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

# Proposed estimation/calculation methods for recycling and reprocessing facilities with an output of 1,000 tonnes or more of waste per annum under proposed amendments to the *Waste Avoidance and Resource Recovery Regulations 2008*

Consultation paper

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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
WARR Regulation Amendments
Waste Avoidance and Resource Recovery
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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 estimate amounts of material collected, disposed and recycled, in the manner approved by the CEO.

# 2 Purpose of this paper

Liable persons are occupiers of premises, whether or not the person holds a licence in respect of the premises —

a) if reportable waste is treated, processed or sorted at the premises for the purposes of reprocessing, recycling or energy recovery; and
b) if, as a result of that treatment, processing or sorting, at least 1,000 tonnes of reprocessed, recycled or recovered material is produced in a financial year at the premises that —
    i. needs no further processing and is ready for use as a production input or a final product; or
    ii. is to be exported from the State.

For the purpose of this consultation paper, these liable persons will be referred to as liable recyclers.

This consultation paper sets out proposed approved methods for liable reyclers 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.

Liable recyclers will be required to report the following information annually for the most recently concluded financial year:

- Amount of waste received (tonnes per annum)
- Amount of material processed (tonnes per annum)
- Amount of material stored in stockpiles at the end of financial year (tonnes)
- Amount of residual waste or processing losses (tonnes per annum)
- Destination / fate of material received (recycling, stockpiled, waste-to-energy or disposal to landfill)
- Destination / fate of processed material (process/sold locally, exported interstate, exported overseas)

- Material category of waste received
- Source waste stream of waste received (municipal solid waste (MSW), commercial and industrial (C&I) or construction and demolition (C&D))
- Geographic source of material received (Perth metropolitan region, Peel region or other regions)

# 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.

# 5 Data recording format

Information is to be recorded in the following format.

*Table 1: Reporting format for reporting material received at the site*

| **Material category** | **Source waste stream** | **Geographic source** | **Amount (tonnes per annum)** |
|---|---|---|---|
| e.g. Cardboard | MSW, C&I or C&D | Metropolitan Perth, Peel or other region | |
| e.g. Glass | | | |

*Table 2: Reporting format for reporting residual waste*

| **Material category** | **Amount removed (tonnes per annum)** | **Destination / fate** | **Geographic destination** |
|---|---|---|---|
| e.g. Mixed putrescible waste | | Landfill or waste-to-energy | Local, interstate or overseas |
| e.g. Mixed inert waste | | e.g. Landfill | |

*Table 3: Reporting format for reporting products and recycled material*

| **Material category** | **Amount removed (tonnes per annum)** | **Fate** | **Geographic destination** |
|---|---|---|---|
| e.g. Paper & cardboard | | e.g. Export overseas for reprocessing | Local, interstate or overseas |
| e.g. Aggregate | | e.g. Sold locally as product | |

# 6 Material categories

The following waste categories are to be reported.

*Table 4. List of waste categories for reporting*

| **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 | |

Recyclers may report using more detailed categories consistent with their record-keeping. Where alternative categories are used, the report must show how the waste categories reported align to DWER waste material categories in Table 4.

An annual waste composition study will be required where the recycling premises only receives and records materials in categories that do not align with the material categories in Table 4. The study is to be conducted over a period of at least five days.

**Question 1 - Are the proposed material categories practical and appropriate for the Western Australian recycling industry?**

# 7 Proposed approved methods

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

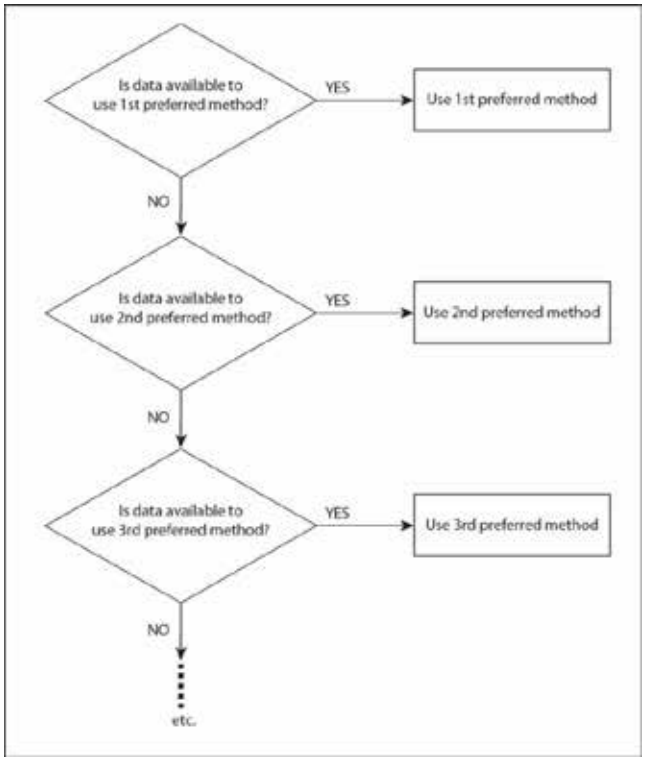


*Figure 1: Hierarchy of methodologies*

## 7.1 1st preferred method – Estimation by weight

Where a weighbridge is installed at the site, all compacted waste loads and all waste loads of more than one cubic metre in volume entering and leaving the site will be weighed. Volume estimation may be used for small loads under one cubic metre in size (i.e. cars and utes).

*Equation 1: Estimation of weight by weighed waste*

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

## 7.2 2nd preferred method – Estimation by volume

For sites without a weighbridge or where a weighbridge is inoperable, the volume-estimation method may be used for the duration that the weighbridge is not working.

*Equation 2: Estimation of weight from volume*

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

*Table 5: 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 |

# 8 Estimating the weight of stockpiles

## 8.1 1st approved method - Mass balance

For the purposes of annual reporting, the net weight of the stockpiles for the year is calculated using a mass balance; i.e. the amount at the start of the year and whether the amount of the stockpiled material grew or reduced over the year.

*Equation 3: Estimating annual weight of stockpiles*

$$Weight_{stockpile} = Weight_{original} + Weight_{received} - Weight_{left\ site} - Weight_{contamination\ removed}$$

This method is preferred for sites with a weighbridge. However, it is only suitable for non-degradable material, such as concrete, dry recyclables, etc. Volume estimation should be used to determine the amount of material in green waste stockpiles at the end of the financial year (see 9.2).

## 8.2 2nd approved method - Volumetric survey

If not all material added to the stockpile or removed and produced from the stockpile has been weighed, a volumetric survey may be used to estimate the amount of waste contained in stockpiles. Volumetric surveys should be used to estimate the amount of green waste stockpiled on-site at the end of the reporting period.

Volumetric surveys should be conducted as close to the end of the reporting period as possible.

The volume is converted to weight by multiplying the volume by the bulk density.

**Question 2 - 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 3 - 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?**

# 9 Estimating bulk density of material categories

Sites without a weighbridge, or where the weighbridge is inoperable for six months or more in one year, must conduct a bulk density survey at their premises to determine the bulk density of the various material category loads entering and leaving the site. A detailed report of the bulk density survey, including raw data, must be submitted to DWER with the next annual data report following the survey.

The bulk density survey is to measure the weight and volume of at least five loads of at least three cubic metres for each material category reported.

Where a weighbridge is inoperable for less than six months in one year, DWER default values for waste material bulk densities and vehicle/container volumes should be used.

# 10 Source of waste

The source waste stream (MSW, C&I or C&D) and geographic source (Perth metropolitan region, Peel region and other regions) of each load entering or leaving the site is to be recorded.

Where this data is not recorded, the liable recycler will conduct four surveys over the year, each of one week in length, to determine the proportion of material entering or leaving the site by geographic source and by waste stream.

C&D recycling facilities may assume all waste delivered to their premises for processing is from the C&D waste stream.

# 11 Destination / fate of waste

Liable recyclers are required to report what happens to the waste received at their site.

The options for fate are: landfilled, recycled, stockpiled or waste-to-energy.

The categories for geographical destination are: local, exported interstate or exported overseas.

# 12 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 A. These include default bulk densities to be used to estimate weight from volume, where this information is not estimated by the liable recycler.

**Question 5 - Are the proposed default material densities appropriate for the Western Australian recycling industry?**

# 13 Alternative methods

Liable recyclers 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. Liable recyclers must submit these methods, with relevant substantiating information, to DWER for consideration and approval prior to use.

# 14 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 the Western Australian recycling industry?
2. 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?
3. 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?
4. Are the proposed default material densities appropriate for the Western Australian recycling industry?

# 15 Glossary

| Acronym / symbol | Definition |
|---|---|
| å | Sum of |
| T | Tonnes |
| $m^3$ | Cubic metres |
| C&D | Construction and Demolition waste<br>Solid waste from residential, civil and commercial construction and demolition activities |
| C&I | Commercial and Industrial waste:<br>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<br>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– Default values

### Default vehicle volumes[2]

| Vehicle type | Assumed volume ($m^3$) |
|---|---|
| Small vehicle (car, ute, van, trailer) | 1 |
| Open truck - small, 2 axles | 3 |
| Open truck - large 2 axles | 6 |
| Open truck - 3 axles | 10 |
| Open truck - 4 axles | 12 |
| Open truck - 5 axles | 18 |
| Open truck - 6 axles | 20 |
| Open truck - 8 axles | 20 |
| Open truck - 9 axles | 32 |
| Open truck - 11 axles | 40 |
| Compactor truck - volume unknown | 10 |

### 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 |

| Material category | Default bulk density ($t/m^3$) |
|---|---|
| Other /mixed - inert[1] | 1.3 |

# Appendix B – Examples of using methods

## Example 1 – estimation of weight from volume

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

## Data recorded on incoming loads and calculations

| **Incoming Loads** | **Load volume ($m^3$)** | **% fullness** | **Source waste stream** | **Geographic source** | **Material category** | **Material bulk density ($t/m^3$)** | **Estimated Weight (tonnes)** |
|---|---|---|---|---|---|---|---|
| Load 1 | 15 | 100% | MSW | Perth Metro. | Co-mingled recycling | 0.063 | 0.95 |
| Load 2 | 20 | 100% | C&I | Perth Metro. | Cardboard (compacted) | 0.13 | 2.60 |
| Load 3 | 1 | 100% | C&I | Perth Metro. | Glass | 0.347 | 0.35 |
| Load 4 | 3 | 80% | C&I | Perth Metro. | Cardboard (loose) | 0.055 | 0.13 |
| Load 5 | 15 | 100% | MSW | Perth Metro. | Co-mingled recycling | 0.063 | 0.95 |

## Summary data reported

Summary total tonnes of waste received by source waste stream and geographic source to be reported

| **Source waste stream** | **Geographic source** | **Material category** | **Weight (tonnes)** |
|---|---|---|---|
| MSW | Perth Metro. | Co-mingled recycling | 1.89 |
| C&I | Perth Metro. | Cardboard | 2.73 |
| C&I | Perth Metro. | Glass | 0.35 |

# References


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3. UK Environment Agency (1998) *UK Density Conversion Factors for Waste*. https://www.sepa.org.uk/media/163323/uk-conversion-factors-for-waste.xlsx
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5. Victoria EPA, *Waste Materials Density Data* https://www.epa.vic.gov.au/business-and-industry/lower-your-impact/~/media/Files/bus/EREP/docs/wastematerials-densities-data.pdf.
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