blue environment pty ltd

Stockpiling and illegal dumping of tyres: cost to local governments and others

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TyreStewardship AUSTRALIA

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Abbreviations and glossary

ACLG	Australian Classification of Local Governments
DES	Department of Environment and Science, Queensland
DTP	Department of Transport and Planning, Victoria
EOLT	End-of-life tyre(s)
EPA	Environment Protection Authority
EPU	Equivalent passenger unit
LGAQ	Local Government Association of Queensland
OTR	Off-the-road tyre
TDF	Tyre derived fuel
TSA	Tyre Stewardship Australia
TPSS	Tyre Product Stewardship Scheme

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- Local Government Association of Queensland (LGAQ)
- Local Government Association of South Australia (LGASA)
- Local Government Association of Tasmania (LGAT)
- Municipal Association of Victoria (MAV)
- Western Australian Local Government Association (WALGA)
- Australian Local Government Association (ALGA)
- Keep Australia Beautiful
- Clean-up Australia
- Snap Send Solve
- ACT Government
- New South Wales Environment Protection Authority
- RID Squad Hunter and Central Coast Region (New South Wales)
- Queensland Department of Environment and Science
- HQ Plantations Queensland
- Forestry South Australia
- Tasmanian Department of State Growth
- Forico Tasmania
- Recycling Victoria
- EPA Victoria
- Department of Transport and Planning (DTP), Victoria
- Forests and Reserves Victoria (DEECA VIC)
- EPA Western Australia
- Main roads Western Australia
- Department of Biodiversity, Conservation and Attractions (DBCA), Western Australia
- Department of Water and Environmental Regulation (DWER), Western Australia.

Their contributions significantly improved our understanding of end-of-life tyre management and costs in Australia. We received enthusiastic engagement from many organisations and individuals, showing that this is an issue that people are passionate about solving.

Summary

Introduction

Tyre Stewardship Australia (TSA) commissioned Blue Environment and the Centre for International Economics (CIE) to investigate the cost of illegally dumped and stockpiled end-of-life-tyres (EOLT) on governments and communities.

The scale and cost of illegal dumping and stockpiling is very difficult to quantify due to its widespread, illicit and varied nature. Dumping may not be discovered for years or may be cleaned up within days. Dumping may occur on local government land, in state government forests, parks or roads, or on private land. Stockpiling can be distinguished from dumping based on the number of tyres present and how long they have been present. Stockpiles may occur on rural properties, in warehouses and industrial premises, at council waste facilities, in tyre exchange locations and other locations. Stockpiles may build up temporarily due to stock mismanagement or be persistent. Legitimate stores may become indefinite illegal stockpiles over time.

This report provides a reasonable estimate of the cost and scale of dumping and illegal stockpiling associated with EOLT:

- cleaned up by local governments (good estimate)
- cleaned up by state government agencies (reasonable estimate)
- in known large stockpiles (reasonable estimate).

This scope is not comprehensive. It does not cover EOLT:

- dumped but not cleaned up
- dumped on state land that is not a state forest, national park or a state highway
- stored or stockpiled at rural waste facilities
- dumped or stored on private land
- in stockpiles other than in about 40 known locations currently active or recently cleaned up.

Accordingly, the overall scale and cost of EOLT dumping is likely to be substantially larger than is estimated in this report.

Dumped and stockpiled waste is offensive and hazardous to the environment and humans. Dumped EOLT collect water and become a breeding ground for mosquitoes. Additionally, when they burn, tyres release thick, toxic smoke, as well as liquid chemicals from thermal decomposition that are washed away in fire-fighting run-off and can seriously pollute the downstream environment.

The fates of EOLT considered in this report are recovery in Australia, export, disposal at landfill, onsite disposal, and illegal waste disposal.

Method

Information on the incidence and financial costs for illegal dumping was primarily obtained through a survey of local and state governments. The local government data was used to make best available estimates, with stratification by jurisdiction and region type (urban, fringe, regional, rural). Non-market costs were estimated using the willingness to pay method. Financial costs paid by local governments and other public or private land managers to clean up dumped EOLT were divided into: staff clean-up time; vehicle and equipment; disposal or recycling fee; administration; and

investigations, enforcement and prosecution. Non-market costs paid by all land users include: reduced enjoyment, amenity or safety and fire risk.

Results and conclusions

About 21% of Australian local governments responded to the survey, comprising about 30% of the Australian population. This is considered a reasonable response rate. The national response rate for land managers responsible for roads, parks and forests across the states and territories was 25%.

Dumped tyres are a costly nuisance to councils and land managers.

- Compared to other types of dumped waste, 61% of responding councils nominated **tyres as significant or worse**.
- Cleaning up illegally dumped tyres cost Australian councils about $6.5m in 2022-23.
- Nationally, an estimated 300,000 tyres were cleaned up in 2022-23, at an average cost of about $22 per tyre. This cost per tyre is almost triple the average disposal fee for a car tyre at a tyre shop (about $7.60).
- The greatest component of the cost is staff clean-up time, followed by disposal or recycling fee, vehicle and equipment hire and administration.
- Regional councils were calculated to face the greatest cost per tyre, followed quite closely by councils on the urban fringe.
- Regional and rural councils face transport costs that are prohibitive to tyre recycling, and they often store tyres while awaiting resources or new waste facilities.
- An estimated 11 tyres per thousand people were cleaned up from Australian local government land in 2022-23.
- Non-market costs, such as reduced enjoyment, amenity and effects of fires, are paid by all users of the land. The amenity impact on the community when quantified is much larger than the financial costs of clean-up.
- Governments are spending more on cleaning up dumped tyres than the expected cost if they were recycled or disposed through legal channels.
- People are willing to pay much more than the current management cost to avoid the risk and loss of amenity caused by dumped waste.

Key results are summarised below.

Table S1 Summary of report findings

Item	Value (2022-23)
Estimated financial cost of cleaning up dumped tyres by local governments	$6.5 million
Estimated cost per tyre cleaned up	$22
Estimated number of dumped tyres cleaned by local governments	300,000
Estimated financial cost of cleaning up dumped tyres on state land managers	$2.4 million
Estimated size of identified stockpiles[1]	>2.1 million EPU
Public cost that would be incurred to clean up identified stockpiles	$8.3 to $23.3 million
Non-market costs[1] of dumped tyres	$100 million
Expected value of the risk imposed on the community by tyre stockpiles	$432,000

[1] See the definition in Section 1.2.

1. Introduction

1.1 Context

Tyre Stewardship Australia (TSA) commissioned Blue Environment and the Centre for International Economics (CIE) to investigate the cost of illegally dumped and stockpiled end-of-life-tyres (EOLT) on governments and communities. This report contains the findings of that work.

Dumping incidents are typically viewed (and managed) as a local government problem, which contributes to the lack of collated data on the topic (Crofts et al. 2010). This report aims to fill a data gap and quantify the problem to the extent data can be obtained. It estimates the financial costs incurred by local governments, state governments, private land owners for managing dumped or stockpiled EOLT, the tyre-specific challenges faced, and an analysis of how management and costs differ between the land manager types, jurisdictions, and local government class (urban, urban fringe, regional, rural). The data sources included survey responses, government data sets, organisation data sets, stockpile and recycling costs data shared by TSA and publicly available information. The project also estimates the 'non-market' environmental costs (see Section 1.7) imposed on the rest of the community by perpetrators of dumping and stockpiling. The scope was EOLT that are currently regulated by the Australian Government and included in the Tyre Product Stewardship Scheme (TPSS) (i.e. passenger, truck and off-the-road tyres). Other kinds of EOLT such as bicycle, electric scooter and wheelchair tyres were out of scope (DCCEEW 2024).

The scale and cost of illegal dumping and stockpiling is very difficult to quantify due to its widespread, illicit and varied nature. Dumping may not be discovered for years or may be cleaned up within days. In addition to local government land, dumping may occur in forests, parks or other state government land, or on private land. Flows of collected EOLT may accumulate on land housing vehicles, in repair shops, at local government landfills, in failed recovery operations or due to criminal activity. Legitimate stores may become indefinite illegal stockpiles. The wide array of parties involved in the cleaning up of EOLT means **data is not centrally stored. Even data on large stockpiles cleaned at taxpayer expense is difficult to obtain**.

However, government reporting tools such as the national 'Snap Send Solve', and NSW's 'RIDonline', are recording increases in tyre-related illegal dumping incidents over time.

This report provides a reasonable estimate of the cost and scale of dumping and illegal stockpiling associated with EOLT:

- cleaned up by local governments (good estimate)
- cleaned up by state government agencies (reasonable estimate)
- in known large stockpiles (reasonable estimate).

It does not cover EOLT:

- dumped but not cleaned up
- dumped on state land that is not a state forest, national park or a state highway
- stockpiled at rural waste facilities
- stored on private land
- in stockpiles other than about 40 known locations that are currently active or cleaned up in recent years.

Taking into consideration what is not covered, the overall scale and cost of EOLT dumping is likely to be substantially larger than is estimated in this report.

1.2 Terminology

For clarity, this section defines key aspects of the terminology used in this report.

- **Cost** refers to the monetary value of a negative impact of illegal dumping and/or stockpiling. Cost may be financial or non-market in nature (see below). In total, the costs estimated in this report are the incremental economic (including environmental) costs imposed on the rest of the Australian community by those benefiting from illegal dumping and stockpiling of EOLT (perpetrators and, potentially, their customers). 'Incremental' means the costs are additional to those that would be incurred under a scenario in which all EOLT are correctly managed. Readers using this report as an input to Policy Impact Analysis should note that cost, when defined this way, is higher than the overall economic cost to Australia, since it does not account for the initial act of dumping or stockpiling having a lower resource cost than correct waste management.

  Within this definition of cost:
  - The **financial cost** associated with cleaning up or managing dumped or stockpiled EOLT refers to the direct monetary costs, including staff clean up time, disposal and recycling fees, vehicle and equipment, administration, investigations, enforcement and prosecution.
  - The **non-market cost** of EOLT dumping and stockpiling is the non-financial impact on the community. It encompasses the amenity impacts of dumping and the pollution of air and water resulting from tyre stockpile fires.
- **Illegal dumping** is incidental disposal on public or private land, such as on road-sides, in forests, gullies, paddocks etc. Illegal dumping incidents may be deemed residential (a small number of EOLT) or commercial (involving 10 or more EOLT). **Commercial dumping** refers to a dumping incident containing greater than 10 EOLT.
- **Stockpiles**, **f**or the purpose of this report, refer to stores of > 5000 EOLT for more than 12 months (TSA n.d.). Many stockpiles are on private property and are unmanaged; others may occur at rural waste facilities due to lack of funds to transport or process them. **Identified stockpiles** are those listed on the TSA database used for this project. It is not comprehensive as there is no formal method for aggregating this information. It excludes, for example, most stockpiles abandoned in warehouses.

1.3 Current status of tyre product stewardship

TSA was formed in 2014 to implement the national TPSS, as authorised by the Australian Competition and Consumer Commission. This voluntary scheme aims to increase the collection and recycling of EOLT, and to explore new uses and products using the recycled materials. It does so by accrediting and working with participant organisations from the tyre industry, including tyre manufacturers, retailers, collectors, and recyclers (TSA 2023a). The scheme collects levies from voluntary levy paying importers/manufacturers and injects the money into recovered tyre market growth. Since its inception, TSA has invested $9 million on market development, including supporting around 64 *projects*. Over 1,700 participants have engaged in the scheme. However, as this report illustrates, there is more work to be done.

Tyres are on the *Minister's Priority List* of products requiring urgent action and signifying the potential for establishment of a compulsory product stewardship scheme (DCCEEW 2022). This would increase the scope, breadth and responsibilities of the current scheme and should

significantly reduce dumping. The Minister's list identifies two actions the tyre industry should take by November 2024 or the Minister may consider regulating the product:

- manufacturers, importers, distributors and retailers must demonstrate improved and measurable product stewardship actions
- tyre importers not currently members of the TPSS should commence formal participation.

1.4 Types of tyres

The three main types of EOLT included in the stewardship scheme are:

- **Passenger tyres**, which are those used on typical automotive vehicles or trailers. This group contributes to the greatest quantity of tyres consumed in Australia.
- **Truck tyres**, used on sport utility vehicles, light trucks, larger trucks, truck trailers and buses. These are the second highest type of tyre consumed in Australia. Truck tyres are equivalent to 2 to 10 EPUs, depending on the tyre size required by the type of vehicle (TSA 2020a).
- **Off-the-road (OTR) tyres**, which include agriculture and mining off-road tyres, tracks and conveyor belts. Their size varies depending on the application from 3 EPU for a forklift to over 400 EPU for a giant earthmover.

1.5 What happens to end-of-life tyres?

The fates of EOLT are recovery in Australia, export, disposal at landfill, illegal waste disposal, and onsite disposal. Recovery rates (the percentage of EOLT collected and recycled or recovered for energy) for passenger and truck tyres have declined from 90% in 2020, to 77% in 2023 (TSA 2023b).

Recovery in Australia

Recovery refers to the EOLT that are collected and reprocessed into products or secondary materials that are returned to productive use. The recovery fates for EOLT include:

- **Re-treading and repairing** tyres for reuse give truck and OTR tyres a second life, but this is generally not used on passenger tyres in Australia
- **Civil engineering**, such as the use of tyres in the construction of retaining walls or permeable pavements
- Creation of highly processed rubber products, such as **used tyre crumb, granules and buffing**, which have a wide range of uses by cutting or grinding the EOLT
- **Pyrolysis** (by heating in the absence of oxygen) to decompose the tyre and obtain products such as char, oil, syngas and steel
- **Energy recovery** through combustion of shredded tyres in cement kilns, industrial boilers or furnaces – this is uncommon in Australia but is the predominant use of exported EOLT waste (TSA 2020b).

Export

In 2022-23, about 70% of recovered EOLT were **exported** to other countries for recovery, with approximately one quarter destined for re-treading and re-use as a second-hand tyre, and three quarters for use as tyre derived fuel (TDF) in energy recovery processes (TSA 2023b). The exported proportion has dropped from around 76% in previous years, a decline due, at least in part, to export regulations developed following concerns about negative environmental or health impact in the importing countries (MRA 2021).

As of December 2021, export of EOLT (whole or pieces) need to be conducted under an export licence. Whole baled tyres or tyres in pieces larger than 150 mm cannot be exported. Tyres may be exported under licence if:

- processed into shreds or crumb of not more than 150 millimetres for use as tyre derived fuel
- processed into shreds or crumbs not for use as tyre derived fuel, or into buffings or granules
- sent to an appropriate retreading facility
- sent to an appropriate importer for re-use as a second-hand tyre on a vehicle.

Disposal

EOLT may be **disposed at landfills** in most states and territories, but rules about the format (whole vs shredded), fees, and allowable quantities per person differ between the jurisdictions. Typically, EOLT must be shredded prior to disposal because whole tyres cannot be compacted and tend to 'float' on the waste mass.

Illegal waste disposal fates

Illegal fates are dumping and stockpiling, both of which are defined in Section 1.2. Stockpiling of EOLT is a fate only when not subsequently cleaned up, but is generally illegal and/or a management failure. Regulations for tyre storage differ between the states and territories. *Guidelines* for tyre storage in each of the jurisdictions are available on TSAs website (TSA 2022).

Onsite disposal

'Onsite disposal' is the activity of stockpiling or burying of tyres and OTR on the work site (generally related to mining operations). There are limited regulations requiring OTR recovery (TSA 2023c). As people become more aware of impacts on future generations and land users, onsite disposal is an increasingly unacceptable fate for EOLT.

1.6 The problems with tyre dumping and stockpiling

It is an offence to litter or dump any waste, and it is illegal to stockpile without appropriate licences and approvals. Dumped and stockpiled waste is offensive, and can be hazardous to the environment and humans.

Tyres can create specific hazards due to their shape and composition. Firstly, dumped EOLT collect water and become a breeding ground for mosquitoes, which can spread disease to wildlife, humans and livestock (DEECA 2023). Additionally, when they burn, tyres release thick, toxic smoke, as well as chemicals that are washed away in fire-fighting run-off and can seriously pollute the downstream environment (EPA Victoria 2023a). Tyre fires are extremely difficult to extinguish and can result in evacuation of a suburb or town (Black and Rollason 2018; ABC News 2016). Clean-up and emergency fire response is much more costly than responsible disposal (Fattal et al. 2016).

To illustrate the growing issue, a report published by Boomerang Alliance (2022) stated that 'in NSW alone there were over 322 fires involving tyres between 2008 and 2013 and the incidence of vector-borne diseases (dengue fever, Ross River fever, Barmah Forest virus etc.) has skyrocketed from an estimated 3,000 cases in 2002 to nearly 11,000 in 2013'.

1.7 Costs of cleaning up dumped tyres

Dealing with dumped EOLT has significant financial costs. When the dumper cannot be identified, clean-up costs may fall to local councils, property owners or state agencies, depending on whether the dumping incident occurred on public land, private land, land surrounding public roads, or it is a particularly large incident. Clean-up costs, including money, time and effort, are sometimes undertaken by individuals (volunteers) or community groups (Healthy Waterways 2016). Once the EOLT are picked up, they are usually taken to a recycler, a landfill or stockpiled for management costs to be incurred in the future. Not all dumped EOLT are cleaned up, sometimes they are left because they are not detected, or due to lack of resources for cleaning up. These EOLT impose non-market costs, such as reduced amenity.

Mismanagement tends to lead to costs being incurred more than once – for example, a resident may pay for disposal of a tyre, which is then inappropriately dumped or stockpiled by a commercial operator, and subsequently cleaned up by a local council or state environmental regulator. This means the second set of costs, which are the focus of this study, are *additional* to the costs that have been incurred under the pretence of correct management of the EOLT.[2]

The types of costs incurred from EOLT dumping or stockpiling fit into two broad categories, financial costs and non-market costs.

Financial costs

Financial costs paid by local governments and other public or private land managers to clean up dumped EOLT include:

- **staff clean-up time** – wages or fees paid for staff or contractors to travel, pick up necessary equipment, collect the waste, clean-up the site, deliver to waste facility, staff time for managing temporary storage of collected EOLT (legal stockpiles) and, for private land owners, the personal time cost of removing EOLT
- **vehicle and equipment** – the cost of hiring or owning and maintaining vehicles and equipment used to clean-up the tyre dumps, surveillance equipment
- **disposal or recycling fee** – the gate fee charged by the waste facility (this may also include collection fees if the waste facility is required to collect the waste)
- **administration** – the staff and business running costs such as receiving and processing complaints, staff management, data collection, education campaigns
- **investigations, enforcement and prosecution** – some of the wages of investigative and legal staff, legal fees.

Non-market costs

Non-market costs are paid by all land users and include:

- **reduced enjoyment, amenity or safety** – the concern or negative feelings experienced by individuals in the community from seeing dumped or stockpile EOLT and the risk to safety
- **fire risk** – the potential impacts of a fire, such as air pollution, health impacts, environmental damage, waterway damage.

When dumped EOLT are not cleaned up, the material resource within them is lost.

[2] Note that, for the purpose of this report, costs are defined as costs to the rest of the community excluding perpetrators (see Section 1.1). Under this definition, the price charged by perpetrators is the relevant cost, rather than the resource costs involved in the activity of dumping.

1.8 About this report

Following this introduction, Chapter 2 describes the methodology used for data collection, estimation and analysis. Chapter 3 presents the data in graphs and tables with some explanation. Chapter 4 discusses the findings of the previous sections. Chapter 5 contains five (5) case studies on illegal dumping and stockpiling in a range of locations. Chapter 6 summarises the overall findings and presents recommendations.

Data are generally rounded to no more than three significant figures, reflecting the estimated accuracy level of the data. This means that some columns of numbers may not add perfectly.

2. Method

This section describes the methods used for collecting data, filling gaps, modelling and analysing the data on EOLT dumping and stockpiling.

The project utilised multiple methods for obtaining data on the following costs:

- financial costs of illegal dumping
- financial costs of illegal stockpiling
- non-market costs of illegal dumping
- non-market costs of illegal stockpiling.

Information on the incidence and financial costs for illegal dumping was primarily obtained through a survey of local and state governments (Section 2.1). Local governments were classified based on the Australian Classification of Local Governments (ACLG), see Section 2.3. Supplementary datasets (Section 2.2) and a carefully conducted estimation plan (Section 2.4) filled in data gaps.

Non-market costs were estimated using the willingness to pay method in Section 2.5. Finally, Section 2.6 describes the method for expanding TSAs stockpile database and estimating market and non-market costs associated with stockpiles by using the risk of fire.

2.1 Survey and stakeholder engagement methods

There is currently no established system for collecting and storing data on the financial costs incurred by local and state governments for managing illegally dumped waste (or dumped EOLT in particular) across Australia. Therefore, we sought the data directly from the agencies responsible for dealing with the majority of the dumping: local governments and state land managers (parks, forests and roads).

The aim was to capture the following points in relation to the target year, the 2022-23 financial year:

- severity of the issue compared to other dumped waste
- common locations for dumped EOLT
- management (fate) of the collected EOLT
- cost of cleanup and cost component breakdown
- proportion of dumped waste that is EOLT
- proportion of incidents related to commercial activity (i.e. greater than 10 EOLT)
- management issues specific to EOLT
- trend of dumped EOLT stocks over time
- anecdotes or case studies.

National survey of local governments

We developed a survey for local governments, which was prepared in SurveyMonkey. We asked three local governments to test the survey and provide feedback on the layout and questions. The feedback received was then used to improve the survey design. Appendix A shows the final survey questions.

We predicted a higher response rate if the email came from a familiar organisation so we sought the assistance of the state Local Government Associations for survey distribution. All kindly agreed to help. We drafted an email with survey links and an introductory letter from TSA attached, for the associations to forward to their mailing lists. The associations used waste manager contacts where available, otherwise the email was sent to generic council email addresses.

In early October 2023, the Local Government Associations distributed the surveys, and responses were collated for analysis. This enabled ongoing tracking of response rates, provided the associations with a list of local governments that were yet to respond, and allowed for early identification of issues. In most cases, the reminders were only sent to local governments that had not yet submitted a response.

Follow up phone calls or emails were made when we needed clarification about a response or to collect additional data or photographs for use in the case studies in Chapter 5.

The ACT does not have multiple local governments and waste management is dealt with by the territory departments. The state land manager survey described below was used for the ACT.

Survey of state and territory land managers

We developed a separate survey for state land managers. This survey was similar, but shorter than, the local government survey, as some questions in the first survey were not applicable. Appendix A shows the survey questions.

Prior to distribution, we identified the departments that manage state land and reached out to obtain direct contact details, where possible. Where specific details were not provided, we found generic 'front-door' email addresses (e.g. 'info @ xx'). Data from early engagement by the land managers was collected at this point, including the information included in Case Study 1.

During October and November 2023, all stakeholders received an initial email with survey links and the introductory letter attached, followed by two reminder emails, unless they provided a response or declined. After this process, additional efforts were completed by both Blue Environment and TSA on a case-by-case basis in an attempt to increase the response rate. The survey and email or phone responses were collated and analysed, for this report.

2.2 Collecting other data sets

We anticipated that not all local governments or state land managers would complete the survey or have data available. Therefore, we performed an online search to identify existing information and data sets that might supplement the survey data and submitted data requests to the relevant agencies. Three state governments provided us with data sets on EOLT dumping, Victoria, New South Wales and Queensland. Explanation of the data and their limitations are outlined below.

Victorian Local Government Annual Survey from Recycling Victoria

Recycling Victoria provided an aggregated dataset for the following data points on illegal dumping: number of call outs, number of penalties, tonnes collected, cost. Council level data was available for all of these points except cost. Composition of the tonnes collected was not able to be split into waste types. Not all councils are able to provide data and some can only provide one or two of the data points we request. Additionally, responses year-to-year can vary significantly.

RIDonline data from NSW Environment Protection Authority

RIDonline is a voluntary system for reporting and tracking investigations of illegal dumping in NSW. Incidents may be added to the database by members of the public, local councils or other public land managers such as National Parks and Wildlife Service and Crown Lands. RIDonline is generally used well by Councils that participate in RID squads or programs and by Councils or organisations that have received illegal dumping prevention grants from the EPA. Investigations carried out by the EPA are not tracked in RIDonline, however some incidents may be included, depending on how they were initially reported.

Local Government Illegal Dumping Partnerships Program for 2022-23 from Queensland's Department of Environment and Science

The Local Government Illegal Dumping Partnerships Program provided funding to local governments in Queensland for removal, investigation and prevention of illegally dumped waste. Tyre related dumping incidents reported by local governments were shared for the purpose of analysis and gap filling in this project. Location, volume and outcome information was provided, but cleanup cost was not available.

2.3 Classification of local governments

This section describes the local government classification method so that the reader can understand what each of the classes mean and how they were determined.

We determined to understand the financial cost on local governments of cleaning up EOLT in the following four classes:

- urban – densely populated urban centre
- urban fringe – a local government on the margin of an urban centre
- regional – less populated area that is part of an urban centre
- rural – a non-urban area with low population density

We searched for an existing database that included these or similar groupings of local governments, by state or Australia wide. The Australian Classification of Local Governments (ACLG) published by ALGA 'classifies councils into 22 categories according to their socioeconomic characteristics and their capacity to deliver a range of services to the community' (IPWEA 2021). Population density is also a core factor in the ACLG classification. Upon reviewing Figure 1 below and the supporting text in the reference report, we grouped the 22 categories into the four broad areas listed above as shown in Table 1.

Figure 1 The Australian Classification of Local Governments (ACLG) from Australia's Local Government 2021 National State of the Assets Technical Report, Appendix C

Step 1	Step 2	Step 3	Identifiers	Category
URBAN (U)				
Population more than 20 000 OR If population less than 20 000, EITHER Population density more than 30 persons per square kilometre OR 90 per cent or more of the local governing body population is urban	CAPITAL CITY (CC)	Not applicable		UCC
	METROPOLITAN DEVELOPED (D) Part of an urban centre of more than 1 000 000 or population density more than 600 per square kilometre	SMALL MEDIUM LARGE (L) VERY LARGE (V)	up to 30 000 30 001–70 000 70 001–120 000 more than 120 000	UDS UDM UDL UDV
	REGIONAL TOWNS/CITY (R) Part of an urban centre with population less than 1 000 000 and predominantly urban in nature	SMALL MEDIUM LARGE (L) VERY LARGE (V)	up to 30 000 30 001–70 000 70 001–120 000 more than 120 000	URS URM URL URV
	FRINGE (F) A developing LGA on the margin of a developed or regional urban centre	SMALL MEDIUM LARGE (L) VERY LARGE (V)	up to 30 000 30 001–70 000 70 001–120 000 more than 120 000	UFS UFM UFL UFV
RURAL (R)				
A local governing body with population less than 20,000 AND Population density less than 30 persons per square kilometre AND Less than 90 per cent of local governing body population is urban	SIGNIFICANT GROWTH (SG) Average annual population growth more than three per cent, population more than 5000 and not remote	Not applicable		RSG
	AGRICULTURAL (A)	SMALL MEDIUM LARGE (L) VERY LARGE (V)	up to 2000 2001–5000 5001–10 000 10 001–20 000	RAS RAM RAL RAV
	REMOTE	EXTRA SMALL (X) SMALL MEDIUM LARGE (L)	up to 400 401–1000 1001–3000 3001–20 000	RTX RTS RTM RTL

Source: IPWEA 2021

Table 1 Local government classes, based on the ACLG classification from Australia's Local Government 2021 National State of the Assets Technical Report (IPWEA 2021).

Grouped local government class	ACLG step 1	ACLG step 2	Categories
Urban	Urban	Capital City (CC) Metropolitan developed (D)	UCC, UDS, UDM, UDL, UDV
Urban fringe	Urban	Fringe (F)	UFS, UFM, UFL, UFV
Regional	Urban	Regional towns/city (R)	URS, URM, URL, URV
Rural	Rural	Significant growth (SG) Agricultural (A) Remote	RSG, RAS, RAM, RAL, RAV, RTX, RTS, RTM, RTL

The technical report referenced above includes an index of all Australian local governments (Appendix D). In the data collation workbook, we coded each local government based on the index and Table 1 above.

2.4 Data estimation method for filling survey data gaps

It is difficult to quantify the cost of cleaning up illegal EOLT dumping because the costs are usually combined with other waste types or cleanup activities (such as litter and street sweeping) (NSWOEH 2015). We asked survey recipients to provide as much detail as they were able, but some gaps existed that required filling through estimation, and not all local governments provided a survey response. This section describes steps used to estimate, where required, local government and state land manager illegal EOLT dumping data.

Local government coverage and estimation

Estimates of costs to local governments of illegally dumped EOLT and the number of illegally dumped EOLT were required where a local government did not respond to the survey, or did not respond with sufficiently comprehensive data. Generally, data points not covered by survey responses were filled in using per capita averages calculated from existing survey responses, based on the method described below. The use of supporting state government datasets to fill in gaps was explored, but only NSW EPA's RIDonline data was determined to have sufficiently granular data for use.

The first step in the estimation process was to analyse existing survey responses. This was to inform us how representative the data was and whether it was suitable to apply estimates or averages for the locations where no data was provided. Two key metrics, which assessed survey data by jurisdiction by local government class by cost component, were used in the analysis:

1. **Coverage**. The proportion of the Australian population represented by the local government survey responses.
2. **Variance**. The extent of data variation in relation to the mean, as expressed by the co-efficient of variation of the data (i.e. standard deviation divided by mean).

Selection bias[3] was considered and we determined, in consultation with TSA, that the presence of multiple null responses suggested an absence of, or limited, bias and that the average values of the data should be reasonably representative of Australian local governments.

Data by jurisdiction by local government class by cost component were assessed using the above two metrics. The following estimation process was then applied based on the assessment results.

1. Survey data were used for local governments that responded.
2. For non-respondents, estimates were made by cost component, where possible. Cost components include staff clean-up costs, vehicle and equipment hire, disposal or recycling fee, administration and investigation, enforcement and prosecution. Where a local government responded with total costs only, these costs were attributed to 'unspecified'. Where a local government responded with not all cost components, the available costs were applied and the missing costs estimated.
3. State datasets were used to estimate data for local governments that did not respond to the survey where appropriate. This includes NSW's RIDonline data for councils with a 'RID squad'.
4. Estimates based on available local government survey data were made for non-responding local governments that did not have other estimates available (e.g. from state government datasets). National or state averages were adopted, based on the following two steps.

[3] Selection bias is the effect that occurs when the participants in a study do not suitably represent the target population of the study. In the case of our survey, a non-response selection bias could have occurred if only the most interested councils (i.e. those with a large dumping issue) responded, and the councils that do not have a dumping issue did not respond.

5. If, based on the local government survey, the coverage was greater than or equal to 50% and the coefficient of variance was 1.5 or below, estimates were based on existing survey responses on the average cost per capita by jurisdiction, local government class and cost component.
6. In all other cases, estimates were based on existing survey responses on the population-weighted average cost per capita across Australia by local government class and cost component.

Following the data estimation process, we ran a sensitivity analysis on our estimated costs of cleaning up illegal dumping of EOLT to local governments. This was to determine whether further survey efforts would cause much change to the results. This was performed by using a random number generator for costs for ten non-responding local governments and using the minimum and maximum cost by cost component from available survey responses. The test runs resulted in total costs of less than or up to 10% difference to our current best estimate, suggesting potential new survey responses would not cause significant changes to the results.

State land manager coverage and estimation

We received four responses to the state land managers' survey, with additional information for seven state land managers obtained via targeted consultations. Due to the limited number of available data points, national averages by agency type (i.e. roads, parks and forests) based on existing survey responses were used to fill gaps for that agency type in other jurisdictions.

The following steps were followed for estimating data for state land managers that did not respond to the survey:

1. Survey and/or consultations data were used for state land managers that responded.
2. Estimates based on available state land manager survey data were made for non-responding state land managers based on the average cost per capita across Australia, by agency type.
3. Data was only estimated one time where there was more than one 'Roads', 'Parks' and/or 'Forests' state land management agency in a jurisdiction.

2.5 Estimation of non-market cost of illegal dumping

Illegal dumping imposes not only clean-up costs but also, while the dumping is in the environment, amenity and safety impacts on the community. The economic cost of these impacts is measured as the amount households would be willing to pay to avoid the impacts. These amounts were estimated using results from a large choice modelling survey conducted by the CIE for the NSW, Victoria and Queensland environmental regulators on willingness to pay for reduced litter and illegal dumping in various public settings across Queensland, Victoria and New South Wales (CIE 2022). The relevant values from that study are the amounts households would be willing to pay in exchange for reductions in the frequency with which they see illegally dumped waste (of all types, not only EOLT). Estimates of willingness to pay in other states were assumed to be a population-weighted average of the values for the three eastern states. The reduction in sightings of illegal dumping that would be delivered if EOLT dumping were to be eliminated was estimated based on responses to the local government survey about the share of EOLT in dumped waste. This reduction was allocated to different settings (National Parks, highways, industrial areas, etc.) based on the perceived share of commercial and industrial waste in illegal dumping reported by respondents to the 2022 CIE choice modelling survey. Values were then applied to the estimated change in sightings and aggregated over households.

Table 2 Estimates of household willingness to pay to reduce illegal dumping (CIE 2022)

Location	Willingness to pay $/household/month per unit decrease in the square root of the number of days per year seeing illegally dumped waste	Average number of days per year seeing illegally dumped waste
Queensland beaches	0.2788	24.6
Queensland highways	0.1810	64.0
Queensland industrial	0.1610	38.1
Queensland National Parks	0.2231	27.6
Queensland recreational parks	0.1451	33.4
Queensland residential	0.1403	83.2
Queensland retail	0.1084	39.8
Victoria beaches	0.3552	29.5
Victoria highways	0.1580	77.8
Victoria industrial	0.1988	43.2
Victoria National Parks	0.3535	40.5
Victoria recreational parks	0.1612	62.2
Victoria residential	0.2675	85.5
Victoria retail	0.2035	49.2
NSW beaches	0.3481	51.1
NSW highways	0.1896	68.4
NSW industrial	0.2215	51.2
NSW National Parks	0.4123	41.9
NSW recreational parks	0.2260	52.4
NSW residential	0.2452	93.4
NSW retail	0.1678	49.8

2.6 Estimation method for the costs associated with stockpiles

Another form of mismanagement of EOLT waste is stockpiling. Stockpiling differs from dumping in that the owner or operator of the land on which the EOLT waste is located is the perpetrator or one of the perpetrators. The illegal nature of the activity usually arises from either an excessive volume of EOLT or the location in which they are stored. Tyre stockpiling takes several forms. It may occur in warehouses due to intentional criminal activity, at industrial premises of businesses providing EOLT waste management services, or on rural properties. Some stockpiles are temporary, for example due to inventory mismanagement. Others are persistent. In this analysis, we aim to quantify the costs imposed on the community by large, persistent stockpiles on private land; that is, private stockpiles storing more than 5000 EOLT for more than 12 months. It is important to recognise that these costs do not capture the entire cost of tyre stockpiling.

The costs imposed on the community by EOLT stockpiling include the handling and transport costs involved in cleaning up stockpiles, when borne by the community, and the costs incurred when

stockpiles catch fire. The costs of stockpile fires include both financial costs, such as labour from firefighting and environmental regulators, and non-market costs, such as air and water pollution.

These costs vary from year to year depending on whether any major stockpiles are cleaned up or catch fire. In a specific year, there may be no fires and the out-turn cost may be zero, but this doesn't mean the community was not exposed to risk. Rather than measuring the out-turn costs for 2022-23, we estimate:

- the value of the risk to which the community was exposed in 2022-23 due to stockpile fires (the estimated annual likelihood of a stockpile fire multiplied by its estimated consequence)
- the cost that would be involved in cleaning up all identified stockpiles and transporting the waste to recyclers.

The current level of stockpiling forces the community to choose between these costs — either investing in clean-up costs (some of which may be recovered from land owners) or bearing the annual fire risk.

Several parameters are required for the estimation of these costs, including the volume of known stockpiles of EOLT, the unit cost of cleaning up stockpiles, the likelihood of stockpile fires, the clean-up costs associated with a fire, and the value placed by households on avoiding the air and water pollution caused by fires.

Prior to commencing this project, TSA had an incomplete database of current and historical EOLT stockpiles. Where available, this database recorded the location, size, and status. Clean-up costs were recorded where available. Blue Environment and the CIE conducted desktop research and sought information from state environment protection agencies to further populate this database. Few responses were received. Most of the identified stockpiles added to the database were found through news articles, state environmental regulator media releases, and local government organisations. TSA has also been surveying state agencies and intends to continue adding to the database over time. Data on clean-up costs were generally not available. Conversions between weights and counts were made by assuming 8 kg per equivalent passenger unit (EPU) (TSA 2020).

There is no sound basis for estimating the coverage of the existing database. For example, stockpiles in warehouses are not well captured by the database and their clean up cannot be confirmed by satellite images, so the extent of this type of stockpiling is unknown. We therefore estimated costs based only on identified stockpiles.

Based on the information in the database, the CIE categorised the status of each stockpile as either 'at reported size', 'below reported size', 'fully cleaned up' or 'unknown'. The 'below reported size' category captured stockpiles for which the size of the stockpile had been reduced by an unspecified amount following reporting of the size of the stockpile, often at the time of a state environmental regulator notice. Each stockpile was categorised as either 'private' or 'council', noting that several major EOLT stockpiles were identified at regional and remote council waste facilities.

The sizes of identified stockpiles, for the purpose of estimating economic costs to the community, was estimated by adding:

- the recorded size of stockpiles categorised as 'private' and 'at reported size'
- half of the recorded size of stockpiles categorised as 'private' and 'below reported size' (assuming the size of stockpiles in the process of being reduced is uniformly distributed between zero and the maximum reported size)

- for private stockpiles categorised as either ‘at reported size’ or ‘below reported size’ with no recorded size, the median stockpile size from the set of stockpiles with recorded size (median was preferred to average to avoid undue influence from overrepresentation of the largest stockpiles).

Other parameters were estimated based on information in the database and from a review of the literature.

3. Results

This chapter presents the survey response rates and main data findings obtained through implementation of the methods described previously. Further discussion of these findings is provided in Chapter 4.

3.1 Local government survey response rates

About 21% (115 out of 538) of Australian local governments responded to the survey, comprising about 30% of the Australian population. This is considered a reasonable response rate (Cleave 2020, IBAC 2023, Lindemann 2021). About 15% of local governments, equating to 20% of Australia, responded to the survey with financial cost data, and not all these provided data for each financial cost component (see Section 1.7). An additional 0.5% of the population was represented using datasets provided by state governments (see Section 2.2 for descriptions of these data sets and 2.4 for how they were applied). There were 28 comments stating that the financial cost data was not collected or unable to be separated from the financial costs of other waste.

The survey data contained a range of responses (including null responses; where EOLT dumping is not an issue for local governments) and it was determined that the average of the collation of available data was suitable for representing the remaining local governments without selection bias (see Section 2.4).

We also received information from three councils via phone or email communication, in response to our survey emails.

3.2 State land manager survey response rates

We approached government land managers responsible for roads, parks and forests in all states and territories. The national response rate was 25%, consisting of a combination of responses submitted through SurveyMonkey, and data provided through email or interviews. Responses were received from agencies in most jurisdictions, but numbers varied.

Multiple state agencies explained that data on EOLT is either not collected in a central location, or not collected at all, so they were unable to provide us with the requested data. We suspect that this was also the case with some of the other agencies that did not respond.

3.3 Estimated financial costs of illegal dumping to local government

The estimated financial cost to local governments for cleaning up illegally dumped EOLT in 2022-23 was about $6.5 million.

Figure 2 shows the breakdown of this cost across the financial cost components associated with managing EOLT. Staff clean-up time accounts for the largest financial cost to local governments, followed by disposal or recycling fees, then vehicle and equipment hire and administration.

Figure 2 Estimated financial cost paid by local governments to clean up illegally dumped tyres, by cost component, Australia 2022-23

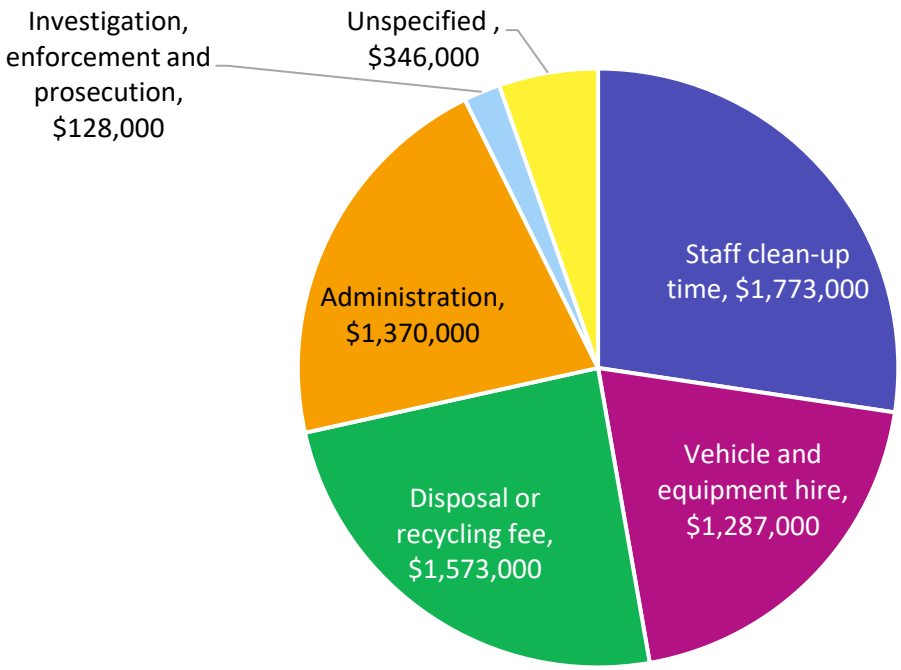


Table 3 Estimated financial cost paid by local governments to clean up illegally dumped tyres, by cost component, Australia 2022–23

Item	Value	Proportion of total cost
Staff clean-up time	$1,770,000	27%
Disposal or recycling fee	$1,570,000	24%
Administration	$1,370,000	21%
Vehicle and equipment hire	$1,290,000	20%
Investigation, enforcement and prosecution	$128,000	2%
Unspecified	$346,000	5%
Total cost	**$6,480,000**	
Total number of tyres	**300,000**	
Total cost per tyre	**$22**	

Our analysis found that, nationally, local governments cleaned up an estimated 300,000 EOLT at an average financial cost of $22 per tyre (Table 3). This cost is almost triple the average cost of disposing of a car tyre at a tyre shop (about $7.60). Figure 3 shows the estimated financial cost and number of dumped EOLT managed by local governments in each jurisdiction in Australia. However, this overall cost is influenced by the size and population of a jurisdiction. Therefore, Figure 4 represents the estimated cost per capita, highlighting that jurisdictions with low population densities are disproportionately impacted by the costs.

Figure 3 Estimated financial cost paid by local governments to clean up illegally dumped tyres and number cleaned up, by jurisdiction, Australia 2022–23

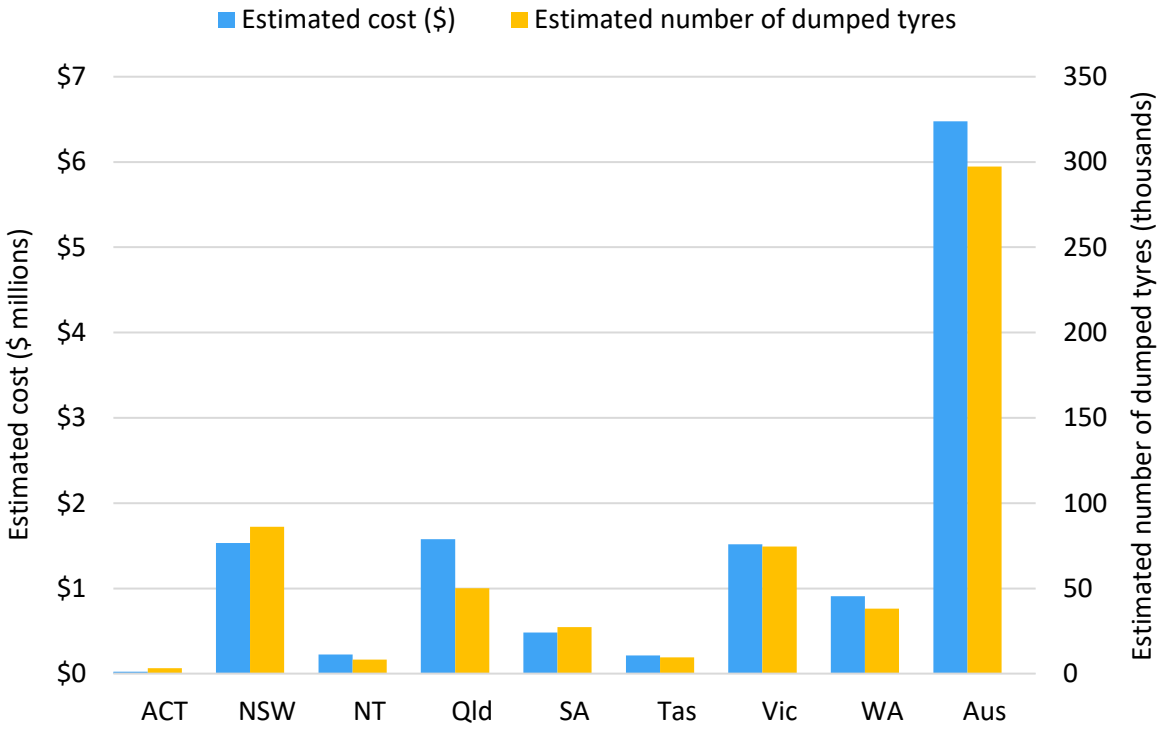


Figure 4 Estimated financial cost per capita paid by local governments to clean up illegally dumped tyres, by jurisdiction, Australia 2022–23

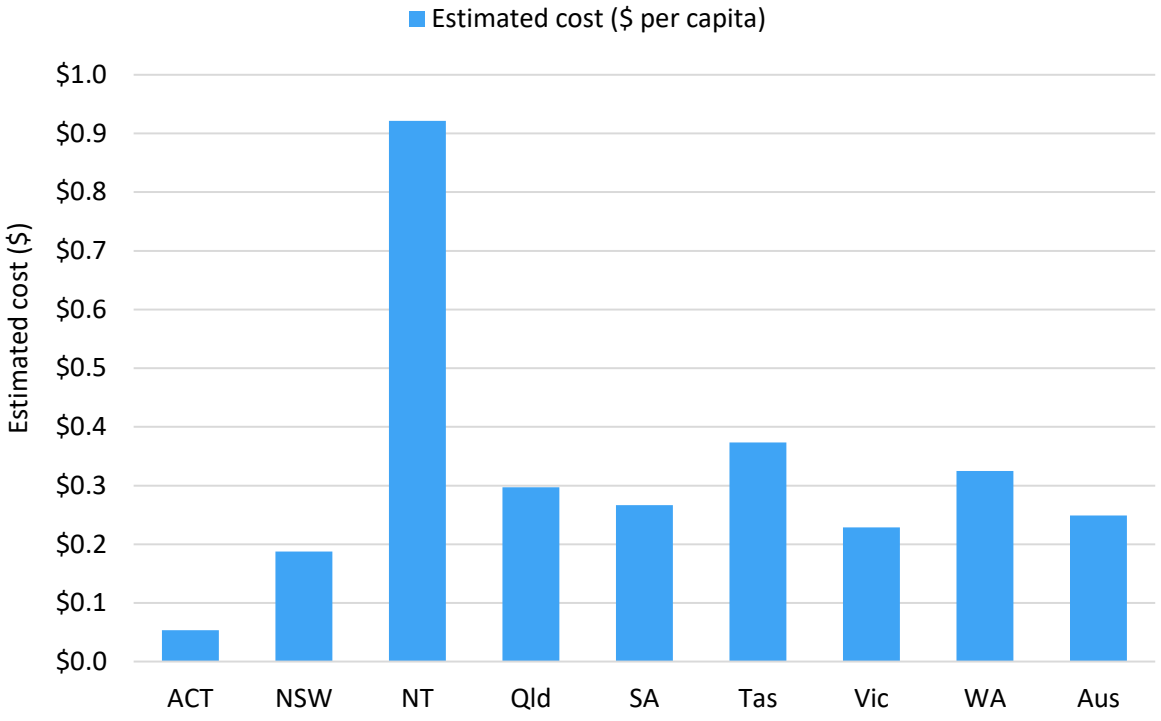
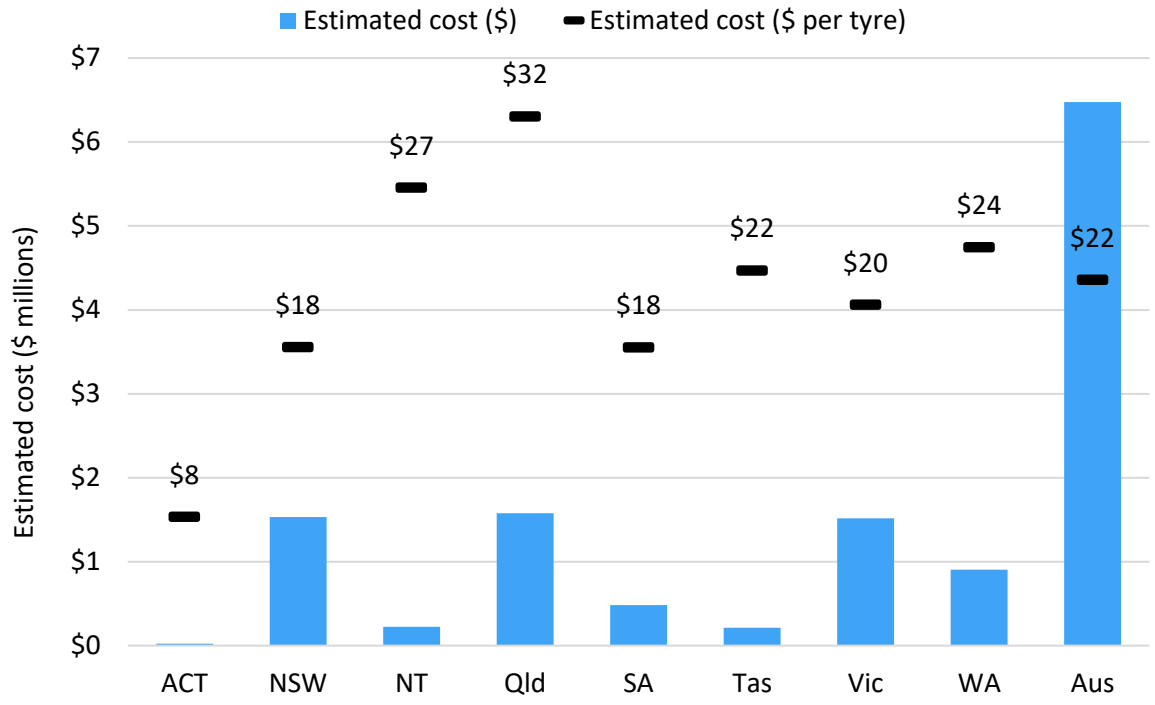


Table 4 Estimated financial cost paid by local governments to clean up illegally dumped tyres and number cleaned up, by jurisdiction, Australia 2022–23.

Jurisdiction	Estimated cost ($)	Estimated number of dumped tyres	Estimated cost ($ per tyre)	Estimated cost ($ per capita)
ACT	$25,000	3,000	$8	$0.05
NSW	$1,532,000	86,000	$18	$0.19
NT	$223,000	8,000	$27	$0.92
Qld	$1,578,000	50,000	$32	$0.30
SA	$484,000	27,000	$18	$0.27
Tas	$213,000	10,000	$22	$0.37
Vic	$1,516,000	75,000	$20	$0.23
WA	$907,000	38,000	$24	$0.32
Aus	**$6,478,000**	**300,000**	**$22**	**$0.25**

Estimated financial cost and cost per EOLT in the jurisdictions is shown in Figure 5. The estimates suggest that the highest cost per tyre was incurred by Queensland, at $32 per tyre, followed by Northern Territory and Western Australia. Possible reasons for these higher costs are unpacked in the Discussion Section and Case Study 2.

Figure 5 Estimated financial cost and cost per tyre paid by local governments to clean up illegally dumped tyres, by jurisdiction, Australia 2022–23



Local governments were grouped into one of four area classes (urban, urban fringe, regional and rural) using the method in Section 2.3. Illegal EOLT dumping appears to attract the highest total cost in urban fringe local governments (Figure 6). However, Figure 7 shows that when viewed per capita

to adjust for population, the cost (per capita) and number of EOLT cleaned up (per thousand people) in rural areas is approximately double that of the other areas.

Table 5 Estimated financial cost paid by local governments to clean up illegally dumped tyres, by local government class, Australia 2022–23.

Local government class	Estimated cost ($)	Estimated cost ($ per tyre)	Estimated cost ($ per capita)	Estimated number of dumped tyres	Estimated number of tyres per capita ($ per capita)	Estimated number of dumped tyres per 1000 residents
Urban	$744,000	$10	$0.07	72,000	0.0065	7
Fringe	$2,220,000	$27	$0.37	81,000	0.0136	14
Regional	$2,090,000	$31	$0.29	67,000	0.0093	9
Rural	$1,430,000	$19	$0.82	77,000	0.0439	44
Total	**$6,480,000**	**$22**	**$0.25**	**300,000**	**0.0114**	**11**

Figure 6 Estimated financial cost paid by local governments to clean up illegally dumped tyres and number cleaned up, by local government class, Australia 2022–23

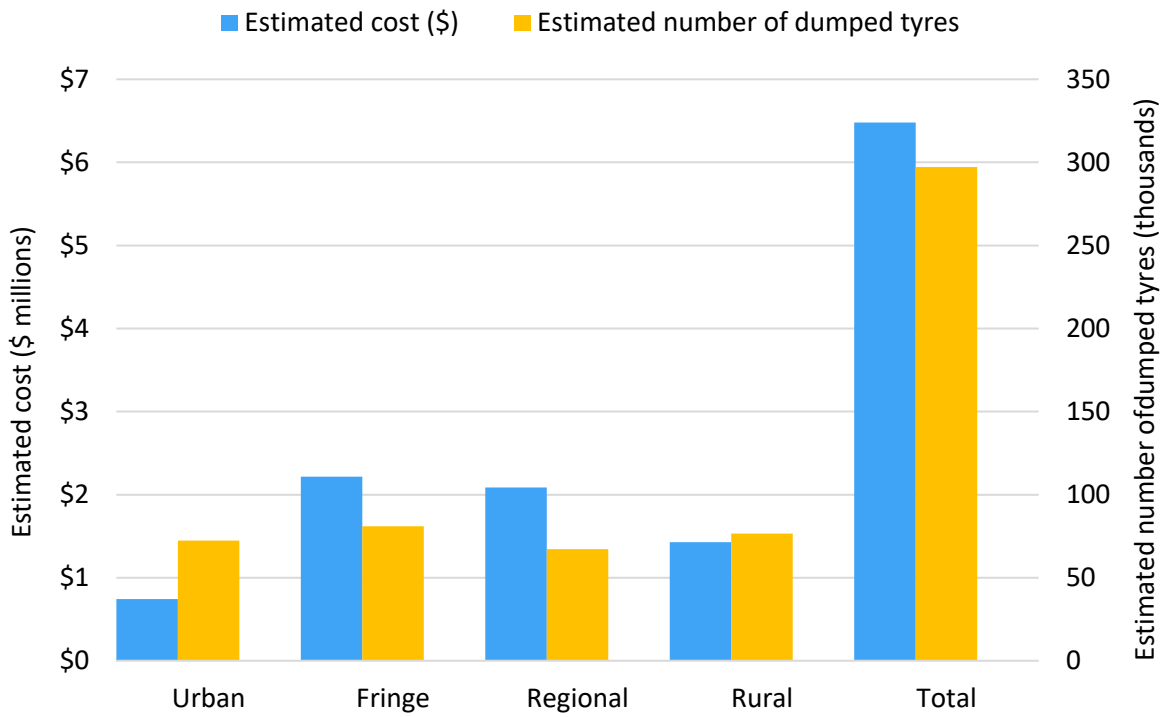


Figure 7 Estimated financial cost per capita paid by local governments to clean up illegally dumped tyres and number cleaned up per thousand residents, by local government class, Australia 2022–23

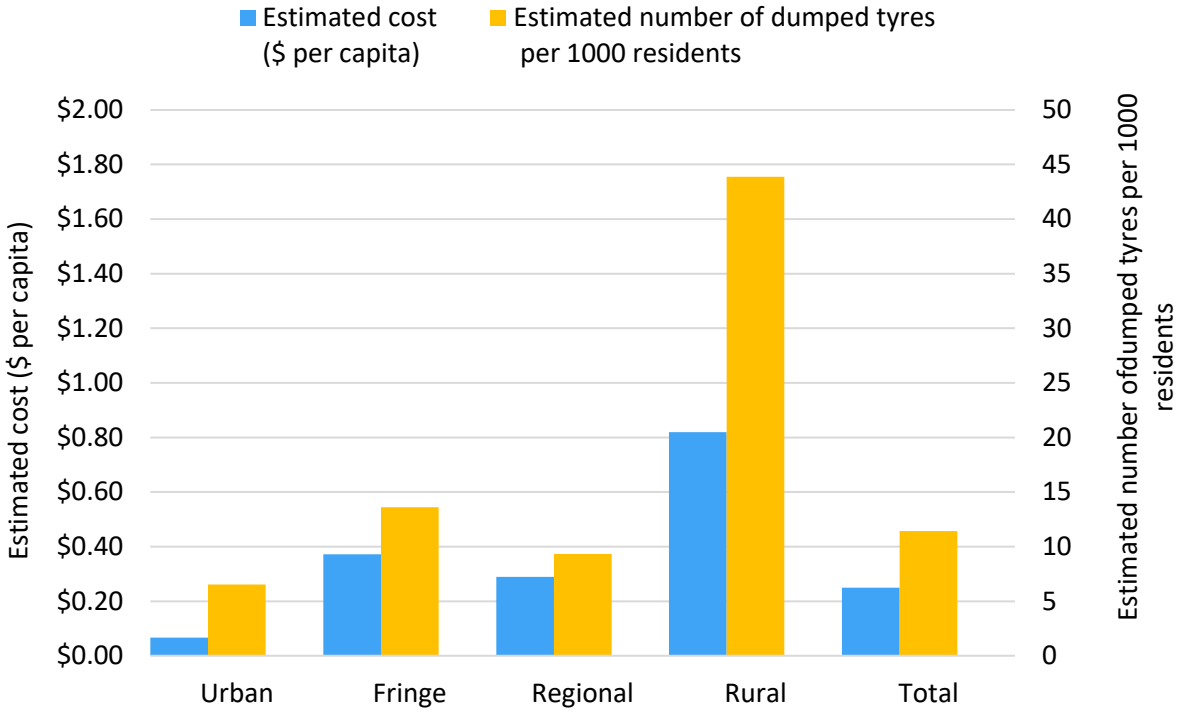


Figure 8 shows the estimated total financial cost and cost per EOLT by local government class incurred by local governments in 2022-23. Care should be taken when interpreting these costs because costs may differ depending on the fate of the EOLT, and the area type could have an impact on the typical fate. For example, fringe councils have greater access to recyclers and cleanup services, compared to rural councils (that were more likely to pick up and store the collected EOLT). Multiple rural councils reported low costs because they currently store the EOLT, but noted that prohibitively expensive costs of transporting and recycling these EOLT may need to be paid in future years. This is explored further in the discussion and case study 2 also illustrates the issue.

Figure 8 Estimated financial cost and cost per tyre paid by local governments to clean up illegally dumped tyres, by local government class, Australia 2022–23

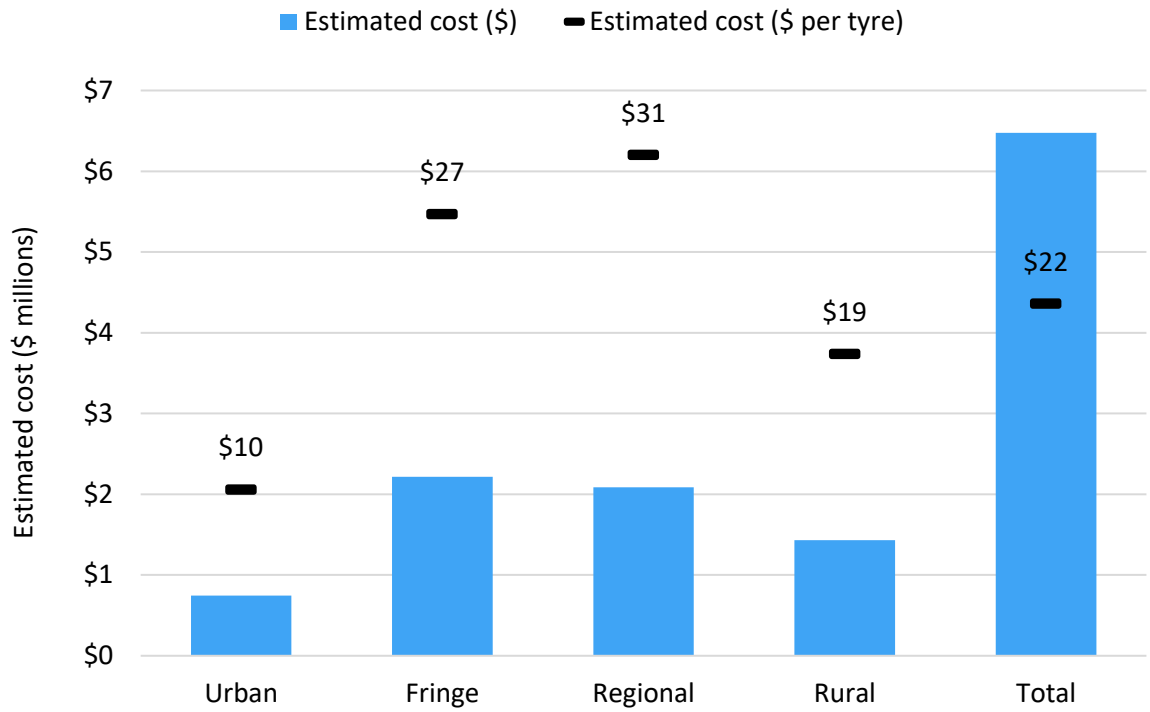
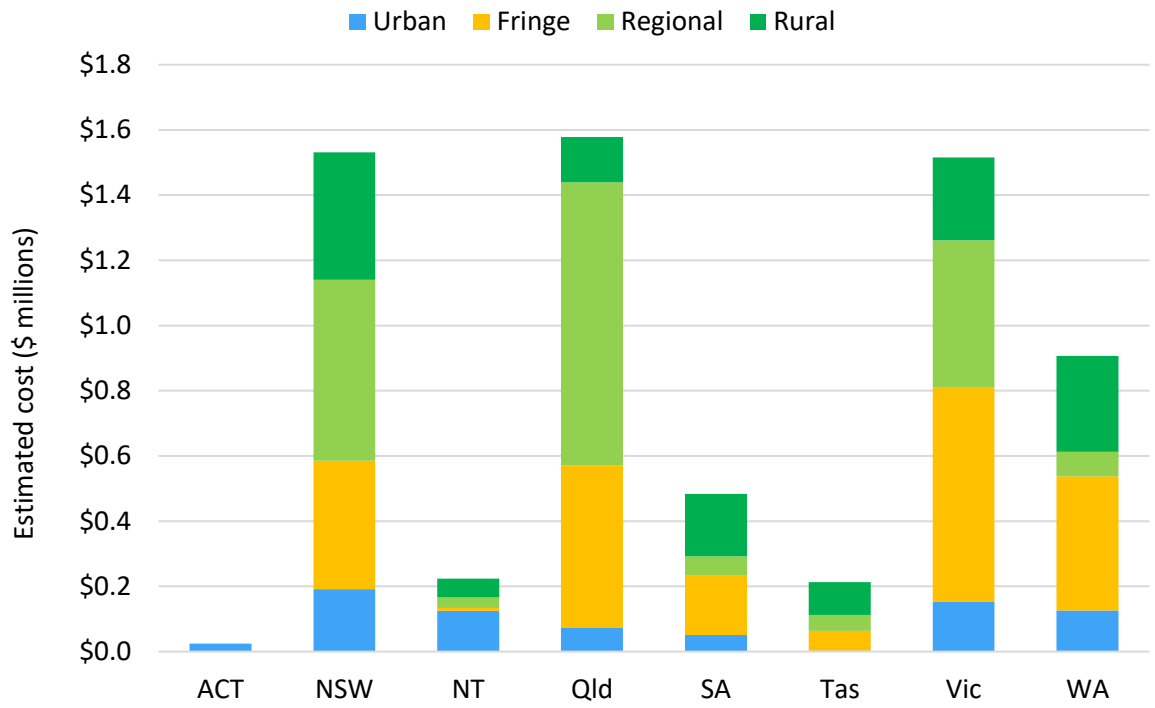


Table 6 Estimated financial cost paid by local governments to clean up illegally dumped tyres, by jurisdiction and local government class, Australia 2022–23

Jurisdiction	Urban	Fringe	Regional	Rural
ACT	$25,000	$0	$0	$0
NSW	$191,000	$394,000	$555,000	$392,000
NT	$125,000	$8,000	$33,000	$58,000
Qld	$72,000	$500,000	$867,000	$140,000
SA	$50,000	$184,000	$57,000	$192,000
Tas	$3,000	$61,000	$49,000	$101,000
Vic	$152,000	$658,000	$451,000	$255,000
WA	$125,000	$411,000	$76,000	$294,000
Aus	**$744,000**	**$2,217,000**	**$2,087,000**	**$1,430,000**

The financial cost of cleaning up illegally dumped EOLT on local governments by class and jurisdiction is shown in Figure 9.

Figure 9 Estimated financial cost paid by local governments to clean up illegally dumped tyres, by jurisdiction and local government class, Australia 2022–23



The survey asked local governments to specify which management option they typically use for dealing with cleaned up EOLT, giving four options: recycle, stockpile, landfill, other (Figure 10). Recycling was typical for urban, urban fringe and regional, but less than 30% of rural councils reported recycling as typical. Landfill and stockpiling became more common as population density decreased. The cost of storing EOLT can be considered 'incomplete', because the full cost of recycling or disposal is incurred at a later date when the stockpile is cleared.

Figure 10 Typical fate of tyres by local government class, Australia 2022–23 (%)

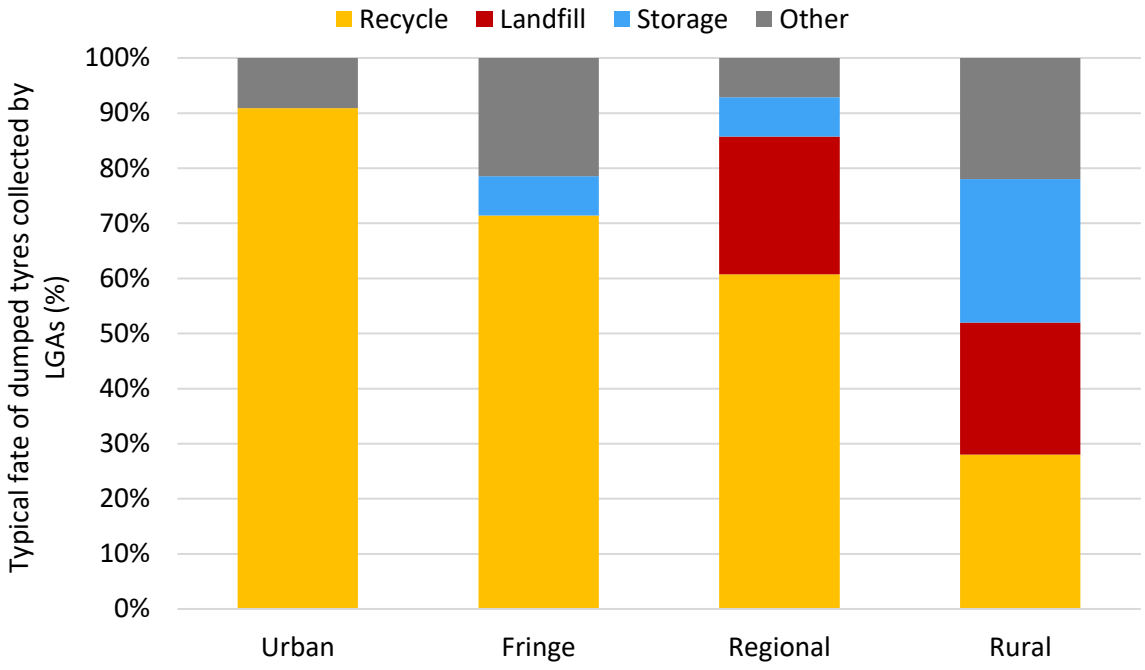
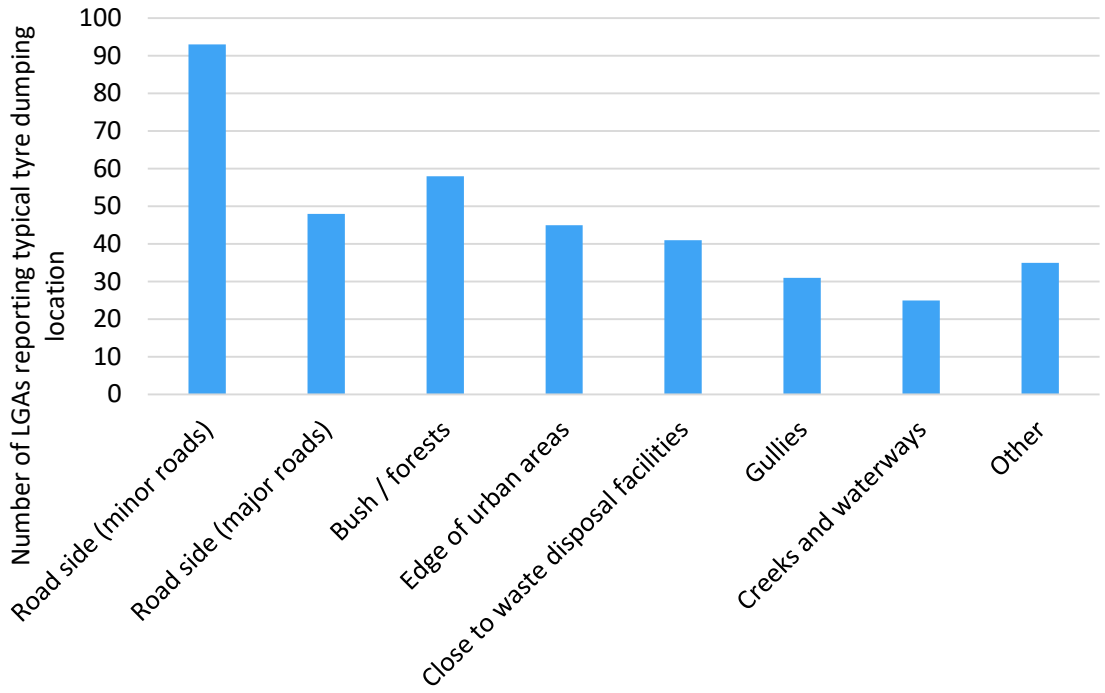


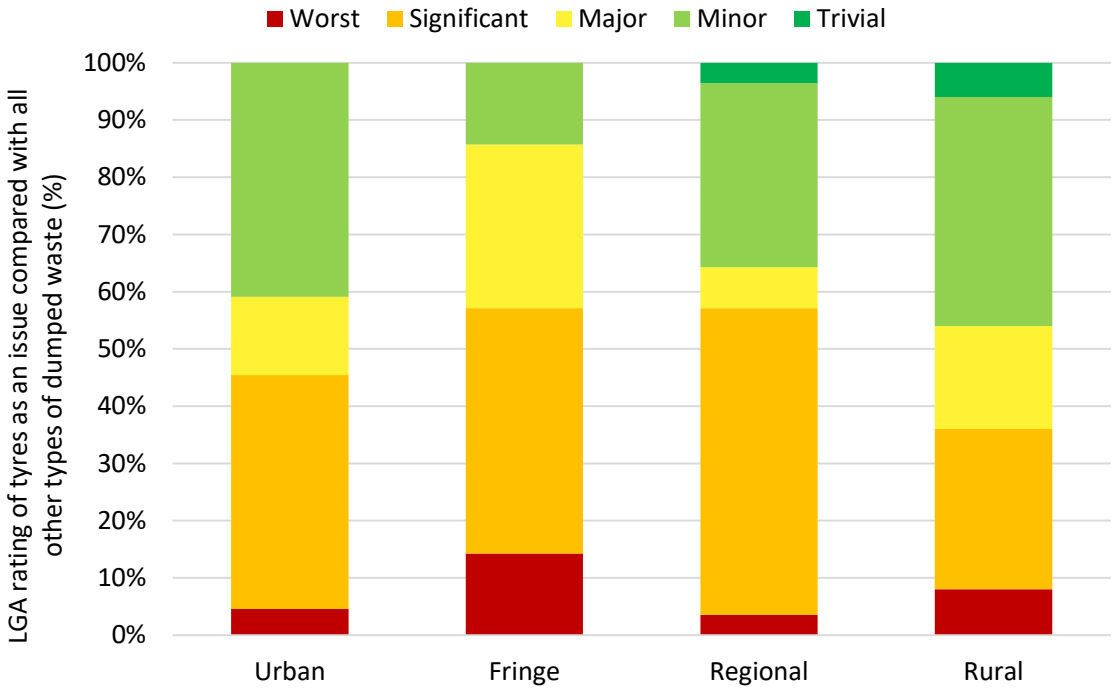
Figure 11 shows the typical locations where EOLT are dumped. The most common locations used for tyre dumping are roadsides, bush or forested areas and the edge of urban areas.

Figure 11 Typical locations of tyre dumping in local government areas



Councils compared waste EOLT to all other types of dumped waste, while considering factors such as quantity, difficulty, cost and management options. About 7% of councils rated EOLT as the worst dumped waste issue they face, while 16% rated EOLT as major, 39% as significant, 37% as minor, and 4% as trivial. Figure 12 shows how the rating differed depending on local government class.

Figure 12 Local government rating of tyres as a dumping issue compared with all other types of waste, by local government class, Australia 2022–23 (%)



The survey also asked local governments about the number of EOLT in the environment in their area over the course of 2022-23. Available responses showed that:

- for 69% of responding councils, the number of EOLT stayed about the same (they kept up with cleaning up new dumping)
- for 23% of responding councils, the number of EOLT increased (they could not keep up with the amount of new dumping)
- for 9% of responding councils, the number of EOLT decreased (they cleaned up new and historical dumping).

3.4 Estimated financial costs to state governments of cleaning up illegally dumped tyres

The estimated financial cost for state land managers to deal with dumped EOLT in 2022-23 was over $2.1 million. Our survey found that the costs for state land managers appear to be largely borne by road management departments. We estimate that, out of the states and territories, New South Wales incurred the greatest cost to manage dumped EOLT based on their population. The estimate used population statistics as a proxy for EOLT generation and potential for dumping.

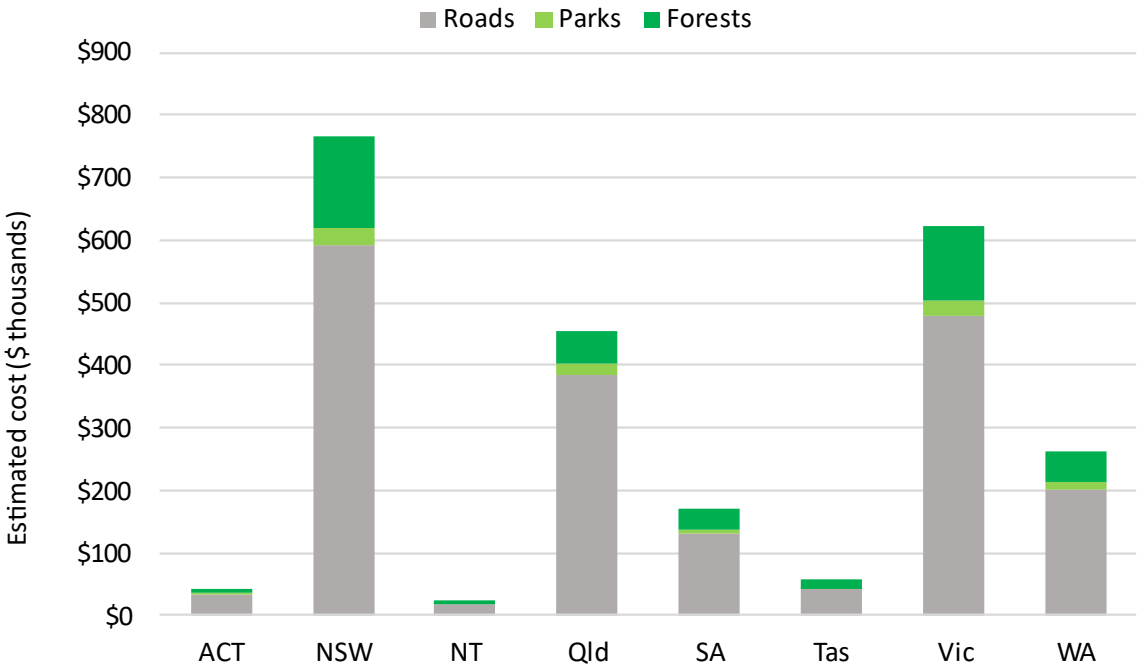
All of the four respondents that ranked the significance of EOLT as a dumping issue rated tyres as significant, major, or the worst dumping issue they face.

Three of the four state land managers stated that they typically recycle collected dumped EOLT, with the other stating it stockpiled and/or disposed of dumped EOLT.

Table 7 Estimated financial cost paid by state land managers to clean up illegally dumped tyres, by jurisdiction and environment type, Australia 2022–23

Jurisdiction	Roads	Parks	Forests	Total
ACT	$34,000	$2,000	$8,000	$44,000
NSW	$592,000	$29,000	$146,000	$766,000
NT	$18,000	$1,000	$4,000	$23,000
Qld	$385,000	$19,000	$50,000	$454,000
SA	$132,000	$7,000	$32,000	$170,000
Tas	$41,000	$2,000	$15,000	$58,000
Vic	$480,000	$24,000	$118,000	$622,000
WA	$202,000	$10,000	$50,000	$262,000
Aus	**$1,883,000**	**$93,000**	**$424,000**	**$2,400,000**

Figure 13 Estimated financial cost paid by state land managers to clean up illegally dumped tyres, by jurisdiction, Australia 2022–23



3.5 Estimated non-market costs of illegal dumping

As discussed in Chapter 2, the non-market costs of illegal dumping relate to loss of amenity and perceived safety and environmental impacts on the community. The economic value of these costs is measured as the amount households would be willing to pay to avoid the impacts. Unit values for these amounts are set out in Chapter 2.

Given the economic values we are working with relate to illegal dumping of all waste types, we need to estimate the degree to which illegal dumping would be reduced if tyre dumping were eliminated. The survey of local councils indicated that tyres comprised 14 per cent of dumped waste by weight. NSW EPA has estimated tyres make up 3 per cent of illegal dumping by incidence (NSW EPA 2022a, p.6.). We expect weight would be more closely correlated with amenity than a simple count of incidents, since it captures the fact that a larger volume of dumped waste will have a larger impact on amenity. It is also closer to data points observed reported by individual councils elsewhere, such as Lockyer Valley Regional Council reporting tyres accounting for almost 20 per cent of all illegally dumped waste over the 18 months to August 2023 (Lockyer Valley Regional Council 2023) and City of Greater Geelong reporting tyres make up 21 per cent of dumped items (City of Greater Geelong 2023). We therefore estimate households' valuation of a 14 per cent reduction in sightings of illegally dumped waste. When aggregated over all households in Australia, this reduction in illegal dumping is valued at around $101 million per year.

Table 8 Estimated household willingness to pay to eliminate tyre dumping

	Total change in sightings	Willingness to pay per household	Households	Total willingness to pay
	Sqrt(days/year)	$/household/year	Number	$million/year
Queensland	-2.6	5.2	2,126,512	11.1
Victoria	-4.2	9.7	2,650,001	25.8
NSW	-4.4	12.9	3,140,281	40.6
Rest of Australia	-3.9	10.0	2,354,000	23.5
Total				**101.1**

3.6 Estimated financial and non-market costs of stockpiling

As discussed in Chapter 2, we aim to quantify the costs imposed on the community by known, large, persistent stockpiles on private land; that is, private stockpiles storing more than 5000 EOLT for more than 12 months, that have been captured in the TSA database. It is important to recognise that these costs do not capture the entire cost of EOLT stockpiling. For example, as this report was being finalised a stockpile was identified at Mildura, with over 100,000 EOLT and clean-up costs of $900,000.[4] This stockpile has not been captured in our analysis and it is possible other stockpiles of similar size have yet to be identified. It is also important to note the TSA stockpile database does not capture stockpiling that is going undetected. Stockpiling in warehouses, to the degree it is happening, is likely to fall into this category.

We estimate:

- the value of the risk to which the community was exposed in 2022-23 due to stockpile fires (the estimated annual likelihood of a stockpile fire multiplied by the estimated consequence of a fire which involves both financial and non-market costs)
- the cost that would be involved in cleaning up all identified stockpiles and transporting the waste to recyclers.

The current level of stockpiling forces the community to choose between these costs — either investing in clean-up costs (some of which may be recovered from land owners) or bearing the annual fire risk.

Several parameters are required for the estimation of these costs, including the volume of stockpiled EOLT, the unit cost of cleaning up stockpiles, the likelihood of stockpile fires, the clean-up costs associated with a fire, and the values placed by households on avoiding the air and water pollution caused by fires.

Using the method outlined in Chapter 2, we estimate the current size of identified stockpiles at around 2.1 million EPUs or 17,000 tonnes. Table 9 shows how we have derived this estimate from the database of known stockpiles. We consider this estimate conservative, as it is based only on identified stockpiles and we use the median, rather than average stockpile size, for filling data gaps. The order of magnitude of this estimate appears reasonable given Randell, Baker and O'Farrell (2020) estimated annual additions to stockpiles are no more than 5,000 tonnes per year.

[4] https://www.epa.vic.gov.au/about-epa/news-media-and-updates/media-releases-and-news/huge-clean-up-cost-for-waste-tyre-dumping (accessed 2 April 2024)

Table 9 Estimating the size of identified stockpiles of tyres using the stockpile database

	Identified stockpiles at reported size	Identified stockpiles below reported size	Total
Stockpiles on database with size estimated (count)	10	3	13
Total size where estimated (EPU)	**1,721,000**	**371,000**	**2,092,000**
Stockpiles on database with no size estimated (count)	7	2	9
Total size where not estimated (assuming database median of 21,600 EPU/stockpile) (EPU)	**151,000**	**43,000**	**194,000**
Estimated total recorded size of identified stockpiles (EPU)	**1,870,000**	**414,000**	**2,290,000**
Weight	100%	50%	
Estimated total size of identified stockpiles (EPU)	**1,870,000**	**207,000**	**2,080,000**

What it would cost to clean-up identified stockpiles

The cost of cleaning up EOLT stockpiles varies with their location and the manner in which tyres have been stored. Environmental regulator activities that contribute to this cost include securing the site, scientific sampling and testing, and gathering evidence from local witnesses. State environmental regulators do everything possible to make stockpilers pay, but if it is impossible or impractical to do so, taxpayers ultimately pay the cost.

As noted in Section 1.7, stockpile clean-up costs are largely additional to the costs that would have been incurred had the waste been properly managed. When EOLT are illegally stockpiled and cleaned up by government, consumers of tyres pay for waste management twice – once to the commercial operator who stockpiles the tyres and a second time through rates or taxes to the government who cleans up the stockpile.

The most recent observations of the unit cost of cleaning up EOLT stockpiles include $3.94 per tyre in reparation costs ordered by Perth Magistrates Court (WA Government 2023), between $4 and $6 per tyre in costs of cleaning up the estimated 1 million tyres in the Stawell stockpile in 2017 (DEECA 2023, p.31.), and between $3 and $4 per tyre to clean-up the Numurkah stockpile in 2019 (ABC 2020). Earlier estimates from California are a similar order of magnitude at between $2.70 and $3.76 per tyre after adjusting for inflation and exchange rates (San Diego State University Institute for Regional Studies of the Californias 2009). Anecdotally, prices have increased in recent years following the COVID-19 pandemic, the baled tyre export regulations, and an increase in shipping costs.

TSA is surveying recyclers about quotations they have given for stockpile clean-ups. The response received to date implies a cost of $11.23 per tyre. This is considerably higher than the cost observed for the historical stockpiles discussed above.

Based on this evidence, we adopt a range estimate of incremental clean-up costs of between $4.00 and $11.23 per tyre. This implies a total cost of cleaning up identified stockpiles of between $8.3

million and $23.3 million. We note that some of this cost may be recoverable from responsible parties, including landowners.

The annual risk imposed by identified tyre stockpiles

The risk imposed by EOLT stockpile fires is the product of their likelihood and their consequence. We are aware of six major EOLT stockpile fires occurring over the last 11 years:

- Villawood, NSW in January 2013
- Numurkah, Victoria in May 2013
- Broadmeadows, Victoria in January 2016
- Rocklea, Queensland in June 2017
- Katherine, NT in July 2019
- Lincoln Gap, SA in February 2023.

We therefore assume a likelihood of one major fire every two years if EOLT stockpiles remain at their current levels. Some reports suggest there are many more smaller fires involving tyres (Boomerang Alliance 2022), but, since it is not known how many of these fires were associated with stockpiles, we limit our analysis to the costs of major fires.

There are three components to our estimated consequence (i.e. economic cost) of a tyre fire:

- firefighting and clean-up costs
- air pollution
- water pollution.

Financial costs

When a EOLT stockpile catches fire it is extremely difficult to extinguish. Fires typically require management by firefighters for several days. Local water utilities or stormwater managers may need to erect barriers to prevent run-off from entering waterways or pump contaminated water out of waterways. After the fire has burnt out, the site must be cleaned up. This may include soil testing by environmental regulators and transportation of soil to waste management sites.

There are few cost estimates available in the literature or from consultations with state agencies. Reviews have for many years cited the $600,000 cost of cleaning up a contaminated watercourse from a tyre fire in Bindoon, Western Australia, in 1990, and the $750,000 cost to the fire brigade from a tyre fire in Salisbury, Queensland, in 1992 (URS 2006). Deloitte Access Economics (2022) cite clean-up costs of $571,000 for small to moderate tyre fires, increasing to up to $25 million for a hypothetical stockpile fire the size of the Stawell stockpile at its peak. The total cost of cleaning up the Katherine tyre fire was estimated halfway through the clean-up process at $500,000 (Katherine Town Council 2020). Considering these data points, we adopt $600,000 as an estimate of the expected value of the clean-up cost of a major tyre stockpile fire.

Non-market costs

The cost of air pollution from waste fires, albeit not tyre fires specifically, was estimated by the CIE in a choice modelling study conducted for the Department of Climate Change, Energy, the Environment and Water in 2023 (CIE 2023). It found households were, on average, willing to pay $0.73 per adult per year to reduce by one the number of waste fires in their local government area over the next 20 years. Assuming a national adult population of 9.94 million and 566 local government areas, the average estimated economic cost of air pollution from a tyre stockpile fire is $256,320 per fire.

As a result of the costs incurred for clean-up and waterway management (discussed above), few tyre stockpile fires will result in waterway pollution. For example, the run-off from fighting the Broadmeadows fire was pumped out of creeks by Melbourne Water, preventing contamination of Merri Creek downstream (Utility Magazine 2016). This involved erecting signage, advising the community against using the Jack Roper Reserve, and ongoing water quality testing. We consider these costs to be captured by the clean-up cost estimate of $600,000 discussed above.

However, there remains a risk that some fires would pollute waterways. Contaminated water from the Villawood fire reached 1.5 km down a canal towards Georges River (O'Brien 2013). Experience overseas suggests a worst-case scenario would see contamination lasting for a year (Best and Brookes 1981). This means that non-market valuation studies estimating willingness to pay for river outcomes in 30 years' time, such as Gillespie and Bennett (2022), are not applicable. Cooper et al (2023) found Melbourne households would be willing to pay $2.39 million for a one percentage point increase in the Ecologically Healthy waterways in Melbourne (i.e. to change 80 km of waterways from Highly Modified to Ecologically Healthy). Morrison et al (2016) found that, in the Cooks River catchment in Sydney, households were willing to pay $3.51 per kilometre per year for five years to increase the length of streams that had "natural channels and native vegetation", while in the Georges River catchment households were willing to pay $1.14 per kilometre per year for five years.

We take an average of the two values from the Morrison et al (2016) study, adjusted for inflation, and multiplied by the 1.5 km observed for the Villawood fire to arrive at an estimate of household willingness to pay to avoid water pollution from a tyre fire of $4.31 per household. We aggregate this value only over households within the local government area (an average of 16,983 households) and apply it only to one in ten tyre stockpile fires (on the assumption that the preventative activities costed above will be effective in nine out of ten fires). This implies an expected cost of water pollution from a tyre stockpile fire of $7,325.

Summary

The estimated total economic cost of a tyre stockpile fire is therefore $863,645, comprising $600,000 in fire-fighting and clean-up costs, $256,320 in air pollution costs and $7,325 in expected water pollution costs.

Bringing together our estimated annual likelihood of tyre stockpile fires of 0.5 and our estimated economic cost of a tyre stockpile fire of $863,645, the expected value of the risk imposed on the community by tyre stockpiles is $431,823 per year.

4. Discussion

4.1 Financial costs of tyre dumping in local government areas

Dumped tyres are a nuisance for many Australian councils, with 61% of councils labelling tyres as significant or worse (7% 'worst', 16% 'major' and 39% 'significant'), when compared to other types of dumped waste. We estimate that illegally dumped tyres cost Australian councils about $6.5 million in 2022-23. Nationally, with an estimated 300,000 tyres cleaned up, the average clean-up cost was $22 per tyre. This cost per tyre is almost triple the average cost the former owners would have paid for disposing of a car tyre at a tyre shop (about $7.60)[5]. It is worth noting the following on our estimates of the cost of cleaning up illegally dumped tyres paid by Australian councils:

- Local governments that collect and store tyres do not pay for the full end of life management cost, which would eventually include recycling or disposal fees, until the stockpile is cleared.
- It is possible that disposal or recycling costs paid for by a local council have already been incurred once. For example, if a resident pays for disposal of a tyre, which is then inappropriately dumped by a commercial operator, and subsequently collected and recycled by a local council.

The greatest cost is associated with staff clean-up time, followed by disposal or recycling fee, vehicle and equipment hire and administration. Anecdotal evidence provided to TSA stated that recycling costs have increased in recent years following COVID-19, the tyre export regulations, and an increase in shipping costs. Investigation, enforcement and prosecution and unspecified costs were much lower than the other components. The low investigation cost could be due to the fact that there is usually very little evidence to follow.

The most common places that people dump tyres are roadsides, bushes/forests and at the edge of urban areas. Of the 121 local government survey respondents, 93 reported that the side of minor roads are a typical tyre dumping location. These areas are accessible and out of the public eye.

Urban fringe local governments incurred high costs per tyre

Interestingly, 'urban fringe' was the local government class with the second highest estimated cost per tyre ($27), while urban had the lowest ($10). It is not known for certain why this difference was so great, but there are a few reasons that could have contributed to the contrast between urban and urban fringe cost per tyre. Firstly, urban fringe areas are typically larger with more secluded locations that are preferred by dumpers, so there are more incidents occurring. It is common knowledge that dumpers travel from city centres, with few 'good' dumping locations, to fringe suburbs that are accessible but out of sight. These dumping sites may be easy to dump at, but difficult to collect from which would increase the effort and equipment requirements, (for example down a hill or embankment, see case study 1). They also host the most industrial hubs, which would be generating large numbers of EOLT at vehicle or tyre mechanics or retailers (as seen by the significant quantity of commercial scale dumping incidents). Additionally, warehouses in these industrial hubs might be used for temporary storage (sometimes with the legitimate intention of recycling the tyres) prior to the tyres being dumped nearby. Urban fringe regions are likely to have good access to recyclers, but the recyclers may still be a fair distance from the dumping site,

[5] The cost of tyre recycling varies across locations and depends on the size, presence of a rim and number being recycled at one time. Costs of recycling passenger tyres range from $1.64 to $11.00 per tyre (Barwon South West WRRG 2019; WALGA 2017; TSA unpublished). Truck and tractor tyres generally cost more to recycle, from $8.27 up to $58.75 per tyre (WALGA 2017). Prices have increased in recent years following COVID-19, the baled tyre export ban, and increase in shipping costs.

meaning that councils are paying for more staff or contractor transport time, compared to urban councils. It is also possible that urban fringe councils collect more data on the financial costs, because of the higher number of dumped tyres (per capita) that they clean up, compared to councils cleaning up fewer tyres that may have underestimated some costs (e.g. administration).

Urban fringe costs should also be viewed in comparison to regional and rural areas, which incurred financial costs of $31 and $19 respectively. The main contributor to this cost difference was the impact of regionality on transport costs, (which are reportedly the most variable cost component), and subsequently management type (recycle/storage/landfill).

Rural and regional tyre management - transport distance and local government stockpiles

According to one tyre recycling company, transport is the most variable cost associated with tyre recycling. Costs become prohibitive as the distance to disposal or recycling facilities increases. Some local governments in Queensland, Tasmania and Northern Territory reported stockpiled[6] EOLT at their landfills while they wait for adequate resources, external funding support or recycling to be made available in their area. This appears to be more common in regional and rural areas where local government areas are larger and facilities more spread out.

Written survey responses from local governments in rural or regional Queensland, Western Australia and Northern Territory, described how costs associated with transporting EOLT to a recycling facility are prohibitively expensive. In many cases, staff or contractors have already travelled more than 100 km to pick up the dumped tyres. These councils end up with stockpiles of EOLT at landfills, or waste left where it was dumped at the outskirts of towns. Case study 2 provides an example of this issue.

The following anecdotes illustrate the issue further:

- ‘The major factor limiting councils in the remote area is the cost in sending the tyres back to a recycling centre. … All remote councils in the NT also have a dumped car issue and end-of-life vehicle issue in general. The limiting factor is again financial. The remote councils are not equipped with the machinery or staff to process bulk waste like ELV or tyres and typically end up with either large stockpiles at their landfills or dumped waste on the outskirts of the towns.’ – response to our local government survey
- ‘The sheer costs associated with processing tyres here is exacerbated further by the distance needed to take the tyres to a credible … recycling depot. The normal person cannot afford council disposal fees and charges.’ – response to our local government survey
- A regional Queensland council that receives only tyres (legally) from the local tyre shops also has stockpiling issues. The storage is increasing each year due to unavailable funds for transportation off site. This also causes issues with the council's licence requirements. The Department of Environment and Science conducts annual inspections of its sites. The Council has 5 stockpiles of tyres that contain approximately 1.2 million tyres (calculation: 5 piles approximately 75m long x 30m wide x 7mtrs high with 16 EPU per m^3). – response to our local government survey
- Tyres attached to dumped cars also contribute to stockpiles in some Queensland councils. LGAQ explained to us that ‘People buy run-down cars for low prices, drive them up the coast and then abandon the cars when they break down’. After the cars are picked up, the metal is sold for recycling, but the tyres do not have enough value to be worth transporting for processing.
- ‘It is an expensive waste to deal with in the proper manner. Many people stockpile tyres on their property due to the cost of disposal. An amnesty funded by State/Federal funding to

[6] Council storages were not included in the costs of stockpiling reported in Section 3.5 but would impose some costs on communities.

manage stockpiles could assist in reducing this hazardous waste in the community.' – response to our local government survey.

The ongoing management of these stockpiles (e.g. stacking tyres appropriately or removing litter) also utilises valuable council resources. Regional councils would like to see more support for areas where costs are particularly impactful to the fate of EOLT.

Commercial dumping

Commercial dumping (i.e. incidents greater than 10 tyres) contributes to a significant proportion of dumped EOLT in terms of the number of incidents and the number of tyres. Our survey found that, about 14% of dumping incidents on local government land and 64% on state land (lowest: 10%, highest: 99%) were on a commercial scale. We compare this to a Western Australian local government survey in 2017 finding that 58% of tyre dumping incidents contained 5 or less tyres and 18% of incidents contained 6 to 10 tyres (WALGA 2017). The evidence suggests that commercial scale dumping behaviour fluctuates over time, but has increased in recent years, probably due to increasing costs across all parts of industry (transport, recycling processes, processing prior to export etc.), potentially greater profitability of rogue operations (discussed in detail below), and the export regulations leading to more tyres staying in Australia.

Clean-up staff and equipment requirements

Local governments reported some key factors that influence the cost of cleaning up dumped tyres. They outlined the following clean-up requirements that are specific to tyres:

- two people for lifting and safety
- separate vehicle because they cannot go in waste trucks
- tray back vehicle, trailer or truck (depending on tyre quantity)
- sort tyres by size before disposal
- de-rim for recycling
- cranes or mechanical lifting
- difficult locations are more expensive to remove from
- storage for efficient runs to tyre recycler
- special contractors that charge a higher fee.

Recycling fee factors

Multiple factors can increase the recycling fees incurred by local governments. Firstly, tyres that have been dumped in the environment, are often dirty upon collection. Recyclers are unable to readily process dirty tyres and often charge a higher gate fee (usually double the normal rate) to account for the cleaning. Additionally, where there is already a significant supply of tyres, recyclers may choose not to accept the dirty tyres, in preference for the clean tyres. In some cases, local governments are required to de-rim the tyres before delivery, which increases staff labour costs, otherwise they may be given the option to pay an additional fee for delivery of tyre including rim. Finally, if the tyres are unable to be delivered to the recycler, there will be a collection fee that is additional to the gate fee.

Even the recycling of legally disposed tyres can be challenging for councils. 'It is very difficult to price tyres for acceptance at a facility as the weighbridge operators need to know the diameter of the tyre and the difference types. Also, some recyclers charge many or most tyres from a landfill as dirty. This is double the cost and an unexpected waste charge to the customer on disposal.' – local government survey response.

The illegal dumping team of a local government in NSW stated that they think the reason for most of the dumped tyres is because the local landfill has a quantity limit per person and there is only one recycler in the area, which is a long travel distance from many residents and requires clean tyres and a fee. Hotspots in the bush are used for bulk dumping (assumed commercial), but small incidents (of 2-3 tyres) occur everywhere.

4.2 Financial costs of tyre dumping on state land

State land managers are responsible for the care of state parks, forests and roads, including the land surrounding those roads. One of the main issues they deal with is illegally dumped waste. Illegally dumped tyres cost state land managers in Australia an estimated $2.1 million in 2022-23.

The data analysis suggests that the majority of the burden sits on road managers. As mentioned in the Section 4.1, this is likely to be because roadsides are inherently accessible to vehicles. An example of tyre dumping at the EJ Whitten Bridge is described in Case Study 1. In this case study, the dumping affects two land managers, the Department of Transport and Planning, and Melbourne Water.

While roads may attract the greatest number of dumped tyres, forests and parks are also dumping targets. Dumping in forests reportedly costs more per tyre than on roads, because the tyres are more difficult to collect and more often require specialist equipment or double handling (see case study 3). For example, staff may carry the tyres out of a forest, then the tyres are moved by other staff to a central location, before being collected by licenced waste specialists. An example of continual tyre dumping in state forests including the collection costs and challenges are described in Case Study 4. Forest land managers also reported difficulty with surveillance, since dumpers may not return to the same site twice, or may vandalise equipment, such as cameras.

There tends to be a higher proportion of commercial scale dumping incidents on state land (64%), than local government land (14%), where commercial refers to incidents greater than 10 tyres. These commercial dumping incidents would be from a combination of legitimate businesses and illegal waste disposal operators (often called ‘rogue operators’).

Illegal waste disposal operators

Many local governments and state land managers suspect that commercial or rogue operator dumping behaviour contributes to a significant amount of the dumped tyres that they deal with. These tend to work as follows:

1. A business claiming to be a waste disposal operator approaches mechanics shops and other small businesses offering a service to remove and dispose of used passenger vehicle and motorcycle tyres.
2. Some businesses take up the offer and pay the relevant fees to remove and dispose of their waste tyres.
3. The waste tyres are taken away but are not delivered to an appropriate facility. Thousands of tyres are dumped across many locations, sometimes spanning multiple local government areas. Instead of dumping the tyres, the rogue operators may stockpile them on rented private property (often in warehouses) and then abandon the site.

Case Studies 1 (EJ Whitten Bridge) and 3 (HQ Plantations) contain examples of suspected rogue operator tyre dumping. Figure 14 taken from a Boomerang Alliance report breaks down the cost of tyre recovery compared to costs for rogue operators. In the last two years, rogue operators have been able to increase their charges from $1 or $2 per tyre to up to $3.50 per tyre. This is because the

operating costs for legitimate operators increased, leading them to increase their prices, in part because of the export regulations (legitimate prices are now greater than $4) (Wheeler 2024).

Figure 14 Cost of tyre recovery compared to costs for rogue operators

Aspect of recovery	Appropriate minimum cost/ passenger tyre	Rogue operator's price behaviour
Collection and transport	$0.80	- No jockey to driver assist loading (Work Cover standard) - No workers' compensation or superannuation for staff
Facilities	$0.55	- Overstocking site (fire and disease hazard) - No insurance (insurance for a licensed site is as high as $5 million p.a.)
Safety and licencing	$0.15	- No fire, water or waste infrastructure - No government licenses or local government approvals
Initial processing	$0.35	- Capital cost of shredders are five times that of a baler - Illegal operators dump whole tyres
Sale of product	$0.26	- Until October 2014 legitimate operators received a financial benefit of 8.5¢ per EPU from the sale of product. Recent international developments have seen the market for TDF crash. As a result it now costs recyclers some 26¢ per EPU to dispose of their products
MINIMUM COST	$2.11/tyre	- Illegal operators avoid around 85¢/tyre by operating in an unsafe and illegal manner

Source: Boomerang Alliance 2022, p. 56

4.3 Non market costs of dumping

The community dislikes seeing dumped tyre waste. We estimate the total economic cost across Australia of illegal dumping of tyres on amenity and community safety concerns is in the order of $100 million each year. This represents roughly $4 per person per year — in the order of 0.02% of gross domestic product. While we are confident in the order of magnitude of this estimate, there is some uncertainty over the precise cost arising due to assumptions made in aggregating consumer willingness to pay over various locations and assumptions made in estimating the share of illegal dumping comprised of tyres.

On this basis, the amenity impact on the community is the largest of the problems generated by tyre dumping and stockpiling. The estimated cost of these impacts is significantly higher than the estimated cost incurred in cleaning up illegal tyre dumping each year. It would therefore be worthwhile considering what further actions could be taken by governments to prevent dumping or clean it up more quickly to reduce this cost.

4.4 Financial costs of stockpiles

Tyre stockpiles are imposing a significant economic costs on the community. We estimate that each year the community is bearing a risk of financial costs from major tyre fires valued at around $300,000. Experience indicates that every two years there will be a large tyre stockpile fire costing

the community around $600,000 in costs associated with firefighting and clean-up. Case Study 5 in the following chapter contains a brief history on the stockpile at Lincoln Gap and the fire that occurred in early 2023.

To remove this risk, stockpiles would need to be cleaned up. We estimate it would cost between $8.5 million and $23.3 million to clean-up 20 identified private stockpiles. Some of this cost may be recoverable from responsible parties, including landowners.

Only one of these two cost estimates should be included in an estimate of the 'size of the problem' of tyre dumping and stockpiling, alongside the non-market costs of stockpiling discussed in Section 4.5 below.

The resulting estimate of the size of the problem could be considered conservative because:

- In principle, the size of the problem should also include the cost of cleaning up annual additions to tyre stockpiles, which would be required to limit fire risks to their current level. Unfortunately, there are insufficient data currently available to estimate annual additions.
- These estimates represent the cost of private stockpiling only. They exclude the cost of stockpiles at remote and regional local government landfill sites, which, despite being managed by government, nevertheless impose similar fire risks and deferred transport costs to private stockpiles. They also exclude the costs of stockpiles in warehouses, which are not well recorded.
- We have considered only the risk of major stockpile fires. There may also be risks from smaller fires. Boomerang Alliance (2020) claims that 'In NSW alone there were over 322 fires involving tyres between 2008 and 2013.'
- We have not included lost productivity or financial costs to the health, of vector-borne diseases (dengue fever, Ross River fever, Barmah Forest virus etc.) from mosquitos bred in tyre stockpiles due to a lack of quantitative evidence allowing attribution of disease to stockpiles.

It should also be noted, for the purpose of using this estimate of the size of the problem in economic cost-benefit analysis, that it is not net of profits generated by perpetrators of stockpiling.

4.5 Non-market costs of stockpiles

In addition to the financial costs imposed on the community by stockpiles discussed in Section 4.3 above, stockpiles impose the risk of the community incurring non-market costs. We have estimated that each year the community is bearing a risk of non-market costs from tyre fires valued at $263,645 per fire. Experience indicates that every two years there will be a large tyre stockpile fire costing the community around $256,320 in air pollution costs and $7,325 in expected water pollution costs.

This estimate could be considered conservative because:

- These estimates represent only the costs from private stockpiling. They exclude the cost of stockpiles at remote and regional local government landfill sites, which, despite being managed by government, may still impose some fire risks on surrounding communities.
- We have considered only the risk of major stockpile fires. There may also be risks from smaller fires.
- We have not included non-market costs of vector-borne diseases.

4.6 Global tyre dumping statistics

Tyre dumping and the associated market and non-market costs is a stubborn issue, with countries across the globe struggling with the increase of waste tyre production and incorrect disposal. Three examples are provided below from countries which follow a similar illegal dumping management framework to Australia (Smith 2022; Bevan 2022; Walsh 2023).

1. In 2007, the State of Washington, USA, removed 32,671 dumped tyres at a cost of $US4.3 million, and an average of 3,035 tyres for around $US700,000 every year until 2020 (Washington State Department of Ecology 2023a). Some funds for this program came from a $1 fee charged on each new replacement tyre sold in Washington. Over 55% of the Department of Ecology's funding has gone to tyre cleanup activities since 2015 (Washington State Department of Ecology 2023b).
2. Thousands of tyres were illegally dumped in a privately owned forest in Ireland, costing the landowner the equivalent of $12,000 AUD (Walsh 2023). Council spent resources reaching out to the landowner and appealing to the public for information.
3. Comprehensive data on illegal dumping in England is available from 2014 to 2022, due to compulsory council reporting requirements; noting that it excludes the majority of private land incidents and large-scale incidents dealt with by the Environment Agency. In both the 2020-21 and 2021-22 years (April-March), 15,000 tyres dumping incidents were reported (DEFRA 2023). They were the least common category for dumping, accounting for 1% of the total dumped waste, bearing in mind that most other categories included a range of items such as 'white goods' or 'electrical'. Dumping incidents are typically 'small van load' or 'car boot or less', adding to the indication from a Western Australian survey finding that 58% of tyre dumping incidents contained 5 or less and 18% of incidents contained 6 to 10 tyres (WALGA 2017).

The local government survey conducted for this work suggests a clean-up rate in Australia of 11 tyres per thousand people. The data from England suggests about 0.27 incidents of tyre dumping per thousand people but does not specify the number of tyres. However, unless the English dumping averaged more than 40 tyres per incident, Australia's dumping and clean-up rates for EOLT greatly exceed those of England. Australia's greater land mass appears to provide more opportunities for dumping.

Australia's recovery rate can also be compared with international statistics. According to a 2022 review of end-of-life options for tyres, 'Due to the relative low cost of tyres and the complexity related to recycling, worldwide around 41% of the total amount of end-of-life tyres is discarded into landfills or stockpiles without any recovery of the material or of the energy' (Valentini and Pegoretti 2022). Australia is about on par with than the global average, with a tyre recovery rate of 58% (TSA 2023b).

4.7 Programs in place to prevent dumping and stockpiling

This section describes some of the various programs that currently exist to prevent or prosecute dumping and stockpiling.

State environmental regulator programs

The environmental regulators in most jurisdictions run illegal dumping or illegal waste disposal programs. These programs are designed to prevent illegal waste behaviours and support investigation and prosecution. For example, EPA Victoria runs an illegal waste disposal program which uses data, drones, partnerships or other methods, to prevent large scale dumping and hold offenders accountable. In Victoria, EOLT are a 'reportable priority waste' and must be tracked via the

EPA Waste Tracker System. The EPA can use the waste tracker data to identify businesses suspected of illegally transporting or storing waste tyres. In mid-2023, EPA Victoria ran a series of snap inspections for potentially non-compliant businesses. The idea was to find and hold the people and businesses responsible, instead of having poorly managed illegal stockpiles that could be a fire risk or result in expensive EPA clean-up operation in the future (EPA Victoria 2023c).

Reporting dumped tyres

Witnesses can report incidents of dumping or stockpiles directly to their local government or through online systems such as Snap Send Solve or RIDonline (Snap Send Solve 2023; NSW EPA 2022b). Incidents can also be reported to the environmental regulators via phone. An incident is typically handed over to the appropriate local government, state land manager or private property owner, depending on the location and size of the issue, with environmental regulators engaging with clean-up or investigation only when incidents are large enough to require their involvement or there is actionable evidence.

While tyres are a less-reported dumped waste type, Snap Send Solve has experienced 'an average of 62% increase in dumped tyre reports year on year since August 2019' (EPA Victoria 2023a; Snap Send Solve 2023). NSW RIDonline data shows a trend of increasing reports of tyre-related illegal dumping incidents across the last six years.

Local government enforcement and education programs

Here, we describe some publicly available examples of efforts local governments have taken in recent years to reduce waste tyre dumping.

1. Gladstone Regional Council (2020) in Queensland experienced an increase in illegal dumping and appealed to their residents to stop the behaviour in their 'Don't Dump in our Backyard' campaign. This was after the number of investigations in a 3-month period jumped from 28 in 2019 to 106 in 2020. The council identified hotspot areas and found that 'most offences occur in land located on the outskirts of urban areas where offenders are less likely to be seen by members of the public'.
2. Brisbane City Council suggests that people can curb illegal dumping by request a transfer station receipt from contractors removing waste, someone borrowing a vehicle to remove waste or employees removing waste using business vehicles (Brisbane City Council 2023).
3. The Bellarine Peninsula in Victoria has been labelled a hotspot for illegal tyre dumping. The council responded to over 4000 cleanup requests for illegal dumping (i.e. not illegal dumping of tyres only) that cost around $800,000 in 2022 (Sciberras 2023). It has also invested in rock barriers and CCTV to try to reduce dumping.
4. Lockyer Valley Regional Council, Queensland, reported that from February 2022 to August 2023, illegally dumped tyres accounted for almost 20 per cent of all identified illegally dumped waste, with only general household waste being a larger contributor (Lockyer Valley Regional Council 2023). Over two years, council officers removed more than 1550 tyres dumped on public land. The council employs a full-time Illegal Dumping Compliance Officer, cameras and access to vehicle registration data to enforce and fine offenders.

Successful prosecutions

Tyres are not a commonly reported type of dumping incident, which means there is a lower chance of witness evidence for prosecutions. Additionally, tyres do not retain much physical evidence, so the most common evidence reported to us was photographs or video footage. A local government and forestry company reported that they installed cameras, but the dumpers vandalised the

equipment or went to alternative locations. Despite the difficulties with obtaining evidence, some successful prosecutions have been outlined below.

1. A successful prosecution of a commercial tyre dumper in South East Queensland was undertaken by the Department of Environment and Science (DES). 'Over the course of a few months in 2018, a small business owner operated a waste disposal business in South East Queensland. The business would approach mechanics shops and other small businesses offering a service to remove and dispose of used passenger vehicle and motorcycle tyres. A number of businesses took up the offer and paid the relevant fees for the removal and disposal of their waste tyres. About 3,500 waste tyres were taken away but were not delivered to an appropriate facility. Instead, they were dumped across some 17 locations spanning different local government areas. DES investigated the dumping, successfully identified the alleged offender and prosecuted the offences. The alleged offender pleaded guilty to illegal dumping and carrying out an environmentally relevant activity without an Environmental Authority. The Court imposed a fine of $30,000 plus investigation and legal costs. No conviction was recorded. We understand that the tyres were cleaned up by the relevant local governments in each location.'
2. In 2018, EPA Tasmania issued an environmental infringement notice to multiple Tasmanian tyre retailers for the illegal disposal of used tyres. For example, Tazzy Tyres (Kingston) was fined $3,180 for disposing about 500 waste tyres on land managed by Sustainable Timber Tasmania and subsequently collected the tyres and disposed of them appropriately (EPA Tasmania 2018).
3. In August 2021, the illegal dumping taskforce of the City of Logan, Queensland located a large pile of illegally dumped 'hoon-damaged' car tyres in Park Ridge (City of Logan 2022). Subsequent review of footage captured by covert surveillance devices identified an offender. Investigators initiated enforcement against the registered owner of a vehicle used in the commission of the offence. A compliance notice was issued that forced the removal and lawful disposal of the tyres at the offenders' cost and a $2,757 fine was issued.

5. Case studies

This section sets out four scenarios of tyre dumping and one of tyre stockpiling. It looks at the costs and challenges faced by organisations responsible for cleaning up the waste.

5.1 Case study 1 - Tyre dumping at the EJ Whitten Bridge, Victoria

The EJ Whitten Bridge in Kealba, Victoria, forms part of the M80 ring road freeway that connects Melbourne's western and northern suburbs to other main freeways. The bridge crosses high over the Maribyrnong River. The Department of Transport and Planning (DTP) is responsible for maintaining the bridge and land around it, while Melbourne Water is responsible for managing the river and embankments. Commercial scale tyre dumping under the bridge is an ongoing and expensive problem for both organisations. The dumping is suspected to occur here because the area is close to an industrial park, with multiple access tracks or roads, and away from the public eye. Based on the quantities, DTP suspects that nearly all the dumping under the EJ Whitten Bridge is by commercial operators.

Figure 15 Tyres dumped under the EJ Whitten Bridge in Victoria's western metro area (1)

Photo provided by Department of Transport and Planning.

In just 3 months, about 2500 tyres accumulated under the EJ Whitten Bridge, requiring a DTP clean-up that cost $49,000. Due to the large number of tyres, DTP's contractors negotiated a new rate with a local recycler of $12/ tyre instead of the usual flat $30/ tyre.

The EJ Whitten Bridge roadside reserve shares borders with private property. This has made access for dumpers easier because they can enter the property and reserve via an access track, or enter via the gate on McIntyre Drive, by cutting the locks on the gates at either site. The track gets dumpers away from public sight. DTP has now installed a new structurally reinforced gate into the reserve.

Demarcations and safety protocols mean that Melbourne Water is responsible for the dumped waste that ends up in the Maribyrnong River or on the river bank. This means two clean-up operations need to be undertaken. Figure 18 shows the tyres remaining on the river bank after the DTP cleanup was completed.

Figure 16 Tyres dumped under the EJ Whitten Bridge in Victoria's western metro area (2)

Photo provided by Department of Transport and Planning.

Figure 17 Tyres dumped under the EJ Whitten Bridge in Victoria's western metro area (3)

Photo provided by Department of Transport and Planning.

Figure 18 Dumped tyres on the banks of the Maribyrnong River under EJ Whitten bridge, following DTP cleanup

Figure 19 Dumped tyres in the Maribyrnong River

Photos taken by Lisa McLeod, Blue Environment.

5.2 Case study 2: Council tyre stockpiles in rural Queensland following clean-up efforts

Tyres are the primary waste issue for some councils in Queensland. The Local Government Association of Queensland (LGAQ) explained how greater distances between towns, lead to challenges with dumping and council stockpiles, because it is not cost effective to transport and arrange for processing.

In the central-west and north-west regions of Queensland, many councils have stockpiles of tyres removed from the environment or received from local residents. We understand that in some cases, the scale of these stockpiles exceeds their permit requirements, but moving them to a recycler is apparently not financially viable. Shredding and landfilling may also be cost-prohibitive, and is not environmentally preferred. The risk of fire represents a (non-market) environmental cost on communities.

'Transporting out of the region for processing is too expensive, so they just pile the tyres up' – LGAQ.

A volumetric waste survey from Queensland's Central West region was performed as part of LGAQ's regional waste management plan development process. The photos in this case study were a part of that survey. The region is made up of seven councils and encompasses over 390,000 km^2 with a population density of less than 0.05 persons per km^2.

Figure 20 About 7,000 tyres stored at a landfill in north-west Queensland

Photo provided by LGAQ

'At present we are storing waste tyres that we do collect, in hope that a tyre recycling facility is established, but many tyres are also left where they are observed as no-one can afford to fund their disposal. It can be a 500 km round trip to collect waste tyres in our region, so the costs are considerable when compared to smaller council areas' – survey response from a rural council responsible for a large land area.

Disposal of EOLT is currently allowed in Queensland landfills but fire and environmental costs are a concern. LGAQ is working with the state government to ban tyres from landfill and require tyre retailers to arrange recycling of the old tyres. At the time of writing, retailers are not required to accept EOLT when they supply customers with new tyres, and customers who do not want to pay the tyre retailer disposal fee are able take the EOLT home. Sometimes these uncollected tyres are subsequently dumped. LGAQ would like to see this 'loophole' closed and more EOLT recovered.

Figure 21 The tyre area at a landfill in central west Queensland containing about 720 m^3 of material

Photo provided by LGAQ

The North Queensland Regional Organisation of Councils wrote to Australian MPs in March 2023 requesting a mandated stewardship scheme (NQROC 2023). One council stated in our survey, 'We need a better product stewardship system where the retailers are required to take used tyres and pass on to an approved recycling facility. If the disposal is factored into the purchase price of tyres that incidence of dumping will reduce dramatically'.

Figure 22 Some of the 7,650 m^3 of tyres stockpiled at another landfill in central west Queensland

Photo provided by LGAQ

'A key example of why more work is needed to support remote communities to deal with end-of-life tyres.' – LGAQ

5.3 Case study 3 - Tyre dumping in Queensland plantations

HQPlantations is a private company that operates in 78 state forests along Queensland's east coast. They advise that tyres are the worst dumping problem they face, with approximately 50% of all dumped waste being tyres, costing the business tens of thousands of dollars per year to clean up.

In one case cited by the company, a person repeatedly hired trucks to collect tyres from dealers then dumped the tyres in the company's plantations. There were 50 or more tyres per dump site and at least eight sites within the relevant plantation licence area. With the cooperation of the rental company, HQPlantations were able to match coordinates of tyre dump sites in their plantations with the GPS tracking from the rental car company and identify the culprit. He was successfully prosecuted in court and fined $30,000. HQPlantations paid all costs associated with the clean-up but were not able to recover any of this money. The fine proceeds went to the Queensland Government.

Figure 23 Tyres with and without rims dumped in a Queensland state forest

Figure 24 Tyres dumped in a Queensland state forest

Photos provided by HQPlantations

Even when plantations are close to urban areas, cleaning up tyres in forested areas can require special equipment and double handling, which increases the cost. Additionally, dumped tyres are often dirty and may attract a higher recycling fee or even be rejected. Dumped cars with tyres attached are also an issue for HQPlantations. The Beerburrum plantation alone received hundreds of dumped cars per year at its peak, now down to around 50 per annum.

Figure 25 Beerburrum 'donut pad'

Figure 26 Tyres dumped at Beerburrum Plantation

Photos provided by HQPlantations.

5.4 Case study 4 - Tyre dumping on a crown reserve and managed by a New South Wales local government

In late 2023, Shoalhaven Council found 67 tyres dumped on the side of an unnamed track just off of Yerriyong Road. The location of the tyre dumping was a Crown Reserve, just south of a motorcycling facility and bordered by several nature reserves and conservation areas. Figure 27 and Figure 28 provided show the tyres on the track and the clean-up effort.

This number of tyres was unusual for the Council, which reported that dumping incidents typically have 4-10 tyres per incident. Council suspects the tyres were dumped by a 'back yard' tyre operator who may well advertise their services via online platforms. Council considers the main tyre retailers and vehicle service operators in Nowra to be reputable.

Figure 27 Tyres dumped on a track just off Yerriyong Road, in Yerriyong, NSW.

Photo provided by Phil McNeice, Shoalhaven City Council, NSW.

Council's ranger services work closely with the South Nowra Correctional Centre's community project team, led by a Senior Corrections Officer and comprising inmates nearing the end of their custodial sentence. The waste was removed by hand and taken to one of Council's recycling and waste facilities. The waste disposal charge for this incident was an estimated $1675 ($25 per tyre). Had a private contractor been engaged, the cost would have been at least $1000 higher.

Figure 28 A Corrective Services Community Project Team collecting dumped tyres in Yerriyong

Photo provided by Phil McNeice, Shoalhaven City Council, NSW.

5.5 Case study 5 - Lincoln Gap tyre stockpile fire in South Australia

A licensed waste tyre treatment operation and transport business in Lincoln Gap hosted five large tanks, each 15 m high with a 40 m diameter (ABC News 2023). Four were being used to store tyres prior to processing and the stockpile grew to an estimated 500,000 tyres (EPA SA 2020). In 2019, the licence was varied by EPA SA, preventing receipt of new tyres so the stockpile would decrease, however, no significant reduction occurred (EPA SA 2023). EPA SA issued a clean-up order which was to be fulfilled by 2021, but instead the site was abandoned.

Two of the large tanks filled with tyres were set alight on 23 February 2023 (Figure 29) during a summer heat wave. The Country Fire Service, Metropolitan Fire Service and State Emergency Service worked day and night to put the fire out (ABC Emergency 2023). Police attended and traffic control closed off parts of the Eyre and Lincoln Highways. The other two full tanks were at risk of catching fire but, luckily, did not.

Figure 29 Tanks engulfed at the Lincoln gap fire tyre, with piles of tyres in the foreground

Image supplied to ABC News by the Country Fire Service (ABC News 2023)

Local residents and businesses were advised to remain indoors and keep doors and windows closed to avoid the smoke. Smoke also significantly reduced visibility on the roads, affecting drivers. The fire tied up important resources during the heat wave and Country Fire Service crews were still attending the fire 5 days later (CFS 2023).

Information on the costs related to this fire is not publicly available. Based on previous major tyre fires, we estimate the potential cost at about $0.75 million, the bulk of which would be firefighting and clean-up costs but also including the non-market cost of pollution.

Figure 30 Fighting the tyre fire in the Lincoln Gap tanks

Image from EPA SA website (EPA SA 2023).

5.6 Case study 6 - Tyre dumping on Victorian road sides

Over the past 12 months, Victoria's DTP has seen an increase in illegal dumping in Victoria, 'not just in the west but across the wider metro region'. Whether this has been solely for tyres, or demolition material, a spike in escalation, cost, and transfer fees could potentially be the cause for this. Across the network, particularly within roadside reserves where access can be gained, dumping occurs out of the public eye. This means that those people would need to be scoping specific areas to dump. DTP reports that tyre dumping has spiked in 2023, with incidents ranging from 10-20 tyres or in recent cases, 2500-3000 tyres at a time.

The cost of cleaning up dumped tyres to the DTP is approximately $120,000 for the first quarter of 2023-24 financial year and includes the following cleanups:

Location	Approximate number of tyres	Clean-up cost
EJ Whitten Bridge	2500	$49,000
Laverton Shared User Path (SUP)	3000	$51,000
Other hotspots, including the Western Ring Road SUP	Unspecified	$20,000

Figure 31 Tyres dumped on Laverton shared user path in Victoria's west

Photo provided by Department of Transport and Planning

5.7 Case study 7 - Tyre waste from burnouts

A significant issue in Shoalhaven, NSW, is 'burn-outs' and tyres that are subsequently removed and left behind. The tyre debris and dust left behind on the road surface percolates down the road and enters Tianjarra Creek which is habitat to two endangered frog species.

Figure 32 Tyre debris from 'burn outs' collected by DTP, November 2023

6. Conclusions

Dumped tyres are a costly nuisance to councils and land managers.

- Compared to other types of dumped waste, 61% of responding councils nominated **tyres as significant or worse.**
- Cleaning up illegally dumped tyres cost Australian councils about $6.5m in 2022-23.
- Nationally, an estimated 300,000 tyres were cleaned up in 2022-23, at an average cost of about $22 per tyre. This cost per tyre is almost triple the average cost for responsible disposal of a car tyre at a tyre shop (about $7.60).
- The greatest component of the cost is staff clean-up time, followed by disposal or recycling fee, vehicle and equipment hire and administration.
- Regional councils were calculated to face the greatest cost per tyre, followed quite closely by councils on the urban fringe.
- Regional and rural councils face transport costs that are prohibitive to tyre recycling, and they often store tyres while awaiting resources or new waste facilities.
- An estimated 11 tyres per thousand people were cleaned up from Australian local government land in 2022-23.
- Non-market costs, such as reduced enjoyment, amenity and effects of fires, are paid by all users of the land. The amenity impact on the community when quantified is much larger than the financial costs of clean-up.
- Governments are spending more on cleaning up dumped tyres than the expected cost if they were recycled or disposed through legal channels.
- People are willing to pay much more than the current management cost to avoid the risk and loss of amenity caused by dumped waste.

Table 10 Summary of report findings

Item	Value (2022-23)
Estimated financial cost of cleaning up dumped tyres on local governments	$6.5 million
Estimated cost per tyre cleaned up	$22
Estimated number of dumped tyres cleaned by local governments	300,000
Estimated financial cost of cleaning up dumped tyres on state land managers	$2.4 million
Estimated size of identified stockpiles[7]	>2.1 million EPU
Public cost of cleaning up identified stockpiles	$8.3 to $23.3 million
Estimated average economic cost of a tyre stockpile fire	$864,000
Non-market costs[8] of dumped tyres	$100 million
Expected value of the risk imposed on the community by tyre stockpiles	$432,000

[7] Includes illegal private stockpiles from commercial operations but does not include local government stockpiles

[8] Non-market costs are the non-financial impacts of tyre dumping on communities, such as amenity, safety and the environment.

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Appendix A Survey questions

Appendix A Survey questions

A1 End-of-life tyre dumping survey (local gov't)

This section contains images of the SurveyMonkey form for the local government survey.

About this survey

This survey aims to capture the cost to local government of managing dumped tyres in 2022-23 financial year.
We expect it will take 10 to 15 minutes.
Individual council data will not be published.
The focus of this survey is diffuse dumping of waste tyres. We will talk to EPAs about major stockpiles of abandoned tyres.

Instructions:

Please complete the questions below.
Best estimates are fine if accurate data is not readily available.
If you have any queries, please contact Laura Rhodes by email at laura.rhodes@blueenvironment.com.au or phone on 03 9081 0440.

Contact details

Council name:

Contact person name:

Contact person role:

Contact email address:

State or Territory

Region type

1. Compared with all other types of dumped waste, how would you rank waste tyres as a problem on the land you manage (taking into account quantity, difficulty, cost, management options, etc.)?

- ◯ Worst
- ◯ Major
- ◯ Significant
- ◯ Minor
- ◯ Trivial

2. What were the common location types for dumped tyres (select all appropriate options)?

- ☐ Road side (major roads)
- ☐ Road side (minor roads)
- ☐ Gullies
- ☐ Creeks and waterways
- ☐ Bush / forests
- ☐ Close to waste disposal facilities
- ☐ Edge of urban areas
- ☐ Other (please specify)

3. What did you mostly do with the dumped tyres you collected?

- ◯ Recycle
- ◯ Landfill
- ◯ Stockpile
- ◯ Other (please specify)

4. Please tell us what you can about the scale and costs of your management of dumped waste **of all types** in 2022-23 financial year:
(Please enter a number. Decimals, percentages, and non-numeric characters are not accepted)

estimated number of waste dumping incidents cleaned up

estimated cost of clean-ups ($)

What components are you including in this cost estimate?

- ☐ Staff clean-up time
- ☐ Vehicle and equipment
- ☐ Disposal or recycling fee
- ☐ Administration
- ☐ Investigations, enforcement and prosecution

If you are able, please estimate the value of components included in the cost specified above:
(Please enter a number. Decimals, percentages, and non-numeric characters are not accepted)

Staff clean-up time ($)	
Vehicle and equipment hire ($)	
Disposal or recycling fee ($)	
Administration ($)	
Investigation, enforcement and prosecution ($)	

Comments or explanations related to this cost information:

5. Please tell us what you can about the scale of your management of dumped tyres in 2022-23 financial year:
(Please enter a number. Decimals, percentages, and non-numeric characters are not accepted)

estimated proportion of all cleaned up waste that was tyres (% by weight)	
approximate total number of waste tyres cleaned up	
estimated proportion of tyre dumping incidents that involved dumping of more than 10 tyres at once (%)	

6. Does cleaning up dumped tyres have any particular costs compared with other waste types (e.g. two people required; shredding)?

- [ ] No
- [ ] Yes (please specify)

7. Over the course of 2022-23, did the number of end-of-life tyres in the environment in your Council area:

- ◯ increase (you couldn't keep up with the amount of new dumping)
- ◯ stay about the same (you kept up with cleaning up new dumping)
- ◯ decrease (you cleaned up new and historical dumping)
- ◯ I have no idea about this.

8. Are you aware of any major illegal stockpiles (>5,000 tyres) in your local government area? If so, we may contact you for more information.

- ◯ Yes
- ◯ No

9. We plan to include case studies in our report. Do you have any potential incidents we could use (e.g. successful prosecutions or particularly challenging or egregious incidents)? If so, please include a couple of sentences below and we may contact you for more information.

10. Do you have any other comments that you think might be relevant to this issue (e.g. problems with dumped cars or council stockpiles of collected tyres)?

Done

A2 End-of-life tyre dumping survey (state land managers)

This section contains images of the SurveyMonkey form for the state land manager survey.

About this survey

This survey aims to capture the cost to government of managing dumped tyres in 2022-23 financial year.
We expect it will take 10 to 15 minutes.
Individual land manager data will not be published.
The focus of this survey is diffuse dumping of waste tyres. We will talk to EPAs about major stockpiles of abandoned tyres.

Instructions:

Please complete the questions below.
Best estimates are fine if accurate data is not readily available.
If you have any queries, please contact Laura Rhodes by email at laura.rhodes@blueenvironment.com.au or phone on 03 9081 0440.

Contact details

Agency name:	
Region name:	
Contact person name:	
Contact person role:	
Contact email address:	

State or Territory

1. Compared with all other types of dumped waste, how would you rank waste tyres as a problem on the land you manage (taking into account quantity, difficulty, cost, management options, etc.)?

- ◯ Worst
- ◯ Major
- ◯ Significant
- ◯ Minor
- ◯ Trivial

2. What did you mostly do with the dumped tyres you collected?

- ◯ Recycle
- ◯ Landfill
- ◯ Stockpile
- ◯ Other (please specify)

3. Please tell us what you can about the scale and costs of your management of dumped waste **of all types** in 2022-23 financial year:
(Please enter a number. Decimals, percentages, and non-numeric characters are not accepted)

estimated number of waste dumping incidents cleaned up

estimated cost of clean-ups ($)

What components are you including in this cost estimate?

- ☐ Staff clean-up time
- ☐ Vehicle and equipment
- ☐ Disposal or recycling fee
- ☐ Administration
- ☐ Investigations, enforcement and prosecution

If you are able, please estimate the value of components included in the cost specified above:
(Please enter a number. Decimals, percentages, and non-numeric characters are not accepted)

Staff clean-up time ($)

Vehicle and equipment hire ($)

Disposal or recycling fee ($)

Administration ($)

Investigation, enforcement and prosecution ($)

Comments or explanations related to this cost information:

4. Please tell us what you can about the scale of your management of dumped tyres in 2022-23 financial year:
(Please enter a number. Decimals, percentages, and non-numeric characters are not accepted)

estimated proportion of all cleaned up waste that was tyres (% by weight)	
approximate total number of waste tyres cleaned up	
estimated proportion of tyre dumping incidents that involved dumping of more than 10 tyres at once (%)	

5. Does cleaning up dumped tyres have any particular costs compared with other waste types (e.g. two people required; shredding)?

- ☐ No
- ☐ Yes (please specify)

6. Over the course of 2022-23, did the number of end-of-life tyres in the environment in your area:

- ◯ increase (you couldn't keep up with the amount of new dumping)
- ◯ stay about the same (you kept up with cleaning up new dumping)
- ◯ decrease (you cleaned up new and historical dumping)
- ◯ I have no idea about this.

7. We plan to include case studies in our report. Do you have any potential incidents we could use (e.g. successful prosecutions or particularly challenging or egregious incidents)? If so, please include a couple of sentences below and we may contact you for more information.

8. Do you have any other comments that you think might be relevant to this issue?

Done

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TSA0333/04.2023