



SPREP
Secretariat of the Pacific Regional
Environment Programme



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Regional Waste Data Collection, Monitoring and Reporting Framework

July 2023



A Regional Waste Data Collection, Monitoring, and Reporting (DCMR) Framework that provides a standardised approach for monitoring and reporting waste data for the Pacific Island Countries and Territories (PICTs) and the region.

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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



www.pacwasteplus.org

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Glossary

Terminology	Definition
ANWR	Australian National Waste Report
COP	Conference of Parties
DCMR	Data Collection, Monitoring and Reporting (Framework)
EU	European Union
FSM	Federated States of Micronesia
KPI	Key Performance Indicator
M&E	Monitoring and Evaluation
MEA	Multilateral Environmental Agreement
MIA	Minamata Initial Assessment Report
MSW	Municipal Solid Waste
NIP	National Implementation Plan
PICTs	Pacific Islands and Territories
PIP	Performance Implementation Plan
PNG	Papua New Guinea
POPs	Persistent Organic Pollutants
RMI	Republic of the Marshall Islands
SDGs	UN Sustainable Development Goals
SKPI	Supplementary KPI
SPREP	The Secretariat of the Pacific Regional Environment Programme
SWAP	Committing to Sustainable Waste Actions in the Pacific
tpa	Tonnes per annum

Executive Summary

The Secretariat of the Pacific Regional Environment Programme (SPREP) has identified the need for a Regional Waste Data Collection, Monitoring, and Reporting (DCMR) Framework that provides a standardised approach for monitoring and reporting waste data for the Pacific Island Countries and Territories (PICTs) and the region.

The DCMR Framework has been developed to ensure waste data is collected, analysed, and reported in a consistent and reliable way across the Pacific.

Building on this data overtime ensures the PICTs possess the necessary information to enact effective informed decision making on waste management. It allows a data driven approach to justifying investment targets (i.e., for investment in waste and recycling education, programs, and infrastructure), identifying priority needs in each country and across the region while meeting national legislated and obligated reporting requirements.

Development of the Regional Waste DCMR Framework was conducted by performing two foundational tasks:

1. A literature review of current data monitoring and reporting requirements, the available systems in use, both in the Pacific and internationally, and resulting strategic recommendations.
2. The development of a Key Performance Indicator (KPI) registers to determine the performance indicators necessary to inform decision making, whilst considering the limited resources and difficulty of data collection encountered in the region.

Key recommendations from the literature review included:

- Conducting baseline assessments to understand the current data situation, identify data gaps, and address challenges in data collection.
- Implementing consistent reporting timeframes to ensure timely and accessible data for informed decision-making.
- Establishing data collection standards, including using standardised waste categories (definitions) and consistent units of measurement across different countries.
- Regular data collection intervals to eliminate variances between datasets and enable reliable analysis.
- Uniform Key Performance Indicator (KPI) structures provide the necessary template for necessary information to create, calculate, and analyse performance indicators.

A set of eight (8) Core KPIs were developed as a priority for data collection. A set of ten (10) Supplementary KPIs can be developed over time if sufficient capacity and resources are available.

Table 2 and **Figure 1** summarise the data collection methods and associated KPIs developed as part of the Regional DCMR Framework.

Introduction

Waste management is a challenging issue facing Pacific Island Countries and Territories (PICTs). Many countries and territories in the region suffer from limited resource availability, scarcity of usable land, susceptibility to climate related weather events, and sparsely dispersed populations, making effective waste management difficult to achieve. Additionally, many PICTs lack the infrastructure to optimally manage and dispose of their waste.

Access to high-quality waste data guides investment and provides the evidence-base required by policymakers and government to make informed decisions on the management of wastes. The implementation of a region-wide waste management data collection, monitoring, and reporting framework for PICTs ensures that waste data is collected, analysed, and reported in a consistent and reliable way across the Pacific.

A regional framework will address the following main issues in the Pacific region:

- **Inefficient & inconsistent collection of data:** The lack of infrastructure, resources, and expertise in PICTs makes it challenging for high quality waste data to be collected and analysed. Many PICTs do not regularly report waste data and therefore the information that available is often outdated or lacks consistency preventing any meaningful observations to be made.
- **Sub-optimal coordination across the region:** Waste data collection has historically been quite fragmented due to the specific challenges facing PICTs in waste management and data monitoring, making it difficult to compare and aggregate data across the PICTs.

A regional framework will develop the protocols required for the capture of consistent, reliable, and practicable waste data.

Objectives

SPREP has identified the need for a Regional Waste Data Collection, Monitoring, and Reporting (DCMR) Framework that provides a standardised approach for monitoring and reporting waste data for PICTs at the national, and subsequently regional level. The DCMR Framework is vital for standardised management of data and is visually represented in **Figure 2 (Section 5)**. It comprises of:

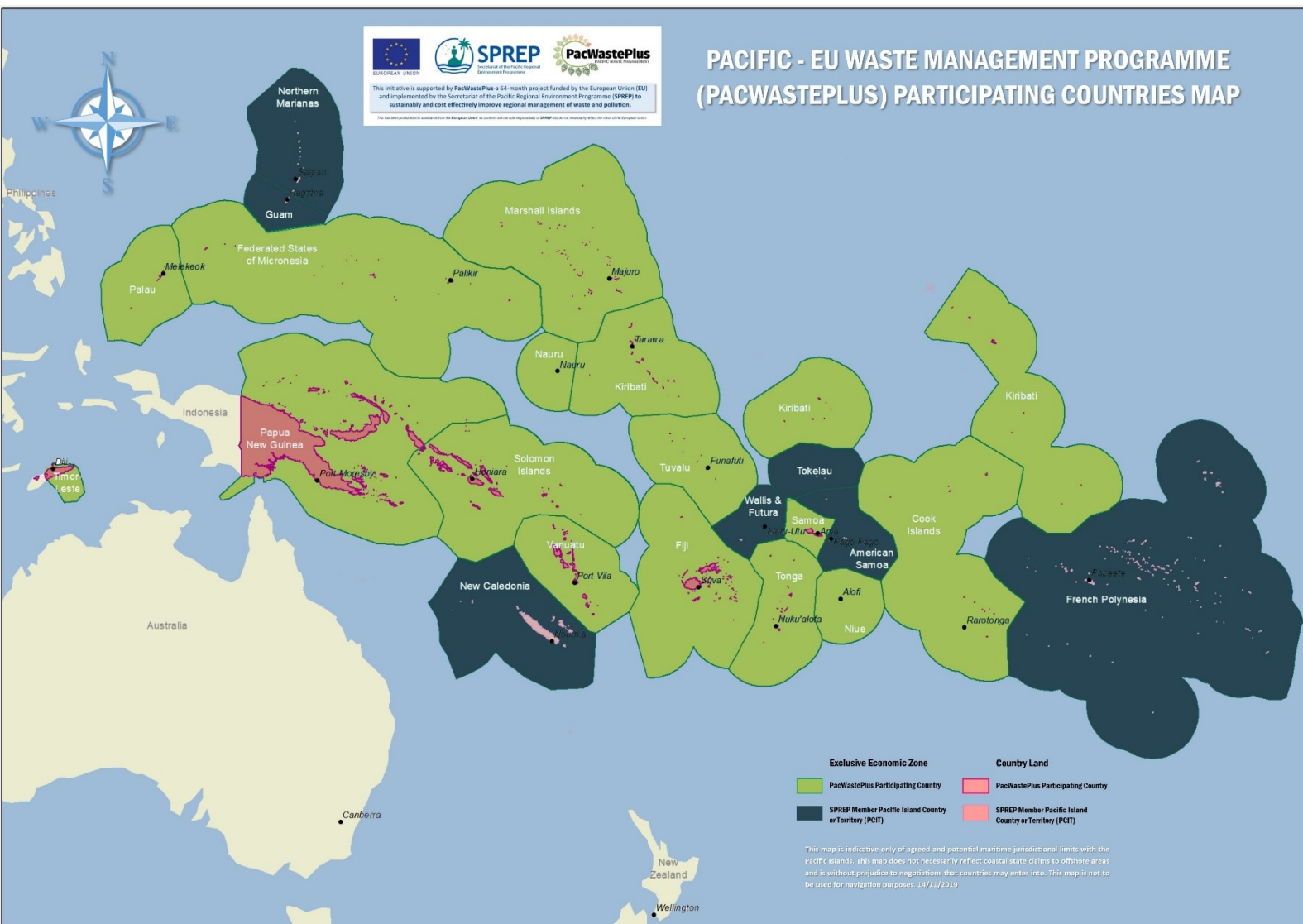
- **Data collection:** the primary gathering of raw data directly from sources.
- **Data monitoring:** The aggregation and analysis of collected data on a routine basis, which enables results to be compared against existing National datasets, other countries, the region, and over time. The purpose of this is to identify trends, changes, or variances in the data to support informed decision making.
- **Data reporting:** The compilation of data to key stakeholders. This has two subsections:
 - Required reporting: individual national reporting requirements (typically to a Multilateral Environmental Agreement (MEA) governing body) that is legislated and obligatory.
 - Regional reporting: the synthesis of the data collection and monitoring stages into a concise format that is useful for assisting countries to make informed waste management decisions, and guide investment.

The Regional Waste DCMR Framework will outline the key data requirements, the recommended methods to collect and analyse the data, and identify the key stakeholders and partners that will be involved in the process. By providing a comprehensive DCMR Framework, PICTs will possess the necessary information to enact effective waste management and informed decision-making. It will also allow a data-driven approach to justifying investment targets and identifying priority needs.

Scope

This report focuses on PICTs currently participating in the PacWaste Plus Program, which include:

- Cook Islands
- Democratic Republic of Timor-Leste
- Federated States of Micronesia (FSM)
- Republic of Fiji
- Republic of Kiribati
- Republic of the Marshall Islands (RMI)
- Republic of Nauru
- Niue
- Republic of Palau
- Papua New Guinea (PNG)
- Independent State of Samoa
- Solomon Islands
- Kingdom of Tonga
- Tuvalu
- Republic of Vanuatu



Research Methodology and Data Quality

Development of the Regional Waste DCMR Framework was conducted by performing two foundational tasks:

1. A literature review of current data monitoring and reporting requirements, the available systems in use, both in the Pacific and internationally, and resulting strategic recommendations.
2. The development of a Key Performance Indicator (KPI) registers to determine the performance indicators necessary to inform decision making, whilst considering the limited resources and difficulty of data collection encountered in the region.

Firstly, the literature review examined a list of documents provided by SPREP, alongside researched international data management systems applicable to the Pacific as a region. The research focused on identifying information on data collection, data monitoring, and data reporting.

Review of the provided literature found limited information on specific data collection and monitoring requirements, therefore, to further identify the elements applicable to the framework, a review of an international best practice example (see **Section 3**) was undertaken. In contrast, the reviewed literature provided sufficient information on previous and current data reporting requirements, mostly in the form of Multilateral Environmental Agreements (MEAs), and other specific project reporting requirements.

Secondly, a KPI register was developed. To develop a standardised KPI register that conforms to both existing reporting requirements and the technical capabilities of PICTs, a long-list KPI register (**Appendix A**) was developed via a three-step process:

1. Recording all KPIs mentioned in documentation provided by SPREP, and relevant documentation found through research.
2. Sorting the KPIs based on their prevalence in the literature.
3. Grouping the KPIs based on their thematic focus and data collection method.

To ensure practicality of the KPIs, the data collection methods were critically assessed for feasibility, reliability, and value, and this resulted in four preferred data collection methods:

- Waste facility register information.
- Household and business waste audit and community surveys.
- Policy surveys.
- Landfill and stockpile audits.

The KPIs which utilised data generated from the preferred collection methods were prioritised and this resulted in the KPI short-list. Further information is detailed in **Section 0**.

The KPI register was reviewed by SPREP and the wider consultation group, and their feedback was incorporated for the final version of this Regional Waste DCMR Framework.

Literature Review

The literature review was conducted to identify the current waste data collection, monitoring, and reporting requirements within the Pacific region. A set of core documents provided by SPREP were analysed, alongside a best practice example of waste data reporting. Examined literature provided by SPREP included:

- The PacWaste Plus Draft Project Data Strategy (2019)
- SPREP Performance Implementation Plan Key Performance Indicators (SPREP PIP KPIs) (2021).
- Cleaner Pacific 2025 - Pacific Regional Waste and Pollution Management Strategy 2016-2025, (2016).
- Multilateral Environment Agreements (MEAs) reporting requirements.
- SPREP Developing a Project Logic – A Guide for Project Design, (2021).
- Monitoring and Evaluation (M&E) Frameworks (PacWastePlus, 2020; Sustainable Waste Action in the Pacific, 2021).

The review also examined the Australian National Waste Report (ANWR) as a best practice example, which details the standards and regulations used for the Australia's waste data collection, collation, and reporting. However, Australia's capability to capture and report waste data far exceeds the capabilities of most PICTs, thus not every aspect utilised in the ANWR may be feasible for the region.

For example, the ANWR relies to a great extent on the use of weighbridge data, requiring infrastructure that is not widely available in the Pacific region. The examined literature was used to find alternative, practicable data sources.

The following sub sections detail the existing data collection and monitoring requirements (**Section 0**), the existing data reporting requirements (**Section 6)b**), other data sources identified through the literature review (**Section 0**) and the best practise data requirements from the Australian report (Section 0). Lastly **Section 0** summarises the strategic recommendations resulting from this analysis.

Existing Data Collection and Monitoring Requirements

The DCMR Framework seeks to build upon and improve previously implemented data collection and monitoring requirements for waste management in the Pacific. Six requirements were identified during the literature review:

- 1) Collection and management of waste data is to be conducted regularly. Most currently available data is not comparable across PICTs as it has been reported across differing years and/or was collected with differing methodologies. Data sets include:
 - a) Inventories of hazardous wastes; and
 - b) Waste facility locations.
- 2) PICTs shall endeavour to implement waste monitoring and reporting programmes, with the support of SPREP and partners.
- 3) PICTs shall endeavour to ensure the timely monitoring of the requirements within the Pacific Regional Waste and Pollution Management Strategy 2016–2025, coordinating alongside SPREP and partners.

- 4) As prescribed by the Minamata convention, PICTs shall endeavour to develop and improve:
 - a) Inventories of use, consumption, and anthropogenic emissions to air and releases to water and land of mercury and mercury compounds.
 - b) Modelling and geographically representative monitoring of levels of mercury and mercury compounds in vulnerable populations and in environmental media, including biotic media such as fish, marine mammals, sea turtles and birds, as well as collaboration in the collection and exchange of relevant and appropriate samples.
 - c) Assessments of the impact of mercury and mercury compounds on human health and the environment, in addition to social, economic, and cultural impacts, particularly in respect of vulnerable populations.
 - d) Harmonised methodologies for the activities undertaken under subparagraphs (a), (b) and (c).
 - e) Information on the environmental cycle, transport (including long-range transport and deposition), transformation and fate of mercury and mercury compounds in a range of ecosystems, taking appropriate account of the distinction between anthropogenic and natural emissions and releases of mercury and of remobilization of mercury from historic deposition.
 - f) Information on commerce and trade in mercury and mercury compounds and mercury-added products.
 - g) Information and research on the technical and economic availability of mercury-free products and processes and on best available techniques and best environmental practices to reduce and monitor emissions and releases of mercury and mercury compounds.
- 5) As described in the Minamata Convention, parties should, where appropriate, build on existing inventories of existing mercury deposits and stockpiles, as well as natural and anthropogenic mercury releases, monitoring networks for the level's mercury and mercury compounds in vulnerable populations and environmental media, as well as the transport, transformation, and fate of mercury in a range of ecosystems.
- 6) As described in the Stockholm Convention, PICTs were required to develop an implementation plan for the implementation of the convention's obligations, which needed to be transmitted to the Conference of the Parties by the end of 2006.¹ The article states that each party shall:
 - a) Develop and endeavour to implement a plan for the implementation of its obligations under this Convention.
 - b) Review and update, as appropriate, its implementation plan on a periodic basis and in a manner to be specified by a decision of the Conference of the Parties.

Existing reporting requirements

Existing reporting requirements contained within the reviewed literature have been documented below.

PacWaste Plus Project Data Strategy

The draft PacWaste Plus Project Data Strategy states that PacWaste Plus projects need to report against the following international indicators, although limited detail was available with regards to reporting frequency or format:

- UN Sustainable Development Goals (SDGs):
 - Member states are encouraged to release voluntary national reviews, asking countries to "conduct regular and inclusive reviews of progress at the national and sub-national levels, which are country-led and country-driven"

¹The PICTs that have met the initial requirements of Article 7 of the Stockholm Convention on Persistent Organic Pollutants (POPs) are: Cook Islands, FSM, Fiji, Kiribati, Marshall Islands, Nauru, Niue, Palau, PNG, Samoa, Solomon Islands, Tonga, Tuvalu, and Vanuatu. Of this group with completed initial implementation plans, only Tuvalu is up to date with the latest amendment.

- SDG reporting is guided by the UN’s fundamental principles of official statistics.
- SDG reporting is achieved in one of three ways:
 - Including SDG data and information on an existing national platform.
 - Developing a new platform dedicated to SDG data reporting (such as a website).
 - Providing data to a regionally maintained platform.
- The UN has created a continuously updated ‘toolkit’ for SDG reporting which was designed support national governments in the monitoring and reporting on the Sustainable Development Goals. It is accessible to the public.
- Convention on Biological Diversity (Aichi Convention):
 - Convention 17 of the article states that by 2015, each Party should have developed, adopted as a policy instrument, and has commenced implementing an effective, participatory, and updated national biodiversity strategy and action plan.
 - The Convention encourages the use of an online a national reporting tool ², which enables parties to enter, review, submit information requested by the convention.
 - The Convention also states that, where possible, parties should share and report their information, and maintain a repository of collected data.
 - The reporting requirements in the Convention are voluntary resulting in potentially limited conformance countries with limited ability or resources to report.
- EU grant requirements (project logic framework).

Cleaner Pacific 2025

It was noted that PICTs are to provide annual reports to SPREP of national waste management projects and programmes using an agreed template. However, a review of the examined literature was unsuccessful in identifying the referenced template.

Minamata Convention

- Requires member parties to report to the Conference of Parties (COP) on the measures taken to implement the convention’s targets, the effectiveness of these measures, and the challenges the party faces in meeting the convention’s objectives.
- Member parties are to include in their reports, information on:
 - Mercury supply sources and trade (article 3)
 - Manufacturing processes where mercury or mercury compounds are used (article 5)
 - Artisanal and small scale-gold mining (article 7)
 - Emissions (article 8)
 - Releases of mercury and mercury compounds (article 9).
- The COP provides a timeframe and specific format for reporting to be followed by member parties but takes into consideration the requirements and desirability of reporting alongside other relevant waste and chemical conventions.

² The Clearing-House Mechanism of the Convention on Biological Diversity

Stockholm Convention National Implementation Plans (NIPs)

Member parties are to submit a national report every four years. It is important that parties complete their reports in an accurate and timely manner.

- Each party shall report to the Stockholm COP on the measures it has taken to implement the provisions of the Convention, and on the effectiveness of the implemented measures in meeting the objectives of the Convention.
- Each party shall provide to the Convention Secretariat:
 - Statistical data on its total quantities of production, import and export of each of the targeted chemicals, or a reasonable estimate of such data; and
 - To the extent practicable, a list of the States from which it has imported each such substance and the States to which it has exported each such substance.

Waigani Convention

Each party shall submit to the Convention Secretariat such reports as the COP may require regarding the hazardous wastes generated in the area under its jurisdiction to enable the Secretariat to produce a regular hazardous wastes report.

Committing to Sustainable Waste Action in the Pacific (SWAP) Monitoring & Evaluation Plan

The following requirements were noted:

- Countries and territories are to report to the project's principal managing unit every six months, regarding progress made on pilot projects and other related SWAP activities.
- Project progress reports are submitted to the French Development Agency and stakeholders twice a year, including:
 - A half-year report in June; and
 - An annual report by the end of March.
- The annual report is to include a narrative account of the projects progress, details of the proposed work programme for the following year (including budget forecasts).
- Terminal Report will be submitted before the official project closure.
- Submissions of externally audited financial reports should be made.

Data sources identified via the literature review

Access to previously collected and available data in the Pacific region can be limited. The examined literature identified additional potential data sources that could be explored further for useful data and information to incorporate into the Regional Waste DCMR Framework.

Table 1 is a list of the main potential data sources.

Table 1 Potential data sources and example insight

Data Source	Description of data types
Regional/Country project monitoring and reports.	<p>Information on national waste programmes, including, but not limited to:</p> <ul style="list-style-type: none"> • Number and type of national/state/municipal waste programs. • Waste policy/strategy information such as implementations, or the number of policies adopted or drafted. • Financing towards waste programs. • Stockpile removal/monitoring information. • Information on hazardous waste such as Mercury, from Minamata convention reports. • Counts of regulated and unregulated waste facilities. • Information on hazardous wastes. • Project outcomes, changes, and recommendations.
Waste audits and audit reports	<p>Crucial waste data, including but not limited to:</p> <ul style="list-style-type: none"> • Waste composition. • Recycling and recovery rates. • Per capita generation of waste. • Waste capture information.
Reports from national authorities	<p>Information on status of national waste management systems and projects. Including, but not limited to:</p> <ul style="list-style-type: none"> • Coverage, number, and type of collection services. • Number and types of waste processing/storage/other service sites. • Number of staff working in waste. • Information on levies.
Customs data	<p>Import and export data. Can provide data such as:</p> <ul style="list-style-type: none"> • Sources of waste: what countries are sending waste to PICTs, how much waste, and what type. • Identify potential recycling markets by examining countries which import waste/recycled materials and goods. • The types and quantities of goods being imported as a predictor for what types of waste may be generated from them.
Waste facility data (limited availability)	<p>Comprises data recorded at waste facilities which can include infrastructure such as incinerators or landfills. Can provide data such as:</p> <ul style="list-style-type: none"> • Quantities and type of hazardous materials accepted at a site. • Amount of waste captured at sites. • Type of waste captured at sites. • Operating costs. • Source of funding. • Facility location.
International waste reports	<ul style="list-style-type: none"> • Identification of potential data sources, specific data collection methodologies, and solutions. Could include information on data collection, analysis, and the efficient dissemination of information.
Community engagement	<ul style="list-style-type: none"> • Community engagement surveys and similar public outreach programs could provide useful insight into the public perception of waste management and data collection strategies.

Data Requirements from an International Best Practice Example (Australia)

In Australia, the nation's individual states and territories are responsible for regulating waste management policies. However, the data systems used by these states and territories for waste management decision-making have evolved largely independently of one another.

In 2022, the biennial Australian National Waste Report implemented for the first time the Australian Standard for Waste and Resource Recovery Data and Reporting. This work addressed the variations present in each state and territories' data systems. (Aside from increasing expenses, synthesizing the data from these separate sources makes it significantly harder to create national reports and datasets.) The Standard aims to help make comprehensive, economy-wide, and timely data publicly available to support better consumer, investment, and policy decision, as per target seven of Australia's National Waste Policy Action Plan. The following sections outline recommendations for efficient data collection, monitoring and reporting, which are applicable for consideration and implementation in PICTs.

Defining and Obtaining Data from Primary Providers

A mandatory data collection system should be established by PICTs (ideally at a national scale) with inputs provided at the region, province or state level depending on where the responsibilities lie for waste management, to collect and collate data from:

- Waste and resource recovery facilities, and other facilities which received more than a minimum threshold amount of waste or recovered materials during a reporting year, and
- Waste generators that manage a certain amount of waste via on-site storage above a minimum threshold amount.

The minimum threshold to be determined individually by each PICT given the range and sizes of facilities present.

Waste quantities which are immaterial to a broad understanding of regional or national waste quantities or flows should fall below the threshold level, and thus do not need to be collected. An exception to this, is in tracking resource recovery (reuse and recycling) efforts to communicate barriers and show progress over time.

Voluntary reporting systems should be established for:

- Waste and resource recovery facilities and other facilities that received less than the threshold quantity of waste or recovered materials in the reporting year (except as outlined above).
- Ad hoc facilities that manage waste quantities above a certain threshold (such as construction sites undertaking on-site processing for off-site use).

Data to be collected

PICTs should create reporting systems for facilities that handle more than the relevant threshold of waste, recovered materials, or secondary materials. Data should be reported in at least an aggregated method, or load-by-load if possible. Noting the existence of the Inform Data Portals for each country, officers are recommended to contact the Inform Team to ensure they are utilising this resource appropriately for this outcome. Data should ideally include:

- Each load of waste, recovered materials or secondary materials entering the facility, including quantity (either measured across a weighbridge or estimated using the capacity of the delivery vehicle and percentage fullness), source (i.e., household, large commercial, disaster) and waste category or type).
- Each load of waste recovered or secondary materials leaving the facility (including quantity, destination, intended use and waste category or type).
- On-site short-term stores or stockpiles at the start or end of the reporting period, by waste category and type (in tonnes or, if not known, cubic metres) including stockpiles of recyclables.

- Capacities (in tonnes or, if not known, cubic metres) of the maximum quantity of material that can be legally received and processed per year without substantial upgrades.
- Spatial data of waste generation areas, waste management infrastructure, major ports, roads etc. to assist modelling of waste management logistics systems.

Volumetric surveys (including a baseline survey and regular volumetric survey monitoring) should be considered to supplement data collected via waste audits and staff surveys.

Collection Frequency and Reporting Timelines

- Waste data should be collected at least annually but better practice is to collect data on a more regular basis either quarterly or monthly (i.e., with existing monthly reconciliation processes).
- Volumetric surveys should be undertaken at regular intervals (in Australia, surveys are completed at least annually).
- PICTs should endeavour to continuously improve the timeliness of their reporting to the public and to relevant waste authorities.

Data Collection Mechanisms

Where possible, PICTs should minimise manual handling in their data collection process and aim to implement a system with fully automated data uploads. For example, during delivery of a load, and assuming a facility has no weighbridge, data on the delivered load could be collated directly into an online form (e.g., a MS Excel form or macro), assuming a device is available, so that inputs are automatically fed directly into a database (that then sorts and aggregates the data) during inspection of loads.

Developing a National Waste Report

The current process for developing the Australian National Waste Report was established in 2015. Since then, it has become more flexible and iterative, but the following steps are still adhered to:

- The Australian Government provides annual waste reporting tools to input data within six months after the end of the data period. The national data component of the tool will be as current as possible before it is issued.
- Australian states and territories enter data for the relevant period data into the national waste reporting tool, communicating and negotiating changes to the tool as needed. This process should be complete within 12 months of the end of the data period.
- The Australian Government collates draft data and completes the trend analysis for issue to the Australian states and territories for review.
- The Australian Government then issues a draft National Waste Report within 15 months of the end of the data period and publishes the final report within 18 months of the end of the data period.

The Standard is to be reviewed at least once every two years following the release of the National Waste Report.

The PICTs could implement a similar process for developing their national waste reports, utilising the Inform Data Portal as a vehicle similar to that described in the Australian system.

Data Management

Collected data must be suitable for comparison across countries, across the Pacific region, and over time. Standardised and procedural data management actions are recommended in the Standard to promote the collection and maintenance of high quality, reliable waste data.

Data Units

Primary unit reported is tonnes ('wet' weight). Where quantity data is recorded volumetrically, it should be converted to wet weight via known or typical density values.

Data Validation

Reporters should perform data quality checks and cleaning of data prior to reporting or transferring data to authorities. Likewise, authorities should do the same before reporting or transferring to the national level.

The checks should consider completeness, accuracy, consistency, and reasonableness. Specifically, checks attempt to amend:

- Unit errors (such as mistaking kilograms for tonnes).
- Inconsistent categorisation of wastes from the same company or of the same type.
- Major gaps.
- Major differences from previous years (for example, in the quantity of a particular waste category).

Significant errors should be identified and removed. Suspect data should be identified, and comment provided.

Data Gaps

Significant data gaps should be filled through research and use of best estimates. Filling these gaps requires the use of information that is based on transparent logic, applied consistently over time, and documented. Where possible, margins of error should be estimated as these gaps are filled, and formatting or comments made to communicate how these estimations have been made.

It should be noted that improvements to data availability and data quality over time can result in significant changes to reported values; recording changes to data collection processes, and the date that these changes were made, helps to identify where this may be the case over time.

Amendments to historical data

Where possible, a record of historical data is to be maintained. Where methods for data collection or processing are modified over time, historical data should also be adjusted to reflect these changes and improvements. This ensures that all data from the past, present, and the future, can be compared.

For instance, a methodological change was made in the way hazardous waste data was handled in the 2022 Australian National Waste Report. In previous versions, certain hazardous wastes sent for treatment were not used in the calculation of the overall recovery rate. However, in the new approach, average fate proportions (i.e., the average amount of hazardous waste recycled, converted to energy, or disposed of) were attributed to the calculation of the overall recovery rate. This adjustment led to an inclusion of an additional 1.2 million tonnes of waste previously excluded from recovery rate calculations.

Data Quality and Uncertainty

Programs to continually improve waste data quality should be implemented and maintained by the PICTs. Annual reports should include reporting on data quality from the collection and collation process.

This can include:

- The number of facilities missing from the data.
- Gaps that have been filled by estimation.
- Correction of past errors.
- The proportion of waste generation derived from weighbridge measurements, volumetric surveys, waste audits and staff surveys, and from mandatory reporting.



Where possible, collectors of waste data should attempt to capture, record, and report the degree of uncertainty of the captured data, including an estimated error margin. Assumptive default error margins are recommended to be considered within the standard.

They are as follows:

- Weighbridge $\pm 0.5\%$.
- Volumetric estimate – case-by-case estimate.
- Conversion of volume to weight using site-specific density factors $\pm 15\%$.
- Conversion of volume to weight using default density factors $\pm 25\%$.

Metadata

Waste data collators should record with their data:

- The applicable data period.
- The date of receipt of waste.
- The name, position, and organisation of the provider of the waste.
- The method(s) of measurement.
- Any assumptions made in deriving the recorded values.
- Validation checks undertaken.
- Software name, and version.

Estimated uncertainty (i.e., Quantify uncertainty by using measures such as confidence intervals, error bars, or ranges to show the possible variation or error in the data. OR Qualify uncertainty by using words such as likely, probable, or possible to indicate the degree of confidence or doubt in the data or the results. Identifying the source of data will also help to communicate the reliability of the data.)

Literature Review of Strategic Recommendations

The top five strategic recommendations for long term data management have been consolidated from the literature review and are detailed below:

1. Undertake baseline assessments.
2. Implement consistent reporting timeframes.
3. Implement data collection standards (see **Section 0**).
4. Implement regular data collection intervals.
5. Utilise a uniform KPI structure.

Baseline Assessments

Data collection should be prefaced where possible by a baseline assessment.

Understanding the baseline data situation provides valuable guidance towards the development of a future data management framework.

Developing a data baseline identifies:

- What data is currently collected in each of the countries, including data gaps.
- Whether the currently collected data is relevant / necessary to be gathered.
- Challenges to data collection, and how data can be used to guide decision making.
- The presence of other relevant information, such as previous reviews of collected data and other reports that help build the baseline situation.

Baseline assessments should endeavour to provide reliable data, allowing a broad understanding of the status of waste in the Pacific. 'Reliable' data can be defined as data, which is recent, comparable, consistent, and accessible.

It is recommended that baseline assessments include:

- Information on how data is collected, and the relevant units of measurement.
- Waste composition.
- The amount and type of waste:
 - received at waste facilities.
 - processed, recovered, or recycled on or off site.

It is recommended that the PICTs treat the 2021/22 waste audit findings as their baseline until another waste audit can be completed. (It is noted that many of the PICTs were impacted by COVID-19 and/or extreme weather events at the time of the audits).

Implement Consistent Reporting Timeframes

It is understood that PICTs vary greatly in their ability to perform waste data collection and reporting. Some PICTs have greater access to resources that allow for timely and consistent waste data collection and reporting, whereas others may not have adequate policies in place to support reliable waste data collection.

The delivery of accessible and recent data is crucial for informed decision-making. Therefore, it is recommended that waste data is both recorded and made accessible at regular intervals, for subsequent analysis.

It is recommended that PICTs endeavour to deliver the following to SPREP and partners:

1. National waste management project reports (annually).
2. Important waste data metrics such as waste generation, waste capture, resource recovery, and recycling rates, etc (monthly).
3. Relevant Convention required information and reports, within Convention timeframes (ranging from annually to every four years).
4. Waste infrastructure information, such as the number of facilities, and illegal waste storage/processing sites (annually).
5. Import and export data (monthly).

Data Collection Standards

In line with the data standards used to create the Australian National Waste Report, waste data collected across different countries at the waste facilities should capture the same data types under a standard list of waste categories (and ideally record data for the same year as the other countries).

As detailed in the Australian National Waste Report data standard, waste facilities should record:

1. Information on waste entering the facility.
2. Information on waste exiting facility.
3. Any significant present stockpiles, especially those containing hazardous waste.
4. The maximum capacity for storage or processing at relevant facilities in one year.

Volumetric surveys should be undertaken to supplement or to replace the above data. As an alternative to recording data per load, vehicle counting could be undertaken over a period of one week (7 days), with the maximum capacity of each vehicle and percent fullness tracked (or estimated) and supplemented by waste density measurement.

Countries should attempt to follow a “Count Once, Use Numerous Times” principle in their methodologies when collecting their waste data. Due to the restricted resources and available effort, the more data that can be collected from one event or source the better. A list of proposed data collection methods and their sources is included in **Section 0** of this report.

Additionally, it is important that all facilities collecting the data use consistent units of measurement. For example, tonnes of waste where possible, or volume in cubic metres.

Data Collection Intervals

There were noticeable inconsistencies within reviewed literature as to the intervals that waste data should be collected.

It would be beneficial to agree the intervals and the year for PICTs to use for collecting data towards the same indicator, as this helps to eliminate variance between datasets.

Comparing data from different countries across different years is not reliable for analysis and decision making (e.g., an audit undertaken in one country during a year impacted by higher than usual rain events will not be comparable to audit data undertaken in another country during a year of standard rainfall.)

Uniform KPI Structure

When considering how performance indicators will be used to guide decision-making and investment, it is important that all parties fully understand the indicators themselves, and what information is necessary to inform them.

A uniform KPI structure and set of descriptions will provide a template for all necessary information needed to create, calculate, and analyse the performance indicators.

It is recommended that all KPIs provide the relevant information as follows:

- 1) Performance indicators:
 - a) Name.
 - b) Meaning/description.
 - c) Why the indicator is important.
 - d) Desired outcomes.
- 2) Data requirements:
 - a) Calculation or identification of data gaps.
 - b) What data is required.
 - c) Where the data is collected.
 - d) Data collection intervals.
 - e) Units of measurement.
- 3) Protocols:
 - a) Methodology.
 - b) Assumptions.
- 4) Policy linkages (where relevant) both at the regional and national level.



Regional Data Collection Framework

The following sections detail the recommended data collection and analysis methods that aim to develop a standardised approach across the Pacific region. The methods presented have been chosen based on:

- **Feasibility** – judged by the existence of similar data collection protocols and programs currently employed in the region.
- **Value** – lead by a ‘collect once and use multiple times’ approach, the data collection methods proposed capture key data to produce multiple KPIs.
- **Reliability** – use of reliable data collection methods supplemented with additional steps to produce statistically accurate and relevant insights.

The proposed approach to data collection will allow for consistent and comparable KPIs to be produced. The proposed KPIs have been developed to guide data analysis and are based on the results of the literature review (in Section 0). Reporting to these KPIs should help to improve the efficiency of data collection activities by building on pre-existing data collection practices across the region. **Table 2** (below) and **Figure 1** summarise the data collection methods and associated KPIs developed as part of Regional DCMR Framework.

Core KPIs are the recommended minimum level of data collection and analysis (considered priority indicators based on reviewed literature), while **Supplementary KPIs** should be developed overtime and if there is sufficient capacity and resources.

Table 2 Regional data collection framework summary – methods and associated KPIs

Method	Data collection frequency	Core KPI	Supplementary KPI
Waste facility register	Annual, monthly data collection is better practice. As necessary following disaster events.	<ol style="list-style-type: none"> Count / capacity of modern waste facilities. Count / capacity of unregulated waste facilities. National recovery rate. 	<ol style="list-style-type: none"> Cost of disposal to landfill (per tonne). Weight of waste disposed. Weight of waste recovered. Volume and type of stockpiled hazardous waste (including Commercial Hazardous Waste). Weight of disaster waste disposed.
Household and commercial waste audit and community survey.	Every five years.	<ol style="list-style-type: none"> Per capita waste generation rate. Municipal Solid Waste (MSW) composition. Household waste capture rate. Household collection service coverage. 	<ol style="list-style-type: none"> Marine plastic pollution potential. Awareness and support of waste management services. Commercial waste capture rate. Commercial collection service coverage.
Policy survey.	Biennial.	<ol style="list-style-type: none"> Fulfillment of MEA reporting requirements. 	<ol style="list-style-type: none"> Proportion of strategic waste management initiatives implemented.
Landfill and stockpile audit, OR volumetric survey (between audits).	Every five years.	Validation of Waste facility register.	

In **Figure 1** over page, shows the movement of waste from the point of waste generation, to either a modern / registered facility, or an informal / unregistered facility, or to the environment (water, land, air) due to dumping, burying, or burning.

The data collection method and the KPIs are grouped under each stage. For example, waste audits and surveys apply to the point of waste generation at households and at businesses, while the waste facility register, and stockpile audit, apply to wastes transferred to facilities.

In terms of waste transport / transfer:

- the solid lines depict formal collection methods for wastes that are then transferred to a facility.
- the dotted lines depict the other methods of transport to waste facilities (e.g., direct transport by residents or businesses to a facility) or to the environment (e.g., lost through dumping or burying to land not part of a waste facility, or lost into waterways, or through the burning of waste).



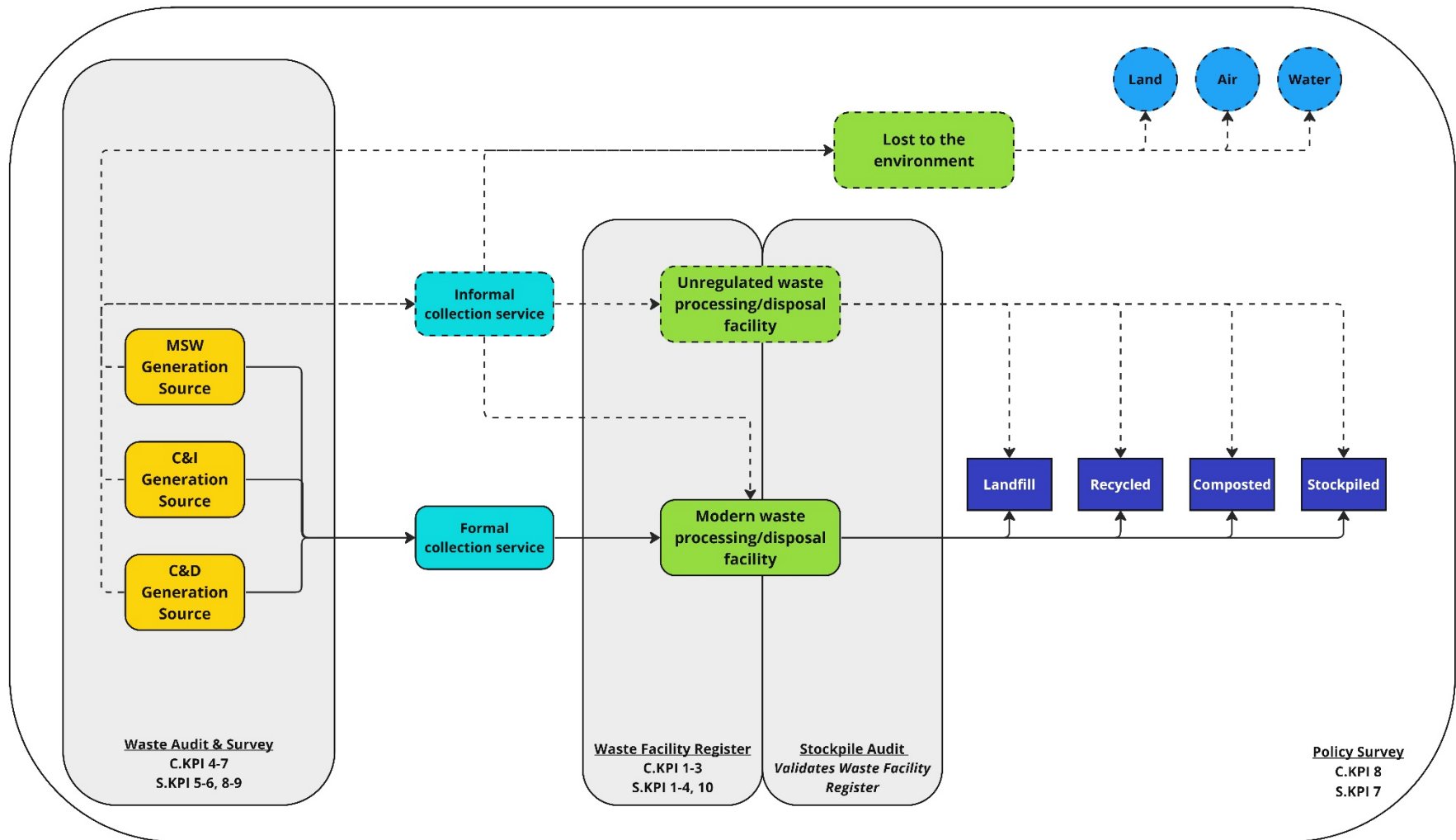


Figure 1 Waste flow summary diagram - data collection methods and associated KPIs

Data Collection and Management Methods

The following section details the four proposed data collection methods used to collect the data required for KPI reporting.

Each section provides an overview description and discussion of frequency, responsibility, and management protocols.

Waste Facility Register

Governments should maintain a register of all regulated and unregulated waste management facilities. The scope of the waste facility register should cover:

- Landfills & dumpsites.
- Recycling processors and material recovery facilities (MRFs).
- Organics processing facilities.
- Incinerators.
- Transfer stations.

Governments will need to establish a minimum processing threshold (tonnes of waste received annually), above which annual reporting is a compulsory requirement for license approval.

Facility operators would be required to provide the following information through a standardised data collection form:

- Facility infrastructure information (leachate management, daily cover, equipment, etc.).
- Operational costs.
- Estimate of the weight of material disposed or recovered per month, per quarter or per year (if only the estimated volume of material is known, then standardised conversion factors must be used to convert volumes into weight).
- Maximum annual processing capacity (disposal/ recycling/ recovery).
- Estimated annual facility operation cost.
- Accepted waste material categories.
- Volume and type of stockpiled material (by waste type).
- Estimate the weight of disaster waste sent to facility per year following disaster events.

Table 3 summarises further details of the waste facility register.

Table 3 Data collection method – Waste facility register

Data collection frequency	Annual (reporting to SPREP) Monthly or quarterly facility reconciliation
Dataset format	<p>Standardised data collection form – A standardised form distributed to all waste management facilities above the minimum processing threshold. Details could vary for modern and unregulated facilities. A template form is presented in Appendix B.</p> <p>Aggregated waste facility register – A digitally formatted (Microsoft Excel) document used to aggregate individual data collection forms by facility type. The aggregated register will include a summary page of KPI 1-3 and SKPI 1-4, and 10.</p>
Data management protocols	<ul style="list-style-type: none"> • Government personnel would be required to input individual data collection forms into the waste facility register. • Records should be cross-referenced to previous years to reduce the risk of data entry errors. • SPREP (or similar regional personnel) would be required to collect each national waste facility register and combine into a regional waste facility database (refer Section 0).
Stakeholders	<ul style="list-style-type: none"> • Waste facility operators. • PICT government personnel (under a nominated department). • SPREP staff.

Household and Commercial Waste Audit and Community Survey

Accurate and robust waste data is commonly collected through household and commercial waste audits. Recent programs to standardise audit procedures and carry out projects across the region should be sustained through future years.

Household Waste Audit

Audits are required to determine the total rate of household waste generation (from the point of source) and waste material compositions. Audit activities should also be combined with a community survey (preferably managed by the same audit delivery partner) that allow audit results to be linked with socio-economic indicators and census data. An example questionnaire template is presented in **Appendix C**.

The scope of community survey topics should include:

- Disposal behaviours, and if possible, behaviours by material type.
- Access to waste management services.
- Awareness of waste management services and support for recycling activities.
- Primary waste disposal methods (e.g., participation in community composting activities, recycling).
- Current fees charged for collection services and willingness to pay for waste management.
- Socio-economic details (e.g., estimated monthly income, number of persons in the household).

A hybrid approach (audit and community survey) also allows for different waste disposal pathways to be quantified. Audits and surveys should differentiate between waste that is commonly:

- Collected and disposed in a formal manner (to a regulated waste facility).
- Collected and disposed in an informal manner (e.g., on an irregular basis).
- Dumped, littered to the environment, buried, or burned, or
- Recovered (through recycling or composting services).

Table 4 summarises further details of the household waste audit. See **Appendix C** for an example of the survey.

Table 4 Data collection method – Household waste audit

Data collection frequency	<p>Every five years (or greater interval where resources are limited, with intermediate measures undertaken every five years such as visual audits and surveys – all PICTs will need to coordinate delayed audits to occur in the same year)</p> <p>Audits will ideally have a duration of 7 days (where resources allow) to capture the waste data for each day of the week (weekdays and weekends), and to obtain more representative data.</p>
Dataset format	<p>Household waste audit (raw data) – Consolidated database (Microsoft Excel) of the total audit results collected and analysed. Individual households and businesses should be geospatially categorised for cross-referencing with community survey results.</p> <p>Household waste audit summary report – Audit project management should ensure that the project summary report clearly identifies results for KPI 4-7 and SKPI 5-6. Project summary reports should also clearly report the data collection methods and analysis used to develop KPIs (such as steps to consolidate audit reports and community survey results).</p> <p>Household waste audit analysis will also require accurate census data of population and socio-economic indicators (considered outside the scope of the DCMR).</p>
Data management protocol	<ul style="list-style-type: none"> • Audit raw data should be made available to validate summary reports. • Audit methodology should employ statistical methods to ensure a reliable and robust data quality. • Extrapolation of audit results across a national population should account for variations in socio-economic and regional conditions. • SPREP (or similar regional personnel) would be required to collect each national waste audit summary report and combine into a regional household and commercial waste database (refer Section 0).
Stakeholders	<ul style="list-style-type: none"> • Audit delivery contractor. • Audit management agency (nominated government agency or SPREP). • Government agencies responsible for waste management and for monitoring commercial operations; and • Communities (householders) participating in audit data gathering.

Commercial Waste Audit

Audits are required to determine the total rate of commercial waste generation (from the point of source) and waste material compositions. Commercial premises chosen for audit sampling must be representative of the broader business types, with data captured separately for different geographical areas (particularly for urban and rural areas).

Audit activities should also be combined with a community survey (preferably managed by the same audit delivery partner) that allow audit results to be linked with socio-economic indicators and typical waste generation rates for each business type.

An example questionnaire template is presented in **Appendix D**.

The scope of community survey topics should include:

- Commercial activity type (e.g., motel, retail shop selling clothes, food premises primarily take away or sit in restaurant, manufacturer, laundromat, etc).
- Information that can be used to estimate waste generation rates such as the number of workers, each day generating waste, the number of visitors / patrons visiting the business on average per day and per week, allowing for peak periods and low periods of visitation, businesses size in square meters.
- Waste generation area and scope (i.e., the floor area of the business, if wastes are generated at one site, or at multiple premises then consolidated for collection).
- If the business is attached to a household, and if so, if wastes are collected in the same truck.
- Disposal behaviours, and if possible, behaviours by material type.
- Access to waste management services.
- Awareness of waste management services and support for recycling activities.
- Primary waste disposal methods (e.g., participation in community composting activities, recycling).
- Current fees charged for collection services and willingness to pay for waste management.

A hybrid approach (audit and community survey) also allows for different waste disposal pathways to be quantified. Audits and surveys should differentiate between waste that is commonly:

- Collected and disposed in a formal manner (to a regulated waste facility).
- Collected and disposed in an informal manner (e.g., on an irregular basis).
- Dumped, littered to the environment, buried, or burned.
- Recovered (through recycling or composting services).

Table 5 summarises further details of the commercial waste audit. See Appendix D for an example of the survey.

Table 5 Data collection method – Commercial waste audit

Data collection frequency	<p>Every five years (or greater interval where resources are limited, with intermediate measures undertaken every five years such as visual audits and surveys – all PICTs will need to coordinate delayed audits to occur in the same year)</p> <p>Audits will ideally have a duration of 7 days (where resources allow) to capture the waste data for each day of the week and to obtain more representative data.</p>
Dataset format	<p>Commercial waste audit and community survey (raw data) – Consolidated database (Microsoft Excel) of the total audit results collected and analysed. Individual businesses should be geospatially categorised for cross-referencing with community survey results.</p> <p>Commercial waste audit summary report – Audit project management should ensure that the project summary report clearly identifies results for SKPI 5-9. Project summary reports should also clearly report the data collection methods and analysis used to develop KPIs (such as steps to consolidate audit reports and community survey results).</p> <p>Commercial waste audit analysis will also require:</p> <ul style="list-style-type: none"> • Total number, type, and size of businesses in the province / state, and nationally. To determine the capture rate, the total amount of commercial waste should be known or estimated.

	<ul style="list-style-type: none"> • The result can be compared to waste amounts transferred to local / regional waste facilities. Knowledge of the number of total businesses in the sampling area will assist in extrapolation of the waste generation rates to the national scale. • Details on stockpiles of waste being stored at the premises including number of stockpiles, volume measurement of waste stockpiled, type of waste being stockpiled, and the approximate rate of waste being stockpiled, (see Table 20 Supplementary KPI 4 for a definition of “stockpile”)
Data management protocol	<ul style="list-style-type: none"> • Audit raw data should be made available to validate summary reports. • Audit methodology should employ statistical methods to ensure a reliable and robust data quality. • Extrapolation of audit results across total number of similar businesses should account for variations in waste generation rates (peak and off-peak seasons, special events, if relevant). • SPREP (or similar regional personnel) would be required to collect each national waste audit summary report and combine into a regional household and commercial waste database (refer Section 0).
Stakeholders	<ul style="list-style-type: none"> • Audit delivery contractor. • Audit management agency (nominated government agency or SPREP). • Government agencies responsible for waste management and for monitoring commercial operations. • Communities (businesses) participating in audit data gathering.

Policy Survey

Progress against national and regional strategic initiatives should be tracked in a standardised fashion. A uniform methodology would allow progress against strategic targets to be accurately tracked and reported.

The policy survey also allows an opportunity to evaluate the fulfillment of MEA reporting requirements. As each PICT has a separate set of legislated MEA requirements, countries should separately review annual progress and the need for additional resources.

The policy survey should initially involve a baseline survey that quantifies:

- Total number of legislated MEA reporting requirements.
- Total number of planned national strategic initiatives.
- Total number of planned regional strategic initiatives.

This baseline should be updated each time a PICT enacts new legislation or policy that impacts waste management.

The biennial policy survey would be required to review which MEA reporting requirements have been met (on time and to an accurate level) and any new waste management initiatives that contribute to strategic planning. Noting this survey is a responsibility for each country, it will need to be supported through political and management systems to ensure appropriate staff and resource is allocated to the activity.

Table 6 summarises further details of the policy survey.

Table 6 Data collection method – Policy survey

Frequency	Biennial
Data input format	National policy review – A concise summary report detailing activities contributing to fulfilling MEA reporting requirements and strategic planning (both national and regional). The report should clearly quantify KPI 8 and SKPI 8.
Data management protocol	<ul style="list-style-type: none"> • A data management system (Microsoft Excel formatted) should be used to track policy activities through-out the year, including: <ul style="list-style-type: none"> - Budget and resources. - Planned delivery timeframe. - Tracking towards completion. • Regular use of the data management system will decrease the end-of-year requirements to consolidate all relevant activities. • Decreases the risk for legislated commitments to be missed (by allowing for future planning of resources) or not included within the policy review. • SPREP (or similar regional personnel) would be required to collect each national policy review report and combine into a regional policy database (refer Section 5).
Stakeholders	<ul style="list-style-type: none"> • Local government (councils and agencies) responsible for fulfilling MEA reporting requirements and implementing strategic initiatives. • Program donor partners and support agencies. • International MEA governing bodies. • Private sector. • SPREP.

Landfill and Stockpile Waste Audit

Audit of waste facilities should be conducted every four years to validate data collected through the waste facility register. Audits should be carried out following the standardised audit procedure. Volumetric surveys can be undertaken more regularly or to replace or supplement landfill and stockpile waste audits and must include a baseline survey for comparison.

The waste facility register is expected to rely upon operator estimations of annual disposal rates, as such, the landfill and stockpile waste audit provide an alternate method to estimate the facility disposal rate. This would require a representative audit sample to be collected and extrapolated beyond the audit period.

Sampling should account for typical facility open days (e.g., weekdays compared to weekends) and expected seasonal variations. Volumetric surveys can be used to supplement data collection.

Audits of waste facilities also allow for detailed information of non-household waste disposal rates from commercial sectors to be captured. Audits should seek to classify waste by source streams and industry. The audit scope is also expected to expand beyond the limitation of the waste facility register to include unmanaged dumpsites and stockpiles of hazardous wastes.

Table 7 summarises further details of the landfill and stockpile audit.

Table 7 Data collection method – Landfill and stockpile waste audit

Frequency	Every four years (or greater interval if resources are limited and volumetric surveys are used - all PICTs will need to coordinate delayed audits to occur in the same year).
Data input format	<p>Landfill and stockpile audit (raw data) – Consolidated database (Microsoft Excel) of the total audit results collected and analysed. Individual stockpiles should be geospatially categorised for accurate reporting.</p> <p>Landfill and stockpile waste audit summary report – Audit project management should ensure that the project summary report clearly identifies results for KPI 1-3 and SKPI 1-4 and 10. Audit discussion should also include comparison and validation of the waste facility register. Recommendations should be made to improve the accuracy of the waste facility register. The summary reports should also clearly report the data collection methods and analysis used to develop KPIs.</p>
Data management protocol	<ul style="list-style-type: none"> • Audit raw data should be made available to validate summary report conclusions including a separate sheet explaining the calculations used to report final data. • Audit methodology should employ statistical methods to ensure a reliable and robust data quality. • Extrapolation of audit results across annual disposal rates should rely on a representative audit sample. • SPREP (or similar regional personnel) would be required to collect each national landfill and stockpile waste audit summary report and combine the results into the regional waste facility database (refer Section 5).
Stakeholders	<ul style="list-style-type: none"> • Audit delivery contractor. • Local government authorities (e.g., Councils). • Private sector. • Audit management agency (nominated government agency or SPREP). • Communities participating in audit data gathering.

KPIs

Data collected through the recommended methods can be used to develop a range of waste management insights. The following sections describe eight core and ten supplementary KPIs intended to structure results reporting and data management.

The core KPIs are the recommended minimum level of data collection and analysis (considered priority indicators based on reviewed literature), while Supplementary KPIs should be developed if there is sufficient capacity and resources.

Table 8 Summary of Core KPIs and Supplementary 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 Multilateral Environmental Agreement (MEA) reporting requirements.	8. Commercial waste capture rate.
	9. Commercial collection service coverage.
	10. Weight of disaster waste disposed.

Core KPIs

Table 9 KPI 1 – Count / capacity of modern waste facilities

Definition	<ul style="list-style-type: none"> • “Capacity” – KPI reporting should include both the number (by count) of modern waste facilities and the total maximum capacity to dispose/ recover waste. Capacity reporting should indicate the theoretical ‘maximum’ facility capacity (e.g., capped by license conditions), not the current operational conditions. • “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 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.
Reason	<p>Modern waste management facilities follow current standards and regulations for waste management, aiming to minimise the negative impacts of waste disposal and processing on human and environmental health. Modern facilities manage leachates and ensure no material flow to the environment once accepted at site. Such facilities would ensure a significant improvement in the overall health of the environment and the community.</p> <p>Tracking the number of modern waste facilities across the region allows for a geospatial understanding of best-practice disposal infrastructure. Targets can be set to achieve a certain number of facilities while infrastructure investment aimed at addressing gaps in available capacity.</p>
Assumptions & limitations	<ul style="list-style-type: none"> • Incinerators should be included in facility counts and capacity checks in the future as more information is made available by waste audits and completion of waste facility registers. • Capacity relies on an estimated ‘maximum’ disposal/recovery rate and may be unrealisable in certain circumstances. • Does not provide facility operation details (e.g., leachate capture systems or type of cell lining). • Assumes all modern waste facilities complete the waste facility register.
Format & units of measurement	<p>Count (#) – by facility type.</p> <p>Capacity – tonnes per year by facility type.</p>
Required data	<p>Waste facility register – including details to assess each facility’s satisfactory classification as “modern” and validate estimated capacity.</p>
Method	<p>The total sum of entries (by Count and by Capacity) in the waste facility register.</p>

Table 10 KPI 2 – Count / capacity of unregulated waste facilities

<p>Definition</p>	<ul style="list-style-type: none"> • “Capacity” – KPI reporting should include both the number (by count) of unregulated waste facilities and the total maximum capacity to dispose/ recover waste. Capacity reporting should indicate the theoretical ‘maximum’ facility capacity (e.g., equipment processing rate), not the current operational conditions. • “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” – ‘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 / recovery facilities for dry recyclables (and e-waste), organics recovery facilities, and waste-to-energy facilities.
<p>Reason</p>	<p>Unregulated waste facilities often lack the infrastructure and resources necessary for proper waste management, which can lead to pollution and health risks for local communities. Unregulated waste facilities can release harmful chemicals and pollutants into the air, water, and soil. By reducing the number of these facilities and properly managing the associated waste, the release of pollutants and harmful chemicals into the environment will decrease and lead to significant outcomes for environmental and community health.</p> <p>Tracking of unregulated facilities can also identify investment opportunities to upgrade existing sites to best-practice infrastructure and management.</p>
<p>Assumptions & limitations</p>	<ul style="list-style-type: none"> • Does not provide facility operation details (e.g., leachate capture systems or type of cell lining). • Assumes all unregulated waste facilities complete the waste facility register. • Potential that unregulated facilities are unmanned, requiring additional resources to estimate the annual disposal tonnages and costs. • Information may need to be sourced from waste audits.
<p>Format & units of measurement</p>	<p>Count (#) – by facility type.</p> <p>Capacity (tpa) – tonnes per year by facility type.</p>
<p>Required data</p>	<p>Waste facility register – including details to assess facilities’ classification as “unregulated” and validate estimated capacity.</p>
<p>Method</p>	<p>The total sum of entries (by Count and by Capacity) in the waste facility register.</p>

Table 11 KPI 3 – National recovery rate

<p>Definition</p>	<ul style="list-style-type: none"> • “National” – results are to be reported as a national average, accounting for waste received by all facilities. • “Recovery” – any activity that diverts waste material from landfill, including: <ul style="list-style-type: none"> ○ 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 processing that allows for the capture and reuse of energy. • “Recovery rate” – the percentage of total waste received by waste facilities that is recovered (i.e., diverted from landfill) and returned to the economy.
<p>Reason</p>	<p>A national recovery rate is influenced by a range of factors and stakeholders, such as dedicated collection services, available infrastructure, and economic incentives to discourage waste disposal. It acts as a simple and quantifiable method for comparison between reporting periods, against other countries in the region, and serves as base data to calculate other indicators.</p> <p>Accurate measurement and reporting of a national recovery rate are required to track regional strategy objectives. Recycling rates can also infer market status for recycled products and materials.</p> <p>Considering the limited capacity for waste recovery currently available across the Pacific, establishing a minimum reporting threshold for recovery data can assist with informative waste data reporting. For example, this KPI would only be reported at the national scale when the total weight of waste recovered annually in a country amount to at least 5% of the weight of waste disposed in that same year.</p> <p>Additionally, while regional recovery efforts in a country may be small-scale or focus on one material type only, these recovery operations or programmes may still be effective and as such, the progress of these efforts should be reported (in brackets next to the national result). In these cases, the recovery rate is the number of recovered materials as a proportion of the total amount of targeted material for recovery.</p>
<p>Assumptions & limitations</p>	<ul style="list-style-type: none"> • Excludes informal waste recovery activities that take place outside of waste facilities, such as small-scale organics recovery or specialty recycling. • Does not differentiate between the types of waste recovery.³ • Assumes the accurate completion of the waste facility register. • For facilities lacking a weighbridge, volumetric estimates would be required to determine the total quantities of wastes received and diverted from landfill. • Additional conversion factors would need to be applied to convert volumetric data into weight-based estimates. • Incomplete facility register data should be validated through landfill audit activities.
<p>Format & units of measurement</p>	<p>Percentage (%) – measured as the fraction of the total waste recovered over the total waste received by waste facilities.</p>

³ PICTs should individually evaluate their capacity to separately report waste recovery as: percentage of dry recycling, percentage of organics recovery and percentage of energy recovery.

Required data	Waste facility register – waste facilities are required to report the total weight of waste received annually, and the total weight of materials recycled or recovered.
Method	<p>National Recovery Rate</p> <ol style="list-style-type: none"> 1) Sum the total quantity of waste received by all waste facilities (tpa) from the waste facility register. 2) Sum the total quantity of waste diverted from landfill (tpa) from the waste facility register. 3) Calculate: $\text{National recovery rate (\%)} = \frac{\text{Total quantity of waste diverted from landfill (tpa)}}{\text{Total quantity of waste received by all waste facilities (tpa)}}$ <p>Small Scale Recovery (below threshold):</p> $\text{Recovery (\%)} = \frac{\text{Quantity of waste targeted for recovery successfully recovered (tpa)}}{\text{Total quantity of waste targeted for recovery generated/disposed (tpa)}}$



Table 12 KPI 4 – Per capita waste generation rate

Definition	<ul style="list-style-type: none"> • “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).
Reason	The per capita waste generation rate provides a way to compare waste generation rates of or countries and identify trends and changes in the waste generation rate of a population over time. It also helps to assess the overall performance of implemented waste reduction and education initiatives. Collected data can also be used to calculate other performance indicators, such as the waste capture rate.
Assumptions & limitations	<ul style="list-style-type: none"> • Requires accurate census data of population (including details of population distribution and socio-economic conditions). • Calculation of national waste generation rates is a mathematical estimate based on extrapolation of audit results. • Liable to impacts of daily or seasonal variations dependent on the time of the audit. • Requires the use of community survey results to accurately convert a per household (from the Household waste audit) measurement into a per capita measurement. • Excludes waste generated by businesses or the construction sector (i.e., waste outside the scope of the household waste audit).
Format & units of measurement	Per capita (kilograms/ capita/ year) – reporting should use a consistent weight basis (kilograms) over an agreed measurement period (per year).
Required data	<ul style="list-style-type: none"> • Household waste audit – audit activities are required to sample the entirety of waste generated per household (at the source). • Community survey – required to account for the number of persons per household, the geographic positioning and socio-economic standing. • Census data – national data required to extrapolate waste audit results. <p>Additionally, it is useful to collect/monitor/report:</p> <ul style="list-style-type: none"> • Household waste generation in kg/capita/day. • Household waste generation in kg/household/day. • Both measurements can provide useful data and assist in calculating the main indicator if there are data gaps.
Method⁴	<ol style="list-style-type: none"> 1) Household waste audit results is converted from a household basis to a per capita basis using community survey results. 2) Results are grouped and averaged based on either geographic position (e.g., urban, semi-urban and rural) or socio-economic standing (e.g., low, medium, or high income).⁵ 3) Census data is used to extrapolate audit results across the national population (accounting for either geographic position or socio-economic standing) to calculate the total waste generated. 4) Calculate: $\text{Per capita waste generation rate} \left(\frac{\text{tpa}}{\text{capita}} \right) = \frac{\text{Total waste generation (tpa)}}{\text{Total population (capita)}}$

⁴ Steps 1 to 4 of the Method should be conducted by the nominated Household waste audit delivery partner and reported in the audit summary report.

⁵ The exact grouping method will depend on the availability of census data, although should aim to use a minimum of three population categories with unique waste generation rates.

Table 13 KPI 5 – Municipal Solid Waste (MSW) Composition

Definition	<ul style="list-style-type: none"> • “MSW” (Municipal Solid Waste) – waste originating from the public (typically managed by local government entities) and excludes commercial waste. • “Composition” – categorised breakdown of waste materials.
Reason	<p>Waste composition analyses provide insight into the types of material, and how much material is being introduced into a waste stream at the time of sampling. Knowledge of waste stream compositions creates opportunity for informed waste management systems to be crafted and implemented towards identified priority waste types. They can also indicate what material is still available in the residual waste stream to target improvements in recovery. Composition analyses can also highlight hazardous wastes present in the municipal solid waste stream.</p>
Assumptions & limitations	<ul style="list-style-type: none"> • Household audit sampling must be representative of the broader population, with data captured separately for different geographical areas. • Liable to impacts of daily or seasonal variations dependent on the time of the audit. • Excludes material categories not included in the standardised audit methodology (typically recorded as ‘Other’). • Excludes waste generated by businesses or the construction sector (i.e., waste outside the scope of the household waste audit).
Format & units of measurement	<p>Composition percentage (%) – separate material categories are reported as a weight-based percentage of the total waste sampled.</p>
Required data	<ul style="list-style-type: none"> • Household waste audit – audit activities are required to sample the entirety of waste generated per household (at the source). Waste should be collected and sorted into standardised material categories, with the weights of individual material categories measured. • Community survey – required to account for the number of persons per household, the geographic positioning and socio-economic standing.
Method	<ol style="list-style-type: none"> 1) Waste samples are collected, noting the geographical source of the material. 2) The waste samples are weighed for their total weight, then sorted into separate material categories (based on standardised audit guidelines). 3) Individual material categories are weighed and presented as a percentage of the total sample weight. 4) Results are reported separately for each geographical region.

Table 14 KPI 6 – Household waste capture rate

<p>Definition</p>	<ul style="list-style-type: none"> • “Household waste” – waste originating from households only (excludes waste generated by the public away from home and commercial waste). • “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: <ul style="list-style-type: none"> - 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.
<p>Reason</p>	<p>Waste capture rates measure the effectiveness of a country’s waste collection system. It provides information into how much of the total waste generated is being successfully collected and disposed of. As such, it provides an indication of both how many people are using the service and how well those people use the service. High capture rates can indicate effective waste management systems. Low capture rates may indicate inadequate infrastructure, low participation in the collection program or poor waste regulation and management enforcement.</p> <p>When there is limited data coverage in urban or rural populations, or for large population centres like capital cities, or sample sizes do not sufficiently represent the total country population, data available for this KPI cannot be confidently extrapolated to the national level, and so cannot be reported. Data must be available for a minimum of one ‘rural’ area and one ‘urban’ area to report at the national scale.</p>
<p>Assumptions & limitations</p>	<ul style="list-style-type: none"> • Household audit sampling must be representative of the broader population, with data captured separately for different geographical areas. • Liable to impacts of daily or seasonal variations dependent on the time of the audit. • Does not provide insight into the final disposal destination of captured waste.
<p>Format & units of measurement</p>	<p>Percentage (%) – measured as the fraction of the total waste captured through formal waste management services over the total waste generated by households.</p>
<p>Required data</p>	<ul style="list-style-type: none"> • Household waste audit – audit activities are required to sample the entirety of waste generated per household (at the source). If households rely on multiple waste disposal methods, each method should be quantified as a proportion of the total waste generated. • Community survey – required to account for the number of persons per household, the geographic positioning and socio-economic standing. Survey questions should determine the typical waste disposal method relied upon by each household. • Census data – national data required to extrapolate waste audit results. <p>Additionally, it is useful to monitor/report:</p> <ul style="list-style-type: none"> • Total weight of household waste generated. • Total weight of household waste captured. • Both measurements can provide useful data and assist in calculating the main indicator if there are data gaps.

Method

- 1) The total household waste generation rate is quantified for the sample population (as per KPI 4).
- 2) Audit and survey activities quantify each household disposal method (including formal and informal management practices).
- 3) Calculate for each sample area of the household audit and community survey:

$$\text{Household waste capture rate (\%)} = \frac{\text{Waste captured by management services (tpa)}}{\text{Total household waste generated (tpa)}}$$

- 4) Extrapolate regional results across the national population using census data to determine the average national household waste capture rate.



Table 15 KPI 7 – Household collection service coverage

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<ul style="list-style-type: none"> • “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 collection service be: <ul style="list-style-type: none"> - Regular – services are provided consistently in a way that 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.
<p>Implementation of a waste collection service is a fundamental requirement for effective waste management. Without some form of waste collection service, waste can accumulate, and be dumped illegally to the detriment of environmental and community health. It also provided a basis for exploring methods to improve waste management performance, such as through increasing the coverage of the collection service if coverage is low.</p> <p>When there is limited data coverage in urban or rural populations, or for large population centres like capital cities, or sample sizes do not sufficiently represent the total country population, data available for this KPI cannot be confidently extrapolated to the national level, and so cannot be reported. Data must be available for a minimum of one ‘rural’ area and one ‘urban’ area to report at the national scale.</p>
<ul style="list-style-type: none"> • Community surveys are required to understand if a particular household’s collection service is regular, accessible, and affordable. • Does not account for community perception or participation in an available collection service. • Requires accurate census data of the total number of households nationally.
<p>Percentage (%) – measured as the fraction of the total number of households with a waste collection service over the total number of houses (nationally).</p>
<ul style="list-style-type: none"> • Community survey– requires participation from the community to determine the availability and management of waste collection services. • Census data – national data required to extrapolate waste audit results
<p>1) Calculate for each sample area of the community survey:</p> $\text{Household collection service coverage (\%)} = \frac{\text{Number of survey participants with access to a collection service}}{\text{Total number of survey participants}}$ <p>2) Extrapolate regional results across the national population using census data to determine the average national household waste capture rate.</p> <p>3) Results should be validated and cross-referenced with an alternate data source, such as private waste collection contracts or municipal collection service records.</p>

⁶ Less resource intensive methods may be deployed to validate community survey results, such as consultation with private waste collection contractors or records maintained of municipal collection services.

Table 16 KPI 8 –Fulfillment of Multilateral Environmental Agreement (MEA) reporting requirements

<ul style="list-style-type: none"> ● "Fulfillment" – to satisfy the condition of a reporting requirement to be fulfilled, it must: <ul style="list-style-type: none"> - Delivered on time (whether by a specific deadline or at a regular reporting interval). - Presented in the required format and units of measurement. - Utilise the correct information portal or platform for reporting. - Be based on accurate data collection methods. ● "MEA" (Multilateral environmental agreement) – 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.
<p>Fulfillment of MEA reporting requirements is a measure of the extent to which a country has satisfied legal obligations to its relevant MEAs. This provides a measure of a country's capability or commitment to meet the obligations or goals set by various MEAs. Results can be used to benchmark a country's waste management performance and allow for comparison with other regional or international member countries. Failure to meet reporting requirements can indicate areas where additional resources or capacity need to be developed.</p>
<ul style="list-style-type: none"> ● Requires an accurate baseline survey of the total number of MEA reporting requirements that need to be met within the review interval, including: <ul style="list-style-type: none"> - When – the date the reporting requirement needs to be met. - What – the format and units of measurement to be used. - Where – the portal or governing body the report needs to be submitted to. - How – the approved data collection methods for developing report conclusions. ● MEA reporting requirements may fall under different governmental departments, hence require cross-departmental communication to track progress and completion of reports.
<p>Percentage (%) - measured as the fraction of the number of fulfilled MEA reporting requirements (for each survey interval) over the total number of unique MEA reporting requirements.</p> <p>Countries may also choose to separately report the percentage of partially fulfilled MEA reporting requirements (e.g., those completed but not delivered on time).</p>
<p>Policy survey – survey to include the initiate baseline assessment of the total MEA reporting requirements, plus the biennial evaluation of their satisfactory fulfillment.</p>
<p>Calculate:</p> $\text{Fulfillment of MEA reporting requirement} = \frac{\text{Number of satisfactorily completed reports}}{\text{Total number of reports required}}$

Supplementary KPIs

Table 17 SKPI 1 – Cost of disposal to landfill

Definition	<ul style="list-style-type: none"> • “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).
Reason	The cost of disposal to landfill allows for countries to benchmark and compare disposal costs with previous periods and other countries. It allows governments and private industry to accurately budget for estimated future costs. Combined with measurements of total waste disposed (refer SKPI 2), it can indicate the total national cost of landfilling.
Assumptions & limitations	<ul style="list-style-type: none"> • Results are reported as a weighted average across all facilities, hence does not readily report the variation in facility operating conditions or costs. • Completion of the waste facility register likely to require a volumetric estimation of the total material disposed if weighbridges are not available. • Some private landfill operators may be resistant to providing commercially sensitive information. • Excludes capital expenditure required for activities such as new cell construction or capping.
Format & units of measurement	Cost (\$/tonne) – measured as the dollars spent (annual operating expenditure) over the total weight of material disposed for the reporting period.
Required data	Waste facility register – requires each facility to accurately report the total annual operating expenditure and weight of waste disposed.
Method	<p>1) Calculate for each facility reported in the waste facility register:</p> $\text{Cost of disposal to landfill} \left(\frac{\$}{\text{tonne}} \right) = \frac{\text{Annual facility operating cost} \left(\frac{\$}{\text{year}} \right)}{\text{Annual waste disposal} \left(\frac{\text{tonne}}{\text{year}} \right)}$ <p>2) Calculate the national weighted average cost of disposal to landfill (individual facility disposal costs should be weighed against their proportional contribution to the total weight of waste disposed nationally).</p>

Table 18 SKPI 2 - Total weight of waste disposed

Definition	<ul style="list-style-type: none"> • “Weight” – measured as a weight-based summation of all waste facilities. • “Disposed” - waste that is appropriately collected and landfilled, as opposed to waste which gets dumped, burned, buried, littered, or otherwise.
Reason	Provides an indication of the effectiveness of a country’s waste management system in diverting waste from the environment via landfill. Results can be used to evaluate the need for additional investment into waste disposal infrastructure and identify opportunities for improved recycling.
Assumptions & limitations	<ul style="list-style-type: none"> • Excludes certain types of waste disposal, such as disposal taking place in facilities below the minimum processing threshold or at sites that rely on incineration without energy recovery. • Assumes the accurate completion of the waste facility register. • For facilities lacking a weighbridge, volumetric estimates would be required to determine the total quantity of waste disposed to landfill. • Additional conversion factors would need to be applied to convert volumetric data into weight-based estimates. • Incomplete facility register data should be validated through landfill audit activities.
Format & units of measurement	Tonnes per year (tpa) – measured as a summation of recorded weight of waste landfilled in a country.
Required data	Waste facility register – the weight of waste (tonnes) landfilled in a country during the data collection period.
Method	The total sum of entries (by tonnes disposed) in the waste facility registers .

Table 19 SKPI 3 – Total weight of waste recovered

Definition	<ul style="list-style-type: none"> • “Weight” – measured as a weight-based summation of all waste facilities. • “Recovered” - waste that is appropriately collected and diverted from landfill through: <ul style="list-style-type: none"> - 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 processing that allows for the capture and reuse of energy.
Reason	Provides an indication of the effectiveness of a country’s waste management system in diverting waste from landfill and the environment, with products being recirculated to the economy. Provides an opportunity to identify new recycled product markets and opportunities for material consolidation.
Assumptions & limitations	<ul style="list-style-type: none"> • Excludes informal waste recovery activities that take place outside of waste facilities, such as small-scale organics recovery or specialty recycling. • Does not differentiate between the types of waste recovery.⁷ • Assumes the accurate completion of the waste facility register. • For facilities lacking a weighbridge, volumetric estimates would be required to determine the total quantities of wastes received and diverted from landfill. • Additional conversion factors would need to be applied to convert volumetric data into weight-based estimates. • Incomplete facility register data should be validated through landfill audit activities.
Format & units of measurement	Tonnes per annum (tpa) – measured as a summation of recorded weight of waste recovered in a country.
Required data	Waste facility register – the weight of waste (tonnes) recovered in a country during the data collection period.
Method	The total sum of entries (by tonnes recovered) in the waste facility registers .

⁷ PICTs should individually evaluate their capacity to separately report the tonnes of material recovered by waste type and method.

Table 20 SKPI 4 – Volume and type of stockpiled hazardous waste

<p>Definition</p>	<ul style="list-style-type: none"> • “Volumes” – measured as a volume-based summation of all known waste stockpiles (by material type). • “Stockpile” – an accumulation of materials⁸, held in reserve or storage, that typically occurs during: <ul style="list-style-type: none"> - 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. The KPI should report separately for the following types of stockpiled hazardous waste: <ul style="list-style-type: none"> - Asbestos. - E-waste. - Healthcare and pharmaceutical waste. - Used oil. - Used tyres. - Obsolete chemicals.
<p>Reason</p>	<p>Knowledge of the quantities of stockpiled hazardous waste indicates the degree of risk that the waste poses to human health and the environment. Hazardous waste stockpiles can create environmental and human health hazards as stockpiled material can leach into soil and groundwater. It can be used to plan future costs to transport, processes or dispose known waste stockpiles and secure donor funding. Finally, it can provide insight into the extent to which a country is meeting relevant MEA requirements.</p>
<p>Assumptions & limitations</p>	<ul style="list-style-type: none"> • Register data needs to be validated by audits activities to accurately quantify hazardous waste stockpiles. • Risk that facility operators will not accurately report stockpiled quantities (due to risk of litigation). • Often relies of visual estimated of stockpile size and stockpiles of mixed material can be difficult to estimate. • The waste facility register will only regularly update stockpile volumes at participating waste facilities, meaning that unmanaged stockpiles will only be evaluated through audit activities. • There can be significant resource commitment required to identify and assessing all national hazardous waste stockpiles.
<p>Format & units of measurement</p>	<p>Volume (m³) per material type – measured as a summation of recorded volumes of stockpiles by each material type.</p>
<p>Required data</p>	<p>Waste facility register – requires the annual reporting and estimation of known hazardous waste stockpiles.</p>
<p>Method</p>	<p>The total sum of entries (by volume stockpiled) in the waste facility registers of each hazardous waste category.</p>

⁸ Countries should nominate a minimum quantity (e.g., greater than 5 m³) and time (e.g. longer than 6 months) threshold for a waste storage site to be classified as a stockpile.

Table 21 SKPI 5 – Marine plastic pollution potential

Definition	<ul style="list-style-type: none"> • “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. • “Potential” – a theoretical estimate of the potential weight of plastic that ends up in the ocean annually.
Reason	<p>The coastal geography of the Pacific region means that marine plastic has both a high generation rate (given the proximity of the ocean to the source of generation) and a high impact on community livelihoods and national economies which typically rely on industries such as fishing and tourism. Regional environmental programs such as SWAP are aimed at decreasing the impact of marine plastic. A marine plastic pollution potential can capture both changes in the use of plastic and changes in responsible waste management (that decreases the risk of waste causing pollution to the environment). Even though the measurement is theoretical, it allows for a comparison between countries more at risk for generating marine plastic pollution.</p>
Assumptions & limitations	<ul style="list-style-type: none"> • Excludes microplastics resulting from sources such as textile fibres, tyre dust and cosmetics. • Excludes plastic pollution resulting from non-household sources (such as commercial businesses or poorly managed landfills). • Is a theoretical measurement that does not quantify the actual rate of marine plastic pollution. • Does not account for distances between waste generation source and ocean (which can impact the potential of waste to become marine pollution).
Format & units of measurement	<p>Tonnes per year (tpa) – measured as an estimated weight of plastic waste that is mismanaged annually.</p>
Required data	<ul style="list-style-type: none"> • Household waste audit – audit activities are required to quantify the household waste generation rate and composition. • Community survey – required to estimate the household waste capture rate. • Census data – national data required to extrapolate waste audit results.

Method⁹	<p>1) Quantify the weight of waste that is mismanaged: calculated as the difference between the rate of household waste generation (KPI 4) and the household waste capture rate (KPI 6):</p> <p>Mismanaged waste (tpa)</p> $= \text{Household waste generation} \left(\frac{\text{tpa}}{\text{capita}} \right) \times \text{national population (capita)} \times (1 - \text{waste capture rate (\%)})$ <p>2) Estimate the mass of plastic waste that is mismanaged / has the potential to become marine pollution: multiply the MSW composition for plastic waste (KPI 5) to the calculated weight of mismanaged waste:</p> <p>Marine plastic pollution potential (tpa)</p> $= \text{Mismanaged waste (tpa)} \times \text{Plastic MSW composition (\%)}$
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Table 22 SKPI 6 – Awareness of waste management services

Definition	<ul style="list-style-type: none"> • “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: <ul style="list-style-type: none"> - Access to waste collection services. - Access to waste drop-off points. - Availability of local recycling services. - Availability of local composting services.
Reason	Waste education initiatives should initially target increase public awareness of existing waste management services. Increased participation can create additional financial incentives to broaden and improve existing services. Tracking of community awareness should guide education initiatives and support existing waste services.
Assumptions & limitations	<ul style="list-style-type: none"> • Community surveys are required to know what waste management services are available in the survey area prior to undertaking the survey. • Awareness of a service does not equate to participation in existing services (e.g., either due to a lack of support or financial barriers).
Format & units of measurement	Percentage (%) - measured as the fraction of the number of survey responses indicating awareness of waste services over the total number of available waste services.
Required data	Community survey – survey development should initially determine the total number and type of available waste services and structure questions to be relevant to community awareness of those available services.
Method	<p>Calculate:</p> $\text{Awareness of waste services (\%)} = \frac{\text{Number of positive responses indicating awareness}}{\text{Number of available services} \times \text{Number of survey participants}}$

⁹ Method adapted from *The Marine Plastic Footprint* (International Union for Conservation of Nature), available: <https://portals.iucn.org/library/node/48957>

Table 23 SKPI 7 – Proportion of strategic waste management initiatives implemented

Definition	<ul style="list-style-type: none"> • “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.
Reason	Implementation of proposed waste management initiatives can be used to evaluate the success of strategic planning. Planning should be both endorsed and realistically achievable within the proposed timeframe.
Assumptions & limitations	<ul style="list-style-type: none"> • Does not easily identify the source or nature of strategic initiatives implemented. • Initiatives require different levels of funding or resources to implemented, meaning that a proportion does not give additional insights of investment into national waste management. • Requires an accurate baseline survey of the total number of planned initiatives that each PICT has adopted.
Format & units of measurement	Percentage (%) – measured as the fraction of the number of successfully implemented initiatives over the total number of planned initiatives.
Required data	Policy survey – the baseline policy survey is required to quantify the total number of planned national and regional strategic initiatives. Each annual policy review is required to report the total number of implemented initiatives since the previous review period.
Method	<p>Calculate:</p> $\text{Proportion of initiatives implemented (\%)} = \frac{\text{Total number of initiatives implemented nationally}}{\text{Number of planned national initiatives} + \text{Number of planned regional initiatives}}$

Table 24 SKPI 8 – Commercial waste capture rate

Definition	<ul style="list-style-type: none"> • “Commercial waste” – waste originating from businesses only. • “Capture rate” – the proportion of total commercial waste generated that is successfully captured and disposed of or recovered in an environmentally responsible manner. Waste capture can include: <ul style="list-style-type: none"> - 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.
Reason	Waste capture rates measure the effectiveness of a country’s waste collection system. It provides information into how much of the total waste generated is being successfully collected and disposed of. As such, it provides an indication of both how many businesses are using the service and how well those businesses use the service.
Assumptions & limitations	<ul style="list-style-type: none"> • Commercial premises audit sampling must be representative of the broader business types, with data captured separately for different geographical areas. • Liable to impacts of daily or seasonal variations dependent on the time of the audit. • Does not provide insight into the final disposal destination of captured waste.
Format & units of measurement	Percentage (%) – measured as the fraction of the total waste captured through formal waste management services over the total waste generated by businesses.
Required data	<ul style="list-style-type: none"> • Commercial waste audit – audit activities are required to sample the entirety of waste generated per business (at the source). If businesses rely on multiple waste disposal methods, each method should be quantified as a proportion of the total waste generated. • Community survey – required to account for the number of activities undertaken by the business, the geographic positioning and business operational sites. Survey questions should determine the typical waste disposal method relied upon by each business at each site of operation. • National and provincial / state commercial information – national data, and data at the provincial / state level, required to extrapolate waste audit results. This indicator requires knowledge of the number of businesses in a country and their geographic distribution.
Method	<ol style="list-style-type: none"> 1) Audit and survey activities quantify each business’ disposal method (including formal and informal management practices). 2) Results from participating businesses are collated by sample area. These locations are then grouped and averaged based on either geographic position (e.g., urban, semi-urban and rural) or socio-economic standing (e.g., low, medium, or high income).¹⁰ 3) The total commercial waste generation rate is quantified for each grouping. 4) Calculate for each sample area of the business audit and community survey: $\text{Commercial waste capture rate (\%)} = \frac{\text{Waste captured by management services (tpa)}}{\text{Total commercial waste generated (tpa)}}$ 5) Extrapolate regional results to the national level using available provincial / state and national commercial/business information to determine the average national commercial waste capture rate.

¹⁰ The exact grouping method will depend on the availability of census data, although should aim to use a minimum of three population categories with unique waste generation rates.

Table 25 SKPI 9 – Commercial collection service coverage

<p>Definition</p>	<ul style="list-style-type: none"> • “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: <ul style="list-style-type: none"> - 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 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.
<p>Reason</p>	<p>Implementation of a waste collection service it is a fundamental requirement for effective waste management. Without some form of waste collection service, waste can accumulate, and be dumped illegally to the detriment of environmental and community health. It also provided a basis for exploring methods to improve waste management performance, such as through increasing the coverage of the collection service if coverage is low.</p>
<p>Assumptions & limitations</p>	<ul style="list-style-type: none"> • Business surveys are required to understand if a particular commercial waste collection service is regular, accessible, and affordable. • Does not account for community perception or participation in an available collection service. • Requires accurate data of the total number of businesses participating nationally.
<p>Format & units of measurement</p>	<p>Percentage (%) – measured as the fraction of the total number of businesses with a waste collection service over the total number of businesses (nationally).</p>
<p>Required data¹¹</p>	<ul style="list-style-type: none"> • Community survey – requires participation from the community to determine the availability and management of waste collection services. • National and provincial / state commercial information – national data, and data at the provincial / state level, required to extrapolate waste audit results. This indicator requires knowledge of the number of businesses in a country and their geographic distribution.
<p>Method</p>	<ol style="list-style-type: none"> 1) Calculate for each sample area of the community survey: Commercial collection service coverage (%) $= \frac{\text{Number of survey participants with access to a collection service}}{\text{Total number of survey participants}}$ 2) Extrapolate regional results across the national population using available national commercial/business data to determine the national collection service coverage. 3) Results should be validated and cross-referenced with an alternate data source, such as private waste collection contracts or municipal collection service records.

¹¹ Less resource intensive methods may be deployed to validate community survey results, such as consultation with private waste collection contractors or records maintained of commercial collection services.

Table 26 SKPI 10 – Weight of Disaster Weight Disposed

Definition	<ul style="list-style-type: none"> • "Weight" – measured as a weight-based summation of all waste facilities. • "Disaster Waste" – Large quantities of waste caused by disasters.¹² • "Disposed" - waste that is appropriately collected and landfilled, as opposed to waste which gets dumped, burned, buried, littered, or otherwise.
Reason	<p>PICTs are particularly vulnerable to the negative impacts of natural disasters, which can generate significant amounts of waste. Managing the waste generated by these disasters can be challenging, particularly in the absence of sufficient data, resources, and information to enable effective waste management practices.</p> <p>One way to assess the effectiveness of disaster waste management efforts is by measuring the total weight of disaster waste disposed. This metric not only provides an estimate of the amount of disaster waste being effectively managed but can also allow for an estimation of the total amount of disaster waste generated in a year.</p> <p>Calculating this key performance indicator (KPI) can be undertaken by regularly updating the waste facility register. There is no need for additional audits or surveys. If more detailed information is required, the disaster waste guidelines produced by SPREP¹³ provides methodologies to assist with disaster waste data collection and analysis.</p>
Assumptions & limitations	<ul style="list-style-type: none"> • Only captures disaster waste which ends up at waste facilities, including landfills, disposal sites and recovery facilities. • Disaster waste which remains in-situ, unmanaged, or uncollected may not be captured by this performance indicator. • The indicator may not provide information as to the type and volume of waste disposed. This is dependent on the level of detail included with in the facility register. For example, hazardous wastes such as oils or chemicals may require special handling and treatment, and their disposal may not be accurately captured by this performance indicator.
Format & units of measurement	Tonnes per year (tpa) – measured as a summation of recorded weight of disaster waste disposed of via landfilling or receipt at waste facility in a country.
Required data	Waste facility register – the weight of disaster waste (tonnes) landfilled or received at a waste disposal facility in a country following disaster events.
Method	Calculate: The total sum of entries (by tonnes of disaster waste disposed) in the waste facility register .

¹² SPREP, *Practitioner’s Guideline and Introduction of Systems to Enable Pacific Islands to Effectively Manage Disaster Waste – Draft*, 2022

¹³ Ibid

Regional Data Monitoring and Reporting Framework

The data monitoring and reporting framework is provided in **Figure 2** below.

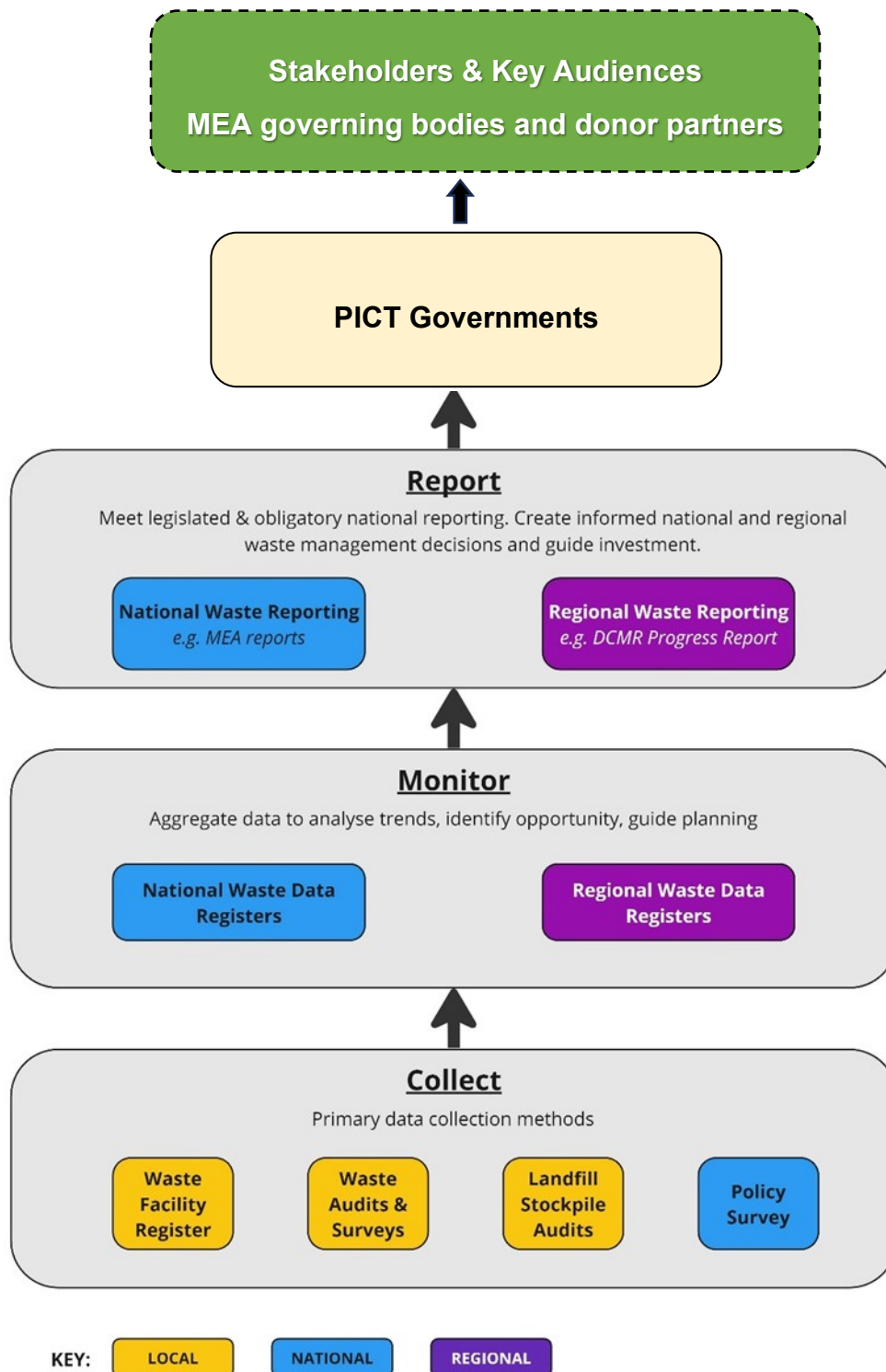


Figure 2 Regional Data Monitoring and Reporting Framework

The following data tools are recommended for country and regional waste data aggregation and reporting purposes:

- a) Existing Inform Country Data Portal and the Pacific Environment Portal. If possible, these portals should be updated to house the following:
 - i) A regional waste facility database - An aggregated database of individual national waste facilities registers, used to monitor regional trends, identify investment opportunities, and highlight best-practice examples. Also acts as the repository for landfill and stockpile waste audit results (which are used to regularly validate data gathered through the waste facility register).
 - ii) A regional household waste database – A summary database consolidating individual national waste audit summary reports, tracking changes in waste generation, composition, and capture rate across the region. Used to identify opportunities for expanded services and key education themes.
 - iii) A regional policy database - A summary database combining the regions standing against MEA reporting and progress against regional strategic plans.

Country and regional progress reports which synthesises the findings from the three monitoring databases will also include:

- i) Protocols for reporting to each KPI including minimum thresholds for what can be considered representative of the country / at the national scale.
- ii) The approach used to identify data/knowledge gaps.
- iii) Data collection, monitoring and reporting timeframes.
- iv) Reporting protocols and templates.
- v) Key stakeholders and their responsibilities and inputs.

Regional monitoring and reporting should include an active element of stakeholder engagement to give country representatives the opportunity to provide feedback on the recent round of reporting. Recommendations for improved data collection, monitoring and reporting should also be identified.

References

Department of Agriculture, Water, and the Environment, (2021). *Australian standard for waste and resource recovery data and reporting.*

Department of Climate Change, Energy, the Environment and Water, (2022). *National Waste Report 2022.*

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SPREP, (2020). *State of Environment and Conservation in The Pacific Islands: 2020 Regional Report.*

SPREP, (2021). *Performance Implementation Plan Key Performance Indicators*

SPREP, (2021). *Developing a Project Logic – A Guide for Project Design*

PacWaste Plus, (2020). *Monitoring and Evaluation Frameworks, Sustainable Waste Action in the Pacific*

PRIF, (2022). *Regional Recycling Centre Scoping Study: Network Options Report.*



Appendix A

KPI Long List and Evaluation

Category	KPI	PWP Project Data Strategy	Cleaner Pacific 2025 Indicators	J-PRISM II Waste Indicators	State of the Environment Core KPIs	SWAP Results Framework	SPREP PIP 2022-2033	PWP Project Logic Framework
Waste Generation	Per capita generation of waste (MSW)	X	X	X				
	Annual waste generation rate (C&I and C&D)							
	Marine plastic pollution potential				X	X		
	MSW waste composition	X						
	C&I waste composition (by sector)							
	C&D waste composition (by sector)							
Waste Capture	Collection services coverage	X	X	X	X			
	Household waste capture rate	X	X	X				
	Commercial waste capture rate	X	X	X				
	Unit cost of waste collection service			X				
	Fee charged per waste collection service	X						
Waste Disposal	Total waste disposed							
	Total waste disposed in an environmentally acceptable manner							X
	Total recycling processed							X
	Quantities and types of stockpiled hazardous waste (by material type)	X	X		X			
	National recycling rate	X	X		X	X	X	X

Category	KPI	PWP Project Data Strategy	Cleaner Pacific 2025 Indicators	J-PRISM II Waste Indicators	State of the Environment Core KPIs	SWAP Results Framework	SPREP PIP 2022-2033	PWP Project Logic Framework
	Rate of hazardous waste disposal or treatment (including export)						X	X
	Total waste illegally dumped	X		X				
	Total organics recovered							
Infrastructure	Number of modern waste facilities (by type)	X		X	X			
	Number of unregulated waste facilities (by type)	X		X	X			
	Cost of disposal to landfill per tonne	X		X				
	Cost of recycling per tonne (by material type)			X				
	Resilience of waste disposal facilities during disasters				X			
	Condition of air/ water/ soil quality in waste facility buffer and impact zones				X			
	National or municipal composting programs		X	X				X
	Number of active recyclers in the country			X				X
	Number of sites remediated					X		X
Waste Management and Planning	Awareness of waste management services	X			X	X		
	Participation and support of waste management activities	X						
	Number of strategic waste management initiatives implemented	X			X	X	X	X
	Fulfillment of MEA reporting requirements	X			X			

Category	KPI	PWP Project Data Strategy	Cleaner Pacific 2025 Indicators	J-PRISM II Waste Indicators	State of the Environment Core KPIs	SWAP Results Framework	SPREP PIP 2022-2033	PWP Project Logic Framework
	Number of CDL programs	x	x					x
	Number of EPR programs	x	x					x
	Number of national pollution inventories		x					
	Number of user-pay/ sustainable waste financing programs		x					x
	Number of completed national waste audits utilising agreed regional methodology							x
	Number of active waste stream monitoring programmes (by country, waste stream)							x
	Number of waste management training/ education courses	x						
	Number of marine litter management programs					x		

Note: 'x' indicates that the KPI is referenced as a recommendation in the relevant strategic document.

Appendix B Waste Facility Register - Standardised Data Collection form Template

PART A

Facility Name: _____

Facility Address: _____

1. Operator Information:

Name: _____

Contact Number: _____

Email: _____

Data Collection Frequency: _____

Data Reporting Frequency: _____

1. Facility Type:

Landfill/Dumpsite

Recycling Processor/Materials Recovery Facility

Organics Processing Facility

Incinerator

Transfer Station

Other / Further information: _____

2. Facility infrastructure:

Functional leachate management

Dedicated staffing

Equipment access, e.g., bulldozer, baler, tractor

Cover system, e.g., daily, intermittent soil cover

Fire prevention and control measures (Recycling Facility)

Bunded areas / site water runoff management system (Recycling Facility)

3. Licencing:

Facility licenced: Yes No

If yes, provide basic licence information: _____

Proceed to Part B.

PART B

4. Estimate of the weight of material disposed or recovered per year: _____ tonnes.

5. Maximum annual processing capacity (disposal/recycling/recovery):

Disposal: _____ tonnes

Recycling: _____ tonnes

Recovery: _____ tonnes

Total Processing Threshold (tonnes/year): _____

6. Estimated annual facility operation cost: \$ _____

7. Accepted waste material categories:

Material category	Accepted	Not Accepted
Metals	[]	[]
Paper and cardboard	[]	[]
Plastics	[]	[]
Batteries	[]	[]
E-Waste	[]	[]
Glass	[]	[]
Hygiene	[]	[]
Organics	[]	[]
Fishing/seafood	[]	[]
Single-Use Plastics	[]	[]

Material Category	Details of specific material categories accepted
Hazardous Wastes	
Other	

8. Volume of stockpiled material (by waste type):

Waste Type: _____ Volume: _____ m3

Waste Type: _____ Volume: _____ m3

Waste Type: _____ Volume: _____ m3

Waste Type: _____ Volume: _____ m3

Waste Type: _____ Volume: _____ m3

Waste Type: _____ Volume: _____ m3

Waste Type: _____ Volume: _____ m3

9. Disaster waste

If applicable, estimate the weight of disaster waste sent to facility per year following disaster events:
_____ tonnes.

Appendix C Community Survey – Household Survey Questionnaire Template

1. Demographic Information

Name: _____

Age: _____

Gender: Male Female Other

Do you live in a: House Apartment Other (please specify): _____

Number of people in household: _____

Occupation: _____

Education Level: _____

Estimated Monthly Household Income: \$ _____

2. Simplified Disposal Behaviour

What are the primary waste disposal methods in your household?

Landfill

Composting

Recycling

If yes, list material types: _____

Burning/Burying/Dumping

Other (please specify): _____

3. Disposal Behaviour by Material Type

Metal: Recycling Landfill Other (please specify): _____

Paper/Cardboard: Recycling Landfill Other (please specify): _____

Plastic: Recycling Landfill Other (please specify): _____

Batteries: Recycling Landfill Other (please specify): _____

E-waste: Recycling Landfill Other (please specify): _____

Glass: Recycling Landfill Other (please specify): _____

Hygiene: Landfill Other (please specify): _____

Organics: Composting Landfill Other (please specify): _____

Other (please specify): _____

4. Current Recycling Behaviours

Do you currently reuse/recycle? Yes No

If yes, which materials do you reuse/recycle? (check all that apply)

Paper/Cardboard

Glass

Plastic

Metal

Other (please specify): _____

Are you willing to separate your waste further to improve recycling rates? Yes No

5. Access to Collection/Disposal Services

Do you have access to the following services? (check all that apply)

Kerbside collection

Collection per specific material stream

If yes, what type of material(s) is collected? _____

Waste drop-off point

Self-haul to landfill/dumpsite/facility

Other (please specify): _____

If you have access, how often is waste collected from your premises? _____

Please rate your satisfaction with the service(s) provided to you from 1 – 10. _____

What are the good aspects of the provided service?

What aspects of the service could be improved?

6. Waste Service Awareness

Are you aware of the waste management services provided in your area? Yes No

If yes, please specify the services you are aware of: _____

If no, would you like to learn more about available waste management services? Yes No

What type of waste collection/disposal service would be useful for you?

7. Willingness to Pay for Collection/Disposal Services

Do you currently pay for waste collection and/or disposal services? Yes No

If yes, please specify the type of service(s): _____

If yes, please specify the amount paid for the service(s) per month: \$ _____

If no, are you willing to pay for waste collection and/or disposal services? Yes No

If yes, how much are you willing to pay for waste collection/disposal services per month? \$ _____

8. Consumption Habits

How often do you purchase single-use plastic products (e.g., water bottles, straws, plastic bags, etc.)?

Daily

Weekly

Monthly

Rarely

Never

Thank you for taking the time to complete this survey. Your feedback is valuable in helping us understand waste management needs in our community.

Appendix D Community Survey – Commercial Survey Questionnaire Template

PART A

1. Demographic Information

Business Name: _____

Business Address: _____

Industry Sector: _____

Business Type: _____

Number of Employees: _____

Contact Person: _____

Contact Number: _____

Email: _____

2. Waste Disposal Methods

What are the primary waste disposal methods used by your business? (check all that apply)

Recycling

Landfill

Incineration (at facility)

Burning/Burying/Dumping

Other (please specify): _____

3. Access to Collection/Disposal Services

Do you have access to the following services? (check all that apply)

General Waste Collection service

If you have access, list collection frequency: _____

Specific material collections (e.g., recyclables)

If yes, what type of material(s) is collected? _____

Waste drop-off point

Self-haul to landfill/dumpsite/facility

Other (please specify): _____

Please rate your satisfaction with the service(s) provided to you from 1 – 10: _____

What are the good aspects of the provided service?

What aspects of the service could be improved?

4. Willingness to Pay for Collection/Disposal Systems

Do you currently pay for waste collection and/or disposal services? Yes No

If yes, please specify the type of service(s): _____

If yes, please specify the amount paid for the service(s) per month: \$ _____

If no, are you willing to pay for waste collection and/or disposal services? Yes No

If yes, how much is your business willing to pay for waste collection/disposal services per month? \$

5. Current Recycling Behaviours

Do you currently recycle? Yes No

If yes, which materials do you recycle? (check all that apply)

Paper/Cardboard

Glass

Plastic

Metal

Other (please specify): _____

Are you willing to separate your waste further to improve recycling rates? Yes No

6. Waste Service Awareness

Are you aware of the waste management services provided in your area? Yes No

If yes, please specify the services you are aware of: _____

If no, would you like to learn more about waste management services? Yes No

What type of waste collection/disposal service would be useful for you?

7. Waste Management Practices

Does your business have a waste management plan in place? Yes No

If yes, please describe the plan: _____

Are there any waste reduction initiatives in place at your business? Yes No

If yes, please describe the initiatives: _____

8. Consumption Habits

Does your business purchase single-use plastic products? Yes No

If yes, which products do you purchase? (check all that apply)

Water bottles

Straws

Plastic bags

Single-use sachets

Other (please specify): _____

Is your business willing to reduce the use of single-use plastic products? Yes No

9. Estimated Monthly Waste Generation

How much waste (in tonnes) does your business generate each month? _____

10. Hazardous Waste Generation

Does your business generate any of the following hazardous waste types?

Asbestos

e-waste

Healthcare and pharmaceutical waste

Used oil

Used tyres

Obsolete chemicals

11. Volume of stockpiled material on premises (by waste type, particularly hazardous wastes):

Waste Type: _____ Volume: _____ m3

Waste Type: _____ Volume: _____ m3

Waste Type: _____ Volume: _____ m3

Waste Type: _____ Volume: _____ m3

Waste Type: _____ Volume: _____ m3

Thank you for taking the time to complete this survey. Your feedback is valuable in helping us understand waste management needs in our community.



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