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PacWastePlus
PACIFIC WASTE MANAGEMENT

This initiative is supported by **PacWastePlus**-a 72 month project funded by the European Union (**EU**) and implemented by the Secretariat of the Pacific Regional Environment Programme (**SPREP**) **to sustainably and cost effectively improve regional management of waste and pollution.**

Samoa National Waste Audit Analysis Report

August 2023

This Waste data collation, analysis and reporting for the Samoa National Waste Audit Analysis Report was guided by the overarching Regional Waste Data Collection, Monitoring, and Reporting (DCMR) Framework for the Pacific Island Countries and Territories (PICT).

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Our vision: A resilient Pacific environment sustaining our livelihoods and natural heritage in harmony with our cultures.

PacWaste Plus Programme

The Pacific – European Union (EU) Waste Management Programme, PacWaste Plus, is a 72-month programme funded by the EU and implemented by the Secretariat of the Pacific Regional Environment Programme (SPREP) to improve regional management of waste and pollution sustainably and cost-effectively.

About PacWaste Plus

The impact of waste and pollution is taking its toll on the health of communities, degrading natural ecosystems, threatening food security, impeding resilience to climate change, and adversely impacting social and economic development of countries in the region.

The PacWaste Plus programme is generating improved economic, social, health, and environmental benefits by enhancing existing activities and building capacity and sustainability into waste management practices for all participating countries.

Countries participating in the PacWaste Plus programme are: *Cook Islands, Democratic Republic of Timor-Leste, Federated States of Micronesia, Fiji, Kiribati, Nauru, Niue, Palau, Papua New Guinea, Republic of Marshall Islands, Samoa, Solomon Islands, Tonga, Tuvalu, Vanuatu*.

Key Objectives

Outcomes & Key Result Areas

The overall objective of PacWastePlus is "*to generate improved economic, social, health and environmental benefits arising from stronger regional economic integration and the sustainable management of natural resources and the environment*".

The specific objective is "*to ensure the safe and sustainable management of waste with due regard for the conservation of biodiversity, health and wellbeing of Pacific Island communities and climate change mitigation and adaptation requirements*".

Key Result Areas

- **Improved** data collection, information sharing, and education awareness
- **Policy & Regulation** - Policies and regulatory frameworks developed and implemented.
- **Best Practices** - Enhanced private sector engagement and infrastructure development implemented
- **Human Capacity** - Enhanced human capacity

Learn more about the PacWaste Plus programme by visiting

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PacWastePlus PACIFIC WASTE MANAGEMENT

www.pacwasteplus.org

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Map of Samoa

Source: World Atlas, 2020

Glossary

Acronym	Definition
C&D	Construction and Demolition (Waste)
C&I	Commercial and Industrial (Waste)
DCMR	Data Strategy & Collection, Monitoring, and Reporting (Framework)
MNRE	Ministry of Natural Resources and Environment
KPI	Key Performance Indicator
MEA	Multilateral Environmental Agreement
MSW	Municipal Solid Waste (i.e., waste originating from the general public that is typically managed by local government entities, excludes commercial / business waste)
NGO	Non-Governmental Organisation
PICT	Pacific Island Countries & Territories
SPREP	Secretariat of The Pacific Regional Environment Programme

Terminology	Definition
Capacity	The total maximum waste storage and processing that can take place at a facility (as capped by license conditions).
Capture rate	The proportion of total waste generated that is successfully captured and disposed or recovered in an environmentally responsible manner (e.g., by a formal collection service or self-hauled to a licensed facility)
Coverage	The proportion of total households that have access to a regular waste collection service.
Modern	A 'modern' facility employs 'sound waste management practices' (as defined by the UNEP) and results in minimal adverse impacts on the environment. A 'modern' facility must be licensed, staffed, have access to equipment and machinery such as a bulldozer, employ a leachate management system and implement a daily cover routine at a landfill, and must not be exceeding their maximum storage capacity.
Per capita	Units measured on a per person basis (i.e., to allow for extrapolation over a national population).
Recovery	Any activity that diverts waste material from landfill, including processing of dry recyclables (such as paper, cardboard, metal and plastics such as PET and HDPE), organics recovery, and energy recovery.
Unregulated	Typically, unlicensed waste facilities which do not follow international frameworks, rules, and guidelines to protect the health of the environment and community.
Waste facility	'Waste facilities' involved in the handling, disposal, or recovery of waste streams above a minimum processing threshold determined on country basis (i.e., tonnes of waste received per year). Can include landfills or dumpsites (that primarily rely on burying waste in a controlled manner), recycling facilities for dry recyclables, organics recovery facilities, and waste-to-energy facilities. Incinerators are not included in this analysis.

Executive Summary

Waste data collation, analysis and reporting for the Samoa National Waste Audit Analysis Report was guided by the overarching Regional Waste Data Collection, Monitoring, and Reporting (DCMR) Framework for the Pacific Island Countries and Territories (PICT). The implementation of the DCMR Framework ensures that waste data is collected, analysed, and reported in a consistent and reliable way across the Pacific.

Table (a) Summary of Key Performance Indicators (KPIs) for Samoa

Core KPIs	Result	Supplementary KPIs	**Result**
1. Count / capacity of modern waste facilities	0 / 0	1. Cost of disposal to landfill ($/tonne)	US $164
2. Count / capacity of unregulated waste facilities	2 / Capacity unknown	2. Weight of waste disposed (tpa)	13,600 (See Section 3.2)
3. National recovery rate (%)	28.58% (See Section 3.2)	3. Weight of waste recovered (tpa)	1,080
4. Per capita waste generation rate (kg/capita/year)	93.7	4. Volume and type of stockpiled hazardous waste (m^3)	See Section 3.2
5. Municipal Solid Waste (MSW) composition (%)	Figure (a)	5. Marine plastic pollution potential (tpa)	129
6. Household waste capture rate (%)	94.03%	6. Awareness and support of waste management services (%)	No data
7. Household collection service coverage (%)	93.90%	7. Proportion of strategic waste management initiatives implemented (%)	84.00%
8. Fulfillment of MEA reporting requirements (%)	51.67%	8. Commercial waste capture rate (%)	See Section 3.2
		9. Commercial collection service coverage (%)	See Section 3.2
		10. Total weight of disaster waste disposed (tpa)	No data

Note: 'No data' indicates that the audit did not capture the parameters / measurements necessary to calculate the KPI.

Legend		
Sufficient data	Limited data	No data

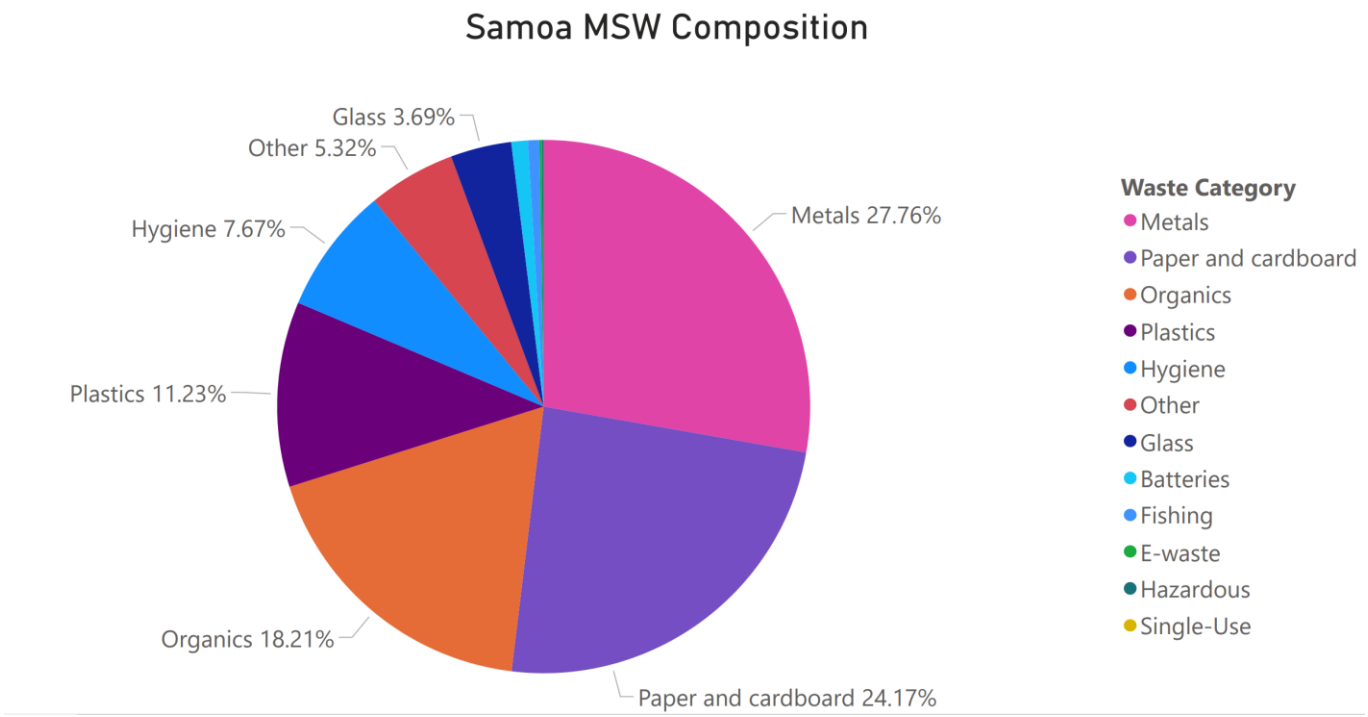


Figure (a) Samoa Municipal Solid Waste (MSW) Composition (% by weight)

1 Introduction

1.1 Background

Samoa is one of fifteen Pacific Island Nations which took part in the PacWaste Plus Programme implemented through SPREP and funded by the European Union Delegation of the Pacific. The PacWaste Plus Programme aims to improve waste management activities across the islands and strengthen the capacity of Governments, industries, and communities to manage wastes to protect human health and the environment.

Samoa's waste management practices are mostly limited to landfilling. Recycling efforts are primarily carried out by private operators, with some support from the government. A large proportion of organic waste is sustainably self-managed in rural communities. The remaining waste is commonly burnt, buried, or dumped.

The Samoa Recyclers and Waste Management Association was established to coordinate among recyclers and strengthen engagement with government agencies and international donors. The Waste Management Act 2010 provides a comprehensive legal framework for waste management and recycling activities, although progress in implementing the required mechanisms has been limited. The country requires investment in infrastructure, implementation of data-guided decision making, and increased general waste management education to improve the current situation.

1.2 Purpose and Aim

The purpose of this audit analysis and report is to establish a baseline position for Samoa's waste data and waste management systems.

The aim of this report is to:

- Validate pre-existing national waste audit data; and
- Build national waste insights based on new key performance indicators (KPIs) to understand waste management trends.

The results of this report, and the other fourteen SPREP country audit analysis reports, will be collated together to inform a broader Pacific Regional Data and Audit Analysis Report.

1.3 Scope

The scope of this report is limited to the following waste data collected in Samoa:

- **Samoa waste audit report 2021**: The audit was undertaken in March 2020 (just prior to closure of borders due to COVID-19) and in May 2020 (after the reopening of the borders) and provided an evaluation of household and business waste generated in Samoa. Audit data and information was obtained via interviews and waste collections from 201 households of which 120 participated in interviews, and 47 businesses of which 39 participated in interviews, followed by sorting and weighing. The audit report also provided an assessment of the state of Samoa's landfills including landfill audits and stockpile assessments.

This national report examines the MSW, commercial and industrial (C&I), disaster waste and landfill waste streams. Landfills may receive a broad array of waste types, including construction and demolition (C&D) waste, hazardous waste, and other types of waste in addition to MSW and C&I waste. As such, landfill waste is considered a separate waste stream.

The potential for marine plastic pollution is considered for macroscopic plastic waste (i.e., plastics that can be identified through compositional audits) originating from household sources. Accurate data on the amount and management of macroscopic plastic waste in the region is limited.

1.4 Country Overview

Samoa, officially known as the Independent State of Samoa, is located in the South Pacific Ocean, about halfway between New Zealand and Hawaii. The capital city of Samoa is Apia, located on the island of Upolu. Samoa has a population of approximately 200,000 and a total land area of 2,831 square kilometres, most of the population lives on the island of Upolu and 80 percent of this population lives in rural communities. The four populated Islands of Samoa are Upolu, Savai'i, Apolima and Manono.

Samoa has an active waste management strategy and multiple stakeholders are responsible for its delivery. The *Waste Management Act 2010* provides a comprehensive legal framework for waste management and recycling activities in the country.

The *Samoa National Waste Management Strategy 2019-2023* is an updated version of the previous strategy developed by the Ministry of Natural Resources and Environment (MNRE). The strategy aims to improve waste management practices in Samoa.

The responsibility for managing solid waste is divided among various institutions in Samoa, which include:

- National government: The national government is responsible for creating national legislation, strategies, and policy frameworks for waste management, as well as fulfilling obligations under international conventions, primarily through the MNRE.
- Local government: Responsible for village-level affairs, including public health and village hygiene, and enforcing waste management laws at the community level.

Other committees and associations as well as private sectors also play a role in Samoa's waste management. Overall, the implementation of the strategy will require collaboration and engagement from all stakeholders, including government agencies, businesses, communities, and individuals.

2 Methodology

Waste data collation, analysis and reporting was guided by the overarching Regional Waste Data Collection, Monitoring, and Reporting (DCMR) Framework for the Pacific Island Countries and Territories (PICT). The implementation of the DCMR Framework ensures that waste data is collected, analysed, and reported in a consistent and reliable way across the Pacific.

2.1 Data Sources

Data collated and examined in this audit analysis report was sourced from the data sources listed in **Table 1.**

Table 1 Data sources examined and available data

Data Source	Methods for data collation	Reported data
Samoa waste audit report 2021	• Sample collection from households and businesses • Sort and weigh of household/business waste • Household and business interviews • Landfill audit • Stockpile assessment	• Access to general waste collection service • Household and business waste composition • Recyclable collection and composition • Stockpile types and quantities • Landfilled waste composition and weight • Customs data for imported and exported goods
2021 Samoa National census	• National census	• Population data • Household data (size, number)

2.1.1 Samoa Waste Audit 2021

The audit was undertaken in March 2020 and in May 2020 and utilised the Waste Audit Methodology produced by Pacific Regional Infrastructure Facility (PRIF).

The audit took place over approximately 2 months around COVID-19 border closure and reopening times. Data was collected from households in urban and rural areas as well as commercial premises. A total of 201 household samples and 47 commercial samples were gathered. In addition, around 416 landfill samples were collected and the waste composition, recycling potential, hazardous waste status and life were audited for landfills over a two-week period.

Table 2 Sample locations for audits

Sample Location	Population (2021)	Classification
Apia (urban Upolu)	35,974	Urban
Rest of Upolu	123,690	Rural
Savai'i	45,175	Rural

2.2 Data Analysis

Each country's audit reports, audit data, and other relevant data sources were inspected for relevant information which was subsequently collated into country specific databases. The extracted audit data was then used to calculate the DCMR Framework KPIs. KPI reporting followed the calculation methodologies as detailed in the DCMR Framework.

The main assumptions made during the analysis are discussed below.

Where it was necessary to modify calculation methodologies or assumptions (e.g., in cases of missing data or when certain parameters had to be calculated using assumptions derived from external data sources like census data), details of the changes are provided under their corresponding KPI in **Section 3.2.**

2.2.1 Main Assumptions

- The audit data provided for 'urban' areas (Apia) and 'rural' areas (rural Upolu and Savai'i) (see Table 2) is assumed to be representative of the rest of the country.
- All population estimates used to calculate performance indicators are based on national census data from 2021.
- All waste plastics which are not managed in an environmentally sound manner are assumed to have the potential risk of polluting oceans and estuarine waterways.
- Commercial waste service coverage reporting has relied primarily on survey information conducted during audits of commercial business waste.

2.3 Key Performance Indicators

The DCMR Framework introduces a series of KPIs (see

Table 3**)**. The KPIs were developed to guide data analysis with the aim of improving the efficiency of data collection activities by building on pre-existing data collection practices across the region.

Each of the KPIs were designed to be reported to using corresponding data collection methodologies.

These comprise of:

- a waste facility register
- household waste audits and community surveys
- business waste audits and surveys
- a policy survey
- landfill and stockpile audits

Table 3 Key Performance Indicators (KPIs) from the DCMR Framework

Core KPIs	Supplementary KPIs
1. Count / capacity of modern waste facilities	1. Cost of disposal to landfill
2. Count / capacity of unregulated waste facilities	2. Weight of waste disposed
3. National recovery rate	3. Weight of waste recovered
4. Per capita waste generation rate	4. Volume and type of stockpiled hazardous waste
5. Municipal Solid Waste (MSW) composition	5. Marine plastic pollution potential
6. Household waste capture rate	6. Awareness and support of waste management services
7. Household collection service coverage	7. Proportion of strategic waste management initiatives implemented
8. Fulfillment of Multilateral Environmental Agreement (MEA) reporting requirements	8. Commercial waste capture rate
	9. Commercial collection service coverage
	10. Total weight of disaster waste disposed

3 Audit Analysis Results

3.1 Summary of Data Availability

The waste audits provided varying levels of data and information for the purposes of calculating performance via the indicators introduced in the DCMR Framework. The extent to which there was adequate data and information to calculate the KPIs is represented below in **Table 4.**

Table 4 Summary of data availability for reporting against DCMR Framework KPIs

Core KPIs	Supplementary KPIs
1. Count / capacity of modern waste facilities	1. Cost of disposal to landfill
2. Count / capacity of unregulated waste facilities	2. Weight of waste disposed
3. National recovery rate	3. Weight of waste recovered
4. Per capita waste generation rate	4. Volume and type of stockpiled hazardous waste
5. Municipal Solid Waste (MSW) composition	5. Marine plastic pollution potential
6. Household waste capture rate	6. Awareness and support of waste management services
7. Household collection service coverage	7. Proportion of strategic waste management initiatives implemented
8. Fulfillment of MEA reporting requirements	8. Commercial waste capture rate
	9. Commercial collection service coverage
Legend	10. Total weight of disaster waste disposed
Sufficient data / Limited data / No data	

Note: 'No data' indicates that the audit did not capture the parameters/measurements necessary to calculate the KPI.

In summary:

- The audit report provided adequate information to report to Core KPIs 3, 4 and 6 to 8, and Supplementary KPIs 1, 3 and 7.
- There was limited data available to calculate Core KPIs 1, 2 and 5, and Supplementary KPIs 2, 4, 5, 8 and 9.
  - Storage and processing capacities for waste facilities were not identified in the audit report.
  - Weights of waste disposed at landfill were calculated using Upolu's assumed rate of disposal to landfill and extrapolated to give results for the other populated islands of Samoa. It is likely the other islands have different disposal rates.
  - Some information on the volume of used oil was provided, but no measurements were given for the other hazardous waste categories. The stockpile audits also used different methodologies and units of measurement across sites. The report noted the likely existence of more stockpiles than was measured.
  - MSW composition data was not available in a complete and robust dataset. As such total waste generation proportions were substituted over household audit data. This had implications for the calculation of marine plastic pollution potential, which requires calculation of the proportion of plastic in total waste composition.
  - There was some information pertaining to the collection service coverage and waste capture rate for commercials presented in the audit report, however it is difficult to confidently extrapolate the results of the indicator to the national level due to the data insufficiency. See **Section 3.2.**
- There was no information pertaining to Supplementary KPIs 6 and 10.

In the future, improved data capture and data quality will benefit performance assessment by reducing the extent to which assumptions and substitutions are necessary. In turn, the KPIs will reflect a more accurate depiction of the status of waste management in the Solomon Islands.

3.2 KPI Reporting Results

The following sections present the results of the collated and analysed waste audit data for each of the eight core and ten supplementary KPIs introduced in the DCMR Framework. The results of the analysis will serve as a baseline position for Samoa to compare future data to, and to guide subsequent waste management or waste data related activities.

Core KPI 1: Count / capacity of modern waste facilities

Result	**Count of modern waste facilities: 0** • Samoa has two designated waste disposal sites: – Tafaigata, a sanitary dump located on the most populated island, Upolu. – Vaiaata, a semi-aerobic landfill located on the island of Savai'i. • While the government owns and manages Samoa's landfill sites, private companies are responsible for the daily waste treatment, storage, and disposal operations. • Tafaigata landfill has a gatehouse, recyclables segregation area, hazardous waste incinerator, and wastewater lagoons. However, it cannot be classified as 'modern' as the original waste cells are full, and waste is currently being sent to cells with no lining and therefore lack leachate management. • According to the report, Vaiaata landfill on Savai'I has fewer on-site facilities than Tafaigata and limited monitoring. Whilst leachate is collected, the quality of leachate is not monitored. No information on the daily covering of waste was identified in the report. Therefore, it cannot be classified as a 'modern' facility under the DCMR framework. **Capacity of modern waste facilities (tonnes per annum): 0** • Since none of the disposal facilities in Samoa meet 'modern' requirements, the capacity of 'modern' facilities is 0.
Assumptions	• None
Data gaps	• No information regarding use of a cover system at Vaiaata landfill. • No estimates or parameters were used to calculate the maximum annual processing capacity (tpa) at Tafaigata and Vaiaata.
Key considerations	• There are no landfills or dumpsites in Samoa which are up to 'modern' standards. • Issues with leachate management at these facilities mean that both the environment and community are at risk of hazards due to contamination and material flow. • No daily cover usage at the landfill sites means that these sites are very susceptible to material flow during climate-related weather events such as cyclones. • Investment to upgrade existing landfills in Samoa to meet with modern standards/best practice will lead to better outcomes for the local environment and community health. • The National Solid Waste Management Strategy 2019-2023 highlights key priorities for improving landfill disposal in Samoa, including establishing monitoring systems for rubbish collection and landfill operations, developing manuals and regulations, and exploring options for expanding or relocating the landfill through public-private partnerships.

Core KPI 2: Count / capacity of unregulated waste facilities

Result	**Count of unregulated waste facilities**: **2** • At the time of the audit, the total number of 'unregulated' dumpsites in Samoa was unknown. Therefore, the count of 'unregulated' facilities reported to this KPI reflects only the number of sites that were audited during the 2020 landfill audits. As such, it may not representative of the true amount of unregulated sites in Samoa. **Capacity of unregulated waste facilities (tonnes per annum): No data** – Tafaigata landfill: 50,000m^2 capacity remaining at time of audit. Designated waste cells are at capacity and need extension. – Vaiaata landfill: 80,000m^2 capacity remaining at time of audit. • Information regarding the current and maximum storage and processing capacities of either disposal site in tonnes per annum was not identified in the report.
Assumptions	• None
Data gaps	• No estimates or parameters were used to calculate the maximum annual processing capacity (tpa) of Samoan disposal sites. • No information is available on the current and total capacity of the sites. • The total number of unregulated dumpsites in Samoa is unknown.
Key considerations	• The audit only examined Tafaigata landfill and Vaiaata landfill, both of which are 'unregulated'. • It is recommended that the number, location, name, operations of all landfills/dumpsites and recovery facilities are collated for future reporting to this performance indicator. • Lack of leachate management at these facilities means that both the environment and community are at risk of hazards due to contamination and material flow. • No daily cover usage at the landfill sites means that these sites are very susceptible to material flow during climate-related weather events such as cyclones. • The identified unregulated facilities present investment opportunities to upgrade existing sites to align with best practice. Reducing the number of these facilities will lead to better outcomes for the local environmental and community health.

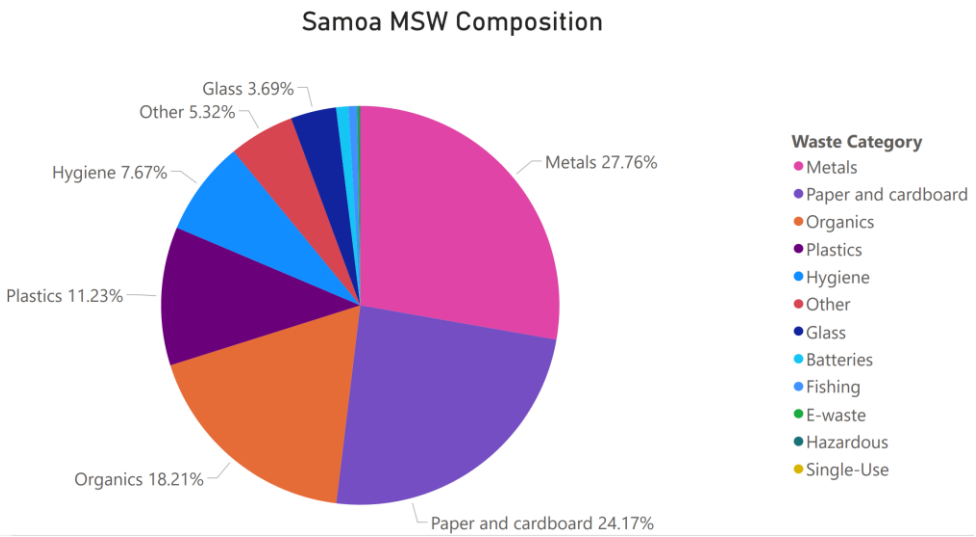
Core KPI 3: National recovery rate

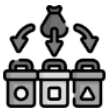
Results	**National recovery rate (%): 28.58%** Private operators are responsible for all of Samoa's recycling sector. Despite the *Waste Management Act 2010* providing a thorough legal framework for waste management and recycling, at the time of the audit report there hadbeen little progress made in drafting or implementing the necessary mechanisms, such as legal, regulatory, financing, and coordination institutions. As such, recycling in Samoa is limited. • Waste targeted by the private sector includes: – Used lead acid batteries – E-waste – Glass bottles – Aluminium cans, and other – Scrap metals – PET – Used oil According to the audit report: • There are no national recovery facilities. • Systematic source separation does not occur in Samoa and there are no transfer stations, apart from a few aluminium can collection cages in Apia. • Waste pickers work at landfill to recover valuable recyclable materials. These are then sold to recyclers who compact and ship the materials internationally, or else they are stockpiled in Samoa. • Green waste is often segregated and composted by householders, but no data was available to the auditors to quantify this.
Assumptions	• Examination of raw audit data resulted in the estimation of 1080.2 tpa of waste being recovered in Samoa. • Since estimates for the weight of waste disposed (tpa) are only presented for one landfill (Tafaigata), an estimate only of the total amount of waste generated in Samoa (tpa) is used. • Of the material categories targeted for recovery in Samoa, a total of 3779 tpa of waste is generated per year. • The recovery rate presented is the proportion of waste which is targeted for recovery in Samoa that is successfully recovered over the amount of that waste which is generated annually.
Data gaps	• Limited information on the total quantity of waste received by all facilities (tpa). Only information for Tafaigata landfill was provided. • The total number of unregulated dumpsites in Samoa is unknown.
Key considerations	• Using the available data provided by the audit, approximately 30% of the generated materials in Samoa targeted for recovery are successfully diverted from landfill each year. • It is recommended that future audits follow the suggested methodologies presented in the DCMR framework to collate data for calculation of this performance indicator.

Core KPI 4: Per capita waste generation rate

Results	**Per capita waste generation rate (kg/capita/year): 93.7** – kg/capita/day: 0.257 – kg/household/day: 1.69
Assumptions	• Household waste audit data was converted from a per household basis to a per capita basis, then grouped and averaged based on geographic position (i.e. rural, semi-urban or urban), and extrapolated using census data of the national population. • The islands of Apolima and Manono were not audited and as such no household data was available. An assumed 'rural' average waste generation rate was used based on household audit data provided for 'rural' Upolu and Savai'i. • The populations of each island in Samoa were sourced from the 2021 national census.
Data gaps	• No information collected for the two islands of Manono and Apolima.
Key considerations	• Future per capita waste generation rates will provide insight into waste management trends and changes for Samoa.

Core KPI 5: Municipal Solid Waste (MSW) Composition

Results	Metals are the most prevalent waste type of waste generated in Samoa. This is followed by paper and cardboard, and then organics. • Metals: 27.76% • Paper & Cardboard: 24.17% • Organics: 18.21%  Figure 1 Samoa Municipal Solid Waste (MSW) composition (% by weight)
Assumptions	• Recorded waste audit composition categories were organised into broader categories as used in the PRIF waste audit guidelines. Past audits may record different categories. • The islands of Apolima and Manono were assigned average 'rural' household waste composition proportions based on Savai'i and rural Upolu. • The total waste generated for each island in Samoa (Upolu, Savai'i, Apolima, and Manono) was converted from a weight to a percentage, from a total weight of 26,982 tonnes. This means that the composition proportions presented here are reflective of all waste streams, not just household waste.
Data gaps	• The figure presented in the audit report for household composition does not provide quantitative proportion percentages for every waste category present in the figure. – Raw audit data was examined, but the composition results could not be identified within the dataset. Thus, the household waste composition presented here differ from the 2020 audit.
Key considerations	• Impacts of the pandemic and climate change or weather events will have changed the proportions of waste types sourced from households. • Household waste compositions provide an insight into the types of waste contained inside the MSW stream. Knowledge of the waste types and proportion of these wastes present within the household waste stream allows for targeted decision making and prioritisation of problem waste types.



Core KPI 6: Household waste capture rate

Results	**Household waste capture rate (%): 94.03** – Total weight of household waste generated = 19,268 – Total weight of household waste captured responsibly = 18,119
Assumptions	• The survey and audits did not collect measurements of the weight of waste captured by management services. As such, census data was used and extrapolated across household audit results. $$Household\ waste\ capture\ rate\ (\%) = \frac{weight\ of\ managed\ waste\ (tpa)}{total\ household\ waste\ generated\ (tpa)}$$ Total weight of managed waste is calculated as the product of: $$weight\ of\ managed\ waste\ (tpa) = \frac{household\ collection\ coverage\ (\%)}{total\ household\ waste\ generated\ (tpa)}$$ Collection service coverage (%) is the product of: $$household\ collection\ coverage\ (\%) = \frac{number\ of\ households\ with\ some\ form\ of\ collection\ service}{total\ number\ of\ households}$$ Total household waste generated is the summation of waste generation tonnages for all sampling locations. Waste generation rates for individual sampling locations are calculated by: $$total\ household\ waste\ generated\ (tpa) = average\ waste\ generation\ rate\ of\ location\left(\frac{kg}{\frac{capita}{year}}\right) \times location\ population$$ • See KPI 7 for reported service coverage results. • Using data from Upolu (Apia) and Savai'i to represent all urban and rural areas during KPI calculation results in an inflated calculation result for the weight of managed waste. Extrapolation to the national level results in a very high collection coverage.
Data gaps	• No audit or interview data was recorded on Apolima and Manono. • No information pertaining to the weight of waste captured by waste management services in Samoa.
Key considerations	• A waste capture rate of 94% at the national scale is unrealistic. The audit report states that only 50% of households use the government-provided free collection services in Samoa. (The data used to reach this figure was not identified in the audit report or the raw dataset.) • The calculation for this performance indicator was heavily reliant on a range of assumptions. Most notably, the urban and rural zone collection coverages were extrapolated at the national level, based on survey results presented in the audit report. • It is recommended that future data collection includes data from multiple locations representing both rural and urban areas. • This KPI is expected to change significantly in the future as relevant data is collected to calculate the household waste capture rate more accurately.

Core KPI 7: Household collection service coverage

Results	**Household collection service coverage (%): 93.90** • A free public collection service is provided by the government for waste collections in Samoa. • The presented figure is likely to be unrealistic, as it contradicts with other figures mentioned in the report. It is likely inflated due to almost all household survey respondents indicating they had access to some form collection service.
Assumptions	• Interview results indicating the number of households with access to a collection service were extrapolated to the national level. From a total of 120 household interviews: – 94.5% service coverage was reported in Upolu. – 92% service coverage was reported for Savai'i. • With Upolu (Apia) and Savai'i being used representatively for all urban and rural areas during KPI calculation, extrapolation to the national level portrayed that Samoa had near-perfect collection coverage. • Both of the sampled islands conducted interviews in areas with existing collection services.
Data gaps	• No data collected for Manono and Apolima. • Information on service coverage within the report pertaining to areas outside of audited locations is limited.
Key considerations	• A coverage of 94% is likely unrealistic. Data from the MNRE in 2019 reported a collection service coverage by amount of 38% for the island of Upolu. The result presented for this performance indicator contradicts previously published data. This is likely because of the high collection service coverage indicated by the participants of the household surveys. • The report states that only 50% of households use the government-provided free collection services in Samoa. (The data used to reach the 50% conclusion in the 2020 report was not identified in the audit report or the raw dataset.) • This figure will become more accurate as additional data is collected using the DCMR Framework's suggested community survey. The survey data collection method will provide more representative results in the future. The result of this indicator is expected to change significantly.

Core KPI 8: Fulfillment of Multilateral Environmental Agreement (MEA) reporting requirements

Results	**Fulfillment of MEA reporting requirements (%): 51.67%**

Convention	Status	Reporting requirements	Reports delivered
Basel Convention	Accession	Annual reports (20)	3
Minamata Convention	Ratification	First national report due in 2019 (1)	1
Stockholm Convention	Ratification	5 reporting cycles (5)	2

Assumptions	• Only MEA's with mandatory reporting requirements were included in the calculation of this KPI. • For conventions like the Waigani Convention, strict reporting requirements are not enforced and so are not included in the calculation.
Data gaps	• None
Key considerations	• Whilst Samoa has satisfied the requirements of reporting to the Minamata Convention, Samoa is behind on national reports for the Stockholm Conventions.

Supplementary KPI 1: Cost of disposal to landfill

	Cost of disposal to landfill ($/tonne): US$164 • According to MNRE data presented in the audit report, the cost of operating the two designated national waste landfills is US $164 per tonne.
	• None
	• None
	• This figure was directly sourced from the audit report. • Completion of the waste facility register suggested by the DCMR Framework will provide sufficient data to accurately calculate this indicator to work as a benchmark for comparing disposal costs against previous periods, other countries, and the region.

Supplementary KPI 2: Total weight of waste disposed

Results	**Total weight of waste disposed (tonnes per annum): 13,600** • The audit reported identified that approximately 11,500 tonnes of waste were disposed of at Tafaigata landfill in 2020. No similar figures are provided for Vaiaata.
Assumptions	• The result is the total waste generation for each island in 2020, divided by the proportion of waste that entered Tafaigata from total Upolu waste generated in 2020. Majority of waste generated in Samoa is on Upolu (serviced by the country's main landfill, Tafaigata landfill).
Data gaps	• Limited information to calculate the annual quantity of waste disposed (tpa), as tonnages were only reported for Tafaigata. No weight of waste to landfill was reported for the other islands.
Key considerations	• This performance indicator provides an indication of the effectiveness of a country's waste management system in diverting waste from the environment via landfill. This result can be used to evaluate the need for additional investment into waste disposal infrastructure and identify opportunities for improved recycling. • This measurement is expected to change considerably once data is collected from other facilities in the future using the waste facility register suggested in the DCMR Framework.

Supplementary KPI 3: Total weight of waste recovered

Results	**Total weight of waste recovered (tonnes per annum): 1,080** • This result is a summation of recovery weights sourced directly from the audit report and raw dataset. • Waste targeted by private sector recovery operators includes: – Used lead acid batteries – E-waste – Glass bottles – Aluminium cans, and other – Scrap metals – PET – Used oil
Assumptions	• The result is the total amount of waste recovered, divided by the assumed national total waste generation.
Data gaps	• None
Key considerations	• Of the material categories targeted for recovery in Samoa, a total of 1,080 tpa of waste is diverted from landfill per year. • Calculation of this performance indicator requires the completion of the waste facility register with the inclusion of data for any recovery facilities operating in Samoa. This will provide an indication of the effectiveness of a country's waste management systems, recovery systems and infrastructure, and a comparative data point for other countries and time periods.

Supplementary KPI 4: Volume and type of stockpiled hazardous waste

Results	**Volume and type of stockpiled hazardous wastes (m^3):** – Asbestos: 0 (for audited sites) – E-waste: 3 m^3 – Healthcare and pharmaceutical waste: Insufficient data – Used oil: 264 m^3 – Used tyres: 139 m^3 – Obsolete chemicals: 0 (for audited sites)
Assumptions	• None
Data gaps	• Additional stockpiles of hazardous wastes are assumed to exist. • Weights of stockpiles of healthcare and pharmaceutical waste were provided in the audit report. However, there was insufficient information to convert these figures into volumes for the purpose of this performance indicator. • Currently waste oils are stockpiled in backyards as there is no collection or recycling program for them in Samoa. An estimated 500,000 litres have accumulated over many years across various locations in Samoa, including vehicular and mechanic workshops, power stations, transportation companies and oil importers and suppliers. This was not audited but was mentioned in the audit report.
Key considerations	• The volume of other hazardous waste stockpiles in Samoa remains unknown. • It is recommended that future stockpile audits record the estimated volume of each category of hazardous waste separately to provide an indication of the size and presence of stockpiled hazardous waste in Samoa. • Landfill audits, stockpile assessments, and the completion of the waste facility register proposed by the DCMR Framework will provide the information required to calculate this performance indicator.

Supplementary KPI 5: Marine plastic pollution potential

Results	**Marine plastic pollution potential (tonnes per annum): 129**
Assumptions	• Assumes a national weight of mismanaged waste, based on household audit samples. – This calculation uses the total weight of waste generated, subtracted by the weight of waste captured by collection services. The difference is the estimate for mismanaged waste used in this calculation. – Mismanaged waste is defined as all waste which is not captured in collection services, and ends up buried / burned / littered etc. • Uses proportion of plastics captured in MSW composition.
Data gaps	• Requires a more reliable metric for mismanaged waste. • Data gaps from Core KPI 5 (MSW composition) limit the accuracy of this performance indicator result.
Key considerations	• Waste plastics which are not managed in an environmentally sound manner are assumed to pose a significant risk of polluting oceans and estuarine waterways.

Supplementary KPI 6: Awareness of waste management services

Results	**Awareness of waste services (%): No data**
Assumptions	• None
Data gaps	• Unable to calculate based on audit reports as this performance indicator requires completion of community survey, specifically gathering responses on: – Number of positive responses indicating awareness; – Number of available services; and, – Number of survey participants.
Key considerations	• Completion of the community survey in the future is required to report to this KPI. Monitoring the community's awareness provides an indication of the success of education initiatives and effective use of existing waste management services.

Supplementary KPI 7: Proportion of strategic waste management initiatives implemented

	Proportion of waste management initiatives implemented (%): 84.00 – Number of successfully implemented initiatives = 21 out 25 – Number of pipeline initiatives = 4 • Implemented initiatives include: – Samoa's Waste Management Act 2010 – National Environment Sector Plan 2017-2021 – National Waste Management Strategy 2019-2023 • Pipeline initiatives include: – Container deposit scheme – Wastewater treatment residential extension – Review of MNRE legislation
Assumptions	• None
Data gaps	• None
Key considerations	• A recent addition is the *Waste (Plastic Bag) Management Regulations* signed in 2018, which bans plastic shopping bags, packaging, straws, styrofoam food containers, and cups, with exemptions for some food packaging. The ban takes effect over several stages, allowing businesses and the public time to prepare.

Supplementary KPI 8: Commercial waste capture rate

Results	• Commercial waste capture rate (%): Insufficient data • Measured as the fraction of the total waste captured through formal waste management services over the total waste generated by businesses. • Without estimates of commercial waste generation rates and the number of businesses, this indicator cannot be calculated.
Assumptions	• None
Data gaps	• No estimate for the total amount of commercial waste successfully captured by management services identified. • No information on the number of businesses in Samoa provided in the report. • No information on waste generation rates of businesses or total amount of waste generated by businesses provided.
Key considerations	• Accurate calculation relies on an estimate of total numbers of businesses in the country categorised by business type, and an estimate of the commercial waste generation rates for each business type. • Completion of business surveys suggested in the DCMR Framework will provide an indication of how many businesses are using collection services, and other forms of waste management, and to what extent these businesses access the service.

Supplementary KPI 9: Commercial collection service coverage

Results	**Commercial collection service coverage (%): Insufficient data** • The report confirms that businesses on all of Samoa's populated islands have access to collection services. • Businesses are responsible for their own waste disposal, either by transport directly to landfill or via collection contractors. The report details the frequency and zones for Upolu and Savai'i. • It is likely that a large proportion of businesses in Samoa can access the collection services. However, the audit report did not present information allowing for the calculation of the proportion of businesses in Samoa with access to a collection service.
Assumptions	• None
Data gaps	• The audit report did not quantify access to alternative collection services used by businesses (e.g., waste disposal-points or self-haul) however the different disposal methods indicated by respondents was listed. • No information on the total number of businesses participating nationally, and specific collection service coverages for businesses.
Key considerations	• Commercial waste collection services are available in Samoa, but there was insufficient data to report to this performance indicator. • Accurate calculation relies on understanding the total number of businesses participating nationally, and specific collection service coverages for businesses. • Completion of business surveys suggested in the DCMR Framework, would provide an indication of how regular, accessible, and affordable collection services are for businesses.

Supplementary KPI 10: Weight of disaster waste disposed

Results	**Weight of disaster waste disposed (tpa): No data** • Measured as a sum of the recorded weight of disaster waste disposed to landfill or received and stockpiled at waste facility following a disaster event. No disaster waste data was recorded during the examined audits.
Assumptions	• Only captures disaster waste which ends up disposed of or stored at waste facilities, including landfills, disposal sites and recovery facilities. • Assumes that the waste facility register has been completed to capture disaster waste information separately of other waste loads received post-event (i.e., information on disaster waste categorised separately to other waste types/streams).
Data gaps	• The calculation of this performance indicator relies on estimations of the weight of disaster waste (tonnes) landfilled or received at a waste disposal facility following disaster events.
Key considerations	• Calculation of this performance indicator provides an estimate of the amount of disaster waste being effectively managed and the total amount of disaster waste generated in a year. • Calculating this KPI can be undertaken by regularly updating the waste facility register. Tracking the vehicle capacity and percentage fullness of the load of any 'disaster waste' carrying vehicles entering the facility will help reconcile waste amounts disposed if these wastes are not managed separately.

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