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Green Industries SA (GISA)

DRAFT 2026 Kerbside Waste Audit Guidelines

South Australia



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Acronyms

APC	APC Waste Consultants
C&I	Commercial and Industrial
CDS	Container Deposit Scheme
DCCEEW	Department of Climate Change, Energy, the Environment and Water
FOGO	Food Organics and Garden Organics
GISA	Green Industries SA
GO	Garden Organics
JSEA	Job Safety and Environment Analysis
LGA	Local Government Area
MRF	Materials Recovery Facility
MSW	Municipal Solid Waste
MUD	Multi-Unit Dwelling
PPE	Personal Protective Equipment
SA	South Australia
SUD	Single-Unit Dwelling
SWMS	Safe Work Method Statement
WHS	Work Health and Safety

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Note about these Guidelines

2026 Kerbside Waste Audit Guidelines for South Australia have been developed to enable the collection of household data on waste, recycling, food and garden organics quantities and characteristics within local government areas in South Australia. These Guidelines replace the 2007 Guide to Kerbside Performance Reporting.

The Guidelines Toolkit contains supporting resources, templates, checklists and tools.

The Guidelines and Toolkit will be re-evaluated and revised periodically. We recommend stakeholders regularly check the Green Industries SA website (www.greenindustries.sa.gov.au) for updates.

These Guidelines outline key issues and methods for measuring average household waste generation and composition through bin-auditing processes. It includes the general waste, comingled recycling, garden organics (GO) and food organics and garden organics (FOGO) streams.

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1 Overview of 2026 Kerbside Waste Audit Guidelines

1.1 Context



Councils conduct kerbside waste audits to monitor and evaluate various aspects of waste management performance, such as waste generation and composition, material diversion rates, contamination levels and the effectiveness of a newly implemented system or public-education initiatives.

Audit data also informs both local decision-making and broader statewide resource-recovery objectives.

The review of the *Environment Protection (Waste to Resources) Policy 2010* undertaken by SA Environment Protection Authority (SA EPA) in 2024 identifies difficulties in comparing bin material composition results across councils. The *Beyond recycling: Moving SA towards a more circular economy* discussion paper highlights the establishment of a standardised statewide audit methodology as a priority to improve data reliability and better support policy development. It will also enable more timely and consistent reporting by local government on household waste generation and resource-recovery performance.

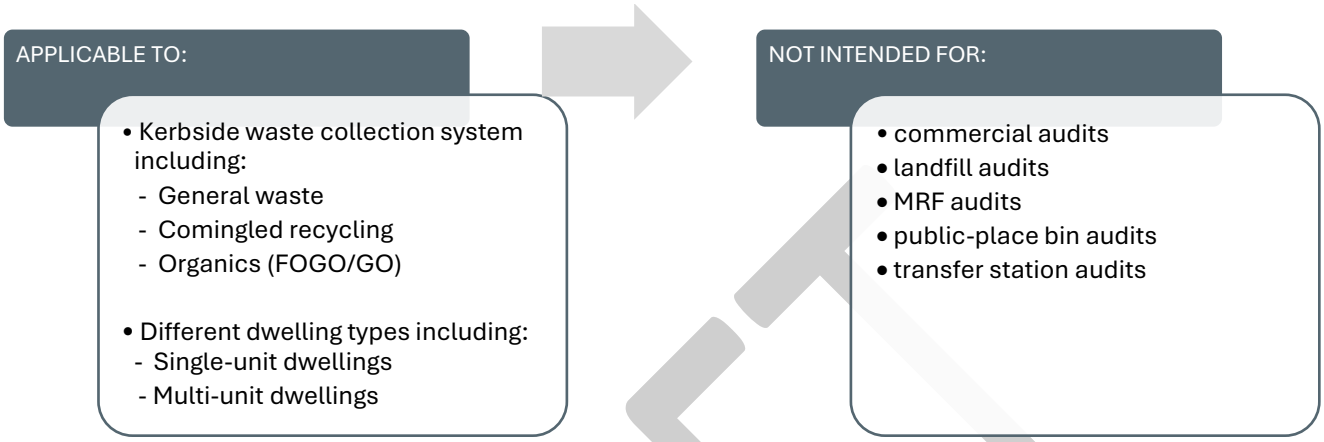
The South Australian Government's *Accelerating SA's transition to a circular economy: South Australia's Waste Strategy 2025–2030* (the Strategy) sets targets to increase resource recovery and reduce contamination, including reducing contamination in household bin systems in metropolitan Adelaide and a 50% reduction in organics disposed to municipal solid waste (MSW) kerbside and commercial and industrial (C&I) landfill bins by 2030. This requires minimisation of food waste and diversion of more organic materials from landfill. Progress toward these targets will be measured through kerbside bin audits. The Strategy also sets kerbside bin contamination targets for organics and recyclables in metropolitan Adelaide local government areas which will be measured through kerbside bin audits. There is a need to standardise kerbside waste collection bin audit methodologies to ensure consistency and enable comparison of results across councils.

Green Industries SA (GISA) conducted a review of kerbside waste audit guidelines in SA and other jurisdictions in Australia. The 2026 Kerbside Waste Audit Guidelines for South Australia were developed after investigating common challenges and opportunities.

The purpose of the new Guidelines is to establish a clear, statewide method for consistent, comparable and robust **routine kerbside waste audit methodology**, which is the kerbside audit methodology recommended by Green Industries SA to provide robust, comparable local and statewide data. It is recommended that routine audits are

undertaken every three years and have a minimum 32 sorting categories as detailed in the Guidelines Toolkit Appendix B.

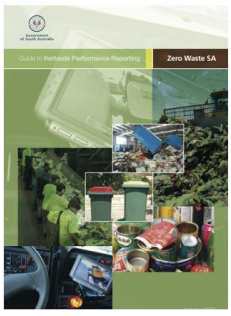
Figure 1 Guidelines application

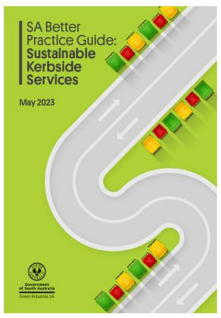


1.2 Inputs to these guidelines

The following inputs were considered in the development of these guidelines:

- *Guide to Kerbside Performance Reporting*, Zero Waste SA, (2007)
- existing state-based waste audit guidelines in use in Australia
- national guidelines including the National Kerbside Collections Roadmap[1] and the National standard for waste and resource recovery data and reporting[2]
- *Accelerating SA's transition to a circular economy: South Australia's waste strategy 2025–2030*
- feedback from GISA and nominated stakeholders as part of Stage 1 consultation
- knowledge and experience of APC Waste Consultants (authors)
- independent peer review
- independent statistical advice.







[1] Department of Climate Change, Energy, the Environment and Water (2024, February). *National Kerbside Collections Roadmap: Staged improvements to the consistency of kerbside collections* national-kerbside-collections-roadmap.docx

[2] Blue Environment Pty Ltd for Department of Climate Change, Energy, the Environment and Water (2024). *Australian standard for waste and resource recovery data and reporting – Second Edition*. National standard for waste and resource recovery data and reporting – Second Edition – DCCEEW.

1.3 Overarching basis for audit guidelines

Any kerbside audit represents a snapshot of the waste generated by a specific sample of households within a defined geographic area and time. However, the consistent application of robust and standardised audit methodology, material classification and data-collection processes enables meaningful comparison over time and between local government areas (LGAs).

When undertaken at regular intervals (for example, every three years), kerbside waste audits provide valuable trend data that helps councils to assess the performance of their waste management systems while also gaining a more reliable and comparable statewide evidence base for planning, policy, and reporting.

Why perform a routine audit of kerbside waste collection systems?

- report within a council and/or region on the performance of a chosen waste and recycling system
- compare performance with that of other councils in similar circumstances
- provide feedback to the community on its recycling efforts
- review the performance of a new system
- review the performance of an existing system prior to tendering for a new kerbside contract or at a mid-term review
- track waste generation quantities, use of waste and recycling systems and contamination
- support decision-making, including service reviews, contract tendering, and performance management
- provide the state government with data on the performance of kerbside systems to enable aggregated reporting and performance benchmarking across councils

Why is it important to follow the guidelines?

- provides councils and others with a standard, replicable method for measuring household behaviour through kerbside collected waste
- delivers comparable and robust data
- facilitates reliable local and statewide reporting and performance evaluation
- enables reliable and consistent data to plan future waste education reduction and circular economy policies and strategies

What are the benefits for councils?

- provides access to accurate, reliable and consistent data to develop strategies for improving resource recovery and reducing contamination
- tracks and measures efficiency of household kerbside bin systems
- enables performance comparisons with different collection systems
- facilitates performance comparisons with other similar councils
- provides easily accessible and robust data available for requests from community or state and federal agencies

These guidelines have been developed to ensure that the data resulting from the **routine kerbside audits** will be able to provide answers to important questions including:

- What is the average material generation by weight of each stream in a kerbside collection system?
- What is the average material composition by weight of each stream in a kerbside collection system?
- What is the average rate of bin contamination in the comingled recycling or organics streams by weight?
- What are the most common contaminants in the comingled recycling or organics streams by weight?
- What are the biggest diversion opportunities by weight in the general waste stream?
- What percentage of food organics and garden organics by weight is not being correctly source-separated?
- What percentage of other recyclables by weight is not being correctly source-separated?
- Are there differences in contamination rates between different service configurations (for example, weekly FOGO collection compared to fortnightly FOGO collection, or other service configurations)?
- What is the difference in waste composition and recycling behaviour between single-unit dwellings and multi-unit dwellings?
- What are the type and quantity of CDS-eligible containers remaining in the kerbside bins?
- What are the type and quantity of hazardous and e-waste materials remaining in the kerbside bins?

The Guidelines acknowledge that councils may require additional or more frequent audits to meet specific purposes. Appendix B therefore provides a decision-making matrix describing alternative audit methodologies, their applications, strengths, and limitations.

1.4 The basis for sample size and selection

A suggested sample size (that is, the number of households to include in an audit) for the routine kerbside audit is proposed for each council in South Australia. The approach to sample size and selection aims to strike a balance between audit cost, the accuracy and representativeness of audit results and what is practical to achieve in the field. Simplicity and cost efficiency are key considerations for local governments.

The total suggested number of households to audit in each council ranges from a sample size of 50 (for smaller regional councils) to 200 (most metropolitan and large regional councils), including both single-unit dwellings and multi-unit dwellings. The number of single-unit dwellings and multi-unit dwellings to audit is proportional to the number of single-unit dwellings and multi-unit dwellings in the overall council area.

Auditing a greater number of households yields more accurate results, although increasing the sample size adds to the audit costs. The sampling methodology and sampling plan are detailed in the **Guidelines Toolkit: Appendix E** and provide minimum sampling size and collection details for each council.

1.5 Sample collection method

The preferred and recommended methodology for the routine kerbside audit collection is by an 'aggregated' collection of 'matched pairs', where samples are collected in a waste collection truck. This method provides statistically robust data with a lower WHS risk and at a lower cost than a 'bin by bin' method. It allows matching between kerbside waste streams from the same households to provide a more comprehensive understanding of household behaviour and supports calculation of generation rates, presentation rates, contamination, diversion and recovery rates.

1.6 Waste sorting categories

Two suggested lists of waste audit sorting categories have been provided (see Guidelines Toolkit, Appendix B):

- a consolidated list of 32 categories, which is the minimum number of categories for the routine household kerbside audit. This provides a lower cost option as fewer categories are quicker to sort.
- an expanded list of 65 categories, with additional optional sub-categories that could be included at Council's discretion, to provide greater visibility of material types found in kerbside bin.

Councils may choose to expand the minimum categories list by incorporating some or all additional sub-categories from the expanded list to capture specific materials of interest. Alternatively, councils also have an option to use the detailed list as the starting point and collapse categories further or introduce new categories to suit the purpose of their waste audit.

1.7 Tools and resources

A series of templates, checklists and forms have been developed to aid in planning and implementing waste audits in accordance with the guidelines. These are detailed in the **Guidelines Toolkit**, with the relevant items referenced at the beginning of each section.

1.8 Guidelines structure

The 2026 Kerbside Waste Audit Guidelines is structured as follows:

Section 1	Overview of 2026 Kerbside Waste Audit Guidelines
Section 2	Checklist for audit planning
Section 3	Health, safety and environmental considerations
Section 4	Confidentiality and privacy
Section 5	Information on audit sample size and selection
Section 6	Methodology for sample collections.
Section 7	Sample sorting methodology
Section 8	Data analysis and reporting

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Section 9	Additional audit options (i.e. high-rise multi-unit dwellings, properties with additional bins or different bin sizes
Section 10	Presents the Guidelines Toolkit, which is a separate document with supporting templates, checklists, forms, reference materials, WHS supporting tools and statistical considerations
Section 11	Glossary with specialised terms used in the guidelines, organised in alphabetical order, together with their definitions

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2 Audit planning

Guidelines Toolkit: Templates, checklists and forms

- Audit planning and equipment checklist (Section 2.1)
- Tender checklist for local governments engaging external waste audit service providers (Section 2.2)
- Example job safety and environment analysis template (Section 5.1)
- Sorting category definitions and inclusions (Section 3.1)

2.1 Audit frequency and timing

Each council has different objectives, resources and budgets for auditing. For example, a council may want to measure household waste behaviour before and after a kerbside service change, such as the introduction of a FOGO bin or to measure the impact of recycling education campaigns. In these cases, audits are most useful six months prior to the service change or education campaign and three to six months after the service change or education campaign is implemented, depending on the scale of the change and the time of the year when audits should occur.

Ongoing audits can be valuable to gain a representative view of waste behaviour across a wider region or group of councils. The **2026 Kerbside Waste Audit Guidelines recommend a routine audit of all waste services be undertaken at least every three years**.

Councils may undertake more frequent auditing as may be required to measure the performance of current kerbside services, assess the effectiveness of education and/or policy initiatives, in preparation for new waste contracts and/or determine the possible impacts of service changes e.g. introducing a new service, smaller bins or changing collection frequencies.

To ensure that you are measuring typical household behaviours, audits should be avoided during school holiday periods, public holidays and religious events (e.g. summer holiday period, Easter, Ramadan and school holidays). Residents may be absent, tourist numbers may rise and household behaviours may change.

Types and quantities of materials generated during these periods can differ significantly from what is ‘normally’ generated. Extrapolating data during audits conducted in holiday times could lead to incorrect assumptions about waste generation and diversion rates and contamination of the various streams.

Similarly, auditing should be avoided following a natural disaster (for example, storms, bushfires and floods), which may lead to atypical waste profiles, including the dumping of large quantities of food after extended power outages. Given there is a correlation between climatic variation and waste composition and generation (for example, higher

and/ or varying types of beverage containers as well as fluctuations in the volumes of garden organics during extended dry or wet periods and growth usually associated with spring and summer), subsequent audits could be undertaken at different times of the year to measure seasonal variation.

2.2 Audit planning tasks

Table 1 outlines the actions that should be completed before the first samples are collected. A checklist is provided in the separate Guidelines Toolkit document.

Table 1 Audit planning actions

Routine audit planning task	Notes
Define the purpose and scope of the audit	Determine the questions you want answered in the audit and check if there is an opportunity for cross-council collaboration.
Decide if you should do an in-house audit or appoint an external waste audit contractor	If there is sufficient staff availability and expertise, conducting a waste audit using local government staff may be less expensive than engaging an external provider. External providers, however, have experienced sample collection and sorting staff, which is likely to provide efficiency and sorting accuracy benefits, especially for larger audits.
Appoint an audit project manager	The audit project manager undertakes the logistics, including audit planning, work health and safety (WHS), progress reporting, street selection and inception meeting. A second project manager will be appointed by the external waste auditor, if engaged by Council to undertake these works.
Request rates or other databases; complete area selection and street selection	A map of the council's collection zones and days are required to plan the sample collection. The Guidelines describe street selection methods. It is important to include some reserve streets in the case auditors are unable to obtain the sample for any reason from the primary list of streets.
Confirm with council which materials are accepted in each kerbside bin	The materials accepted in kerbside bins, particularly comingled recycling and organics bins, may vary between councils.
Agree sorting categories and their definitions	Two options are provided in the Guidelines Toolkit: • a condensed list of categories, providing the minimum necessary information • a detailed, expanded list of categories. The final sorting list needs to include at least the minimum list of categories. This can be expanded by the council based on the purpose of the audit.
Organise a covered waste sorting area	A minimum 10 m x 10 m covered area is preferred to provide a safe workplace and to prevent sorted material getting wet during weather events or from being dispersed across the site.

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Routine audit planning task	Notes
Organise empty kerbside collection truck(s) and driver(s) for sample collection	Check that trucks are empty and free from contamination before collections commence. When collecting two waste streams on the same day (e.g. general waste and comingled recycling) and if there is truck and driver availability, two trucks working in convoy is more efficient than one truck doing two separate collection runs as it ensures that the matched pair is collected. In the absence of two trucks, one truck collects the first waste sample e.g. general waste, empties the load at the sort site and returns to the same households to complete the second collection.
Consult council waste collection supervisor (internal or contractor) on sample collection logistics and timing	This is important to ensure the targeted household bins are not collected by council's day labour or its contractors before the audit collection trucks arrive.
Arrange access to weighbridge if possible	This is to obtain the weight of the aggregated collection. If there is no available weighbridge, auditors will rely on the weights obtained during the physical audit.
Organise all sample collection and sorting equipment	A checklist is provided in Guidelines Toolkit (Section 2.1). Ensure you have sufficient wheelie bins. For example, a 200-household audit will require 30 to 50 240L bins to sort the material. Ensure you have enough trestle tables for sorting. Height-adjustable tables are best to prevent back strain. Ensure you also have tubs for smaller quantities of material and for items that need counting.
Arrange site inductions and any required safety briefings for auditors	Sorting sites at existing facilities may have their own induction requirements.
Plan for the disposal of sorted waste	This is usually possible at the disposal or recycling facilities currently used by councils.
Request data from previous audits	This is necessary for historical trend analyses.
Complete Job Safety and Environment Analysis	This includes both the collection and sorting phases. A template is provided in Guidelines Toolkit (Section 5.1).
Organise a letter on council letterhead explaining the audit	To give to any concerned residents. Councils may use this letter to inform internal and customer service staff about the audit process.
Organise sample collection and sorting staff and rosters	Sample collection requires truck driver(s) and an audit collection supervisor. Examples of labour resources for sample sorting are included in the Guidelines.
Organise data entry, data analysis and reporting staff	Ensure you have appropriately skilled employees to input data collected during the audit, qualified analysts and skilled report writers. It is suggested you request one set of consolidated comments on the draft report from council and/or stakeholders prior to finalising.

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3 Health, safety and environment

Guidelines Toolkit: Templates, checklists and forms

- Example job safety and environment analysis template (Section 5.1)

Both the sample collection and sample sorting phases of waste audits present risks to personal safety and the environment. Examples include the risks associated with working around heavy vehicles and road travel (collisions, injuries from getting in and out of trucks, and risks associated with handling waste materials (hazardous materials, needle-stick injuries, dust inhalation, lithium batteries). A detailed plan should be prepared on the assessment and mitigation of hazards and risks, primarily for work, health and safety but also including environmental management. The Guidelines Toolkit provides a template job safety and environmental analysis (JSEA), including risk-assessment criteria. This includes examples of common risks, but it is recommended all audit projects include job-specific and site-specific risk assessments. A list of recommended personal protective equipment (PPE) is included in *the Audit planning and equipment* checklist.

All audit staff should be up to date with vaccinations in line with SafeWork SA[3] guidance and a risk-based approach to managing exposure to waste and biological hazards.

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[3] Workplace safety in South Australia is regulated by SafeWork SA under the *Work Health and Safety Act 2012 (SA)* and associated regulations

4 Confidentiality and privacy

Complete and accurate household addresses should be recorded during sample collection to ensure the correct collection method has been followed and that samples from all streams are matched by household. It is important to note that individual household information must be anonymised and not correlated with the composition data during the data entry, analysis or reporting phases of the audit. The aggregated sample collection method minimises the interaction between auditors and residents, as the samples are collected in a regular garbage truck on the regular collection day. Collected samples are aggregated, not collected in individual bags. The following procedures are recommended to ensure confidentiality and privacy for residents:

- It is not recommended to advertise the audit or offer an 'opt out' system, as this is particularly challenging for councils to administer and for auditors to manage. Residents may change waste behaviours if they are aware of an audit. Advertising the audit can also create unnecessary angst in the community over the audit process.
- Councils need to provide the collection supervisor with a letter of authority on council letterhead that can be provided to any concerned resident during the sample-collection phase.
- If a resident does have genuine concerns about being included in the audit, their household can be excluded prior to the sample being collected.
- All sample collectors and auditors should be briefed on customer service, confidentiality and privacy.
- Audit staff should be required to sign a confidentiality agreement which prohibits them from removing anything from the material they sort or from revealing any information they might obtain while sorting or auditing.
- Sample disposal procedures should be agreed and documented prior to the audit commencing.

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5 Audit sample size and selection

Guidelines Toolkit: Templates, checklists and forms

- Statistical considerations (Section 6.1)

5.1 Sample size

Table 2 below lists all the councils in South Australia, presenting the minimum sample size for each council, which can range from 50 to 200 households, depending on council profile. The Sampling Plan, developed by statisticians, is provided in Guidelines Toolkit.

The number of households to be sampled in each council reflects the relative size of the council and population density, with a minimum threshold of 50 households for smaller regional councils. For more populous LGAs, the guidelines recommend a larger number of households, sampled over several scheduled collection days and collected across the LGA.

Stratified sampling may also be used to account for other differences across the LGA. Stratified sampling is where representative samples from sub-populations are taken to represent differences in housing, demography and/or geography. ABS Census data is used to determine the proportion of multi-unit dwellings and single-unit dwellings to be sampled. It is suggested that multi-unit dwellings are included in the sample where they comprise more than 10% of the housing stock. [4]

[4] Such as Adelaide, Burnside, Charles Sturt, Holdfast Bay, Norwood Payneham and St Peters, Prospect, Unley, Walkerville, West Torrens.

Table 2 Suggested number of households to sample in each council as per sampling plan detailed in Guidelines Toolkit – Appendix E

Local government area	Location	Area (km²)	Population 2025	Number of households (2025 est.)	SUDs%	MUDs%	Sampling plan group[5]	Minimum sample size
Adelaide	Metro	16	30,173	16,763	41.4	56.9	Group A	200
Adelaide Hills	Metro	794	42,875	15,880	98.4	1.2	Group A	200
Adelaide Plains	Regional	932	11,736	4,347	98.4	0.3	Group B	150
Alexandrina	Regional	1,827	31,427	13,664	97.7	1.1	Group B	150
Barossa	Regional	894	26,817	11,174	98.2	0.9	Group B	150
Barunga West	Regional	1,590	2,688	1,280	97.4	0.8	Group C	50
Berri Barmera	Regional	476	10,758	4,677	97.0	1.9	Group B	150
Burnside	Metro	28	48,257	19,303	88.9	10.8	Group A	200
Campbelltown	Metro	24	58,826	23,530	90.5	9.3	Group A	200
Ceduna	Regional	5,420	3,757	1,565	95.5	1.8	Group C	50
Charles Sturt	Metro	55	130,841	54,517	89.1	10.5	Group A	200
Clare and Gilbert Valleys	Regional	1,892	9,467	4,116	98.8	0.0	Group B	150
Cleve	Regional	5,019	1,771	770	98.7	0.0	Group C	50
Coober Pedy	Regional	78	1,526	848	89.8	6.1	Group C	50
Copper Coast	Regional	773	16,601	7,546	98.5	0.4	Group B	150
Elliston	Regional	6,742	1,057	460	96.3	0.0	Group C	50
Flinders Ranges	Regional	4,070	1,662	791	96.0	1.9	Group C	50
Franklin Harbour	Regional	2,756	1,367	621	96.3	0.8	Group C	50
Gawler	Metro	41	27,564	11,984	97.8	1.2	Group B	150
Goyder	Regional	6,715	4,141	1,882	99.1	0.0	Group C	50
Holdfast Bay	Metro	14	39,683	18,038	83.1	16.2	Group A	200
Kangaroo Island	Regional	4,401	5,212	2,369	97.4	1.2	Group C	50
Karoonda East Murray	Regional	4,416	1,026	466	97.7	0.0	Group C	50
Kimba	Regional	5,697	1,064	443	99.2	0.8	Group C	50
Kingston	Regional	3,340	2,420	1,152	97.8	0.9	Group C	50

[5] Group A includes most metropolitan and some large regional councils; Group B includes smaller metropolitans councils and larger regional councils; and Group C includes smaller regional councils

Local government area	Location	Area (km^2)	Population 2025	Number of households (2025 est.)	SUDs%	MUDs%	Sampling plan group[5]	Minimum sample size
Light	Regional	1,277	17,317	6,185	99.4	0.1	Group B	150
Lower Eyre	Regional	4,721	6,268	2,507	98.7	0.0	Group B	150
Loxton Waikerie	Regional	7,764	11,971	5,205	97.7	0.9	Group B	150
Marion	Metro	56	101,229	42,179	93.0	6.8	Group A	200
Mid Murray	Regional	6,272	9,674	4,607	95.7	0.5	Group B	150
Mitcham	Metro	76	71,267	27,410	90.2	9.4	Group A	200
Mount Barker	Regional	595	45,111	17,350	98.7	0.5	Group B	150
Mount Gambier	Regional	34	28,057	12,199	91.2	8.5	Group B	150
Mount Remarkable	Regional	3,423	2,861	1,300	96.9	0.7	Group C	50
Murray Bridge	Regional	1,832	23,539	10,234	98.2	0.4	Group B	150
Naracoorte Lucindale	Regional	4,520	8,930	3,721	98.9	0.3	Group B	150
Northern Areas	Regional	2,986	4,688	2,131	99.5	0.0	Group C	50
Norwood Payneham and St Peters	Metro	15	40,845	18,566	80.8	18.6	Group A	200
Onkaparinga	Metro	518	184,827	77,011	97.5	1.8	Group A	200
Orroroo Carrieton	Regional	3,322	884	402	98.5	0.0	Group C	50
Peterborough	Regional	3,020	1,701	895	99.0	0.0	Group C	50
Playford	Metro	345	115,790	44,535	98.8	0.8	Group A	200
Port Adelaide Enfield	Metro	92	143,022	59,593	91.8	7.6	Group A	200
Port Augusta	Regional	1,158	14,469	6,291	91.7	7.0	Group B	150
Port Lincoln	Regional	30	15,065	6,550	93.0	6.1	Group B	150
Port Pirie	Regional	1,761	17,664	8,029	97.6	1.5	Group B	150
Prospect	Metro	8	23,459	9,384	85.3	14.5	Group B	150
Renmark Paringa	Regional	916	10,274	4,467	96.3	2.0	Group B	150
Robe	Regional	1,092	1,621	737	98.3	0.6	Group C	50
Roxby Downs	Regional	110	4,089	1,514	96.9	2.8	Group B	150
Salisbury	Metro	160	151,019	58,084	95.3	4.2	Group A	200
Southern Limestone Coast (formerly Grant)	Regional	1,898	9,223	3,547	96.9	0.1	Group B	150
Southern Mallee	Regional	5,702	2,013	915	96.7	1.4	Group C	50

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Local government area	Location	Area (km^2)	Population 2025	Number of households (2025 est.)	SUDs%	MUDs%	Sampling plan group[5]	Minimum sample size
Streaky Bay	Regional	6,223	2,292	997	96.5	1.0	Group C	50
Tatiara	Regional	6,527	7,088	2,953	98.9	0.3	Group B	150
Tea Tree Gully	Metro	95	105,120	42,048	97.3	2.5	Group A	200
Coorong	Regional	8,833	5,627	2,558	98.7	0.2	Group C	50
Tumby Bay	Regional	2,669	2,963	1,347	93.5	4.1	Group C	50
Unley	Metro	14	40,731	17,709	76.6	23.1	Group A	200
Victor Harbor	Regional	385	17,457	8,313	97.5	1.6	Group B	150
Wakefield	Regional	3,468	6,993	2,914	98.5	0.4	Group C	50
Walkerville	Metro	4	8,673	3,771	87.0	12.3	Group B	150
Wattle Range	Regional	3,926	12,378	5,382	96.7	2.5	Group B	150
West Torrens	Metro	37	66,547	28,933	84.9	14.6	Group A	200
Whyalla	Regional	1,071	21,720	9,873	94.9	4.5	Group B	150
Wudinna	Regional	5,075	1,171	488	95.9	0.0	Group C	50
Yankalilla	Regional	751	6,299	2,863	96.2	2.1	Group B	150
Yorke Peninsula	Regional	5,900	12,242	5,830	96.9	0.5	Group B	150

STATISTICIANS NOTE:

1. **Groups are formed on the basis of a number of demographic variables including population, number of privately owned dwellings, proportion of single unit dwellings and multi-unit dwellings, income, SA2 areas and geographical areas.**
2. **Increasing the number of material categories will require a larger sample size in order to obtain reliable information**

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5.2 Selecting areas and streets to audit

The following aspects are relevant when choosing which areas and streets to audit within an LGA:

- It is necessary to consider each council's waste collection days and the waste streams scheduled for collection. Align these days with your audit week to ensure you collect the 'matched pair' in week 1 of your audit.
- Selection of streets is random, usually via a randomised selection process in Microsoft Excel, but will be constrained by the regular waste collection schedule and logistical considerations. Sampling over multiple days and/or several suburbs maximises opportunities to capture different demographics, as the collection schedule is designed to service the entire population of the LGA.
- Where more than 10% of households are in multi-unit dwellings, stratified sampling should be used as opposed to simple random sampling alone. This will involve identifying the ratio of single-unit dwellings to multi-unit dwellings using ABS Census data and altering sample sizes accordingly to accommodate these proportions. This will inform the selection of areas and streets when separately sampling multi-unit dwellings.
- Local government collection contractors and receival facility knowledge and feedback may provide valuable information on the waste behaviour of different segments of a LGA that is not obvious from the ABS data. This may influence decisions to target specific areas for an audit, for example local governments may need to identify the source of high levels of contamination to develop appropriate strategies and mitigate contract risk.
- Households should be randomly selected to prevent bias. Selection of multi-unit dwellings detailed in Section 6.2.1.

5.3 Selecting streets and bias

Bias is a systematic over or underrepresentation of sub-populations with different waste disposal behaviour in a survey design. It results in sample estimates that are not expected to be that of the true value for the overall population.

When randomly selecting streets, it is necessary to have a secondary list of reserve streets for each day of the audit collection. Reserve streets and addresses are provided if auditors are unable to obtain the sample for any reason from the primary list of streets. For safety reasons, it is important that collections only occur from the side of the street on which the vehicle is travelling and collecting, that is, in the direction of travel.

Section 6 of these guidelines provides detailed information about where to start the audit.

6 Sample collection

Guidelines Toolkit: Templates, checklists and forms

- Single-unit dwellings sample collection form (Section 4.1)
- Multi-unit dwellings sample collection form (Section 4.2)

6.1 Sample collection method



Samples are to be collected using an aggregated collection method. This requires an empty garbage truck (for each waste stream) to collect the samples.

Collections are carried out by a standard waste collection truck on the scheduled collection day — as this is normal practice, residents are less likely to be concerned about security (for example access to personal information and identity theft). Aggregated sample collections provide a statistically robust methodology, are less expensive and mitigate the risk of manual handling injuries and negative publicity.

6.2 Aggregated collection method: how to collect the audit samples

The bin contents from all selected households are collected by an empty waste collection vehicle (free from contamination), which forms one combined load per waste stream per collection day. The samples should be collected before the regular collection takes place to have minimal impact on the regular collection routes and times. This will involve liaising with local government and council waste collection contractors to ensure they do not service the selected streets prior to the audit team collecting the samples.

Templates for single-unit dwellings and multi-unit dwellings collection forms are provided (see Guidelines Toolkit). These include all the information required during collection.

In all cases, it is recommended that an audit supervisor accompany the truck driver(s) to ensure the correct number of households are collected and that all data is recorded for bin presentation purposes.

For councils providing a three-bin system, it is recommended that the week one of the audit occurs when households present two waste streams for collection. This usually comprises general waste and FOGO or alternatively comingled recycling. In some local government areas, households may present organics and comingled recycling for collection. In both scenarios each stream will be collected in separate loads as a

'matched pair' (that is, only collect the sample if the household has presented the two target waste streams). The remaining kerbside service is collected in the same collection cycle, generally in the following week (week two). This facilitates an assessment of household behaviours in the collection cycle.

Additional separate collection runs may be required on one or more days if multi-unit dwellings are being sampled. This is detailed in Section 9 where additional audit options are presented.

It is recommended that approximately 10 to 20 households be sampled from each selected area depending on the number of households on the streets selected. Every second to fifth household should be selected for sampling. In streets with fewer than 20 households, every second household should be sampled. A greater spread of households should be sampled in larger streets where it is practical. This ensures that a sample is drawn from a larger area and improves the statistical robustness of the sampling.

Plan to have a list of additional streets as 'reserve streets' in case insufficient bins are placed out for collection in selected streets or the bins have been collected by the council or its contractor.

An example of a sample collection schedule for a three-bin audit is shown below. This example is for a 200-household audit with general waste and FOGO bins as the matched pair.

Table 3 Example of audit sample collection schedule for a 200-household three-bin audit (general waste, comingled recycling and FOGO streams)

	Sample collection: Week A	Sample collection: Week B
Monday	▪ Collection run #1: 40 general waste bins collected from approximately 7–10 streets*, tip the load at the sorting site ▪ Collection run #2: return to the households where general waste bins were collected and collect the second target waste stream. Tip the load at the sorting site ▪ Note: ideally if resources permit, there will be two trucks working in convoy, so that collection run #1 and #2 can be undertaken at the same time	Return to same households and collect the comingled recycling bins if they are presented
Tuesday	As above in the next selected area where both target waste streams are presented for collection	As above
Wednesday	As above in the next selected area where both target waste streams are presented for collection	As above
Thursday	As above in the next selected area where both target waste streams are presented for collection	As above
Friday	As above in the next selected area where both target waste streams are presented for collection	As above

Note: *subject to sample size

The aggregated sample collection method for a three-bin audit is shown below.

Ensure the truck(s) to be used are empty and you have the collection run sheets with you

Identify a 'start point' (e.g. a specified street corner). Sample bins from every second household as long as both the target waste streams are presented e.g. general waste and comingled recycling or FOGO bins

Garden organics generation is particularly dependent on weather conditions. Record the weather on collection day, for example, if it has been particularly wet

Record the address and bin size for every second household. If the address is a vacant block or a non-dwelling (e.g. a shop), ignore and move on.

If both target waste streams 'matched pair' are presented, collect them both (in separate loads). Record them and include as part of the target sample (e.g. target may be 50 to 200 households).

If there are no bins presented at the dwelling, record the address, mark as 'not presented', move on and do not count as part of the target sample. Substitute with the next household in the street presenting both bins.

If only one of the target bins is presented e.g. general waste, record it but do not collect and do not count as part of the target sample. Substitute with the next household in the street presenting both bins.

If only one of the other target waste streams is presented e.g. comingled recycling or a FOGO, record it but do not collect and do not count as part of the target sample. Substitute with the next household in the street presenting both bins.

Record the bin size and percentage fullness for each bin collected (by looking in the bin before it is collected and visually estimating if the volume of material in the bin is between 0–25%, 25%–50%, 50%–75% , 75%–100% or >100%).

Collect a maximum of 10 bins from each street and then move on to the next street until the target number of households are collected.

Return all sampled bins to the nature strip in the same place they were initially presented.

Before each day's sample collection is tipped at the sorting site, weigh the truck over a weighbridge both when full with the sample and when empty to determine the net weight of the collected sample. If no weighbridge is available, auditors will rely upon the weights recorded during the physical audit.

Return the following week to collect the third target stream bins from the same households. Use the same sample collection addresses from the first week and fill in the remaining waste stream column on the data collection sheet. In order to accurately represent presentation rates, if residents do not present a recycling bin, no substitute bin should be collected.

6.2.1 Including multi-unit dwellings in the audit

Multi-unit dwellings should be sampled, sorted and analysed separately from single-unit dwellings to observe household behaviours.

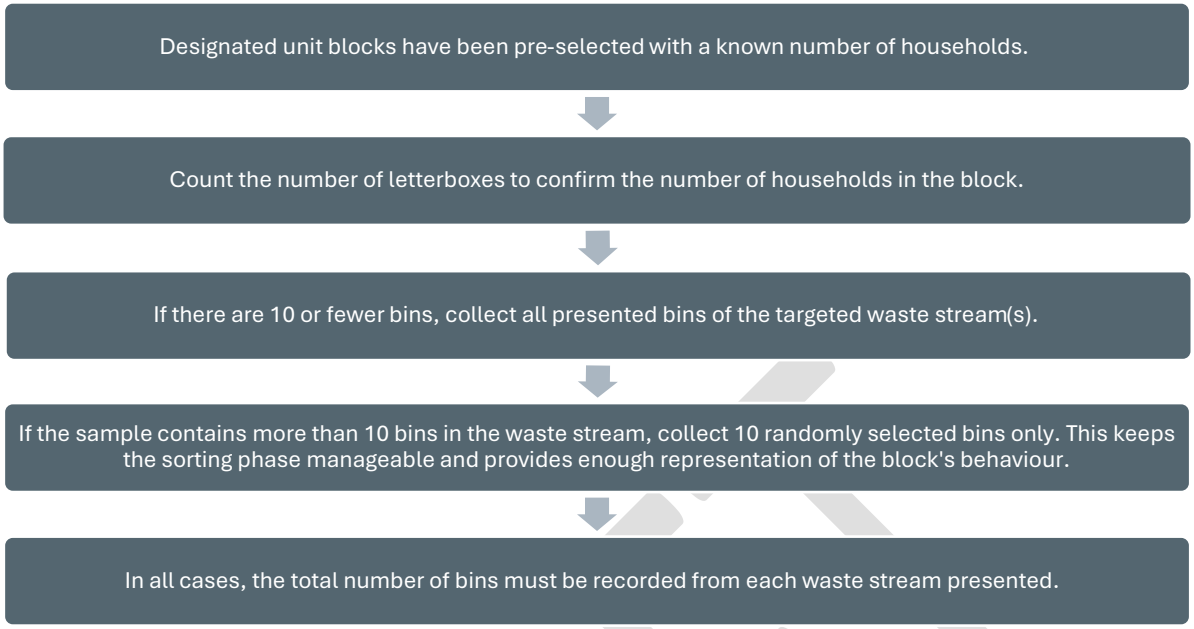
If multi-unit dwellings are included, the number of multi-unit dwellings audited should approximately reflect the proportion of multi-unit dwellings in the overall council area. For example, if a council comprises 30% multi-unit dwellings and the total number of targeted households in the area is 200, plan to collect samples from multi-unit dwellings blocks representing at least 60 multi-unit dwellings households across council. In this example, 6 to 8 multi-unit dwellings (with 8 to 10 households each), could be sampled, ensuring samples come from a broader range of multi-unit dwellings.

Samples from multi-unit dwellings blocks should be collected and sorted separately from loads from single-unit dwellings, as multi-unit dwellings need a separate set of results to enable a comparison of behaviours between the dwelling types.

Specific multi-unit dwellings can be targeted to provide the required number of households, using a council database of blocks and number of households. Check with each council that the selected multi-unit dwellings have easy access to the designated bin storage areas. Locked bin bays should be avoided, where possible. The multi-unit dwellings sample should avoid high-rise buildings (for example, buildings over six storeys), to avoid one or two large buildings skewing the sample. Advice on additional audit types including high-rise buildings and differing bin sizes is provided in Section 9. Similarly, to single-unit dwellings, council collection schedules should be consulted to determine the days multi-unit dwellings blocks put out bins, which is often multiple times per week. Choosing blocks with weekly bin collection makes data analysis easier.

If the audit includes multi-unit dwellings, the sample collection method is shown below.

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7 Sample sorting

Guidelines Toolkit: Templates, checklists and forms

- Example sample sorting form: minimum audit categories (Section 4.3)
- Example sample sorting form: including all additional optional audit sub-categories (Section 4.4)
- Sorting category definitions and inclusions (Section 3.1)
- Sorting tips for auditors (Section 3.3)

7.1 Overview of sorting categories

Sorting categories are based on the following considerations:

- providing enough information from the audit to contribute to valuable insights, such as weights and proportions of household general waste, recycling and organics recovery performance, contamination and landfill diversion
- ability to provide insights into the performance of the recycling services
- ability to provide insights into eligible container deposit scheme (CDS) containers placed in kerbside bins
- ability to understand problematic, hazardous and banned materials in the kerbside bins, including household chemicals, batteries and e-waste, to allow assessment of alternative collection methods
- understanding of the various packaging types presented in the kerbside bins and the proportion of material disposed that this represents

- providing an option for a minimum, reduced number of sorting categories to give local governments a lower cost alternative
- consistency with South Australian and national waste audit and data reporting frameworks and standards.

Two suggested lists of sorting categories have been provided in the Guidelines Toolkit: a minimum list required for routine audits, including 32 categories which provide visibility of consolidated material types and a lower-cost alternative for councils as the samples are quicker to sort; and a detailed list of 65 categories, including the 32 minimum required categories and 33 additional optional categories. Councils may choose to enhance the minimum categories list by adding categories from the detailed list on specific materials of interest. For example, extra sub-categories may be suggested based on council discussions with processing facility operators. Councils may also choose to use the detailed list of categories as a starting point and collapse categories further, based on the purpose of its waste audit.

Additional sorting categories can be added if specific information is required. For example, if data to inform garden organics processing options is needed, the 'garden organics' category can be further broken down into 'garden organics/vegetation', 'wood/timber – untreated' and 'oversized garden organics', for example.

In general, analysis at a more aggregated level is more informative than highly granular surveys that include numerous waste categories resulting in small proportions and high percentage errors. Aggregating waste categories into broader groupings improves the reliability of statistical estimates, particularly where sample sizes are constrained (such as by sampling cost). Highly disaggregated results are only feasible where large samples are possible.

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7.2 How to undertake sample sorting

7.2.1 Receiving the load at the sorting site

If a weighbridge is available, weigh the truck both full with the load and empty (after tipping). Record the net weight of the load on the collection sheet.

If there is no available weighbridge, auditors will rely upon the weights recorded during the physical audit.

Tip the load onto the designated area ready for sorting.

Once tipped for sorting, each day's collected sample is identified as one 'load' and the data is recorded for the whole load. For example, for a 200-household audit there are 5 sets of results for each waste stream (one for each collection day's load). Ensure the sample code from the collection sheet is allocated to that load in the sorting phase on the sheets, as this provides a unique identifier for each sample.

Keep each day's collected sample separate to enable comparison of sorting results between demographic areas. For example, for a 200-household audit, each day sample comprises 40 households.

Loads from multi-unit dwelling blocks should be collected and sorted separately from single-unit dwelling loads to ensure a separate set of results for multi-unit dwelling and to enable comparison of behaviour between dwelling types.

7.2.2 Calibrating your sorting tubs

All bins and containers for weighing sorted materials should be weighed when empty and this 'tare' weight accounted for. To do this:

Locate the tare or zero button on the scale. It may be labeled ‘TARE’, ‘ZERO’ or have a ‘Z’ symbol. Press this button.

The scale will now display a weight of zero, even if the container is still on it. This indicates that the container's weight has been tared out.

You can now add the items you want to weigh into the container. The scale will display the weight of the items, excluding the container's weight.

If you remove the container, the scale may display a negative value. To reset the scale back to zero, you can either press the tare button again or remove the container and re-start the scales.









7.2.3 Sorting general waste and comingled recycling loads

Set up the tables so you have easy access to the bins and tubs. It may be useful to label each container. This can be done by writing on tape and sticking the tape to the container or writing on plastic plates and sticking them to the container. Similar materials can be grouped together – all the plastic in one area, metals in another and so on.

Another table should be placed near the sorting area on which the weighing and recording will take place. This should be close enough for sorters to easily and quickly move containers on to it but not so close as to get in the way of the sorting process. Scales and recording sheets should be kept on this table. A phone should also be kept on this table to take relevant photos.

Be careful not to lift anything too heavy without help, place some of the load on the tables for sorting. For general waste bins, this could be one or two garbage bags.

For recycling loads, start by collecting any bagged material. Look inside to see whether the contents are 'bagged recyclables' or 'bagged garbage'. Weigh these categories separately, record and discard, then move on to the rest of the load.

Separate the rest of the load by sorting it into the categories using your tared bins or containers

For residual bins, open all bagged waste, disperse the contents and sort into categories using your tared bins or containers.

Once all the material is separated into its categories, weigh each sorted category and record the weight in kilograms to two decimal places (i.e. to the nearest 10 grams). Record the weight of sorted material in the data recording form. Templates are provided in Guidelines Toolkit.

7.2.4 Sorting FOGO or garden organics streams

FOGO or garden organics loads can usually be initially sorted on the ground rather than on tables because there are fewer different material types in the bin. Use a rake or litter-picker to sort any material that is not garden organics into separate tubs for weighing.

Put all the remaining garden organics into wheelie bins for weighing.

Further separate the non-garden materials into their correct categories if necessary. For FOGO, open all FOGO-compliant caddy liners and sort contents. Weigh each tub/container including discarded caddy liners.

7.2.5 Counting items

It is recommended that some items are also counted as well as weighed. This is useful for understanding CDS-eligible beverage containers and hazardous or problem waste items in the kerbside bins. The categories to be counted are shown in the **Guidelines Toolkit (Section 3.2)**, at the *Material categories acceptance in each kerbside collection stream*. Once these categories are in their tubs, count the individual items and record the number on the data sheet.

7.3 Estimating labour requirements for sorting

As discussed previously, a good assumption is that on each day of the audit you can collect and sort 40 to 50 households in two trucks working in convoy, if resources permit, where one truck collects an aggregated sample of general waste bins and the second an aggregated sample of comingled recycling or FOGO bins, tipping both loads separately at the sorting site and sorting both loads on the same day. Note: Where resources are limited, one truck collects an aggregated sample of one target stream, returning to collect the second target stream after tipping the first at the sort site.

A minimum of two sorters is required to do this for the minimum category list in routine audits. If councils choose the detailed category list with all 65 options, three or four experienced waste sorters will be required. Note that the collection supervisor can assist in sorting after collection finishes, if there is time left in their shift.

The estimates above are based on experienced waste sorters who understand the sorting category definitions and recording processes. Inexperienced sorters are likely to take longer.

8 Analysis and reporting

Guidelines Toolkit: Templates, checklists and forms

- Sorting category definitions and inclusions (Section 3.1)
- Material categories acceptance in each kerbside collection stream (Section 3.2)
- Material categories consolidation for analysis purposes (Section 3.3)
- Additional material analysis (Section 7)

8.1 Determining what is accepted in each kerbside bin and what constitutes contamination

While efforts are underway to harmonise kerbside bin contents nationally[6], councils may have different criteria around which materials are accepted in the kerbside bins. This is often based on what the receiving materials recovery facility (MRF) or organics processing facility is able or willing to accept. As part of the audit planning process (see Section 2), audit project managers will need to confirm with councils which materials are accepted and identify those that are considered contaminants.

8.2 Consolidation into broader categories

Due to the large number of waste sorting categories, data can be shown in both detailed form and consolidated into some major material types. **Guidelines Toolkit – Appendix B – Reference Material**, the *Material categories consolidation for analysis purposes* shows suggested consolidation categories to use when analysing and reporting the audit data.

8.3 Data analysis

Important notes:

For councils sampling both single-unit dwellings and multi-unit dwellings in their audit, all the indicators discussed below can be analysed and reported separately for single-unit dwellings and multi-unit dwellings, as well as overall.

[6] Department of Climate Change, Energy, the Environment and Water (2024, February). *National Kerbside Collections Roadmap: Staged improvements to the consistency of kerbside collections.* national-kerbside-collections-roadmap.docx

The primary indicators calculated from the audit data are outlined below.

8.3.1 Overview of analysis

All data recorded during the audit should be entered into Excel or another spreadsheet program.

The net weight of the load, as recorded at the weighbridge, should closely match the total weight of the sorted materials for each load. Any significant differences (more than 10%) should be investigated – for example, there could be a decimal point in the wrong place. Wet weather can also significantly impact the weight of loads that are not protected from rain.

Suggested indicators to calculate and report from the data – such as waste generation, composition, contamination, material recovery rates and landfill diversion – are included in the Guidelines. Calculations are provided below.

For waste streams that are not collected weekly (e.g. fortnightly comingled recycling, fortnightly garden organics, or some multi-unit dwelling blocks collected more than once per week), audit data needs to be converted to a weekly equivalent. For multi-unit dwelling blocks where not all bins were collected for sampling, analysis also needs to extrapolate the data from these blocks to account for the non-collected bins to represent one week's waste generation – for example, calculate the average weight per bin based on the sampled bins, apply the average weight to the total number of bins on site adjusted by the number of collections per week for each waste stream.

8.3.2 Presentation rates

Not all households present all bins for collection every week. Information about participation and non-presentation is useful for estimating average per-household waste and recycling within sampled populations. It is also useful for measuring differences in waste generation and recycling management behaviours. Calculating presentation rates can help councils understand how residents are participating in their kerbside services.

Presentation rates are calculated by dividing the number of households that presented a bin during the sample collection by the total number of households sampled during the sample collection. Presentation rates can be calculated for each waste stream (for example, general waste, comingled recycling and FOGO or garden

organics). Note that because the audit sample bins are collected very early in the morning (that is, before the usual collection time), presentation rates are indicative, as they may not capture bins from residents who put their bins out 'at the last minute'.

Example for calculating bin presentation rate below. Similar calculation applies to other streams.

$$\text{Bin presentation rate (\%)} = \frac{\text{Total number of households that presented a target waste stream bin in the sample collection}}{\text{Total number of households passed (i.e. presenting plus non-presenting households)}} \times 100$$

In the event a household has been randomly selected, and its bin is not presented at the kerbside, data collectors should record a 'NP' (not presented) on the data sheet relating to this particular household using the following method:

1. Record households who do not present a bin for each of the waste streams being audited as 'non presenters' on the recording sheets.
2. Auditors should note this as a 'non-presenter', provide appropriate comments on this household (e.g. 'no general waste bin presented') and move to a substitute household that has all bins presented.
3. Record bin data from the replacement or substitute households, with a note clearly identifying the household as a 'replacement' or 'substitute' household for the non-presenter. This may be from a neighbouring property or the next randomly selected property.
4. Data about non-presenters and presenters should be used to estimate rates of non-presentation across the LGA.

SINGLE DWELLINGS SAMPLE COLLECTION RUN SHEET						Sample number: e.g. SD1		Date:		Collection supervisor:			
Matched pairs being collected: GAR / REC / ORG						Council:		Net weight of load (kg):		Target number of households to collect:			
EXAMPLES	CODE	DATE	Address			Substitute?	GARBAGE (GAR)		COMMINGLED RECYCLING (REC)		ORGANICS (ORG)		COMMENTS
			No.	Street Name	Suburb	Blank if no	Bin size	Bin % full	Bin size	Bin % full	Bin size	Bin % full	Note: organics will be collected in week 2
	NOTES: Only record volume where the bins are collected (see example 1). If no matched GAR and REC, do not record vol (see example 2), then sample next house and record as substitute (see example 3).												
	1	25/1	1	William St	Avon		240	70	240	90			
	2	25/1	5	William St	Avon		240	P		NP			REC not presented. GAR presented, not collected
	3	25/1	7	William St	Avon	✓	240	80	240	60			Substitute

8.3.3 Waste generation

Waste generation is expressed as kilograms per household per week of each waste stream. This is calculated by:

$$\text{Waste generation per household (kg per household per week)} = \frac{\text{Total weight of waste stream collected in kg (e.g. general waste) adjusted for collection frequency}}{\text{Total number of households sampled}}$$

Important note:

For waste streams that are not collected weekly (e.g. fortnightly comingled recycling, fortnightly organics, or some multi-unit dwellings blocks collected more than once per week), audit data needs to be converted to a weekly equivalent. For MUD blocks where all bins were not collected for sampling (e.g. multi-unit dwellings with more than 10 bins, where only 10 randomly selected bins are collected, as explained in section 6.2.1), analysis also needs to extrapolate the data from these blocks to account for the non-collected bins to represent one week's total waste generation. For example, calculate an average weight per bin based on the 10 sampled bins, then apply that to the total number of bins recorded at the site, adjusted by the number of collections per week.

8.3.4 Waste composition and contamination

This can be presented by weight and percentage, both consolidated into key categories (see Guidelines Toolkit – Appendix B – Reference Materials). Contaminants in comingled recycling, FOGO or garden organics bins are identified based on the classification of accepted materials. Any material collected from comingled recycling or garden organics bins that is presented in bags is deemed contamination. Similarly, any bagged material collected from FOGO that is not presented in AS 4736 compostable bags/liners is deemed contamination, on the basis that the bags are not opened at the MRF or organics processing facility and therefore the contents are not recovered. The sorting categories of 'bagged garbage', 'bagged recyclables' or 'non-compliant bagged FOGO' allow analysis of the amount of incorrect bagged or packaged material residents are putting in the comingled recycling, garden organics and FOGO bins and their proportions.

8.3.5 Waste or materials that should be in another bin or service

The weight and percentage of recoverable materials placed in the general waste bin that should be in the comingled recycling, FOGO or garden organics bin, as well as the amount of hazardous, problematic or banned waste that should not be disposed of in any kerbside bin, can be analysed from the audit data to help inform education initiatives and policy. The general waste audit data can also help determine the materials available for the FOGO service or e-waste collection, for example. This can be calculated by both weight and percentage.

8.3.6 Hazardous and banned materials

Some hazardous and banned materials may be counted during the audit, to calculate the average number per household per week and extrapolated to calculate the number of items annually across the whole council area, including the waste streams where they were found. This may assist councils to develop targeted education and interventions aimed at promoting the correct disposal pathways. Where small quantities are found results should be described as indicative estimates, and extrapolation should clearly state underlying assumptions. It is recommended hazardous and banned materials be grouped together for analysis and reporting purposes, according to the minimum (or expanded) audit category list in the Guidelines Toolkit.

8.3.7 Container deposit scheme (CDS)

If the detailed audit categories are used, further sorting and counting of CDS-eligible beverage containers in the kerbside general waste and recycling bins will allow calculation of the average number of these containers in each waste stream each week by housing type and material type. This shows the potential value of CDS containers that are not returned to CDS collection points and remain in the kerbside bins.

8.3.8 Recovery rate[7]

Recovery rate calculations are applicable to express kerbside collection system rates or specific kerbside stream rates, for example: a three-bin collection system recovery rate is defined as the percentage of waste that is recovered for recycling from the total kerbside waste, which is expressed as follows:

$$\text{3-bin system recovery rate (\%)} = \frac{\text{Organics + comingled recycling}}{\text{Organics + comingled recycling + general waste}} \text{ X 100}$$

The organics recovery rate is defined as the percentage of total waste from the general waste and organics bin that is recovered for recycling using the organics kerbside waste, calculated as follows:

$$\text{Organics recovery rate (\%)} = \frac{\text{Organics}}{\text{Organics + general waste}} \text{ X 100}$$

[7] Note that 'recovery rate' also has broader meanings. In the *Australian Standard for Waste and Resource Recovery Data and Reporting*, it is defined as 'the weight of materials allocated to the fates waste reuse, recycling or energy recovery divided by the weight of waste generated.'

Similarly, the recyclables recovery rate is used as a way to examine trends in the recovery rate and is calculated as follows:

$$\text{Recyclables recovery rate (\%)} = \frac{\text{Comingled recycling}}{\text{Comingled recycling + general waste}} \times 100$$

8.3.9 Diversion from landfill

Calculating diversion from landfill is helpful for understanding current system performance as well as identifying opportunities to potentially increase diversion. Council's diversion from landfill can be measured against local government and state targets. The following landfill diversion calculation uses a 3-bin system comprising general waste, comingled recycling bin and organics:

$$\text{Diversion from landfill (\% of waste diverted from landfill)} = \frac{\text{(Total weight of recycling collected + total weight of organics collected) } \mathbf{minus} \text{ weight of contamination in those streams}}{\text{Total weight of general waste collected } \mathbf{+} \text{ total weight of recycling collected } \mathbf{+} \text{ total weight of organics collected}} \times 100$$

The diversion rate is likely to differ from that calculated by council using the overall general waste, recycling and organics tonnages generated through weighbridge data during the course of the year. This is primarily due to calculations of the actual tonnes contained in each waste stream disposed over a twelve-month period, without factoring in contamination in the recycling streams. It is also noted that the audit is a snapshot in time and does consider seasonal fluctuations or other annual trends.

8.3.10 Greenhouse gas impact of landfilled materials

The greenhouse gas emissions saved by diverting materials from landfill (or the greenhouse gas emissions produced by landfilling materials) can be calculated. Table 4 shows the amount of greenhouse gas generated when 1 tonne of various materials is landfilled. These factors do not account for methane collection and combustion. Over the five years between 2019–20 and 2023–24, an average of 36% of landfill methane generated in SA was collected and combusted.[8]

Table 4 Greenhouse gas impact of landfilled materials

Landfilled material	Tonnes of greenhouse gas (CO_2e) produced per tonne of that material landfilled (tCO_2e/t)
Municipal solid waste (overall)	1.6
Food	2.1

[8] Australian Government Department of Climate Change, Energy, the Environment and Water. (2026). *Australia's National Greenhouse Accounts (UNFCCC/Paris Agreement inventory)*, https://www.greenhouseaccounts.climatechange.gov.au/, accessed 11 November 2026.

Paper and cardboard	3.3
Garden and green waste	1.6
Wood	0.7
Textiles	2.0
Nappies	2.0
Rubber and leather	3.3
Inert waste, including concrete, plastic, metal and glass	0.0

Source: Australian Government Department of Climate Change, Energy, the Environment and Water. (2023, August). *Australian National Greenhouse Accounts Factors: For individuals and organisations estimating greenhouse gas emissions*. Australian National Greenhouse Accounts Factors.

8.3.11 Volume conversions

Analysis is predominantly calculated by weight. Volume may be calculated when the audit is being undertaken by experienced auditors or by using published standards to calculate volumes using known densities and weights of common waste and recyclable materials. Refer Appendix 4 of the *National Standard for Waste and Resource Recovery Data and Reporting*[9].

8.3.12 Bin capacity utilised

The audit sample collection method includes measuring the fullness of bins at each sampled household during the collection phase. This can be used to assess how much bin capacity residents are using and whether the provided capacity is adequate. For each bin collected, the auditor will record the waste stream, bin size and percentage fullness by looking in the bin before it is collected and visually estimating the volume of material inside. Bin fullness is recorded in the following increments: 0–25%, 25%–50%, 50%–75%, 75%–100% or >100%.

8.3.13 Trends over time

Data collected from **routine waste audits** can over time identify emerging issues and assess trends in waste disposal behaviours which may be used to inform service changes, policy, trials, system interventions and education initiatives.

[9] Blue Environment Pty Ltd for Department of Climate Change, Energy, the Environment and Water. (2024). *Australian standard for waste and resource recovery data and reporting – Second Edition*. National standard for waste and resource recovery data and reporting - Second Edition – Tables and Appendices DCCEEW.

9 Additional audit options

9.1 High-rise developments

High-rise developments, for example, six storeys or more should be avoided in regular kerbside bin audits, to prevent one or two large properties skewing the overall multi-unit dwellings results and to ensure proportionally, that the appropriate number of multi-unit dwellings are sampled.

It is recommended that councils undertake separate audits of high-rise developments. Usually, there is a trend toward smaller household sizes and lower waste and recycling generation in high-rise buildings.

A site assessment will need to be undertaken for each high-rise high-density development to determine access and resource requirements such as bin configuration, type of collection vehicle, height limits, security keys, collection times etc. Compaction equipment and large bulk bins require specialised collection systems.

To maintain operational efficiencies and contain costs, a maximum sample size of ten 240L equivalent bins for each waste stream is recommended.

These audits can inform tailored education campaigns and identify emerging issues and potential improvements for the management of waste. More information on high-rise waste management can be found at *Waste management essentials for urban developments: Mixed-use, multi-unit and medium to high density residential developments*.

9.2 Properties with additional bins or different bin sizes

Kerbside audits can be modified to sample a sub-set of households that have opted in to variations in bin types, sizes and numbers offered by some councils for example, 140L organics bins or additional general waste bins. These sub-samples need to be collected separately to other households. Results can help assess if waste behaviour is different in this group of households, to determine if they are using the extra or reduced capacity correctly, and to see if waste generation and contamination levels are different at these households compared with the households receiving the standard service.

9.3 Materials of specific interest

Audit sub-categories can be added to provide additional detail about specific materials that are being investigated for potential recovery.

If textiles recycling initiatives are considered, for example, sub-categories such as 'clothing', 'leather and rubber' and 'other textiles' could be included.

9.4 Other fit-for-purpose methods

Other methods known as 'bin by bin' audits, visual audits or the cone and quartering method are detailed in **Appendix B – Decision Making Matrix** for alternative objectives that are different from the routine audits mentioned in the Guidelines.

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10 Guidelines Toolkit

A series of templates, checklists and forms have been developed to aid in planning and implementing waste audits in accordance with these Guidelines. Relevant resources are listed in each section. The full list of resources is provided below.

Figure 2 List of tools and resources

Guidelines toolkit: Templates, checklists and forms

Appendix A – Operational Checklists

- Audit planning and equipment checklist
- Tender checklist for local governments engaging external waste audit service providers

Appendix B – Reference Material

- Sorting category definitions and inclusions
- Material categories acceptance in each kerbside collection stream
- Material categories consolidation for analysis purposes
- Decision-making matrix: guidance for other applicable methods

Appendix C – Audit Forms and Templates

- Single-unit dwellings sample collection form template
- Multi-unit dwellings sample collection form template
- Example sorting form: minimum audit categories
- Example sample sorting form: including all additional optional audit sub-categories

Appendix D – WH&S Supporting Tools

- Example Job Safety and Environment Analysis template

Appendix E – Statistical Considerations

Appendix F - Additional Material Analysis

11 Glossary

Term	Definition
Aggregated collection method	Sample collection method where one waste stream from multiple households is collected by a truck as a single load for sorting and analysis. It is the recommended methodology for routine audits from Green Industries SA.
Audit load	The aggregated material collected from sampled households for the purpose of a waste audit
Audit sample	The households, bins, materials or loads selected for inclusion in a waste audit.
Bin capacity utilisation	The proportion of available bin volume that is occupied by material at the time of collection, estimated using pre-defined fullness ranges.
Circular economy	An economic system that seeks to minimise waste and maximise the recovery, reuse, repair and recycling of materials and resources.
Comingled recycling	Single-bin collection system (typically yellow-lidded) for multiple dry recyclable materials
Consolidated category	A broader material category formed by combining detailed sorting categories to simplify analysis and reporting.
Containerised / packaged food	Food remaining within its original packaging or in a non-compostable container, that would be considered a contaminant in a recycling or waste treatment facility.
Contamination	Material presented for collection and is not accepted in the waste stream.
Contamination rate	The proportion of material within a recycling, organics or FOGO stream that is not accepted in that collection system.
Detailed audit	An audit using the full list of sorting categories to provide greater material-level detail.
Diversion	Diverting waste from landfill for other uses (i.e. recycling or energy recovery).
E-waste	Discarded electronic equipment such as computers, phones, and televisions. Banned from landfill in South Australia.
FOGO-compliant material	Food organics and garden organics accepted in the FOGO system, including loose food waste, coffee grounds, tissues, paper towels, compostable packaging, garden clippings and food contained in certified compostable liners.
FOGO system performance	A measure of how effectively food organics and garden organics are being recovered through a FOGO collection service.
General waste	Waste stream typically collected for disposal to landfill.
Hazardous waste	Waste materials that pose risks to human health or the environment if not managed properly (i.e. batteries, paints, pesticides, gas bottles, waste oils,

	cleaners, solvents, pool chemicals, drain cleaners, degreasers and other chemicals)
Kerbside audit	A systematic assessment of household waste generation, composition, contamination, diversion and recovery performance from kerbside collection services.
Landfill diversion rate	The percentage of waste diverted from landfill through recycling, organics recovery or other resource-recovery activities.
Matched pair	One bin each of two targeted waste streams, both presented for collection at the same time by one single-unit dwelling or multiple bins of two targeted waste streams presented for collection at a multi-unit block.
Material separation efficiency	The proportion of recoverable material that is correctly disposed of in the intended collection stream.
Multi-unit dwellings	In this guide, this means residential developments of more than one household in one or more buildings where households share waste bins.
Non-presenter	A sampled household that does not present the audited waste stream for collection on the scheduled collection day.
Organics recovery rate	The amount of organics correctly disposed as FOGO or garden organics expressed as a proportion of the total amount of organics found in the kerbside collection system.
Presentation rate	The percentage of sampled households that present a particular waste stream for collection during the audit period.
Replacement household	A household selected to replace a sampled household that did not present the required bins for collection.
Reserve streets	A list of additional streets, randomly selected and approved by council for inclusion if the sample size cannot be achieved due to any adverse event such as insufficient bins placed out for collection in the selected streets or the bins have been collected by council or its contractor.
Residual waste	Residual material that remains after any source separation or reprocessing activities of recyclable materials or garden organics.
Resource recovery	Activities through which wastes are collected, sorted, processed (including through composting), and/or converted into raw materials for use in a production system.
Routine kerbside audit	Kerbside audit methodology recommended by Green Industries SA to provide robust, comparable local and statewide data. Routine audits have a minimum 32 recommended sorting categories and should be done at least every three years.
Sample collection	In this guide, this means the act of collecting kerbside presented waste from randomly selected households as per the sampling plan.

Sample sorting	The separation and weighing of collected waste into defined material categories for analysis.
Single-unit dwellings	In this guide, this includes detached households, terrace houses, townhouses and other stand-alone houses where each household has its own kerbside bins (no shared bins).
Sorting category	A specific material classification used during waste auditing for the separation, weighing and recording of materials.
Source separation	The practice of separating different materials into designated collection streams at the point of disposal.
Statistical confidence	The degree of certainty that audit results are representative of the wider population being sampled.
Stratified sampling	A sampling method in which sub-groups within the population, such as single-unit dwellings and multi-unit dwellings, are sampled separately and proportionally to their representation within the study area.
Waste composition	The relative proportion of different material types present in a waste stream, typically expressed as a percentage by weight.
Waste generation	The process of producing waste. In kerbside audits it is commonly expressed as kilograms per household per week.
Waste stream	A distinct waste collection system for specific material types, such as general waste, comingled recycling, garden organics or FOGO.

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