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PacWastePlus
PACIFIC WASTE MANAGEMENT

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

Waste Audit Report

SOLOMON ISLANDS

June 2023

Australian Aid

Supported by the Australian Government through the Pacific Ocean Litter Project

The information and data gathered from these waste audits will be used by countries in the Pacific to support the development and monitoring of waste and resource recovery projects and recommend the infrastructure and policy interventions required. The regional dataset will also be used to identify and evaluate potential regional projects that would improve waste management in the region.

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Cover Photo: Gizo Disposal Site – Waste Data Report, Solomon Islands Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM), 2022.

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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 PacWastePlus programme will generate 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 PacWastePlus 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 PacWastePlus programme by visiting:

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PacWastePlus
PACIFIC WASTE MANAGEMENT

https://pacwasteplus.org/

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Glossary

Terminology	Definition
APWC	Asia Pacific Waste Consultants
CDS	Container Deposit Scheme
Cefas	Centre for Environment Fisheries and Aquaculture Science
CI	Confidence Interval
CLiP	Commonwealth Marine Litter Programme
EHO	Environmental Health Officer
EU	European Union
GPS	Global Positioning System
HCC	Honiara City Council
HDPE	High Density Polyethylene
JICA	Japanese International Co-operation Agency
KG	Kilogram
LDPE	Low Density Polyethylene
MARPOL73/78	The International Convention for the Prevention of Pollution from Ships (Marine Pollution), 1973 as modified by the Protocol of 1978
MEA	Multilateral Environmental Agreements
MECDM	Ministry of Environment, Climate Change, Disaster Management and Meteorology
MHMS	Ministry of Health and Medical Services
MSW	Municipal Solid Waste
PRIF	Pacific Region Infrastructure Facility
PVC	Polyvinyl Chloride
SBD	Solomon Islands Dollar
SPREP	Secretariat of the Pacific Regional Environment Programme
USD	United States Dollars
VHF	Very High Frequency

Executive Summary

Report Sources	• Solomon Islands – Waste Data report (Cefas, 2018) authored by APWC • Solomon Islands – Waste Audit Report (PacWastePlus, 2022) authored by MECDM
Summary of Audit Activities	• Household and commercial audit (Nov - Dec 2018) • Material collected from eight communities •Total of 218 household samples (81.6% rural, 18.4% urban) •Total of 46 commercial samples (67.4% Honiara, 32.6% Auki) • Landfill audit (Oct - Nov 2021) • Samples collection from 6 landfills in five provinces • Five stockpile assessments undertaken in five location in the Central and Western Province
General Waste Management	• Urban: 37% to 45% of waste generated is being captured through the waste management systems currently in place • Rural: all waste generated is being disposed of through burning, burying and dumping, either on land or in nearby waterways.
Average Waste Disposal Rate	• Households: 170 gram/capita/ day (Overall 104 tonnes/ day) • Businesses (Honiara): 1,630 gram/ business/day (Overall 5.1 tonnes/ day)
Recycling	• There are 4 recycling companies operating in the country at small scale. • Types of waste collected and exported include: aluminium can, scrap metals, plastics (PET Bottles, HDPE, LDPE) and Used Lead Acid Batery.
Stockpiles in Country	• Stockpiled items included PET Bottles, LDPE, HDPE, iron roofing materials, plastic waste tanks, aluminium cans awaiting export, gas cylinders, plastic water tanks, and Used Lubricant Oils. • Informal stockpiles of end of life vehicles, tyres and aluminum cans are common in the outer islands.
Average Landfill Composition	• Plastics-44% • Organics- 21% • Paper Cardboard- 12% • Metal- 9% • Hazardous - 5% • Hygiene- 3% • Glass- 3% • Batteries-1% • E-Waste- 1% • Others- 1%

1 Introduction

The Solomon Islands is a member of the Pacific Island Forum and the Secretariat of the Pacific Regional Environment Programme (SPREP), both intergovernmental organisations focused on achieving the United Nations Sustainable Development Goals.

The Solomon Islands is one of fifteen Pacific Island Nations taking part in the PacWaste Plus Programme implemented through SPREP and funded by the European Union Delegation of the Pacific. The programme is focused on improving waste management activities and the capacity of Governments, industries, and communities to manage wastes to protect human health and the environment.

SPREP engaged MRA Consulting to consolidate existing waste audit data for the Solomon Islands. This report is a consolidation of two audit reports: the Centre for Environment Fisheries and Aquaculture Science (Cefas) report authored by Asia Pacific Waste Consultants (APWC) and the PacWaste Plus programme audit authored by the Solomon Islands Ministry of Environment, Climate Change, Disaster Management and Meteorology (MECDM).

The information and data gathered from these waste audits is intended to support the development and monitoring of waste and resource recovery projects in Solomon Islands and recommend the infrastructure and policy interventions required.

1.1 Solomon Islands – Waste Data Report (Cefas, 2019)

The Commonwealth Litter Programme (CLiP) is an initiative delivered by Cefas and funded by the United Kingdom's Department for Environment, Food and Rural Affairs. The initiative supports developing countries across the Commonwealth in advancing national litter action plans focused on preventing plastics from entering the oceans.

In 2018, CLiP contracted APWC to study waste management practices in the Solomon Islands and offer best-practice solutions and training to staff who are engaged in the design and delivery of waste services. The study included a desktop review of national waste management practices, waste infrastructure and the legislative framework.

This was complemented by an audit of household and commercial waste. Interviews were conducted with all households where waste was collected to cross-reference socioeconomic and waste behaviour data with the waste disposed. The resulting report presented the data, analysis and recommended best practice activities that address gaps in the management of waste within the Solomon Islands.

1.2 Solomon Islands – Waste Audit Report (PacWaste Plus, 2022)

To complement the household audit undertaken by APWC for Cefas, the MECDM was engaged through the PacWaste Plus programme to undertake an audit of Solomon Islands landfills. The audits used the *Waste Audit Methodology – A Common Approach* produced by the Pacific Region Infrastructure Facility (PRIF). The waste audit was undertaken with support from provincial officers and other key stakeholders, with samples collected from six landfill sites in 2021.

Results from the audit were used to characterise the composition of waste disposed to landfills, estimate national waste disposal rate and determine the size and nature of waste stockpiles.

The audit was funded by SPREP through the EU-funded PacWaste Plus programme and with support from the Australian-funded Pacific Ocean Litter Project.



2 Country Profile

The Solomon Islands is in the Melanesia region of the Pacific Ocean and is composed of six major islands (Choiseul, Isabel, Malaita, Makira, New Georgia and Guadalcanal) and over 900 smaller islands. It covers a total land area of approximately 28,896 square kilometres.

The Solomon Islands has a population of over 720,000 people, of which 26% are in urban areas while 74% while rural areas (***Table 1***). Urban populations are largely concentrated in the capital city Honiara and Auki (located in Malaita Province). The population has a current growth rate of approximately 2.6% per year.

Table 1: Population of the provinces of Solomon Islands (Solomon Islands National Statistics Office, 2019)

Province	Capital City	Population
Central	Tulagi	30,326
Choiseul	Taro Island	30,619
Guadalcanal	Honiara	154,150
Honiara (Capital)	Honiara	130,176
Isabel	Buala	30,399
Makira-Ulawa	Kirakira	52,006
Malaita	Auki	173,346
Rennell-Bellona	Tigoa	4,091
Temotu	Lata	22,132
Western	Gizo	94,207
Total		**721,452**

English is the official language, although only 1-2% of the population are capable of fluent communication. The most used language is Solomons Pijin, along with over 70 local languages.

The government of the Solomon Islands is separated intro three levels: national, provincial and local. Administration is largely determined by nine provincial governments and the Honiara City Council which administers Honiara city as a separate entity from the Guadalcanal province. Matters of waste management and pollution are the responsibility of provincial governments, although limited financing and resources means each is still largely dependent on the national government.

2.1 Socio-Economic Background

The economy of the Solomon Islands is primarily structured around subsistence agriculture, fishing and forestry activities. Important cash crops include copra, cacao and palm oil while common local market crops include taro, rice, yams and bananas. In 2019, the Solomon Island's top three exports (OEC, 2019) were:

1. Rough wood (65.8%)
2. Processed fish (10.2%)
3. Aluminium ore (8.16%)

Tourism has remained underdeveloped in the Solomon Islands, limited by a lack of dedicated infrastructure and transportation. Government efforts are currently trying to increase tourism rates.

The Solomon Island's estimated national GDP is US$1.38 billion, equalling approximately US$2,200 per capita (IMF, 2019). The most recent trade balance was negative, with a total export of US$0.57 billion and total imports of US$0.60 billion.

The human development index (HDI) published by the United Nations Development program reported a HDI rating of 0.567 for the Solomon Islands (2019), a 19.4% increase since 2000. The Solomon Islands is positioned at 151 out of 189 countries and territories. This measurement is based on health (e.g., life expectancy at birth), education (e.g., expected years of schooling), gender equality and standard of living.

Transportation in the Solomon Islands is limited by a lack of roads. There are only 34 kilometres of sealed roads, much of which is in poor conditions. Many rural areas do not have telephones or other modern communication facilities, resulting in many Solomon Island communities being isolated from larger urban centres.

2.2 Institutional Framework

There are various stakeholders responsible for management of waste in Solomon Islands, including:

- National government – responsible for national legislation, strategies and policy frameworks for waste, primarily under the jurisdiction of the MECDM and the Ministry of Health and Medical Services (MHMS);
- Provincial Government – establish the local regulatory framework for waste management and management of waste disposal facilities; and
- Municipal Governments – responsible for providing household waste collection and management of landfill sites. There are only two town councils in the Solomon Islands; Honiara City Council (HCC) and Gizo Town Council.

Solomon Islands has several policies, legislations, strategies and multilateral agreements that address solid waste management and control of pollution (***Appendix A***).

The MECDM is the key department for the national coordination of waste management as established by *The Environment Act 1998*. Operational management typically falls under the responsibility of Environmental Health Officers (EHO) employed by the Ministry of Health.

Some specific waste streams, such as wastewater treatment solids fall within the jurisdiction for the relevant government agency or state-owned enterprise.

Collaboration between stakeholders, capacity building within lead agencies and proactive adherence to legislated responsibilities will all be required to address waste and pollution in the Solomon Islands.

Figure 1: Map of Solomon Islands with provincial areas (https://gisgeography.com/solomon-islands-map/)

3 Study Methodology

Audits completed under the Cefas program (2019) and the PacWaste Plus programme (2022) were completed with different scopes and by different organisations:

- The methodology used during the Cefas audit (2019) is described in ***Sections 3.1 to 3.4.*** This study was completed prior to the publication of the PRIF Guidelines (2020), hence aspects of the methodology or sorting categories used may differ from more recent audits completed in the region.
- The methodology used during the PacWaste Plus programme audit conducted by MECDM in 2022 is described in *Section 3.4*. Review of available data from MECDM has shown that some aspects of the data collection do not adhere to requirements of the PRIF guidelines, namely:
  - Auditors visually estimated load weight (tonnes) rather than load volume (m^3)
  - No evidence of a plastic bag audit as recommended by the PRIF Guidelines (2020); hence 'bagged waste' composition has not been applied across the entire audit.
  - Use of waste source codes (MSW, Commercial, Construction) and sectors (e.g., manufacturing, retail, shopping) are not consistent with the PRIF guideline.
- Stockpile observations conducted as part of the PacWaste Plus programme audit include some recommendations from the PRIF Guidelines, although a consistent approach to estimating the quantity of stockpiled materials doesn't appear to have been employed.
- A quantification and cross referencing with customs data was not carried out under the PacWaste Plus programme audit. It is recommended that an analysis of this information is conducted to further quantify materials with the potential for resource recovery.

3.1 Sample Collection

3.1.1 Household Sampling Distribution

This section provides the outcomes for waste data collection work undertaken in December 2018. Statistical analysis determined the sample size required to provide reliable and robust data. The minimum and maximum number of household samples required are shown in ***Table 2.***

Table 2: Households sample to be collected (Cefas, 2019)

Confidence level	0.95			0.9		
Error	5%	10%	15%	5%	10%	**15%**
Sample size	**781**	**196**	**87**	**550**	**138**	**62**

Using the calculations provided above, it was assumed that the minimum number of samples required is 140 and the maximum number is 200.

Sampling was split based on the population distribution within different communities in Solomon Islands. Honiara City was sampled as representative of an urban population for Solomon Islands. Rural sampling was undertaken on Auki in Malaita province and in the remote communities around Honiara.

The proposed sample split, and actual sample distribution achieved is shown in ***Table 3***.

Table 3: Population distribution vs sample distribution (Cefas, 2019)

Solomon Islands	Population	%	No. of households required	Samples achieved
Capital Honiara/Island of Guadalcanal	82,485	13%	26	**40**
Noro/New Georgia Islands	3,365	1%	1	**0**
Outer Islands	**553,568**	**87%**	**173**	**179**

In total, 219 samples were collected, with 179 rural and 40 urban samples collected from eight different communities. The rural samples were divided between two localities, with 81 samples collected from five villages along Lunga river (Guadalcanal province) and the remaining 98 samples collected from three communities in Malaita province.

The sample collection from each island was limited by the ease of collection of samples, the ability to transport samples, as well as the presence and absence of collection systems. The audit team was in Solomon Islands for two and a half weeks and assessed waste from eight communities. The number of samples collected from each site, as well as the collection system available, is listed in ***Figure 2***.

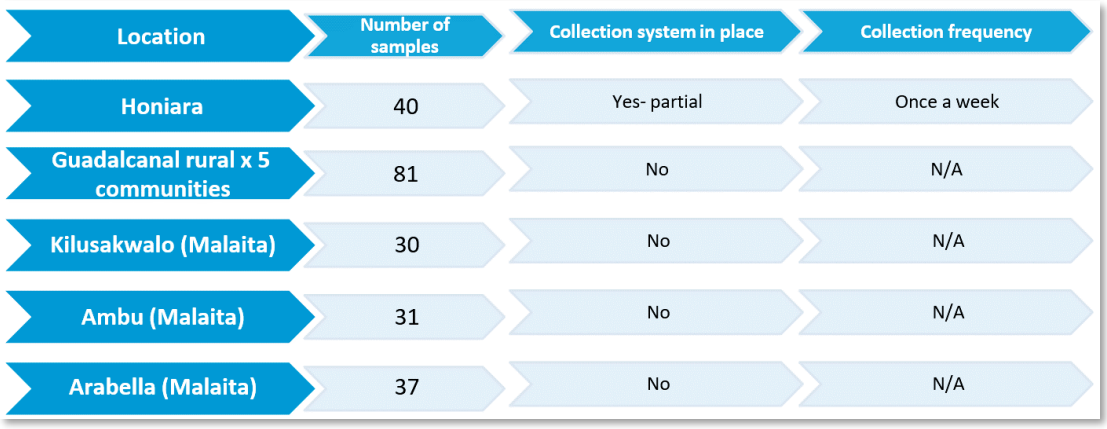


Figure 2: Samples Collected and Collection System in Place (Cefas, 2019)

3.1.2 Commercial Sampling Distribution

In addition to the household samples, 46 commercial samples were assessed – 31 premises in Honiara and 15 premises in Auki (Malaita). Commercial premises were divided into four major categories and the sample number from each is shown below in ***Table 4.***

Table 4: Commercial Samples Collected in Honiara and Auki (Cefas, 2019)

Type of business	Honiara	Collection frequency	Auki	Collection frequency
Accommodation and restaurant	9	Once a week	3	**Not collected**
Administrative and support services	4	Once a week	7	**Not collected**
Public administration	4	Once a week	-	**Not collected**
Wholesale and retail trade	14	Once a week	5	**Not collected**
Total	**31**		**15**	

3.2 Sample Collection Methodology

Domestic waste samples were collected household by household to determine the waste generation and disposal rate per household. Waste collection methods had to be modified based on the locality being assessed.

3.2.1 Collections from areas with house-to-house collection systems

Audit teams approached the respective collection service provider to assist with the collection of waste just before it was being picked up by the waste trucks. In Honiara, auditors conducted a waste collection prior to the normal collection truck arrival. Each household was approached, and its rubbish bags/bins ready for disposal were requested. No samplings were undertaken in Honiara from collection points.

Each collection team comprised the following staff:

- Audit collection supervisor
- Audit collection runner
- Local staff member to ensure smooth running of collections

Random streets were selected from each ward and a sample was collected from every third to fifth house in each street. No more than five samples were collected from the same street. The audit collection supervisor collected the following data for each house sampled:

- GPS location
- Number of bags per household
- Interview tag provided
- Photo

The sample collection recording sheet template is provided in ***Appendix E***. At the end of each day, the sample collection sheet was scanned and converted to a digital format. The methodology remained the same for both households and commercial premises. The major challenge in collecting waste per household was ensuring that the household or commercial premises could be identified readily by the interviewers later. Different methods were trialled in Vanuatu and the lessons learned were applied in Solomon Islands. A tagging system was employed, whereby a coloured thread or ribbon was attached to each house where a sample was taken. The collection supervisor also had a conversation with the residents to ensure that the house wasn't subdivided and that the correct house was being tagged. The next day, the interviewers arrived at the location using GPS co-ordinates and identified the households using the ribbon/thread tag.

3.2.2 Collection from areas with no collection service

Eight Solomon Island communities were sampled as representative of areas with no collection system. These include five communities along river Lunga in the Guadalcanal province and three communities in Auki. To achieve the sampling required in these villages and communities, three separate visits were required to ensure the requisite sample size could be achieved.

The method used is as follows:

1. On day one, audit staff approached the village chief or pastor (or both) and sought permission to undertake waste data collection in their village. After permission was given, the requirements of the sampling process were explained, and advice was sought as to the best day to provide bags for sampling to the community.
2. Auditors returned on the appointed day and provided each household with a bag to use to dispose of their waste from that day onwards. The maximum number of bags provided to a community was 35. Some communities were very small and one community on Lunga River had only seven households. As such, only seven bags were provided. Villagers were told not to dispose of any bulky waste or problem waste that they have been having trouble disposing of into the black bags.
3. The village chief/pastor was requested to make an announcement at church the next day reinforcing the message regarding disposing of all wastes from that day onwards into the plastic bags being distributed throughout the village.
4. The audit team returned after three days to retrieve the bags from each household. As each household brought their waste bag, the bag was labelled and provided to the sorting team. An interview was conducted with the member of the household depositing the bag. Refreshments were provided to all members of the village during the interview stage.
5. The tagged bags were brought back to the Ranadi dump site. All sorting took place in Honiara and an abandoned police warehouse in Auki.

3.3 Household Interviews

Interviews were conducted with all households where waste was collected. The interviews were conducted using the interview sheet provided at ***Appendix F***. As noted above, each household location was captured using GPS, a photograph was taken, and a colourful ribbon or piece of string attached to help identify each household.

Auditors noted that interviews were challenging because people are at work during the day. Therefore, most of the interviewing was undertaken in the evenings and early mornings or weekends.

The standard audit procedure is to seek voluntary participation by households in the interview process. The participation rate was high in Solomon Islands and auditors were able to interview all households from which waste was collected.

3.4 Sample Sorting

All waste in Honiara and the rural communities was collected in plastic bags. Once collected, the bags were labelled and brought to the local sorting facility. At all locations, the municipal council provided APWC with a space for sorting of waste upon request.

Bag tags were used to identify all sample. Samples were lined up to ensure none were missing. All actual samples were cross-referenced with the collection sheet to ensure consistency between sample collection and sorting. Material from each bag was sorted separately into the 49 categories, listed in ***Appendix B.***

Typically, the sorting area consisted of a raised table covered with a tarpaulin or plastic sheets. The bagged waste was opened, and the contents sorted into the categories above. Each bag was handled separately and material from only one bag was placed on the table at any one time. Separated materials were placed in appropriate containers, weighed on a set of electronic scales and the weight recorded.

Beverage containers from all general waste samples were labelled to ensure no cross-contamination. They were then stored and counted separately. Containers were sorted by size, material (e.g., plastic, aluminium) and product type (e.g., milk, juice).

Further, all plastic bags were sorted into different types of bags and all containers were further sorted by size, material type and product type. Cigarette butts, coffee cups and takeaway containers were also segregated. This further sort was undertaken to 294 categories (***Appendix C***).

3.5 Landfill Audit

The landfill audit completed by MECDM utilised the *Waste Audit Methodology – A Common Approach* produced by PRIF. The audit report developed by MECDM lack detailed discussion of the methodology used, hence no validation was completed for certain aspects of the PWP audit data or the reliability of conclusions. The method described below has been inferred from data and reports received by MRA.

Auditors were supplied with data recording sheets and visually assessed vehicle loads arriving at landfill site, noting the vehicle details, source of the waste, the estimated volume and compaction level and an assessment of the waste composition. Auditors used waste categories listed in Appendix D to characterise the waste.[1] These categories differ from those used as part of the 2018 audit due to the different scope of study and the intervening publication of the PRIF methodology.

Each day the auditors aimed to assess as many loads as possible delivered during opening hours, within safe and practical limitations. Time constraints meant that only Ranadi landfill could be audited for the entire week period, capturing disposal patterns across the weekdays and weekend.

No landfills or disposal sites have weighbridges to accurately measure weights. Auditors relied upon visual observations and questions asked to vehicle drivers to estimate the weight of material deposed.[2]

[1] The PRIF Guideline (2020) recommends that audit categories used for visual compositions are combined with a detailed 'garbage bag content' audit. This allows the waste not visible to auditors (i.e., contained in garbage bags) to still be estimated during disposal. Data supplied from the PWP audit (2022) does not indicate a 'garbage bag content' audit took place. The results also suggest that all MSW contained in garbage bags was classified as 'Plastic' waste.
[2] The PRIF Guideline (2020) recommends that auditors estimate the volume (m^3) of disposed waste, then apply industry standard density factors based on the waste composition for conversion into a weight-based measurement (tonnes). Data supplied from the PWP audit (2022) suggests that vehicle capacities (tonnes) and level of waste compaction (high, medium, or low) were used by auditors to estimate the weight of disposed material directly, without use of volumes or density factors.

Out of the nine disposal sites proposed for audit, three sites (Taro, Buala and Lata) were not audited due to travel restrictions due to COVID-19. ***Table 5*** lists the sites visited as part of the landfill audit and the number of days each were surveyed. Only the Ranadi landfill audit captured data from the weekend, hence conclusions about difference in weekend disposal habits at other disposal sites cannot be made with the current data.

Table 5: Landfill Audit Schedule (PacWaste Plus, 2022)

Landfill	Days audited
Ranadi	7 days (Monday – Sunday)
Tulagi	3 days (Tuesday – Thursday)
Kirakira	3 days (Wednesday – Friday)
Auki	4 days (Tuesday – Friday)
Gizo	5 days (Monday – Friday)
Noro	4 days (Tuesday – Friday)

4 Study Limitations

The current study has relied on observations, data and analysis conducted by previous audit projects. All audits have constraints around the available time and budget to complete the study. This often requires a relatively small data set to be extrapolated as a national average.

The following section outlines some of the limitations impacting data accuracy.

Time frame

- Audits were carried out as a one-week snapshot, with results extrapolated to obtain annual averages.
- Seasonal trends and weather events may change waste generation over time.
- Cefas and PacWaste Plus programme audits are separated by four years, hence comparison of results should be treated with caution due to changes in population, socio-economic conditions and waste management systems.

Representative Sample

- The current study has relied on data and reports provided by APWC and MECDM, although not all aspects of data collection or modelling could be validated with the available resources.
- Audits are carried out using random sampling, stratified by geographic area, to minimise the risk of collecting samples from atypical households.
- Substantial variation was observed between disposal rates of rural and urban areas, even after accounting for factors like income and consumption.
- Travel restrictions due to COVID-19 in 2022 prevented auditors from collecting samplings from three of the eight identified disposal sites in Solomon Islands.

Sample Size Limitations

- All surveys carry an element of sampling error, which is the mathematical error associated with using a sample to represent a total population.
- For household disposal rates within a particular region, sampling uncertainty was around 20% of the household disposal rate.
- For commercial disposal rates within a particular region, sampling uncertainty was around 40% of the business disposal rate.

Weight-based Analysis

- The collection of data for household and commercial audits was recorded by weight. This type of collection may cause some materials to appear to be present in quite small proportions due to their comparatively low densities (e.g. plastic beverage containers). They can, however, consume large amounts of volume.
- Landfill audits relied on visual observations to estimate waste weight.

Collection Methodology

- For areas with collection services, a household's regular rubbish load was picked up. If households were disposing of any rubbish via other means, this was not picked up in the survey. The numbers collected may be a reasonable estimate of waste going to landfill, but are unlikely to be a reasonable estimate of waste generation rates.
- For areas without collection services, the households were given a bag into which to put rubbish and were collected after three days. Some households may have taken this opportunity have disposed of extra rubbish, with nappies being a particular concern.
- Results showed a general trend of waste quantities in this sample being lower than in previous samples of sites with disposal services. This could be due to the methodology that covers disposal rates rather than generation rates.

5 Solomon Islands Waste Service Provisions

The following sections summarise findings from:

- The desktop review of waste services conducted under the Cefas project (2019)
- Onsite observations of landfill operation reported as part of the PacWaste Plus programme audit (2022)

Some aspects of this information may have changed since the completion of the 2019 desktop review. The current study notes that a formal survey of Solomon Islands waste collection services (including scope, regularity, cost and managing body) would be required to understand the current state of waste services. Changes to the structure and prevalence of recycling operations is also expected to have changed since 2019. Recent contributions under the PacWaste Plus programme and industry bodies such as the Solomon Islands Recyclers and Waste Management Association (SIRWMA) have contributed to growing the local recycling sector.

5.1 Waste Collection

Depending on the region of the Solomon Islands, the management of municipal solid waste (MSW) falls under the responsibility of either the provincial government or the local municipal council (in the case of Honiara and Gizo). Currently, the only regular waste collection operating in the Solomon Islands is within the urban centre of Honiara.

5.1.1 Honiara City

Waste collection, policies and monitoring are managed by the HCC Environment Division and Works Division. Weekly collection services are offered to both households and business within the urban boundaries of the city. A mixture of door-to-door services and central collection points are used, with residents supplying their own metal drums, plastic bins or wooden platforms for storing waste.

Waste collection activities are undertaken by both the HCC Works Division staff and private collection contractors. Residences pay for their waste collection service through rates collected by HCC. The Cefas audit (2019) estimated that the collection service covers between 42-60% of the urban area. Poor road conditions and ill-suited collection vehicles restrict the coverage of the collection services.

Large informal settlements outside the HCC boundary have sporadic and limited access to waste collections using shared deposit locations. Residents in Honiara do not pay a direct fee of waste collection. Interviews during the Cefas audit (2019) found that collections often occur monthly to once every three months (resulting in containers overflowing with waste and littering the environment).

Collections are also offered to businesses on a request only basis, with businesses required to pay a fee of approximately SBD$30 per collection bin (some businesses are required to pay higher fees for more regular collections to limit odour. Market waste within Honiara is a large contributor to the commercial waste stream, with an estimated generation rate of 7.4 tonnes per market day, of which approximately 93% is organic matter (Cefas, 2019). The lack of operating composting facilities within Honiara means all this material is disposed to Ranadi landfill.

5.1.2 Provinces

Limited waste collection occurs under the management of provincial governments due to lacking funds and dedicated resources. The increasing demand to address waste and pollution have led to efforts being made by provincial governments to increase the reliability of collection services, but currently MSW poorly managed and commonly illegally dumped. Some provincial councils manage shared waste disposal and collection areas through internal works divisions. Typically, there are 4 to 6 disposal points (such as a shed or collection of metal drums) that service a major population centre. This service is commonly free for residents, but some businesses also pay for waste collection services.

5.2 Landfills

Landfills in the Solomon Islands are managed locally by the works division of the town council or provincial government. On the outer islands that lack government managed landfills, waste is disposed via informal dumpsites, burning and burying. Observations made by Cefas (2019) and PacWaste Plus (2022) audits suggest that all landfills and dumpsites in the Solomon Islands require infrastructural improvements to reduce environmental risks. Many are also running out of available airspace, creating additional pressure on the surrounding areas and leading to an increase in waste burning practices. Waste picking is commonly practised at landfills and waste disposal sites. Collection typically targets aluminium cans, scrap metal, firewood and food scraps. No other waste separation or segregation occurs at disposal facilities.

5.2.1 Ranadi Landfill (Guadalcanal province)

Ranadi Landfill is located on the outskirts of Honiara City, near the coastline, local communities, businesses and waterways. The site serves as the major waste disposal location for the Greater Honiara area, which includes waste collected by HCC and material self-hauled to the site.

A Landfill Management Unit within the HCC Works Division includes permanent staff that manage and operate the site. Dedicated security (including guards, fencing and locking gates) decreases illegal dumping and allows a waste tipping fee to be charged. Rates are varied for domestic, commercial, industrial and hazardous waste sources.

Permanent equipment onsite includes a front-end loader and bulldozer used to move and compact arriving waste. JPRISM funded rehabilitation included the installation of a leachate collection system, although observations during the PWP audit (2022) noted that ventilation pipes, cells and leachate ponds have been damaged or are in a poor state.

The site is currently exceeding its original design capacity, with very limited room to expand its existing footprint. It is likely that HCC will need to relocate waste disposal activities to a new site upon closure of Ranadi Landfill.

Figure 3: Layout of the Ranadi Landfill seen on Google Map

5.2.2 Provincial Dumpsites

Some dumpsites outside of Honiara are managed by provincial governments, including:

- Tulagi Disposal Site (Central province)
- Kirakira Disposal Site (Makira-Ulawa province)
- Auki Disposal Site (Malaita province)
- Gizo Disposal Site (Western province)
- Noro Disposal Site (Western province)

Most of these facilities lack security (fencing or locking gates) or dedicated staff. Due to the unregulated nature of disposal, gate fees are rarely charged to residents and only occasionally charged to businesses. These sites act as disposal points for provincial waste collection services and for self-hauled waste.

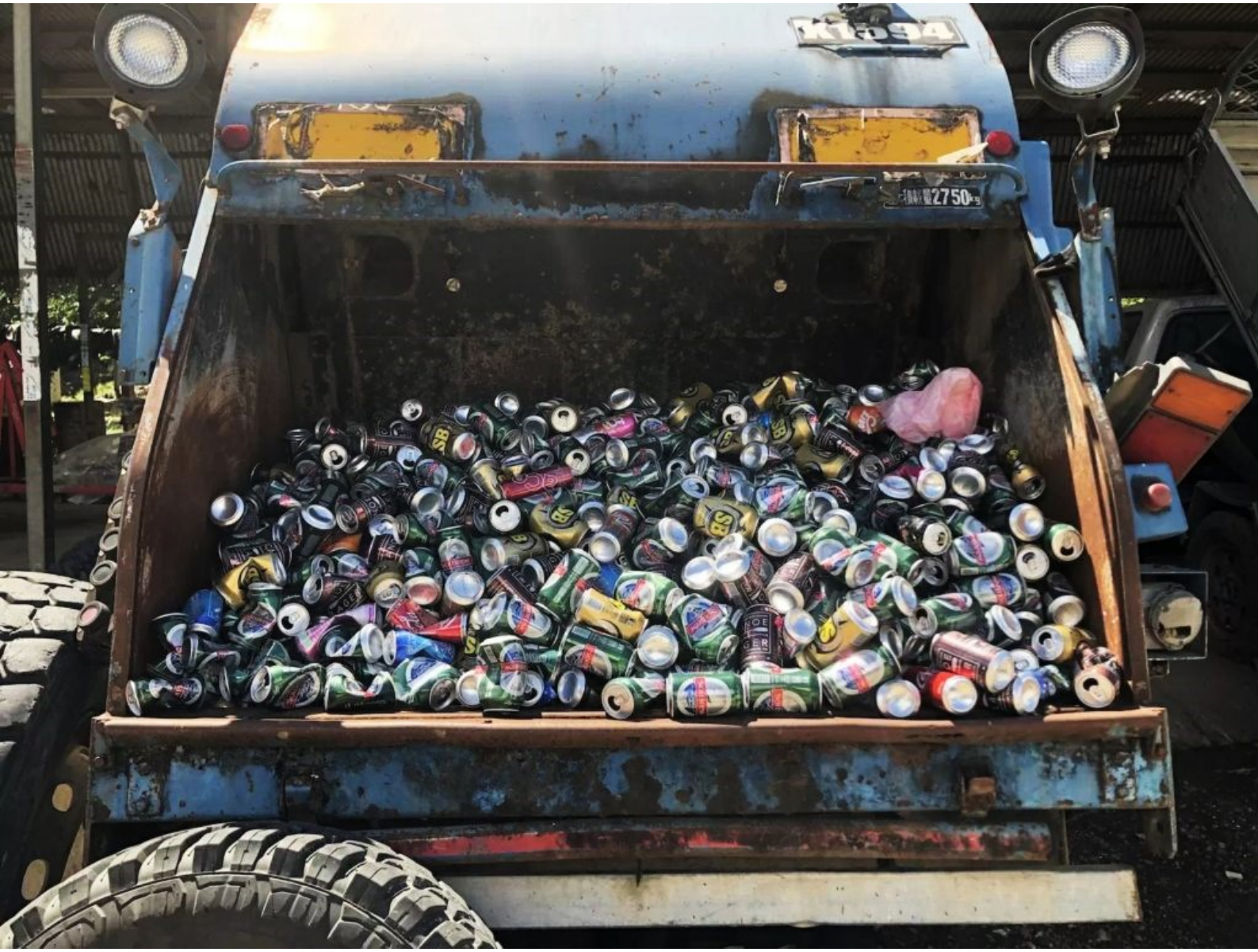
There is very minimal active leachate or litter management at provincial dumpsites, resulting in large environmental impacts on the surrounding area. Some provincial governments hire equipment (e.g., bulldozers or excavators) to move or compact waste as the need arises. Others rely on waste burning to control onsite volumes of waste.

5.3 Recycling

There are several small-scale, private recycling operations in the Solomon Islands. Most operate in the vicinity of Honiara, relying on access to international shipping routes to export recycled material to foreign markets. Hence the profits made from recycling in the Solomon Islands are largely dependent on international shipping rates and commodity prices.

Recycling is currently focused on the collection and compaction of aluminium cans due to their high commodity value. Some businesses purchase directly from residents or waste pickers at disposal sites. Past activities lead by HCC have also collected PET bottles, although difficulty in accessing international recycling markets restricted the amount of material exported.

A small-scale Container Deposit Scheme (CDS) is currently operating in Honiara, with some businesses such as Solomon Brewers Ltd offering refunds on glass bottles for reuse. This system has yet to be expanded to encompass sustainable financing principals or opportunities for additional revenue raising within the waste management sector.



6 Audit Findings

The data and information provided in the following sections are drawn from the Cefas (2019) and PacWaste Plus (2022) audit projects, which use methodologies (***Section 3***) that don't necessarily align with that prescribed by the PRIF Methodology (2020). Referencing of the original audit reports have been made in sections where data or results have been directly adapted.

6.1 Household Surveys

6.1.1 Access to Service

A total of 181 households were surveyed during the Cefas (2019) project, representing urban (Honiara) and rural (Guadalcanal and Malaita provinces) populations. The survey found the following households had access to a general waste collection service:

- **Urban:**
  - Honiara (39 surveyed): 56%
- **Rural:**
  - Guadalcanal rural (71 surveyed): 34%
  - Kilusakwalo (29 surveyed): 0%
  - Ambu (18 surveyed): 0%
  - Arabella (22 surveyed): 0%

6.1.2 Household Waste Separation

Due to the lack of household or domestic recycling services in the Solomon Islands, survey results do not indicate that any separation of recyclable goods (e.g., cardboard, plastics or beverage containers) takes place.

Interviews attempted to understand different was separation and disposal practices of households. The typical materials separated from general waste collection are:

- Organic waste, which are typically burned, fed to animals or composted
- Bulky waste, which are typically burned, dumped (to land or the sea) or self-hauled to a dumpsite

Results show that waste separation is much more widely practices for organic waste than bulky material (*Table 6*). Urban areas with collection services reported higher rates of waste separation than rural areas, which typically rely on a single disposal method for all their waste.

Table 6: Level of Waste Separation by Households

Material type	Rural	Urban
Organic waste	42%	49%
Bulky	4%	13%

6.1.3 Waste Disposal Methods

As presented above, many households in the Solomon Islands do not have access to a waste collection service. Many are forced to rely on dumping, burning or burying waste as their primary form of disposal. Comparative data from JICA (2011) and the Cefas (2019) audit shows that only 37 to 45% of waste generated is being captured through the waste management systems in urban areas.

Burning is the primary waste disposal method used across the Solomon Islands, particularly for rural regions without a waste collection service. For urban populations, many still separate green waste for burning. Education campaigns across Malaita have focused on developing community and household compost system, which is reflected in the minimal amounts of green waste being buried or dumped in survey responses. However, many residents still prefer to burn garden waste. Burning is also commonly employed to dispose difficult to manage sanitary wastes such as nappies.

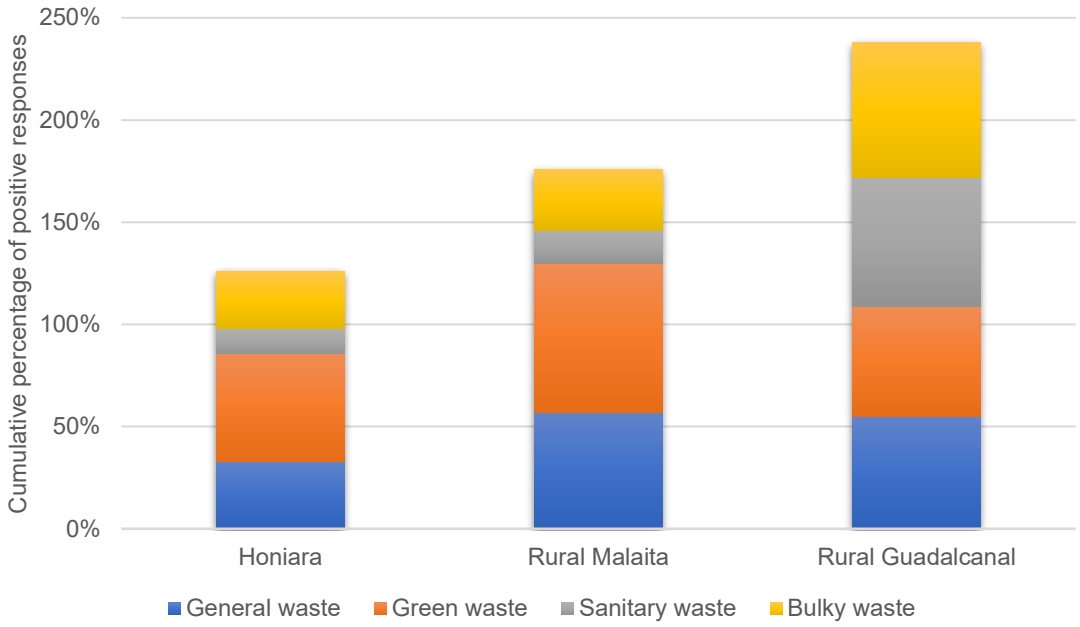


Figure 4: Waste burning rates in the Solomon Islands

Dumping in water: while urban and rural communities on Guadalcanal exhibited low rates of dumping to water (ocean, rivers or creeks), other rural samples showed the practice is common. For communities in Malaita, disposal to water was over twice as common as dumping on land. A dedicated waste collection, access to a formal disposal facility and educational messaging would be required to reduce the prevalence of this practice.

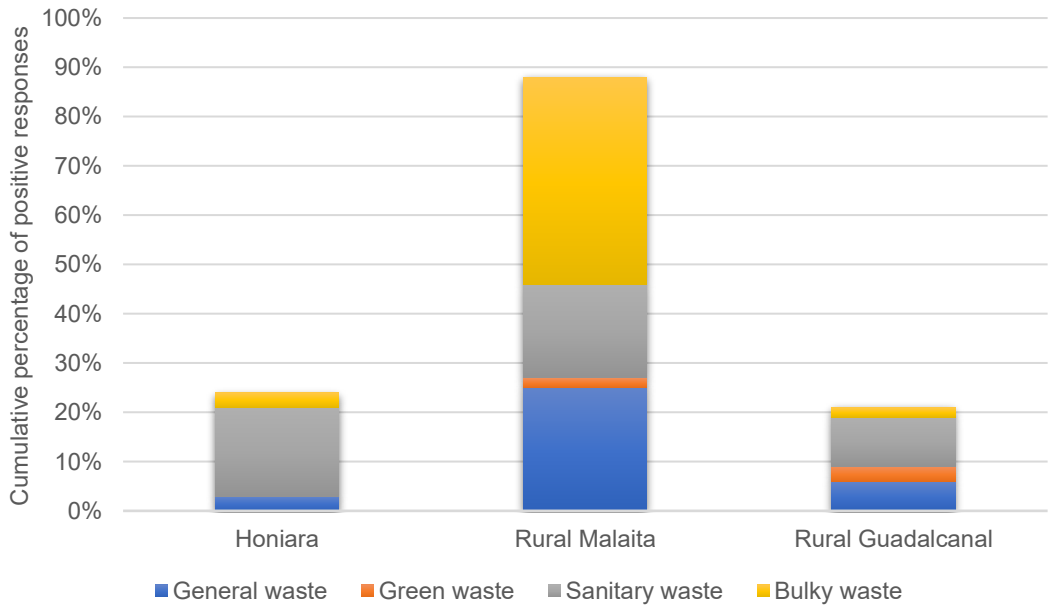


Figure 5: Waste dumping in water rates in the Solomon Islands

Dumping to land: for rural communities in Guadalcanal, dumping to land is the most common disposal method after burning. It is likely that proximity to Honiara has led to more widespread awareness of the damage that dumping in waterways can cause (e.g., harming tourist perception). Nevertheless, nappies and other sanitary waste are still commonly dumped in water and on land across Guadalcanal.

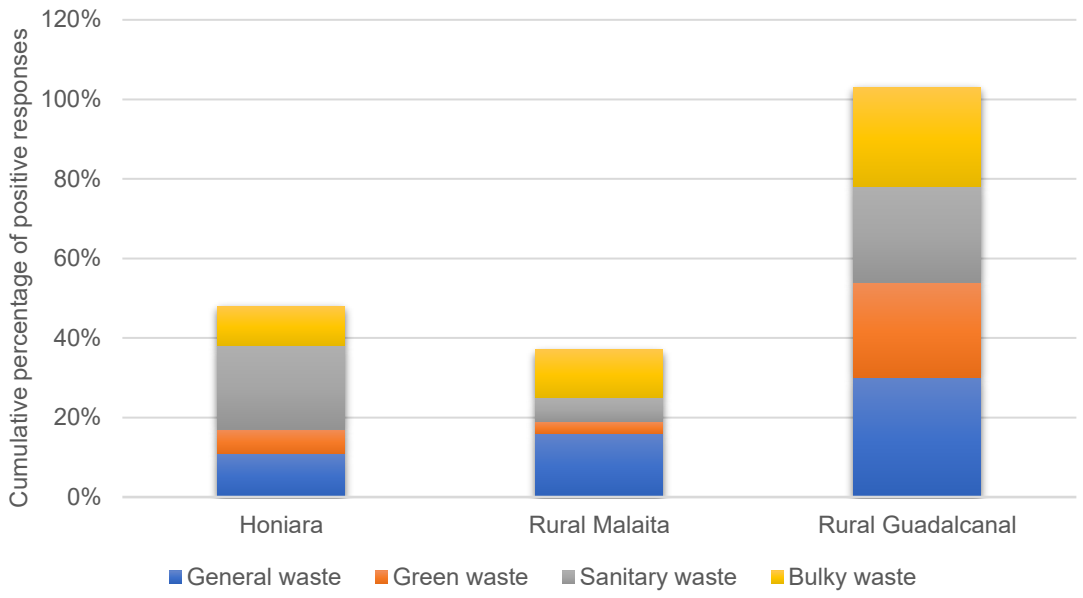


Figure 6: Waste dumping on land rates in the Solomon Islands

Burying (***Figure 7***) is not commonly practice in Honiara and rural Guadalcanal, where residential lots are smaller than other rural areas (leading to less available space to bury waste). For rural Malaita, burying is the leading disposal method for sanitary wastes.

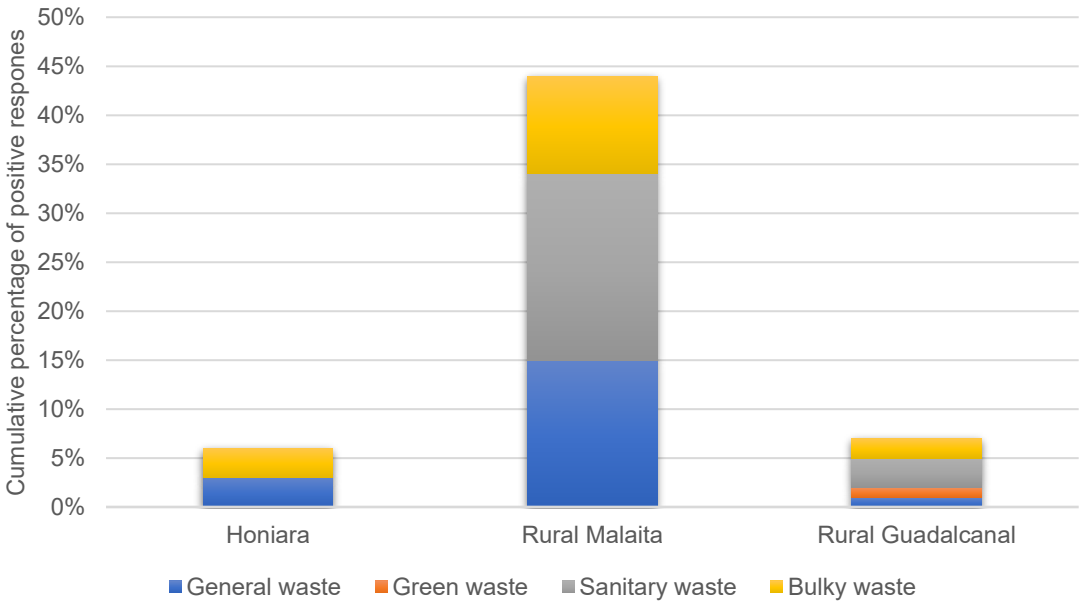


Figure 7: Waste burying rates in the Solomon Islands

Based on the disposal data, the following conclusions can be drawn:

- Burning is the most common way of disposing of waste in areas that don't have collection systems.
- Although the collections in Honiara are unreliable and do not cover the entire city, there is a significant change in disposal behaviour in comparison to localities without a system in place.
- The provision of a collection service would be a good first step for areas beyond Honiara. In Honiara, the collection service needs to improve in terms of regularity and consistency.

6.1.4 Willingness to Pay and Service Satisfaction

Survey questions sought to gauge the level of satisfaction with current waste collection services, and what households thought is an appropriate price for waste collection. ***Table 7*** summarises the results. Rural communities with a waste collection service (Guadalcanal) were generally more satisfied with their current waste collection service than urban communities. Residents across the urban and rural surveys typically reported similar methods to improve the collection service.

Survey results also revealed that rural residents were willing to pay more for waste collection services than urban communities, potentially reflecting the strain that a lack of collection is currently having on the community.

Table 7: Satisfaction and willingness to pay

	Rural	Urban
Average rating for current collection service	7.9	2.6
Method of improvement	• Provide additional bins and bags to residents • Increase collection frequency	• Increase collection frequency • Expand service to all rate paying households • Improve collection infrastructure (metal drums supplied to residents)
Willing to pay (single bag)	Average SBD$2.60	Average SBD$1.80

6.2 Waste Generation Data

6.2.1 Household Waste

Waste disposal rates for households was calculated by APWC as part of the Cefas audit (2019). Results are summarised in ***Table 8*** and ***Table 9***.

Table 8: Waste disposal rate for Solomon Islands (Cefas, 2019)

Area	Average waste disposal (g/capita/day)	95% Confidence Interval (g/capita/day)	Average number of people in a household
Honiara	310	296–324	**8.2**
Rural Guadalcanal	299	253–345	**5.2**
Rural Malaita	**87**	**64-110**	**6.2**

Note: *The number of people per household is based on the data collected from household interviews and is not the average number of households overall as reported by the Bureau of Statistics*

Table 9: Solomon Islands national household disposal rate (Cefas, 2019)

Estimated household disposal rate (g/capita/day)	Estimated overall household disposal (tonnes/day)
170 (95% BCI 110–230)	**104 (95% BCI 67–140)**

Audit results show that urban areas typically have a higher waste generation rate. Rural areas of Guadalcanal are likely influenced by the proximity to Honiara. Remote rural communities located in Malaita province have a much lower waste generation rate. Results align with expectations that urban areas have higher-income disposal due to increased access to commercial goods.

6.2.2 Commercial Waste

The Cefas audit (2019) similarly calculated the average commercial waste disposal rate (***Table 10***), referencing a 2017 survey of 312 Honiara business sending waste to landfill. The current study has not been able to validate or cross reference this source. The number of businesses operating in Honiara is assumed to have grown from this measurement in intervening years. A more contemporary review of local businesses would be required to obtain a more accurate estimate of overall commercial disposal.

Table 10: Honiara commercial disposal rate

Sector	Estimated commercial disposal rate (kg/business/ day)
Accommodation	81
Administration and services	22
Restaurants	15
Retail and wholesale trade	7
Average	**16.3 (5.09 tonnes/ day)**

The average disposal rate in Auki was 2.1 kg/business/day, but a count of business in Auki was not available.

6.3 Waste Composition

6.3.1 Household Waste Composition

Household waste composition (by weight) is presented as a total average standardised across each of the regions audited (***Figure 8***) and with results split by each region (***Figure 9***).

Organics: food, wood/ timbre, garden organics and other organics

Organics was the leading material category for household waste, ranging from 45% (Honiara) to 87% (Ambu) of total sample weight. The relative composition in urban or semi-urban areas was lower than rural samples. This is likely due to limited materials available for consumption in rural communities (i.e., low amounts of shops or disposable income), increasing reliance on local subsistence agriculture consumption.

Although some organics separation is practiced in rural communities, there are still considerable quantities of material that could be recovered. Correct composting can create natural nutrients recycling to support local farmers.

In urban environments, it can be harder to access alternate disposal arrangements (e.g., composting or animal feed) for organic waste. This means in large volumes of recoverable organics being disposed to landfill through waste collection services.

Metal: aluminium cans, aluminium recyclables, steel cans and other metals

The second most prevalent material in Solomon Island household waste is metals, most of which are recyclable such as aluminium and steel containers. Particularly in urban (Honiara – 11%) and semi-urban (Guadalcanal – 18%) areas, aluminium beverage containers consisted of a large portion of household waste. The high commodity value of aluminium and the presence of existing recycling operation in the Solomon Islands show there is capacity to expand current efforts to recover metal from households. A CDS across the Solomon Islands would provide a sustainable financing system to incentives increased source separation.

Plastics: single streams (e.g., PET, HDPE, PVC, PP) and other plastics

Plastics were the third most prevalent material by weight in audited areas. Like metals, consumption patterns in urban and semi-urban areas led to higher proportions of plastic in household waste streams.

One of the most common types of plastic waste is paper bags, representing 33% of total plastic waste and 3.4% of the overall household waste composition. The quantities of plastic waste being disposed to waste facilities, or the environment could be reduced in the Solomon Islands through a plastic bag ban similar to other Pacific Island nations.

Recyclable PET beverage containers were also commonly observed in household waste streams (25% of total plastic waste). A national CDS would similarly incentives the source separation of eligible plastic containers, decreasing their presence in landfills and the environment.

Table 11 provides additional details for plastic material categories samples from household waste.

Table 11: Average composition of plastic waste in household waste stream

	Count of total plastic waste	Weight composition of total plastic waste	Weight composition of overall household waste
PET Containers	7.2%	25.2%	2.6%
HDPE Containers	0.3%	1.5%	0.2%
Plastic bags	17.9%	33.0%	3.4%
PP	1.3%	0.9%	0.1%
EPS	3.0%	2.1%	0.2%
Flexible/ film	60.9%	29.3%	3.0%
Other plastic	9.3%	8.0%	0.8%

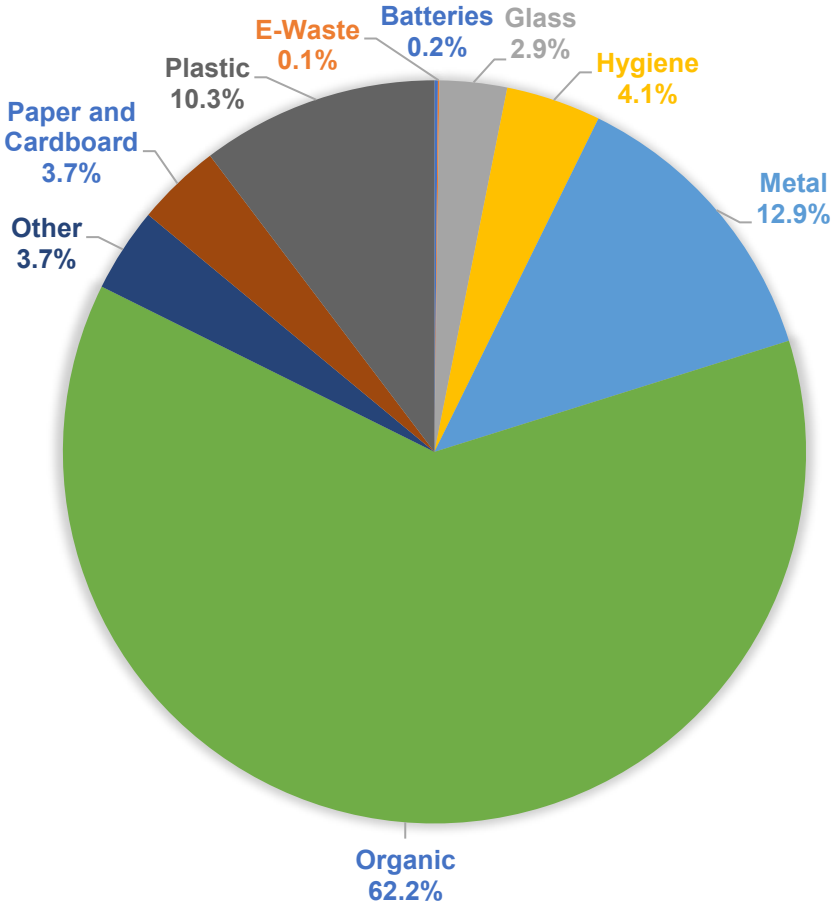


Figure 8: Household waste composition standardised by total weight of material sampled from each (5) regions

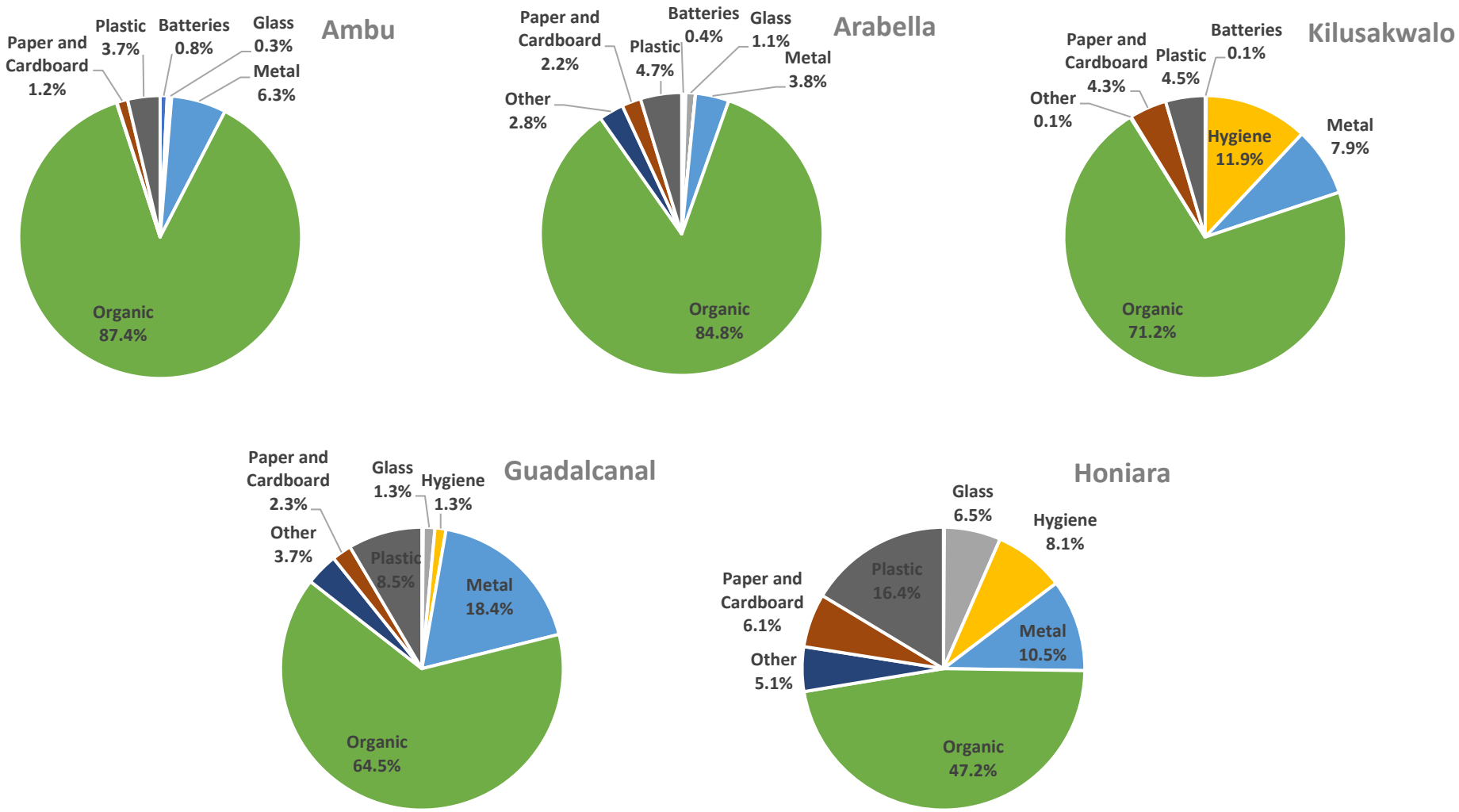


Figure 9: Household waste composition by region

Figure 10 was sourced from the Cefas audit report (2019), highlighting the top ten individual items disposed in the Solomon Islands and proposed best practice actions to manage these items.

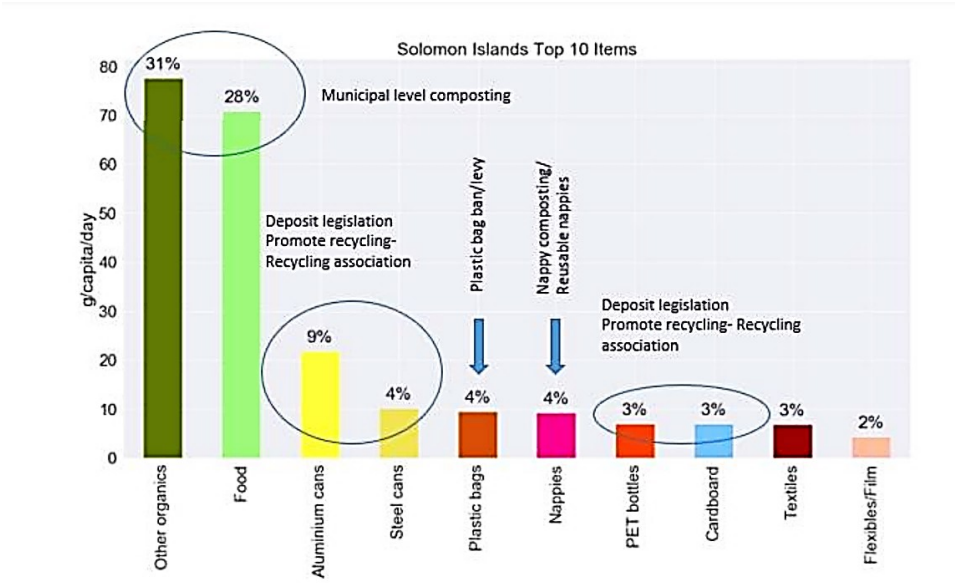


Figure 10: Solomon Islands top 10 waste items and proposed solutions (Cefas, 2019)

6.3.2 Commercial Waste Composition

Commercial waste composition (by weight) is presented for each industry sector sampled in Honiara and an aggregate of samples from Auki[3] (***Figure 11***). No average commercial waste composition has been calculated, as this would require a detailed survey of all businesses in the Solomon Islands to determine the number and size of businesses within each sector group.

Accommodation

Accommodation businesses were characterised with the largest proportion of organic waste from any commercial sector (73%). The entirety of this material was food waste that could be diverted for composting. This was followed by glass that would be largely eligible under a potential CDS scheme. This shows there is considerable opportunities to divert waste from landfill in the accommodation sector.

Administration

Offices in Honiara showed high proportions of paper & cardboard waste (24%), significantly higher than household samples (4%). Plastics (21%) similarly measured in higher proportions than household (10%) or other commercial samples (5 to 15%).

Restaurants

Restaurant samples align with expectations of high proportions of organic waste (62%), paper & cardboard (14%) and packaging resulting from the consumption of food and beverages. Nearly the entirely of waste resulting from restaurants could be diverted and recovered through composting and container recycling programs.

Retail

Retail trades showed expectedly large proportions of paper & cardboard (58%), the highest from any business sector sampled. Metals and other recyclables were lower in proportion compared with other results, suggesting a dedicated paper and cardboard collection for retail businesses could be appropriate if offtake markets were secured.

Auki Businesses

Auki businesses show an overall composition similar to that of Honiara offices, although with considerably higher proportions of e-waste (6%). E-waste was measured at a higher proportion than any other business (0 to 0.1%) or household (0.1%) samples). This could be an anomaly resulting in the audit being undertaken or a non-representative sample group, hence follow-up studies should be used to confirm the presence of e-waste.

[3] Data received from the Cefas audit (2019) did not segregate Auki commercial samples by industry type, hence comparative analysis of different sector waste streams was not possible.

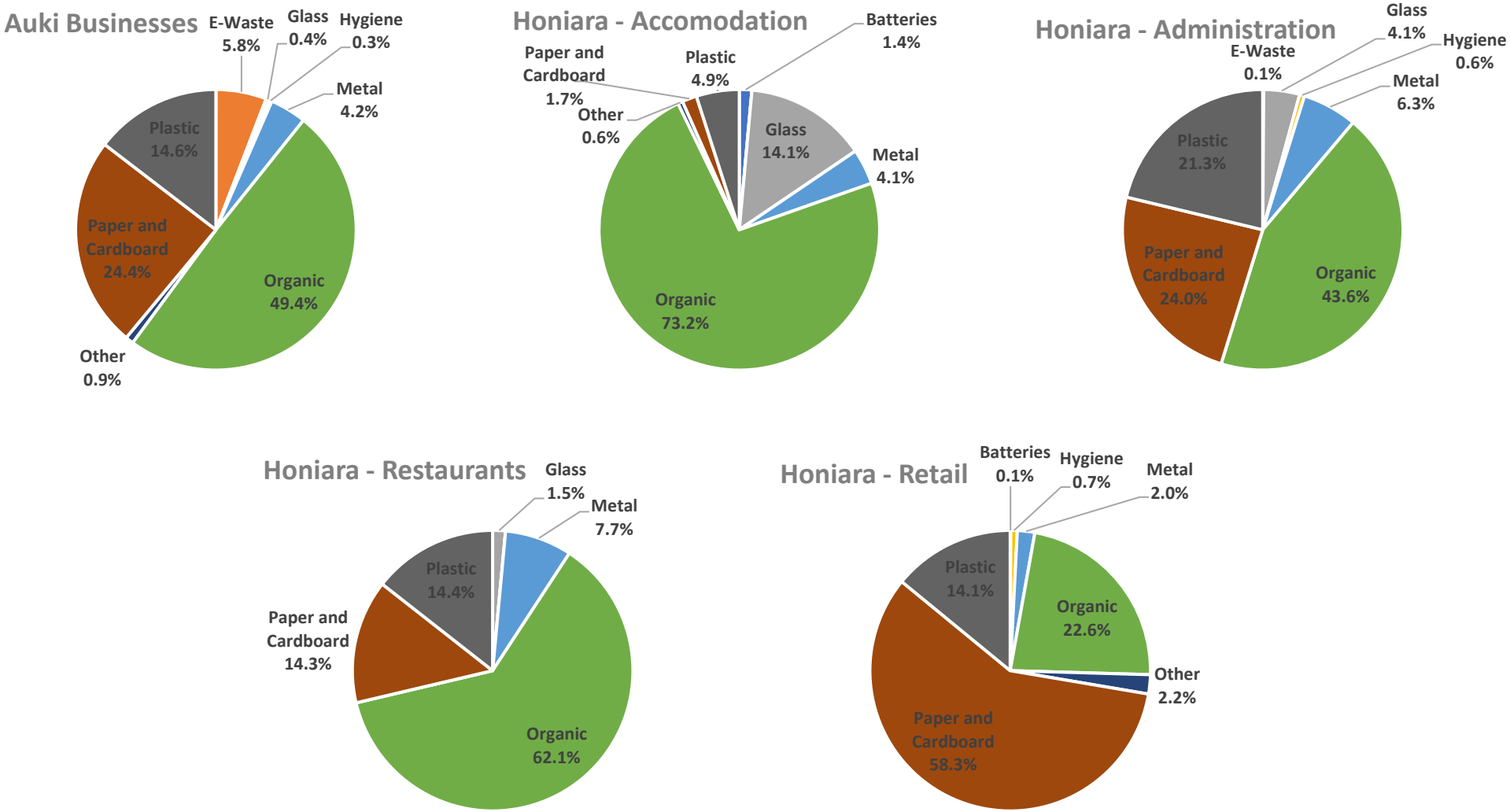


Figure 11: Solomon Islands commercial waste composition by industry type

6.4 Landfill Results

The following sections describes the results of the PacWaste Plus landfill audit (2022) conducted at Ranadi landfill and five provincial dumpsites. Observations were used to estimate average disposal patterns at each facility, along with an overall disposal composition. Not all recommendations made by the PRIF Guidelines (2020) for landfill audit reporting could be reflected by the current study due to limitations in the available data supplied by the MECDM (refer Section 3).

6.4.1 Landfill Waste Disposal Rate

Ranadi landfill accepts the highest number of waste loads weekly, compared to other audited sites (***Table 12***). Most of this material arrives from businesses (C&I waste) in the Honiara area. Observations also reveal that residents self-hauling waste to the landfill is common practice at Ranadi, providing an additional revenue stream through the acceptance of gate fees. Ranadi landfill also receives hazardous waste and hospital (infectious) waste on a regular basis, representing a risk to landfill operators and local waste pickers.

In provincial disposal sites, there is often a more even distribution of MSW and C&I waste being disposed. Tulagi and Kirakira observed higher MSW rates during the audit, while Auki, Noro and Gizo observed higher C&I. Noro disposal site was the most frequently visited provincial dumpsite, primarily servicing Sol Tuna and the National Fisheries Development which have operations in the area. Very low proportions of construction and demolition (C&D) were observed during the audit, with an overall average of 0.7% of waste loads arriving at landfills. This suggests that C&D waste is either reused in other construction projects or informally disposed of.

Table 12: Weekly incoming loads to Solomon Island landfills

	Ranadi Landfill	Tulagi Disposal Site	Kirakira Disposal Site	Auki Disposal Site	Noro Disposal Site	Gizo Disposal Site	Total
Average loads (per week)	370.0	9.3	14.0	19.2	68.2	51.8	532.5
Proportion MSW (%)	33.0%	75.0%	66.7%	27.3%	41.0%	46.2%	36.3%
Proportion C&I (%)	66.8%	25.0%	33.3%	72.7%	56.4%	51.3%	63.1%
Proportion C&D (%)	0.3%	0.0%	0.0%	0.0%	2.6%	2.6%	0.7%

Note: review of audit data show only Ranadi landfill was sampled on the weekend, meaning weekly averages may not be representative of different disposal patterns occurring during weekends.

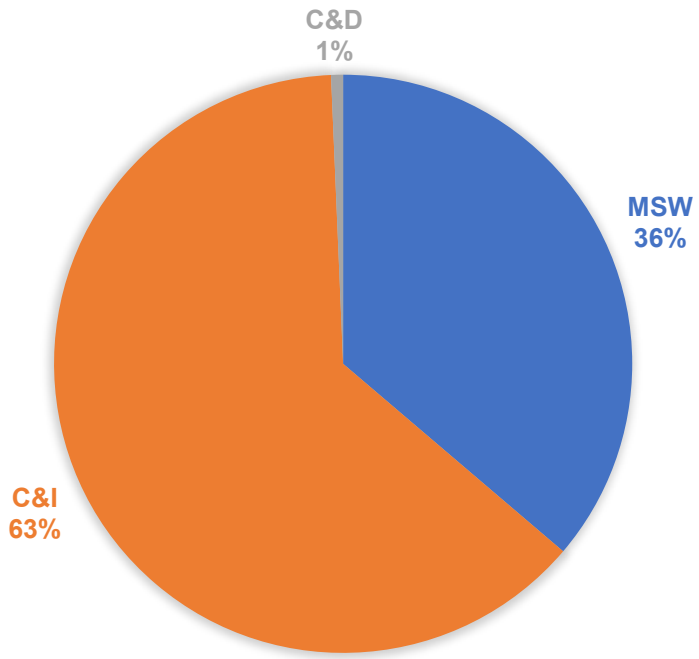


Figure 12: Solomon Island landfill average waste disposal rate by source

6.4.2 Landfill Waste Quantity

Auditors conducting the PacWaste Plus programme (2022) estimated the total weight of the observed waste based on its compaction level and knowledge of the vehicle's capacity (refer to Section 3 for more details). The total waste disposed was then calculated and reported as a daily average for each site ***(Table 13***).

Results confirm that Ranadi landfill is the largest landfill in the Solomon Islands, receiving for over 70% of the total waste disposed nationally. Future planning to extend the Ranadi landfill lifespan or construct additional disposal sites for Honiara will be critical to receive this waste in the future.

Table 13: Summary of estimated waste disposal rates

Site	Disposal rate (tonnes/ day)
Ranadi Landfill	104.6
Tulagi Disposal Site	4.2
Kirakira Disposal Site	3.0
Auki Disposal Site	9.1
Noro Disposal Site	16.5
Gizo Disposal Site	9.3
Total	**146.7**

Note: *Total national disposal rates for the Solomon Islands are expected to be above this estimated figure due to inability to audit all landfills/ disposal sites*

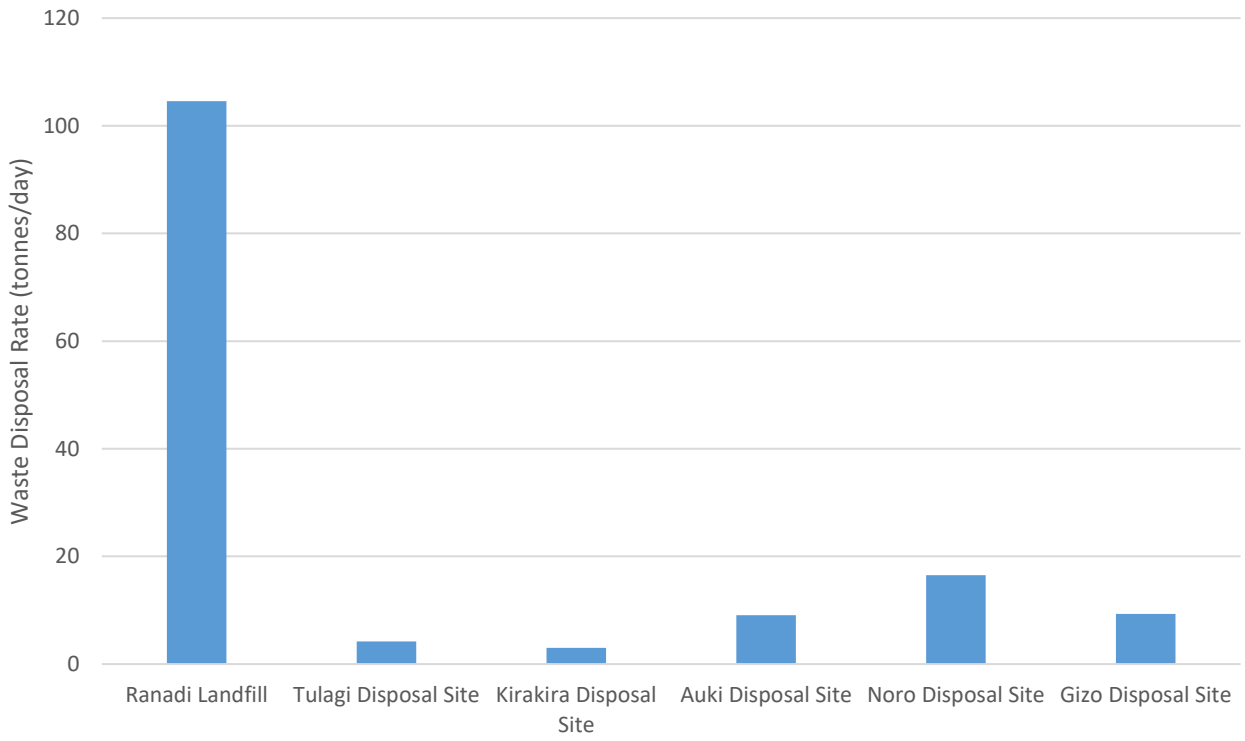


Figure 13: Solomon Islands landfill waste disposal rates

Modelling conducted during the Cefas audit (2019) estimated Honiara disposal rates to be 27.5 tonnes/day from households and 5.09 tonnes/day from businesses. These estimates do not align with observations made during the PacWaste Plus programme audit (2022), which estimates much higher tonnages are disposed daily to Ranadi landfill (104.6 tonnes/ day).

This disparity may be due to:

- The scope of the Cefas audit not capturing all waste being disposed to landfill in the Honiara area (e.g., additional impact of outlying regions or businesses)
- An increase in Honiara population in the intervening years
- An increase in per capita waste disposal in intervening years

6.4.3 Landfill Waste Composition

The composition of waste material disposed to landfills was estimated from visual assessments of each load. Results were then aggregated and averaged across the total loads assessed. Weight-based compositions reported in ***Section 6.3*** are assumed to be more representative of material disposed from household and businesses due to the sampling methodology used. Although landfill waste compositions are still useful to identify major opportunities to divert material arriving at the disposal site.

Figure 14 displays the average landfill disposal composition for the Solomon Islands.

Plastics: single streams (e.g., PET, HDPE, PVC, PP) and other plastics

Observations made during the PWP audit (2022) characterised plastic waste as the leading material disposed to landfills in the Solomon Islands. Analysis of the audit data provided by the MECDM suggest that waste contained within garbage bags was classified as 'Plastic' waste in its entirety. The actual proportion of plastic material may be lower than estimated if a 'garbage bag contents' audit was conducted as per the PRIF Guidelines (2020). This would allow an estimate of the true composition of waste contained within garbage bags to be reflected in the total landfill composition.

Organics: food, wood/ timbre, garden organics and other organics

Organics were a leading material presented at Solomon Island landfills, with an overall composition of 21%. Organics disposal was particularly prevalent at Ranadi landfill (45%), with an estimated disposal rate of 46.5 tonnes/day.

Large proportions of organic matter in landfills have several drawbacks, such as:

- High generation of landfill gas emissions during decomposition
- High generation of liquid leachates due to high moisture content
- Use of available landfill airspace by potentially recoverable material
- Loss of nutrients that could be recycled into the agricultural sector

The loss of available airspace is particularly of concern to Ranadi landfill, which has had restricted available airspace since the initial 2018 site visits conducted by APWC.

Paper & Cardboard: cardboard, paper, liquid paper board, composite and soiled paper & cardboard

Paper & cardboard followed as the third major category of waste presented at landfills, ranging from 9% (Noro Disposal Site) to 21% (Auki Disposal Site). Similar to organic waste, paper & cardboard contribute to landfill gas and leachate generation. It can also be diverted either through local compositing or recycling into new paper & cardboard products. High frequency of C&I disposal to landfills (refer ***Table 12***) is expected to be the primary contributor to paper & cardboard waste.

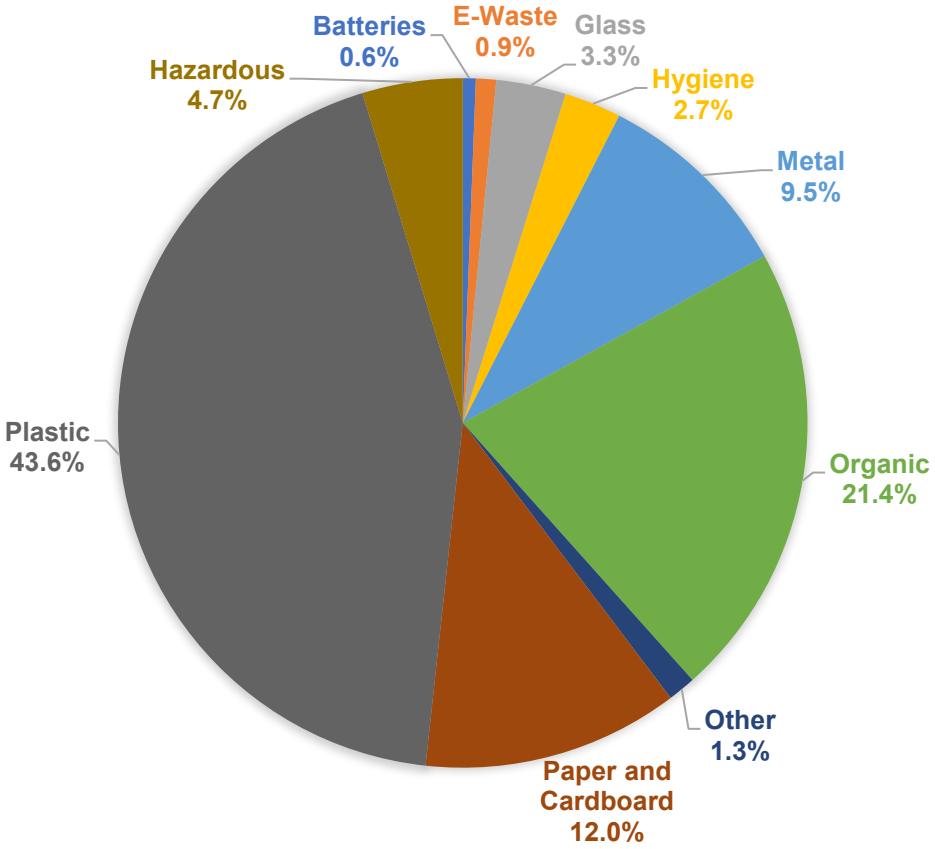


Figure 14: Average waste composition disposed to Solomon Island landfills and dumpsites

Comparison of household and business waste compositions measured in the Cefas audit (2018) and landfill waste compositions measuring by the PacWaste Plus programme audit (2022) reveal:

- Increased proportions of plastic waste in 2022
- Decreased proportions of organic waste in 2022
- The presence of hazardous wastes to landfill not measured by the Cefas audit (2018)

These differences may be due to factors discussed above (i.e., allocation of 'garbage bag' waste), efforts to encourage community composting in the Solomon Islands and changes in purchasing habits (e.g., higher consumption of purchased and packaged food).

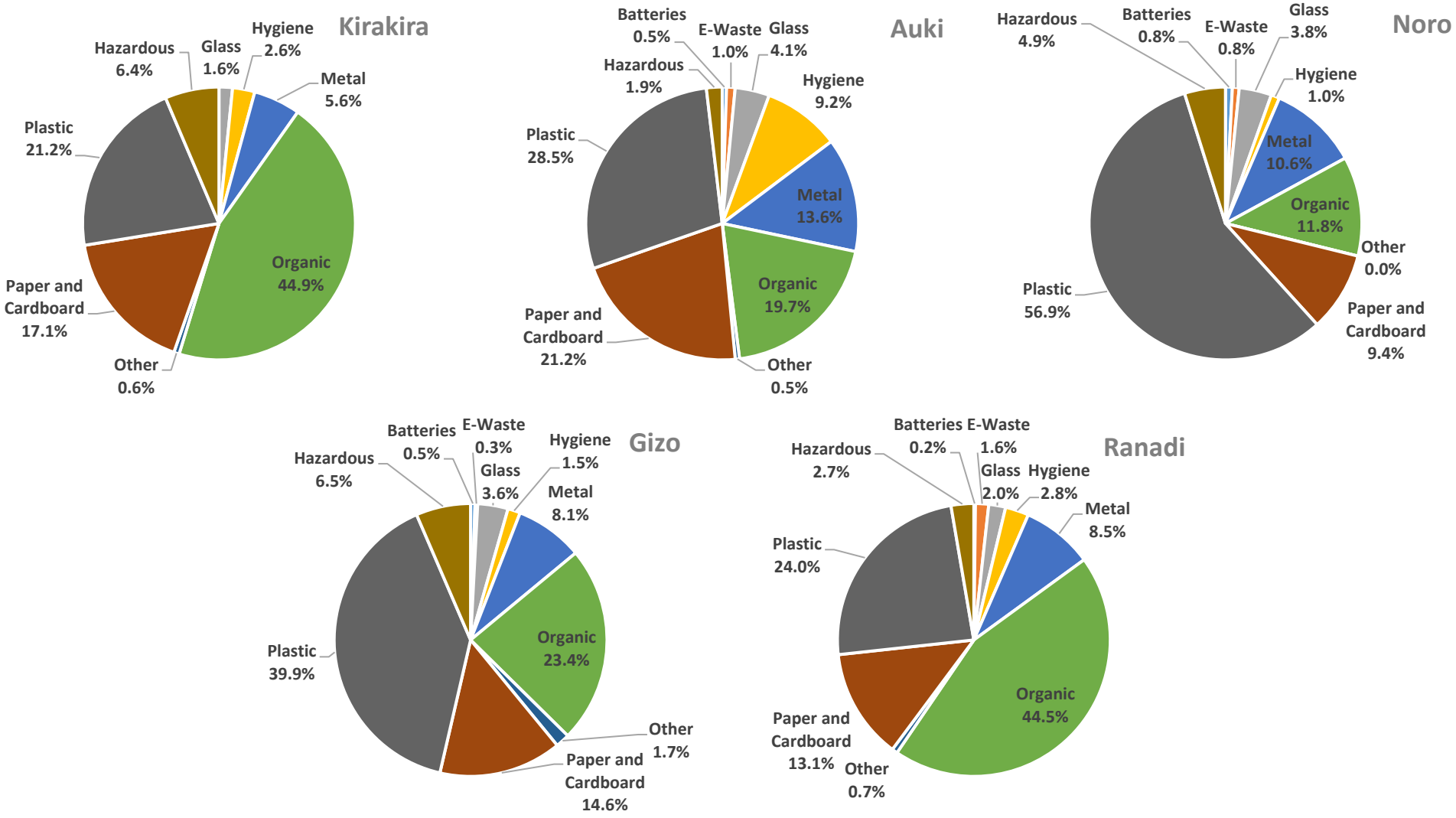


Figure 15: Landfill waste composition by disposal site

6.5 Material Stockpiles

The following observations reported by the PWP audit have not followed all recommendations made by the PRIF Guidelines, hence reporting lacks consistency between sites. The following sections should be referred to as being representative of the types of material collected and stockpiled in the Solomon Islands. It can also be used to highlight available resources available for recycling. This section should not be taken to be representative of the total volume of material stockpiled, as additional sites are assumed to exist.

6.5.1 Formal Stockpiles

Audit of stockpiles on the following five locations were conducted in November – December 2021:

1. Design and Technology Centre, Honiara
2. Gold Ridge Mining Company, Guadalcanal
3. Solomon Power Company, Honiara
4. National Fisheries Development, Noro, Western Province
5. Gizo Recycling Centre, Gizo, Western Province

Informal stockpiling is also commonly practiced, particularly for end-of-life vehicles in the vicinity of Honiara and provincial town centres. A summary of stockpile observations made during the PacWaste Plus programme audit (2022) is provided in ***Table 15***.

Table 14: Summary of formal waste stockpiles in the Solomon Islands

Location	Design and Technology Centre, Honiara	Gold Ridge Mining Company	Solomon Power Company	National Fisheries Development	Gizo Recycling Centre
Description	A private recycling operation located in East Honiara. Material is self-hauled by waste producers and disposed free of charge.	A mining site used to stockpile wastes from past operations	State-owned electricity enterprise with its main power plant located in Central Honiara	The predominant supplier of tuna in the Solomon Islands	Primary recycling operation in the Solomon Islands, utilising a compactor to increase material densities prior to export.
Used lubricant oil	10,200 L	Large quantities stored in IBCs	1,600 L plus 1,300L of water/ oil mixture	20 to 30 tonnes stored in IBCs	-
Used/ damaged items	1,962 pallet crates	-	2 obsolete electricity generators	-	-
20-ft shipping containers	-	Estimated 4 to 6	2	5	-
44-gallon drums	-	-	55	150 to 200	-
Other	6,110 PET bottles 3 tonnes of plastic wrap	Various chemicals	Various scrap iron	40 to 50 gas cylinders Various scrap metal, refrigeration waste and other material	5.22 tonne aluminium cans Approx 140 kg of recycled plastics, paper and cardboard

7 Conclusions and Recommendations

The following sections draw on conclusions reached by the Cefas and PacWastePlus audit results. Most of the recommendations have been adapted from best-practice considerations presented by the Cefas report (2019). Since 2019, little change has occurred to improve best-practice standing as evidenced by the 2022 PacWaste Plus programme audit. It is recommended that Solomon Island decision makers work towards the priority areas discussed below.

7.1 Management of Organics

Future waste management strategic planning for the Solomon Islands must include considerations to improve the management of organic waste. By improving organic waste management through programs such as community-scale composting, the waste sector can:

- Decrease the environmental impacts caused by organic waste decomposition in landfills (i.e., gas and leachate generation)
- Reduce pressure of landfill space, resulting in monetary savings and improved life of landfills
- Decrease waste transportation requirements if organic material is processed locally
- Create recovery pathways for nutrients to be reused by the local agricultural sector

Using results from the 2022 PacWaste Plus programme audit, up to 2% of waste current disposed to landfills and dumpsites could be recovered for composting. If 60% of organic waste can be diverted, this equates to an 18.8 tonne/day reduction of waste to landfill. This would mean approximately 11,000 m^3 of landfill space can be saved annually (Conversion factors as per waste densities listed by Sustainability Victoria, Australia[4]).

Composted organic waste can either be resold to the community or applied as landfill cover. Currently no Solomon Islands landfill or dumpsite is practicing regular capping or covering activities. Regular capping can decrease gas, leachate and litter generation.

Some efforts are already underway to compost organic waste originating from rural households. These programs should be expanded to included businesses and urban communities.

7.2 Container Deposit Legislation

CDS are an effective approach to reducing littering and improving resource recovery that has been previously successful in the Pacific region.

The Marshall Islands, Kiribati, Palau and Tuvalu are examples of nations which have begun collecting and exporting beverage containers with the assistance of container refunds to residents and businesses.

More details on these schemes and considerations for its deployment in the Solomon Islands can be found through the *Container Deposit Schemes for the Pacific Islands: A Guide for Policy Makers* (JICA, 2022).[5]

A small-scale CDS is currently operating in Honiara, although this system has yet to be expanded to encompass sustainable financing principals or opportunities for additional revenue raising within the waste management sector.

As part of the Cefas audit (2019), all containers (plastic, aluminium, steel, LPB and glass) were sorted by size, material type and product type. Data shows that each household on average produces nine (9) containers per day in Solomon Islands and almost 100% of these containers could be recycled if an appropriate deposit scheme was in place.

[4] https://www.epa.vic.gov.au/business-and-industry/lower-your-impact/~/media/Files/bus/EREP/docs/wastematerials-densities-data.pdf
[5] Available: https://www.sprep.org/sites/default/files/documents/publications/%E5%88%A5%E6%B7%BB%EF%BC%91%E3%80%80Final%20Copy%20CDS%20Guide.pdf

Figure 16 details the common containers disposed by households for each of the regions included in the Cefas audit (2019).

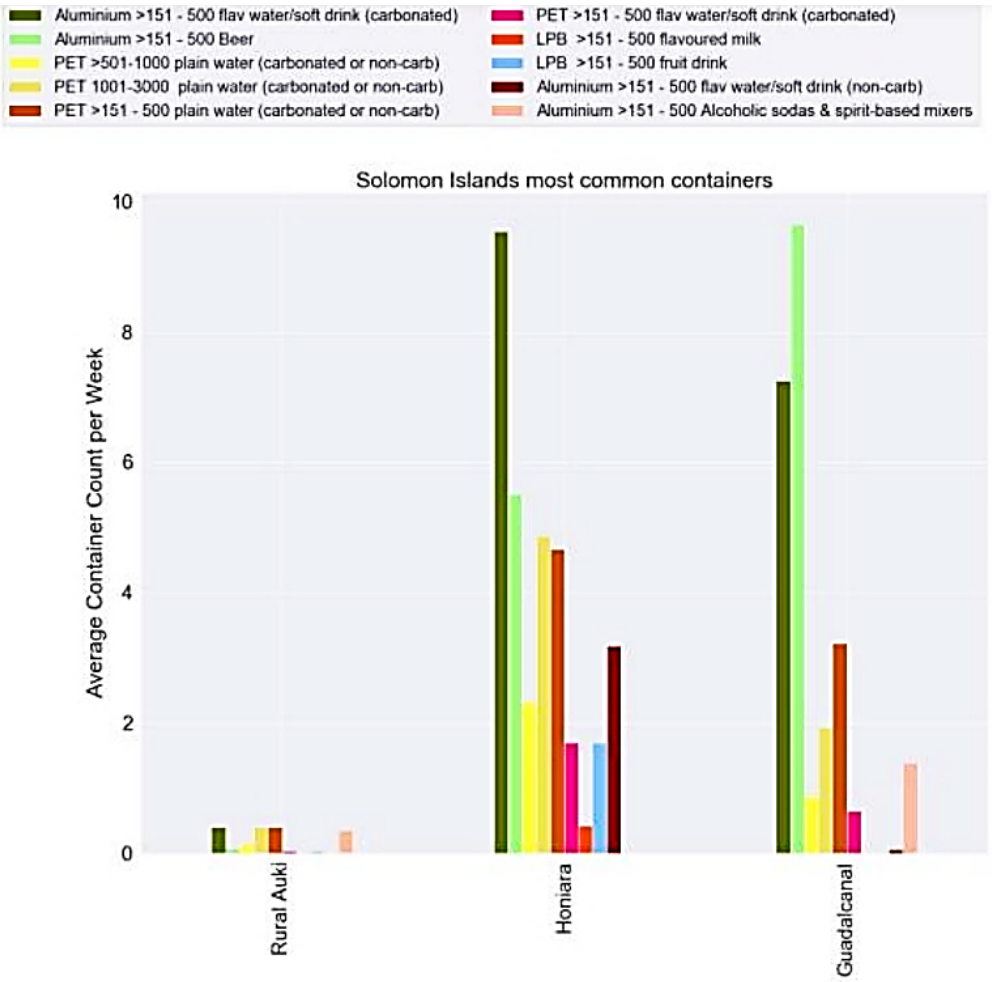


Figure 16: Most common beverage containers – Solomon Islands (Cefas, 2019)

Traditionally, the biggest challenges for recycling in the Solomon Islands are the following:

- Lack of knowledge and exposure to export markets for recycled materials
- The cost of shipping materials from Solomon Islands to market is prohibitively high compared with the relatively small amount of material being generated in the country
- The cost of shipping materials from outer islands to the main islands also must be borne by the recycler
- Sending a container of recyclables out of the country incurs a tax. There have been consistent demands by the recycling sector to have this tax rebated, reduced or removed

PRIF are currently in the process of scoping and developing a Pacific Regional Recycling Hub, which could take financial burden off small recyclers. Used beverage containers, paper and cardboard, scrap metal, batteries, e-waste and end-of-life renewables are included in the scope for the PRIF regional recycling hub.

7.3 Plastic Bag Ban

Analysis of household waste data calculated that 3.4% of the overall waste stream was plastic bags (by weight). This makes plastic bags the third most common non-organic waste produced by household in the Solomon Islands (after recyclable aluminium and PET).

The establishment of a plastic bag ban similar to Vanuatu could significantly decrease the quantities of plastics bags going to landfill or being disposed to the environment. From households alone, this could equate to a 3.5 tonne/ day reduction in plastic waste (based on the 104 tonne/day household waste disposal rate determined by the Cefas audit).

7.4 Other Recommendations

Additional actions requiring government national government intervention and support of donor partners include:

- To introduce applicable waste financing mechanisms to generate sustainable funding support for the provision of waste services.
- To support training for existing staff supporting waste management activities at national, provincial and council levels.
- To strengthen the national co-ordination capacity of the agencies in Solomon Islands response for waste management activities.
- Develop bylaws at the provincial, council or community level for enforcement of existing waste management laws relating to littering, illegal dumping, burning, etc.

8 References

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Appendix A National Legislative Review

Table 15: National Legislative Review (Cefas, 2018)

Laws and Legislations	Roles and Duties
The Environment Act 1998	The Act emphasises environmental management and protection, even at the expense of development projects. The Act tries to address this through the application of environmental impact assessment in order to include environmental considerations as a component of any project. There are provisions for industries to be answerable to regarding a sustainable friendly/healthy manner or approach from management, evaluation and control of products and wastes. Section 3 of the Act specifies the objectives ofthe Act ((a)-(d)). The Act is the most comprehensive legislation that seeks to address waste and pollution at the national level. It defineswastes as liquid, solid, gaseous or radioactive materials, whether toxic or not, which are discharged into the environment or prescribed by regulation to be waste.
The Environmental Health Act 1990	This Act made provisions for securing and maintaining health infrastructures in compliance with sanitary, drainage and sewage specifications. The Act is administered by the Ministry of Health and Medical Services. It provides the backbone for formulation of national health policies, by laws and provincial ordinances. Generally, the Act gives more focus on organizational powers vested on the Ministry than on substantive issues.
The (Public Health Act) 1980 and associated Regulations	This regulation addresses public health issues and how to deal withthem when they occur. The regulations empower the Minister andthe Under Secretary of the Ministry of Health and Medical Services(MHMS) to take specific measures to prevent the occurrence of a public health disease or where such disease had already occurred, to take measures to contain and prevent the spread of the disease.
Shipping Act 1998	This Act was established for protecting the shipping industry (ensuring safety and health). The Act gives effect to the International Maritime Organisation to manage risk, dangers and cleanliness in the marine environment. Part IV mentions the responsibility to respect the safety of all equipment, off and on board the vessel including human beings, which applies to safe disposal of wastes (pollutants) to the ocean that could cause danger or be hazardous to the marine environment and habitat.
Shipping (Marine Pollution) Regulation 2011	This regulation was added to the Shipping Act, which has special emphasis on pollution of the marine environment. The regulation implements international conventions related to marine pollution and shipping such as MARPOL and the International Maritime Organisation standards for safety and security of shipping and prevention of marine pollution by ships. Under this regulation, no pollution and or harmful substances are tobe discharged from vessels, platforms or land into the Solomon Islands waters or from a Solomon Islands vessels into any waters. If a person contravenes the provisions and standards, they are liable/guilty to pay a fine or serve imprisonment. The enforcement also includes meeting the immediate cost of restoration, rehabilitation and cleaning up within a set time frame.
Ports Act 1990	Section VI of the Act makes provision for discharge of waste and other pollution of the port. It states that no person shall cause, suffer or permit any refuse, gas, petroleum oil, bilge water, ballastwater or other offensive substance whatsoever its nature to be discharged, pumped or cast into or onto any waters or land withinthe limits of a port without the prior written permission of the Solomon Islands Ports Authority.
Biosecurity Act 2013	The Act provides for preventing the introduction of disease into Solomon Islands through the importation or landing of animals, plants and other risk items; preventing the introduction of pests and undesirable plants; and requiring vessels and aircrafts to give notice of their arrival in Solomon Islands and for connected purposes. This Act grants regulation-making powers to the Ministerin respect to the introduction or importation of plants, animals andsubstances or other material that may be the carrier of plant or animal pests and diseases. The Act further provides for the appointment of inspectors and defines their powers and prescribed list offences.
Safety at Work Act 1982	The legislation codifies the duties of employers to their employees and others responsible for ensuring the safety of workers in variouswork environments, in particular the safety of workers in dangerous and risky conditions. Part III of the legislation stipulates very specific duties relating to work environments that are dusty or have fumes, pressures and vacuum systems, machinery, electrical installations, fires and explosions, and other hazardous work environments. Part IV provides for the regulation of these conditions and powers given to the commissioner of labour to regulate working conditions, investigate offences and prosecute where there is a breach.
The Town and Country Planning Act 1980	This Act provides for regulation of planning at national and provincial level. Although it has a national scope, the legislation can only be applied to urban areas. The Act empowered each province to have a Town and Country Planning Board. Their responsibility is to prepare local planning schemes and control development of landwithin urban areas. The board has no jurisdiction over customary land, which is a significant limitation.

Laws and Legislations	Roles and Duties
The Mines and Minerals (Amendment) Act 2008	This Act provides the statutory framework for the mining sector. Section 2 states that no mining operations shall take place except inaccordance with its provisions. Several types of permits may be granted by the Minister responsible for mines and minerals: reconnaissance permits, prospecting licenses, mining leases, alluvialmining, gold dealing and building materials permits. The Act made provisions for formulating an Environmental Impact Statement before mining development should occur; Part V 36 (ii) of the Act requires as condition for a mining lease adequate protection of the environment within and outside the mining area. The recent experience with Gold Ridge mining should draw many lessons that will be considered in this strategy.
The Provincial Government Act 1997	Schedule 3 provides a list of activities for which the provinces haveresponsibility and have the power to pass ordinances: • Trade and Industry – Local licensing of professions, trades andbusinesses, local marketing • Cultural and Environment Matters – Protection of wild creatures, coastal and lagoon shipping • Agriculture and Fishing – Protection, improvement andmaintenance of freshwater and reef fisheries • Land and Land Use – Codification and amendment of existingcustomary law about land. Registration of customary rights in respect of land including customary fishing rights • Local Matters – Waste disposal • Rivers and Water – Control and use of river waters, pollution ofwater • Corporate or Statutory Bodies – Establishment of corporate or • statutory bodies for provincial services including economic activity.
Provincial Level	
Honiara City Council (HCC Act) 1999	The Act provides the legal framework for the establishment of the Honiara City Council (HCC) and town boundary on Guadalcanal under section 4 of the Honiara City 1999. The function of the HCC council is still determined using other provisions provided for withinthe Local Government Act, which means that HCC is operated on ordinance to plan, manage and organise Honiara City.
The Honiara (Refuse Disposal) By-law 1994	This by-law is concerned with the management of waste in Honiara and enforcing the management of waste within the city boundary.
Honiara Litter Ordinance 2004	The Litter Ordinance was formulated to keep Honiara clean: local business, houses or individuals must provide litter receptacles forwaste collection, while the council distributes receptacles in the public areas.
HCC Building Ordinance	The HCC Building Ordinance was created to ensureall buildings built within the Honiara City must be legally approved considering safe and healthy development for the health of Honiara City. This Ordinance also states the types of materials that are legally approved to use in building constructions.

Table 16: Solomon Islands Multi-lateral Agreements and Conventions

MEAs and Conventions	Status
Stockholm Convention on Persistent Organic Pollutants 1995	Ratified
Waigani Convention	Ratified
Montreal Protocol	Ratified
MARPOL 73/78: International Convention for the Prevention of Pollution from Ships, 1973 as modified by the Protocol of 1978 (Annexes I, II, III, IV, and V)	Ratified
London Convention on the Prevention of Marine Pollution by the Dumping of Wastes and Other Matter 1972	Ratified
International Convention on Civil Liability for Oil Pollution Damage 1969 (renewed 1992)	Ratified
Noumea Convention	Ratified

Appendix B Material Categories

Consolidation	Category
Metal	• Aluminium cans • Aluminium recyclable • Steel cans • Metal other
Fishing	• Fishing/seafood, metal • Fishing/seafood, plastic • Fishing/seafood, wood
Paper and Cardboard	• Cardboard • Cigarette butts • Liquid Paperboard (LPB) • Paper
Plastic	• PET bottles • HDPE bottles • Expanded polystyrene • Plastic bags • Plastic oil containers • Polypropylene (PP) • Flexible/film • Other plastic
Batteries	• Lithium batteries • Used lead-acid batteries • Other batteries
E-waste	• Computer equipment • Mobile phones • Electrical items and peripherals (including TVs) • Toner cartridges
Hygiene	• Feminine hygiene • Pharmaceutical • Nappies • Medical waste • Other sanitary waste
Organics	• Food • Wood/timber • Other organics
Other	• Hazardous • Textiles • White goods • Ceramics • Animal faeces • Containerised used oil (volume and weight) • EOL renewable energy equipment • End-of-life vehicles • Tyres • Other
Glass	• Glass bottles eligible for CDS • Glass bottles wineand spirit • Glass fines • Glass jars • Glass other

Appendix C Further Sort Sheet

Beverage Containers	Cigarette Butts	Cigarette Packets	Straws	Coffee Cups
Bags-heavy glossy typically branded carry bags type light weight carry bags	Bags-supermarket type light weight carry bags	Takeaway containers (plastic and paper)	Takeaway container lids	

BEVERAGE CONTAINER ONLY FURTHER SORT					
	<150	>151-500	>501-1000	1001-3000	>3000
Aluminium					
Alcoholic sodas & Spirit based mixers					
Beer					
Cider/fruit based etc					
Flav water/soft drink (carbonated)					
Flav water/soft drink (non-carbonated)					
Other					
Steel					
Alcoholic sodas & Spirit based mixers					
Beer					
Cider/fruit based etc					
Flav water/soft drink (carbonated)					
Flav water/soft drink (non-carbonated)					
Other					
LPB					
Milk					
Flavoured milk					
Fruit juice (>90% fruit&/or Veg juice)					
Fruit drink					
Flav water/sports drink, non-carb					
Other					
PET					
Milk					
Drink Pouches					
Flav Milk					
Flav water/sports drink, non-carb					
Flav water/sports drink, carbonated					
Fruit juice (>90% fruit&/or Veg juice)					
Fruit drink					
Other					

BEVERAGE CONTAINER ONLY FURTHER SORT					
	<150	**>151-500**	**>501-1000**	**1001-3000**	**>3000**
HDPE					
Milk					
Drink Pouches					
Flav Milk					
Flav water/sports drink, non-carb					
Flav water/sports drink, carbonated					
Fruit juice (>90% fruit&/or Veg juice)					
Fruit drink					
Other					
Other Plastic					
Milk					
Drink Pouches					
Flav Milk					
Flav water/sports drink, non-carb					
Flav water/sports drink, carbonated					
Fruit juice (>90% fruit&/or Veg juice)					
Fruit drink					
Wine bladders					
Other					
Glass					
Alcoholic sodas/spirit-based mixers					
Beer					
Cider/fruit based etc					
Flav water/sports drink, non-carb					
Flav water/sports drink, carbonated					
Fruit juice (>90% fruit&/or Veg juice)					
Fruit drink					
Wine (glass only)					
Spirit					
Other					

Appendix D Landfill Audit Categories

Consolidated	Category
Metal	• Aluminium cans • Aluminium Recyclables • Steel Containers • Metal Others
Paper Cardboard	• Cardboard • LPB • Composite • Paper
Plastic	• PET Containers • HDPE Containers • LDPE Containers • PVC Containers • PP • EPS • PS • Flexibles/Film • Other Plastic
Single Use Plastic Items	• Beverage Containers • Cigarette Butts • Cigarette Packets • Straws • Coffee Cups • Bags-heavy glossy branded carry bags • Bags-supermarket light weight carry bags • Takeaway Containers plastic not EPS • Takeaway Containers Styrofoam • Takeaway Containers Paper • Takeaway Containers Lids • Bottle Lids
Batteries	• Non-rechargeable Batteries • Rechargeable Batteries • Lead Acid batteries • Mobile Phone Batteries • Power Tool Batteries • Lithium Batteries • Lithium ion Batteries • Other Batteries
Glass	• Glass Bottles • Glass Jars • Glass Fines • Glass Other
Hygiene	• Feminine Hygiene • Pharmaceutical • Nappies (Diapers) • Medical waste • Other sanitary waste
Organics	• Food • Wood/Timber • Garden Organics • Other Organics
Hazardous	• Paint • Fluorescent Tubes • Household Chemicals • Asbestos • Clinical (medical) • Gas Bottles (Butane) • Mercury • Hazardous Other
E-waste	• Computer Equipment • TVs • Mobile Phones • Electrical Items &Peripherals • Toner Cartridges
Other	• Textile • White Goods (vol/count) • Ceramics • Containerised used oil (vol/weight) • EOL renewable energy equip (vol/count) • EOL vehicles (vol/count) • Tyres (vol/count) • Others

Appendix E Household Sample Collection Sheet

	Date	Auditor		Weather			
	Sample number	GPS location recorded?	Photo?	Interview sheet provided?	Interview sheet returned?	Bags provided?	Comments
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							

Appendix F Household Interview Sheet

Area or Island Name: ..... Date ..... Sample number (H1 to H200)_____

Weather..... (Sunny/Windy/Raining)

1. CONTACT INFORMATION

Household name/number	
Total number of people in the household	
No. of adults in the household	
No. of children in the household	
Location	
House type	
House ownership	

2. NATURE OF THE WASTE GENERATED

Daily Diet:

Preference 1.....P or Buy

Preference 2.....P or Buy

Preference 3.....P or Buy

Weekly number of soft drink cans consumed .....

Weekly number of water bottle consumed .....

Weekly Expense on Groceries: **Vt**.....**Per**..... **OR .....**(Total)

Weekly Expense on Transportation: **Vt**.....**Per**.....**OR .....**(Total)

Weekly Expense on Electricity: **Vt**.....**Per**..... **OR.....** (Total)

3. MEASURE OF INCOME

Source of income	
No of people employed in thefamily	
Estimated monthly income	

4. WASTE MANAGEMENT

No. of bins in the house	
What is the waste level in your house when the collection comes?	
Do you burn any waste?	
Choose one. Do you	
• Take your bin out to a collection point	
• Throw it along the road/creek/ocean	
• Bin gets collected from your house	
• Other (describe how you dispose of your waste and where)	

How do you dispose of the following:	
• Green waste	
• General waste	
• Bulky waste	
• Nappies	

5. AWARENESS LEVEL

Are you aware of the waste collection/recycling services available? (Y/N) if yes, how many?	
Did you get any information aboutthe collection services	
How did you get this information or where did you hear about it?	
Do you have a radio?	

6. APPRECIATION OF THE COLLECTION SERVICE

Rate your collection service from 1 to 10. 1 is bad.	
What's the reason for the score?	
Do you have any suggestions for improvement?	

7. WILLINGNESS TO PAY FOR THE SERVICE

How much you are willing to pay ifthe waste collection is charged monthly?	
Do you support an idea of introducing a rubbish bag for people to put in their waste like in NZ, Australia, Kiribati and Vanuatu?	
These rubbish bags cost between 20 cents to $1. How much you canafford if we sell the rubbish bag?	

8. CDL & RECYCLING

In order for cans, plastic bottles, and bulky waste to be recycled and send overseas, we need to support the cost by introducing a waste levy like other countries, e.g., 10 cents for soft drinks, $100 for import cars, $50 forwashing machines and refrigerators. Do you support this plan?

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