bev. Plastic Bottles	Cooking Oil Containers	Glass Bottles
2014	2,123,806	381,470	8,431	46,248
2015	2,081,701	365,570	8,695	33,579
2016	2,433,491	357,925	3,864	27,824

Quantity of recyclables (ton/year)

FISCAL YEAR:	QUANTITY - RECYCLED				
	Alum. Cans	Bev. Plastic Bottles	Cooking Oil Containers	Glass Bottles	Total
2014	33.98	9.54	0.21	13.87	57.60
2015	33.31	9.14	0.22	10.07	52.74
2016	38.94	8.95	0.10	8.35	56.34

Quantity of recyclables (ton/day)

FISCAL YEAR:	QUANTITY - RECYCLED				
	Alum. Cans	Bev. Plastic Bottles	Cooking Oil Containers	Glass Bottles	Total
2014	0.09	0.03	0.00	0.04	0.16
2015	0.09	0.03	0.00	0.03	0.15
2016	0.11	0.02	0.00	0.02	0.15
Average	0.10	0.03	0.00	0.03	0.16

*(Source) EPA Yap

f. Waste amount from collection service

YEWS (Yap Environmental Waste Service) is contracted with the state government to provide waste collection services to public facilities such as schools and government authorities. In addition, they collect waste from some households, commercial facilities, and so on, based on individual contracts. The total amount of waste collected by YEWS is 1.27t/day. Thus, the total waste amount from collection service including 0.02t/day from Tomil is 1.29t/day.

g. Waste Discharge to community dump site

Residents in the communities which have no collection service discharge waste to community dump site. The amount of discharged waste to the dump site was calculated as follows. The result shows that 0.92t/day (9.7% of generated amount, 14% of discharged amount) of waste goes to community dump site.

10) Discharged amount to community dump site = Discharged amount of household waste – Collected amount of household waste in Colonia and Tomil – Incoming amount of household waste transported directly to disposal site＝ 3.31 - 0.52 - 1.87 = 0.92 t/day

h. Discharged waste amount

The total amount of discharged waste was calculated as 6.57t/day from the result mentioned above.

7) Amount of discharged waste ＝8) Amount of collected waste + 9) Amount of disposal waste transported directly to disposal site + 10) Amount of disposal waste at community dump site = 1.29 + 4.36 + 0.92 = 6.57 t/day

i. Waste generation from other than household

Waste amount generated from other than household was calculated as 3.35t/day (35.4 % of generated waste) based on the following formula.

3) Amount of the waste generated from other than household ＝ 4) Amount of On-site recycling + 5) Amount of recyclables for CDL + 6) Amount of self-disposal waste + 7) Amount of discharged waste– 2) Amount of household waste = (1.95+0.16+0.77+6.57-6.10)＝ 3.35t/day

j. Amount of State Solid Waste

The total amount of generated waste in Yap was calculated as 9.45t/day, which is the sum of generated amount of household waste and other than household waste.

1) Amount of state solid waste ＝ 2) generated amount of household waste＋3) generated amount of other than household waste ＝ 6.10 + 3.35 = 9.45t/day

k. Waste flow in Yap

Waste flow in Yap was formulated as follows, based on the result mentioned above.

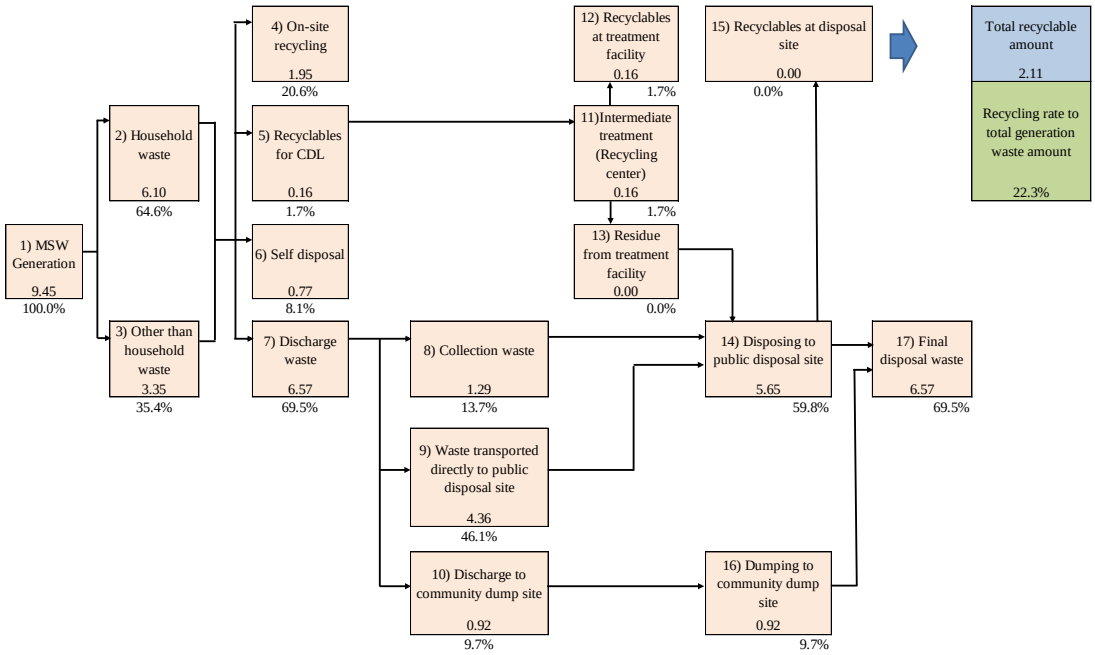


Figure 1-4 Waste flow in Yap (2017)

Annex2 : Annual Work Program FY 2018

Annual Work Program (FY 2018)

Title: *Action plan towards technically appropriate and financially sustainable SWM system in Yap State*	
Implementation Activity	Cost(US$)
Component1: Expansion of waste collection service to out of Colonia Mainly the following activities/works will be implemented; - Selection of Pilot Project (PP) village/community - Public opinion survey (POS) at the selected PP community - Design of collection system - Establishment of waste fee collection/payment system - Preparation of tools for awareness rising	8,533
Component2: Privatization(PPP) of waste collection service provided in Colonia Mainly the following activities/works will be implemented; - Review of present collection service provided private sectors - Examination of appropriate collection fee to institutions - Review of contract document - Contract with State Government for institutional waste collection - Contract with private waste collection company	6,360
Component3: Enhancement of CDL system Mainly the following activities/works will be implemented; - Assess additional category(s) through survey - Clean up activity for existing material on main island - Set up deposit and refund schedule based on the operation cost - Acquisition of space at Public Landfill site - Material/machinery procurement supporting method	20,198
Component4: Proper management of public disposal site Mainly the following activities/works will be implemented; - Planning for O&M of disposal site - Planning for O&M of equipment - Establishment of data management system such as incoming data, O&M data and cost	4,185
Component5: Green waste recycling Mainly the following activities/works will be implemented; - Discuss with DAF on collaboration of compost program - Grasp and observe current situation of utilization of organic waste	804
Component6: Proper management of inappropriate disposal waste such as waste oil and tires Mainly the following activities/works will be implemented; - Examine and finalize survey contents and selection of survey sectors - To collect information at island countries and states in FSM about those waste issues and treatment so on. - Exchange with related countries, states and institutions	3,822
Total	43,902

Annual Work Program (FY2018) Activities and the Schedule

Component/Activity	Contents	Responsible section/staff							FY2018													Remarks
			SWM Section			Environmental Section			Q1			Q2			Q3			Q4					
		Project Manager	Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.		
Component1: Expansion of waste collection service to out of Colonia																						
1.1 Planning, preparation, implementation and monitoring of PP for waste collection																						
1.1.1 Select PP village/community	Villages will be selected where installed collection house in Tomil and Fanif municipality. In case of Tomil municipality, village(s) which is not well established waste fee collection system will be selected.	◎	○																			
1.1.2 POS at the selected PP community	POS on waste collection, willing to pay etc. will be carried out to all household in targeted villages in order to make a plan for waste collect system.		○	○		◎		○														
1.1.3 Design collection system	Collection system such as discharge method, place, container and collection frequency, waste fee etc. will be examined and/or reviewed.	◎	○																			
1.1.4 Establish waste fee collection/payment system	Waste fee payment and collection system will be establish to provide fair service to payer.	◎	○																			
1.1.5 Prepare tools for community meeting	Leaflet on proper waste discharge manner to collection service will be designed and printed		○			◎		○														
Component2: Privatization(PPP) of waste collection service provided in Colonia																						
2.1 Review of contract for waste collection service																						
2.1.1 Revise of collection service provided private sectors	Explanation and understanding for commencement of waste fee collection to present private customers		◎	○																		
2.1.2 Examination of appropriate collection fee to institutions	Establishment waste collection fee for institutions based on the discharged waste amount.		◎	○																		
2.1.3 Revise of contract document	Review of present contract for waste collection service	◎	○																			
2.2 Commencement of revised collection service																						
2.2.1 Contract with State Government for institutional waste collection	New contract on waste collection service with State Government	◎	○																			
2.2.2 Contract with private waste collection company	Contract-out waste collection work to private company	◎	○																			
Component3: Enhancement of CDL system																						
3.1 Establish additional category(s) to CDL system																						
3.1.1 Assess additional category(s) through survey	Firstly disused vehicle and battery will be targeted for CDL. And next target items for CDL will be examined based on the survey.					◎		○														
3.1.2 Clean up activity for disused vehicle left in main island	Place and number of disused vehicles left will be carried out preliminary survey. The following matters shall be decided; Period to clean-up, clean-up system, cost estimation, ensuring space for collected disused vehicles etc.					◎		○														
3.1.3 Set up deposit and refund schedule based on the operation cost	Cost estimation for treatment of disused vehicle and battery Establish deposit and refund amount Establishment a period for commencement of deposit to imported vehicles and batteries and refund					◎		○														

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Annual Work Program (FY2018) Activities and the Schedule

Component/Activity	Contents	Responsible section/staff							FY2018													Remarks
			SWM Section			Environmental Section			Q1			Q2			Q3			Q4					
		Project Manager	Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.		
3.2 Prepare area and construct new recycling center																						
3.2.1 Acquisition of space at Public Landfill site	A procedure to acquire the land for recycling center construction will be progressed.					◎	○															
3.2.4 Material/machinery procurement supporting method	Specifications and the price of press machine to treat disused vehicles will be invested. Research a donation agency and request to donate press machine according to the procedure.					◎	○															
Component4: Proper management of public disposal site																						
4.1 Planning for O&M of disposal site																						
4.1.1 Planning	To manage and operate disposal site premeditatedly, operation plan for disposal, and maintenance plan for facility i.e. leachate oxidation pond, gas ventilation pipes approach road and management house etc. will be prepared.	◎	○																			
4.2 Planning for O&M of equipment																						
4.2.1 Planning	To manage and operate excavator and wood chipper operated at disposal site premeditatedly, O&M plan i.e. daily and periodical maintenance will be prepared.	◎	○																			
4.3 Data management system such as incoming data, O&M data and cost																						
4.3.1 Establishment of system	Data management system included incoming waste data, O&M data and cost for disposal site and equipment will be established and used.	◎	○	○	○																	
Component5: Green waste recycling																						
5.1Planning for promotion on green waste recycling																						
5.1.1 Discuss with DAF on corroboration of compost program	A possibility of corroboration between composting dissemination program promoted DAF and green waste produced at disposal site will be discussed.	◎	○																			
5.1.2 Grasp and observe current situation of utilization of organic waste	A following present situations will be observed and the information and data will be collected. Observe present composting program promoted by DAF Arrangement of contents and schedule for awareness rising activity in the project i.e. component1 for expansion of collection service and component3 introduce new CDL system so on. An operation frequency of wood chipper and amount of chip produced and distributed.	◎	○	○																		
Component6: Proper management of inappropriate disposal waste such as waste oil and tires																						
6.1 To grasp present situation for waste oil and tires numerically in Yap																						
6.1.1 Examine and finalize survey contents and selection of survey sectors	A survey contents will be prepared to carry out survey and traced for situation of waste oil and tires generated in Yap main island. And offices and factories generated waste will be selected as a samples.					◎		○														
6.2 To collect information at island countries and states in FSM about those waste issues and treatment so on.	Topics for those waste and effective treatment method will be collected.					◎		○														
6.3 Exchange with related countries, states and institutions	Information and discussion related those waste will be exchanged with other island countries, other states in FSM and institutions.					◎		○														

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Annual Work Program (FY 2018) Cost of Component and activities

Component/Activity	Cost(US$)										
	a. Personnel	b. Construction	c. Purchase of equipment/ machinery	d. Transportation expenses	e. Operation cost	f. Maintenance of equipment	g. Maintenance of facility	h. Tool/ material	i. Utility	j. Office supply	Total
Component1: Expansion of waste collection service to out of Colonia	7,290	0	0	174	0	0	0	1,000	0	69	8,533
1.1 Planning, preparation, implementation and monitoring of PP for waste collection	7,290	0	0	174	0	0	0	1,000	0	69	8,533
1.1.1 Select PP village/community	135	0	0	3	0	0	0	0	0	0	138
1.1.2 POS at the selected PP community	735	0	0	18	0	0	0	0	0	6	759
1.1.3 Design collection system	630	0	0	15	0	0	0	0	0	6	651
1.1.4 Establish waste fee collection/payment system	630	0	0	15	0	0	0	0	0	6	651
1.1.5 Prepare tools for community meeting	5,160	0	0	123	0	0	0	1,000	0	51	6,334
											0
Component2: Privatization(PPP) of waste collection service provided in Colonia	6,150	0	0	147	0	0	0	0	0	63	6,360
2.1 Review of contract for waste collection service	5,430	0	0	129	0	0	0	0	0	57	5,616
2.1.1 Revise of collection service provided private sectors	2,730	0	0	66	0	0	0	0	0	27	2,823
2.1.2 Examination of appropriate collection fee to institutions	1,260	0	0	30	0	0	0	0	0	15	1,305
2.1.3 Revise of contract document	1,440	0	0	33	0	0	0	0	0	15	1,488
2.2 Commencement of revised collection service	720	0	0	18	0	0	0	0	0	6	744
2.2.1 Contract with State Government for institutional waste collection	720	0	0	18	0	0	0	0	0	6	744
2.2.2 Contract with private waste collection company	0	0	0	0	0	0	0	0	0	0	0
											0
Component3: Enhancement of CDL system	14,700	0	0	351	5,000	0	0	0	0	147	20,198
3.1 Establish additional category(s) to CDL system	11,640	0	0	279	5,000	0	0	0	0	117	17,036
3.1.1 Assess additional category(s) through survey	360	0	0	9	0	0	0	0	0	3	372
3.1.2 Clean up activity for disused vehicle left in main island	8,310	0	0	198	5,000	0	0	0	0	84	13,592
3.1.3 Set up deposit and refund schedule based on the operation cost	2,970	0	0	72	0	0	0	0	0	30	3,072
3.2 Prepare area and construct new recycling center	3,060	0	0	72	0	0	0	0	0	30	3,162
3.2.1 Acquisition of space at Public Landfill site	3,060	0	0	72	0	0	0	0	0	30	3,162
3.2.4 Material/machinery procurement supporting method	0	0	0	0	0	0	0	0	0	0	0
											0

Annual Work Program (FY 2018) Cost of Component and activities

Component/Activity	Cost(US$)										
	a. Personnel	b. Construction	c. Purchase of equipment/ machinery	d. Transportation expenses	e. Operation cost	f. Maintenance of equipment	g. Maintenance of facility	h. Tool/ material	i. Utility	j. Office supply	Total
Component4: Proper management of public disposal site	4,050	0	0	96	0	0	0	0	0	39	4,185
4.1 Planning for O&M of disposal site	1,530	0	0	36	0	0	0	0	0	15	1,581
4.1.1 Planning	1,530	0	0	36	0	0	0	0	0	15	1,581
4.2 Planning for O&M of equipment	1,260	0	0	30	0	0	0	0	0	12	1,302
4.2.1 Planning	1,260	0	0	30	0	0	0	0	0	12	1,302
4.3 Data management system such as incoming data, O&M data and cost	1,260	0	0	30	0	0	0	0	0	12	1,302
4.3.1 Establishment of system	1,260	0	0	30	0	0	0	0	0	12	1,302
											0
Component5: Green waste recycling	780	0	0	18	0	0	0	0	0	6	804
5.1Planning for promotion on green waste recycling	780	0	0	18	0	0	0	0	0	6	804
5.1.1 Discuss with DAF on corroboration of compost program	510	0	0	12	0	0	0	0	0	6	528
5.1.2 Grasp and observe current situation of utilization of organic waste	270	0	0	6	0	0	0	0	0	0	276
											0
Component6: Proper management of inappropriate disposal waste such as waste oil and tires	3,690	0	0	90	0	0	0	0	0	42	3,822
6.1 To grasp present situation for waste oil and tires numerically in Yap	1,710	0	0	42	0	0	0	0	0	18	1,770
6.1.1 Examine and finalize survey contents and selection of survey sectors	1,710	0	0	42	0	0	0	0	0	18	1,770
6.2 To collect information at island countries and states in FSM about those waste issues and treatment so on.	990	0	0	24	0	0	0	0	0	12	1,026
6.3 Exchange with related countries, states and institutions	990	0	0	24	0	0	0	0	0	12	1,026
Total	36,660	0	0	876	5,000	0	0	1,000	0	366	43,902

Annex3 : Annual Work Program FY 2019

Title: ***Action plan towards technically appropriate and financially sustainable SWM system in Yap State***	
Implementation Activity	Cost(US$)
Component1: Expansion of waste collection service to out of Colonia Mainly the following activities/works will be implemented; - Having village/community meeting - Selection of waste collector provided waste collection and make agreement - Installation of collection house - Implementation and monitoring of PP	16,560
Component2: Privatization(PPP) of waste collection service provided in Colonia Mainly the following activities/works will be implemented; - Contract with State Government for institutional waste collection - Contract with private waste collection company - Commencement of new collection service	18,228
Component3: Enhancement of CDL system Mainly the following activities/works will be implemented; - Clean up activity for existing disused vehicle on main island - Set up deposit and refund schedule based on the operation cost - Propose and enact amendment to Recycling Regulations - Construction of recycling center - Ensure space for disused car and scrap metal pressed - Material/machinery procurement supporting method	581,682
Component4: Proper management of public disposal site Mainly the following activities/works will be implemented; - Operation and maintenance of disposal site - Operation and maintenance of equipment - Examination and evaluation of system (recording, input to computer, analyzing and reporting)	23,100
Component5: Green waste recycling Mainly the following activities/works will be implemented; - Policy decision on promotion of green waste recycling - Promotion method - Creating promotion tool	10,116
Component6: Proper management of inappropriate disposal waste such as waste oil and tires Mainly the following activities/works will be implemented; - Examine and finalize survey contents and selection of survey sectors - To collect information at island countries and states in FSM about those waste issues and treatment so on. - Exchange with related countries, states and institutions	13,080
Total	662,766

Annual Work Program (FY2019) Activities and the Schedule

Component/Activity	Contents	Responsible section/staff							FY2019													Remarks
			SWM Section			Environmental Section			Q1			Q2			Q3			Q4					
		Project Manager	Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.		
Component1: Expansion of waste collection service to out of Colonia																						
1.1 Planning, preparation, implementation and monitoring of PP for waste collection																						
1.1.6 Community meeting	Leaflet will be distributed and explained to resident at community meeting. A willingness to participate to collection service will be confirmed.		◎	○		○		○														
1.1.7 Select waste collector and make agreement	Waste collection company and/or collector for PP will be selected based on the vehicle, equipment and other condition. Villages will contract waste collection service with collection company/collector.		◎																			
1.1.8 Install collection house	Villages where have already installed collection house will be selected for PP.	◎	○	○																		
1.1.9 Implementation and monitoring	Contents for monitoring such as situation of discharge, collection and payment of collection fee and improved issues will be decided. Implementation staffs and method will be decided. Recording and reporting of results		◎	○		○		○														
Component2: Privatization(PPP) of waste collection service provided in Colonia																						
2.2 Commencement of revised collection service																						
2.2.1 Contract with State Government for institutional waste collection	New contract on waste collection service with State Government	◎	○																			
2.2.2 Contract with private waste collection company	Contract-out waste collection work to private company	◎	○																			
2.2.3 Commencement of new collection service	Commencement to provide collection service to public institutions		◎	○																		
Component3: Enhancement of CDL system																						
3.1 Establish additional category(s) to CDL system																						
3.1.2 Clean up activity for disused vehicle left in main island	Place and number of disused vehicles left will be carried out preliminary survey. The following matters shall be decided; Period to clean-up, clean-up system, cost estimation, ensuring space for collected disused vehicles etc.					◎		○														
3.1.3 Set up deposit and refund schedule based on the operation cost	Cost estimation for treatment of disused vehicle and battery Establish deposit and refund amount Establishment a period for commencement of deposit to imported vehicles and batteries and refund					◎		○														
3.1.6 Propose and enact amendment to Recycling Regulations	Following Regal procedure will be necessary; Prepare draft recycling regulation, propose it and enact amendment					◎		○														

Annual Work Program (FY2019) Activities and the Schedule

Component/Activity	Contents	Responsible section/staff							FY2019													Remarks
			SWM Section			Environmental Section			Q1			Q2			Q3			Q4					
		Project Manager	Technical office	Financial assistant	Operator	Technical officer	Technical engineer	Assistant clerk	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.		
3.2 Prepare area and construct new recycling center																						
3.2.2 Construction of recycling center	Contractual procedures for construction of recycling center					◎	○															
3.2.3 Ensure space for disused vehicle and scrap metal pressed	The following procedure will be necessary to ensure the space; Estimation of required space for used car and scrap metal pressed, selection a site, procedure of acquisition the land and ensure the land					◎	○															
3.2.4 Material/machinery procurement supporting method	Specifications and the price of press machine to treat disused vehicles will be invested. Research a donation agency and request to donate press machine according to the procedure.					◎	○															
Component4: Proper management of public disposal site																						
4.1 Planning for O&M of disposal site																						
4.1.2 Operation and maintenance	Disposal site will be operated based on the plan.		◎		○																	
4.2 Planning for O&M of equipment																						
4.2.2 Operation and maintenance	Equipment will be operated and maintained based on the plan.		◎		○																	
4.3 Data management system such as incoming data, O&M data and cost																						
4.3.2 Examination and evaluation of system (recording, input to computer, analyzing and reporting)	Data management system will be used, examined and improved.	◎	○																			
Component5: Green waste recycling																						
5.1Planning for promotion on green waste recycling																						
5.1.3 Policy decision	Policy to corroborate and/or recycle green waste will be establish.	◎	○																			
5.1.4 Promotion method	A following promotion method of green waste recycling will be established; Recycling method, promotion system with awareness rising implemented in the project.	◎	○			○																
5.1.5 Creating promotion tool	Leaflet on green waste recycling will be designed and printed.		○			◎		○														
Component6: Proper management of inappropriate disposal waste such as waste oil and tires																						
6.1 To grasp present situation for waste oil and tires numerically in Yap																						
6.1.2 Implement survey	The survey will be carried out periodically.					◎		○														
6.2 To collect information at island countries and states in FSM about those waste issues and treatment so on.	Topics for those waste and effective treatment method will be collected.					◎		○														
6.3 Exchange with related countries, states and institutions	Information and discussion related those waste will be exchanged with other island countries, other states in FSM and institutions.					◎		○														

Annual Work Program (FY2019) Cost of Component and activities

Component/Activity	Cost(US$)										
	a. Personnel	b. Construction	c. Purchase of equipment/ machinery	d. Transportation expenses	e. Operation cost	f. Maintenance of equipment	g. Maintenance of facility	h. Tool/ material	i. Utility	j. Office supply	Total
Component1: Expansion of waste collection service to out of Colonia	16,020	0	0	384	0	0	0	0	0	156	16,560
1.1 Planning, preparation, implementation and monitoring of PP for waste collection	16,020	0	0	384	0	0	0	0	0	156	16,560
1.1.6 Community meeting	1,455	0	0	36	0	0	0	0	0	15	1,506
1.1.7 Select waste collector and make agreement	135	0	0	3	0	0	0	0	0	0	138
1.1.8 Install collection house	405	0	0	9	0	0	0	0	0	3	417
1.1.9 Implementation and monitoring	14,025	0	0	336	0	0	0	0	0	138	14,499
											0
Component2: Privatization(PPP) of waste collection service provided in Colonia	4,860	0	0	120	13,200	0	0	0	0	48	18,228
2.2 Commencement of revised collection service	4,860	0	0	120	13,200	0	0	0	0	48	18,228
2.2.1 Contract with State Government for institutional waste collection	720	0	0	18	0	0	0	0	0	6	744
2.2.2 Contract with private waste collection company	180	0	0	3	0	0	0	0	0	3	186
2.2.3 Commencement of new collection service	3960	0	0	99	13200	0	0	0	0	39	17,298
											0
Component3: Enhancement of CDL system	25,800	50,000	500,000	621	5,000	0	0	0	0	261	581,682
3.1 Establish additional category(s) to CDL system	3,000	0	0	72	5,000	0	0	0	0	30	8,102
3.1.2 Clean up activity for disused vehicle left in main island	0	0	0	0	5000	0	0	0	0	0	5,000
3.1.3 Set up deposit and refund schedule based on the operation cost	2280	0	0	54	0	0	0	0	0	24	2,358
3.1.6 Propose and enact amendment to Recycling Regulations	720	0	0	18	0	0	0	0	0	6	744
3.2 Prepare area and construct new recycling center	22,800	50,000	500,000	549	0	0	0	0	0	231	573,580
3.2.2 Construction of recycling center	13170	50000	0	318	0	0	0	0	0	135	63,623
3.2.3 Ensure space for disused vehicle and scrap metal pressed	3420	0	0	81	0	0	0	0	0	33	3,534
3.2.4 Material/machinery procurement supporting method	6210	0	500000	150	0	0	0	0	0	63	506,423
											0

Annual Work Program (FY2019) Cost of Component and activities

Component/Activity	Cost(US$)										
	a. Personnel	b. Construction	c. Purchase of equipment/ machinery	d. Transportation expenses	e. Operation cost	f. Maintenance of equipment	g. Maintenance of facility	h. Tool/ material	i. Utility	j. Office supply	Total
Component4: Proper management of public disposal site	12,480	0	0	288	1,000	1,200	8,000	0	0	132	23,100
4.1 Planning for O&M of disposal site	4,680	0	0	108	0	0	8,000	0	0	48	12,836
4.1.2 Operation and maintenance	4680	0	0	108	0	0	8000	0	0	48	12,836
4.2 Planning for O&M of equipment	4,680	0	0	108	1,000	1,200	0	0	0	48	7,036
4.2.2 Operation and maintenance	4680	0	0	108	1000	1200	0	0	0	48	7,036
4.3 Data management system such as incoming data, O&M data and cost	3,120	0	0	72	0	0	0	0	0	36	3,228
4.3.2 Examination and evaluation of system (recording, input to computer, analyzing and reporting)	3120	0	0	72	0	0	0	0	0	36	3,228
											0
Component5: Green waste recycling	9,780	0	0	240	0	0	0	0	0	96	10,116
5.1Planning for promotion on green waste recycling	9,780	0	0	240	0	0	0	0	0	96	10,116
5.1.3 Policy decision	4860	0	0	120	0	0	0	0	0	48	5,028
5.1.4 Promotion method	2520	0	0	60	0	0	0	0	0	24	2,604
5.1.5 Creating promotion tool	2400	0	0	60	0	0	0	0	0	24	2,484
											0
Component6: Proper management of inappropriate disposal waste such as waste oil and tires	12,660	0	0	300	0	0	0	0	0	120	13,080
6.1 To grasp present situation for waste oil and tires numerically in Yap	2,940	0	0	72	0	0	0	0	0	24	3,036
6.1.2 Implement survey	2940	0	0	72	0	0	0	0	0	24	3,036
6.2 To collect information at island countries and states in FSM about those waste issues and treatment so on.	5580	0	0	132	0	0	0	0	0	60	5,772
6.3 Exchange with related countries, states and institutions	4140	0	0	96	0	0	0	0	0	36	4,272
Total	81,600	50,000	500,000	1,953	19,200	1,200	8,000	0	0	813	662,766