



Chuuk State  
Solid Waste Management Strategy  
2019 – 2028  
(Action Plan: 2019-2023)





## **Acknowledgements**

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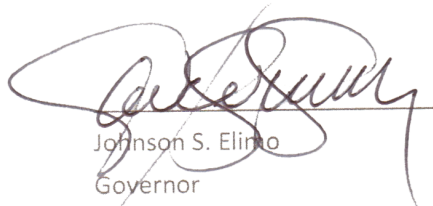
## Foreword

Dealing with solid waste in the State of Chuuk, covering 40 dispersed and isolated municipalities is a great challenge for the Chuuk State Government and its related departments, agencies and offices, along with any others in the State who may be addressing this issue.

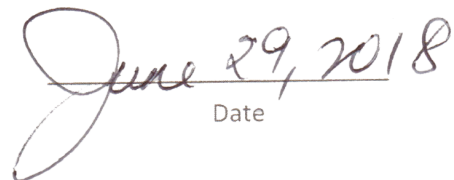
For the present population and future generations, Solid Waste Management will continue to be an ever increasing future challenge for the State to cope with. With this new edition of the “Chuuk Solid Waste Management Strategy 2019-2028, generously funded by the Japan International Cooperation Agency (**JICA**) Chuuk State can see the way forward to meeting this challenge.

The State needs to act with a unified aim and solidarity to fulfill the aspiration for a clean and beautiful Chuuk - guided by this Solid Waste Management Strategy - beginning now and moving into the future. ***Take Care of Chuuk, Clean Chuuk, Love Chuuk! ;“Tumunu Chuuk, Nimeti Chuuk, Tongei Chuuk!”***

Let us contribute to the National and State efforts for a clean and healthy Federated States of Micronesia by applying the three Rs: ***REDUCE, REUSE AND RECYCLE.***



Johnson S. Elinio  
Governor  
Chuuk State Government



June 29, 2018  
Date

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## **ACRONYMS**

|        |   |
|--------|---|
| AP     | Action Plan   |
| AWP    | Annual Work Program   |
| CDL    | Container Deposit Legislation   |
| CSG    | Chuuk State Government  |
| CWC    | Chuuk Women's Council   |
| DTPW   | Department of Transportation and Public Works   |
| DECCEM | Department of Environment, Climate Change and Emergency Management  |
| EPA    | Environmental Protection Agency   |
| EIA    | Environmental Impact Assessment   |
| FSM    | Federated States of Micronesia  |
| FY     | Financial Year  |
| HH     | Household   |
| JEMCO  | Joint Economic Management Committee   |
| JICA   | Japan International Cooperation Agency  |
| MID    | Marina Interim Dumpsite   |
| MRF    | Materials Recovery Facility   |
| NGO    | Non-governmental Organization   |
| PET    | Polyethylene Terephthalate  |
| POPs   | Persistent Organic Pollutants   |
| SBOC   | Office of Statistics, Budget and Economic Management, Overseas Development Assistance, and Compact management |
| SPREP  | Secretariat of the Pacific Regional Environment Program   |
| SSW    | State Solid Waste   |
| SSWMS  | State Solid Waste Management Strategy   |
| SWM    | Solid Waste Management  |
| UNDP   | United Nations Development Program  |
| WACS   | Waste Amount and Composition Survey   |



## **Executive Summary**

This new State Solid Waste Management Strategy (SSWMS) is formulated with the aim of enabling Chuuk State to establish a technically sound and financially sustainable solid waste management (SWM) system. To do so, this SSWMS consists of not only of strategic elements, but also a mid-term action plan of the first five years with technical, institutional and financially appropriate options, which will lead to implementation of the SSWMS.

### **SWM issues targeted under the strategy**

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

### **Strategy**

The Vision, Scope, Key Strategic Actions and Targets are provided in order to formulate this new Chuuk State Solid Waste Management Strategy .

### **Vision**

A sustainable Chuuk State; where effective solid waste management practices are implemented in a socially, economically, and environmentally sustainable manner for the benefit of future generations.

### **Scope**

This SSWMS covers the 10-year period from 2019 to 2028, along with an action plan designed to be implemented during the first half of the period, from 2019 to 2023. A general review of the strategy will be undertaken in 2023 to update its relevance to current needs, and then plan the next set of activities for the remaining period of the strategy.

This SSWMS covers solid wastes generated by households, institutions and commercial operations in the state, and all these wastes generated in Chuuk are termed State Solid Waste (SSW) in this strategy. The Strategy does **not** cover medical waste, hazardous waste, derelict vehicle, electrical and electronic waste, or waste oil.

### **Key Strategic Actions**

The document provides for the following four strategic actions. These actions are shown in brief as follows:

#### **1. Proper management of landfill sites**

A long-term development plan for final disposal shall discuss the followings:

- i. The immediate rehabilitation of the previously-used Neouo landfill site;
- ii. Proper management of the Marina Interim Dump site (MID) until Neouo landfill starts its operation;
- iii. Safe closure of MID after Neouo landfill starts operation;

- iv. Preparation of a new landfill site based on the estimated time available for operations at the re-opened Neouo landfill before closure is required;
- v. Introduction of gate fee (when Neouo landfill reopens for operation).

**2. Introduction of a Container Deposit Legislation recycling system**

In order to introduce a Container Deposit Legislation (CDL) system for recycling beverage containers in Chuuk, the followings steps need to be taken:

- i. Establish a legal framework: a CDL law and CDL regulations;
- ii. Establish an institutional framework;
- iii. Technical preparation.

**3. Enhancement of human capacity: Learning from experiences of other states and countries**

Chuuk is fortunate to be able to learn other countries in the region in order to improve human capacity. In concrete terms, the following supports from Hachioji municipality in Japan are expected to be provided:

- i. Raise people’s awareness on 2R (Reduce and Reuse);
- ii. Enhance capacity so as to improve waste collection.

**Targets**

Table 1 Strategy Targets

| Item  | Unit | 2019 | 2023 | 2028 |
|---|------|------|------|------|
| Recycling rate (to generation waste amount)               | %    | 20   | 23   | 24   |
| Collection rate (to discharge waste amount)               | %    | 37   | 52   | 77   |
| Inappropriate discharge rate (to generation waste amount) | %    | 18   | 12   | 10   |
| Rate of waste transported to disposal site directly       | %    | 52   | 22   | 7    |

**Action Plan**

By taking the guiding principles and the identified SWM issues, the specific activities required to implement this SSWMS are presented in an Action Plan. This Action Plan, which defines the priorities for the next five years, is formulated based on the following assumptions:

**Assumptions**

- Looking ahead to “post-2023” the SWM sector in Chuuk State needs to move beyond any dependency on Compact Funds from the U.S. Government, as these cannot be expected to continue to be provided, and pursue the establishment of a self-financing SWM system.
- By responding to the immediate financial challenge, which is that the Small Sector Grant of the U.S. Compact Funds will no longer finance recurring costs, this action plan is formulated as if it were a **stand-alone project**.

### **Title and components of the Action Plan**

The name for the five-year action plan is ***“Action Plan (Project) towards a technically appropriate and financially sustainable SWM system for Chuuk State”***.

The action plan consists of the following four components:

#### **Component 1: Proper management of landfill sites**

- The immediate rehabilitation of the currently disused Neouo landfill site;
- Proper management of the Marina Interim Dump site (MID) until the rehabilitated Neouo landfill reopens;
- Safe closure of MID after Neouo landfill starts operation;
- Preparation of a new landfill site considering the available operation period of the Neouo landfill;
- Introduction of gate fees at the rehabilitated Neouo landfill site

#### **Component 2: Introduction of a CDL recycling system.**

**Component 3: Enhancement of human capacities: Learning from experiences of other states and countries.**

**Implementation schedule for the Action Plan (the Project)**

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

| Activities   | Mid-term plan |      |      |      |      |
|--|---------------|------|------|------|------|
|  | 2019          | 2020 | 2021 | 2022 | 2023 |
| 1. Proper management of landfill sites   |               |      |      |      |      |
| 1.1 Rehabilitation of of the currently-disused Neoue landfill site   |               |      |      |      |      |
| 1.1.1 Preparation of rehailitation of Neouo landfill   | ■             |      |      |      |      |
| 1.1.2 Rehabilitation of Neouo Landfill site  | ■             | ■    |      |      |      |
| 1.1.3 Proper operation and maintenance of Neouo landfill   |               | ■    | ■    | ■    | ■    |
| 1.1.4 Introduction of gate fee   |               | ■    | ■    |      |      |
| 1.2 Proper management of the Marina Interim Dump site (MID) until the rehabilitated Neouo landfill reopens |               |      |      |      |      |
| 1.2.1 Proper operation and maintenance of MID  | ■             |      |      |      |      |
| 1.2.2 Safe closure of MID after Neouo landfill reopens   | ■             | ■    | ■    |      |      |
| 1.3 Preparation of a new landfill site   |               |      |      |      |      |
| 1.3.1 Site selection of a new landfill site  | ■             | ■    | ■    |      |      |
| 1.3.2 Designing of a new landfill site   |               |      |      | ■    | ■    |
| 1.3.3 Construction and Operation of a new landfill site  |               |      |      |      |      |
| 2. Introduction of CDL   |               |      |      |      |      |
| 2.1 Establish a legal framework  | ■             |      |      |      |      |
| 2.2 Establish an institutional framework.  |               | ■    |      |      |      |
| 2.3 Technical preparation.   | ■             | ■    | ■    | ■    | ■    |
| 3. Enhancement of human capacities: Learning from experiences of other states and countries                |               |      |      |      |      |
| 3.1 Enhancement of 2R (Reduce, Reuse)  | ■             | ■    |      |      |      |
| 3.2 Improve waste collection service   | ■             | ■    |      |      |      |

### **Implementation cost for project**

Entire project cost (US\$) is shown in the table below.

|  | FY2019  | FY2020  | FY2021  | FY2022  | FY2023  | Total     |
|--|---------|---------|---------|---------|---------|-----------|
| Component 1: Proper management of landfill site  | 260,367 | 218,102 | 311,940 | 186,828 | 215,388 | 1,192,625 |
| 1.1 Rehabilitation of currently disused Neoue landfill site  | 190,117 | 136,134 | 191,628 | 133,668 | 119,196 | 770,743   |
| 1.2 Proper management of the Marina Interim Dump site (MID) until Neouo landfill reopens             | 59,019  | 69,044  | 36,216  | 0       | 0       | 164,279   |
| 1.3 Preparation of a new landfill site   | 11,231  | 12,924  | 84,096  | 53,160  | 96,192  | 257,603   |
| Component 2: Introduction of CDL.  | 261,353 | 377,688 | 26,217  | 28,920  | 24,096  | 718,274   |
| Component3: Enhancement of human capacities: Learning from experiences of other states and countries | 135,193 | 37,710  | 0       | 0       | 0       | 172,903   |
| Total  | 656,913 | 633,500 | 338,157 | 215,748 | 239,484 | 2,083,802 |

## **Introduction**

On the island of Chuuk, there are collection bins everywhere with phrases written on them that read: *“TUMUNU CHUUK; NIMETI CHUUK; TONGEI CHUUK*. These environment related phrases written in big letters capture Chuuk’s efforts in managing waste management in today’s modern society. The phrases mean *TAKE CARE OF CHUUK; CLEAN CHUUK* and *LOVE CHUUK*. The Chuukese people have always been closely linked to their culture. Their culture thrives on respect; not just respect among themselves, but with nature. To respect nature is to help sustain life.

During the 1500’s when whalers, traders, and explorers roamed the seas of the Orient and the Pacific, islanders were nurturing their share of the earth. But when foreigners set foot on the islands, they introduced a bigger problem to the islanders: maintaining their natural resources. Thus, with the introduction of the new world, an increase of consumption and waste began to take its toll.

Solid Waste Management was later introduced when the islands adopted new forms of government and adopted a new way of life. Chuuk has faced the Solid Waste Management problem since the advent of the colonial powers to Micronesia. The introduction of pre-prepared food and drinks to Micronesia has exacerbated the problem of solid waste to the point where it is now costly to manage it. The traditional methods of managing waste which include burning, composting, and disposing waste in the sea have become threats to the environment and public health instead of solutions to managing solid wastes. Thus, this State Solid Waste Management Strategy was created to serve as a guideline to assist the Chuuk State Government manage this solid waste challenge.

# **1 Formulation of State Solid Waste Management Strategy**

## **1.1 Objectives**

The previous Chuuk State Solid Waste Management Plan covered the period of 2012 to 2017 and defined certain strategic elements for managing wastes with due consideration to the issues at that time. Whilst there were a number of initiatives undertaken, and some challenges were overcome, many issues remain to be tackled. Strategic efforts need to be re-directed to focus on the remaining critical issues, as well as emerging ones currently faced in the solid waste sector in Chuuk State, in particular paying special attention to Weno, where the waste problem is most severe.

Considering the situation, this State Solid Waste Management Strategy (SSWMS) is formulated to enable Chuuk State to establish a technically sound and financially sustainable solid waste management (SWM) system. To do so, this new SSWMS consists of not only of strategic elements but also a mid-term Action Plan for the first five years with technical, institutional and financially appropriate options, which will propel realization of this new SSWMS.

## **1.2 Structure of the new SSWMS**

This State Solid Waste Management Strategy is presented in two parts:

**Part One** provides an overview of the current SWM situation faced in the waste management sector in Chuuk State. In this part, the current issues are ascertained through a two-step process: first,

description and measurement of the current situation, and then through analysis of that situation. As a first step, current waste flow is formulated based on a series of baseline surveys conducted in Weno, Chuuk, and the situation is technically as well as quantitatively understood. Then, the issues and challenges are identified based on the waste flow. Thus, the SSWMS mainly discuss on Weno by considering the magnitude of the waste problem, and most figures presented are of Weno, and generally the term 'Chuuk' should be understood as only referring to Weno in this document.

**Part Two** presents the main body of the SSWMS. It consists of the following: (i) the strategy which sets out the policy directions for next 10 years, along with numerical targets; (ii) a mid-term action plan for the first five years in order to progress towards the targets of the SSWMS; and (iii) annual implementation plans. Part Two will define the direction Chuuk State 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

“CHUUK” means mountain: Chuuk Lagoon contains mountainous islands. Geographically, the islands of Chuuk are part of the Caroline group. They are located in the north western part of the Pacific Ocean. The islands of Chuuk Lagoon are located approximately 1000 kilometers southeast of Guam. There are 11 high mangrove-fringed islands; and a series of 14 outlying atolls and low islands surrounding the lagoon. Chuuk State also includes several other island groups composed of atolls at some distance to Chuuk Lagoon.

The temperature is constantly in the upper 80’s °F. During the summer, the temperature rises to 90°F. Because of its location on the typhoon belt, Chuuk is susceptible to tropical typhoons.

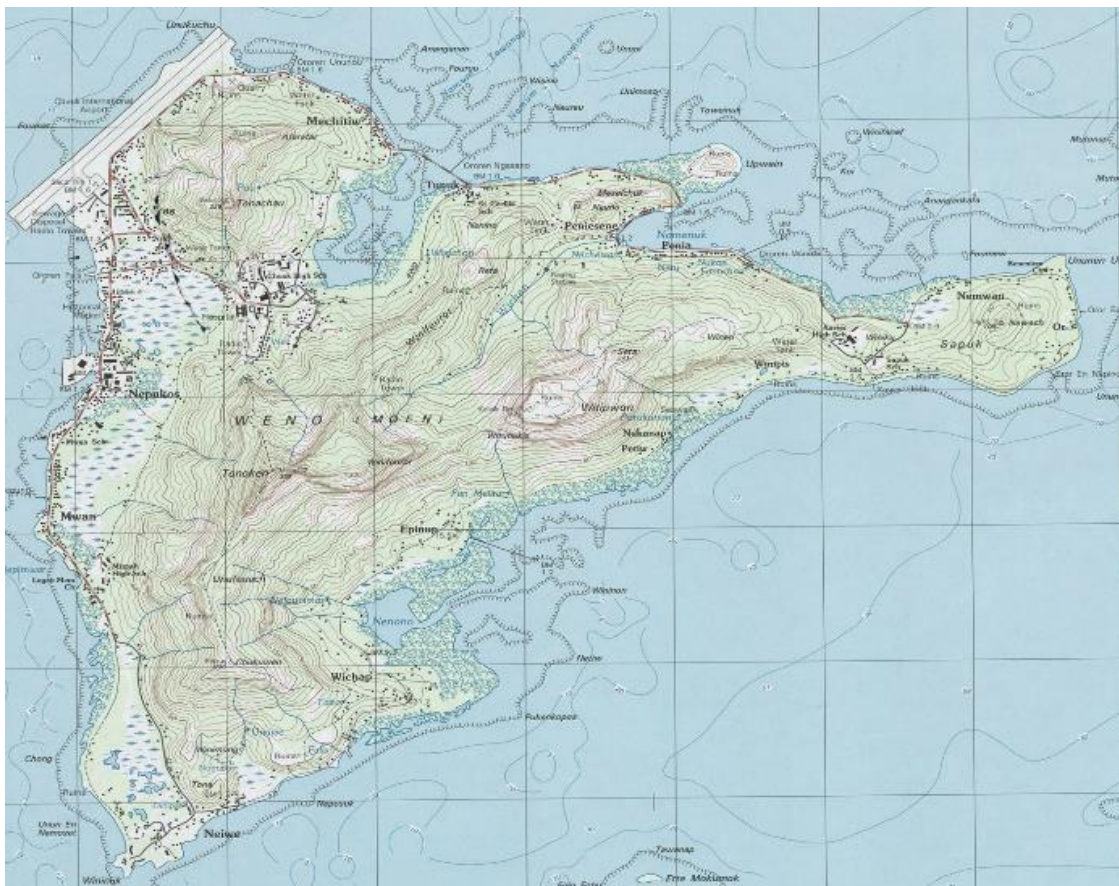


Figure 2-1 Topographic Map of Weno Island in Chuuk Lagoon, where the capital is located.



## 2.1.2 Administration

Over the years, Chuuk has been part of the Spanish, German, Japanese, and American colonial administrations. Each colonial power added to the Chuukese lifestyle and form of government.

Similar to the other states in the FSM, Chuuk State's constitutional government consists of three branches: executive, legislative, and judicial. The head of the executive government is the Governor, while the legislative power is vested in the State Legislature, which consists of two houses, the Senate and the House of Representatives (the only State of the FSM to have two houses in the State Legislature). Chuuk State is also represented at the national level through a Senator at large and five Senators representing the five regions in Chuuk. The Judicial branch is headed by a Chief Justice and several associate judges. At the local level, municipal governments are governed by a mayor with some legislative functions.

## 2.1.3 Population

Among the FSM states, Chuuk State is the most populated with a figure of 48,654 persons according to Census 2010. Among them, 13,850 (28.5%) live in Weno Is. The number of households was 7,024 with an average of 6.9 persons per household. Also, the 2010 census revealed that 3,245 households, 46.2% of the total households, had immediate family members residing outside FSM such as Guam and Hawaii.

## 2.1.4 Land Ownership

Most of the land in Chuuk is privately owned. Therefore, acquiring land for public use such as for a public disposal site remains a challenge for Chuuk State. However, with the amended Eminent Domain Law, the acquisition of private land for public use becomes possible.

## 2.1.5 Economic and Financial situation

The economic and financial situation in the FSM in 2016 is summarized as follows.

Table 2-1 Economic and Financial Situation

| FY2016  |         |          |            |                |
|---|---------|----------|------------|----------------|
| GDP current prices (\$ million):  | 329.9   |          | Population | GDP per capita |
| Population:   | 102,453 | Chuuk:   | 46,688     | 1,994          |
| GDP per capita (\$):  | 3,220   | Kosrae:  | 6,227      | 3,376          |
| GNI per capita (\$):  | 3,715   | Pohnpei: | 37,893     | 4,313          |
| GNDI per capita (\$):   | 4,785   | Yap:     | 11,645     | 4,495          |
| 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 <sup>1</sup>          | 15,702 | 15,339 |
| -  | Average annual wage <sup>2</sup>          | 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 Flows

Analysis of waste flow is the very first step to understanding the current SWM situation well. A series of baseline surveys, including the waste generation survey at the household level, and a survey on incoming waste to the Marina interim dump site were carried out in July 2017, and based on these results, provided information to determine the current waste flows for Chuuk. For the details of how the waste flow surveys were conducted, please see Annex 1.

- **Waste generation by source:** 63.5% of waste generated is from households while the remaining 36.5 % is from sources other than households such as shops, restaurants, businesses, and public institutions. Managing household waste is of great importance.
- **3R:** As much as 20.2% of generated waste is recycled on site. However, if a CDL program was implemented in Chuuk, it would greatly contribute to the State's beautification, as well as helps to save space at the public landfill site. Introduction of a CDL recycling system would be strategically important for future progress on SWM in Chuuk.
- **Waste collection:** Around 28% of waste generated, which is equivalent to approximately 37% of waste discharged, is collected by DTPW. The collection rate is low since substantial areas of Weno Island are inaccessible for the waste collection trucks. Basically the residents in the collection area are satisfied with the service provided by DTPW.
- **Final disposal:** As much as 76.8 % of the discharged waste, which is equivalent to 58.3% of generated waste, is discharged to the Marina interim dump site. The remaining 23.2 %, which is equivalent to 17.6 % of generated waste, is discharged by uncontrolled dumping to nearby open spaces.
- **Final disposal:** Only 48 % of the incoming waste to the Marina interim dump site is collected by DTPW, while the remaining 52 % is brought directly by households and business entities.

<sup>1</sup> These figures include employees of both private and public sectors.

<sup>2</sup> These figures are average salaries of both private and public sectors.

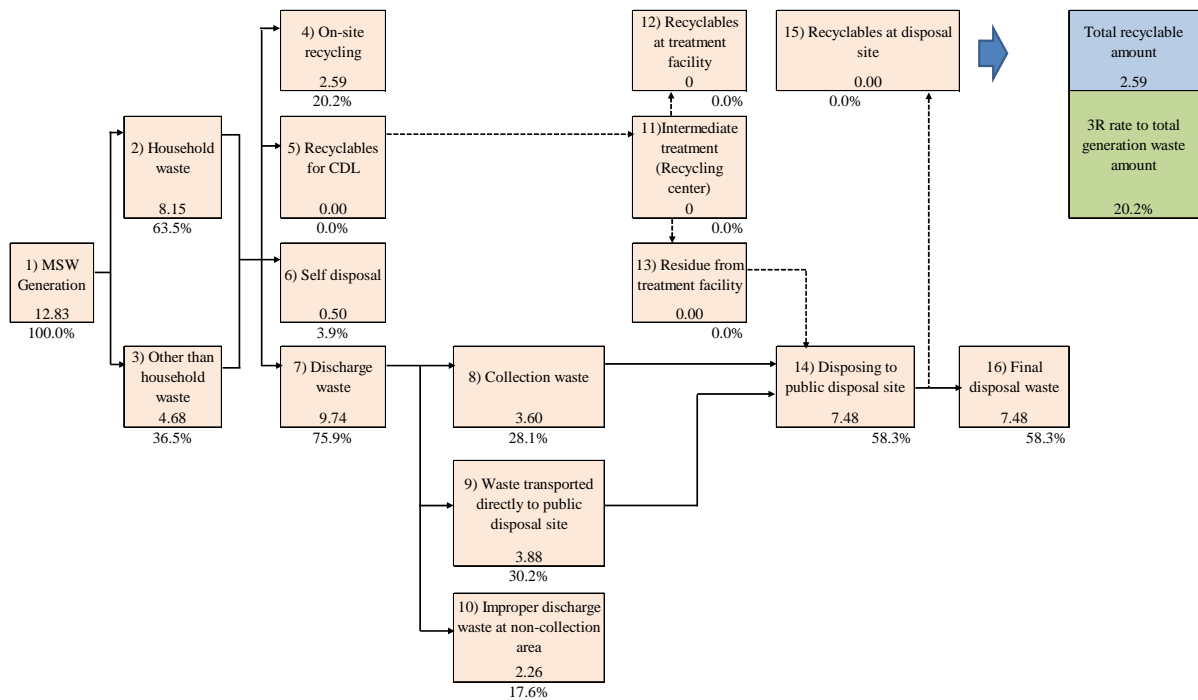


Figure 2-2 Waste flow in Chuuk State in 2017 (unit: ton/day)

## 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<sup>3</sup>.

#### a.1 Generation rate of household waste

As shown in Table 2-2, waste generation rates of households are calculated by summing up (i) waste that is eventually recycled on-site, (ii) waste that goes to the CDL program, (iii) self-disposed waste and (iv) discharged waste. On-site recycling and self-disposed waste amounts were estimated based on the household survey of waste generation conducted in 2017. For the discharged waste amount per household, a data of the Waste Amount and Composition Survey (WACS) carried out of 2017 in Pohnpei state was used since that of Chuuk obtained in 2015 was unreliable.

Table 2-2 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 in 2017 |
|  | Recyclable for CDL program     | -  |

<sup>3</sup> (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

|                |                      |   |
|----------------|----------------------|---|
| Non-recyclable | Self- disposed waste | Household survey on waste generation in 2017                        |
|                | Discharged waste     | Waste amount and composition survey (WACS) in Pohnpei state in 2017 |

As seen in Table 2-3, total generation rate of household waste is 582g (1.28lb)/person/day. The rate breaks down into (i) 185g (0.41lb)/person/day for on-site recycling, (ii) 36g (0.08lb)/person/day for self-disposal, and (iii) 361g (0.79lb)/person/day of discharged waste. As much as 32% of generated waste at household level is recycled at source, and also partially disposed of at their premises, and then the remaining 62% is discharged as waste.

Table 2-3 Generation rate of household waste

| Unit          | Recyclable        |                                | Non-recyclable |                  | Generation rate of household waste |
|---------------|-------------------|--------------------------------|----------------|------------------|------------------------------------|
|               | On-site recycling | Recyclable for the CDL program | Self-disposal  | Discharged waste |                                    |
| g/person/day  | 185               | 0                              | 36             | 361              | 582                                |
| lb/person/day | 0.41              | 0                              | 0.08           | 0.79             | 1.28                               |
| %             | 31.8              | 0.0                            | 6.2            | 62.0             | 100                                |

A characteristics of waste composition carried out in 2017 in Pohnpei were shown as below;

- By weight ratio, kitchen waste accounts for 30% of the discharged waste for household waste. Considering that kitchen waste is recycled in many household as a feed of livestock, the percentage of kitchen waste in the waste generation total is extremely high. Plastics - including PET bottles - account for 16 % by weight, with the next highest component by weight being diapers at 10 %, in indication of the numbers of young children per typical household.
- By volume ratio, that of plastics account for 44 %; the next highest volume category being that of cardboard at 16 %, showing a large volume of packaging waste as a characteristic of the waste stream.

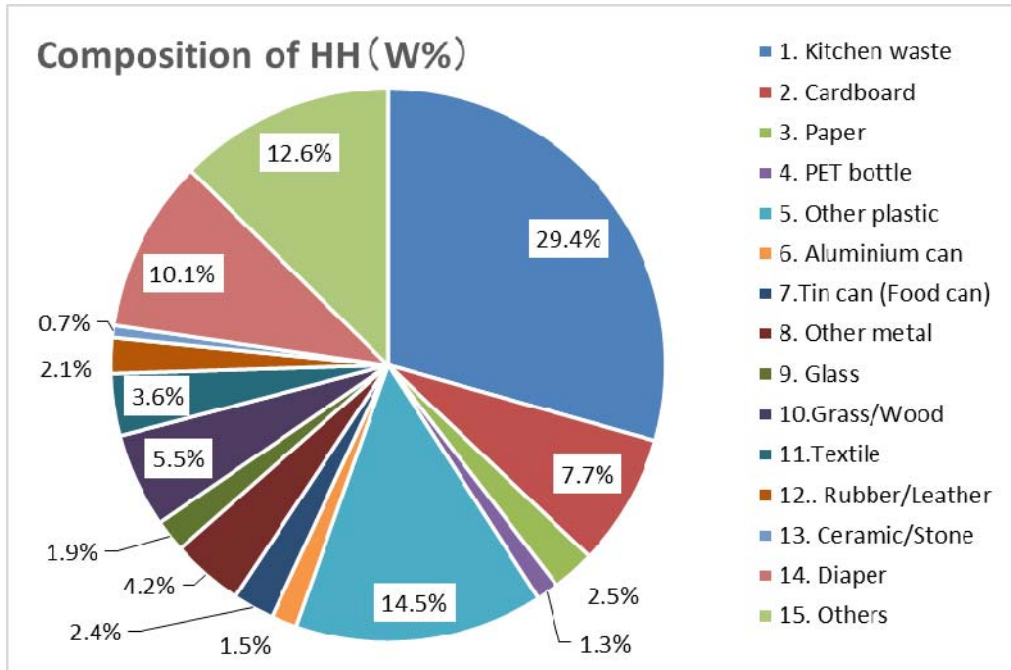


Figure 2-3 Composition of Household waste (Weight %) from the WACS implemented in Pohnpei

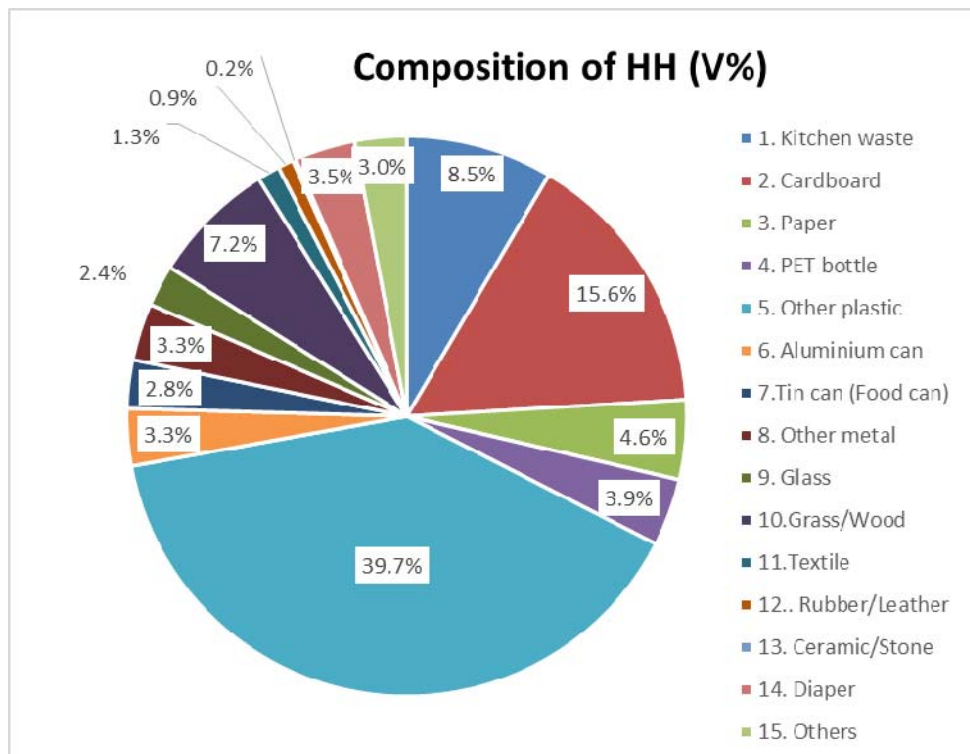


Figure 2-4 Composition of Household waste (Volume %) from the WACS implemented in Pohnpei

## **a.2 Generation rate of SSW**

Waste is generated not only from households but also from business entities and public institutions. The generation rate of non-household waste is 334g (0.74lb)/person/day, is calculated through dividing the non-household waste figure by the population figure. By adding the generation rate of household waste and that of non-household waste, the generation rate of all solid waste, 916g (2.02lb)/person/day, is obtained.

Table 2-4 Generation rate of State Solid Waste

| Unit          | Household waste | Other than household waste | State solid waste |
|---------------|-----------------|----------------------------|-------------------|
| g/person/day  | 582             | 334                        | 916               |
| lb/person/day | 1.28            | 0.74                       | 2.02              |
| %             | 63.5            | 36.5                       | 100.0             |

(Source) Current waste flow of Chuuk

## **b. Waste Discharge**

There are two waste collection systems in Chuuk. One is a 'station' collection system using yellow garbage bins (the 'station') and the other is the horn (bell) collection system, where a collection truck drives around the town and sounds its horn to notify the public that a garbage collection is happening. For the station collection system, plastic bags are used for holding discharged waste, and placed into the large garbage bins. For the horn collection system, various containers such as plastic bags drums, trash bin (plastic, aluminum tin) and basket made of metal mesh, cardboard etc. are all used.

## **c. Waste Collection**

### **c.1 Collection system**

Although there is no designated section for SWM within the Department of Transport and Public Works (DTPW) the waste collection service is provided by DTPW as required through by-law. As of June 2018, seven personnel work on SWM in DTPW: i.e. two drivers, three collection workers for collection, and two equipment operators for landfill operation. These personnel operate waste collection systems: both the station and horn collection systems. The station collection system is used in more populous areas, where both, commercial entities and residents dispose their wastes to the 22 yellow garbage bins installed along road sides<sup>4</sup>. In less populous areas, the horn collection system is used, and functions well. Generally speaking, business entities and public institutions are satisfied with the current collection services provided by DTPW. However, significant parts of Weno Island do not receive a waste collection due to the road conditions.

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<sup>4</sup> The information is as of 2017. The exact number of yellow garbage bins might be different now.

Location map for yellow garbage bins and horn collection route are shown in below figure. In principal, collection frequency is once a week as per schedule.

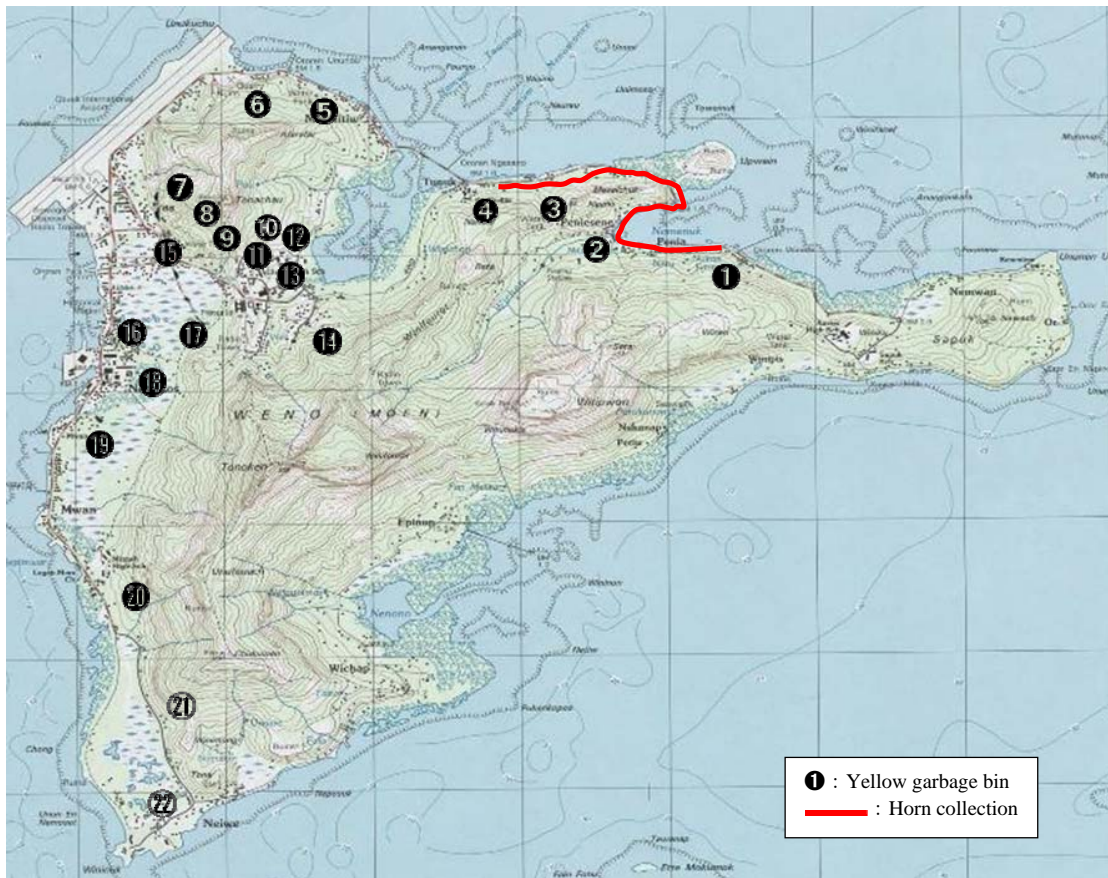


Figure 2-5 Location map for yellow garbage bins and horn collection route

### c.1 Collection vehicles and maintenance

Two used compactor trucks have been donated by the Embassy of Japan. As of June 2018, one, a 4-ton compactor truck, was damaged in an accident and is no longer used. Therefore, collection work is carried out by the single remaining 4-ton compactor truck. Two new compactor trucks (4-ton) will soon be provided by the Embassy of Japan.

### c.2 Organization and crew for collection work

Although there is no designated section for SWM within DTPW, the waste collection service is provided by DTPW. As of June 2018, seven personnel work for SWM, i.e. two drivers and three collection workers for collection and two equipment operators for landfill operation. Daily maintenance of the collection vehicle is the responsibility of the driver, and light repair is done by the DTPW mechanical workshop.

### c.3 Waste collection fee

There is no waste fee collection system in Chuuk.

|  |  |
|--|--|
|   |  |
| <p>Station collection</p>  | <p>Yellow garbage bin (station)</p>  |
|  |  |
| <p>Horn collection</p>   |  |



#### c.4 Collection coverage

Collection coverage in population is estimated as 48% in Weno based on the survey of collection routes and areas done by EPA.

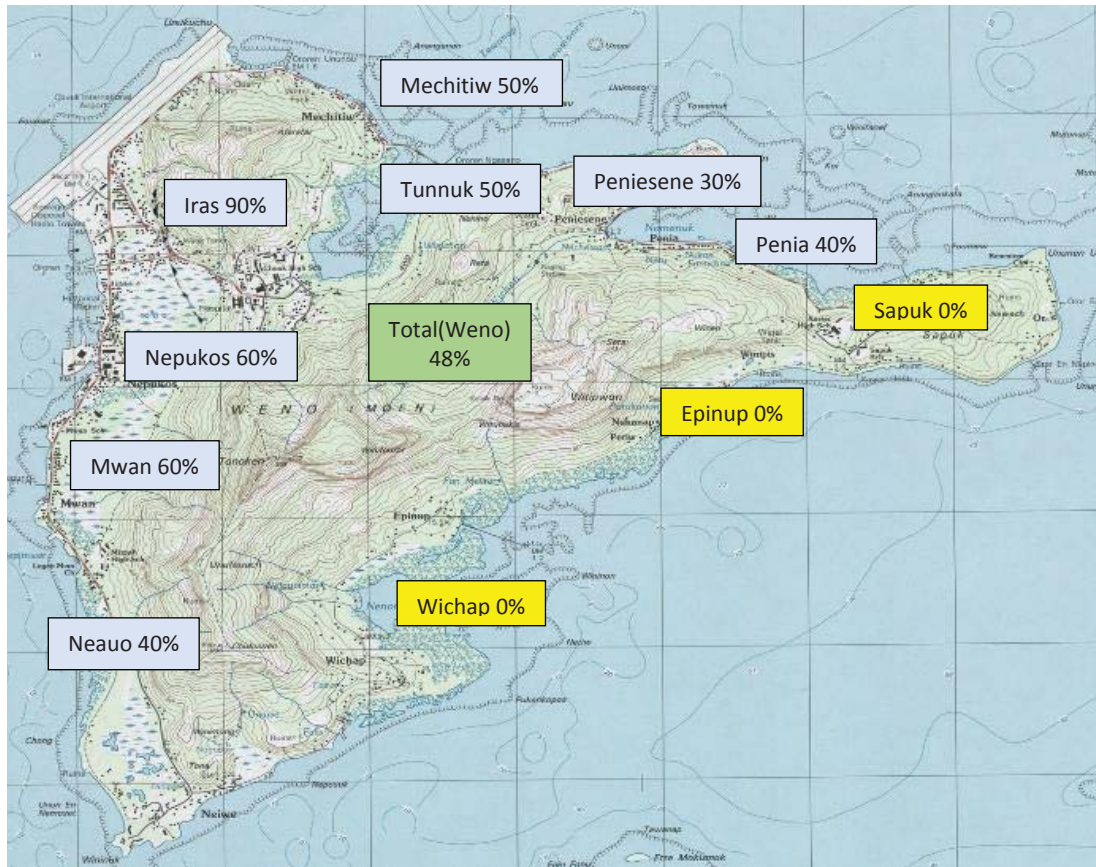


Figure 2-6 Collection coverage by village

#### d. Waste Disposal

There is a temporary disposal site called the marina dump site. While 58.3% of generated waste, which is equivalent to 77% of discharge waste, is disposed at the marina dump site, 17.6% of generated waste, which is equivalent to 23% of discharged waste, is improperly disposed to nearby open spaces.

##### d.1 Disposal/landfill site

The location and outline for three disposal/landfill sites are shown below:



- Marina interim dumpsite
- Previously-used Neouo landfill site
- A proposed New landfill site



Figure 2-7 Location of existing, old and proposed landfill sites on Weno Island

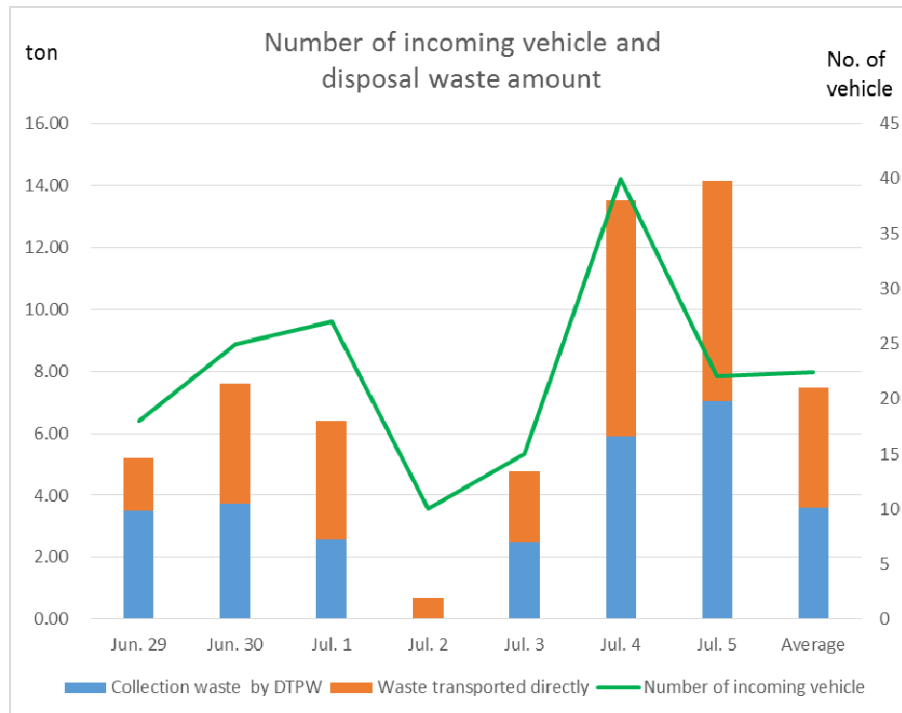
**A. Outline of sites**

| Aerial photo taken in Jun 2018   | Outline of site   |
|--|---|
|  | <p>Marina interim dumpsite</p> <ul style="list-style-type: none"> <li>• Location: Marina next to DT&amp;PW Workshop</li> <li>• Area(m2): 1,700m2</li> <li>• Operation from 2016 Jan.</li> </ul> |

|   |   |
|---|---|
|   | <p>Neouo landfill site</p> <ul style="list-style-type: none"> <li>• Location: Neouo village near sea side</li> <li>• Area(m2): 3,750 m2</li> <li>• In 2014, improvement work was carried out by JPRISM phase I, then DTPW stopped using the site at the end of 2015.</li> </ul> |
|  | <p>New landfill site</p> <ul style="list-style-type: none"> <li>• Location: Nepcos Village</li> <li>• Area(m2): 1,600 m2</li> <li>• Land was purchased in 2017 for future landfill site.</li> </ul>   |

## B. Incoming waste

The number of vehicles and amount of incoming waste to the public disposal site was surveyed and the results are shown in the figure below. The average incoming waste amount is 7.47 ton/ day, while the average number of incoming vehicles is 22 per day. The average amount of incoming waste per vehicle is 340 kg (750 lb) per vehicle. While 48% of the incoming waste is collected by DTPW, the remaining amount is directly brought onto the site by others, mainly commercial entities such as the supermarkets and hotels in Weno. Individual households rarely bring their waste directly to the disposal site, which implies that the residents who receive collection services are satisfied with the service provided by DTPW, unless they dump their wastes in the open near their houses instead.



(Source) The incoming waste survey in June 2017

Figure 2-8 Number of incoming vehicles & disposal waste amount (ton/day)

**d.2 Improper dispose (discharge)**

As revealed in the current waste flow, 17.6% of generated waste, which is equivalent to 23.2% of discharged waste, is disposed to nearby open space improperly.

**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 20.2% of generated waste at household is recycled at source, within their premises, i.e. kitchen waste used as feed to livestock or dried coconut fiber/husks as firewood.

|   |  |
|---|--|
|  |  |
| <p>On-site Recycling: Kitchen waste for feed to livestock</p>                     | <p>On-site Recycling: Coconut shell dried for firewood</p>                         |

**e.2 CDL Program**

Chuuk created CDL system in 1979 with a Truk State law, before the FSM became independent. This covered only aluminum cans containing soft drinks ('soda') and a 5¢ deposit per can applied. The State Treasury claimed an immediate 20% of the revenue, and the remaining 80% went to the Chuuk Visitor Bureau who was tasked with operating the system<sup>5</sup>. The system has been erratic in operation over the years, and last functioned around 2002.

**2.2.3 Institutional Situation of SWM**

**a. Organization for SWM**

Followings are the main roles and responsibilities of the relevant SWM organizations.

**a.1 Department of Transportation and Public Works : DTPW**

Although there is no section in charge of SWM in DTPW, as of June 2018, seven personnel in Land Transportation work for SWM, i.e. two drivers and three collection workers for collection and two equipment operators for landfill operation. In the case that the work volume exceeds the capacity of these seven staff, other DTPW staff will assist.

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<sup>5</sup> Initially, it was the Truk Environmental Action Agency that was the recycling agent.

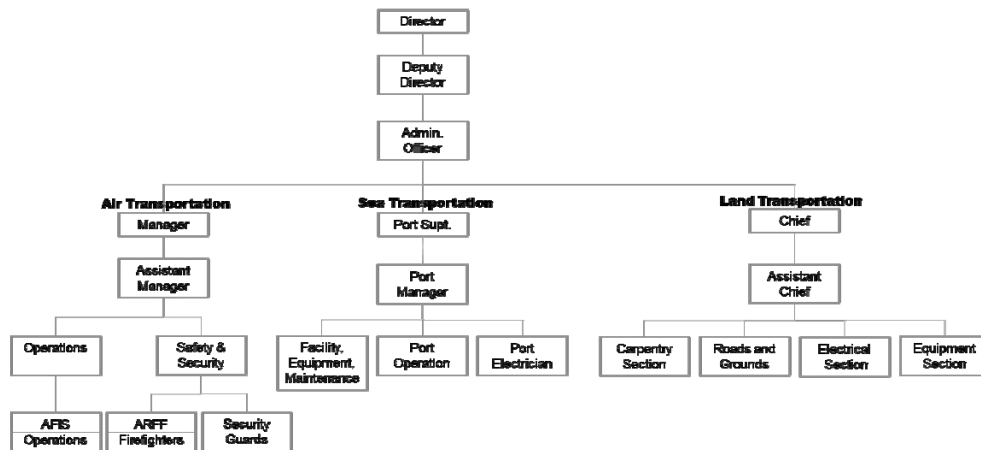


Figure 2-9 Organization chart of DTPW (Source: DTPW)

### a.2 Chuuk State Environmental Protection Agency : CSEPA

EPA is a regulatory agency. EPA regulates DTPW regarding operations of final disposal as well as waste collection. The following are the main roles on SWM by EPA:

- Formulation of laws and regulations on environment, control activities based on relevant laws and regulations;
- Environmental education ;
- Environmental monitoring (leachate quality) ;
- Formulation of Solid Waste Management Plans;
- Promoting recycling;
- Responsible agency for CDL;

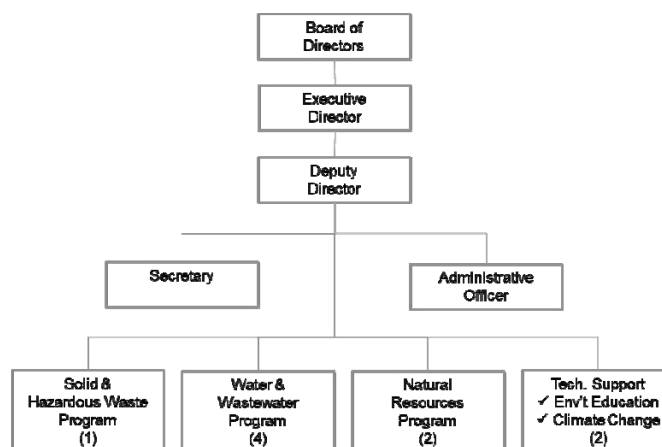


Figure 2-10 Organization chart of EPA

## b. Policies and Laws on SWM

In Chuuk, the laws relating to SWM are contained in sections of the Chuuk State Code. The details are as follows:

- **Title 21, Chapter 13** (Sanitation): Prohibits accumulation of rubbish and authorizes the Department of Health Service to issue notices of such. Requires the establishment of standards for and inspection of service establishments, food and schools. Designates September of every year as Sanitation Month in Chuuk;
- **Title 22, Chapter 1** (Chuuk State Environmental Protection Act): Establish the Environmental Protection Agency and its 5-member Board. Established the powers and duties of the EPA to control and prohibit pollution of air, land and water;
- **Title 22, Chapter 3** (Littering): Regulates littering, requires business to establish waste receptacles and requires EPA to designate “sanitary public dump sites” pursuant to environmental impact assessment with the Department of Public Works responsible for maintenance of public dump sites in the state;

## 2.2.4 Financial Situation of SWM

### a. Waste collection fee

There is no system to collect and pay waste collection fees.

### b. Expenditure for SWM and total state expenditure

According to the financial data submitted by DTPW and EPA, the total expenditure for SMW in Chuuk was estimated at around US\$ 43,138 in 2017, while total state expenditure was US\$ 39,655,860. Total disposal waste amount was 2,730 ton/year (7.48t/day x 365day), and therefore unit cost for SWM becomes US\$ 15.80 /ton (43,138 US\$ / 2,730 ton).

Table 2-5 SWM expenditure in Chuuk in FY 2017

| Item                                       | Expenditure (USD)               |
|--|---------------------------------|
| A. Total State expenditure                 | 39,655,860                      |
| B. Total expenditure for SWM               | 43,138                          |
| Ratio of SWM expenditure (B) / (A)         | 0.11%                           |
| Breakdown of expenditure for SWM           |                                 |
| 1. Waste Collection                        | 22,213                          |
| 1.1 Personnel cost                         | 18,313(2 drivers, 3 collectors) |
| 1.2 O&M (fuel, maintenance cost etc.)      | 3,900                           |
| 2. Landfill operational cost               | 20,925                          |
| 2.1 Personnel cost                         | 7,405(2 operators)              |
| 2.2 O&M cost (fuel, maintenance cost etc.) | 13,520                          |
| Total                                      | 43,138                          |

Source: State expenditure is from Fund Summary Sheet of Chuuk State Government, and breakdown of expenditure for SWM is from DTPW.

## **2.3 Major Characteristics of SWM in Chuuk**

### **2.3.1 Waste generation**

Whilst the generation rate of household waste is calculated as 582 g (1.28 lb)/person/day, the generation rate non-household waste is 334 g (0.74 lb)/person/day. By summing up these figures, the total generation rate of state solid waste, 916 g (2.02 lb)/person/day, is obtained. This rate is almost the same as those of other states of FSM.

### **2.3.2 Waste discharge**

While 31.8 % are prevented to become waste by either recycling at source or self-disposing within their premises, the remaining 68.2 % of the generated waste at household is discharged. The recycling rate, the amount of recycled waste as on-site recycling, divided by the generated amount from both households and other than household, is as high as 20.2 %, which is very good.

While as much as 77 % of the discharged waste is appropriately disposed at the public landfill site, the remaining 23 % is disposed to nearby open spaces without much environmental consideration.

### **2.3.3 Waste collection system**

DTPW have a responsibility to provide a waste collection service for Weno Island. As a whole, the proportion of households who use the collection service is only 28.1 %, partially due to the inaccessible road conditions in the southeastern part of Weno. Currently, waste collection is provided mainly in the northwestern part of Weno Island. Maintenance and management of collection vehicles are essential to maintain and raise the collection rate. Also, in order to improve collection efficiency, it is necessary to improve the waste discharge behavior of many residents.

### **2.3.4 Improper disposal**

According to the SWM baseline survey, 17.6 % of the generated waste is disposed nearby in open spaces in an inappropriate manner. This improper disposal mainly occurs in non-collection areas where collection trucks are unable to access due to the road conditions.

### **2.3.5 Recycling system based on the CDL program**

Chuuk created a CDL system in 1979 with a Truk State law, before the FSM became independent. This covered only aluminum cans containing soft drinks ('soda') and a 5¢ deposit per can applied. However, the system has been erratic in operation over the years, and last functioned around 2002. Therefore, littered cans and bottles are observed everywhere. By learning from the success of Yap and Kosrae, it is an appropriate time for Chuuk to consider re-introduction of a CDL system, which will surely contribute to reducing littering and beautifying the island.



### **2.3.6 Management of the public landfill site**

Improvement of the final disposal site in Chuuk is an urgent matter. Currently, the Marina Interim Dump site (MID) is used as a temporary site. Although a gate to control incoming vehicles is installed, management is not adequate. Operations are only during the day time. Also, due to the limited collection coverage, many shops and some of households bring their waste directly into the public landfill site. This comprises 71% of the entire incoming waste to the public landfill site. No tipping fees are imposed. As an immediate measure, previously-used Neouo landfill site is being rehabilitated to start using it again, although this is also only a medium-term solution. As for the final disposal, it is imperative to create a political consensus on the comprehensive plan, which includes (i) appropriate closure plan of MID, (ii) rehabilitation plan of Neouo landfill site and (iii) construction of the new landfill site.

### **2.3.7 Waste collection fee**

Currently, waste collection is provided mainly in the northwestern part of Weno Island, but there is no waste fee charged for this service. In order to cover the collection cost, it is necessary to consider introducing a waste fee sooner or later, probably in the latter five years of the strategy period. Consideration needs to be given as to how the fee would be collected from households and businesses.

### **2.3.8 Cost for SWM**

Total expenditure for SWM in Chuuk was estimated at 43,138US\$ in 2017. The main expenses of SWM are for (i) waste collection and transportation as well as (ii) operation and management of the disposal site. Every expenditure related to SWM is financed from the DTPW budget. Total disposal amount was 2,730 ton/year (7.48 ton/day x 365 days); thus unit cost for SWM was estimated at 15.80US\$/ton (43,138US\$ / 2,730 ton).

### **2.3.9 Institutional Settings**

DTPW is responsible for SWM, namely (i) collection and transportation of waste, (ii) operation and management of disposal site and (iii) operation and maintenance of collection vehicles, heavy equipment, etc. There is no section in charge of SWM in DTPW. As of June 2018, seven personnel in Land Transportation work for SWM, i.e. two drivers and three collection workers for collection and two equipment operators for landfill operation. In case, work volume exceeds the capacity, staff from other department will assist.

EPA will be responsible for reviewing any Environmental Impact Assessment as the construction project for a new landfill site progresses. Also, EPA will be the lead agency to realize re-introduction of any CDL system in Chuuk.

## **PART TWO: STRATEGY**

### **3 The State Solid Waste Management Strategy (SSWMS)**

The SSWMS is based on development of the CHUUK STATE SOLID WASTE MANAGEMENT PLAN (2012 to 2016) to understand the current state and different issues of waste management, and to establish a roadmap to improve solid waste management practices in Chuuk for the next ten years: from 2019 to 2028.

With support from JPRISM II, Chuuk State, along with other FSM states, is developing its strategy for the next ten years. This strategy supports the long-term goals developed within the FSM as well as the Cleaner Pacific 2025 developed by SPREP and JICA.

#### **3.1 Purpose**

The new SSWMS 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 with the aim of reaching a sustainable and truly integrated means of waste management in Chuuk State. It is also envisioned that this SSWMS 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 Chuuk State Governor.

#### **3.2 Vision**

A sustainable Chuuk State: where effective waste management practices are implemented socially, economically, and environmentally for the benefit of future generations.

#### **3.3 Scope**

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

The new SSWMS covers solid wastes generated in the household, institutional and commercial waste streams of the state, and those wastes are called State Solid Waste (SSW) in this strategy. The Strategy does not cover medical waste, hazardous waste, derelict vehicles, electrical and electronic wastes and waste oil.

#### **3.4 Guiding Principles**

**Principle 1: Establish a financially sustainable SWM system with due consideration of “Post 2023”.**

Financially speaking, the Compact Fund from the U.S. Government has been supporting the environmental sector in Chuuk. Since it is known that such financial support will end in 2023 and every government sector is expected to undergo fiscal austerity, it is important, and urgent, to start considering establishing a self-financing SWM system with due consideration of “Post-2023”. A **User-pays system**, with the introduction of collection fees and/or tipping fees is one possibility, whilst a **Public-Private Partnership (PPP)** such as contracting out further SWM-related activities to the private sector could also be another possibility.

#### **Principle 2: Waste reduction through maintaining current practice as well as by introducing CDL program**

Practices rooted in the lifestyle of the Chuukese people, such as using kitchen waste as feed to livestock and dried coconut shell as firewood, are widely observed in Chuuk. Appreciating and maintaining such practices greatly contributes to **waste reduction**. Also, introduction of a CDL program in Chuuk that prevents recyclables from going into the garbage will contribute to waste reduction.

#### **Principle 3: Emphasis on capacity development**

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

#### **Principal 4: Commitment to the clean and beautiful Pacific region**

Wastes are a grave threat to sustainable development in the Pacific Islands. Inadequate management of wastes can affect the health of Pacific communities, degrade natural ecosystems, reduce their resilience to climate change impacts, and ultimately retard the social and economic development of Pacific Island Countries and territories. Many countries and territories of the Pacific face heightened risks from the impacts of poor waste and pollution management, since their economic bases (tourism, fishing and agriculture) are heavily reliant on an environment relatively free of waste. Furthermore, many waste issues are transboundary in nature, which means that poor control and management in one country (or region) can negatively affect neighboring countries. By considering all these issues, this SSWMS is basically well aligned with the aspirations elucidated in the Pacific Regional Waste and Pollution Management Strategy (Cleaner Pacific 2025<sup>6</sup>), 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: Preparation of long-term development plan for final disposal**

In Chuuk, it is urgent and imperative to prepare a long-term development plan for final disposal sites. In the long-term development plan, the following shall be examined: i) the immediate rehabilitation of the previously-used Neouo landfill; ii) proper management of the Marina Interim Dump site (MID)

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<sup>6</sup> Cleaner Pacific 2025 is the regional SWM strategy which is formulated by SPREP and JICA. Refer to <http://www.sprep.org>

until a rehabilitated Neouo landfill starts its operation; iii) safe closure of MID after Neouo landfill starts operation and iv) preparation of a new landfill site considering the available operation period provided by the rehabilitated Neouo landfill site.

### **Issue 2: Further efforts to minimize waste**

Generally speaking, it is important for key stakeholders such as the EPA and local NGOs to increase peoples' environmental awareness through awareness raising activities to reduce waste at source. In concrete terms, introduction of a CDL program will also contribute to reduction of waste as well as a reduction in littering. By learning from the successful CDL programs of Yap and Kosrae, it is an appropriate time for Chuuk to consider introduction of a revised CDL system.

### **Issue 3: Financial sustainability with sound institutional setting**

Last but not least, financial sustainability of SWM is crucial at this juncture, given the political and economic situation faced by FSM with the ending of the US Compact funding in 2023. Key activities must be carried out with special attention to long-term financial sustainability. There are many ways to secure financial sustainability of SWM, such as privatization of certain activities and introduction of waste collection fees. Furthermore, regardless of the ways to secure financial sustainability, the responsible organization has to be identified and tasked to ensure financial sustainability.

## **3.6 Key Strategic Actions and Time Frame**

To achieve strategic targets, Action Plans targeting SWM issues have been developed, to be implemented through a step by step approach.

### **3.6.1 Key strategic actions**

The strategy consists of the following four strategic actions. These actions and their brief contents are shown as follows:

#### **1. Proper management of landfill sites**

Long-term development plan for final disposal needs to address the following:

- i. The immediate rehabilitation of the previously-used Neouo landfill site;
- ii. Proper management of the MID until the rehabilitated Neouo landfill starts operations;
- iii. Safe closure of MID after Neouo landfill starts operations;
- iv. Preparation of a new landfill site considering the operation period of Neouo landfill;
- v. Introduction of gate fees at Neouo landfill once it re-opens.

#### **2. Introduction of CDL system**

In order to re-introduce a CDL system in Chuuk, the followings steps need to be taken:

- i. Establish a legal framework: a CDL law and CDL regulations;
- ii. Establish an institutional framework;

iii. Technical preparation.

### **3. Enhancement of human capacities: Learning from experiences of other states and countries**

Chuuk is fortunate to be able to learn from others' experiences to improve their own human capacities. In concrete terms, the following support from Hachioji Municipality in Japan are expected to be provided soon:

i. Raise people's awareness on 2R (Reduce and Reuse )

2R (Reduce and Reuse) activities such as (i) reducing waste discharge by introducing compost, (ii) campaign for waste reduction in collaboration with local NGOs and (iii) promotion of reuse through organizing a "flea market".

ii. Enhance human capacities to improve waste collection

In order to improve waste collection services, activities such as (i) training on inspection and maintenance of collection vehicles (to SWM personnel), (ii) preparation of a manual for waste collection work and (iii) workshop on waste discharge manner (to residents) will be carried out.

#### **3.6.2 Time Frame**

This SSWMS covers the 10-year period from 2019 to 2028 with an Action Plan designed to be implemented for the first half of the period, 2019 to 2023. The time frame for strategic actions is shown in Table 3-1 below. The first five years (2019-2023) will be used to establish technical and institutional systems, with the second half of the strategy (2024-2028) being the period to expand and promote the established systems.

Table 3-1 Time frame to conduct strategic actions

| Activities   | Mid-term plan |      |      |      |      | Long-term plan |      |      |      |      |
|--|---------------|------|------|------|------|----------------|------|------|------|------|
|  | 2019          | 2020 | 2021 | 2022 | 2023 | 2024           | 2025 | 2026 | 2027 | 2028 |
| 1. Proper management of landfill sites   |               |      |      |      |      |                |      |      |      |      |
| 1.1 Rehabilitation of of the currently-disused Neouo landfill site   |               |      |      |      |      |                |      |      |      |      |
| 1.1.1 Preparation of rehaillitation of Neouo landfill  | ■             |      |      |      |      |                |      |      |      |      |
| 1.1.2 Rehabilitation of Neouo Landfill site  | ■             | ■    |      |      |      |                |      |      |      |      |
| 1.1.3 Proper operation and maintenance of Neouo landfill   |               | ■    | ■    | ■    | ■    | ■              |      |      |      |      |
| 1.1.4 Introduction of gate fee   |               | ■    | ■    |      |      |                |      |      |      |      |
| 1.2 Proper management of the Marina Interim Dump site (MID) until the rehabilitated Neouo landfill reopens |               |      |      |      |      |                |      |      |      |      |
| 1.2.1 Proper operation and maintenance of MID  | ■             |      |      |      |      |                |      |      |      |      |
| 1.2.2 Safe closure of MID after Neouo landfill reopens   | ■             | ■    | ■    |      |      |                |      |      |      |      |
| 1.3 Preparation of a new landfill site   |               |      |      |      |      |                |      |      |      |      |
| 1.3.1 Site selection of a new landfill site  | ■             | ■    | ■    |      |      |                |      |      |      |      |
| 1.3.2 Designing of a new landfill site   |               |      |      | ■    | ■    |                |      |      |      |      |
| 1.3.3 Construction and Operation of a new landfill site  |               |      |      |      |      | ■              | ■    | ■    | ■    | ■    |
| 2. Introduction of CDL   |               |      |      |      |      |                |      |      |      |      |
| 2.1 Establish a legal framework  | ■             |      |      |      |      |                |      |      |      |      |
| 2.2 Establish an institutional framework.  |               | ■    |      |      |      |                |      |      |      |      |
| 2.3 Technical preparation.   | ■             | ■    | ■    | ■    | ■    | ■              | ■    | ■    | ■    | ■    |
| 3. Enhancement of human capacities: Learning from experiences of other states and countries                |               |      |      |      |      |                |      |      |      |      |
| 3.1 Enhancement of 2R (Reduce, Reuse)  | ■             | ■    |      |      |      |                |      |      |      |      |
| 3.2 Improve waste collection service   | ■             | ■    |      |      |      |                |      |      |      |      |

### 3.7 Target

Numerical targets for strategic actions have been established to evaluate progress of the Action Plan.

Numerical targets for mid-term target year in 2023 and for final target year in 2028 have been established based on population projections and waste amounts (being the waste generation amount per person per day), only for the main island of Weno in Chuuk State.

#### 3.7.1 Setting future targets

Targets have been set based on the projected population and waste generation amounts, and the following strategic values:

- Recycling activities are consisted of (i) on-site recycling at generation sources, (ii) recycling by a CDL system and (iii) recycling at the landfill site. The on-site recycling amount per person per day is estimated to keep to the present figure, because the household lifestyle is not expected to change significantly during the period. On the other hand, the recycling rate by the CDL

system which is expected to be introduced into Chuuk is estimated by referring to figures obtained from on-going CDL systems in other states of the FSM.

- Collection rate is calculated by dividing the collection amount collected by DTPW by the discharged amount. Although the current collection rate is only 37%, the future collection rate is aimed to improve to 52% by 2023 and to 77% by 2028 with introduction of new compactor trucks donated by the Embassy of Japan.
- With the improvement of the collection of waste by DTPW, the rate of inappropriate discharge, and the rate of waste transported directly to landfill site by business and others, should to be reduced.

Table 3-2 Numeric targets

| Item   | Unit | 2017 | 2023 | 2028 |
|--|------|------|------|------|
| Recycling rate (to waste generation amount)                      | %    | 20   | 23   | 24   |
| Collection rate (to discharged waste amount)                     | %    | 37   | 52   | 77   |
| Rate of inappropriate discharge (to the waste generation amount) | %    | 18   | 12   | 10   |
| Rate of waste transported directly to landfill site              | %    | 52   | 22   | 7    |

Table 3-3 Planning indices

| Item                  | Unit          | 2017   | 2023   | 2028   |
|-----------------------|---------------|--------|--------|--------|
| Population            | person        | 14,008 | 14,323 | 14,605 |
| GDP Growth Rate       | %             | 0.49   | 0.69   | 0.81   |
| Waste generation rate | g/person/day  | 582    | 604    | 628    |
| - Household waste     | lb/person/day | 1.28   | 1.33   | 1.38   |
| Waste generation rate | g/person/day  | 916    | 951    | 988    |
| - SW                  | lb/person/day | 2.02   | 2.10   | 2.18   |

### 3.7.2 Future waste flow

Future waste flows are calculated based on the numerical targets for mid-term target year in 2023 and for final target year in 2028 are shown below.

Table 3-4 Estimated Future waste amount

|                       | Unit    | 2017  | 2023  | 2028  |
|-----------------------|---------|-------|-------|-------|
| Generation amount     | ton/day | 12.83 | 13.46 | 14.13 |
| Discharge amount      | ton/day | 9.74  | 9.78  | 10.22 |
| Collection amount     | ton/day | 3.60  | 5.09  | 7.87  |
| Recycle amount        | ton/day | 2.59  | 3.15  | 3.34  |
| Final disposal amount | ton/day | 7.48  | 8.11  | 8.81  |

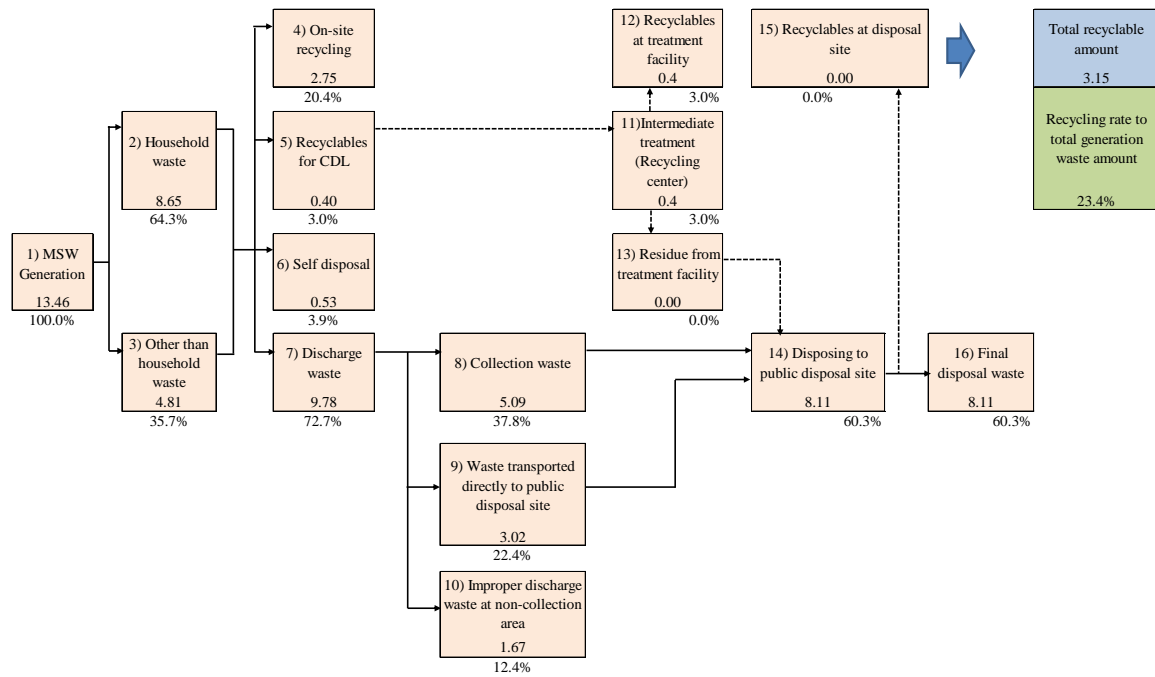


Figure 3-1 Estimated Future waste flows in 2023 (unit: ton/day)



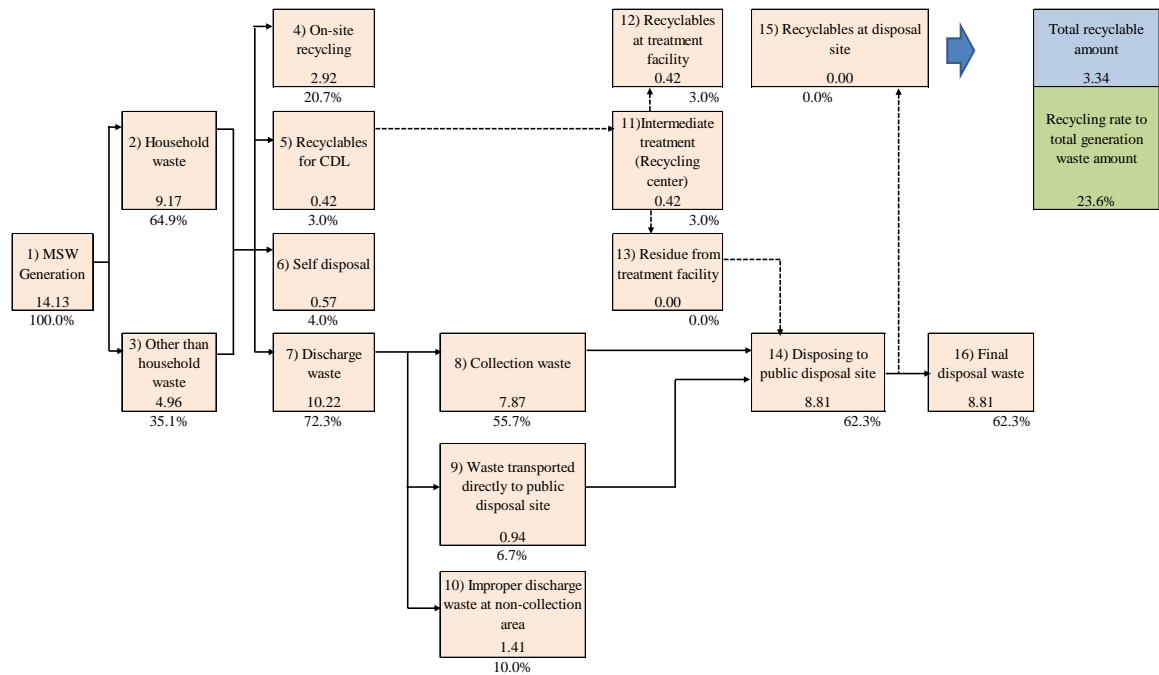


Figure 3-2 Estimated Future waste flows in 2028 (unit: ton/day)

### 3.7.3 Setting the planning indices

Planning indices used to set these targets are shown below.

#### a. Future Population

The population growth rate in Chuuk State was 0.04% per year during 2000 to 2010, based on the census data. Future population until 2028 was estimated to increase with same rate, 0.04%. As a result, population in 2013 and in 2028 are estimated to be 14,320 and 14,610 respectively.

Table 3-5 Future population estimates

|              | Census |        | Growth rates<br>2000-2010 | Present | Future estimation |        |
|--------------|--------|--------|---------------------------|---------|-------------------|--------|
|              | 2000   | 2010   |                           | 2018    | 2023              | 2028   |
| Total (Weno) | 13,802 | 13,856 | 0.04 %                    | 14,050  | 14,320            | 14,610 |
| -Iras        | 1,834  | 2,511  | 3.69%                     |         |                   |        |
| -Mechitiw    | 1,740  | 1,646  | -0.54%                    |         |                   |        |
| -Tunnuk      | 1,058  | 780    | -2.63%                    |         |                   |        |
| -Penia       | 749    | 489    | -3.47%                    |         |                   |        |
| -Peniesene   | 592    | 551    | -0.69%                    |         |                   |        |
| -Sapuk       | 1,580  | 1,197  | -2.42%                    |         |                   |        |
| -Epinup      | 363    | 333    | -0.83%                    |         |                   |        |
| -Wichap      | 1,202  | 1,233  | 0.26%                     |         |                   |        |
| -Neauo       | 1,097  | 1,385  | 2.63%                     |         |                   |        |
| -Mwan        | 1,523  | 1,417  | -0.70%                    |         |                   |        |
| -Nepukos     | 2,064  | 2,314  | 1.21%                     |         |                   |        |

**b. Future waste generation amount**

The future waste generation amount in Chuuk State was estimated using the following formula:

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

The future waste generation rate per person per day is heavily influenced by the economic conditions. The actual GDP growth rate of all of the FSM States from 2008 to 2016 published by the World Bank was used to estimate future GDP growth rate. The future waste generation rate per person per day was estimated based on the future GDP growth rate.

**b.1 Actual GDP Growth Rate**

The actual GDP growth rates published by institutions are shown in the figure below. The actual GDP growth rate published by the World Bank was used to estimate future GDP growth rate.

| Estimation Agency | 2008   | 2009  | 2010  | 2011  | 2012   | 2013   | 2014   | 2015  | 2016   |
|-------------------|--------|-------|-------|-------|--------|--------|--------|-------|--------|
| ADB               | -      | -     | -     | -     | -1.70% | -3.00% | -2.20% | 4.90% | -0.10% |
| UN                | -2.20% | 1.20% | 2.00% | 3.30% | -2.00% | -3.90% | -2.20% | 4.90% | -0.10% |
| WB                | -2.22% | 1.18% | 2.04% | 3.35% | -1.99% | -3.86% | -2.16% | 4.93% | -0.06% |

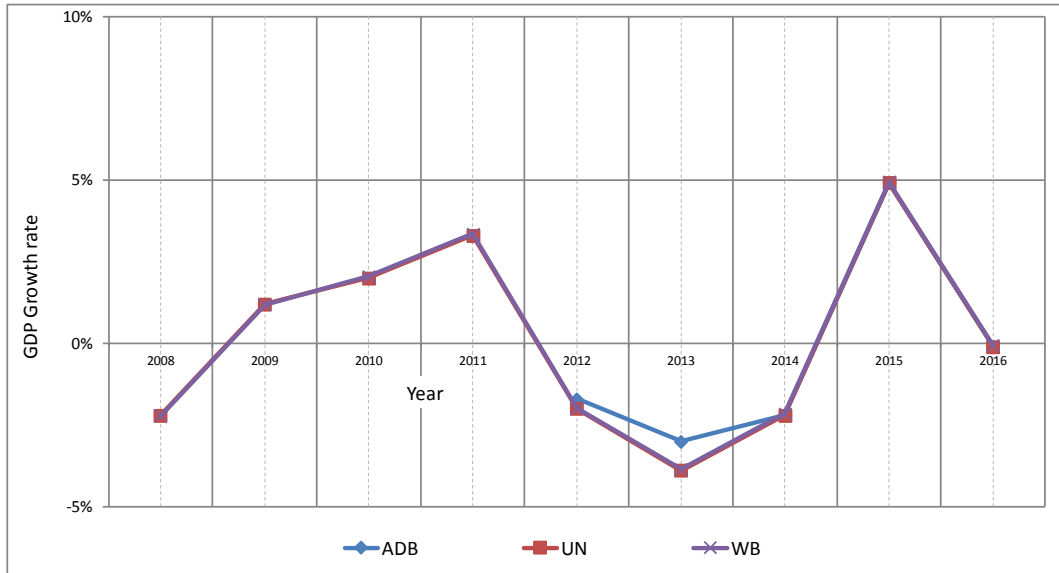
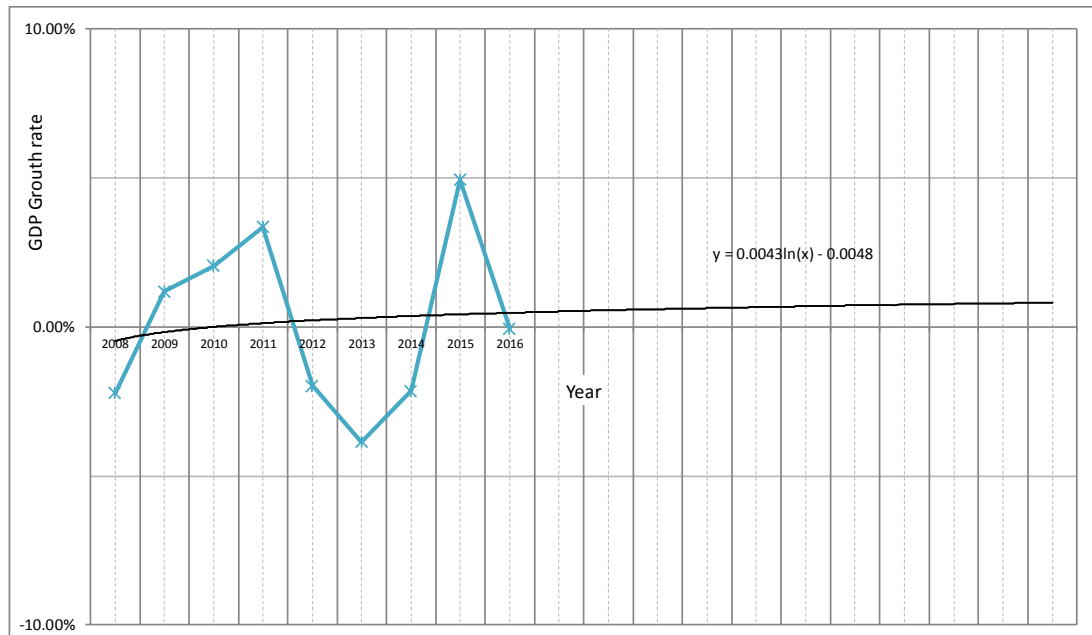


Figure 3-3 Actual GDP Growth Rate

## b.2 Estimated GDP Growth Rate

The estimate for future GDP growth rate in the FMS is shown in Figure3-4 below. GDP growth rate was estimated to be decreasing; the rate is estimated to be 0.5 % and 0.07 % in mid-term target year in 2023 and long-term target year in 2028 respectively.



|            | 2008   | 2009  | 2010  | 2011  | 2012   | 2013   | 2014   | 2015  | 2016  |
|------------|--------|-------|-------|-------|--------|--------|--------|-------|-------|
| Actual     | -2.22% | 1.18% | 2.04% | 3.35% | -1.99% | -3.86% | -2.16% | 4.93% | 0.00% |
| Projection | -      | -     | -     | -     | -      | -      | -      | -     | -     |

|            | 2017  | 2018  | 2019  | 2020  | 2021  | 2022  | 2023  | 2024  | 2025  | 2026  |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Actual     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     |
| Projection | 0.49% | 0.53% | 0.57% | 0.60% | 0.64% | 0.66% | 0.69% | 0.72% | 0.74% | 0.77% |

|            | 2027  | 2028  | 2029  | 2030  | 2031  | 2032  | 2033  | 2034  | 2035  | 2036  |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| Actual     | -     | -     | -     | -     | -     | -     | -     | -     | -     | -     |
| Projection | 0.79% | 0.81% | 0.83% | 0.85% | 0.87% | 0.88% | 0.90% | 0.92% | 0.93% | 0.95% |

Figure 3-4 Estimated GDP Growth Rate

### b.3 Waste generation rate

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

Table 3-6 Waste generation rate

| Year | Unit             | Household waste | Other than household waste | State solid waste |
|------|------------------|-----------------|----------------------------|-------------------|
| 2017 | g / person / day | 582             | 334                        | 916               |
|      | lb /person / day | 1.28            | 0.74                       | 2.02              |

### b.4 Future waste generation rate

The future waste generation rate is estimated using the following formula:

$$(\text{Waste generation rate}) \times (\text{Estimated GDP growth rate}) = \text{Future waste generation rate}$$

Future waste generation rates for the mid-term target year in 2023 and long-term target year in 2028 are shown in the table below.

Table 3-7 Future waste generation rate

| Year | Unit             | Household waste | Other than household waste | State solid waste |
|------|------------------|-----------------|----------------------------|-------------------|
| 2023 | g / person / day | 604             | 347                        | 951               |
|      | lb /person / day | 1.33            | 0.77                       | 2.10              |
| 2028 | g / person / day | 628             | 360                        | 988               |
|      | lb /person / day | 1.38            | 0.80                       | 2.18              |

## 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 for the next five years, is formulated based on the following assumptions.

### Assumptions

- Looking firmly ahead to “post-2023”, the SWM sector in Chuuk State has to relieve itself of any 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 any recurring costs, this action plan is formulated just like a **stand-alone project**.

### Title and components of the action plan

The name for the five-year action plan is ***“Action plan (Project) towards a technically appropriate and financially sustainable SWM system in Chuuk State”***.

The action plan consists of the following four components:

#### **Component 1: Proper management of landfill sites**

- The immediate rehabilitation of the previously-used Neouo landfill site;
- Proper management of the Marina Interim Dump site (MID) until Neouo landfill starts its operation;
- Safe closure of MID after Neouo landfill starts operation;
- Preparation of a new landfill site considering the operation period of Neouo landfill;
- Introduction of gate fees when Neouo landfill re-opens.

#### **Component 2: Introduction of CDL system**

#### **Component 3: Enhancement of human capacities: Learning from experiences of other states and countries**

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

## 4.1 Component1: Proper management of landfill sites

### 4.1.1 Necessary activities

Activities required to introduce proper management of landfill sites in Chuuk.

- i. The immediate rehabilitation of the previously-used Neouo landfill site;
- ii. Proper management of MID until Neouo landfill re-opens;
- iii. Safe closure of MID after Neouo landfill re-opens;
- iv. Preparation of a new landfill site considering the operation period of Neouo landfill;
- v. Introduction of gate fees when Neouo landfill starts its operation.

Table 4-1 Activities required and organizations responsible for rehabilitation of Neouo landfill site

| Activity  | Contents of activity  | Organization |      |
|---|---|--------------|------|
|   |   | EPA          | DTPW |
| <b>1.1 Rehabilitation of currently disused Neouo landfill site</b>  |   | -            | ⊙    |
| <b>1.1.1 Preparation for rehabilitation of Neouo landfill</b>   |   | -            | ⊙    |
| a. Technical preparation  | Conducting topographic survey, clarification of boundary of the land, examination of access road and surrounding environment.   | -            | ⊙    |
| b. Basic design of Landfill Site  | Basic design including layout of boundary embankment, layout of access road, leachate collection point and necessary facilities.  | -            | ⊙    |
| c. Cost estimation and Budget application   | Cost estimation based on the basic design and apply for the budget for construction   | -            | ⊙    |
| <b>1.1.2 Reahabilitation of Neouo Landfill site</b>   |   | -            | ⊙    |
| a. Upgrading of Access Road   | Upgrading access road from junction at Neive to the landfill site around 500 m including laying pipe culverts to drain the water from hillside to the mangrove side.  | -            | ⊙    |
| b. Construction of Neouo Landfill Site  | Construction of Neouo landfill site including embankment along the east and north boundary to stop rainwater to go into landfill site.  | -            | ⊙    |
| <b>1.1.3 Proper operation and maintenance of Neouo landfill</b>   |   | -            | ⊙    |
| a. Planning of landfill operation   | Landfill procedure will be planned and determined.  | -            | ⊙    |
| b. Management of incoming waste   | Incoming waste monitoring system will be planned and implemented  | -            | ⊙    |
| c. Proper operation and management of Neouo landfill site   | Operation and management will be implemented according to the plan.   | -            | ⊙    |
| d. Proper operation and maintenance of heavy equipment  | Necessary arrangement of heavy equipment such as bulldozer and excavator according to the operation plan  | -            | ⊙    |
| <b>1.1.4 Introduction of gate fee</b>   |   | -            |      |
| a. Examine gate fee collection system financially, technically and institutionally.                       | The preliminary surveys which cover the following points will be carried out; i) how much DTPW will collect in total? (=what percentage of the total SWM cost shall be covered by the gate fees?) ii) fee by car types, and/or by business-private, iii) gate management, fee collection system, and accounting system. | -            | ⊙    |
| b. Follow necessary administrative procedures to introduce the gate fee                                   | Follow necessary administrative procedures, such as prepare documents to propose gate fee, and approval from the relevant authorities, etc.   | -            | ⊙    |
| c. Establish the gate fee collection system   | The gate fee collection system, including fee categories, gate management, fee collection system, accounting system within DTPW and control of illegal dumping.   | -            | ⊙    |
| d. Disseminate the information on the gate fee collection system to residents and commence to collect it. | Notify the public on introduction of gate fees at the final disposal site through public media.   | -            | ⊙    |

**Table 4-2 Activities required and organizations responsible for proper management of Marina Interim Dump site until Neouo landfill re-opens**

| Activity  | Contents of activity  | Organization |      |
|---|---|--------------|------|
|   |   | EPA          | DTPW |
| <b>1.2 Proper management of the Marina Interim Dump site (MID) until Neouo landfill reopens</b> |   | -            | ⊙    |
| <b>1.2.1 Proper operation and maintenance of MID</b>  |   | -            | ⊙    |
| a. Closure plan for MID   | Closure plan for MID will be developed and estimation of life of usage as a landfill site.  | -            | ⊙    |
| b. Proper operation and maintenance of MID.   | Operation and maintenance according to the closure plan.  | -            | ⊙    |
| <b>1.2.2 Safe closure of MID after Neouo landfill starts operation</b>                          |   | -            | ⊙    |
| a. Closure of MID   | Closure of MID according to the Closure plan including leveling and compacting of landfill face, installation of gas extraction pipe and cover with top soil. | -            | ⊙    |

**Table 4-3 Activities required and organizations responsible for preparation of a new landfill site**

| Activity   | Contents of activity   | Organization |      |
|--|--|--------------|------|
|  |  | EPA          | DTPW |
| <b>1.3 Preparation of a new landfill site</b>                  |  | ⊙            | ⊙    |
| <b>1.3.1 Site selection of a new landfill site</b>             |  | ⊙            | -    |
| a. Propose candidate sites                                     | Propose several candidate sites in order to compare appropriate site for landfill operation.             | ⊙            | ⊙    |
| b. Basic design for the candidate sites                        | Conduct basic design to the proposed candidate sites to compare.   | ⊙            | ⊙    |
| c. Selection of a new landfill site                            | Selection of a new landfill site based on the above comparison.  | ⊙            | ⊙    |
| <b>1.3.2 Designing of a new landfill site</b>                  |  | -            | ⊙    |
| a. Design of a new landfill Site to the selected site          | Design of a new landfill site to the selected site.  | -            | ⊙    |
| b. Cost estimation based on the design                         | Cost estimation based on the design made.  | -            | ⊙    |
| c. Selection of Contractor to construct new landfill site      | Tender for selecting contractor to construct.  | -            | ⊙    |
| <b>1.3.3 Construction and Operation of a new landfill site</b> |  | -            | ⊙    |
| a. Planning of landfill operation                              | Landfill procedure will be planned and determined.   | -            | ⊙    |
| b. Management of incoming waste                                | Incoming waste monitoring system will be planned and implemented   | -            | ⊙    |
| c. Proper operation and management of new landfill site        | Operation and management will be implemented according to the plan.                                      | -            | ⊙    |
| d. Proper operation and maintenance of heavy equipment         | Necessary arrangement of heavy equipment such as bulldozer and excavator according to the operation plan | -            | ⊙    |

⊙: Responsible organization, ○: Supporting organization



#### 4.1.2 Implementation schedule

The implementation schedule for these landfill site activities is shown below.

Table 4-4 Schedule for rehabilitation of Neouo landfill site

|   | FY2019 |    |    |    | FY2020 |    |    |    | FY2021 |    |    |    | FY2022 |    |    |    | FY2023 |    |    |    |
|---|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|
|   | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 |
| <b>1.1 Rehabilitation of the currently disused Neouo landfill site</b>                                    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>1.1.1 Preparation of rehabilitation of Neouo landfill</b>  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Technical preparation  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Basic design of Landfill Site  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| c. Cost estimation and Budget application   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>1.1.2 Rehabilitation of Neouo Landfill site</b>  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Upgrading of Access Road   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Construction of Neouo Landfill Site  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>1.1.3 Proper operation and maintenance of Neouo landfill</b>   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Planning of landfill operation   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Management of incoming waste   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| c. Proper operation and management of Neouo landfill site   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| d. Proper operation and maintenance of heavy equipment  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>1.1.4 Introduction of gate fee</b>   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Examine gate fee collection system financially, technically and institutionally.                       |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Follow necessary administrative procedures to introduce the gate fee                                   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| c. Establish the gate fee collection system   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| d. Disseminate the information on the gate fee collection system to residents and commence to collect it. |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |

Table 4-5 Schedule for proper management of Marina Interim Dump until Neouo landfill re-opens

|   | FY2019 |    |    |    | FY2020 |    |    |    | FY2021 |    |    |    | FY2022 |    |    |    | FY2023 |    |    |    |
|---|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|
|   | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 |
| <b>1.2 Proper management of the Marina Interim Dump site (MID) until Neouo landfill reopens</b> |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>1.2.1 Proper operation and maintenance of MID</b>  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Closure plan for MID   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Proper operation and maintenance of MID.   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>1.2.2 Safe closure of MID after Neouo landfill starts operation</b>                          |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Closure of MID   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |

Table 4-6 Schedule for preparation of a new landfill site

|  | FY2019 |    |    |    | FY2020 |    |    |    | FY2021 |    |    |    | FY2022 |    |    |    | FY2023 |    |    |    |
|--|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|
|  | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 |
| <b>1.3 Preparation of a new landfill site</b>                  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>1.3.1 Site selection of a new landfill site</b>             |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Propose candidate sites                                     |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Basic design for the candidate sites                        |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| c. Selection of a new landfill site                            |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>1.3.2 Designing of a new landfill site</b>                  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Design of a new landfill Site to the selected site          |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Cost estimation based on the design                         |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| c. Selection of Contractor to construct new landfill site      |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>1.3.3 Construction and Operation of a new landfill site</b> |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Planning of landfill operation                              |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Management of incoming waste                                |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| c. Proper operation and management of new landfill site        |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| d. Proper operation and maintenance of heavy equipment         |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |

#### 4.1.3 Implementation Budget

Budget estimates for proper management of landfill sites are follows:

- Personnel cost: operation of landfill sites;
- OM cost: operation of landfill sites;
- Construction and treatment cost: rehabilitation of Neouo, construction of MID for closing;
- Purchase of equipment/machinery, including spare parts for heavy equipment;
- Design and printing cost for materials for the EIA.

The budget required to implement this component is shown in the table below. The cost was estimated at US\$0.94 million for five years.

Table 4-7 Budget for rehabilitation of Neouo landfill site (US\$)

|  | FY2019         | FY2020         | FY2021         | FY2022         | FY2023         | Total          |
|--|----------------|----------------|----------------|----------------|----------------|----------------|
| a. Personnel cost                        | 61,992         | 99,138         | 154,080        | 96,696         | 82,368         | 494,274        |
| b. Transportation expenses               | 625            | 996            | 1,548          | 972            | 828            | 4,969          |
| c. Construction and treatment cost       | 87,500         | 0              | 0              | 0              | 0              | 87,500         |
| d. Purchase of equipment/machinery       | 0              | 0              | 0              | 0              | 0              | 0              |
| e. Operation cost                        | 0              | 36,000         | 36,000         | 36,000         | 36,000         | 144,000        |
| f. Design and printing cost for material | 40,000         | 0              | 0              | 0              | 0              | 40,000         |
| <b>Total</b>                             | <b>190,117</b> | <b>136,134</b> | <b>191,628</b> | <b>133,668</b> | <b>119,196</b> | <b>770,743</b> |

Table 4-8 Budget for management of Marina interim dump until Neouo landfill re-opens (US\$)

|  | FY2019 | FY2020 | FY2021 | FY2022 | FY2023 | Total   |
|--|--------|--------|--------|--------|--------|---------|
| a. Personnel cost                        | 34,671 | 24,795 | 35,856 | 0      | 0      | 95,322  |
| b. Transportation expenses               | 348    | 249    | 360    | 0      | 0      | 957     |
| c. Construction and treatment cost       | 0      | 44,000 | 0      | 0      | 0      | 44,000  |
| d. Purchase of equipment/machinery       | 0      | 0      | 0      | 0      | 0      | 0       |
| e. Operation cost                        | 24,000 | 0      | 0      | 0      | 0      | 24,000  |
| f. Design and printing cost for material | 0      | 0      | 0      | 0      | 0      | 0       |
| Total                                    | 59,019 | 69,044 | 36,216 | 0      | 0      | 164,279 |

Table 4-9 Budget for preparation of a new landfill site (US\$)

|  | FY2019 | FY2020 | FY2021 | FY2022 | FY2023 | Total   |
|--|--------|--------|--------|--------|--------|---------|
| a. Personnel cost                        | 11,118 | 12,795 | 23,856 | 52,632 | 95,712 | 196,113 |
| b. Transportation expenses               | 113    | 129    | 240    | 528    | 480    | 1,490   |
| c. Construction and treatment cost       | 0      | 0      | 0      | 0      | 0      | 0       |
| d. Purchase of equipment/machinery       | 0      | 0      | 0      | 0      | 0      | 0       |
| e. Operation cost                        | 0      | 0      | 0      | 0      | 0      | 0       |
| f. Design and printing cost for material | 0      | 0      | 60,000 | 0      | 0      | 60,000  |
| Total                                    | 11,231 | 12,924 | 84,096 | 53,160 | 96,192 | 257,603 |

Table 4-10 Budget for proper management of landfill sites (US\$)

|  | FY2019  | FY2020  | FY2021  | FY2022  | FY2023  | Total     |
|--|---------|---------|---------|---------|---------|-----------|
| a. Personnel cost                        | 107,781 | 136,728 | 213,792 | 149,328 | 178,080 | 785,709   |
| b. Transportation expenses               | 1,086   | 1,374   | 2,148   | 1,500   | 1,308   | 7,416     |
| c. Construction and treatment cost       | 87,500  | 44,000  | 0       | 0       | 0       | 131,500   |
| d. Purchase of equipment/machinery       | 0       | 0       | 0       | 0       | 0       | 0         |
| e. Operation cost                        | 24,000  | 36,000  | 36,000  | 36,000  | 36,000  | 168,000   |
| f. Design and printing cost for material | 40,000  | 0       | 60,000  | 0       | 0       | 100,000   |
| Total                                    | 260,367 | 218,102 | 311,940 | 186,828 | 215,388 | 1,192,625 |

## 4.2 Component 2: Introduction of CDL system

### 4.2.1 Necessary activities

In order to re-introduce a CDL system in Chuuk, a legal framework, as well as an institutional

framework, must be put in place along with necessary technical preparations. The detailed activities are shown in the table below.

Table 4-11 Implementation Activities and organizations responsible for introducing CDL

| Activity   | Contents of activity   | Organization |      |
|--|--|--------------|------|
|  |  | EPA          | DTPW |
| <b>2.1 Establish a legal framework</b>   |  | ⊙            | -    |
| 2.1.1 Prepare amendment to the act and regulation of CDL.                                    | Prepare (i) CDL Law (amendment) and (ii) CDL regulations   | ⊙            | -    |
| 2.1.2 Submit draft act and regulation to the relevant authorities, and approval.             | (i) Submit CDL Law to AG. for review, then the Governor present at the Legislature for adoption. (ii) Submit CDL regulations to AG, the Governor, all the relevant organizational for 30-day review. Also public hearing may need it.      | ⊙            | -    |
| <b>2.2 Establish an institutional framework.</b>   |  | ⊙            | -    |
| 2.2.1 Selection of an operator (recycler) and establishment of contractual system            | A private operator shall be chosen. Then the EPA shall make a contract with this private operator to run the recycling activities.   | ⊙            | -    |
| 2.2.2 Establishment of deposit, refund and financial management system                       | (i) Deposit collection system at the customs, (ii) Refund system to customers and (iii) claim system from recycling operator to the Dept. of Finance shall be in place in time.  | ⊙            | -    |
| 2.2.3 Establishment of recording and monitoring system                                       | All the financial transactions as well as the activities of recycling operator (no# of items sold etc.) shall be recorded and monitored by EPA.  | ⊙            | -    |
| <b>2.3 Technical preparation.</b>  |  | ⊙            | -    |
| 2.3.1 Provision of training to finance officers, custom officers and the recycling operator. | Training (i) to finance officers, how to handle the claim sheet submitted by the recycling agent, (ii) to custom officers, how to and what to impose deposits and (iii) to recycling operator, how to claim the money to the finance dept. | ⊙            | -    |
| 2.3.2 Preparation of initial capital at the special revenue fund                             | Estimate the initial capital needed (approximately, US\$200,000) and persuade political leaders to secure the money. Securing this capital is prerequisite to start CDL.   | ⊙            | -    |
| 2.3.3 Find source of funds to purchase a equipment.  | Prepare the proposal to several fund sources, such as EOJ, as soon as possible. Installation of equipment is also an important prerequisite to start CDL.  | ⊙            | -    |
| 2.3.4 Procurement of recycling equipment   | After approval from any fund sources, procure the equipment.   | ⊙            | -    |
| 2.3.5 preparation of space for recycling activities  | Vacate the warehouse at the marina interim dump site for recycling activities  | ⊙            | -    |
| 2.3.6 Awareness raising activities for importers as well as customers                        | Inform importers how CDL functions as well as how to and what items to be deposited. Also inform residents how to get their refunds back.  | ⊙            | -    |

⊙: Responsible organization, ○: Supporting organization

#### 4.2.2 Implementation schedule

As seen in the schedule below, establishing a legal framework is the first step. An equally important activity is to find funding for, and procure, recycling equipment. These two activities are expected to start as soon as the first quarter of FY2019.

Table 4-12 Schedule for introduction of a CDL system

|  | FY2019 |    |    |    | FY2020 |    |    |    | FY2021 |    |    |    | FY2022 |    |    |    | FY2023 |    |    |    |
|--|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|
|  | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 |
| <b>2.1 Establish a legal framework</b>   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.1.1 Prepare amendment to the act and regulation of CDL.                                    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.1.2 Submit draft act and regulation to the relevant authorities, and approval.             |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>2.2 Establish an institutional framework.</b>   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.2.1 Selection of an operator (recycler) and establishment of contractual system            |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.2.2 Establishment of deposit, refund and financial management system                       |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.2.3 Establishment of recording and monitoring system                                       |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>2.3 Technical preparation.</b>  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.3.1 Provision of training to finance officers, custom officers and the recycling operator. |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.3.2 Preparation of initial capital at the special revenue fund                             |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.3.3 Find source of funds to purchase a equipment.  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.3.4 Procurement of recycling equipment   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.3.5 preparation of space for recycling activities  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| 2.3.6 Awareness raising activities for importers as well as customers                        |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |

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

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

#### 4.2.3 Implementation Budget

The main budget items for the introduction of a CDL system are follows:

- Personnel cost: preparation for CDL;
- OM cost: fund for initial capital;
- Construction and treatment cost: Construction of Materials Recovery Facility;
- Purchase of equipment/machinery: Press machine for material targeted by the CDL system
- Design and printing cost for material for public awareness;

The budget estimated to be required to implement this component is shown in the table below. The cost was estimated at US\$1.16 million for five years.

Table 4-13 Budget for the introduction of a CDL system (US\$)

|  | FY2019  | FY2020  | FY2021 | FY2022 | FY2023 | Total   |
|--|---------|---------|--------|--------|--------|---------|
| a. Personnel cost                        | 60,740  | 62,064  | 25,956 | 28,632 | 23,856 | 201,248 |
| b. Transportation expenses               | 613     | 624     | 261    | 288    | 240    | 2,026   |
| c. Construction and treatment cost       | 0       | 200,000 | 0      | 0      | 0      | 200,000 |
| d. Purchase of equipment/machinery       | 200,000 | 0       | 0      | 0      | 0      | 200,000 |
| e. Operation cost                        | 0       | 100,000 | 0      | 0      | 0      | 100,000 |
| f. Design and printing cost for material | 0       | 15,000  | 0      | 0      | 0      | 15,000  |
| Total                                    | 261,353 | 377,688 | 26,217 | 28,920 | 24,096 | 718,274 |

### 4.3 Component 3: Enhancement of human capacities: Learning from experiences of other states and countries

#### 4.3.1 Necessary activities

Human capacities are enhanced through learning from the experiences of other states and countries. Both i) 2R (Reduce, Reuse) and ii) Improvement of waste collection services are areas where Chuuk can learn from others to improve the current situation.

##### i. Enhancement of 2R (Reduce, Reuse)

2R (Reduce and Reuse) activities such as (i) reducing waste discharge by introducing composting as a household activity; (ii) a campaign for waste reduction in collaboration with local NGOs, and (iii) promotion of reuse through organizing a “flea market” will be carried out.

##### ii. Improve waste collection service

In order to improve waste collection services, activities such as (i) training on inspection and maintenance of collection vehicles (to SWM personnel), (ii) preparation of a manual for waste collection work and (iii) workshop on waste discharge manner (to residents) will be carried out.

Table 4-14 Activities and organizations responsible for the Enhancement of 2R (Reduce, Reuse)

| Activity   | Contents of activity   | Organization |      |     |          |
|--|--|--------------|------|-----|----------|
|  |  | EPA          | DTPW | CWC | Hachioji |
| <b>3.1 Enhancement of 2R (Reduce, Reuse)</b>               |  |              |      |     |          |
| <b>3.1.1 Disseminate awareness for 2R</b>                  |  |              |      |     |          |
| a. Assess the current situation of 2R (Reduce and Reuse) . | i) Discuss the questionnaire survey on 2R activities. Select samples and decide who carries out, ii) Implementation of 2R iii) Summarize the result of the questionnaire survey and compile as a report. | ◎            | -    | ○   | ○        |

|   |  |   |   |   |   |
|---|--|---|---|---|---|
| b. Hold workshop for 2R at communities and schools.   | Review the contents of workshops and organize workshops  | ⊙ | - | ○ | ⊙ |
| c. Produce and distribute educational leaflets and original shopping bags.                              | i) Examine the contents of educational materials, ii) Design the leaflet, print and distribute them, iii) Produce "My Bags" and distribute them.   | ⊙ | - | ⊙ | ○ |
| d. Hold flea market.  | (i) Consider an appropriate implementation system of flea market in collaboration with other stakeholders, (ii) Decide place and date, iii) Notify the residents and the relevant organizations, and iv) monitor the implementation. | ⊙ | - | ⊙ | ○ |
| e. Effort to promote reduction of plastic shopping bags (friendly-greeting campaign and cash-back etc.) | Exchange of opinions with related business sectors. Examination of the method to reduce shopping bag in cooperation with business sectors.   | ⊙ | - | ⊙ | ○ |
| <b>3.1.2 Install organic waste disposal unit</b>  |  |   |   |   |   |
| a. Select places to install organic waste disposal units  | Confirm the conditions to select locations to install organic waste disposal units, and the procedure to install.  | ⊙ | - | - | ○ |
| b. Instruct residents how to use organic waste disposal units.  | Install sign boards stating how to use the units and notify it to the residents.   | ⊙ | - | - | ○ |
| c. Monitor usage of organic waste disposal units.   | i) Examine what to and how to monitor the use, ii) compile the monitoring results and analyze them for improvement.  | ⊙ | - | - | ○ |
| d. Propose organic waste disposal units which are able to be produced by locally available materials.   | Experiment an organic disposal units made out of locally available materials with EPA.   | ⊙ | - | - | ○ |

⊙: Responsible organization, ○: Supporting organization

Table 4-15 Contents and organizations in charge for Improve waste collection service

| Activity   | Contents of activity   | Organization |      |     |          |
|--|--|--------------|------|-----|----------|
|  |  | EPA          | DTPW | CWC | Hachioji |
| <b>3.2 Improvement of waste collection service</b>   |  |              |      |     |          |
| <b>3.2.1 Improvement of waste collection service</b>   |  |              |      |     |          |
| a. Carry out on-site investigations to collection works (i.e. time and motion survey) and instructs collection workers to improve collection work. | Implement T&M survey. Identify critical issues on collection work and share them.                      | ○            | ⊙    | -   | ⊙        |
| b. Hold workshop for waste discharge manner  | Organize workshops to share the knowledge on how to improve waste discharge as well as its collection. | ○            | ⊙    | -   | ⊙        |
| c. Conduct training to local staffs for inspection and maintenance of collection vehicle.  | Implement training on inspection and maintenance of collection vehicles.                               | -            | ⊙    | -   | ⊙        |

|  |   |   |   |   |   |
|--|---|---|---|---|---|
| d. Prepare manual for waste collection work and verifies whether collection work is implemented according to the manual. | Conduct training in Japan. Procure a manual on waste collection, and train workers to follow the manual. Monitor their works.   | - | ◎ | - | ◎ |
| <b>3.2.2 Rehabilitation of yellow garbage bins (stations)</b>  |   |   |   |   |   |
| a. Investigate condition and installation location of bins (stations)  | DTPW along with EPA will conduct survey on the current conditions of yellow collection bins (stations) and the appropriateness of their locations. Prepare a list of locations necessary to install bins as well as stations which need repair. | ○ | ◎ | - | - |
| b. Find source of funds to repaired and manufacture  | According to the list prepared under the activity 4.2.1, estimate cost necessary to repair and new installation. EPA shall take initiatives to find a donor or funds.   | ○ | ◎ | - | - |
| c. Repair, manufacture and install bins (stations).  | Repair and fabricate bins (stations) and install them.  | ○ | ◎ | - | - |

◎: Responsible organization, ○: Supporting organization

#### 4.3.2 Implementation schedule

As seen in the schedule below, this component is a two year activity. Based on the development of the existing human capacities, 2R and an improvement of collection service can be expected

Table 4-16 Schedule for Enhancement of 2R (Reduce, Reuse)

|   | FY2019 |    |    |    | FY2020 |    |    |    | FY2021 |    |    |    | FY2022 |    |    |    | FY2023 |    |    |    |
|---|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|
|   | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 |
| <b>3.1 Enhancement of 2R (Reduce, Reuse)</b>  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>3.1.1 Disseminate awareness for 2R</b>   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Assess the current situation of 2R (Reduce and Reuse) .  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Hold workshop for 2R at communities and schools.   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| c. Produce and distribute educational leaflets and original shopping bags.                              |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| d. Hold flea market.  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| e. Effort to promote reduction of plastic shopping bags (friendly-greeting campaign and cash-back etc.) |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>3.1.2 Install organic waste disposal unit</b>  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Select places to install organic waste disposal units  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Instruct residents how to use organic waste disposal units.  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| c. Monitor usage of organic waste disposal units.   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| d. Propose organic waste disposal units which are able to be produced by locally available materials.   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |



Table 4-17 Schedule for improvement of the waste collection service

|  | FY2019 |    |    |    | FY2020 |    |    |    | FY2021 |    |    |    | FY2022 |    |    |    | FY2023 |    |    |    |
|--|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|--------|----|----|----|
|  | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 | Q1     | Q2 | Q3 | Q4 |
| <b>3.2 Improvement of waste collection service</b>   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>3.2.1 Improvement of waste collection service</b>   |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Carry out on-site investigations to collection works (i.e. time and motion survey) and instructs collection workers to improve collection work. |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Hold workshop for waste discharge manner  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| c. Conduct training to local staffs for inspection and maintenance of collection vehicle.  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| d. Prepare manual for waste collection work and verifies whether collection work is implemented according to the manual.                           |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| <b>3.2.2 Rehabilitation of yellow garbage bins (stations)</b>  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| a. Investigate condition and installation location of bins (stations)  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| b. Find source of funds to repaired and manufacture  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |
| c. Repair, manufacture and install bins (stations).  |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |        |    |    |    |

\*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

Main budget items for the Enhancement of 2R are as follows:

- Personnel cost: training for workers etc.;
- Purchase of equipment/machinery: repair and purchase of Yellow bins.

The budget required to implement this component is shown in the table below. The cost was estimated at US\$0.17 million for five years.

Table 4-18 Cost for Enhancement of human capacities: Learning from experiences of other states and countries (US\$)

|  | FY2019         | FY2020        | FY2021   | FY2022   | FY2023   | Total          |
|--|----------------|---------------|----------|----------|----------|----------------|
| a. Personnel cost                        | 104,136        | 37,335        | 0        | 0        | 0        | 141,471        |
| b. Transportation expenses               | 1,057          | 375           | 0        | 0        | 0        | 1,432          |
| c. Construction and treatment cost       | 0              | 0             | 0        | 0        | 0        | 0              |
| d. Purchase of equipment/machinery       | 30,000         | 0             | 0        | 0        | 0        | 30,000         |
| e. Operation cost                        | 0              | 0             | 0        | 0        | 0        | 0              |
| f. Design and printing cost for material | 0              | 0             | 0        | 0        | 0        | 0              |
| <b>Total</b>                             | <b>135,193</b> | <b>37,710</b> | <b>0</b> | <b>0</b> | <b>0</b> | <b>172,903</b> |

#### 4.4 The Action Plan (The Project)

##### 4.4.1 Schedule of the Action Plan (The Project)

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

Table 4-19 Entire Project Schedule

| Activities   | Mid-term plan |      |      |      |      |
|--|---------------|------|------|------|------|
|  | 2019          | 2020 | 2021 | 2022 | 2023 |
| 1. Proper management of landfill sites   |               |      |      |      |      |
| 1.1 Rehabilitation of of the currently-disused Neoue landfill site   |               |      |      |      |      |
| 1.1.1 Preparation of rehailitation of Neouo landfill   | ■             |      |      |      |      |
| 1.1.2 Rehabilitation of Neouo Landfill site  | ■             | ■    |      |      |      |
| 1.1.3 Proper operation and maintenance of Neouo landfill   |               | ■    | ■    | ■    | ■    |
| 1.1.4 Introduction of gate fee   |               | ■    | ■    |      |      |
| 1.2 Proper management of the Marina Interim Dump site (MID) until the rehabilitated Neouo landfill reopens |               |      |      |      |      |
| 1.2.1 Proper operation and maintenance of MID  | ■             |      |      |      |      |
| 1.2.2 Safe closure of MID after Neouo landfill reopens   | ■             | ■    | ■    |      |      |
| 1.3 Preparation of a new landfill site   |               |      |      |      |      |
| 1.3.1 Site selection of a new landfill site  | ■             | ■    | ■    |      |      |
| 1.3.2 Designing of a new landfill site   |               |      |      | ■    | ■    |
| 1.3.3 Construction and Operation of a new landfill site  |               |      |      |      |      |
| 2. Introduction of CDL   |               |      |      |      |      |
| 2.1 Establish a legal framework  | ■             |      |      |      |      |
| 2.2 Establish an institutional framework.  |               | ■    |      |      |      |
| 2.3 Technical preparation.   | ■             | ■    | ■    | ■    | ■    |
| 3. Enhancement of human capacities: Learning from experiences of other states and countries                |               |      |      |      |      |
| 3.1 Enhancement of 2R (Reduce, Reuse)  | ■             | ■    |      |      |      |
| 3.2 Improve waste collection service   | ■             | ■    |      |      |      |

##### 4.4.2 Cost of the Action Plan (The Project)

Main budget items for the Project are shown in the table below.

Table 4-20 List of estimated cost of main items by each component

| Components   | Personnel cost  | OM cost   | Construction and treatment cost   | Parches cost for Machinery and equipment   | Design and printing cost for material                                   |
|--|---|---|---|--|---|
| Component1: Proper management of landfill sites  | <ul style="list-style-type: none"> <li>operation of landfill sites</li> </ul> | <ul style="list-style-type: none"> <li>operation of landfill sites</li> </ul> | <ul style="list-style-type: none"> <li>rehabilitation of previously-used Neouo,</li> <li>construction of MID for closing</li> </ul> | <ul style="list-style-type: none"> <li>spare parts for heavy equipment</li> </ul>                | <ul style="list-style-type: none"> <li>EIA</li> </ul>                   |
| Component2: Introduction of CDL system   | <ul style="list-style-type: none"> <li>preparation for CDL</li> </ul>         | <ul style="list-style-type: none"> <li>fund for initial capital</li> </ul>    | <ul style="list-style-type: none"> <li>Construction of MRF</li> </ul>   | <ul style="list-style-type: none"> <li>Press machine for material targeted CLD system</li> </ul> | <ul style="list-style-type: none"> <li>Leaflet for awareness</li> </ul> |
| Component3: Enhancement of human capacities: Learning from experiences of other states and countries | <ul style="list-style-type: none"> <li>Training for workers</li> </ul>        | -   | -   | <ul style="list-style-type: none"> <li>repair and purchase of Yellow bins</li> </ul>             | -   |

Cost required to implement the Project is shown in the table below. The entire project cost was estimated at US\$2.08 million for five years.

Table 4-21 Estimated project cost by component (US\$)

|  | FY2019  | FY2020  | FY2021  | FY2022  | FY2023  | Total     |
|--|---------|---------|---------|---------|---------|-----------|
| Component 1: Proper management of landfill site  | 260,367 | 218,102 | 311,940 | 186,828 | 215,388 | 1,192,625 |
| 1.1 Development of previously-used Neoue landfill site   | 190,117 | 136,134 | 191,628 | 133,668 | 119,196 | 770,743   |
| 1.2 Proper management of Marina interim dump (MID) until Neouo landfill starts its operation         | 59,019  | 69,044  | 36,216  | 0       | 0       | 164,279   |
| 1.3 Preparation of a new landfill site   | 11,231  | 12,924  | 84,096  | 53,160  | 96,192  | 257,603   |
| Component 2: Introduction of CDL.  | 261,353 | 377,688 | 26,217  | 28,920  | 24,096  | 718,274   |
| Component3: Enhancement of human capacities: Learning from experiences of other states and countries | 135,193 | 37,710  | 0       | 0       | 0       | 172,903   |
| Total  | 656,913 | 633,500 | 338,157 | 215,748 | 239,484 | 2,083,802 |

Table 4-22 Estimated project cost by expense item (US\$)

|  | FY2019  | FY2020  | FY2021  | FY2022  | FY2023  | Total     |
|--|---------|---------|---------|---------|---------|-----------|
| a. Personnel cost                        | 272,657 | 236,127 | 239,748 | 177,960 | 201,936 | 1,128,428 |
| b. Transportation expenses               | 2,756   | 2,373   | 2,409   | 1,788   | 1,548   | 10,874    |
| c. Construction and treatment cost       | 87,500  | 244,000 | 0       | 0       | 0       | 331,500   |
| d. Purchase of equipment/machinery       | 230,000 | 0       | 0       | 0       | 0       | 230,000   |
| e. Operation cost                        | 24,000  | 136,000 | 36,000  | 36,000  | 36,000  | 268,000   |
| f. Design and printing cost for material | 40,000  | 15,000  | 60,000  | 0       | 0       | 115,000   |
| Total                                    | 656,913 | 633,500 | 338,157 | 215,748 | 239,484 | 2,083,802 |

## **5 Annual Work Program**

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

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

Draft AWP's for FY 2019 are attached at Annex 2.

Form for Annual Work Program (FY )

| <b>Title: Action plan towards technically appropriate and financially sustainable SWM system in Chuuk State</b>   |            |
|---|------------|
| Implementation Activity   | Cost(US\$) |
| <p><b>Component 1: Proper management of landfill site</b><br/>Mainly the following activities/works will be implemented;</p>  |            |
| <p><b>Component 2: Introduction of CDL .</b><br/>Mainly the following activities/works will be implemented;</p>   |            |
| <p><b>Component3: Enhancement of human capacities: Learning from experiences of other states and countries</b><br/>Mainly the following activities/works will be implemented;</p> |            |
| <b>Total</b>  |            |

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

| Component/Activity  | Contents | FY2019 |      |      |      |      |      |      |     |      |      |      |      | Remarks |  |  |  |
|---|----------|--------|------|------|------|------|------|------|-----|------|------|------|------|---------|--|--|--|
|   |          | Q1     |      |      | Q2   |      |      | Q3   |     |      | Q4   |      |      |         |  |  |  |
|   |          | Oct.   | Nov. | Dec. | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. |         |  |  |  |
| <b>Component 1: Proper management of landfill site</b>  |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
|   |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
|   |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
|   |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
| <b>Component 2: Introduction of CDL.</b>  |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
|   |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
|   |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
|   |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
| <b>Component3: Enhancement of human capacities: Learning from experiences of other states and countries</b> |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
|   |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
|   |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |
|   |          |        |      |      |      |      |      |      |     |      |      |      |      |         |  |  |  |

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

| Component/Activity  | Cost (US\$)       |                            |                                    |                                    |                   |  | Total |
|---|-------------------|----------------------------|------------------------------------|------------------------------------|-------------------|--|-------|
|   | a. Personnel cost | b. Transportation expenses | c. Construction and treatment cost | d. Purchase of equipment/machinery | e. Operation cost | f. Design and printing cost for material |       |
| <b>Component 1: Proper management of landfill site</b>  |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
| <b>Component 2: Introduction of CDL .</b>   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
| <b>Component3: Enhancement of human capacities: Learning from experiences of other states and countries</b> |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
|   |                   |                            |                                    |                                    |                   |  |       |
| <b>Total</b>  |                   |                            |                                    |                                    |                   |  |       |



**Annex 1 : Current Waste flow in Chuuk State**

# 1 Current Waste flow in Chuuk State

## 1.1 Purpose

Waste flow is formulated for the following purposes:

- To determine, from a quantitative perspective, the current situation of waste management and recycling in Chuuk State;
- To set target figures for future waste management in Chuuk State;
- To formulate a practicable strategy and action plan on waste management in Chuuk State.

## 1.2 Outline of Waste Flow

A schematic diagram of the waste flow is shown as follows:

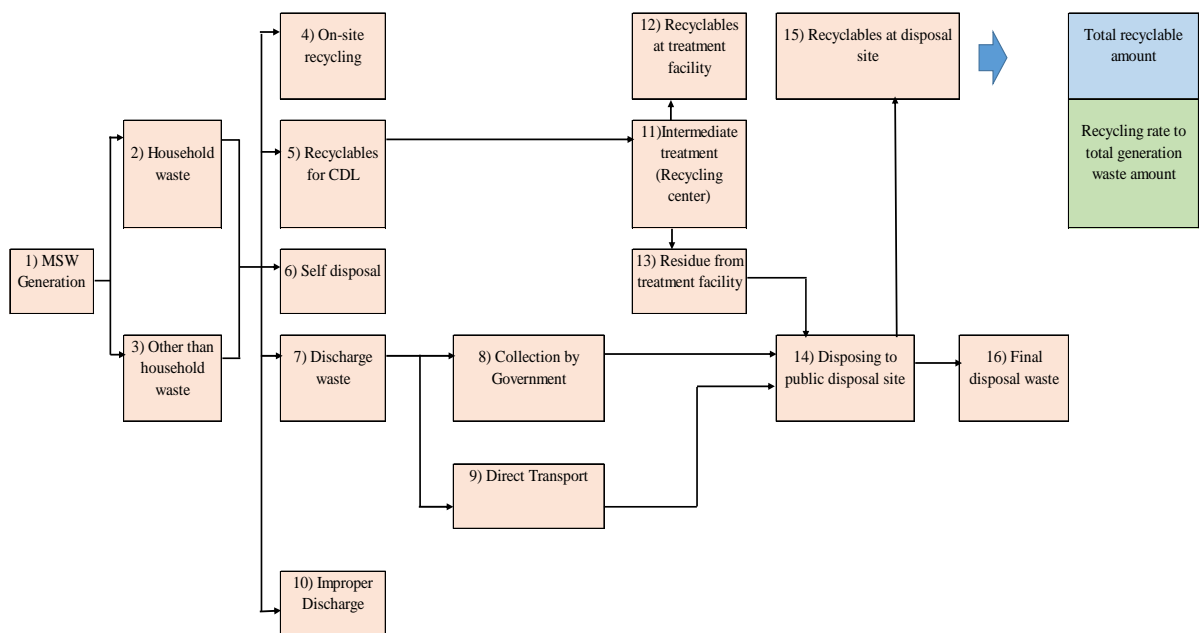


Figure 1 Concept of Waste Flow

Definition of each component in waste flow is as follows.

- [MSM Generation (1)] consists of [Household waste (2)] and [Other than household waste (3)].

- [On-site Recycling (4)] is recycling at generation source, 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 the CDL program (5)] refers to beverage containers kept and refunded at a recycling center.
- [Self-disposal (6)] refers to burying or open burning of waste by households at their own property.
- [Discharged waste (7)] refers to waste excluding [On-site Recycling (4)], [Recyclables for the CDL program (5)] and [Self-disposal (6)] from [MSM Generation (1)]
- [8] Collection waste] refers to waste collected by the collection service.
- [9] Waste transported directly to public landfill site] refers to waste transported by households, shops, super markets, restaurants, hotels, public office, etc., to landfill site directly.
- When waste collection services are not provided, [Improper discharge at non-collection areas (10)] will take place. Households in non-collection areas discharge waste to their back yard. The amount can be estimated according to the discharge waste amount for household excluded collection waste and waste transported directly to public landfill site.
- [Intermediate Treatment (Recycling center) (11)] refers to the redemption center for recyclables under the CDL program.
- [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 landfill site (14)] refers to collected waste and the transportation of waste directly to a public landfill site.
- [Recyclables at landfill site (15)] refers to the recyclables picked up at the public landfill site.
- [Final disposal waste (16)] refers to [Disposing waste to public landfill site (14)] excluding [(Recyclables at landfill site (15))].

### 1.3 Methodology

#### 1.3.1 Baseline Survey

The waste flow in Chuuk State was calculated based on the results of the 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 landfill site (landfill site);
4. Analysis of the CDL program data in a recycling center in another FSM State.

##### a. Waste amount of household waste

The waste amount generated from households was calculated based on the following formula; unit waste amount (g/lb)/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 program: PET bottles, aluminum cans, and glass bottles.
- Non-recyclables
  - ✓ Self-disposal waste: burning of garden waste, etc.;
  - ✓ Discharged waste: discharging to the collection service, transporting to landfill site individually, etc.

A survey was conducted to each household through a questionnaire as a part of the baseline survey. The amount of on-site recyclables, recyclables for the CDL program and self-disposed waste was estimated based on the results of the household survey. For the discharged amount per household, data from a WACS carried out in 2017 in Pohnpei state was used, since that of Chuuk obtained in 2015 was considered unreliable.

##### a.1 Generation waste amount (g (lb)/person/day)

The waste generation amount, which was calculated based on the survey, is 773 g (1.70 lb)/person/day, 37.1 % of which such as on-site recyclables, recyclables for the CDL program and so on, all which are potentially recycled at generation source, as shown in Table 0-1.

Table 1 Unit waste amount generated from household

| Generation waste | Unit waste amount | % | Source |
|------------------|-------------------|---|--------|
|------------------|-------------------|---|--------|

|                                     | (g/person/day) | (lb/person/day) |      |                               |
|-------------------------------------|----------------|-----------------|------|-------------------------------|
| 1. Recyclable waste (a+b)           | 185            | 0.41            | 31.8 |                               |
| a. On-site recycling waste          | 185            | 0.41            | 31.8 | J-PRISM II 2017               |
| b. Recyclable waste for CDL program | 0              | 0.00            | 0.0  | J-PRISM II 2017               |
| 2. No-recyclable waste              | 397            | 0.87            | 68.2 |                               |
| c. Self- disposal waste             | 36             | 0.08            | 6.2  | J-PRISM II 2017               |
| d. Discharge waste (2-c)            | 361            | 0.79            | 62.0 | WACS in Pohnpei state in 2017 |
| Total (1+2)                         | 582            | 1.28            | 100  |                               |

## a.2 Population

Population of Weno in 2017 is predicted based on the growth rate found between 2000 and 2010. The population was estimated around 14,000 residents. And waste collection coverage was estimated as 48% in Weno, based on the survey on collection routes and areas conducted by the Chuuk State EPA.

Table 2 Estimated population of Weno in 2017

|             | Population by census |        | Growth rates | Population in 2017 (Estimation) |
|-------------|----------------------|--------|--------------|---------------------------------|
|             | 2000                 | 2010   |              |                                 |
| Total(Weno) | 13,802               | 13,856 | 0.04%        | 14,008                          |
| -Iras       | 1,834                | 2,511  |              |                                 |
| -Mechitiw   | 1,740                | 1,646  |              |                                 |
| -Tunnuk     | 1,058                | 780    |              |                                 |
| -Penia      | 749                  | 489    |              |                                 |
| -Peniesene  | 592                  | 551    |              |                                 |
| -Sapuk      | 1,580                | 1,197  |              |                                 |
| -Epinup     | 363                  | 333    |              |                                 |
| -Wichap     | 1,202                | 1,233  |              |                                 |
| -Neauo      | 1,097                | 1,385  |              |                                 |
| -Mwan       | 1,523                | 1,417  |              |                                 |
| -Nepukos    | 2,064                | 2,314  |              |                                 |

Table 3 Waste collection coverage by village in Weno

| Area/village | % of population provided collection service |
|--------------|---|
| Total(Weno)  | 48%   |
| -Iras        | 90%   |
| -Mechitiw    | 50%   |
| -Tunnuk      | 50%   |
| -Penia       | 30%   |
| -Peniesene   | 40%   |
| -Sapuk       | 0%  |
| -Epinup      | 0%  |
| -Wichap      | 0%  |
| -Neauo       | 40%   |
| -Mwan        | 60%   |
| -Nepukos     | 60%   |

### a.3 Generation amount of household waste

The waste generation amount for household waste was calculated as 8.15 ton/day in 2017, based on the formula below. Unit generation amount and population in the formula are derived from the data above.

$$(\text{Generation amount of household waste}) = (\text{Unit waste amount}) \times (\text{Population})$$

Breakdown of the generation amount is shown in Table 0-4.

Table 4 Unit generation amount and waste amount generated from households

| Item                       | Unit waste amount (g/person/day) | Population      |                     |        | Waste amount (ton/day) |                     |       |
|----------------------------|----------------------------------|-----------------|---------------------|--------|------------------------|---------------------|-------|
|                            |                                  | Collection area | Non-collection area | Total  | Collection area        | Non-collection area | Total |
| 4) On-site recycling waste | 185                              | 6,724           | 7,284               | 14,008 | 1.24                   | 1.35                | 2.59  |
| 5) Recycling waste for CDL | 0                                | 6,724           | 7,284               | 14,008 | 0.00                   | 0.00                | 0.00  |
| 6) Self-disposal waste     | 36                               | 6,724           | 7,284               | 14,008 | 0.24                   | 0.26                | 0.50  |
| 7) Discharge waste         | 361                              | 6,724           | 7,284               | 14,008 | 2.43                   | 2.63                | 5.06  |
| 2) Generation waste        | 582                              | 6,724           | 7,284               | 14,008 | 3.91                   | 4.24                | 8.15  |

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

**b. Disposal waste amount**

The waste disposal amount in Chuuk State was calculated based on the amount of incoming waste and net specific weight of each type of waste.

The number of vehicles and amount of incoming waste to the public disposal site were surveyed and the results are shown in the figure below. The average incoming waste amount is 7.47 ton/ day, while the average number of incoming vehicles is 22 per day. The average amount of incoming waste per vehicle is 340 kg (750 lb) per vehicle. While 48% of the incoming wastes are collected by DTPW, the remaining are directly brought into the landfill site, mainly by commercial entities such as the biggest supermarket and hotels in Weno.



Incoming waste survey at landfill site

Individual households rarely bring their waste directly to the disposal site, which implies that the residents who receive collection services are satisfied with the service provided by DTPW.

Table 5 Number of incoming vehicles and disposal waste amount

|         | Collection waste by DTPW (ton/day) | Waste transported directly |                         |                     | Total (ton/day) | Number of incoming vehicle (number) |
|---------|------------------------------------|----------------------------|-------------------------|---------------------|-----------------|-------------------------------------|
|         |                                    | HH waste (ton/day)         | Other than HH (ton/day) | sub-total (ton/day) |                 |                                     |
| Jun. 29 | 3.51                               | 0.00                       | 1.70                    | 1.70                | 5.21            | 18                                  |
| Jun. 30 | 3.72                               | 0.00                       | 3.88                    | 3.88                | 7.60            | 25                                  |
| Jul. 1  | 2.55                               | 1.03                       | 2.81                    | 3.84                | 6.39            | 27                                  |
| Jul. 2  | 0.00                               | 0.10                       | 0.59                    | 0.69                | 0.69            | 10                                  |
| Jul. 3  | 2.51                               | 0.06                       | 2.19                    | 2.25                | 4.76            | 15                                  |
| Jul. 4  | 5.90                               | 0.99                       | 6.63                    | 7.62                | 13.52           | 40                                  |
| Jul. 5  | 7.03                               | 0.38                       | 6.74                    | 7.12                | 14.15           | 22                                  |
| Total   | 25.22                              | 2.56                       | 24.54                   | 27.10               | 52.32           | 157                                 |
| Average | 3.60                               | 0.37                       | 3.51                    | 3.88                | 7.47            | 22                                  |

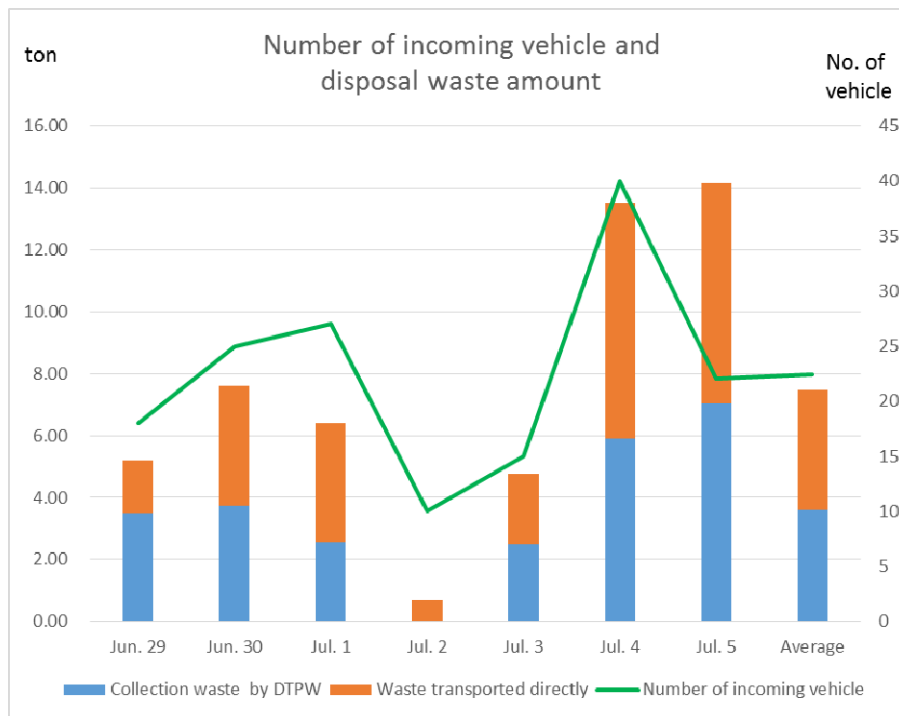


Figure 2 Number of Incoming vehicles and disposal waste amount

**c. Recycling amount at landfill site**

There is no recycling activity at the disposal site.

**d. Final disposal waste amount**

The total waste disposed was calculated using the following formula:

$$16) \text{ Final disposal waste amount} = 14) \text{ Disposal waste amount} - 15) \text{ Recycling amount at landfill site} = 7.47 - 0.00 = 7.47 \text{t/day}$$

**e. Recycling amount of recyclables for the CDL program**

Chuuk created a CDL system in 1979 with a Truk State law, before the FSM became independent. The system has been erratic in operation over the years, and last functioned around 2002, and so no recycling is currently occurring under the CDL program.

$$11) \text{ Intermediate treatment [Recycling at recycling center]} = 12) \text{ Recyclables at treatment facility} = 5) \text{ Recyclables for CDL} = 0.00 \text{t/day}$$

**Waste amount from the DTPW collection service**

A waste collection service is provided by DTPW. The waste amount collected by DTPW is calculated at 3.60 ton/day.



**f. Improperly discharged waste**

As revealed by the current waste flows, 17.6% of generated waste, which is equivalent to 23.2% of discharged waste, is disposed to nearby open spaces improperly.

10) The improperly discharged waste amount = Discharged amount of household waste – Collected amount of household waste – Incoming amount of household waste transported directly to landfill site =  $5.06 - 2.43 - 0.37 = 2.26$  ton/day

**g. Discharged waste amount**

The total amount of discharged waste was calculated as 9.74 ton/day from the information provided above.

7) Amount of discharged waste = 8) Amount of collected waste + 9) Amount of disposal waste transported directly to landfill site + 10) Amount of improper discharge waste =  $3.60 + 3.88 + 2.26 = 9.74$  ton/day

**h. Non-Household waste generation**

Non-household waste generation was calculated as 4.68 ton/day (36.5 % of generated waste) based on the following formula:

3) Amount of the waste generated from non-households = 4) Amount of On-site recycling + 5) Amount of recyclables for the CDL program + 6) Amount of self-disposal waste + 7) Amount of discharged waste – 2) Amount of household waste =  $(2.59 + 0.00 + 0.50 + 9.74 - 8.15) = 4.68$  ton/day.

**i. Amount of State Solid Waste**

The total amount of generated waste in Chuuk State (Weno) was calculated as 12.83 ton/day, which is the sum of generated amount of household waste and non-household waste.

1) Amount of state solid waste = 2) generated amount of household waste + 3) generated amount of other than household waste =  $8.15 + 4.68 = 12.83$  ton/day

**1.3.2 Waste flow in Chuuk State**

A schematic representation of waste flow in Chuuk State is provided at Figure 0-3, based on the information above.

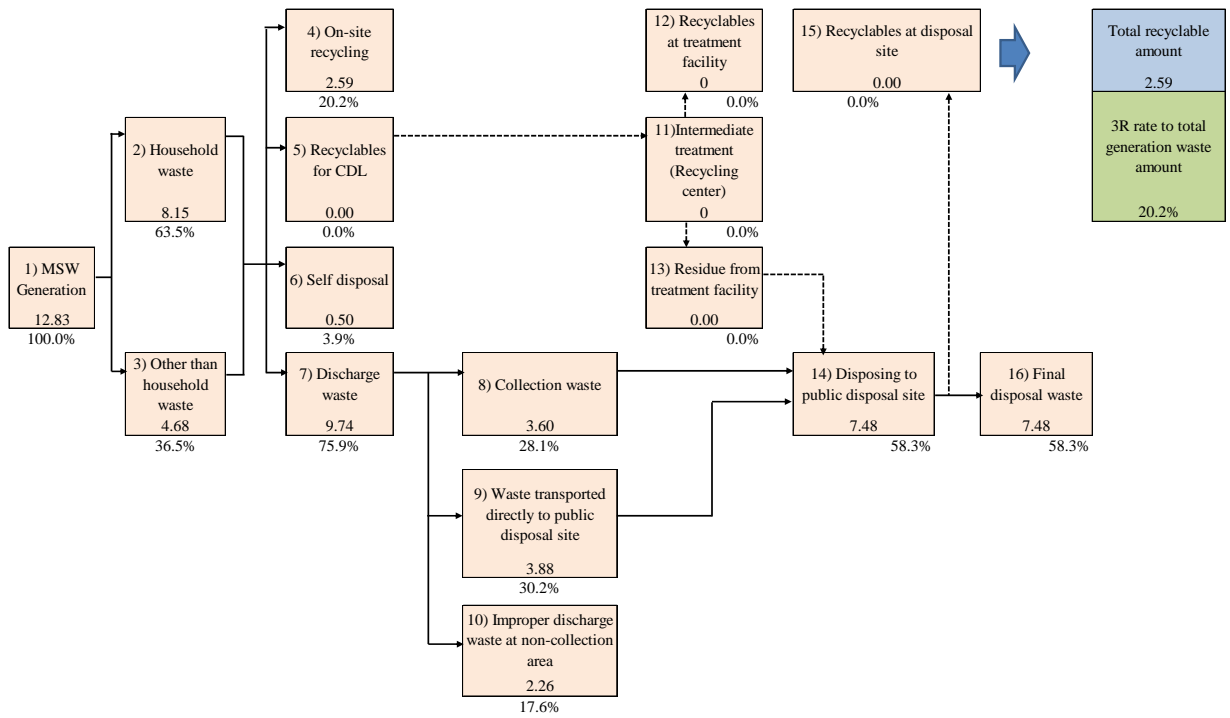


Figure 3 Waste flow in Chuuk State (2017) (unit: ton/day)

**Annex 2 : Annual Work Program in FY 2019**



Annual Work Program (FY 2019 )

| <b>Title: Action plan towards technically appropriate and financially sustainable SWM system in Chuuk State</b>   |            |
|---|------------|
| Implementation Activity   | Cost(US\$) |
| <b>Component 1: Proper management of landfill site</b><br>Mainly the following activities/works will be implemented;  | 260,367    |
| <b>1.1 Rehabilitation of previously-used Neoue landfill site</b><br>1.1.1 Preparation of rehabilitation of Neouo landfill<br>1.1.2 Rehabilitation of Neouo Landfill site                | (190,117)  |
| <b>1.2 Proper management of Marina Interim Dump site (MID) until Neouo landfill re-opens</b><br>1.2.1 Proper operation and maintenance of MID   | (59,019)   |
| <b>1.3 Preparation of a new landfill site</b><br>1.3.1 Site selection of a new landfill site  | (11,231)   |
| <b>Component 2: Introduction of CDL .</b><br>Mainly the following activities/works will be implemented;   |            |
| <b>2.1 Establish a legal framework</b><br>2.1.1 Prepare amendment to the act and regulation of CDL.<br>2.1.2 Submit draft act and regulation to the relevant authorities, and approval. | 261,353    |
| <b>2.3 Technical preparation.</b><br>2.3.3 Find source of funds to purchase a equipment.<br>2.3.4 Procurement of recycling equipment  |            |
| <b>Component3: Enhancement of human capacities: Learning from experiences of other states and countries</b><br>Mainly the following activities/works will be implemented;               |            |
| <b>3.1 Enhancement of 2R (Reduce, Reuse)</b><br>3.1.1 Disseminate awareness for 2R<br>3.1.2 Install organic waste disposal unit   | 135,193    |
| <b>3.2 Improvement of waste collection service</b><br>3.2.1 Improvement of waste collection service<br>3.2.2 Rehabilitation of yellow garbage bins (stations)                           |            |
| <b>Total</b>  | 656,913    |

**Annual Work Program (FY 2019) Activities and the Schedule**

| Component/Activity   | Contents   | FY2019       |          |      |      |      |      |      |     |      |      |      |      | Remarks |    |  |  |
|--|--|--------------|----------|------|------|------|------|------|-----|------|------|------|------|---------|----|--|--|
|  |  | Q1           |          |      |      | Q2   |      |      |     | Q3   |      |      |      |         | Q4 |  |  |
|  |  | Oct.         | Nov.     | Dec. | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. |         |    |  |  |
|  |  | Organization | Hachioji |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
|  |  |              | CWC      |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
|  |  |              | DTPW     |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
|  |  |              | EPA      |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| <b>Component 1: Proper management of landfill site</b>                                       |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| <b>1.1 Rehabilitation of previously-used Neouo landfill site</b>                             |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| 1.1.1 Preparation of rehabilitation of Neouo landfill  |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| a. Technical preparation   | Conducting topographic survey, clarification of boundary of the land, examination of access road and surrounding environment.  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| b. Basic design of Landfill Site   | Basic design including layout of boundary embankment, layout of access road, leachate collection point and necessary facilities.                                     |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| c. Cost estimation and Budget application  | Cost estimation based on the basic design and apply for the budget for construction  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| 1.1.2 Rehabilitation of Neouo Landfill site  |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| a. Upgrading of Access Road  | Upgrading access road from junction at Neive to the landfill site around 500 m including laying pipe culverts to drain the water from hillside to the mangrove side. |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| b. Rehabilitation of Neouo Landfill Site   | Construction of Neouo landfill site including embankment along the east and north boundary to stop rainwater to go into landfill site.                               |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| <b>1.2 Proper management of Marina Interim Dump site (MID) until Neouo landfill re-opens</b> |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| 1.2.1 Proper operation and maintenance of MID  |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| a. Closure plan for MID  | Closure plan for MID will be developed and estimation of life of usage as a landfill site.   |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| b. Proper operation and maintenance of MID.  | Operation and maintenance according to the closure plan.   |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| <b>1.3 Preparation of a new landfill site</b>  |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| 1.3.1 Site selection of a new landfill site  |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |
| a. Propose candidate sites   | Propose several candidate sites in order to compare appropriate site for landfill operation.   |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |

**Annual Work Program (FY 2019) Activities and the Schedule**

| Component/Activity   | Contents   | FY2019       |          |      |      |      |      |      |     |      |      |      |      | Remarks |    |  |  |  |
|--|--|--------------|----------|------|------|------|------|------|-----|------|------|------|------|---------|----|--|--|--|
|  |  | Q1           |          |      |      | Q2   |      |      |     | Q3   |      |      |      |         | Q4 |  |  |  |
|  |  | Oct.         | Nov.     | Dec. | Jan. | Feb. | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. |         |    |  |  |  |
|  |  | Organization | Hachioji |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |
|  |  |              | CWC      |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |
|  |  |              | DTPW     |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |
|  |  |              | EPA      |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |
| <b>Component 2: Introduction of CDL.</b>   |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |
| <b>2.1 Establish a legal framework</b>   |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |
| 2.1.1 Prepare amendment to the act and regulation of CDL.                        | Prepare (i) CDL Law (amendment) and (ii) CDL regulations   |              | ◎        |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |
| 2.1.2 Submit draft act and regulation to the relevant authorities, and approval. | (i) Submit CDL Law to AG for review, then the Governor present at the Legislature for adoption. (ii) Submit CDL regulations to AG, the Governor, all the relevant organizational for 30-day review. Also public hearing may need it. |              | ◎        |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |
| <b>2.3 Technical preparation.</b>  |  |              |          |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |
| 2.3.3 Find source of funds to purchase a equipment.                              | Prepare the proposal to several fund sources, such as EOJ, as soon as possible. Installation of equipment is also an important prerequisite to start CDL.  |              | ◎        |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |
| 2.3.4 Procurement of recycling equipment   | After approval from any fund sources, procure the equipment.   |              | ◎        |      |      |      |      |      |     |      |      |      |      |         |    |  |  |  |

**Annual Work Program (FY 2019) Activities and the Schedule**

| Component/Activity   | Contents  | FY2019       |      |      |      |          |      |      |     |      |      |      |      | Remarks |    |  |  |  |
|--|---|--------------|------|------|------|----------|------|------|-----|------|------|------|------|---------|----|--|--|--|
|  |   | Q1           |      |      |      | Q2       |      |      |     | Q3   |      |      |      |         | Q4 |  |  |  |
|  |   | Oct.         | Nov. | Dec. | Jan. | Feb.     | Mar. | Apr. | May | Jun. | Jul. | Aug. | Sep. |         |    |  |  |  |
|  |   | Organization | EPA  | DTPW | CWC  | Hachioji |      |      |     |      |      |      |      |         |    |  |  |  |
| <b>Component3: Enhancement of human capacities: Learning from experiences of other states and countries</b>  |   |              |      |      |      |          |      |      |     |      |      |      |      |         |    |  |  |  |
| <b>3.1 Enhancement of 2R (Reduce, Reuse)</b>   |   |              |      |      |      |          |      |      |     |      |      |      |      |         |    |  |  |  |
| 3.1.1 Disseminate awareness for 2R   |   |              |      |      |      |          |      |      |     |      |      |      |      |         |    |  |  |  |
| a. Assess the current situation of 2R (Reduce and Reuse) .   | i) Discuss the questionnaire survey on 2R activities. Select samples and decide who carries out, ii) Implementation of 2R ii) Summarize the result of the questionnaire survey and compile as a report.   |              | ◎    | -    | ○    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| b. Hold workshop for 2R at communities and schools.  | Review the contents of workshops and organize workshops   |              | ◎    | -    | ○    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| c. Produce and distribute educational leaflets and original shopping bags.   | i) Examine the contents of educational materials, ii) Design the leaflet, print and distribute them, iii) Produce "My Bags," and distribute them.   |              | ◎    | -    | ○    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| d. Hold flea market.   | i) Consider an appropriate implementation system of flea market in collaboration with other stakeholders, (ii) Decide place and date, iii) Notify the residents and the relevant organizations, and iv) monitor the implementation.             |              | ◎    | -    | ○    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| e. Effort to promote reduction of plastic shopping bags (friendly-greeting campaign and cash-back etc.)  | Exchange of opinions with related business sectors. Examination of the method to reduce shopping bag in cooperation with business sectors.  |              | ◎    | -    | ○    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| 3.1.2 Install organic waste disposal unit  |   |              |      |      |      |          |      |      |     |      |      |      |      |         |    |  |  |  |
| a. Select places to install organic waste disposal units   | Confirm the conditions to select locations to install organic waste disposal units, and the procedure to install.   |              | ◎    | -    | ○    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| b. Instruct residents how to use organic waste disposal units.   | Install sign boards stating how to use the units and notify it to the residents.  |              | ◎    | -    | ○    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| c. Monitor usage of organic waste disposal units.  | i) Examine what to and how to monitor the use, ii) compile the monitoring results and analyze them for improvement.   |              | ◎    | -    | ○    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| d. Propose organic waste disposal units which are able to be produced by locally available materials.  | Experiment an organic disposal units made out of locally available materials with EPA.  |              | ◎    | -    | ○    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| <b>3.2 Improvement of waste collection service</b>   |   |              |      |      |      |          |      |      |     |      |      |      |      |         |    |  |  |  |
| 3.2.1 Improvement of waste collection service  |   |              |      |      |      |          |      |      |     |      |      |      |      |         |    |  |  |  |
| a. Carry out on-site investigations to collection works (i.e. time and motion survey) and instructs collection workers to improve collection work. | Implement T&M survey. Identify critical issues on collection work and share them.   |              | ○    | ◎    | -    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| b. Hold workshop for waste discharge workers to improve collection work.   | Organize workshops to share the knowledge on how to improve waste discharge as well as its collection.  |              | ○    | ◎    | -    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| c. Conduct training to local staffs for inspection and maintenance of collection vehicle.  | Implement training on inspection and maintenance of collection vehicles.  |              | -    | ◎    | -    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| d. Prepare manual for waste collection work and verifies whether collection work is implemented according to the manual.                           | Conduct training in Japan. Procure a manual on waste collection, and train workers to follow the manual. Monitor their works.   |              | -    | ◎    | -    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| 3.2.2 Rehabilitation of yellow garbage bins (stations)   |   |              |      |      |      |          |      |      |     |      |      |      |      |         |    |  |  |  |
| a. Investigate condition and installation location of bins (stations)  | DTPW along with EPA will conduct survey on the current conditions of yellow collection bins (stations) and the appropriateness of their locations. Prepare a list of locations necessary to install bins as well as stations which need repair. |              | ○    | ◎    | -    |          |      |      |     |      |      |      |      |         |    |  |  |  |
| b. Find source of funds to repaired and manufacture  | According to the list prepared under the activity 4.2.1, estimate cost necessary to repair and new installation. EPA shall take initiatives to find a donor or funds.   |              | ◎    | -    | -    |          |      |      |     |      |      |      |      |         |    |  |  |  |



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

| Component/Activity  | Cost (US\$)       |                            |                                    |                                    |                   |  | Total          |
|---|-------------------|----------------------------|------------------------------------|------------------------------------|-------------------|--|----------------|
|   | a. Personnel cost | b. Transportation expenses | c. Construction and treatment cost | d. Purchase of equipment/machinery | e. Operation cost | f. Design and printing cost for material |                |
| <b>Component 1: Proper management of landfill site</b>  | <b>107,781</b>    | <b>1,086</b>               | <b>87,500</b>                      | <b>0</b>                           | <b>24,000</b>     | <b>40,000</b>                            | <b>260,367</b> |
| <b>1.1 Rehabilitation of previously-used Neouo landfill site</b>  | <b>61,992</b>     | <b>625</b>                 | <b>87,500</b>                      | <b>0</b>                           | <b>0</b>          | <b>40,000</b>                            | <b>190,117</b> |
| 1.1.1 Preparation of rehabilitation of Neouo landfill   | 28,080            | 283                        | 0                                  | 0                                  | 0                 | 20,000                                   | 48,363         |
| 1.1.2 Rehabilitation of Neouo Landfill site   | 33,912            | 342                        | 87,500                             | 0                                  | 0                 | 20,000                                   | 141,754        |
| <b>1.2 Proper management of Marina Interim Dump site (MID) until Neouo landfill re-opens</b>                | <b>34,671</b>     | <b>348</b>                 | <b>0</b>                           | <b>0</b>                           | <b>24,000</b>     | <b>0</b>                                 | <b>59,019</b>  |
| 1.2.1 Proper operation and maintenance of MID   | 34,671            | 348                        | 0                                  | 0                                  | 24,000            | 0  | 59,019         |
| <b>1.3 Preparation of a new landfill site</b>   | <b>11,118</b>     | <b>113</b>                 | <b>0</b>                           | <b>0</b>                           | <b>0</b>          | <b>0</b>                                 | <b>11,231</b>  |
| 1.3.1 Site selection of a new landfill site   | 11,118            | 113                        | 0                                  | 0                                  | 0                 | 0  | 11,231         |
| <b>Component 2: Introduction of CDL .</b>   | <b>60,740</b>     | <b>613</b>                 | <b>0</b>                           | <b>200,000</b>                     | <b>0</b>          | <b>0</b>                                 | <b>261,353</b> |
| <b>2.1 Establish a legal framework</b>  | <b>19,380</b>     | <b>196</b>                 | <b>0</b>                           | <b>0</b>                           | <b>0</b>          | <b>0</b>                                 | <b>19,576</b>  |
| 2.1.1 Prepare amendment to the act and regulation of CDL  | 8,262             | 83                         | 0                                  | 0                                  | 0                 | 0  | 8,345          |
| 2.1.2 Submit draft act and regulation to the relevant authorities, and approval.                            | 11,118            | 113                        | 0                                  | 0                                  | 0                 | 0  | 11,231         |
| <b>2.3 Technical preparation.</b>   | <b>41,360</b>     | <b>417</b>                 | <b>0</b>                           | <b>200,000</b>                     | <b>0</b>          | <b>0</b>                                 | <b>241,777</b> |
| 2.3.3 Find source of funds to purchase a equipment.   | 32,230            | 324                        | 0                                  | 200,000                            | 0                 | 0  | 232,554        |
| 2.3.4 Procurement of recycling equipment  | 9,130             | 93                         | 0                                  | 0                                  | 0                 | 0  | 9,223          |
| <b>Component3: Enhancement of human capacities: Learning from experiences of other states and countries</b> | <b>104,136</b>    | <b>1,057</b>               | <b>0</b>                           | <b>30,000</b>                      | <b>0</b>          | <b>0</b>                                 | <b>135,193</b> |
| <b>3.1 Enhancement of 2R (Reduce, Reuse)</b>  | <b>25,908</b>     | <b>267</b>                 | <b>0</b>                           | <b>0</b>                           | <b>0</b>          | <b>0</b>                                 | <b>26,175</b>  |
| 3.1.1 Disseminate awareness for 2R  | 12,180            | 126                        | 0                                  | 0                                  | 0                 | 0  | 12,306         |
| 3.1.2 Install organic waste disposal unit   | 13,728            | 141                        | 0                                  | 0                                  | 0                 | 0  | 13,869         |
| <b>3.2 Improvement of waste collection service</b>  | <b>78,228</b>     | <b>790</b>                 | <b>0</b>                           | <b>30,000</b>                      | <b>0</b>          | <b>0</b>                                 | <b>109,018</b> |
| 3.2.1 Improvement of waste collection service   | 37,968            | 384                        | 0                                  | 0                                  | 0                 | 0  | 38,352         |
| 3.2.2 Rehabilitation of yellow garbage bins (stations)  | 40,260            | 406                        | 0                                  | 30,000                             | 0                 | 0  | 70,666         |
| <b>Total</b>  | <b>272,657</b>    | <b>2,756</b>               | <b>87,500</b>                      | <b>230,000</b>                     | <b>24,000</b>     | <b>40,000</b>                            | <b>656,913</b> |