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PacWastePlus
PACIFIC WASTE MANAGEMENT

This initiative is supported by **PacWastePlus**-a 85-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.**

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Tonga National Waste Audit Analysis Report

June 2025

This Waste data collation, analysis and reporting for the Tonga 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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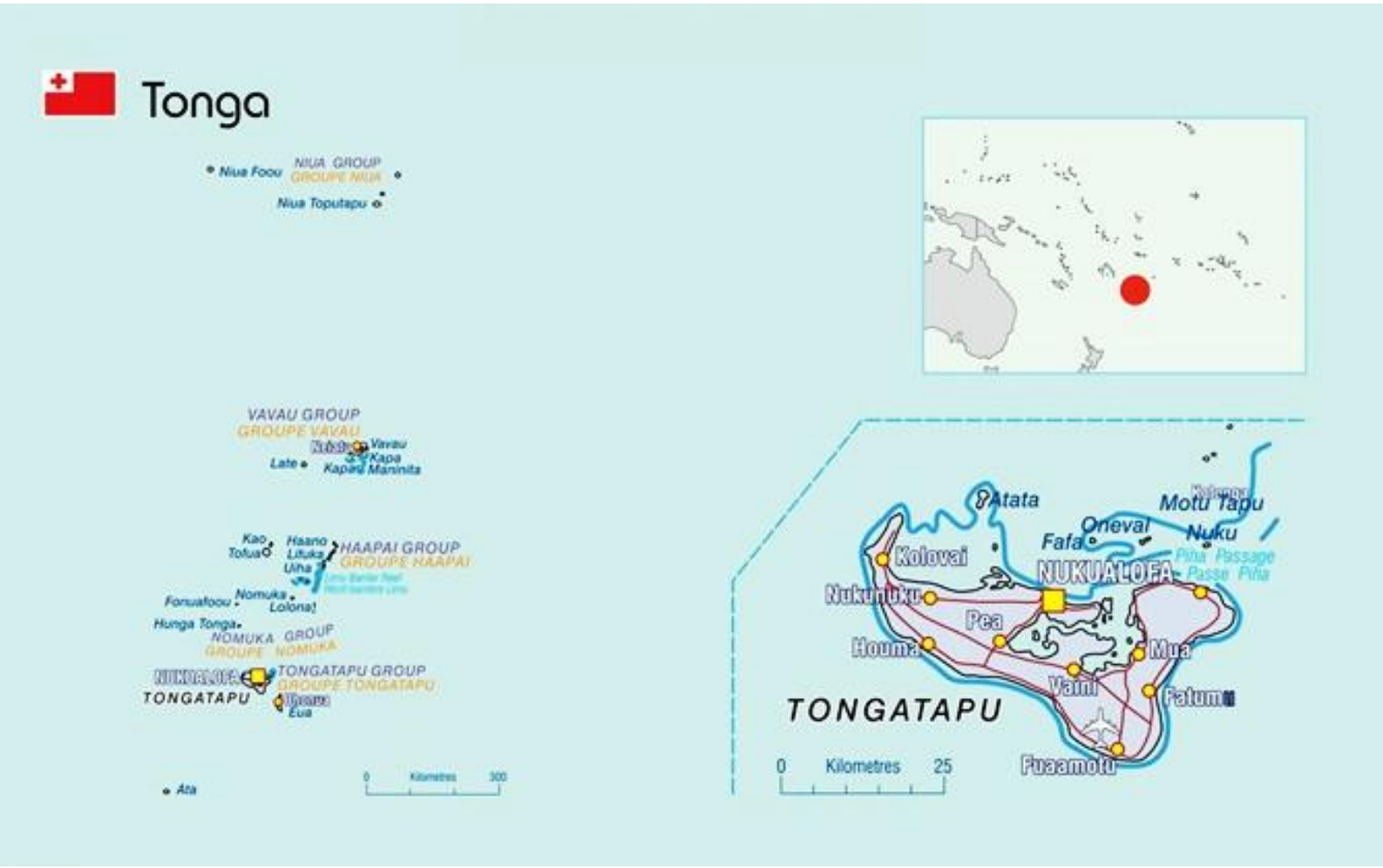
Map of Tonga



Source: Communauté du Pacifique (CPS)

Glossary

Acronym	Definition
C&D	Construction and Demolition (Waste)
C&I	Commercial and Industrial (Waste)
DCMR	Data Strategy & Collection, Monitoring, and Reporting (Framework)
GRC	Gio Recycling Company
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
SRM	Sustainable Resource Recovery Company
WAL	Waste Authority Limited

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 Tonga 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 consistently and reliably across the Pacific.

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

Core KPIs	Result	Supplementary KPIs	Result
1. Count / capacity of modern waste facilities	2 / Capacity unknown	1. Cost of disposal to landfill ($/tonne)	US $12.81
2. Count / Capacity of unregulated waste facilities	3 / Capacity unknown	2. Weight of waste disposed (tpa)	22,297.40
3. National recovery rate (%)	8.57%	3. Weight of waste recovered (tpa)	1,590
4. Per capita waste generation rate (kg/capita/year)	56.23	4. Volume and type of stockpiled hazardous waste (m^3)	Asbestos:32.50 E-waste 272.00 Healthcare and pharmaceutical 0.00 Used oil 223.20 Used tyres 4.00 Obsolete chemicals 1.00
5. Municipal Solid Waste (MSW) composition (%)	Figure (a)	5. Marine plastic pollution potential (tpa)	5.85
6. Household waste capture rate (%)	99%	6. Awareness and support of waste management services (%)	86%
7. Household collection service coverage (%)	99%	7. Proportion of strategic waste management initiatives implemented (%)	82%
8. Fulfillment of MEA reporting requirements (%)	44%	8. Commercial waste capture rate (%)	100%
		9. Commercial collection service coverage (%)	100%
		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.

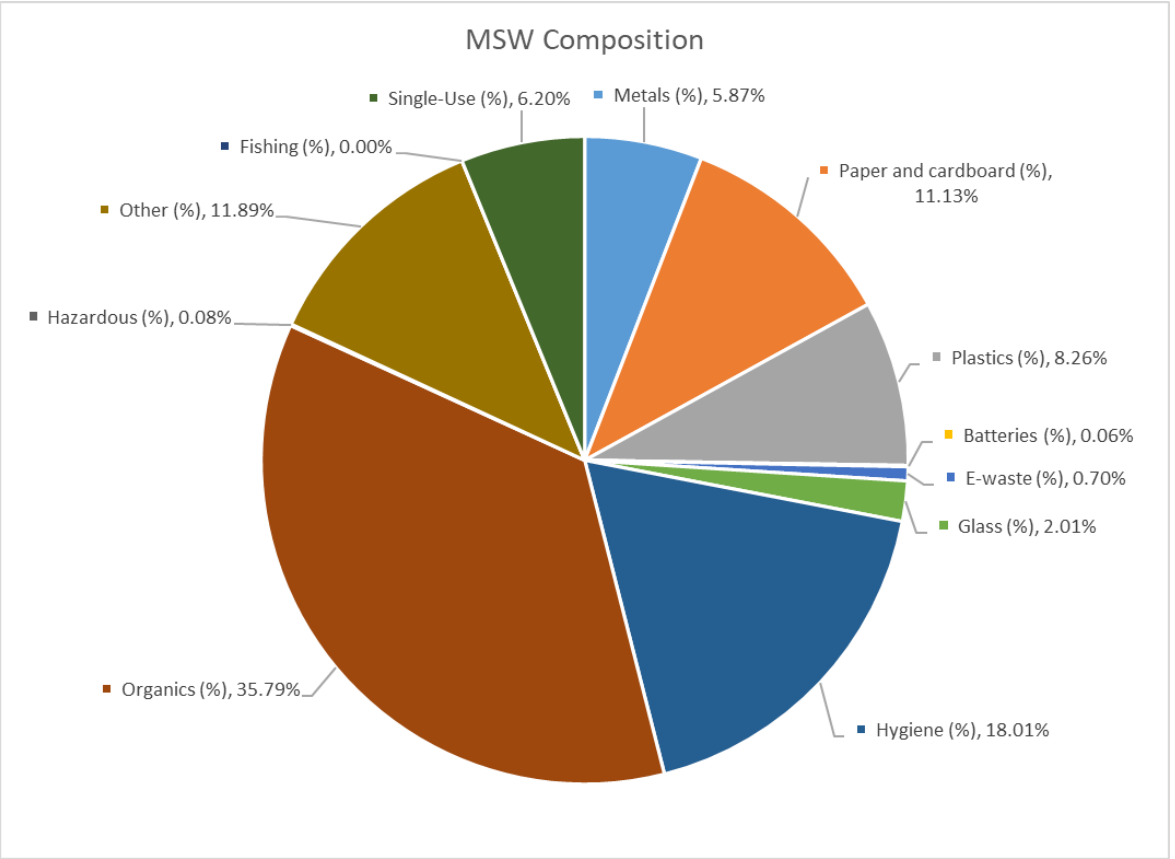


Figure (a) Tonga Municipal Solid Waste (MSW) Composition (% by weight)

1 Introduction

1.1 Background

Tonga 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 waste to protect human health and the environment. Tonga's waste management practices are reliable and diversified. There is a range of collection services and disposal measures in place for different types of waste (e.g., commercial waste, household waste, hazardous waste). Organic waste is often composted by households and or mulched for reuse by the community. In Tonga, recycling efforts are primarily driven by the private sector. Recycling companies collect materials such as used lead-acid batteries (ULABs) and scrap metal, which have maintained their market value in recent years.

Tonga had several projects in the pipeline (at the time the audit report) to enhance waste management and recycling in the country, including:

- Introduction of an Advance Recycling and Disposal Fee, supported by the Pacific Waste and Pollution Prevention (PWP) program.
- Provision of waste bins to all households in Tonga and expansion of collection services to the rest of Tonga.
- Upgrading of the Ha'apai and 'Eua Waste Disposal Sites under the Global Environment Facility Islands funding.
- Establishment of a composting facility at Tapuhia Waste Landfill for efficient management of green waste.

However, although adequately managed, landfills on each of the three islands lack appropriate equipment and are reaching capacity. In addition, plastics pose a major problem to waste management and are generally not separated, stockpiled, or recycled. Investment in infrastructure, implementation of data-guided decision making, and increased general waste management education will improve the current situation.

1.2 Purpose and Aim

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

The aim of this report is to:

- Validate pre-existing national waste audit data;
- Collect additional data to inform data gaps from the Cook Islands 2023 National Waste Analysis Report; 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 waste audit analysis report is limited to the following waste data collected in Tonga:

- **Waste audit report 2021**: The audit was undertaken by Asia Pacific Waste Consultants (APWC) between March and April 2021 and provided an evaluation of household and business waste generated in Tonga. Audit data and information was obtained via interviews and collections from 207 households and 49 businesses. The audit report also provided an assessment of the state of Tonga's landfills including landfill audits and stockpile assessments.
- **2023 National Analysis Report**

- **2023 Tonga analysis Report**
- **2025 Additional Data and Waste Facility Register**

This national report examines the MSW, commercial and industrial (C&I), and landfill waste streams. Landfills may receive a broad array of waste types including construction and demolition (C&D) waste, hazardous waste and disaster 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

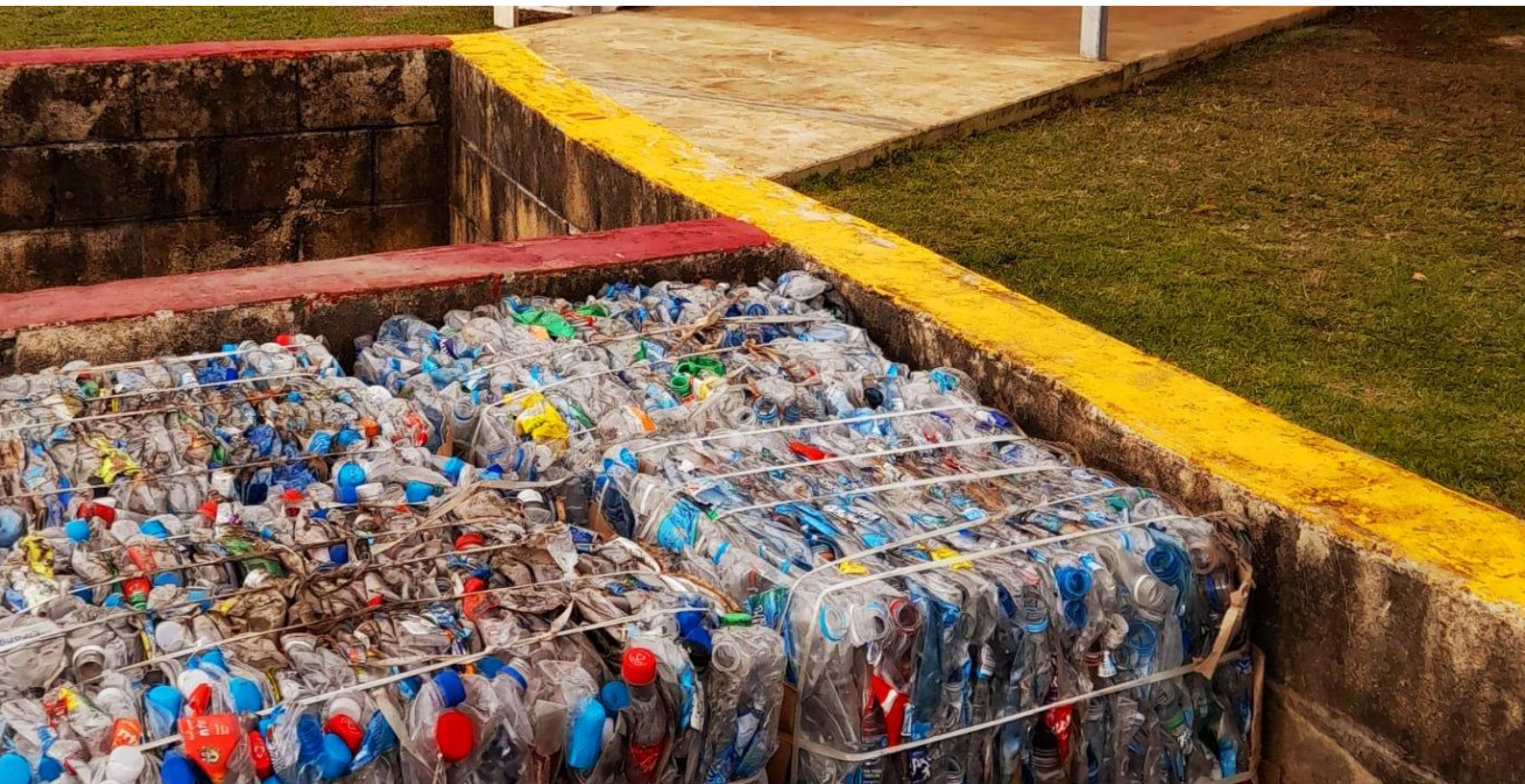
Tonga, officially known as the Kingdom of Tonga, is located in the South Pacific Ocean. It consists of 171 islands, of which 40 are permanently inhabited, and is divided into five administrative island divisions: Tongatapu, Ha'apai, Vava'u, 'Eua, and Ongo Niua. The capital city of Tonga is Nuku'alofa, located on the island of Tongatapu. Tonga has a population of approximately 100,000 and a total land area of 749 square kilometres.

Tonga does not have a comprehensive and integrated waste management strategy to guide overall resource recovery and waste management challenges. Instead, waste management falls under the umbrella of general environmental legislation, regulation and strategy. The Government developed *Waste Management Act Cap 14.06 (as at 2020)*, including *Waste Management (Plastic Levy) Regulations Cap 14.06.01*, which provides for the development of the waste management sector, with wide-ranging powers and responsibilities for the Waste Authority Limited (WAL).

The responsibility for managing solid waste is divided among various institutions in Tonga, 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 Ministry of Meteorology, Energy, Information, Disaster Management, Environment, Climate Change and Communications.
- Local councils: Led by district and town officers to coordinate meetings and promote government developments and activities, including waste management.

Government public enterprises and other waste collection contractors and private recyclers also play a role in the waste management and resource recovery sector.



2 Methodology

Waste data collation, analysis and reporting were 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 consistently and reliably 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	Year	Location/s	Sample Size/s	Method for Data Collection
Tonga Waste Characterization and Situation Analysis	2021	Ha'apai, Vava'u, Tongatapu	250	Household audit
Tonga Waste Characterization and Situation Analysis	2021	Ha'apai, Vava'u, Tongatapu	208	Household survey
Tonga Waste Characterization and Situation Analysis	2021	Ha'apai, Vava'u, Tongatapu	48	Commercial audit
Tonga Waste Characterization and Situation Analysis	2021	Ha'apai, Vava'u, Tongatapu	49	Commercial survey
Tonga National Waste Audit Analysis Report	2023	The National Waste Audit Analysis Report uses data from the Waste Audit Report outlined above.		
Waste Facility Register	2025	Tonga	5	Facility registers

2.2 Data Analysis

The datasets listed in the table above were analysed for relevant information to be collated into PICT specific databases. The extracted data was then used to calculate the 18 KPIs according to the calculation methodologies as detailed in the DCMR Framework. The main assumptions made and challenges met 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 the corresponding KPI in section 3.0 Analysis.

2.2.1 Main Assumptions

The main assumption is that the previously collected data is representative of the goals of the current project. Previous audit was conducted on a large and geographically dispersed sample of households and businesses, but the method of sampling was cross-sectional, i.e., multiple samples were collected at one point in time. Therefore, for these results to be representative, we need to make two key assumptions:

Seasonal variation in waste generation and composition is non-existent or low,

Large time-frame variation (several years) in waste generation and composition is non-existent or low.

While there are solid grounds for these assumptions, there are no empirical records to support them.

Specific assumptions for each KPI calculations are also discussed in Section KPI Reporting Results. For calculation of national averages involving different geographical locations, weighting is done to ensure a more representative value at the national level. This applies to both household/commercial audits and community surveys.

2.2.2 Main Challenges

The collection and analysis of data to measure the KPIs can be quite challenging in the Pacific Region due to the following:

1. Oftentimes, facilities do not carry licenses and as such, capacity to accept waste is not always known. In most cases, operation exceeds capacity due to lack of foresight on the remaining capacity. In addition, planning for new waste facilities can be daunting due to limited options to locate a site. The reasons could be land tenure, site suitability especially for atoll islands, and community approval for potential sites within human settlements.
2. Most of the waste facilities did not undergo Environmental Impact Assessment and as such are operating without necessary environmental controls. This could have been addressed in the licensing process but is not happening due to limited options available to site the facilities.
3. Data collection relies on guess estimates due to lack of proper recording system of waste material flow and receipt of these materials in the facilities. There maybe weighbridges in a few disposal sites but these are not well maintained and calibrated and not functioning all the time. The measurement of capture rate could be very challenging with the lack of data on wastes received in the facilities.
4. It is hard to determine recovery of materials to calculate national recovery rate since most of the materials remain stockpiled and not processed or exported and as such cannot be considered a return to economy. Diverting organic materials from the landfill may be practiced in some PICs but not necessarily processed to become compost or mulch – just dumped in a vacant land.
5. Request for information from the countries is very challenging given the very limited time to deliver this project. Based on Consultants' experience working in the Pacific, requested data may be likely provided within four months at a minimum.
6. Most landfills are unregulated and are operating sub-standardly and cost may not reflect what should have been spent. Also, most landfills operate on a fixed budget and do not consider changing disposal pattern and as such performance improvement cannot be monitored through disposal costs.
7. There is difficulty in locating stockpiles since some of these are stored in backyards with no proper storage facility. Most of the stockpiles are unreported.
8. There seems to be ambiguity in measuring success of initiatives since there is no established M & E framework in national implementation of projects unless the project is regional in scope with donor funding
9. Most landfills are not recording incoming disaster waste since these are emergency actions which are not closely monitored. Some PICs may have disaster wastes dumped anywhere close to the affected areas and remain there for a long time. Demolition may take years.
10. While the introduction of Kobo Toolbox may be helpful in recording data on the spot, there is some degree of reluctance on its use with more preference still given to the paper record. An intensive training on its use as part of a separate data recording training would promote its wider use.

2.3 Key Performance Indicators

The DCMR Framework introduces a series of KPIs (see **Table 2)**. The KPIs were developed to guide data analysis to improve 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 are:

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

Table 2 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 to calculate 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
	10. Total weight of disaster waste disposed

Legend

Calculated with additional data	Calculated in previous report	No data

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

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 Tonga to compare future data 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: 2** • Count of modern waste facilities: 2 • • Waste management in Tonga primarily comprises of disposal to landfill on islands with waste management services. There is one officially designated disposal site on each of the islands of Tongatapu, Vava'u, Ha,apai, and 'Eua. • • The Tapuhia landfill on Tongatapu, and the Kalaka landfill on Vava'u can be classified as 'modern' facilities under the definition set in the DCMR Framework. • Sites are staffed, have dedicated equipment, leachate management in place and practice an incremental cover system. • Tapuhia landfill has an estimated lifespan of 30 years remaining, and daily soil cover is implemented on site. • Kalaka landfill implements soil cover when needed, but as of the time of the audit report, had reached capacity. **Capacity of modern waste facilities (tonnes per annum): No data** • Tapuhia landfill is 50% full. The capacity of 15,000 tpa has been doubled to 34,000 tpa with 2 out of 3 cells already full. • Kalaka landfill is already full.
Assumptions	None
Data gaps	• No estimates or parameters were used to calculate the maximum annual processing capacity (tpa) of Tapuhia and Kalaka disposal sites.
Key considerations	• Two waste facilities in Tonga are classified as 'modern' facilities. However, disposal sites on other islands do not classify as 'modern'. • The number, location, name and operations of all landfills and dumpsites should be collated for future reporting purposes.

Core KPI 2: Count / capacity of unregulated waste facilities

Result	**Count of unregulated waste facilities: 3** • The Faleloa disposal site in Ha'pai, and the Angaha disposal site on 'Eua island, cannot be classified as 'modern' waste facilities due to: • No leachate management: and • No cover systems. • Both sites are open disposal sites, and while recognised as the designated waste facilities for their respective islands, pose a risk to the community and environmental health due to the potential for pollution impacts. • The report also mentions that sewerage and sludge are disposed of via open ditches on Vava'u, Ha'apai, and 'Eua. • There is a recycling facility located in Vahe Vaini which reported waste material stockpiles. It has dedicated staff and equipment but no records of license. **Capacity of unregulated waste facilities (tonnes per annum): No data** • Ha'apai landfill is estimated to reach capacity around 2023.
Assumptions	None
Data gaps	• No estimates or parameters were used to calculate the maximum annual processing capacity (tpa) for the unregulated facilities.
Key considerations	• Two of four officially designated landfills or dumpsites in Tonga are not up to 'modern' standards and as such are classified as 'unregulated'. • The 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 dumpsites means that these sites are very susceptible to material flow during climate-related weather events such as cyclones. • Investment to upgrade existing landfills in Tonga to meet 'modern' standards/best practices will lead to better outcomes for the local environment and community health.

Core KPI 3: National recovery rate

Results	**National recovery rate (%): 8.57%** • Recycling in Tonga is performed by the private sector, through two companies that operate in Tongatapu, Vava'u and Ha'apai. At the time of the audit, these companies were Gio Recycling Company (GRC) and the Sustainable Resource Recovery Company (SRM). • Recycled materials include: – Metals (aluminium, iron, steel, copper, brass, and lead); – E-waste, batteries, car batteries, and vehicular parts such as engines, alternators, chassis, and radiators; – PVC; and, – Some white goods, power tools, generators, catalytic converters and transformers. • This waste is collected and exported to other countries.
Assumptions	• Estimates obtained through interviews were provided in the 2021 waste audit report for annual tonnages of recycled materials collected and exported by GRC and SRM. The combined tonnages of waste collected were used to calculate the total weight of waste diverted from the landfill, which was then subtracted from the total amount of waste received at the landfill. • Assumes an annual 18,553 tonnes of waste disposed in Tonga, and 1,590 tonnes of waste recovered.
Data gaps	• The estimates obtained on recyclable material per year may not accurately reflect the actual quantity of waste materials recovered. Maintaining records of the weight of recyclables collected and exported will provide more accuracy when reporting to this KPI in the future.
Key considerations	• Tonga is one of the few PICTs with access to dedicated waste recovery infrastructure via the private sector. At the time of the audit, there was no official recycling service/system. Kerbside recycling collections have now since become available. • Comparison of landfill audit data and the recycler interview estimates suggests that virtually all used-lead acid batteries, lead, brass, copper, and ferrous metals disposed of are recovered by the private recycling operations.

Core KPI 4: Per capita waste generation rate

Results	**Per capita waste generation rate (kg/capita/year): 56.23** – kg/capita/day: 0.15 – kg/household/day: 0.77
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 national average is weighted based on the number of households sampled in each area. Sample number for each area was based on geographical location. • Where provinces had no data available (i.e. 'Eua and Ongo Niua), an assumed 'rural average waste generation rate was used based on data from household audits performed in Vava'u and Ha'apai. • Population data used in the calculation was sourced from the 2021 national census.
Data gaps	• No household audit information was recorded on the islands of 'Eua and Ongo Niua. • Not all towns and villages represented in audits have corresponding data represented in the 2021 census.
Key considerations	• Future per capita waste generation rates will provide insight into waste management trends and changes for Tonga and allow for comparison within Tonga and across the region.

Core KPI 5: Municipal Solid Waste (MSW) composition

Results	Organics is the most prevalent waste category for household waste in Tonga. This is followed by hygiene, other waste, paper and cardboard, and plastics, detailed below: • Organics: 35.79% • Hygiene: 18.01% • Other waste: 11.89% • Paper and cardboard: 11.13% • Plastics: 8.26%

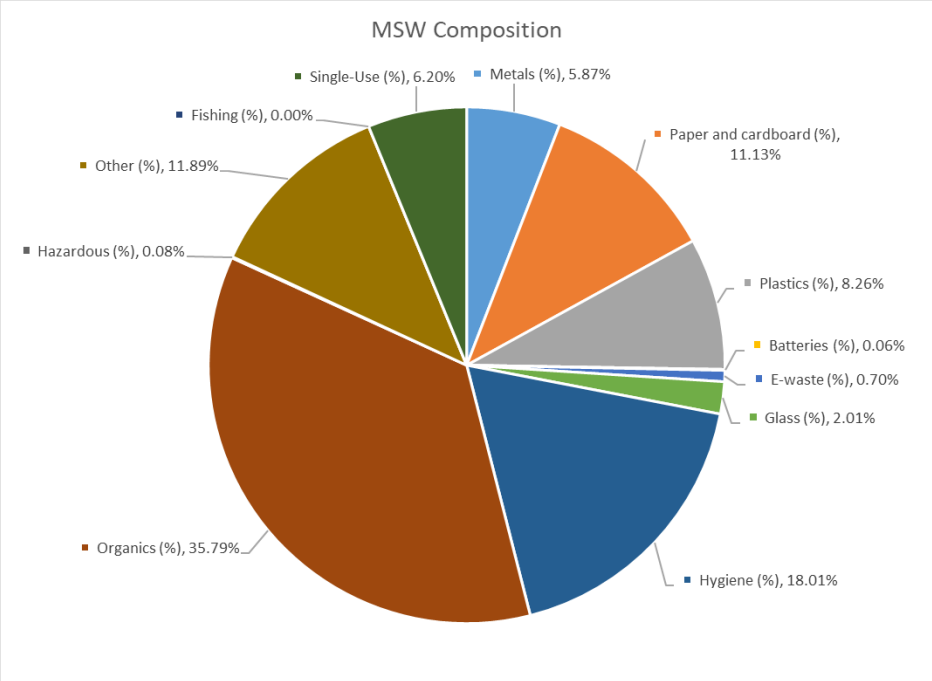


Figure 1 Tonga Municipal Solid Waste (MSW) composition (% by weight)

Assumptions	Where provinces had no data available (i.e. 'Eua and Ongo Niua), an assumed 'rural average waste generation rate was used based on data from household audits performed in Vava'u and Ha'apai.
Data gaps	• No household waste samples were collected on 'Eua and Ongo Niua
Key considerations	• The prevalence of organics in the household waste stream is likely due to reliance on local subsistence agriculture, as rural communities often have fewer options for food and goods, which can result in a greater reliance on locally grown or produced items. • Organics recovery systems, such as a local or national composting service could help support local farmers and reduce the amount of organic waste destined for landfill. • It is recommended that compositional data is updated data on a regular basis. 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 (%): 98.66%** – Total weight of household waste generated = 5,295 tpa – Total weight of household waste captured responsibly = 5,224 tpa
Assumptions	• The survey and audits did not capture each household's disposal method, nor the weight of waste captured by management services, so 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: $$total\ household\ waste\ generated\ (tpa) = average\ waste\ generation\ rate\ of\ location\left(\frac{\frac{kg}{capita}}{year}\right) \times location\ population$$
Data gaps	• The audit and conducted survey did not capture: – Information to quantify each household's disposal method; and – The weight of waste captured by management services.
Key considerations	• The vast majority of the waste generated in Tonga is captured by formal collection services. This includes waste drop-off to collection points by residents. • A high capture rate reflects a high participation in collection programs.

Core KPI 7: Household collection service coverage

Results	**Household collection service coverage (%): 98.58**
Assumptions	• Calculated using information based on 2021 census data, namely the number of households per sampled area. • No collection service coverages were identified in the report for Ongo Niua. This was assigned an average collection service coverage based on percentages for Va'vau, 'Eua, and Ha'apai.
Data gaps	• Data was collected for Va'vau, 'Eua, and Ha'apai, and extrapolated to other areas
Key considerations	• It is estimated that the majority of households have access to collection services. • The high collection coverage is notable. The report noted that new services had commenced in Ha'apai and Va'vau, leading to increased collection service coverage in recent years.

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

Results	**Fulfilment of MEA reporting requirements (%): 44.44%**			
	Convention	**Status**	**Reporting requirements**	**Reports delivered**
	Basel Convention	Accession	Annual reports (12)	1
	Minamata Convention	Accession	First national report due in 2019 (1)	1
	Stockholm Convention	Ratification	5 reporting cycles (4)	1
Assumptions	None			
Data gaps	• 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.			
Key considerations	• Tonga has satisfied the reporting requirements for the Minamata Convention on Mercury. • Tonga is behind on national reports for the Basel and Stockholm Conventions.			

Supplementary KPI 1: Cost of disposal to landfill

Results	**Cost of disposal to landfill ($/tonne): US $12.81**
Assumptions	• Operational costs for 2022 based on the audit report were used to represent the cost of disposal for all facilities in Tonga. • The cost in 2022 was AUD $445,107 which is equivalent to US$ 285,638 • This cost was divided by the estimated mass of material disposed of per annum of 22,297.40 tonnes per annum (see also Supplementary KPI 2).
Data gaps	• No disposal costs for specific facilities were provided, only the total expenditure for site operations and management.
Key considerations	• Operational costs for 2022 based on the audit report were used to represent the cost of disposal for all facilities in Tonga. • The cost in 2022 was AUD $445,107 which is equivalent to US$ 285,638 • This cost was divided by the estimated mass of material disposed of per annum of 22,297.40 tonnes per annum (see also Supplementary KPI 2).

Supplementary KPI 2: Total weight of waste disposed

Results	**Total weight of waste disposed (tonnes per annum): 22,297.40** • Total volume used is the sum of recorded volumes of waste in all the disposal facilities from June 2024 - May 2025 (where records for May were extrapolated to complete month)
Assumptions	• A volume to weight conversion factor of 0.20 tonnes/m3 was used.
Data gaps	• No record of the quantity of waste received at the recycling facility was disclosed due to reluctance of the owner to share business information.
Key considerations	• This KPI indicates the effectiveness of a country's waste management system in diverting waste from the environment via landfill. It allows for comparison against past and future results across Tonga and the region.

Supplementary KPI 3: Total weight of waste recovered

Results	**Total weight of waste recovered (tonnes per annum): 1,590** • Recycling in Tonga is performed by the private sector, via two companies who operate on Tongatapu, Vava'u and Ha'apai. At the time of the audit, these companies were Gio Recycling Company (GRC) and the Sustainable Resource Recovery Company (SRM). • Recycled materials include: – Metals (aluminium, iron, steel, copper, brass, and lead); – E-waste, batteries, car batteries, and vehicular parts such as engines, alternators, chassis, and radiators; – PVC; and, – Some white goods, power tools, generators, catalytic converters and transformers. • This waste is collected and exported to other countries.
Assumptions	• The auditors obtained estimates for the annual tonnages of recycled materials collected and exported by GRC and SRM through interviews. The combined tonnages of waste collected were used to calculate the total weight of waste recovered.
Data gaps	• The collected data may not accurately reflect the actual quantity of waste materials recovered. To obtain a more precise measure, it is recommended that specific records of weight collected and exported are collected and available during audits.
Key considerations	• Tonga is one of the few PICTs with access to dedicated waste recovery infrastructure, via the private sector. At the time of the audit, there was no official recycling service/system in place. Kerbside recycling collections have since become available.

Supplementary KPI 4: Volumes of stockpiled hazardous waste

Results	**Volumes of stockpiled hazardous wastes (m^3):** – Asbestos: 32.5 m^3 – E-waste: 272 – Healthcare and pharmaceutical waste: No data – Used oil: 223.2m^3 – Used tyres: 4 m^3 – Obsolete chemicals: 1 m^3
Assumptions	• The obsolete chemical stockpile comprises of acetylene gas bottles located at a GRC facility. • Asbestos is represented by roofing iron stockpiles.
Data gaps	• This data is taken to be representative of the total volume of material stockpiled, as additional sites are assumed to exist. • No information on healthcare and pharmaceutical waste was observed in the audit report. • E-waste was reported to be stockpiled in a recycling facility. • Used oil quantity was estimated and reported during the development of the Used Oil Management Plan

Key considerations	• According to the information available in the audit report, there are stockpiles of asbestos, used tyres, and obsolete chemicals in Tonga. • The volume of other hazardous waste stockpiles in Tonga remains unknown which makes it difficult to assess the potential risk posed to the community and environment. • 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. • Additional data was obtained, i.e., quantity of used oil from the Tonga Used Oil Analysis undertaken by Araspring, Ltd and e-waste stockpile in a recycling facility located at Vahe Vaini.

Supplementary KPI 5: Marine plastic pollution potential

Results	**Marine plastic pollution potential (tonnes per annum): 5.85**
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 a proportion of plastics captured in MSW composition.
Data gaps	• Requires a more reliable metric for mismanaged waste.
Key considerations	• The relatively low potential of marine pollution can be attributed to high collection coverage. • 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 (%): 86.54**
Assumptions	• The survey question assessed the collection service as a whole, and was not directed to all possible collection services. Therefore, value of 1 was entered as Number of available services in the formula for awareness of the waste services calculation
Data gaps	• Number of available services is not part of the survey.
Key considerations	• Monitoring the community's awareness provides an indication of the success of education initiatives and the effective use of existing waste management services.

Supplementary KPI 7: Proportion of strategic waste management initiatives implemented

Results	**Proportion of waste management initiatives implemented (%): 81.82%** – Number of successfully implemented waste initiatives = 9 out of 11 – Number of planned/pipeline initiatives = 2 • Implemented initiatives include: – Tonga National Infrastructure Investment Plan (2013–2023) – Tonga National Strategic Development Framework 2015–2025 – Hazardous Wastes and Chemicals Act Cap 47.08 (as at 2016) • Pipeline initiatives include: – Building Control Act – Local single-use plastics campaigns
Assumptions	None
Data gaps	None
Key considerations	• Tonga has specific legislation for waste management. Following a significant reform program in the mid-2000s, Waste Authority Limited (WAL) was established as the central administration point for waste management in the country. • The *Waste Management Act* and the *Environment Management Act* are the two most relevant legislations addressing solid waste management, pollution control, and waste minimisation. • Pipeline initiatives include a community awareness campaign advocating for alternatives to single-use plastics. • There is currently no integrated waste management strategy to guide overall resource recovery.

Supplementary KPI 8: Commercial waste capture rate

Results	**Commercial waste capture rate (%): 100** • Theoretically, this is measured as the fraction of the total waste captured through formal waste management services over the total waste generated by businesses.
Assumptions	• Published business survey was used to determine the total number of business establishments which allowed calculation of this KPI. • The number of registered businesses was used to calculate a weighted average of daily generation per business from the audit, and assumed that each country has 250 work days a year.
Data gaps	• No information on the total amount of waste generated by businesses. • No information on the waste generation rates of businesses was 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 (%): 100%** • Tonga has a user-pay collection service for commercial waste on the islands of Tongatapu, Vava'u, Ha'apai, and 'Eua. • Tonga's outer islands do not have official collection services.
Assumptions	• Assumes that the presented service coverage identified in the audit report is adequately representative of their corresponding locations. • No sampling was done in the outer islands so these are not considered in the calculation.
Data gaps	• None
Key considerations	• All businesses in Tonga have access to collection services. • 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** • No recent disaster waste data was recorded in the last 12 months. • The last major disaster experienced in Tonga was the Hunga Tonga–Hunga Ha'apai volcanic eruption and tsunami in 2022. There were 3,239 tonnes of bulky and mixed waste combined and 1,880 tonnes of sewage reported to have been generated and disposed.
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 of if these wastes are not managed separately.

4 Conclusion

From this exercise, the following findings and recommendations are drawn:

1. There could be a big opportunity to promote the DCMR framework at the national level to enable the availability of more reliable regional data for strategic planning by SPREP through this project. However, this would entail more intensive training at the country level to ensure uptake of knowledge and sustained compliance to the framework. In addition, there should be a pilot year set-up for data collection before new annual KPI calculations are made.
2. Among the countries, Tonga was able to present more sufficient data to enable reliable calculation of most of the KPIs. This should be sustained and further support is needed for areas with limited data availability. There is a strong need to encourage recording system to be in place for most of the facilities in the countries.
3. The online recording system can potentially contribute to the collection and storage of data. This can facilitate easy access to the data and reduces risk of data loss.
4. While the previous 2023 analysis presented KPI calculations based on sufficient data in Tonga, some of these KPIs were recalculated based on raw data from waste auditors who did the actual audit. There were differences (some are slight) owing to the weighting approach done in the calculation of national averages. There were also KPIs with no data reported in the previous report which are actually available from the raw data of the actual waste audit. The common methodology approach which was agreed prior to the recent audits should be strictly used to allow lateral comparison among the countries and enable more reliable regional data.
5. There is still a huge gap in the data received from countries owing to the limited recording system available to monitor waste material flow. If recording is done regularly and data stored properly and made available for any legitimate request from external customers, there may be lower probability of obtaining guess estimates of material flow. The confidence level of available data could be higher.

5 Appendix

5.1 KPI Calculations

5.1.1 Collection Methods

The KPIs are calculated from a range of data sources.

Collection Method	What the Collection Method Informs	About the Collection Method	Frequency of Reporting
Waste Facility Register	**KPI 1** Count and capacity of modern waste facilities **KPI 2** Count and capacity of unregulated waste facilities **KPI 3** National recovery rate **SKPI 1** Cost of disposal to landfill **SKPI 2** Weight of waste disposed **SKPI 3** Weight of waste recovered **SKPI 4** Volume and type of stockpiled hazardous waste **SKPI 10** Weight of disaster waste disposed.	The Waste Facility Register is a written survey that can be completed on Word, Excel, Kobo Toolbox, or something similar. It should be completed by or on behalf of waste facility operators.	Annual submission of monthly report (all KPIs and SKPIs). As and when disaster events occur (SKPI 10).
Household Community Survey	**KPI 4** Per capita waste generation rate **KPI 6** Household waste capture rate **KPI 7** Household collection coverage **SKPI 5** Marine plastic pollution potential **SKPI 6** Awareness and support of waste management services.	The Household Community Survey is a written survey that can be completed on Word, Excel, Kobo Toolbox, or something similar. It should be completed by or on behalf of households in Kiribati.	Every five years.
Household Compositional Waste Audit	**KPI 4** Per capita waste generation rate **KPI 5** Municipal solid waste (MSW) composition **KPI 6** Household waste capture rate **SKPI 5** Marine plastic pollution potential.	The Household Compositional Waste Audit is a sort and weigh audit undertaken according to the Waste Audit Methodology: A Common Approach.[1]	Every five years.
Commercial Community Survey	**SKPI 6** Awareness and support of waste management services **SKPI 8** Commercial collection service coverage **SKPI 9** Commercial collection service coverage.	The Commercial Community Survey is a written survey that can be completed on Word, Excel, Kobo Toolbox, or something similar. It should be completed by or on behalf of households in Kiribati.	Every five years.
Commercial Compositional	**KPI 4** Per capita waste generation rate	The Commercial Compositional Waste Audit is a sort and weigh audit	Every five years.

[1] https://www.sprep.org/sites/default/files/documents/publications/waste-audit-methodology-common-approach.pdf

Audit	**KPI 5** Municipal solid waste (MSW) composition **SKPI 5** Marine plastic pollution potential.	undertaken according to the Waste Audit Methodology: A Common Approach.

5.1.2 Calculations for Core KPIs

KPI	Data Source/s	Formula and Notes	Definitions
1. Count / capacity of modern waste facilities	**Waste Facility Register**	**Count of modern facilities** The number of modern waste facilities, including incinerators. **Capacity of modern facilities** The theoretical maximum facility capacity based on the facility license in tonnes per annum for each modern waste facility, including incinerators.	**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, and have access to equipment and machinery such as a bulldozer. A landfill or dumpsite must employ a leachate management system and a daily cover routine. A waste recovery facility should have fire prevention and control measures in place, and appropriate stormwater runoff controls. Facilities must not be exceeding their maximum storage capacity. **Waste facilities** – '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

KPI	Data Source/s	Formula and Notes	Definitions
			primarily rely on burying waste in a controlled manner), recycling / recovery facilities for dry recyclables (and e-waste), organics recovery facilities, and waste-to-energy facilities.
2. Count / capacity of unregulated waste facilities	**Waste Facility Register**	**Count of unregulated facilities** The number of unregulated waste facilities. **Capacity of unregulated facilities** The theoretical maximum facility capacity based on the facility license in tonnes per annum for each unregulated waste facility.	**Unregulated** – typically unlicensed waste facilities which do not follow international frameworks, rules, and guidelines to protect the health of the environment and community. **Waste facilities** – refer to **KPI 1** definitions above.
3. National recovery rate (%)	**Waste Facility Register**	**National recovery rate** Calculated using the below formula: $\frac{Tonnes\ per\ annum\ of\ waste\ diverted\ from\ landfill}{Tonnes\ per\ annum\ of\ waste\ received\ by\ all\ waste\ facilities}$ This excludes informal and small-scale recovery activities that take place outside of waste facilities. However they can be calculated separately using the following formula where waste generated is the sum of what is recovered and disposed of: $\frac{Tonnes\ per\ annum\ of\ target\ waste\ stream\ recovered}{Tonnes\ per\ annum\ of\ target\ waste\ stream\ generated}$ • Where facilities do not have weighbridges conversion factors can be applied to convert volume (m^3) to tonnage (t).	**Recovery** – any activity that diverts waste material from landfill, including: • Dry recycling – the separation and reprocessing of dry recyclables including paper, cardboard, metal, and certain plastics. • Organics recovery – the mulching or composting of mixed organics to produce new products. • Energy recovery – waste

KPI	Data Source/s	Formula and Notes	Definitions
			processing that allows for the capture and reuse of energy.
4. Per capita waste generation rate (kg/capita/year)	**Household waste audit** **Household Community Survey** **Census data** (population distribution, socio-economic conditions)	**Per capita waste generation rate** Calculated using the below formula: $\frac{Tonnes\ per\ annum\ of\ waste\ generated}{National\ population}$ This KPI considers household waste only. This calculation needs to consider the locations where compositional waste audits and surveys were undertaken to apply the audit results appropriately over the PICT. Waste generation varies between settlement types (urban/rural, main island/outer islands, etc.) and as these settlements are distributed uniquely in each PICT it needs to be considered in the calculation. This will be addressed in Section 3.0 Analysis of KPI Results to provide more detail about how the calculation was addressed for each PICT.	**Per capita** – units measured in a per capita (i.e., per person) basis to allow for extrapolation over a national population. **Waste generation rate** – waste generation measured at the point of origin and includes all disposal pathways (formal collection, dumping, burning, burying or other means).
5. Municipal Solid Waste (MSW) composition (%)	**Household waste audit** **Household Community Survey**	**MSW composition** The breakdown of the following waste materials by percentage: • Batteries • E-waste • Fishing • Glass • Hazardous • Hygiene • Metals • Organics • Other • Paper and cardboard • Plastics • Single-use This calculation needs to consider the locations where compositional waste audits were undertaken to apply the audit results appropriately over the PICT. Waste generation varies between settlement types (urban/rural, main island/outer islands, etc.) and as these settlements are distributed uniquely in each PICT it needs to be considered in the calculation. This will be addressed in Section 3.0 Analysis of KPI Results to provide more detail about how the calculation was addressed for each PICT.	**Municipal Solid Waste** (MSW) – waste originating from the public (typically managed by local government entities) and excludes commercial waste.

KPI	Data Source/s	Formula and Notes	Definitions
6. Household waste capture rate (%)	**Household waste audit** **Household Community Survey** **Census data**	**Household waste capture rate** Calculated using the below formula: $\frac{Tonnes\ per\ annum\ of\ waste\ captured\ responsibly}{Tonnes\ per\ annum\ of\ waste\ generated}$ This calculation needs to consider the locations where compositional waste audits and surveys were undertaken to apply the audit results appropriately over the PICT. Waste generation and access to formal waste management services vary between settlement types (urban/rural, main island/outer islands, etc.) and as these settlements are distributed uniquely in each PICT it needs to be considered in the calculation. This will be addressed in Section 3.0 Analysis of KPI Results to provide more detail about how the calculation was addressed for each PICT.	**Capture rate** – the proportion of total waste generated that is successfully captured and disposed of or recovered in an environmentally responsible manner. Waste capture can include: • Waste collected by a household collection service. • Waste that is self-hauled to a licensed waste disposal facility. • Materials that are source separated and diverted to a recovery facility.
7. Household collection service coverage (%)	**Household Community Survey** **Census data** **Waste department records** (for validation)	**Household collection service coverage** Calculated using the below formula: $\frac{Number\ of\ people\ surveyed\ with\ access\ to\ a\ service}{Total\ number\ of\ people\ surveyed}$ This calculation needs to consider the locations where compositional surveys were undertaken to apply the results appropriately over the PICT. Access to waste services varies between settlement types (urban/rural, main island/outer islands, etc.) and as these settlements are distributed uniquely in each PICT it needs to be considered in the calculation. This will be addressed in Section 3.0 Analysis of KPI Results to provide more detail about how the calculation was addressed for each PICT.	• **Collection service** – a waste collection, transportation, and disposal service for household waste. Collection services can be either a house-to-house kerbside collection or community drop-off point. It is a requirement that the

KPI	Data Source/s	Formula and Notes	Definitions
			collection service be: • Regular – services are provided consistently in a way the does not lead to negative environmental impacts or disrupted engagement. • Accessible – drop-off points should be close to households included in the service. • Affordable – if the service is user-pay, then it should be priced in a manner that is affordable to the target population. **Coverage** – the proportion of the total households that have access to a regular waste collection service.
8. Fulfilment of MEA reporting requirements (%)	**Policy Survey**	**Fulfilment of MEA reporting requirements** Calculated using the below formula: $\frac{Number\ of\ satisfactorily\ completed\ reports}{Total\ number\ of\ reports\ required}$	**Fulfilment** – to satisfy the condition of a reporting requirement to be fulfilled, it must: • Delivered on time (whether by a specific deadline or at a regular reporting interval) • Presented in the required

KPI	Data Source/s	Formula and Notes	Definitions
			format and units of measurement. • Utilise the correct information portal or platform for reporting. • Be based on accurate data collection methods. **Multilateral environmental agreement** (MEA) – agreements between countries, usually taking the form of international conventions that strive to protect the environment through the implementation of actions to meet specific environmental goals. Some MEAs have obligations which are legally binding. **Reporting requirements** – MEAs often require member nations to regularly report implementation plans, progress reports, and other information to the authoritative body of the MEA.

5.1.3 Calculations for Supplementary KPIs

KPI	Data Source/s	Formula	Relevant Definitions and Notes
1. Cost of disposal to landfill ($/tonne/annum)	**Waste Facility Register**	**Cost of disposal to landfill** Calculated in two steps, first using the below formula for each separate landfill: $$\frac{\textit{Annual facility operating cost}}{\textit{Tonnes per annum of waste disposed to landfill}}$$ Secondly, calculating the national weighted average according to their proportional contribution to the total weight of waste disposed nationally. This will be addressed in Section 3.0 Analysis of KPI Results to provide more detail about how the calculation was addressed for each PICT.	**Cost of disposal** – a measure of a facility operating cost incurred for the disposal of every tonne of material that is sent to landfill. This does not measure the 'gate fee' charged by landfill facilities, which may include additional profit margins charged to customers. **Landfill** – a waste disposal facility that primarily relies on burying of waste (includes both licensed and unlicensed facilities above the minimum processing threshold).
2. Weight of waste disposed (tonnes per annum)	**Waste Facility Register** **Conversion factors**	**Weight of waste disposed** The total weight in tonnes of waste that is disposed in all landfills across the PICT. Where facilities do not have a weighbridge conversion factors can be used. Where the Waste Facility Register is incomplete landfill audit activities can be used for validation.	**Disposed** - waste that is appropriately collected and landfilled, as opposed to waste which gets dumped, burned, buried, littered, or otherwise.
3. Weight of waste recovered (tonnes per annum)	**Waste Facility Register**	**Weight of waste recovered** The total weight in tonnes of waste that is disposed in all recovery facilities across the PICT. Where facilities do not have a weighbridge conversion factors can be used. Excludes informal waste recovery activities that take place outside of waste facilities, such as small-scale organics recovery or specialty recycling.	**Recovered** - waste that is appropriately collected and diverted from landfill through: • Dry recycling – the separation and reprocessing of dry recyclables including paper, cardboard, metal, and certain plastics. • Organics recovery – the mulching or composting of mixed organics to produce new products. • Energy recovery

KPI	Data Source/s	Formula	Relevant Definitions and Notes
			– waste processing that allows for the capture and reuse of energy.
4. Volume and type of stockpiled hazardous waste (m^3)	**Waste Facility Register** **Alternative : Drones** to identify unreported stockpiles	**Volume and type of stockpiled hazardous waste** The volume in cubic metres (m^3) for each hazardous waste stream: • Asbestos • E-waste • Healthcare and pharmaceutical waste • Used oil • Used tyres • Obsolete chemicals.	**Stockpile** – an accumulation of materials over a specified quantity and time, held in reserve or storage, that typically occurs during: • Temporary storage until enough material is accumulated to treat or dispose of it efficiently. • Temporary storage while commodity prices are low, until the value of the recovered materials rises. • Inappropriate and permanent waste disposal. **Type of Hazardous waste** – waste or waste products that present a risk to environmental or human health, either now or in the future.
5. Marine plastic pollution potential (tonnes per annum)	**Household waste audit** **Household Community Survey** **Census data**	**Marine plastic pollution potential** Calculated in two steps, first quantify the weight of waste in tonnes per annum that is mismanaged using **KPI 4 Rate of household waste generation** and **KPI 6 Household waste capture rate:** Mismanaged waste = $\boldsymbol{KPI\ 4} \times population \times (1 - \boldsymbol{KPI\ 6})$ Secondly, estimating the amount of plastic that has the potential to become marine pollution using the composition of plastic as a percentage (%) identified in **KPI 5 MSW Composition:** Marine plastic pollution potential = $Mismanaged\ waste \times plastic\ composition\ (\%)$	**Marine plastic pollution** – Waste plastics which are not managed in an environmentally sound manner, hence have a risk of polluting oceans and estuarine waterways. The KPI scope only considers macroscopic plastic waste (i.e., plastic that can be identified visually through compositional audits) originating from household sources.

KPI	Data Source/s	Formula	Relevant Definitions and Notes
			Potential – a theoretical estimate of the potential weight of plastic that ends up in the ocean annually.
6. Awareness and support of waste management services (%)	**Household Community Survey**	**Awareness and support of waste management services** Calculated using the below formula: $$\frac{Number\ of\ positive\ responses}{Number\ of\ available\ services\ \times Number\ of\ participants}$$	**Awareness** – based on responses from the community awareness survey, the extent to which knowledge of waste management services is common in a community or on the country level. **Waste management services** – Services available to the public for waste management, including: • Access to waste collection services. • Access to waste drop-off points. • Availability of local recycling services. • Availability of local composting services.
7. Proportion of strategic waste management initiatives implemented (%)	**Policy Survey**	**Proportion of strategic waste management initiatives implemented** Calculated using the below formula: $$\frac{Number\ of\ initiatives\ implemented\ nationally}{Number\ of\ planned\ initiatives\ national\ +\ regional}$$	**Strategic waste management initiatives** – Actions (usually in the form of projects, policy interventions or new regulation) that are established by national and regional waste strategies. **Implemented** – successfully executed actions that are delivered during the reporting period.
8. Commercial waste capture	**Commercial waste**	**Commercial waste capture rate** Calculated using the below formula:	**Capture rate** – the proportion of total commercial waste

KPI	Data Source/s	Formula	Relevant Definitions and Notes
rate (%)	**audit** **Commercial Community Survey** **National commercial information** (i.e. number, types, and geographic distribution of businesses across the PICT)	$\frac{Tonnes\ per\ annum\ of\ waste\ captured\ responsibly}{Tonnes\ per\ annum\ of\ waste\ generated}$ This calculation needs to consider the locations where compositional waste audits and surveys were undertaken to apply the audit results appropriately over the PICT. Waste generation and access to formal waste management services vary between settlement types (urban/rural, main island/outer islands, etc.) and as these settlements are distributed uniquely in each PICT it needs to be considered in the calculation. This will be addressed in Section 3.0 Analysis of KPI Results to provide more detail about how the calculation was addressed for each PICT.	generated that is successfully captured and disposed of or recovered in an environmentally responsible manner. Waste capture can include: - Waste collected by a commercial collection service or that is self-hauled to a licensed waste disposal facility. - Materials that are source separated and diverted to a recovery facility
9. Commercial collection service coverage (%)	**Commercial Community Survey** **National commercial information** (i.e. number, types, and geographic distribution of businesses across the PICT)	**Commercial collection service coverage** Calculated using the below formula: $\frac{Number\ of\ people\ surveyed\ with\ access\ to\ a\ service}{Total\ number\ of\ people\ surveyed}$ This calculation needs to consider the locations where compositional surveys were undertaken to apply the results appropriately over the PICT. Access to waste services varies between settlement types (urban/rural, main island/outer islands, etc.) and as these settlements are distributed uniquely in each PICT it needs to be considered in the calculation. This will be addressed in Section 3.0 Analysis of KPI Results to provide more detail about how the calculation was addressed for each PICT.	**Collection service** – a waste collection, transportation, and disposal service for commercial waste. Collection services can be either a provided as a kerbside collection or as a designated drop-off point. It is a requirement that the collection service be: • Regular – services are provided consistently in a way the does not lead to negative environmental impacts or disrupted engagement. • Accessible – drop-off points should be close to businesses included in the service. – • Affordable – if the service is user-pay, then it should be priced

KPI	Data Source/s	Formula	Relevant Definitions and Notes
			in a manner that is affordable to the target businesses. **Coverage** – the proportion of the total businesses that have access to a regular waste collection service.
10. Total weight of disaster waste disposed (tpa)	**Waste Facility Register** **Alternative : Datasets** collected not yet reported to the Waste Facility Register **Alternative : Drones** to identify unreported stockpiles	**Total weight of disaster waste disposed** Calculated as the sum of weight of disaster waste (tonnes) landfilled or received at a waste disposal facility in a country following disaster events.	**Weight** – measured as a weight-based summation of all waste facilities. **Disaster Waste** – Large quantities of waste caused by disasters. **Disposed** - waste that is appropriately collected and landfilled, as opposed to waste which gets dumped, burned, buried, littered, or otherwise.

6 References

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EUROPEAN UNION

SPREP
Secretariat of the Pacific Regional
Environment Programme

PacWastePlus
PACIFIC WASTE MANAGEMENT