Government of **Western Australia**
Department of **Water and Environmental Regulation**

Proposed estimation/calculation methods for local governments under proposed amendments to the *Waste Avoidance and Resource Recovery Regulations 2008*

Consultation paper

April 2019

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About Stakeholder Consultation
This consultation paper sets out proposed approved methods for liable persons to calculate or estimate the information required to be reported annually under the proposed amendments to the Waste Avoidance and Resource Recovery Regulations 2008 (WARR Regulations).

The Department of Water and Environmental Regulation (DWER) is seeking feedback on the methods set out in this consultation paper. DWER will analyse submissions received and, if required, amend the methods accordingly for the purpose of Gazetting these as a CEO notice under the amended WARR Regulations.

By making a submission, you are consenting to the submission being treated as a public document. If you do not consent to your submission being treated as a public document, you should mark it as confidential, specifically identify those parts which you consider should be kept confidential, and include an explanation.

DWER may request that a non-confidential summary of the material is also given. It is important to note that even if your submission is treated as confidential by the Department, it may still be disclosed in accordance with the requirements of the *Freedom of Information Act 1992*, or any other applicable written law.

The Department reserves the right before publishing a submission to delete any content that could be regarded as racially vilifying, derogatory or defamatory to an individual or an organisation.

How to Make a Submission
Written submissions must be received by 5pm (WST) on Friday 27 May 2019. No late submissions will be considered. We look forward to receiving your submission.
Submissions can be lodged by email (preferred) to waste.data@dwer.wa.gov.au or hard copies can be mailed to:

Project Manager
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For more information, please contact the Project Manager, WARR Regulations Amendments on +61 8 6364 7000.

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1 Introduction

The Department of Water and Environment Regulation (DWER) is amending the Waste Avoidance and Resource Recovery Regulations 2008 (WARR Regulations) to require annual reporting of waste and recycling data. The intention is that liable persons will be required to submit their first mandatory reports in 2019/20 by 1 October 2020.

Liable persons will be required to collect data, and estimate amounts of material collected, disposed and recycled, in the manner approved by the CEO.

2 Purpose of this paper

This paper applies to all local governments in Western Australia.

This consultation paper sets out proposed approved methods for local governments to calculate or estimate the information required to be reported annually under the amended Waste Avoidance and Resource Recovery Regulations 2008 (WARR Regulations).

DWER is seeking feedback on the methods set out in this consultation paper.

Local governments will be required to report the following annually to DWER for the most recently concluded financial year:

- Collection services provided directly by the local government (e.g. kerbside collection, vergeside collection, drop-off);
- Amount of waste and recycling collected, recycled and disposed (tonnes per annum); and
- Cost of providing services and the amount charged.

Further detail regarding the reporting requirements is provided in Appendix A.

The reports will be in a similar format of the DWER annual Local Government Waste and Recycling Census, which local governments have already been using to report.

3 Reporting period

The reporting period is by financial year (1 July to 30 June) for each year. Reports are due to DWER on or before 1 October after the end of the reporting financial year.

4 Reporting format

Under the amended WARR Regulations, liable persons will be required to report using a CEO approved form. DWER is developing an online reporting system for this purpose which will be made available for reports to be submitted by 1 October 2020.

The reports will be in a similar format of the annual Local Government Waste and Recycling Census, which local governments have already been using to report.

Question 1 – Is the annual Local Government Waste and Recycling Census template an appropriate reporting template?

5 Material categories

The following waste categories to be reported.

Table 1. List of minimum waste categories to be reported against

Material categories	
Paper	Organics – Food organics
Cardboard	Organics – Timber / wood
Plastics	Organics – other organics
Metals – Ferrous	Rubber/tyres
Metals – Non-ferrous	Textiles
Glass	Hazardous – asbestos
Concrete	Hazardous - batteries
Bricks	Hazardous - other
Soil, sand, clean fill	E-waste
Organics – Garden organics	

Local governments may elect to report using more detailed categories, as consistent with their own record-keeping. Where alternative categories are to be used, the report must clearly show how the waste categories reported align to DWER standard waste material categories in Table 1.

Question 2 - Are the proposed material categories practical and appropriate for local governments?

6 Proposed approved methods

Local governments must estimate waste amounts and costs using an approved method. This section lists a number of proposed approved methods that local governments can use to estimate the amount of waste and recycling they manage.

The method to be used is based on the information available to the facility. The local government should use the “highest” preferred methodology for which the data is available.

DWER acknowledges that smaller rural local governments are not able to obtain the data necessary to fully complete the reporting requirements. Therefore, special provisions are allowed for local governments with less than 5,000 population (see Section 9) and local governments with

less than 1,500 population (see Section 10).

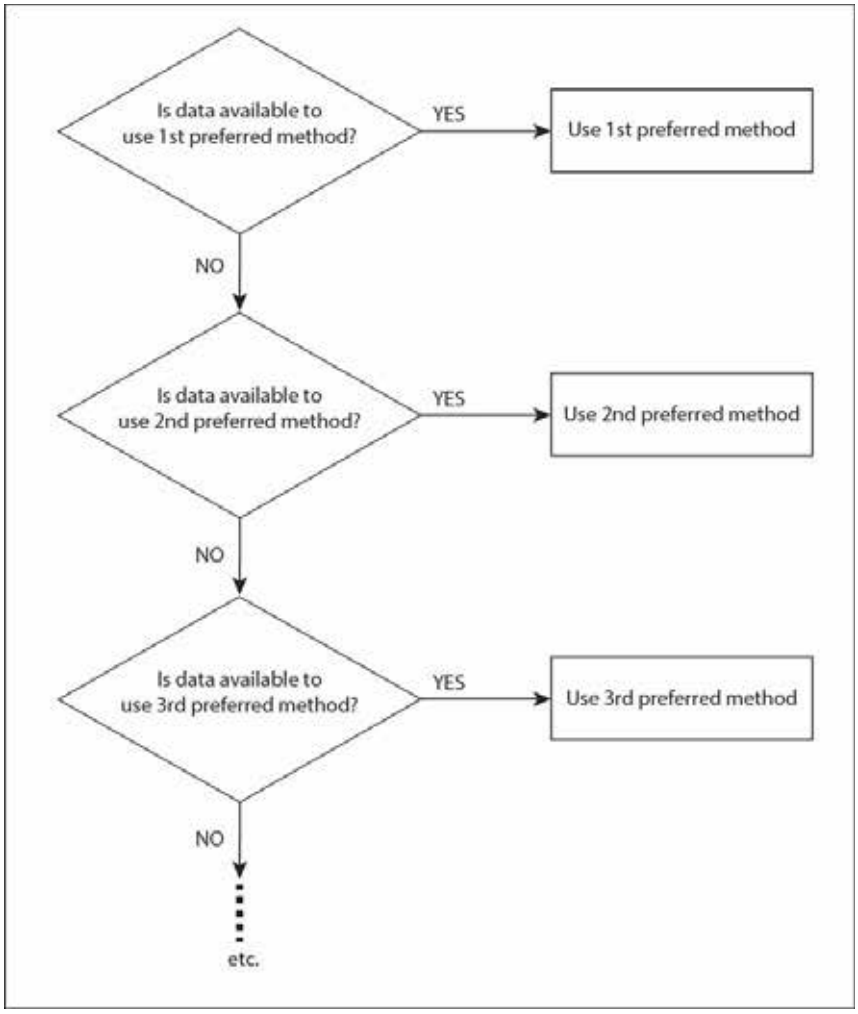

Figure 1: Hierarchy of approved methods

6.1 Estimating weight of material collected, recycled and disposed

Most local governments already have access to data on the amount of waste and recycling they collect, recycle and dispose. Under the new regulations, most recyclers and larger landfills will be required to record and report the amount of waste and recycling they receive, treat and dispose.

Local governments should obtain accurate data from the waste and recycling facilities where the waste and recycling they collect is delivered, whether it is operated by the local government or by a third party.

6.1.1 1st approved method – Weighed at point of aggregation or disposal/processing

The preferred method for estimating the amount of material collected, recycled or disposed is for the material to be weighed on a calibrated weighbridge, load cell or scales at the facility where the material is delivered.

Equation 1: Estimating total material by weighing each load

$$Annual\ waste = \sum (weight\ of\ all\ vehicle\ loads)$$

Table 2: Data to be collected for estimation by weight

Data required to be collected	***Data sources***
Total weight of each load	Weighbridge records
Material type of each load	Weighbridge records

6.1.2 2nd approved method – Volume estimated at point of aggregation or disposal/processing multiplied by assumed density

Where weighing waste material is not possible, the amount may be estimated by estimating the volume of material and multiplying it by the material category bulk density.

Equation 2: Volume method for calculating total weight

$$Annual\ waste = \sum (volume\ of\ waste) \times (density\ of\ waste)$$

Table 3: Data to be collected for estimation by volume

Data required	***Data sources***
Volume of each vehicle / container	Gatehouse records
% capacity of vehicle / container in use	Estimated for each load as it arrives - default is 100%
Material category of each load (e.g. mixed paper, co-mingled recycling)	Determined by gatehouse operator as load arrives

6.2 Estimating weight of recyclables diverted vs disposed where waste is delivered to a material recovery facility (MRF) or other regional waste processing facility

Where waste is delivered to a MRF, alternative waste treatment plant or other regional waste processing facility, the waste will typically be combined with waste from multiple sources and it may not be possible to directly measure the weight of waste recycled or disposed from a single local government.

Local governments will obtain the total weight (using methods in sections 7.1.1 or 7.1.2) of their waste delivered to the facility and then estimate the total weight of waste diverted and disposed from the facility residual rate (i.e. the percentage of total material received at the MRF/AWT that was disposed to landfill).

Equation 3: Estimating total material diverted from a MRF or AWT

$$Total\ material\ recycled\ [t] = total\ material\ collected\ [t] \times (100\% - facility\ residual\ rate[\%])$$

Where a facility is unable to provide a residual rate, the **default rate of 45%** will be used to estimate the amount of material diverted for recycling.

6.3 Drop off collections - additional guidance

Drop-off collections are where waste is delivered to the waste depot by the residents of the local government. Details on the source (i.e. residential or commercial) and type of waste should be determined and recorded as vehicles enter the site. The amount of waste can be determined

either at point of entry, or after the point of aggregation, if the waste depot uses a transfer station.

6.3.1 Where site has a transfer station

Waste is weighed or volume assessed after aggregation at the transfer station, using one of the approved methods listed above (7.1.1 and 7.1.2).

Waste source and type are estimated using averages determined from the transfer station gatehouse records of individual loads.

6.3.2 Drop-off site with no transfer station

Waste is weighed or its volume is assessed on entry to the drop off site using one of the approved methods listed above (in sections 7.1.1 or 7.1.2).

6.4 Combined collections

Local governments are required to report the weight of waste collected, diverted and disposed by waste collection service and type of premises (i.e. domestic or commercial). Some local government collect both commercial, domestic and/or public place waste on the same collection run. In this case, the following methods can be used to determine the proportion of waste collected from each waste stream.

6.4.1 Combined bin collections

Where waste from more than one containerised collection service and/or type of premises is collected in the one vehicle, the weight of waste collected from each may be estimated using relative annual bin capacity (i.e. bin numbers multiplied by bin volume, assuming bins are 100% full).

Equation 4: Estimating amount of each waste stream for combined collections

$$Proportion\ of\ Domestic\ waste = \frac{domestic\ annual\ bin\ capacity}{(domestic + commercial + public\ place)\ annual\ bin\ capacity}$$

$$Annual\ domestic = Proportion\ of\ domestic \times Total\ waste\ collected$$

If the local government does not know how many services it provides, it must undertake an audit of its bins in the field and the waste services it provides.

6.4.2 Mixed use developments

Waste from commercial and domestic premises may be collected in the same bins in some mixed use developments. Where commercial and domestic waste is collected in the same bin, proportion the commercial and domestic streams for mixed use developments by estimating the total amount of waste collected and then subtracting the estimated total amount of domestic waste based on per household generation rate (either estimated by the local government or using the default values provided).

6.5 Recycled materials

Local governments must obtain the total weight of recyclables delivered to the recycling facility using the methods described above.

The weight of residual/contaminated waste must be removed from the weight of recycled materials.

The amount of each material recycled can be estimated by:

a) Weighing the sorted material;
b) Volume assessing the sorted material;
c) Applying waste composition data from waste audits on the local government's own waste stream; or
d) Applying average waste composition data from facility waste audits.

6.6 Estimating the cost of providing waste and recycling services.

In order of decreasing preference, costs can be reported as:

a) Costs by waste type and waste service
b) Costs by waste or service type
c) Overall cost.

The estimated cost of a service should only include costs directly related to providing that service. These may include:

- Waste management staff salaries / wages, plus "overheads" to cover general administration costs (usually as a relative proportion of staff salary, e.g. 50%)
- Collection and disposal contracts
- Waste education costs
- Operational costs for equipment
- Maintenance on equipment / waste vehicles / bins
- Annual amortised capital costs of new equipment / waste vehicles / bins (i.e. the total cost is distributed over the life of the equipment)
- Annual amortised landfill closure costs (the estimated closure cost is divided by the lifespan of the landfill, with the annual cost incorporated into the annual budget)
- Annual amortised costs of constructing a new, replacement landfill in the future (the estimated closure cost is divided by the lifespan of the landfill, with the annual cost incorporated into the annual budget)
- Waste consultancy costs
- Waste service tender costs (e.g. advertising)

Question 3 - Are the proposed calculation methods to estimate the weight of waste received, disposed, leaving and stockpiled at your site clear? If not, what further clarification is required?

Question 4 - Are there any barriers that would prevent your organisation from using these calculation methods? If so, what are they and how can they be overcome?

7 Source waste stream

Local governments are required to report the amount of commercial and industrial (C&I) waste and recycling it collected through the services it provides, or are provided under contract on its

behalf. Where the waste is not collected separately from the domestic waste, the relative amounts for each waste stream may be estimated by the relative annual bin capacity for each waste stream using the methods in Section 7.4.

8 Default values

Where key data is not available, a number of "default values" have been approved to be used in substitution for real world data and are provided in Appendix B. These include default bulk densities to be used to estimate weight from volume, where this information is not available to the local government.

Question 5 - Are the proposed default material densities and other default values appropriate for Western Australian local governments?

9 Special provisions for local governments with a population of less than 5,000

As an acknowledgement that smaller local governments may not have the resources or the capability to report in accordance with the approved methods for local governments, special provisions have been made for local governments with a population of less than 5,000.

All local governments will still be required to use the DWER local government reporting form.

9.1 Estimating weight of material collected, recycled and disposed

9.1.1 Direct measurement

Direct measurement, either by weight or volume, is the preferred method for measuring waste, as described in sections 7.1.1 and 7.1.2. However, if a local government with a population of less than 5,000 does not have the capacity to measure waste directly, then indirect measurement methods may be used.

9.1.2 Indirect measurement

In circumstances *where the amount of waste collected is not directly measured*, local governments with a resident population of less than 5,000 may use alternative methods for estimating the amount of waste collected and disposed.

9.1.2.1 1st approved method - Waste generation rates as determined by a collection service audit

Where a relevant waste collection service audit report is available, the average generation rates estimated from the audit data may be extrapolated to estimate the total weight of waste collected during the year. Where the waste is disposed directly to landfill, the extrapolated waste audit data can also be used to estimate the total weight of waste disposed annually.

The average generation rates can be on a per capita, per household or per bin lift basis.

9.1.2.2 2nd approved method - Number of bin lifts by "typical" bin weight (containerised services only)

The amount of material collected is assumed to be the total number of bins collected during the year multiplied by a "typical" weight of a bin just before being emptied. DWER will provide default waste material densities that can be used to calculate the estimated weight of each bin.

9.1.2.3 3rd approved method - Population by "typical" per capita waste generation rate (all MSW)

The weight of waste generated in a local government area may be estimated by multiplying the number of residents in the local government by a per capita waste generation rate. This method is only suitable as an alternative method for local governments that do not provide a kerbside collection service and do not have a staffed landfill.

9.1.3 Drop off collections - additional guidance

Each load of dropped off waste should be assessed for source (domestic or commercial) and waste type. The weight of waste should be weighed or volume assessed according to the direct measurement methods listed above.

9.1.3.1 Unstaffed drop-off site (no weighbridge or volume estimates)

Where a local government operates an unstaffed drop-off site, and direct measurement of the amount of waste collected is not possible, data will be collected through an annual survey and extrapolated for the whole year. It is recommended that the data is collected for a week at time at four separate occasions over the year to reflect seasonal differences; for example, March, June, September and December.

9.2 Estimating the cost of providing waste and recycling services.

Where a local government with less than 5,000 population is unable to estimate the costs of providing a service, it may use the following default amounts:

- Kerbside collection service - $200 per service per household per year
- Vergeside collection service - $15 per service per household per year
- Drop-off - $215 per tonne received.

10 Special provisions for local governments with a population of less than 1,500

DWER acknowledges the limited resources of local governments with a low population. Therefore, ***where accurate information is not available*** on the amount of waste collected, local governments with an estimated resident population (ERP) of less than 1,500 may choose to only report on the services they provide; they can elect not to report the amount of material collected in each service. DWER will estimate the amount of waste generated and recycled, based on the population or number of households, using the approved "default factors".

All local governments will still be required to use the DWER local government reporting form.

Question 6 – Are the proposed special provisions for smaller local governments suitable?

11 Alternative methods

Local governments may propose alternative methods for the following if these are more accurate than the methods set out above:

- estimating the amount of material received, removed and disposed
- estimating the bulk density

- estimating the waste composition
- estimating the source waste stream

Any alternative methods proposed must be accurate, repeatable and consistent. Local governments must submit these methods, with relevant substantiating information, to DWER for consideration and approval prior to use.

12 Feedback sought

DWER is seeking feedback on the proposed methods set out in this consultation paper, specifically on the following:

1. Are the proposed material categories practical and appropriate for local governments?
2. Is the annual Local Government Waste and Recycling Census template an appropriate reporting template?
3. Are the proposed calculation methods to estimate the weight of waste received, disposed, leaving and stockpiled at your site clear? If not, what further clarification is required?
4. Are there any barriers that would prevent your organisation from using these calculation methods? If so, what are they and how can they be overcome?
5. Are the proposed default material densities and other default values appropriate for Western Australian local governments?
6. Are the proposed special provisions suitable for smaller local governments?

13 Glossary

Acronym / symbol	Definition
å	Sum of
t	Tonnes
m^3	Cubic metres
C&I	Commercial and Industrial waste: Solid waste generated by the business sector, State and Federal Government entities, schools and tertiary institutions
DWER	Department of Water and Environmental Regulation
MSW	Municipal Solid waste Solid waste generated from domestic (residential) premises and local government activities
Peel Region	The Peel region is the area defined by the Peel Region Scheme.
Perth Metropolitan Region	The Perth region, or Perth metropolitan region, is the area defined by the Metropolitan Region Scheme.
Reportable waste	Means waste that is solid matter

Appendices

Appendix A – Reporting requirements for local governments

Local governments will be required to report information related to the following waste services that are provided by the local government, whether that service is operated by the local government or by a third party under contract.

- Kerbside collection of mixed waste transported directly to landfill or transported to landfill via a transfer station;
- Kerbside collection of mixed waste collected and processed through a waste composting facility.
- Kerbside collection of mixed waste collected and processed through an energy recovery facility, or any other such facility.
- Kerbside collection of co-mingled dry recyclables;
- Kerbside collection of garden organics;
- Kerbside collection of combined food organics and garden organics;
- Kerbside collection of separated dry recyclables;
- Vergeside collection of garden organics;
- Vergeside collection of mixed bulk waste;
- Vergeside collection of specific bulk products;
- Drop-off services for mixed waste;
- Drop-off services for dry recyclables;
- Drop-off services for green waste; Drop off-services for hard waste or bulk rubbish, including waste recovered for sale at the drop-off facility;
- Public place services provided through permanent bins in public places for mixed waste;
- Public place services provided through permanent bins in public places for recyclables;
- Special event services provided through temporary bins in public places for mixed waste;
- Special event services provided through temporary bins in public places for recyclables; and
- Any of the services described above that are provided to commercial premises.

Kerbside services are containerised, regular services where waste or recycling are collected from the kerb in front of the residence.

Vergeside services are intermittent or on-demand collection services for garden organic wastes or bulk waste. Typically these services are non-containerised, but bulk

bins may also be used. Bulk waste refers to bulky household items, such as furniture, mattresses and white goods.

Drop-off services allow householders to self-haul their waste to facilities such as transfer stations, landfills and recycling depots that are operated by the local government.

1. All local governments will be required to record and report the following data in tonnes against each waste service provided to the residential or commercial premises located within their district:
   - total weight of waste collected;
   - total weight of waste disposed of to landfill;
   - total weight of waste recovered; and
   - total weight of waste recovered by material type.

2. All local governments will be required to record and report the following cost and charge data:
   - fees charged for waste and recycling collection services; and
   - cost of providing waste and recycling collection services.

3. All local governments will be required to record and report the following data for each waste service provided:
   - percentage of households is provided with such service;
   - participation rate;
   - frequency;
   - type, size and colour of containers used (for kerbside collection services only);
   - number of residential premises covered by the service; and
   - number of commercial premises covered by the service.

Appendix B – Default values

Volume by vehicle type

Vehicle type	Assumed volume (cubic metres)	Assumed weight for mixed waste (tonnes)
Car/ute[4]	1	0.3
Small open truck	3	1.2
Large open truck	10	5
Compactor garbage truck	8	5

Default bulk densities

Material category	Default bulk density (t/m^3)
Paper[3]	0.2
Cardboard[5]	0.1
Plastics[3]	0.14
Metals – Ferrous[1]	0.5
Metals – Non-ferrous	0.14
Glass[1]	0.347
Concrete[6]	1.5
Bricks[5]	1.2
Soil, sand, clean fill[5]	1
Organics – Garden organics[1]	0.15
Organics – Food organics[3,5]	0.5
Organics – Timber / wood[3]	0.19
Organics – other organics	0.3
Rubber/tyres[1]	0.3
Textiles[1]	0.15
Hazardous – asbestos[3]	0.31
Hazardous – other[5]	0.2
Mixed co-mingled recyclables (uncompacted) [1]	0.063
Other / mixed - putrescible[1]	0.3
Other /mixed - inert[1]	1.3

Composition of recycling collections (post-MRF)

Material category	Composition of co-mingled recycling bin wt% (post-MRF)
Paper	15
Cardboard	15
Plastics	8
Glass	12
Ferrous metal	3
Non-ferrous metal	2
Other	45

Source: Compiled from several WA waste audits

Waste generation rates[2]

Non-metro local government:

- 0.6 tonnes per person per year
- 1.47 tonnes per household per year

Local Government Default Cost Data[2]

Kerbside collection cost	$200 per service per household per year
Vergeside cost	$15 per household per service
Rural drop-off cost	$215 per tonne received

Appendix C – Worked examples

Example 1 - Combined bin collections

Example - Kerbside collection service collects from households (domestic), small businesses (commercial) and public place waste collected together.

Households have 7,000 weekly collections of 240L MGB, commercial premises have 200 weekly collections of 240L MGBs and 400 twice-weekly collections of 240L MGBs, public place has 25 weekly collections of 240L bins.

$$Proportion\ of\ domestic = \frac{domestic\ annual\ bin\ capacity}{(domestic + commercial + public\ place)\ annual\ bin\ capacity}$$

Annual domestic premises bin capacity is

$$Domestic\ bin\ capacity\ (L) = 7000 \times 240 \times 52 = 87360000$$

Annual commercial premises bin capacity is

$$Commercial\ bin\ capacity\ (L) = (200 \times 240 \times 52) + (400 \times 240 \times 52 \times 2) = 12480000$$

Annual public place bin capacity is

$$Public\ place\ bin\ capacity\ (L) = 25 \times 240 \times 52 = 312000$$

TOTAL annual bin capacity is 100,152,000 L

The relative proportions for each waste stream are

Domestic 87%

Commercial 12%

Public place 0.3%

Example 2 - Recycling

Example – Amount recycled from green waste collection

During the year, City of HUK collected 245 tonnes through its kerbside greenwaste collection, with a contamination rate of 15%. It also collected 67 tonnes through its annual green waste vergeside collection and 83 tonnes via its green waste drop-off facility.

$$Amount\ of\ green\ waste\ recycled = 85\% \times 245 + 67 + 83 = 358.25$$

$$Amount\ of\ disposed\ as\ contamination = 15\% \times 245 = 36.75$$

References

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