Storage of waste tyres – Regulatory impact statement (RIS)

Regulatory impact statement (RIS)

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This Regulatory Impact Statement has been prepared in accordance with the requirements of the *Subordinate Legislation Act 1994* and the *Victorian Guide to Regulation*.

Regulatory Impact Statement

In accordance with the *Victorian Guide to Regulation*, the Victorian Government seeks to ensure that Regulations are well targeted, effective and appropriate, and that they impose the lowest possible burden on Victorian businesses and the community.

The Regulatory Impact Statement (RIS) process involves an assessment of regulatory proposals and allows members of the community to comment on proposed Regulations before they are finalised. Such public input provides valuable information and perspectives, and improves the overall quality of Regulations.

This RIS has been prepared to facilitate public consultation on the proposed Environment Protection (Scheduled Premises and Exemptions), (Fees) and (Industrial Waste Resource) Amendment Regulations. A copy of the proposed Regulations is attached to this RIS.

Submissions are now invited on the proposed Regulations. Unless requested by the author, all submissions will be treated as public documents and may be made available to other parties.

Written comments and submissions should be forwarded by no later than 5:00 pm, 31 October 2014 to:

Waste Tyres RIS

Policy and Regulation Unit

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Executive summary

The number of used or waste tyres generated in Victoria each year is growing, entering a local market of relatively low regulatory controls and low rates of reuse and recycling. This has resulted in significant volumes of waste tyres going unaccounted for and an increase in the number of large stockpiles and stores in open areas and warehouses, as well as smaller illegal dumping on private and public lands (Table ES1). It is estimated that nearly 50,000 tonnes of waste tyres (approximately 6 million waste passenger car tyres) were unaccounted for in Victoria in 2012–13, believed to be stockpiled or illegally dumped.[1]

Table ES1: Destination of waste tyres in Victoria (in 2012–13)

Destination of waste tyres	Total tonnes	Million EPU	% of total
Recycling[2]	17,248	2.2	20
Export	23,119	2.9	26
Stockpiled as an end point	47,742	6.0	54
Illegal dumping			
Retreading	Not specified[3]	–	–
Energy production	Negligible[4]	–	–
Civil/structural reuse	Not specified	–	–
Landfill	Negligible[5]	–	–
Total	**88,109**	**11.0**	**100**

Note: Totals do not sum due to rounding.

Note: Tyre volumes are presented in equivalent passenger units (EPU). An EPU is based on the typical mass of material in a passenger motor vehicle tyre. Each EPU has an assumed mass of 9.5 kg and, on average, the approximate conversion rates are: Truck tyres represent between 2 EPU (light truck) and 5 EPU (truck and bus); Off-the-road tyres represent around 10 EPU. An end-of-life tyre has an average mass of around 8 kg, or 0.85 EPU.

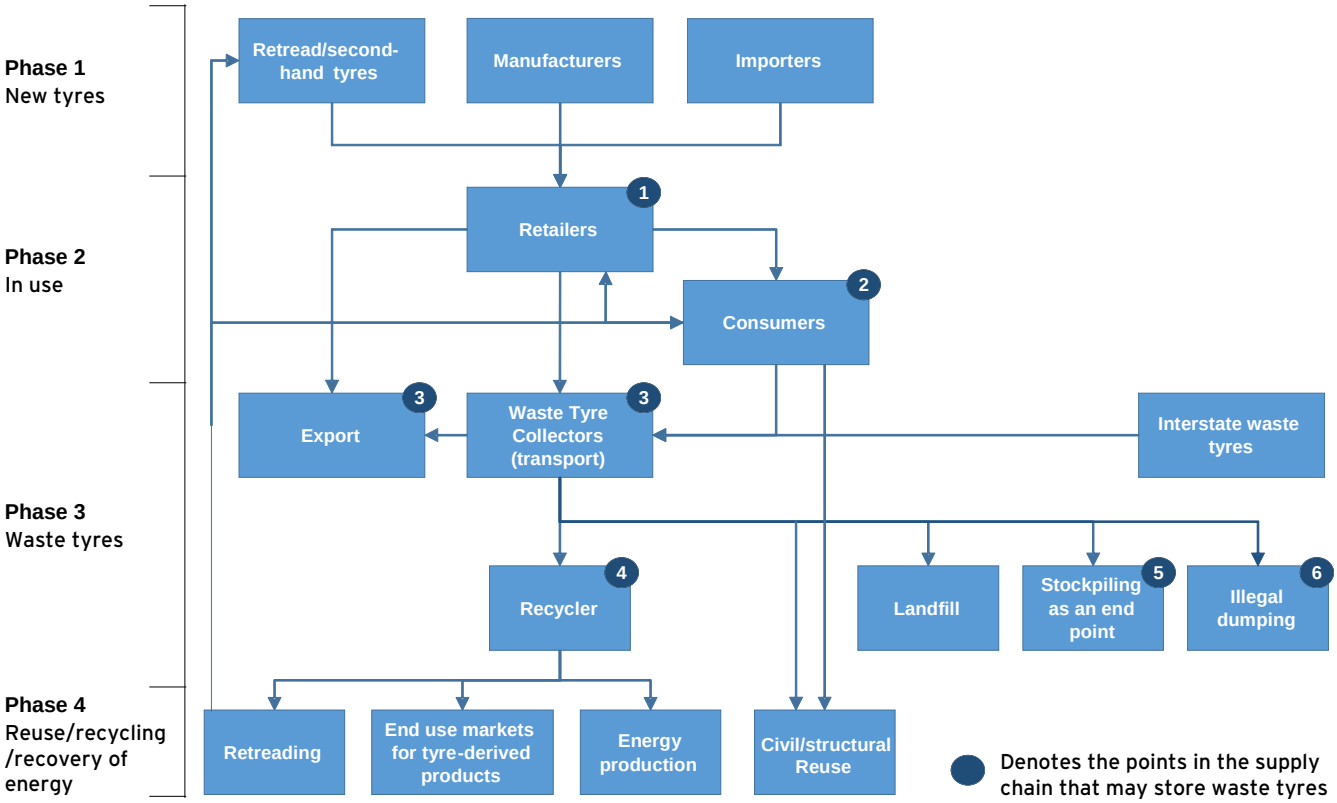
Source: Hyder Consulting (2014) *Emerging materials market analysis: Stage 3 final report*, prepared for Sustainability Victoria, May 19, page 47.

If not properly managed, these waste tyres can create significant environmental and public health risks for Victoria. Whole tyres are flammable and when they are stored together in large volumes, they can create a fire hazard. Once ignited, large volumes of waste tyres are difficult to extinguish and can impose significant environmental, social and economic costs on the community, including emergency services costs, pollution of the air, soil, groundwater and surface waters, disruption to businesses and communities and healthcare costs.

Figure ES1 presents the supply chain for waste tyres, showing where the storage of whole waste tyres generally occurs. They may be stored in large volumes as part of legitimate resource recovery processes, such as feedstock for recycling into tyre-derived products, or consolidated by tyre retailers prior to transport for disposal. While there are incentives for these businesses to mitigate the fire risk posed by storing tyres and protect their significant capital investments, other businesses, such as those that collect and consolidate whole waste tyres or seek economic advantage from operating a low-cost operation with poor management standards, may not respond to the same level of incentives. Rather, there is an opportunity to undercut established waste tyre processors by accepting waste tyres at prices that do not account for the necessary costs of recycling or disposal at facilities with appropriate fire safety standards.

[1] Hyder Consulting (2014) *Emerging materials market analysis: Stage 3 final report*, prepared for Sustainability Victoria, 19 May, page 47.
[2] This includes rubber crumb and rubber granulate.
[3] Hyder Consulting (2014) does not specify the proportion of 'end-of-life' tyres that are used for retreading, as retreaded tyres are specifically excluded from being considered part of the waste stream, consistent with the general approach to consideration of waste and recycling data in Australia, where reuse is excluded from consideration. Hyder Consulting (2014) also notes the cost of new tyres has come down considerably in the past decade and the market for retreaded passenger tyres is no longer viable. While there appears to be a strong retread market for bus and truck tyres, Hyder reports there is little opportunity to grow this market.
[4] Hyder Consulting (2014) reports that there is currently no local market for tyre-derived fuel.
[5] Hyder Consulting (2014) reports that while shredded tyres can be disposed of in landfills, this is understood as an uncommon practice, because of high processing and disposal costs relative to the costs of export or illegal stockpiling.

Figure ES1: Supply chain for waste tyres, showing where the storage of waste tyres occurs



The existing regulatory framework (including the Environment Protection Act, Victorian planning provisions, Country Fire Authority Act, Metropolitan Fire Brigades Act and Building Act) is not effectively addressing the problems associated with waste tyre storage in Victoria. This is a result of the existing regulatory approaches being non-specific to the risk of fire from tyres stores, generally reactive (rather than preventative), costly and time-consuming for the regulator(s) to enforce in cases of inappropriate storage. All other jurisdictions except Queensland[6] and Tasmania require a licence to store waste tyres. There is anecdotal evidence[7] that this disparity is providing an incentive for waste tyres to be brought into Victoria from the neighbouring states of New South Wales (NSW) and South Australia (SA), as it can be cheaper to transport whole waste tyres to Victoria for stockpiling, than to pay for appropriate recycling or disposal in the state of origin.

This RIS sets out to identify the best approach to minimising the environmental and public health impacts (particularly those as a result of fire) from inappropriate storage of waste tyres in Victoria. A risk-based approach has been applied to target those points in the supply chain where stores of whole waste tyres pose the greatest risk to human health or the environment, where businesses face limited incentives to self-manage the fire risk and where businesses may seek to avoid waste tyre recycling or disposal costs. Accordingly, three points in the waste tyre supply chain have been identified as high priorities: stockpiles as an end point or for long-term storage, waste tyre processing (recyclers and retreaders) and waste tyre collection (including consolidation for export).

This RIS considers a range of regulatory and non-regulatory options. These options were identified through a process that considered the regulatory frameworks available to EPA Victoria, other relevant Victorian regulators, and other state, territory and international environmental regulators. Options have also been developed by considering the regulation or management of similar waste types (e-waste, packaging, recyclable containers) or comparable problem types (low-probability, high-consequence risks, such as dangerous goods management).The identified options have been refined to identify a preferred option using a three-stage assessment process, which is summarised in Table ES2.

The preliminary set of options has been filtered by applying an initial assessment framework that assesses the ability of options to effectively reduce the fire risk at the three priority waste tyre storage activities.

[6] Queensland required a licence to store more than 5 tonnes of waste tyres until 2013. See Davis G 2013, 'Removal of tyre storage regulation burns Qld: WRIQ', available at http://www.ben-global.com/storyview.asp?storyid=801572845 accessed 14 May 2014. Queensland continues to license waste tyre recyclers and reprocessors.

[7] PwC (2013), *An options framework for end-of-life tyres in Victoria*, prepared for Sustainability Victoria, June 2013, page 6.

This shortlist was further refined through a secondary assessment that considered four criteria: minimum timeframe, regulatory flexibility, maximum efficiency and improved equity.

Table ES2: Summary of options analysis

Ref.	Option description	Stage 1 (preliminary assessment)	Stage 2 (secondary assessment)	Stage 3 (tertiary assessment – break-even analysis)
1	**Waste Management Policy** – an ongoing statutory policy made under the *Environment Protection Act 1970* (the Act).	✓	✗	
2	**New direct Regulations** – a new Regulation made under the Act with prescriptive duties and direct penalties.	✓	✗	
3a	**Scheduled Premises and Exemptions Regulations** – amending these Regulations so that premises storing waste tyres become scheduled premises, with a works approval requirement only.	✗		
3b	**Scheduled Premises and Exemptions Regulations** – amending these Regulations so that premises storing waste tyres become scheduled premises, with both works approval and licensing requirements.	✓	✓	✓
3c	**Scheduled Premises and Exemptions Regulations** – amending these Regulations so that premises storing waste tyres become scheduled premises, with works approval, licensing requirements and a financial assurance requirement.	✓	✓	✗
4	**Classify tyres as prescribed industrial waste (PIW)** – issuing a classification under the Industrial Waste Resources Regulations.	✓	✗	
5	**Increase inspection and compliance activity** – increase resources for joint inspection and compliance activity by EPA, Fire Services and/or Municipal Building Surveyors, using agencies' existing regulatory tools.	✓	✗	
6	**Environmental rating scheme for tyre retailers** – publicly rating tyre retailers according to their waste tyre management practices.	✗		
7	**Used tyre buy-back scheme** – imposing a deposit on new tyres that is refunded when, as waste tyres, they are taken to accredited waste tyre depots.	✗		
8	**Highlighting risks to financiers** – highlighting to business financiers the risks to business continuity and third parties when sites do not store waste tyres safely.	✗		
9	**Highlighting risks to insurance providers** – similarly, highlighting to insurers the risks associated with sites that do not store waste tyres safely.	✗		
10	**Increased education to generators of waste tyres** – providing generators with increased education and guidance on the options available for disposing of waste tyres and appropriate end uses.	✗		

This secondary assessment identified options 3b and 3c as the two most preferred options that warrant a further assessment using a detailed cost and benefit analysis. Under both options, a works approval and licence will be required for businesses that store whole waste tyres above a certain threshold of EPU or tonnage. The difference between the two options is whether a 'financial assurance' requirement is included in the Regulations. Under option 3c, one of the licensing requirements will be the provision of a financial assurance, typically in the form of a bank guarantee.

Annual licence fees on businesses will apply under both options in order to recover EPA's administrative costs associated with operating and managing the licensing regime. The proposed fees set only a single base fee of 210 fee units, equating to approximately $2,780 at the current fee unit value (2014–15).

Under the two shortlisted options, it is anticipated that some businesses may choose to exit the waste tyre industry instead of upgrading facilities and practices in order to comply with the new requirements. This is likely to occur for businesses that own very large stockpiles of waste tyres (i.e. over a million EPU) that do not currently meet the Victorian Fire Services Guidelines and have no immediate profitable use for the tyres. The number of businesses that will choose to leave the industry is unknown. There is a risk that some of these businesses may abandon their stockpiles. EPA has been undertaking, and will continue to undertake, active management of priority sites to ensure that businesses address risks and achieve compliance as soon as practicable.

The costs of complying with the Victorian Fire Services Guidelines account for over 80 per cent of the estimated costs from the licensing requirements. With a 5,000 EPU threshold, the most significant elements of the costs of complying with the recommendations of the Victorian Fire Services Guidelines are estimated to be the containment area (40 per cent), security fencing (25 per cent), excavation equipment (20 per cent) and securing a reliable water supply (10 per cent).

A break-even analysis of the two options is summarised in Tables ES3 and ES4. This method is often used when the benefits from proposals are difficult to quantify, as is the case when estimating the likelihood of future fires and their direct and indirect impacts.

Table ES3 outlines the number of tyre fires, of different sizes, that would need to be avoided for the options to provide a net benefit to society. It shows that option 3b is a lower cost option than 3c, and applying the regulations to waste tyre stores greater than 5,000 EPU is more preferable than 2,000 EPU. It is acknowledged that option 3c may decrease the fire risk by slightly more than option 3b, as it would provide access to funds that would enable a faster response and cleanup of waste tyre stores by a licensee or EPA in the event that it goes out of business. However, including a financial assurance requirement on top of a licensing requirement, is only expected to reduce fire risk marginally, and will potentially result in higher finance costs for small businesses.

Table ES3 shows that option 3b (with a 5,000 EPU threshold) would need to avoid, for example, five tyre fires with 1– 4 million EPU or 8 tyre fires with 0.5–1 million EPU over 10 years to provide a net benefit to society.

Table ES3: Break-even analysis

		Option 3b		Option 3c	
		2,000 EPU	5,000 EPU	2,000 EPU	5,000 EPU
Estimated cost and benefits ($ million 10-year NPV)					
	Costs	$25.99	$24.15	$27.07	$25.19
	Benefits – cost savings*	-$0.18	$0.10	-$0.18	$0.10
	Total	$26.17	$24.06	$27.25	$25.10
Number of fires avoided over the next 10 years to break even					
	Tyre fire with < 0.5m EPU	177	163	185	170
OR	Tyre fire with 0.5– 1m EPU	8.3	7.7	8.7	8.0
OR	Tyre fire with 1– 4m EPU	5.2	4.8	5.5	5.0
OR	Tyre fire with > 4m EPU	1.20	1.10	1.24	1.15

Note: * Negative cost savings represent an increase in costs.

Alternatively, Table ES4 sets out the number of tyre fires that would need to be avoided, in addition to one tyre fire greater than 4 million tyres, in order for the options to provide a net benefit to society. It demonstrates that option 3b (with a 5,000 EPU threshold) would need to avoid the direct costs of, for example, one tyre fire with 0.5– 1 million EPU, or 15 tyre fires with less than 0.5 million EPU over 10 years, in addition to one large fire (greater than 4 million tyres), to cover its costs. The latter scenario equates to 1.5 fires during each year of the 10-year period, among the 39 sites estimated to currently be in this category.[8]

These calculations do not take into account the indirect impacts of waste tyre fires, which may be sizeable, and include environmental damage, health impacts, nuisance and hardship costs (evacuation of local residents and disruption to businesses). If the indirect costs were able to be reliably quantified and included in the break-even analysis, the number of fires required to be avoided would be lower.

Table ES4: Break-even analysis assuming that one large tyre fire is avoided (more than 4 million tyres)

		Option 3b		Option 3c	
		2,000 EPU	5,000 EPU	2,000 EPU	5,000 EPU
Additional number of fires avoided in the next 10 year over and above avoiding one large tyre fire					
	Tyre fire with < 0.5m EPU	29	15	36	22
OR	Tyre fire with 0.5–1m EPU	1.4	0.7	1.7	1.0
OR	Tyre fire with 1–4m EPU	0.9	0.4	1.1	0.7

Given the existing data limitations on tyre related fires in Victoria, there is a high level of uncertainty about how many tyre fires would be avoided under each option. Given this uncertainty, a conservative approach has been taken and the lowest cost option preferred. Subsequently, the preferred option is 3b with a threshold of 5,000 EPU. The proposed Regulations would therefore incorporate works approvals and licensing requirements, but without a financial assurance requirement.

[8] It is estimated that there are approximately 43 sites holding more than 5,000 EPU under the base case (see Table 23 of Appendix H). Of these, four sites are estimated to hold more than 0.5 million EPU.

Abbreviations and acronyms

Abbreviation/acronym	Description
ACCC	Australian Competition and Consumer Commission
APS	Annual performance statement
ATIC	Australian Tyre Industry Council
ATRA	Australian Tyre Recycling Association
AUD	Australian dollar
AWTRA	Australian Waste Tyre Resources Association
CFA	Country Fire Authority
DEPI	Department of Environment and Primary Industries
EP Act	*Environment Protection Act 1970* (Vic)
EPA	Environment Protection Authority Victoria
EPU	Equivalent passenger unit[9]
MFB	Metropolitan Fire Brigade
NPV	Net present value
OTR	Off-the-road tyres
PIW	Prescribed industrial waste
PwC	PricewaterhouseCoopers Australia
RIS	Regulatory Impact Statement
SEPP	State Environment Protection Policy (made under the *Environment Protection Act 1970 (Vic))*
SV	Sustainability Victoria
TSA	Tyre Stewardship Australia
WMP	Waste Management Policy (made under the *Environment Protection Act 1970 (Vic))*

[9] In this document, tyre volumes are presented in equivalent passenger units (EPU). An EPU is based on the typical mass of material in a passenger motor vehicle tyre. Each EPU has an assumed mass of 9.5 kg and, on average, the approximate conversion rates are: Truck tyres represent between two EPU (light truck) and five EPU (truck and bus); Off-the-road tyres represent around 10 EPU. An end-of-life tyre has an average mass of around 8 kg, or 0.85 EPU. See Atech Group 2001, *A national approached to wast tyres*, prepared for Environment Australia, page 39; PwC and Hyder Consulting, 2010, Draft decision Regulatory Impact Statement: end-of-life tyres prepared for the Environment Protection and Heritage Council (now National Environment and Protection Council), p 141.

1 Introduction

The number of used or waste tyres generated in Victoria each year is growing. It is estimated that nearly 50,000 tonnes of waste tyres (approximately 6 million waste passenger car tyres) were unaccounted for in Victoria in 2012–13, believed to be stockpiled or illegally dumped.[10]

These waste tyres can create environmental and public health risks for Victoria. Whole tyres are flammable and when they are stored together in large volumes, they can create a fire hazard. Once ignited, they are difficult to extinguish and can cause significant environmental, social and economic costs.

It has been acknowledged by industry that a key issue hindering the Victorian Government from effectively managing the environmental and public health impacts from waste tyres and facilitating the market for end-of-life tyres, is the existence of regulatory gaps in the current legislative framework. In particular, a lack of power to prevent the stockpiling of tyres as an end point or to ensure that they are stored in a safe manner.[11]

The Victorian Government environment portfolio agencies, Department of Environment and Primary Industries (DEPI), Environment Protection Authority (EPA), and Sustainability Victoria (SV) are seeking to identify and employ the most appropriate government interventions to address these issues from waste tyres.

While DEPI and EPA are leading the development of this RIS to assess the best options for the safe and appropriate storage and management of whole waste tyres in Victoria, SV is working to identify current and potential market opportunities for waste tyres. A range of options to promote market development are being explored and may include:

- playing a 'brokerage' role for waste tyres through market matching
- supporting the increased uptake of tyre-derived products in civil construction and other existing applications
- enhancing tyre recycling services and associated outcomes through procurement guidelines and support
- identifying and supporting new markets for tyre-derived products and fuels.

In addition, SV continues to work with the newly formed Tyre Stewardship Australia (TSA) to progress a national voluntary Tyre Industry Product Stewardship Scheme.

The following sections provide an overview of the policy context in which the proposed government intervention will operate.

1.1 National Waste Policy – Less waste, more resources

The National Waste Policy[12], agreed upon by all Australian environment ministers in November 2009, sets Australia's waste management and resource recovery direction to 2020. One of the key outcomes to be achieved is 'the risks associated with waste and hazardous substances are understood and managed to minimise current and intergenerational legacy issues'. As part of this outcome, there is an expectation that by 2020, 'local stockpiling of hazardous waste has been significantly reduced, particularly for rural and remote areas'. The policy sets a series of principles to guide actions taken to achieve the outcomes and has led to the development of the voluntary Tyre Industry Product Stewardship Scheme that has been accredited under the *Product Stewardship Act 2011 (Cth)*.

1.2 Tyre Product Stewardship Scheme

At the November 2009 Environment Protection and Heritage Council meeting, following a RIS process, environment ministers committed to work with industry, governments and the community to find appropriate solutions for the responsible management of end-of-life tyres. One of the key actions being taken to improve the market for end-of-life tyres is the development of a national product Tyre Product Stewardship Scheme. TSA has been established by tyre importers to administer the scheme and conducts education, communication, compliance assessment and market development activities.[13]

The Tyre Product Stewardship Scheme was developed through an extensive consultation process involving Australian and state and territory governments, tyre and vehicle importers, retailers, fleet operators, local governments, tyre collectors, tyre recyclers and the mining industry. The Australian Competition and Consumer Commission (ACCC) granted authorisation for the scheme for five years until 3 May 2018.

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[10] Hyder Consulting (2014) *Emerging materials market analysis: Stage 3 final report*, prepared for Sustainability Victoria, 19 May, page 47.
[11] PwC (2013) *A policy framework for end-of-life tyres*, prepared for Sustainability Victoria, June 2013, page 6. See Appendix G for more details on industry consultation.
[12] Former Standing Council on Environment and Water (incorporating the National Environment Protection Council), *National Waste Policy*, available at: http://www.scew.gov.au/coag-strategic-priorities/national-waste-policy-and-chemicals/national-waste-policy.
[13] Australian Government (2014), *Factsheet – Product stewardship for end-of-life tyres*, Commonwealth of Australia – Department of the Environment.

Key features of the scheme, which is funded through an ACCC-authorised levy on the sale of tyres in Australia, include:

- Any stakeholder in the supply chain, including tyre manufacturers and importers, retailers, fleet operators, collectors, recyclers and local governments, may apply to become a participant in the voluntary scheme.
- Participants commit to play their part in ensuring end-of-life tyres go to an environmentally sound use.
- Businesses and organisations can enter into enterprise-to-enterprise agreements or contractual arrangements to ensure that end-of-life tyres are recycled in an environmentally sustainable manner, subject to consideration of relevant competition laws.
- TSA will monitor compliance through random and risk-based audits. Failure to comply may lead to revocation of a participant's accreditation.
- TSA will publish detailed annual reports on the operation of the scheme. There will also be an independent review of the scheme after two years as required by the ACCC. [14]

1.3 Getting Full Value – The Victorian Waste and Resource Recovery Policy

In April 2013, the Victorian Government released *Getting Full Value,* a new waste and resource recovery policy to tackle challenges like those posed by waste tyres. It sets a vision for waste management in Victoria of 'an integrated, statewide waste management and resource recovery system that provides an essential community service by protecting the environment and public health, maximising the productive value of resources and minimising long-term costs to households, industry and government'.

The policy sets four objectives:

- economic prosperity
- integrated and efficient waste and resource recovery system
- public health and wellbeing
- environmental protection.[15]

The final two objectives are most relevant to this RIS and the problems posed by the storage of whole waste tyres, as they aim to address environmental and public health issues associated with the inappropriate storage of waste material.

To achieve the four objectives, the policy sets a range of goals, each of which is supported by a set of strategic directions that will be used to achieve the overall goal. The following two goals are directly relevant to the management of waste tyre stores:

- Goal 7 – Reduce the environmental and public health risks of waste – to achieve this, the Victorian Government's strategic direction is to minimise the environmental and public health impacts of waste and resource recovery facilities.
- Goal 8 – Reduce illegal dumping and littering – to achieve this, the Victorian Government's strategic direction is to curb illegal dumping to protect environmental and human health.

[14] Ibid.
[15] Victorian Government (2013), *Getting Full Value: The Victorian waste and resource recovery policy*, Victorian Government, Melbourne.

2 The problems with the management of waste tyre stores

This chapter outlines the context, aspects and scale of the current problems from the inappropriate management of whole waste tyre storage. This chapter also provides some context about the parties and industries involved with the storage and stockpiling of whole waste tyres.

2.1 Industry context

For the purpose of this document, waste tyres are described as 'generated' when they can no longer be used for their original purpose, and are subsequently removed from a vehicle. At this stage, the tyres can be exported overseas or retained locally for:

- reuse (for example, some uses include being re-tread, used in retaining walls, building foundations and road construction)
- conversion to a different resource (for example, recycled crumbed rubber, tyre-derived fuel)
- disposal.

There are three types of tyres that form part of the tyre supply chain and can be found in waste tyre stores:

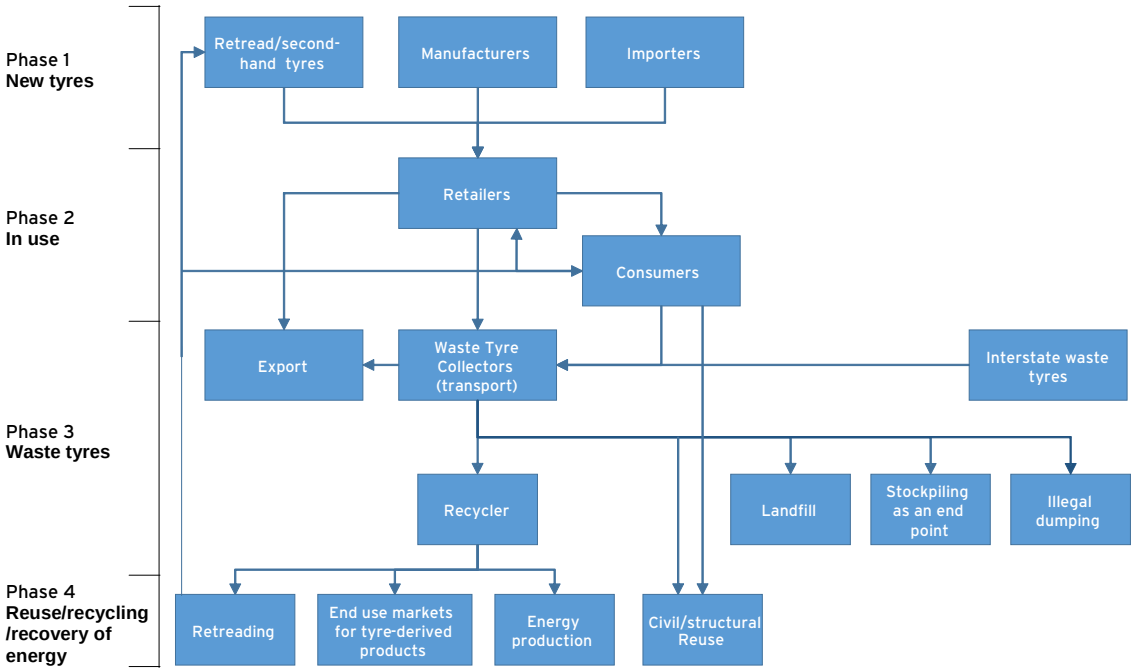
- Passenger tyres – including those used on passenger vehicles, motorcycles and caravans, as well as trailers for domestic use.
- Truck tyres – including those used on buses, light and heavy commercial vehicles, prime movers, trailers and semi-trailers, and fire-fighting vehicles.
- Off-the-road (OTR) tyres – including those used on machinery or equipment used in areas such as forestry, agriculture, mining and construction and demolition.

Some common ratios used to calculate volumes of used tyres in equivalent passenger units (EPU) are provided in Appendix D.

2.2 Tyre supply chain

The tyre supply chain in Figure 1 shows how a tyre progresses through its life to become a waste tyre, and the various paths it can then follow. The tyre supply chain follows four broad phases, with each tyre starting as a new or second-hand tyre for sale, being used on a motor vehicle, reaching the end of its life, and then potentially being reused, recycled, used for energy recovery, disposed of or stored/stockpiled depending on the destination of each tyre at the end of its life.

Figure 1: Supply chain for tyres



In 2013, around 11 million EPU were generated in Victoria[16], with Victoria accounting for around 22 per cent of all waste tyres generated nationally.[17] These are distributed between:

- passenger tyres (33 per cent), truck tyres (35 per cent) and OTR tyres (32 per cent)
- metropolitan areas (71 per cent), regional areas (22 per cent) and remote areas (7 per cent).[18]

Although there are a number of established tyre recyclers operating in Victoria (for example, Tyrecycle and Tyre-A-Way), the rate of local recycling of waste tyres remains relatively low, accounting for around 20 per cent of waste tyres generated. It is estimated that around 26 per cent of waste tyres are directly exported overseas while 54 per cent are unaccounted for and presumed to be stockpiled or illegally dumped (noting that this estimate excludes the import of waste tyres from other states).

Table 1: Destination of waste tyres in Victoria (2012–13)

Destination of waste tyres	Total tonnes	Million EPU	% of total
Recycling[19]	17,248	2.9	20
Export	23,119	2.2	26
Stockpiled as an end point	47,742	6.0	54
Illegal dumping			
Retreading	Not specified[20]	–	–
Energy production	Negligible[21]	–	–
Civil/structural reuse	Not specified	–	–
Landfill	Negligible[22]	–	–
Total	**88,109**	**11.1**	**100**

Note: Totals do not sum due to rounding

Source: Hyder Consulting (2014) *Emerging materials market analysis: Stage 3 final report*, prepared for Sustainability Victoria, 19 May, page 47.

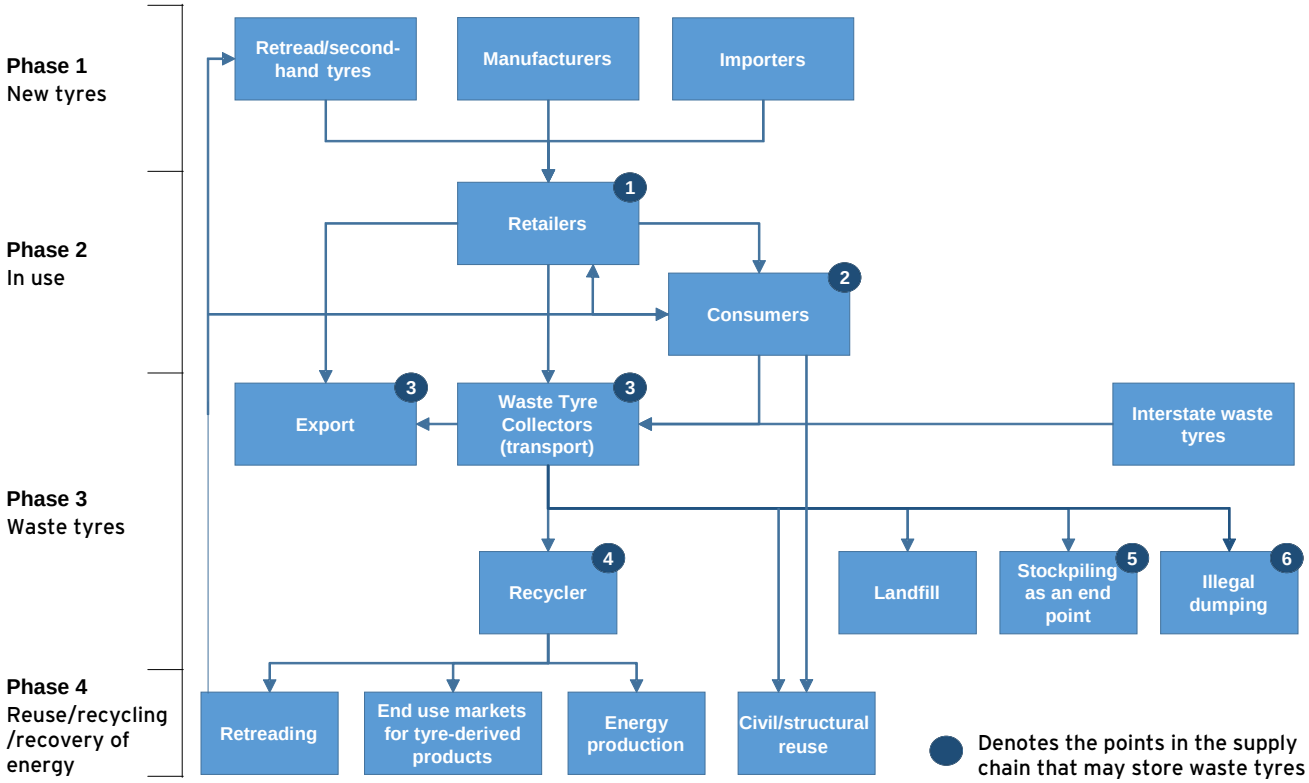
The generation of waste tyres in Victoria is estimated to have grown by 1.6 per cent per annum between 2010 and 2013[23] in line with population growth and increased car ownership.[24] This growth is forecast to increase to 1.8 per cent per annum between 2013 and 2016[25] and continue in line with forecast Victorian population growth of 1.8 per cent per annum over the next 10 years (from 5.4 million to 6.4 million).[26] Assuming growth remains consistent across all destination points (and in the absence of any Victorian Government intervention), this could lead to an increase from 6.0 million (2013) to 7.1 million (2023) EPU going unaccounted for annually, potentially ending up in Victorian stockpiles or illegal dumps. This growth rate also assumes that any interstate movements of waste tyres are minimal and that export trends do not change markedly. However, due to the difficulties in tracking the movement of waste tyres in, and out of Victoria, it is not possible to provide a more comprehensive view of past or future trends.

[16] Hyder Consulting (2014), op cit., page 47.
[17] Hyder Consulting (2012) *Study into domestic and international fate of end-of-life tyres*, prepared for COAG Standing Council on Environment and Water, May 2012, page 12.
[18] Hyder Consulting (2014), op cit., page 45.
[19] This includes rubber crumb and rubber granulate.
[20] Hyder Consulting (2014) does not specify the proportion of 'end-of-life' tyres that are used for retreading as retreaded tyres are specifically excluded from being considered part of the waste stream, consistent with the general approach to consideration of waste and recycling data in Australia, where reuse is excluded from consideration. Hyder Consulting (2014) also notes the cost of new tyres has come down considerably in the past decade and the market for retreaded passenger tyres is no longer viable. While there appears to be a strong retread market for bus and truck tyres, Hyder Consulting reports there is little opportunity to grow this market.
[21] Hyder Consulting (2014) reports that there is currently no local market for tyre-derived fuel.
[22] Hyder Consulting (2014) reports that while shredded tyres can be disposed of in landfills, this is understood to no longer occur. Hyder Consulting presumes this is the case because of high processing and disposal costs relative to the costs of export or illegal stockpiling.
[23] Hyder Consulting (2014), op cit., page 47.
[24] Australian Bureau of Statistics (2013), *Motor vehicle census*, Category 9309.0, January 31, page 4.
[25] Hyder Consulting (2014), op cit., page 47.
[26] Australian Bureau of Statistics (2013) *3220.0 – Population Projections, Australia 2012 (base) to 2101, Series 29(B).*

2.3 Industry overview

There are six main points in the supply chain where the accumulation and storage of waste tyres generally occurs. These are shown by a dark numbered circle in the diagram below.

Figure 2: Supply chain for waste tyres, showing where the storage of waste tyres occurs



These points are described briefly as:

1. Short-term storage of waste tyres by retailers before the tyres are collected or transported offsite.
2. Storage by businesses or consumers who do not dispose of their waste tyres immediately after use or store a small amount of tyres on their land for reuse (for example, farms and food processors use tyres for weighing down plastic wrap on outdoor piles of harvested crops).
3. Short-term storage and consolidation at waste tyre collectors or other intermediaries prior to transportation for recycling, reuse or disposal (for example, baling prior to export).
4. Transitional storage of waste tyres by facilities that wish to use them as inventory in a recycling, retreading or energy production process.
5. Long-term storage of waste tyres (generally on low-value land) by land owners or tenants who have created a stockpile as an end point (for example, to avoid more costly disposal of waste tyres) and/or have no clear plan for the tyres in the short to medium term.
6. Illegally dumped or abandoned waste tyres.

As discussed above, the storage of waste tyres can create a fire hazard, which if not managed appropriately can lead to significant environmental and public health risks for Victoria. At some points in the supply chain, there are currently limited regulatory controls or economic incentives for those who create stores of waste tyres to minimise that fire hazard. This is because many of the costs created by the fire hazard are not directly incurred by the owner of the stockpile or large store of waste tyres. If a fire occurs, many of the costs will be imposed on third parties, including insurers, local residents, the Victorian Government and broader society. This is known as a negative externality[27] and represents a market failure. These

[27] An externality is where private cost and benefits of an activity do not align with the social costs and benefits. In the case of waste tyre stockpiles, the social costs are higher than the private costs and are not fully taken into account when private decisions are made. As there

motivations and the capacity to self-manage fire risks differ amongst the operators storing waste tyres. The incentives held by each industry group are discussed in more detail in the sections below and in Appendix A.

There is also economic an incentive for waste tyres to be diverted towards operators that are less likely to manage the fire risk associated with the storage of waste tyres. Currently there is an economic advantage in stockpiling or exporting whole tyres, relative to the cost of processing waste tyres for recycling or landfill purposes. As Hyder Consulting (2014) reports, this is due to the disparate pricing mechanism for collection/disposal/recycling of tyres. While practices vary, some tyre retailers are charging consumers between $3.50 and $10 per tyre for disposal or recycling costs. Recyclers may then only receive between $1.50 and $2.50 per tyre, to cover the capital and operating costs of the plant.[28] The cost for a tyre shredding plant can exceed $6 million, while the costs to set up a tyre baling machine for the export of whole tyres can be under $50,000.[29] This significant capital investment for a recycling facility produces an incentive to reduce the fire risk from storing tyres and maintain adequate insurance cover. However, the processing facilities are also competing with the lower cost base of those operators who stockpile, or illegally dump the tyres.[30] With limited capital costs and little to no operating costs other than collection and transport, these forms of operation are making greater returns for each tyre collected, with limited incentive to maintain the tyre stores in a fire-safe manner.

The current structure of the industry also means there is limited transparency about whether waste tyres are being sent to appropriate facilities in Victoria. There is no common signal used in the market to identify those tyre collectors that offer a legitimate service and will send the tyres to an appropriate end point. As a result, anecdotal evidence indicates that this has led some tyre retailers to stockpile waste tyres due to uncertainty about appropriate recycling and reuse providers.

Each of the potential waste tyre storage and stockpiling locations in the tyre supply chain is discussed in more detail below.

2.3.1 Tyre retailers

When consumers purchase new tyres from one of the more than 900 tyre retail outlets in Victoria,[31] these retailers commonly pay contractors to dispose of their used tyres, either absorbing the cost or passing it on to consumers through a disposal fee. This would typically cover the cost of collection and transport as well as any primary shredding costs.

Tyre retailers temporarily consolidate tyres onsite prior to collection. They generally do not hold large volumes of tyres onsite at any one time as long as there are reliable and appropriate destinations for reuse, recycling or disposal. Stakeholder feedback suggests that tyre retailers typically sell around 100 tyres per week and stores at tyre retailers are typically in the range of 500– 2,000 EPU.[32]

However, there may be the incentive for retailers, or contractors acting on behalf of retailers to avoid some disposal costs, capturing the difference between disposal fees charged to consumers, and transport and stockpiling costs. In addition, there is currently limited information available to government agencies, retailers and consumers regarding where waste tyres end up.

Given the waste tyres are stored on their retail premises, retailers are considered a low risk as they have an incentive to avoid a tyre fire and minimise any damage to their retail property. Also the sites are usually space limited, reducing the volume of tyres able to be stored onsite, and the subsequent consequences if a fire was to start. Retailers predominantly contribute to the problem by their choice of vendor when disposing of their waste tyres, which may be affected by a lack of information about appropriate choices.

2.3.2 Consumers who are independent generators of waste tyres

Consumers who are independent generators of waste tyres, such as farms, quarries, mines and motor vehicle race tracks may retain relatively low volumes of waste tyres onsite for reuse or prior to disposal.

Tyres generated on farms, quarries and mines are more likely to be larger truck and OTR tyres which will have higher per unit disposal costs than passenger tyres (such as transport, shredding and landfill gate fees). Similarly, in rural and remote locations, transport costs will be higher and this provides an additional incentive to stockpile or dispose of waste tyres onsite.

However, with thorough design and the meeting of relevant planning laws, there have been a number of successful reuses of end-of-life tyres for structural and civil engineering uses in Australia and internationally, including use in retaining walls, building foundations, internal sub-floor formwork, paving/roads, stemming blasting and charging in mines, and landfill engineering.[33]

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is no incentive for these external 'spill over' costs to be considered in private decisions, more stockpiles are created by private individuals than would be optimal for society.

[28] Hyder Consulting (2014), op cit., page 65.

[29] Ibid., page 39.

[30] Ibid., page 65.

[31] IBISWorld (2014) *Tyre Retailing in Australia*, January, pages 4, 29.

[32] Tyrecycle, Personal communication, 5 May 2014.

[33] URS (2006) *Technology and market development for tyre-derived products*, pages 5-1.

In addition, private landfilling onsite may be permitted with regulatory approval (for example, mono-fill landfills on mine sites). However, consumers may be unaware of the permitted options for disposal or may reuse tyres in an inappropriate way.

Consumers and holders of small volumes of waste tyres generally represent a low-level risk. While there is an incentive to avoid a tyre fire (because the tyres are stored on their property), due to a lack of information, consumers may not adequately address the fire risk. While this contributes to the problem, the smaller size of their stores reduces the consequences of a fire and minimises the overall risk.

2.3.3 Waste tyre collectors – transport and collection for export

Waste tyre collectors have an incentive to maintain moderate stockpiles in order to:

- ensure sufficient supply for end uses with high feedstock requirements (for example, energy production and material recycling)
- achieve economies of scale in transport to reduce costs and increase profit.

The volume of stockpiles at these locations will be informed by the end-markets that they serve. For example, shipping containers can hold around 2,400 EPU of baled waste tyres[34] which means that balers will often store up to this amount of tyres prior to export. However, intermediaries providing transport services for larger recyclers may be transporting up to 10,000 EPU per day.[35]

The location of tyre collection and storage businesses is influenced by the locations where waste tyres are generated as well as the locations of end points such as ports (for example, for export), landfills and recycling businesses.

The increasing international demand for the export of baled whole waste tyres[36] and the low barriers to entry (as noted above, the capital costs of baling machinery is about $50,000 compared to the capital costs for tyre shredders of about $6 million) is believed to be increasing the number of operators exporting whole waste tyres in Victoria. Site inspections by EPA and fire authorities have indicated that the low capital costs of these operations (and variability of export market prices) can result in less investment by these businesses in actions to manage fire risks.

These businesses are likely to represent a high risk, as many operate on leased properties and have low capital and plant costs, with less incentive to utilise and maintain fire management infrastructure and systems. Tyre collectors are likely to have agreements with retailers to regularly pick up waste tyres. However, depending on the international demand and market price for whole waste tyres, large quantities may rapidly accumulate onsite if waiting for improved market conditions.

2.3.4 Waste tyre processors – recyclers, retreaders and energy production

There are a relatively small number of tyre recyclers and retreaders [approximately 4–5] in Victoria, including larger businesses such as Tyrecycle and Tyre-A-Way.

Storage of waste tyres is a standard practice in the tyre recycling/reprocessing industry. A suitable inventory of waste tyres is maintained to ensure a reliable flow of raw product into subsequent reprocessing operations.

Processing operations commonly involve actions to sort and undertake a primary shredding of tyres. After this, the shredded tyres can be subjected to further grinding to separate the rubber into various sizes, and removal of the steel and any other remaining synthetic substances.[37]

These larger businesses typically process up to 10,000 EPU per day, although where possible, these volumes are often processed (for example, chipped or crumbed) on the day they are received.[38] With contracts for ongoing deliveries, the inventory held by these businesses has the potential to increase substantially in the event of processing equipment failure.

There are currently waste tyre processing facilities located in the industrial precincts of Melbourne suburbs such as Somerton (Tyrecycle – 20 km north of Melbourne), Broadmeadows (Tyrecrumb – 15 km north of Melbourne) and Dandenong (Tyre-A-Way – 35 km south-east of Melbourne). The location of such sites presents added consequences in the event of a fire, with nearby or neighbouring residences, businesses and infrastructure potentially at risk. Fires can occur as part of the intensive shredding and grinding operations involved in tyre processing, however, the installation of fire suppression equipment on machinery often provides reliable and effective management.[39]

As confirmed during joint EPA and Fire Services inspections of waste tyre storages, the waste tyre storage management practices of this sector vary. Some businesses that operate facilities in other states, with regulatory requirements for the handling and storage of waste tyres, may adopt near-equivalent measures in Victoria for the management of fire risks. While these businesses are reducing risks to themselves and neighbouring properties, they are incurring additional operating costs

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[34] Tyrecycle, Personal communication, 5 May 2014.
[35] Ibid.
[36] Hyder Consulting (2014), op cit., page 39.
[37] Ibid., page 35.
[38] Tyrecycle, Personal communication, 5 May 2014.
[39] Ibid.

and this makes them less competitive than other businesses with lower standards of fire management and suppression capabilities.

While they have incentives to manage the fire risk (due to their capital investment), waste tyre processors represent a high risk due to the potential to store large quantities of waste tyres, and an increased likelihood of fire from the industrial processes that the tyres are put through.

There are currently no businesses in Victoria using waste tyres as their sole feedstock for energy production. A cement kiln in Geelong used waste tyres as feedstock for co-combustion with traditional fossil fuel until it stopped operating in late 2012. It is believed that other cement kilns around Australia still use waste tyres for co-combustion (for example Adelaide Brighton in South Australia). In New South Wales, Green Distillation Technologies has built a pilot pyrolysis plant for processing whole waste tyres[40]. EPA Victoria has received preliminary enquiries from proponents expressing interest in developing similar facilities in Victoria.

2.3.5 Illegally dumped or abandoned waste tyres

To avoid the potential costs of disposal, individuals may dump their waste tyres or abandon an entire stockpile on someone else's land (for example, on a leased paddock, shed or warehouse). Alternatively, land owners may accept waste tyres in return for payment, due to a lack of understanding of the potential impacts from tyre stockpiles and/or perceived reuse opportunities which are not in fact permitted or economically viable.

The third-party land owner is then left to deal with the potential fire hazard of those tyres. To avoid the hazard, the tyres would need to be actively managed or cleaned up and disposed of through a legitimate pathway (i.e. landfill, reuse or recycling). To do this would impose a direct financial cost on the land owner.

A lack of information and negative externality problems (which affect incentives) both lead to illegal dumping and abandonment of waste tyres. This can result in a fire risk if third parties are not willing to accept the cost of managing that risk. However, each case of illegal dumping of tyres is dealt with through the existing investigatory processes by local councils and EPA. EPA has broad powers under the EP Act to direct a polluter or occupier to undertake a cleanup at a site.

2.3.6 Owners of stockpiles as an end point or for long-term storage

Stockpiles as an end point or for long-erm storage may occur in order to avoid the costs of appropriate disposal. While there are reports estimating the annual number of tyres entering stockpiles in Australia and one recent report for Victoria, there is sparse evidence on the 'stock' of tyres in stockpiles or the flow of tyres in and out.

In 2013, an initial estimate of the number and size of tyre stockpiles across the state, was developed through a survey with Victorian councils and catchment management authorities (CMAs). EPA and the Victoria Fire Services (MFB / CFA) also undertook joint inspections to better understand the different cases and patterns of stockpiling of waste tyres in Victoria.

A sample of the results of this research is shown in Table 2. The table also highlights which stockpiles appear to be stored for the long term or an end point. This shows in 2013, an estimated 14 million tyres stockpiled in Victoria, with the majority of these being in one site and numbering up to 9 million.[41] The true number could be much higher than this as not all councils and CMAs responded (66 per cent response rate of the 79 councils and 11 CMAs surveyed). Also, these numbers are based on general visual estimates of the number of tyres in a stockpile rather than a direct count, which could result in a higher or lower estimate.

[40] Hyder Consulting (2014), op cit., page 85.
[41] This estimate varies between 3 million and 12 million, anecdotally, depending on the source of the estimate due to factors such as the unknown depth of the site. This figure of 9 million is as reported in EPA Victoria (2014), *Tyre storage inspection risk ratings*.

Table 2: Sample of estimated Victorian tyre stockpiles

Site location	Estimated number of tyres	Stockpile as an end point or for long-term storage
Campbellfield a	50,000 tyres	✓
Campbellfield b	40,000 tyres	✓
Numurkah	900,000 tyres	
Katunga	150,000- 250,000 tyres	✓
Wehla	75,000- 100,000 tyres	✓
Charlton	5,000- 10,000 tyres	
Stawell	9 million tyres	✓
Broadmeadows	1 million tyres	
Marungi	1.5 million tyres	✓
Total of 80 other sites across Victoria*	1,100,000 + tyres	
Total	**13.9-14.0 million tyres**	

Note: * This is a sample of a larger set of estimate compiled from the survey results. Where surveys have provided area estimates, these have been converted to a number of tyres assuming 1 m^3 contains 13 tyres see:http://www.calrecycle.ca.gov/tires/enforcement/inspections/NumberTires.htm accessed 14 May 2014. The 'total of 80 other sites across Victoria' excludes the seven sites that were inspected so as to not double count.
Source: Data is sourced from a survey of local councils and fire services conducted by EPA Victorian in 2013.

It is estimated that 11 million EPU of end-of-life tyres were generated in Victoria in 2013.[42] With 54 per cent of these tyres believed to be either stockpiled or illegally dumped, the best estimate of the number of tyres that were added to Victorian stockpiles in 2013 is about 6 million EPU.[43] Each year a proportion of these waste tyres added to Victorian stockpiles will be cleaned up, disposed of, reused, recycled or exported, although reliable estimates of these volumes are not currently available.

Even so, we estimate that there are approximately 14.0 million waste tyres currently in Victorian stockpiles and there is anecdotal evidence that tyre stockpiles have been increasing over time. For example, a 2013 PricewaterhouseCoopers (PwC) investigation reported that current levels of stockpiles are increasing in number and size (particularly in the northwest of the state) – partly driven by an influx of tyres from South Australia and New South Wales.[44] Both of these jurisdictions have more stringent regulatory frameworks relating to the transport, storage and disposal of waste tyres – resulting in it being cheaper to pay for the transport of waste tyres to Victoria for stockpiling than to dispose of them to licensed sites in their state of origin. The scale of this activity is relatively unknown, but it is not considered to compose significant volumes, when comparison to the amount of waste tyres generated within Victoria each year.

As the size of these stockpiles can be significant with many of them possessing little to no fire management plans or infrastructure, this category is considered a high risk.

2.3.7 Industry summary

Of the six points in the tyre supply chain discussed above, this RIS will focus on three: stockpiles as an end point or for long-term storage, waste tyre processing (recyclers, retreaders and energy production) and waste tyre collection (including transport and collection for export). These activities generally pose the highest fire risks due to the typical scale and location of their stockpiles, and in the case of long-term stockpiling and waste tyre collection, the limited incentive to manage the fire hazard.

These activities typically involve the storage of waste tyres in excess of 5,000 EPU compared to other groups, such as tyre retailers, who are in the range of 250–3,000 EPU. Instances of illegally dumped tyres and the small scale stockpiling by consumers for onsite reuse are not considered to be of priority for this RIS. While illegal dumping of wastes is a significant problem in general, each case of illegal dumping of tyres is dealt with through the existing investigatory processes by local council and EPA. Additionally, the agricultural sector commonly store small volumes of used tyres for reuse applications on farms. These sites generally do not pose a significant fire risk while the volumes are small.

Appendix A provides further detail on the outcomes of an assessment of the risk posed by the various parts of the industry, based on the number and type of parties storing or stockpiling, their incentives for creating or maintaining large stores of waste tyres and the capacity to manage the associated fire hazard.

[42] Hyder Consulting (2014), op cit., page 47.
[43] It should be noted that this figure may be overstated as not all illegally dumped tyres will end up in stockpiles.
[44] PwC (2013), op cit., page 6.

2.4 Nature and extent of the problem

Whole tyres are flammable and, once ignited, they are difficult to extinguish and can impose significant environmental, social and economic costs on society. The risk of tyre fires increases with the number of sites storing waste tyres, while the duration to extinguish and consequential costs increase with the size of individual tyre stockpiles and the lack of fire suppression and management capabilities at the site. These costs represent externalities, as they are created by the individual choosing to store whole waste tyres, but the impacts are imposed on third parties (for example, adjacent properties, the local community and the environment more broadly). These costs are the focus of this RIS.

There are also other problems associated with whole waste tyre stores that can impose additional externality costs on local communities, such as:

- disease from mosquitoes and vermin breeding in whole tyres
- reduced visual amenity
- leaching and emissions from inert tyres into the environment
- the costs of cleaning up the tyre stockpile.

Given their relative smaller impact (compared with the fire hazard problem), these are not included in the focus of this RIS. A brief description of these problems is provided in Appendix B.

Other problems, while not specific to tyre stockpiles, also arise from inappropriate management of waste tyres more broadly. These include:

- the loss of potentially valuable resources
- the costs of landfill and the opportunity cost of land.

These related problems are beyond the direct control of EPA and do not form part of this RIS. However, through the Victorian Government Environment portfolio, these problems will be considered through the broader market development activities being driven by SV in conjunction with the national Tyre Product Stewardship Scheme administered by TSA.

2.4.1 Fire hazard

Tyres are made from flammable materials, and when they are stored in a concentrated mass such as a stockpile, they pose a fire risk.[45] By weight, between 73 and 76 per cent of a tyre is composed of rubber (a combination of natural and synthetic), with the variation representing different types of tyres.[46] Tyres are designed to absorb heat generated by the friction of road contact. While this makes their combustion point much higher (about twice that of materials such as paper or wood), their ability to absorb heat also makes them difficult to extinguish once ignited. Even if the open flames of the fire have been smothered, the stored heat in tyres can persist for an extended period, meaning there is a high chance of re-ignition.[47]

As tyre fires are difficult to control, they are often left to burn out under supervision, lasting several weeks or months.[48] Under this approach however, the adverse environmental, social and health impacts continue to be incurred, and there is a risk of the fire spreading and causing further issues such as personal injury or property damage.

Due to the large size and the intensity of tyre fires, they pose a significant hazard to persons, equipment and adjacent buildings,[49] and the direct costs to the fire and emergency services of managing the event can be significant. Fire can affect built-up areas and remote locations differently, for example:

- Within a built-up urban environment, industry or housing may be in close vicinity, and can subsequently have a significant impact on the immediate surrounds.
- In rural or remote locations, emergency response capability (i.e. specialist emergency equipment, reticulated fire-fighting water) is generally less common, and surveillance and awareness of high-risk sites is lower, while necessary travel distances much larger, causing issues that could lead to larger fires growing or being sustained for longer periods. [50]

The following section sets out the nature and extent of the fire risk of tyre stockpiles in Victoria, described as a function of:

- the number, size and forecast growth in tyre stockpiles in Victoria in line with population growth, increased car ownership and interstate imports of end-of-life tyres as a result of the perception of a less stringent regulatory framework in Victoria (this has been discussed in the above section 2.1)

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[45] URS (2006), *Market Failure in End-of-life Tyre Markets*, prepared for the Department of the Environment, Water, Heritage and the Arts (DEWHA).
[46] URS (2005),*Financial and Economic Analysis of the Proposed National Used Tyre Product Stewardship Scheme*, prepared for ATMA / ATIG, p 9.
[47] Metropolitan Fire Brigade and Country Fire Authority (2014), *Fire Services Guideline: Open Air Storage of New or Used Tyres*.
[48] Syneca Consulting and Connell Wagner (2008), *Consultation Regulatory Impact Statement for End-of-Life Tyres Management*, prepared for DEWHA.
[49] Atech Group (2001), *A national approach to waste tyres*, prepared for Environment Australia.
[50] Country Fire Authority, Personal communication, 10 July 2014.

- the frequency of tyre fires and forecast number and severity of these fires associated with Victorian tyre stockpiles
- the cost of tyre fires including fire control costs, nuisance and hardship costs, cleanup of contaminated waterways, health costs and property damage.

2.4.2 Risk and frequency of tyre fires

A whole waste tyre store can catch on fire from a variety of sources, including a bushfire, lightning strike, arson or combustion from mechanical processing and grinding. The Victorian fire services indicate that the likelihood of a fire starting in a stockpile is affected by:

- Location – proximity to vegetation.
- Onsite ignition factors – combustible substances or hazards, hot works (i.e. welding, grinding, cutting etc.) and designated smoking areas.
- Prevention measures – effective security measures to prevent arson.[51]

Consultation with MFB and CFA suggests that while records are available of fires involving tyres, it is difficult to determine the number of fires specifically associated with sites that had been storing significant quantities of whole waste tyres as a predominant activity. Although, as a comparison, in NSW, the fire services estimate a total of 256 tyre fires since 2009, with an average of 50 a year.[52]

2.4.3 Costs of tyre fires

As outlined above, the fire hazard and methods needed to manage a fire are different from site to site as there are many factors that affect the both the likelihood and consequences of a tyre fire. As a summary, the extent of impact and subsequent costs from a tyre fire include:

- the size and arrangement of the store(s)
- proximity to water courses
- proximity to townships and the size of those townships
- suppression capabilities, such as a hydrant system, soil supply and availability of earth-moving equipment.

The size of the tyre store and its arrangement (i.e. the size of individual piles within a larger stockpile) is a major factor to consider, as it will affect how long the fire will burn and the amount of air pollution and oil run-off that is created. For example, at the fire at a tyre stockpile (of an estimated volume of approximately 900,000 EPU) in May 2013 at Numurkah, Victoria, more than 20 CFA tankers and two pumpers were used to put the fire out in 20–25 minutes[53]. Because the stockpile was arranged in separated piles, the scale and spread of the fire was limited. Alternatively, a fire of 10 million tyres in Heyope/Knighton, Wales, has been burning or smouldering for more than 15 years as the tyres are packed too densely for the fire to be extinguished[54].

When a tyre stockpile catches on fire, it produces air pollution and a toxic oily run-off that can result in the following costs:

- direct financial costs to fire services agencies to control and put out the fire
- air pollution leading to health impacts on local residents and requiring indoor sheltering, road closures or, in some cases, evacuations, resulting in reduced productivity, potential lost revenue for local businesses and lost leisure time
- environmental impacts, including contamination of air, soil, surface waterways and groundwater which can impact flora and fauna in these ecosystems
- site cleanup costs to remove oily sludge, burnt tyres and contaminated soil
- direct personal injury and property damage from the fire itself
- indirect property damage, where the after effects of a fire can devalue the immediate and surrounding properties, limiting their further use.[55]

A detailed description of the nature and extent of these costs is provided in Appendix C.

Table 3 provides some examples of tyre fires both locally and overseas. The costs associated with these examples are discussed in detail in Appendix C.

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[51] Country Fire Authority, *Tyre stockpiling: Fire risk assessment framework*
[52] Hannam P (2013), *Oil slick danger from tyres in fire*, Sydney Morning Herald, October 28.
[53] Thals K (2013), *Toxic fire threatens Numurkah*, Shepparton News, May 3.
[54] Rowe M (2002), *Dumped on*, The Guardian, May 5.
[55] Syneca Consulting and Connell Wagner (2008), op cit..

Table 3: Examples of tyre fires in Victoria, Australia and overseas

Year	Location	Cost* (year)	Size of stockpile (number of tyres)	Source of fire
Victoria				
30-Jan-13	Rockbank, Victoria	n/a	n/a	Grass fire
2-May-13	Numurkah, Victoria	$110,000	900,000	Suspicious
Elsewhere in Australia				
1990	Bindoon, WA	$1,070,000 (2014)	n/a	n/a
1992	Salisbury, QLD	$1,315,000 (2014)	n/a	n/a
2002	Sydney, NSW	n/a	n/a	n/a
Sep-10	Perth, Northern Midlands, Tasmania	n/a	2,000	Accident
Dec-10	Perth Airport, Perth, WA	$185,000 (2014)	n/a	n/a
Feb-12	Longford, Tasmania	n/a	16,000	n/a
1-Jan-13	Villawood/Chester Hill, West Sydney, NSW	n/a	5,000	Arson
Sep-13	Bell Bay Port, Tasmania	n/a	n/a	Accident
Oct-13	Chipping Norton, Sydney, NSW	n/a	10,000	n/a
Apr-14	Yennora, Western Sydney, NSW	n/a	n/a	n/a
Overseas				
1983	Winchester/Rinehart, Virginia, US	$6,635,000 (2014)	7,500,000	Cause unknown but arson (suspected)
1984	Everett, Washington, US	$11,135,000 (2014)	4,000,000	Cause unknown but arson (suspected)
1986	Somerset, Wisconsin	n/a	9,000,000	n/a
1987	Hudson, Colorado	n/a	3,000,000	n/a
1988	Cochranville, Pennsylvania	n/a	5,000,000	n/a
1989	Heyope/Knighton, Wales	n/a	10,000,000	Arson
1989	Danville, New Hampshire	n/a	3,000,000	n/a
1989	Catskill, New York	n/a	2,000,000	n/a
1990	Hagersville, Ontario	n/a	12,000,000	n/a
1990	Saint-Amable, Quebec	n/a	3,000,000	n/a
1993	Inwood, West Virginia	n/a	3,000,000	n/a
1996	Fresno, California	n/a	2,000,000	n/a
1997	Gila River, Arizona	n/a	3,000,000	n/a
1998	Tracy, California	$21,870,000 (2014)	8,000,000	n/a
1999	Kirby, Ohio, US	$27,565,000 (2014)	7,000,000	Arson
1999	Westley, California, US	$30,740,000 (2014)	7,000,000	Lightning strike
2005	Watertown, Wisconsin, US	n/a	320,000	n/a
2010	Mexborough, UK	n/a	120,000	n/a
2012	Iowa City, Iowa, US	$4,990,000 (2014)	1,300,000	Unknown

Note: * These costs are often a conservative estimate based on the cost to government to clean up and may not include all costs of inconvenience to communities or wider environmental costs such as the cost of detrimental impacts on ecosystems. Costs are inflated using Australian Bureau of Statistics (2014), *Consumer Price Index, Australia, March 2014*, Canberra. Costs has converted using Reserve Bank of Australia, *Historical Exchange Rate Data.*

Sources: Refer to Appendix H for details of references and citations.

2.4.3.1 Quantifying the costs of tyre fires

Many of the costs of tyre fires, while documented qualitatively, have not been quantified in monetary terms. Health impacts, nuisance costs and many of the environmental costs are difficult to reliably quantify. From the available evidence, the fire-fighting costs, costs of avoiding oily run-off polluting waterways, the cost of cleaning up waterways, and the site remediation costs are more often cited (particularly for larger fires).

Table 4 summarises the information available on the costs of 12 tyre fires in Australia and overseas. This shows that the larger the tyre stockpile, the greater the costs to extinguish the fire, mitigate any pollution and clean up the site after the fire is put out. It also shows that site cleanup costs are greater than fire-fighting costs for large fires, whereas for smaller fires it is the opposite. The tyre fire with the highest costs totalled more than $30 million and involved more than 4 million EPU.

While this information provides a useful summary of the overall cost of different sized tyre stockpiles catching fire, this information cannot be extrapolated to calculate an estimate of the annual social costs of current stockpiling. This is due to the uncertainty in the number, size, and location of each stockpile as well as the probability of fire at any given site.

Table 4: Summary of costs of tyre fires (2014 AUD)

	Up to 0.5 million EPU	Between 0.5 and 1 million EPU	Between 1 and 4 million EPU	Greater than 4 million EPU	Unknown size
Total costs of fire fighting^	$9,800 - $306,900	$2,674,700*	$1,212,700 - $3,711,700	$790,500 - $6,636,500	$107,463 - $1,315,300
Pollution mitigation costs	No data	No data	No data	$9,767,400*	$1,071,990*
Site cleanup costs	$10,400 - $14,000	$464,800*	$4,988,200 - $7,423,400	$464,800 - $26,348,600	$184,900*
Range of total costs	**$9,800 - $320,900**	**$3,139,500**	**$1,212,700 - $11,135,100**	**$3,111,200 - $30,740,000**	**$107,463 - $1,315,300**
Tyre fires in this category with cost data	'Fire A', Atech report = 22,000 EPU 'Fire B', Atech report = 28,000 EPU Charlton, CFA case study = 7,500~	Numurkah, VIC, CFA case study = 900,000~	'Fire C', Atech report = 1.8 million EPU Everett, Washington, US = 4 million EPU Iowa City, Iowa, US = 1.3 million tyres	Winchester/Rinehart, Virginia, US = 7.5 million tyres Tracy California, US = 8 million tyres Kirby, Ohio, US = 7 million tyres Westley, California, US = 7 million tyres Stawell, VIC, CFA case study = 9 million tyres~	Bindoon, WA Salisbury, QLD Perth Airport, WA

Note:

^Total costs of fire fighting is comprised of the cost of fire-fighting appliances (trucks, etc), the cost of firefighters and other incidental costs of fire fighting (such as fuel, foam, the cost of excavators to move soil and the cost of food for firefighters).

*Only one data point is available for this cost.

~ Estimates are of potential tyre fires.

Costs have been inflated using Australian Bureau of Statistics (2014), *Consumer Price Index, Australia, March 2014*, Canberra. Costs have been converted using Reserve Bank of Australia, *Historical Exchange Rate Data*.

Sources: Refer to Appendix H for details of references and citations.

2.5 Regulatory overview

2.5.1 Current regulatory framework in Victoria

2.5.1.1 Environment Protection Act

The *Environment Protection Act 1970* ('the EP Act'), administered by EPA, provides a legal framework to protect the environment in the State of Victoria. The two main topics in the EP Act relevant to the safe management of tyres are waste and pollution.

Waste is broadly defined in the EP Act. In general terms it is any material or substance that is of no further use and has been discarded. More specifically, industrial waste is defined in the EP Act as '(a) any waste arising from commercial, industrial or trade activities or from laboratories; or (b) any waste containing substances or materials which are potentially harmful to human beings or equipment' (EP Act, section 4). End-of-life tyres are within the scope of this definition when they are stored in significant quantities.

The EP Act gives EPA an important role in regulating waste through issuing:

- works approvals and licences for industrial and waste management activities that have the potential for significant environmental impact, including landfills
- licences to businesses who receive or treat waste
- permits for the transport of prescribed industrial waste.

A number of specific offences apply to industrial waste. For example, under section 27A(2) of the Act, it is an indictable offence to dump or deposit industrial waste on a site that is not licensed to receive such waste.

The Environment Protection (Industrial Waste Resource) Regulations 2009 regulate the management of hazardous wastes, known as prescribed industrial wastes.[56]

The EP Act provides for levies to be paid in relation to each tonne of waste deposited at a landfill. Waste tyres attract the standard landfill levy. To be accepted however, the Waste Management Policy (Siting, Design and Management of Landfills) specifies that they must be shredded into pieces.[57]

Pollution is not specifically defined in the EP Act but, in summary, pollution involves a change in the environment, which makes air, land or water any of the following:

- noxious, poisonous or offensive to humans
- harmful or potentially harmful to humans, animals or plants
- detrimental to any beneficial use.[58]

EPA is given powers under the EP Act, such as directions and notices, to control and rectify pollution or to prevent it occurring.

2.5.1.2 Enforcement powers under the Act

The EP Act includes four main enforcement provisions that may apply to the storage of tyres (as well as to other contexts):

- Depositing industrial waste under section 27A(2) – It is an indictable offence to dump, deposit, discard or abandon (or permit someone to do so) industrial waste at a place that does not have a licence to accept industrial waste, or at a site that is licensed, but without the licence holder's knowledge.
- Offences relating to industrial waste in section 27A(1) – It is an indictable offence to contravene rules or requirements relating to industrial waste specified in a waste management policy, contravene any regulations relating to industrial waste or cause or permit an environmental hazard.
- Clean up notices issued under sections 62A(1) and (3) – the Authority can issue a notice that specifies clean up and ongoing management measures to a person who occupies a polluting premises, caused pollution to occur, appears to have abandoned or dumped industrial waste or hazardous substances, or who handled industrial waste or hazardous substances in a manner likely to cause an environmental hazard.
- Pollution abatement notices issued under section 31A – the Authority can issue a pollution abatement notice on a number of grounds, including if it is satisfied that a process or activity has caused or is likely to cause pollution, has created or is likely to create an environmental hazard, or has caused or is likely to cause a failure to comply with statutory policy.

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[56] This requires that, for example, a person conducting any business that includes transport of prescribed waste on a highway must have a permit for each vehicle used to transport the waste. Prescribed industrial waste producers are also required to assess processes which produce the waste to establish whether means of avoidance or reduction are available.
[57] They must not exceed 250 mm in size in any dimension (clause 19(6)(f)).
[58] EP Act, sections 39(1), 41(1) and 45(1).

2.5.1.3 Victorian planning framework

Under the Victorian Planning Provisions, local government authorities (councils) refer planning permit applications for material recycling facilities to EPA as the specified referral authority.[59] EPA advises on council's assessment of any potential adverse amenity impacts like odour, dust or noise emissions resulting from the proposed use, and any relevant conditions, including the separation distance to be maintained from sensitive areas and any pollution controls or monitoring requirements.

If the use of a site contravenes the site's planning permit, the relevant council can take compliance and enforcement action under the *Planning and Environment Act 1987*.

2.5.1.4 Country Fire Authority Act 1958 and Metropolitan Fire Brigades Act 1958

Municipal fire prevention officers and the fire services can issue fire prevention notices[60] and, subsequently, infringement notices. To issue a prevention notice, an officer must '[form] the opinion … there is no procedure … more appropriate in the circumstances to address [the] threat'.

2.5.1.5 Building Act 2003

Municipal building surveyors and private building surveyors can issue building notices, including if they believe the use of the building contravenes the Act or the Regulations.[61] The Regulations incorporate the Building Code of Australia (with some amendments)[62], and the Code references AS2118–1999, Australian Standard – Automatic fire sprinkler systems. If a building notice is not complied with, it can be escalated to a building order[63], including an order prohibiting occupation or requiring the owner to carry out works. It is an offence to contravene a building order or to occupy a building in contravention of a building order (Act, s.118).[64]

2.5.2 Regulatory gap

Each element of the current regulatory framework in Victoria (2.5.1.2– 2.5.1.5 above) applies generally to owners and occupiers of premises (or buildings in the case of the Building Act). The broad and non-specific nature of the existing framework subsequently encompasses most parties in the waste tyre supply chain – tyre retailers, consumers who are independent generators of waste tyres, waste tyre collectors that also store waste tyres, waste tyre processors, owners and occupiers of premises with illegally dumped or abandoned waste tyres, and owners of stockpiles as an end point or for long-term storage (2.3.1–2.3.6 above).

However, despite its broad application, the existing regulatory framework is not adequately addressing the problems associated with waste tyre storage in Victoria. This is because the existing regulatory approaches (2.5.1 above) are generally reactive (rather than preventative), costly and time-consuming for the regulator(s) to enforce. These shortcomings are outlined below.

2.5.2.1 Enforcement powers under the Environment Protection Act 1970 (Vic)

The current enforcement provisions under the EP Act (2.5.1.2 above) do not allow EPA to effectively control and manage the risks associated with end-of-life tyre storage. EPA has used these powers in the past, but each case requires significant effort due to the high evidentiary requirements needed to demonstrate a contravention.

Generally, prosecutions for offences under the Act are costly and time-consuming for the regulator. The enforcement of notices can also take a considerable amount of time. The use of enforcement powers is a reactive, rather than preventative approach, and presents resource demands for EPA given the number and changing nature of waste tyre stores in Victoria and the challenges of obtaining cost recovery through the courts.

2.5.2.2 Victorian planning framework

The main shortcoming with relying on the Victorian planning framework is that the use of a site for tyre stockpiling or storage is often not disclosed when a planning permit is sought. In some cases, the use of the site for this purpose may not be foreseen by the planning permit applicant – for example, an applicant for a permit to build a warehouse that is subsequently let to a tenant that uses it to stockpile waste tyres.

In addition, where the proposed use of a site for waste tyre storage is disclosed, there is the potential for inconsistent referral advice and planning permit decisions and conditions across Victoria's 79 local government authorities.

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[59] Victorian Planning Provisions, clauses 52.10 and 66.02-8; section 55 of the *Planning and Environment Act 1987* (Vic).
[60] *Country Fire Authority Act 1958* s.41; *Metropolitan Fire Brigades Act 1958* s.87.
[61] *Building Act 2003 (Vic),* s.106(b).
[62] *Building Regulations 2006 (Vic).* r.109.
[63] *Building Act 2003 (Vic),* s.111.
[64] A municipal building surveyor can also issue an emergency order if they believe it is necessary because (among other things) of a danger to life or property arising out the use of a building (Act, s.102(1)); contravening an emergency order is also an offence (s.118).

2.5.2.3 Country Fire Authority Act 1958 and Metropolitan Fire Brigades Act 1958 (MFB Act)

The use of fire prevention notices under the fire services' legislation is subject to the variable and limited resources and capacity of Victoria's local government authorities. These notices tend to be used for fire risks, such as long grass, rather than for significant waste tyre stockpiles. Some local government authorities may also be concerned about their capacity to recover enforcement and cleanup costs if a notice is not complied with or if a site is abandoned after a notice is issued.

2.5.2.4 Building Act 1993

The *Building Act 1993* and associated regulations and standards only apply to indoor waste tyre stockpiles.

2.5.2.5 Interim Waste Management Policy (Storage of Waste Tyres) under the Act (WMP)

Given the above issues with the existing regulatory framework, the government introduced the interim Waste Management Policy (Storage of Waste Tyres) – declared on 29 April 2014.[65] It applies for 12 months and expires on 29 April 2015. Under the EP Act, the process for making an interim WMP involves the Minister certifying that there are special reasons for it being declared or varied without delay (section 18B). No public consultation process is required. In his certification in April 2014, the Minister noted (among other points) the need to address high-risk stockpile sites over the winter period in preparation for the 2014–15 fire season.[66]

This statutory policy applies to premises in Victoria that store more than 5,000 equivalent passenger units (EPU) or 40 tonnes of waste tyres at any time. It requires waste tyres on these premises to be stored only for purposes such as transfer, reuse, recycling, reprocessing or energy recovery, and in a manner that minimises risks to the environment and human health, predominantly due to the risk of fire.

This duty to minimise risks is complied with if the waste tyres are stored in accordance with the recommendations in the Victorian Fire Services' Guidelines (*Fire Services Guideline – Open air storage of tyres* and *Fire Services Guideline – Indoor storage of tyres*).

The Victorian Fire Services' Guidelines were developed by the MFB and CFA in early 2014. In developing the guidelines, the MFB and CFA had regard to their operational experience and expertise, existing interstate (NSW and SA) and overseas fire services' guidelines on waste tyre storage, and other relevant guidelines, codes and Australian Standards. The approaches recommended in the Victorian Fire Services' Guidelines are 'aimed specifically at operators to help them run [their] sites as safely as possible, and to ensure that fire protection is provided *based on accepted engineering principles, tests, data, fire incidents and field experience*'.[67]

The Victorian Fire Services' Guidelines contain recommendations regarding site selection, tyre pile size, separation distances, ignition source control, security, fire protection equipment, water supplies, containment in the event of fire, fire brigade access, fire risk assessments, and emergency planning, procedures and equipment.

If premises are not meeting the requirements of this statutory policy, EPA can issue a pollution abatement notice under section 31A of the Act (as outlined above).

Under this policy, EPA advises councils about the approaches recommended in the Victorian Fire Services' Guidelines.

The enforcement of the interim WMP is indirect, requiring firstly to identify a potential hazard, then issue a Pollution Abatement Notice, which may be escalated to a Penalty Infringement Notice or prosecution.

As an interim measure, the WMP can only apply for 12 months at a time, meaning there is limited scope to continue its application on a recurrent basis after its expiry on 29 April 2015. The intent is that interim WMPs will only be used in exceptional circumstances that justify a lack of prior consultation. The argument that there are special reasons that justify the making of an interim WMP also becomes more difficult to sustain the longer the regulated standards have been in place.

2.5.3 Comparison of state and territory regulation

The regulation of waste tyres varies across each state and territory in Australia. In comparison to other jurisdictions, Victoria has a relatively light approach, especially in relation to the storage, or stockpiling, of waste tyres. When considering the waste tyre supply chain more broadly, most jurisdictions also require permits to transport waste tyres (above defined thresholds), with related reporting and record-keeping requirements. A comparison of tyre storage regulations is provided in Appendix C. Currently, the requirement to obtain a licence to store waste tyres is imposed by NSW, SA, WA, ACT and NT.

Since 2013, tyre storage is no longer an environmentally relevant activity, requiring a licence from the environmental regulator in Queensland, but unlike Victoria, a licence is still required for facilities that receive and recycle, or receive and reprocess, 1,000 or more EPU in a year. Waste tyre storage facilities remain subject to other regulatory requirements in

[65] Waste Management Policy (Storage of Waste Tyres) 2014, *Victorian Government Gazette*, No S139, 30 April 2014.
[66] Ibid.
[67] Country Fire Authority and Metropolitan Fire Brigades (2014), op cit., section 1.2.

Queensland, under fire, health and planning legislation.[68]

Tasmania regulates a number of tyre storage facilities and requires transporters and receivers of tyres to be registered. Tasmania is also currently examining possible future policy options for the management of waste tyre stores.[69]

The requirement to obtain a licence in other jurisdictions is based on the amount of tyres being stored or received. Each jurisdiction generally sets a threshold above which licensing is required.

In relation to Victoria's neighbouring states, a licence is required for sites in NSW that store more than 5 tonnes of waste tyres or 500 waste tyres at any time (prior to 1 September 2014, the licensing application threshold in NSW was 50 tonnes or 5,000 EPU).[70] In South Australia (SA), sites that recycle or reuse more than 5 tonnes of waste tyres in a year require an EPA SA licence, as do any sites that store waste tyres[71].

There is anecdotal evidence[72] that this disparity in state regulatory requirements is providing an incentive for waste tyres to be brought into Victoria from neighbouring states such as NSW and SA, as it is cheaper to transport whole waste tyres to Victoria for stockpiling, than to pay for appropriate disposal in the state of origin. However, these lower costs of storing waste tyres in Victoria would be at least partly offset by the transport costs associated with moving waste tyres to Victoria.

2.6 Summary of the problems to be addressed

Waste tyres may be stored in large volumes as part of legitimate resource recovery processes. However, if not adequately managed, large stores of whole waste tyres can pose a significant fire hazard and impose costs on the environment and public health. For some businesses in the waste tyre supply chain, there are limited private incentives to manage the fire hazard, as some of the costs of the fires are borne by third parties (i.e. externality costs).

Waste tyres represent a growing hazard to the Victorian community and environment. The number of waste tyres generated each year continues to grow, entering a market of relatively low regulatory controls and low rates of reuse and recycling. This has resulted in large volumes of waste tyres going unaccounted for and an increase in the number of large stockpiles in open areas and warehouses, and smaller illegal dumping into private and public lands.

Large stores of whole waste tyres often constitute significant hazards that, if they catch fire, are difficult to extinguish and pose health risks to the local community through air pollution and contaminate waterways, groundwater and soil. They can also be a means of avoiding the true costs of proper waste disposal, constitute a loss of potentially valuable resources, and provide breeding sites for mosquitoes and vermin which can spread diseases.

The problem with stockpiling is greatest when the typical scale and location of stockpiles poses a high fire risk and/or there are limited incentives to manage the fire risk. This is relevant for three points in the tyre supply chain: stockpiles as an end point or for long-term storage, waste tyre processing (recyclers, retreaders and energy production) and waste tyre collection (including transport for export). Given this, action should particularly focus on addressing the problem caused by these three activities.

The existing regulatory framework in Victoria is not adequately addressing the problems associated with waste tyre storage. To do so, the framework needs to be preventative, flexible, efficient and equitable, with most other jurisdictions in Australia adopting a licensing requirement as part of their approach to managing the issues associated with the storage and stockpiling of waste tyres.

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[68] Regulated waste storage (more than 5 tonnes of tyres)' was one of 20 environmentally relevant activities deleted as part of Queensland's Greentape Reduction program: Queensland Department of Environment and Heritage Protection, *Greentape Reduction – Smarter green partnerships – Review of environmentally relevant activities – Decision regulatory impact statement* (February 2013), p.3. The [ERA] review concluded 'that there is little to no risk of release of contaminants from waste tyre storage facilities and, accordingly, no longer warrants prescription of the activity as an ERA': See Davis G (2013), 'Removal of tyre storage regulation burns Qld: WRIQ', available at http://www.ben-global.com/storyview.asp?storyid=801572845 accessed 14 May 2014.

[69] EPA Tasmania, Personal communication, 29 July 2014.

[70] EPA New South Wales (2014), Consultation on draft POEO (Waste) Regulation 2014, available at: http://www.epa.nsw.gov.au/waste/wasteregconsultation.htm, accessed 17 May 2014.

[71] *Environment Protection Act 1993* (SA), Schedule 1, clause 3(3)

[72] PwC (2013), op cit., page 6.

3 Objectives

Taking into account the nature and extent of the problem set out in chapter 2, the primary objective of this RIS is to identify the best approach to ***minimising the environmental and public health impacts (particularly those as a result of fire) from inappropriate storage of waste tyres in Victoria.***

The Victorian Government environment portfolio is seeking an integrated approach to addressing the problems of waste tyre management. Working with the Victorian Fire Services, the interim Waste Management Policy (Storage of Waste Tyres) was established to strengthen an increased compliance and enforcement approach on known high-risk sites. However, the WMP will sunset on 29 April 2015, and while longer-term market development initiatives are being examined, ongoing action is required.

To support the primary objective and to help address the indirect causes of the problems associated with waste tyre stockpiles, the secondary objectives include:

- reducing the instances of illegal dumping of waste tyres.
- reducing the opportunity for the abandonment of land used to stockpile waste tyres, and its impact on the public, local government and the state.

Additionally, to maintain the longer-term investment to support the development of sustainable resource use and market development for waste tyres in Victoria, a preferred option should also pose no barrier to:

- increasing the demand for waste tyres and tyre-derived product
- improving access and supply of waste tyres to reuse and recycling applications.

4 Options

A range of options have been identified that may contribute to achieving the objectives, particularly to address high-risk storage and minimise the environmental and public health impacts as a result of fire from whole waste tyres.

A 'short list' of options has been selected for further impact analysis by eliminating those preliminary options that do not address high fire risk storage points in the supply chain. The remaining options are then assessed against a range of criteria including earlier realisation of benefits, flexibility, efficiency and equity.

4.1 Base case

All options are considered relative to a base case that assumes continuation of the status quo as at January 2014. This is described above in Chapter 2.5.2. The base case excludes the interim Waste Management Policy (Storage of Waste Tyres) introduced in April 2014 as this will only apply for 12 months.[73] Continuation of the requirements imposed by the interim waste management policy is considered as a stand-alone option (see option 1 in Table 5).

4.2 Identification of options

The options have been identified through a process that considers the regulatory frameworks available to: EPA Victoria; other relevant Victorian regulators; and other state and international environmental regulators. Options have also been developed by considering the regulation or management of similar waste types (e-waste, packaging, recyclable containers) or comparable problem types (low-probability, high-consequence risks, such as dangerous goods management).

An overview of the options is provided in Table 5, with detailed descriptions in Appendix D, Table 20. These options are categorised consistent with the *Victorian Guide to Regulation*.

[73] Waste Management Policy (Storage of Waste Tyres) 2014, *Victorian Government Gazette,* No S139, 30 April 2014,

Table 5: Overview of options

Type of regulatory option	Ref.	Option description
Explicit government regulation (legislation)	1	**Waste Management Policy** – an ongoing statutory policy made under the *Environment Protection Act 1970* (the Act) imposing duties similar to those in the interim Waste Management Policy.
	2	**New direct Regulations** – a new Regulation made under the Act with prescriptive requirements relating to fire suppression equipment, maximum tyre stockpile sizes, emergency management procedures, etc., and direct penalties for non-compliance.
Extending the coverage of existing legislation	3a 3b 3c	**Scheduled Premises and Exemptions Regulations** – amending these Regulations so that premises storing waste tyres become scheduled premises, with sub-options of: • a works approval requirement only (an EPA works approval permits the construction of an entire plant, the installation of equipment or modification of process. Applicants for a works approval are required to demonstrate compliance with all relevant statutory policies – State Environment Protection Policies (SEPPs) and Waste Management Policies (WMPs) – and regulations); or • both works approval and licensing requirements (licences provide ongoing approval from EPA for managing wastes and discharges to the environment that would otherwise be an offence under the EP Act. EPA licences can include waste discharge limits for air, water and land based on statutory policy requirements and the discharge estimates assessed during the works approval stage); and/or • works approval, licensing requirements and a financial assurance requirement (a financial assurance ensures that money is available for cleanup at licensed premises in the event of insolvency or insufficient resources. The amount required to be provided in a financial assurance would be based on the activities occurring at the premises and the quantity and type of wastes stored).
	4	**Classify tyres as prescribed industrial waste (PIW)** – issuing a classification under the Industrial Waste Resources Regulations, which would trigger various requirements associated with PIW, including transport permits, works approvals and licensing.
Increased enforcement of existing provisions	5	**Increase inspection and compliance activity** – increase resources for joint inspection and compliance activity by EPA, Fire Services and/or Municipal Building Surveyors, using agencies' existing regulatory tools.
Information disclosure	6	**Environmental Rating Scheme for Tyre Retailers** – publicly rating tyre retailers according to their waste tyre management practices.
Market-based instruments	7	**Used Tyre Buy-back Scheme** – imposing a deposit on new tyres that is refunded when, as waste tyres, they are taken to accredited waste tyre depots.
Public information and education campaigns	8	**Highlighting risks to financiers** – highlighting to business financiers the risks to business continuity and third parties when sites do not store waste tyres safely.
	9	**Highlighting risks to insurance providers** – similarly, highlighting to insurers the risks associated with sites that do not store waste tyres safely.
	10	**Increased education to generators of waste tyres** – providing generators with increased education and guidance on the options available for disposing of waste tyres and appropriate end uses.

4.3 Preliminary assessment of options

The principal hazard from tyre fires exists at locations where whole waste tyres are stored in large volumes and in particular, where these sites contain little or no fire management plans or infrastructure. This most often occurs where businesses collect and, or receive and process regular volumes of waste tyres (for example, waste tyre processors and waste tyre collectors, including transport and collection for export), or where there are limited private incentives to manage the fire hazard (for example, stockpiles as an end point or for long-term storage).

From the stated objectives, the primary aim is to minimise the environmental and public health impacts (particularly those as a result of fire) from inappropriate storage of waste tyres in Victoria. However, where possible, successful interventions should also support the broader Victorian Government environment portfolio approach to addressing the issues from waste tyres, and provide a strong foundation for longer-term investment in the development of sustainable resource use and market development for waste tyres in Victoria.

The preliminary set of options has been refined by applying an initial assessment framework that assesses the ability of options to effectively reduce the fire risk at the three priority waste tyre storage/stockpiling activities. The results of the preliminary assessment are provided in Table 6, with additional detail in Appendix D, Table 20.

4.3.1 Preliminary assessment outcomes

The nature of the risk posed by tyre storage, being low frequency, but of high consequence, will often require a mechanism to reduce the impact or severity of the risk rather than solely seeking to reduce the likelihood of events occurring. This initial assessment round revealed that options which are focused on the activity of waste tyre storage and seek to maintain high levels of compliance with minimum performance standards, are considered the most viable. These options would be effective across all of the high-risk sectors identified. While many of the non-regulatory options will not be considered further in the assessment of options for this RIS, they have the potential to be included as part of the ongoing environment portfolio approach to improving the management of waste tyres. Such options are consistent with activities planned by SV and TSA, to promote market development for waste tyres.

Table 6: Summary of outcome of preliminary assessment

Ref.	Option description	Stage 1 (Preliminary assessment)
1	**Waste Management Policy**	✓
2	**New direct Regulations**	✓
3a	**Scheduled Premises and Exemptions Regulations** – works approval requirement only	✗
3b	**Scheduled Premises and Exemptions Regulations** – both works approval and licensing requirements	✓
3c	**Scheduled Premises and Exemptions Regulations** – works approval, licensing requirements and a financial assurance requirement	✓
4	**Classify tyres as prescribed industrial waste (PIW)**	✓
5	**Increase inspection and compliance activity**	✓
6	**Environmental Rating Scheme for Tyre Retailers**	✗
7	**Used Tyre Buy-back Scheme**	✗
8	**Highlighting risks to financiers**	✗
9	**Highlighting risks to insurance providers**	✗
10	**Increased education to generators of waste tyres**	✗

4.3.2 Excluded options

Restoring a balance in the market price for tyre storage, increasing awareness of risks and providing positive incentives to recover and recycle tyres, would act on different parts of the market and to varying degrees. However, these options were not believed to adequately address the fire risks from tyre storage at the high-risk activities.

Specifically, options 6 and 7, and 10 were assessed as having the potential to significantly support the reduction of stockpiling of tyres as an end point. However, they would not provide adequate assurance that if or when waste tyres were stored (whether in existing stockpiles or in other high-risk sectors), that they would be managed appropriately to reduce the risks from fire. Options 6 and 7 were also seen to overlap with efforts to establish a national Tyre Product Stewardship Scheme.

Options 8 and 9 were considered to be effective for those businesses that contained large capital assets (for example, established tyre recycling facilities), as they have the potential to influence insurance premiums and financing costs of capital to encourage the sector to manage the risk more effectively. However, these options do not address the problem from other activities (i.e. end point or long-term stockpiling and intermediaries), where the current market is dominated by businesses that focus on securing large supplies of whole waste tyres rather than investing in suitable property and fire suppression equipment to manage the risks associated with tyre stockpiles.

While option 3a would establish a requirement that future developments are designed and built to ensure that the facility is capable of operating in a fire safe manner, it would not address the risks from existing stockpiles or businesses that are already established in the market, or address the ongoing risks from operation.

4.4 Secondary assessment of options

The remaining options are all variations in regulatory approaches that would introduce standards for the management of waste tyre stores (as supported by the most recent version of the Victorian Fire Services Guidelines for the storage of tyres). As noted in section 2.5.2.5, the Victoria Fire Services Guidelines were developed by taking into account operational experience and expertise, and existing interstate and overseas fire services guidelines on waste tyre storage. They recommend approaches to ensure that fire protection is provided based on accepted engineering principles, tests, data, fire incidents and field experience.

The next stage of analysis will be on the relative benefits of each proposed legislative instrument. This analysis draws on a range of qualitative criteria that seeks to reveal a preferred option that exhibits the following characteristics:

- **Minimum timeframe** – an option that enables a short development timeframe, to help minimise regulation and policy development costs and realise the benefits of action sooner and therefore minimise the opportunity for growth in poorly managed storage sites.
- **Regulatory flexibility** – the ability for the authorising instrument to be amended and modified in the near future, to better reflect the changing nature of the risk, improvements in the performance of the industry and introduction of complementary national and state market development schemes.
- **Maximum efficiency** – the cost efficiency of the option in regard to minimising the administrative costs for implementation by government, the regulatory burden on industry and ensuring no significant barrier to market development is imposed, while making certain that the option has a strong ability to effectively manage the risk from tyre fires.
- **Improved equity** – the ability for the government to adequately recover the costs of introducing and maintaining a new regulatory regime that seeks to more equitably balance the costs on the industry for risk posed on communities in the event of a tyre fire. As EPA would also incur administrative costs under the options; where possible the costs to operate and manage the process would be passed on to businesses in the form of fees, in line with the Department of Treasury and Finance's *Cost Recovery Guidelines* (2013).

The resulting analysis reveals option 3b and 3c, which involve the creation of a new category within the Scheduled Premises Regulations, enacting works approval, licensing and/or financial assurance requirements, as the two most preferable options. The analysis against the four criteria demonstrated that the other options are not expected to deliver the same benefits in addressing the objectives. The following summarises key weaknesses of the excluded options, in comparison to the preferred options of 3b and 3c. See Table 7, or Appendix D, Table 21 for further details of the analysis.

It has been assessed that none of the excluded options (1, 2, 4 or 5) would involve substantially lower costs than the remaining preferred options (3b and 3c). For those businesses remaining in the industry, aligning their operations with the Victorian Fire Services Guidelines would represent the largest cost element, and would apply under any of these options. The "Minimum Timeframe" criteria provides a relative estimate of the government labour costs involved in the design and development of the regulatory options. The "Maximum Efficiency" criteria also assessed the relative government compliance and enforcement costs associated with maintaining compliance with the recommendations in the Victorian Fire Services Guidelines.

Table 7: Summary of reasons for exclusion of options

Ref.	Option description	Reasons for exclusion
1	**Waste Management Policy**	• This option is comparable to the preferred options in terms of timeframe, flexibility and efficiency however, it does not provide a good solution in terms of equity. • Equity – A Waste Management Policy does not provide government with the ability to charge fees, and subsequently recover the costs from the introduction of new legislation and ongoing monitoring of compliance with policy requirements. While the administrative costs in regulating a non-licensed business are lower than compared to licensed businesses, there is commonly a higher level of compliance with requirements under the Act at sites that hold an EPA licence.[74] This is considered due to a range of factors, including a greater presence by the regulator, and increased access to and awareness of information to support compliance, which would need to be provided in the short term under a Waste Management Policy.
2	**New direct Regulations**	• This option is similar to the preferred options in terms of efficiency. It possesses the ability to recover costs through the establishment of fees, however, this solution would need a longer timeframe to establish and implement and subsequently it would not provide as much flexibility. • Flexibility – Under the EP Act, the Fire Services Guidelines cannot be incorporated into Regulations. Therefore, the content of the guidelines would need to be replicated in a regulation, with variation requiring amendment of the Regulations. Also, Regulations do not allow for the same degree of site specific variation as licensing (for example, maximum allowable storage limits).
4	**Classify tyres as prescribed industrial waste (PIW)**	• This option is comparable to the preferred options in terms of flexibility, efficiency and equity, however, it does not provide a good solution in terms of implementation timeframes and the desire to realise the benefits of action sooner. • Timeframe – Creating a new classification for waste tyres in the Prescribed Industrial Waste Regulations would trigger works approval, licensing and financial assurance requirements (as with preferred options 3b & 3c), but would be made under the existing A01 schedule category of the Scheduled Premises Regulations. This does not allow for the setting of application thresholds and would also trigger waste tracking requirements, extending the regulations to a large number of businesses including waste tyre generators (retailers), transporters, processers and receivers. This would require a longer timeframe develop and assess the impacts across a broader segment of the industry.
5	**Increase inspection and compliance activity**	• This option provides a good solution in terms of reducing the timeframe required to implement action and its level of flexibility. Compared to the preferred options, option 5 could be implemented in a shorter timeframe and there would be a higher degree of flexibility available, as the enforcement approach could be re-defined without changes to policy or regulation. While this option scores well on these criteria, its outcomes for the other criteria would be lower than the preferred options. As with options 1 and 2, it would not make any improvements to equity and it would not maximise efficiency. • Efficiency – The current regulatory framework across the range of applicable legislation provides opportunities to increase the deterrence at sites that present a hazard to the community. However, given the largely reactive nature of the existing legislative framework and other noted limitations (see section 2.5.2), it would require significant ongoing regulatory effort to enable a comparable and consistent level of industry compliance.

[74] A higher proportion of EPA inspections at strategic priority non-licensed sites, result in the issue of remedial Pollution Abatement Notices (PAN), compared to inspections of small to medium-sized licensed sites.

4.5 Tertiary assessment of options

Following the preliminary and secondary assessment of options, the next chapter of the RIS will analyse the costs and benefits of the two most preferable options:

- Option 3b – Scheduled Premises Regulations – works approval and licensing requirements
- Option 3c – Scheduled Premises Regulations – works approval, licensing requirements and a financial assurance requirement

These two options are a variation of an approach to create a new category within the Scheduled Premises and Exemptions Regulations for businesses that store above a certain EPU threshold of whole waste tyres. The existing Scheduled Premises and Exemptions Regulations are used to establish preventative (via works approval assessment processes) and ongoing operational environmental management requirements (via a licence with conditions) for high-risk industries in Victoria. This option allows for thresholds to be set to ensure that additional compliance requirements are applied to only those high-risk sites, and also enables the greater site specific controls through licence conditions (such as the maximum number of waste tyres to be held onsite at any time). The conditions of the licence could require the storage of waste tyres to be in a manner that minimises risks to the environment and human health, predominantly from the risk of fire. The duty holder would then be considered compliant with this requirement if waste tyres were stored in accordance with the recommendations in the Victorian Fire Services Guidelines.

The analysis of the two most preferred options will include a further analysis of the level of the threshold of onsite EPU onsite at which the option commences.

5 Impacts of the shortlisted options

To identify a preferred option, a detailed impact assessment has been undertaken on the remaining two shortlisted options:

- Option 3b – Scheduled Premises Regulations – works approval and licensing requirements
- Option 3c – Scheduled Premises Regulations – works approval, licensing requirements and a financial assurance requirement.

Under both options, a works approval and licence will be required for businesses that store whole waste tyres above a certain threshold of EPU or tonnage. The difference between the two options is whether a 'financial assurance' requirement is included in the Regulations. Under option 3c, one of the licensing requirements will be the provision of a financial assurance, commonly in the form of a bank guarantee.

The impacts of the two options have been assessed through an economic cost benefit analysis. Where possible, the costs and benefits have been estimated over the life of the Regulations, which is 10 years, and then using a rate of 3.5 per cent, have been discounted back to a 'net present value' (NPV) estimate. The main impacts associated with the two options are:

- Costs
  - government implementation costs
  - transition costs associated with businesses that choose to leave the industry
  - administrative and compliance costs for businesses that must comply with the new Regulations
- Benefits
  - potential cost savings for fire authorities from a reduction in fire management activities
  - potential cost savings for EPA from a reduction in resources required for compliance and enforcement
  - reduction in the fire hazard and risk associated with the storage of waste tyres and therefore avoided costs of tyre fires.

Figure 3 shows how these components are used in the analysis. It is acknowledged that it is difficult to accurately estimate the benefits from a reduction in the risk of waste tyre fires, so the cost benefit analysis is supplemented with a break-even analysis. This analysis estimates the number of fires that would need to be avoided to cover the costs of each option. Appendix H provides more detail on the methodology and assumptions.

Figure 3: Overview of approach to costs and benefits

Most industry sectors contain businesses of varying sizes, often with different environmental risk profiles, with larger sites generally presenting a broader risk profile. For the proposed Regulations, a threshold will be selected, above which a licence and/or works approval would be required. The threshold must be appropriate to ensure that the significant risks are captured, and be based on metrics that are meaningful for the scheduled industry. The appropriate metric must also be a meaningful proxy for the environmental risk the industry presents, and be readily measurable.

In the case of waste tyre storage, some sites process waste continuously while others operate periodically. The threshold subsequently needs to be designed to capture all major sites, including those that may only accept one or two large loads and then take a longer time to process them. It is also to be based on waste accepted and stored, rather than the amount processed, as this is usually more accurately monitored by the occupier and can be more easily checked through contracts and monitoring truck movements.

The threshold of the preferred option should be low enough that it sufficiently reduces the fire risks but high enough that it does not create unnecessary costs for businesses.

As part of the impact analysis, two thresholds are considered: 2,000 and 5,000 EPU. These thresholds were chosen for the following reasons:

- 5,000 EPU (or its equivalent tonnage) is a threshold used in the licensing regime of ACT and up until recently in NSW. It is a volume that, under certain circumstances, has the potential to represent a significant fire hazard. It is also a point that enables the regulations to be focused on the large processors and handlers of waste tyres, while minimising the regulatory burden on smaller or intermittent operators, or those which have strong private incentives

to manage the fire hazard from stores of waste tyres (for example, tyre retailers).

- 2,000 EPU is considered an alternate threshold to capture not only those sites likely to undertake high-risk activities onsite, but also to extend to a larger proportion of operations that involve the generation, collection and transport of whole waste tyres. It is suggested that a single shipping container may store greater than 2,000 whole baled passenger tyres. Therefore, this threshold would apply to most operations engaged in the handling of whole tyres for export, even those that collect infrequent or small volumes at a time. This threshold would also extend to a greater proportion of sites that may have accumulated whole waste tyres from various means (for example, collected for potential future reuse), while still limiting the regulatory burden on those businesses with strong private incentives to manage the fire hazard.

Where relevant, the costs and benefits of the two regulatory options (options 3b and 3c) are shown under both thresholds. The threshold will be determined by the outcomes of the impact analysis and will form part of the preferred option.

5.1 Costs

5.1.1 Government implementation costs

Under both options, EPA would incur additional costs to implement the new regulatory approach. Costs would include the following major components:

- develop and perform training for assessors and field staff
- design the licence conditions
- amend the guidelines for licence management, works approval and financial assurance.

The overall cost of this process has been estimated to be between approximately $24,000 and $28,000 – depending on the option. Appendix H provides more detail on the methodology and assumptions.

The ongoing EPA costs of implementation and enforcement are taken into account as a benefit rather than a cost. This reflects that these ongoing costs are estimated to be lower under the preferred regulatory options than with continuation of the status quo as a result of increased effectiveness of the proposed regulatory regime. The resulting net cost savings for EPA is discussed in Section 5.2.2.

5.1.2 Transition costs associated with operators that choose to leave the industry

When the proposed Regulations are introduced, some businesses may choose to exit the waste tyre industry instead of upgrading facilities and practices to comply with the new requirements. This is likely to occur for businesses that own very large stockpiles of waste tyres (i.e. over a million EPU) that do not currently meet the Victorian Fire Services Guidelines and have no immediate profitable use for the tyres. The initial and ongoing cost of setting up and managing these stockpiles in accordance with the proposed Regulations could be cost prohibitive.

If businesses have no profitable use for the tyres and choose to leave the industry, they will need to dispose of excess stock (for example, through a collector, recycler or to landfill). The costs of tyre disposal are estimated to be between $0.90 and $3.20 per EPU.[75] The midpoint of these estimates ($2.05) has been used for this analysis, which assumes that there will be no upward or downward pressure on disposal costs in response to increased demand for waste tyre disposal services due to the increased supply of waste tyres from businesses exiting the industry.

The number of businesses that will choose to leave the industry is unknown, as is the exact number of operators in the industry. However, it is estimated there may be around 400 sites with more than 2,000 EPU of stored whole waste tyres, see Appendix H, Table 23 and Table 24. This estimate is mostly comprised of retailers (approximately 80 per cent), with the rest made up of long-term stockpilers, tyre collectors/bailers and tyre recyclers.

It is estimated that the majority (approximately 90 per cent) of these businesses will change their operations to reduce the number of tyres they store to below the level of the threshold. For example, it is expected that tyre retailers would organise for their tyres to be collected more frequently to prevent large stores of tyres building up. Any increases in collection and transport costs are expected to be minor and could be borne by either the retailer and/or passed on to consumers. The only sector that is expected to exit the industry is long-term stockpilers. Of the 50 stockpilers, it is assumed that 20 may exit under a 5,000 EPU threshold and 30 may exit under a 2,000 EPU threshold. [76] Disposal costs are therefore higher under the 2,000 EPU threshold as there are more tyres to be disposed of.

The number of operators leaving the industry or reducing the volume of stored waste tyres is assumed to be the same under both options 3b and 3c. While there are additional costs to obtain a financial assurance under option 3c, the magnitude of these costs is small relative when compared to the costs of compliance with licence and associated fire management requirements under option 3b. Therefore, it is assumed that the additional costs under option 3c will not lead to more businesses leaving the industry.

[75] Based on values presented to Boomerang Alliance at NSW Tyre Summit, November 2013.
[76] Refer to Appendix H, Table 23 and Table 24 for a description of the assumptions underlying this estimate.

Based on the assumptions outlined, the estimated cost of disposal is between $21.35 million and $21.41 million, depending on whether the threshold is set at 5,000 EPU or 2,000 EPU.

This cost would be incurred by operators that own the waste tyre stockpiles. There is a risk that some businesses may abandon their stockpiles and leave responsibility for the cleanup to third-party property owners, or the Victorian Government. Given the difficulty in predicting the nature and scale of future legal activity to recover costs from the cleanup of abandoned waste tyre stores, the legal costs have not been quantified as part of this analysis. However, to limit the cases of abandonment, EPA has been undertaking, and will continue to undertake, active management of priority sites to ensure that businesses address risks and achieve compliance as soon as practicable. Prior to the commencement of the proposed Regulations, if a premise is not meeting the requirements of the interim Waste Management Policy, EPA can issue a remedial notice that provides a reasonable time for the premises to meet the requirements of the Policy. The costs associated with management of these sites are likely to include additional project management costs to oversee the disposal process. These costs have been incorporated into the analysis.

Based on the above analysis, once EPA management costs are included, the total transition costs associated with operators that leave the industry are estimated to be between $21.54 million and $21.69 million (depending on whether the threshold is set at 5,000 EPU or 2,000 EPU). This is shown in Table 8. The majority of the total transition costs are associated with one site holding approximately 9 million EPU. It is acknowledged that there is uncertainty as to how the market will respond to the proposed regulations. There may be a downward pressure on disposal costs in response to an increased supply of waste tyres, in particular from the opportunity to secure significant feedstock from one site.

Table 8: Estimated costs associated with operators that choose to leave the industry ($ million 10-year NPV)

Transition costs	Option 3b		Option 3c	
	2,000 EPU	5,000 EPU	2,000 EPU	5,000 EPU
Disposal costs	$21.41	$21.35	$21.41	$21.35
EPA management costs	$0.28	$0.19	$0.28	$0.19
Total	**$21.69**	**$21.54**	**$21.69**	**$21.54**

5.1.3 Administrative and compliance costs

Businesses that continue to operate in the waste tyre industry and store tyres above the threshold will be required to comply with the proposed Regulations. This will include obtaining a works approval (for the construction of a new plant, installation of equipment or modification of processes), applying for a licence (for current businesses and new entrants), complying with licensing conditions and, under option 3c, maintaining a financial assurance. This will result in costs being incurred by both industry and the Victorian Government.

This assessment considers that some businesses may be currently operating in a manner that is consistent with the recommendations of the Victorian Fire Services Guidelines or those of other jurisdictions. Subsequently, they will not incur additional compliance costs with the introduction of the preferred options. Estimated compliance levels that assume continuation of the status quo, as well as the introduction of the preferred regulatory options, are presented in Appendix H, Table 25.

5.1.3.1 Works approvals

Under both options, works approvals will lead to costs for both industry and EPA. For industry, new activities will incur administrative costs from applying for the works approval. This would include time spent applying for the approval and payment of the associated fee. EPA would also incur administrative costs to operate and manage the works approval process, which would be passed on to businesses in the form of application fees, in line with the Department of Treasury and Finance *Cost Recovery Guidelines* (2013).

Most facilities require both a planning permit and an EPA works approvals. The estimated cost to a business to complete, submit and obtain a planning and works approval for new works is between $10,000[77] and $20,000[78] – a midpoint of $15,000 has been used in this analysis.

The assessment of a works approval includes a number of steps. At a high level, this includes assessing applications, receiving public comment, following up assessments with inspections and final approvals. The overall costs from works approval requirements are shown in the table below.

It is estimated that 10 new businesses will enter the market over the next 10 years, with half of these between 2,000 to 5,000 EPU and the other half greater than 5,000 EPU. These businesses are predicted to be over 5,000 EPU and hence the costs of works approvals apply to both the 2,000 EPU threshold and the 5,000 EPU threshold – see Table 9. It is assumed

[77] Consultation with tyre recycler, 5 May 2014.
[78] EPA (2014), Operational information.

that compliance performance for businesses with between 2,000 EPU and 5,000 EPU will be slightly lower than for businesses with over 5,000 EPU.

Table 9: Estimated costs from works approval requirements ($ million 10-year NPV)

Works approval costs	Option 3b		Option 3c	
	2,000 EPU	5,000 EPU	2,000 EPU	5,000 EPU
Time spent applying for the approval	$0.10	$0.05	$0.10	$0.05
Administrative cost to government, which is partly or wholly passed on to industry in the form of fees	$0.06	$0.03	$0.06	$0.03
Total	**$0.16**	**$0.09**	**$0.16**	**$0.09**

Note: Totals may not sum due to rounding.

5.1.3.2 Licensing

Under both options, licensing will lead to costs for both industry and EPA. For industry, the following costs would be incurred by businesses:

- time spent applying for a licence
- time spent amending a licence (it is estimated that 10 per cent of licences will be amended per annum)
- cost of complying with the licensing conditions, including annual reporting requirements.

For EPA, there are also administrative costs associated with operating and managing the licensing regime. These are passed on to businesses in the form of annual licence fees, (and fees for licence amendments when initiated by the licence holder).

It is estimated that business would spend between $1,000 and $14,700 in time applying for a new licence.[79] A midpoint of $7,900 is used for this analysis. When amending a licence, it is assumed that the time cost to businesses is equivalent to half of the time to apply for a new licence. For reporting requirements, a tyre recycling business has estimated they spend 12 hours per annum reporting on their compliance with licensing arrangements in other jurisdictions.[80]

Base fees are set according to the industry category, to reflect EPA time and effort involved in managing licences. For a new category, taking a risk-based approach, the total time taken to manage the licence by EPA has been estimated based on past experience of comparable industries (equivalence assessment) and on discussions with stakeholders. This predominantly includes the costs incurred through site inspections and follow-up, and assessment of Annual Performance Statements (see Appendix I, Table 35). A base fee of 210 fee units has been proposed, equating to approximately $2,780 at the current fee unit value (2014–15). The licence fee amount ensures that those who give rise to the need for government regulation, pay the associated cost. This position is consistent with the principle in the *Cost Recovery Guidelines* (2013) that fees should generally be set to fully recover costs.

The proposed fees set only a single base fee, without an additional volumetric component fee due to the absence of emissions or discharges as part of the usual operating processes. Unlike in other industries, there can be a need to reflect the greater level of resources required to manage the licence as premises become larger and more complex. In these situations, where there is a large variation in the size and complexity of operations across a category (for example, power stations), a scale or tiering of base fee can be set. However, for the proposed regulations it is considered unlikely that EPA effort will vary significantly across sites within the waste tyre storage industry, based on the size or complexity of operations.

To estimate the cost of complying with the recommendations of the Victorian Fire Services Guidelines, this analysis has considered the recommendations of the guidelines and, where possible, obtained industry estimates of the costs of complying with these. Where industry estimates were not available, desktop research has supplemented the available data. The main requirements of the Victorian Fire Services Guidelines for open air and indoor storage of tyres are summarised in Table 10.

The table shows many of the requirements are similar for both indoor and outdoor storage, however, inspections by EPA, CFA and MFB of a range of sites identified that of seven waste tyre storage sites, all sites had some component of outdoor storage, while three sites (40 per cent) also had indoor storage. Further assumptions have been made on the proportion of operators that would face costs in meeting these requirements, including:

- Approximately 55 per cent of sites are already compliant with the requirement for an impervious layer for tyre stores,

[79] This estimate is derived from EPA 2007, *Industrial waste regulatory impact statement*, Table D.7, page 134. The figures have been converted to 2014 dollars using CPI.
[80] Consultation with tyre recycler, 5 May 2014.

assuming two-thirds of urban sites have an existing concreted area.[81]

- Approximately 20 per cent of sites would require a water supply assuming rural and regional sites do not have access to a town water supply.
- Approximately half of operators may already have or have arrangements to access the use of excavators, or other such equipment in the case of emergencies.

Based on these assumptions, the estimated cost from licensing is shown in Table 11. The costs of complying with the Victorian Fire Services Guidelines account for over 80 per cent of the estimated costs from the licensing requirements. With a 5,000 EPU threshold, the most significant elements of the costs of complying with the recommendations of the Victorian Fire Services Guidelines are estimated to be the containment area (40 per cent), security fencing (25 per cent), excavation equipment (20 per cent) and securing a reliable water supply (10 per cent). The estimate also includes costs for the development of an emergency management plan and self-contained breathing apparatus. The assumptions forming the basis of these estimates are presented in Appendix H, Table 31.

Some of the requirements that are more difficult to cost have not been estimated. They include the ignition source control and access for fire brigades (the latter is likely to be minimal as most sites would have access already). One requirement that is potentially significant is the appropriate separation of tyre piles from nearby hazards to mitigate the chance of fires spreading to adjacent tyre piles, buildings, neighbouring properties or endangering road users. While there is a possibility that additional land would be required to store tyres in accordance with the Victorian Fire Services Guidelines, we assume that the most likely response of compliant operators will be:

- where there are restrictions on the available space, operators will reduce the number of tyres to fit within the available land area
- where there are no constraints on the available storage space, operators will appropriately distribute the tyres across their site in accordance with the guidelines.

Table 10: Summary of management recommendations from the Victorian Fire Services Guidelines for indoor and open air storage of new or used tyres

Requirements for open air storage and indoor storage of new or used tyres
1. Appropriate site selection as part of risk assessment for new sites – for example, liaison with fire services, local council, EPA, WorkSafe Victoria about the site.
2. Ignition source control – for example, do not store tyres within 30 metres of easily ignitable materials.
3. Site containment – for example: • an impervious layer should be applied to outdoor sites with pervious soil. • bund walls or catchment pits should be provided to contain the surface run-off during fire-fighting activities.
4. Access for fire brigade appliances.
5. Fire risk assessment – should be developed considering guidance published by the relevant fire authority.
6. Emergency preparedness – for example, an emergency plan should be developed considering guidance published by the relevant fire authority.
7. Emergency procedures – for example, the procedures for raising alarms and contacting emergency services should be developed and provided to the relevant emergency service.
8. Emergency equipment – for example: • equipment such as bulldozers, excavators, or tracked loaders are required to be available to separate unburnt tyres from the burning pile (in the case of outdoor storage or forklifts in the case of indoor storage). For appropriate equipment that is not always available onsite, arrangements should be in place with suppliers and operators with deployment procedures developed. • self-contained breathing apparatus should be available. • all staff, including equipment providers and operators, should be appropriately trained in the site emergency management plan.

[81] These requirements can also be met by sites with impervious soil to contain water run-off although data is not available on the proportion of sites with such characteristics.

Requirements specific to open air storage of new or used tyres	Requirements specific to indoor storage of new or used tyres
9. Fire protection – a hydrant system and fire-fighting equipment should be provided.	9. Fire protection – for example: • a compliant sprinkler system may be required. • a minimum of three hydrant hose streams, each with a minimum flow rate of 10 litres per second.
10. Water supplies – for example, where town water is unavailable or insufficient, adequate static water of a minimum of two 250,000-litre tanks should be located diagonally opposite and fire pumps for remote sites should be considered.	10. Water supply – a minimum of four hours of water supply should be provided.
11. Security – a security fence should surround the site's perimeter.	11. Smoke and heat vents – where required, they should be installed to allow manual operation by the attending fire service.
12. Appropriate organisation of tyres – for example, into piles no greater than 20 m long x 6 m wide x 3 m high.	
13. Appropriate separation of tyre piles – for example, from each other and from boundaries, buildings and roads.	

Table 11: Estimated costs from licensing requirements ($ million 10-year NPV)

Licensing costs	Option 3b		Option 3c	
	2,000 EPU	5,000 EPU	2,000 EPU	5,000 EPU
Time spent applying for the licence	$0.29	$0.16	$0.29	$0.16
Administrative cost to government, which is part or wholly passed on to industry in the form of licensing fees	$0.24	$0.12	$0.24	$0.12
Reporting requirements	$0.25	$0.13	$0.25	$0.13
Time spent amending a licence	$0.12	$0.06	$0.12	$0.06
Complying with Victorian Fire Services Guidelines	$3.21	$2.03	$3.21	$2.03
Total	**$4.12**	**$2.50**	**$4.12**	**$2.50**

5.1.3.3 Financial assurance

Under option 3c, the licence would also include a financial assurance condition. This requires businesses to maintain a financial assurance in any form defined in section 67B(1) of the EP Act. The list is broad and allows the Authority to identify the most appropriate method in each instance. In practice, a bank guarantee is the most common form adopted by businesses. This requires a business to set aside an amount of money in a bank and pay a fee to the bank for that service. In deciding the type and amount of financial assurance, EPA considers the:

- likelihood of EPA incurring costs to fund a cleanup
- possible magnitude of that cleanup.

For businesses, the following costs would be incurred:

- time spent applying for financial assurance
- fees to the bank for provision of the guarantee, including a once-off establishment fee and ongoing annual fees.

EPA incurs administrative costs when receiving and verifying the establishment of the financial assurance. This cost is also passed on to businesses through licensing fees.

The cost to establish a bank guarantee is estimated at 0.5 per cent of the amount guaranteed – this amount is a one-off fee.

The annual fees can range between 1.5 per cent and 5 per cent[82] of the amount guaranteed. This analysis assumes a midpoint of 3.3 per cent for annual fees. The amount guaranteed is assumed to be equivalent to the estimated disposal cost of the maximum volume of tyres to be held on the site. It is also estimated that businesses may spend two hours of resourcing effort in applying for financial assurance. The estimated costs from financial assurance are shown in the table below.

Table 12: Estimated costs from financial assurance requirements ($ million 10-year NPV)

Financial assurance costs	Option 3c	
	2,000 EPU	5,000 EPU
Time spent applying for financial assurance*	$0.00	$0.00
Bank fees	$1.06	$1.03
Administrative cost to government, which is part or wholly passed on to industry in the form of licensing fees	$0.01	$0.01
Total	**$1.08**	**$1.04**

Note * The cost of time spent applying for financial assurance is estimated to be less than $10,000 in total under both thresholds and therefore the numbers round to zero in this table.

There will also be an opportunity cost associated with setting aside an amount of money in a bank given that these funds could be otherwise invested for a financial return. These costs are excluded from the break-even analysis which focuses on economic costs (for example, resources expended) and excludes financial transfers between parties that do not impose additional costs on society. In addition, the discounting of future cash flows already accounts for opportunity costs. However, Table 13 provides an indication of the foregone return per business over 10 years at different potential rates of return and tyre volumes. It is estimated that the financial opportunity cost could range from $80 (2,000 to 5,000 EPU and 3.5 per cent per annum) to $10,000 per business (greater than 5,000 EPU and 10 per cent per annum).

Table 13: Indicative opportunity cost of financial assurance bank deposit (foregone return per business over 10 years)

Assumed rate of return (% per annum)	Option 3c	
	2,000 to 5,000 EPU	> 5,000 EPU
3.5% (real risk-free opportunity cost of capital from the *Victorian Guide to Regulation*)	$82	$2,565
5% sensitivity test	$126	$3,928
10% sensitivity test	$319	$9,955

5.1.4 Summary of the costs

The estimated costs associated with the two options are summarised in Table 14. The largest cost under both options is the disposal costs associated with businesses that choose to leave the industry. The estimated costs of complying with the recommendations of the Victorian Fire Services Guidelines comprise the next largest cost item.

Implementation costs are estimated to be the same under both a 2,000 EPU and 5,000 EPU threshold. These costs relate to design of licence conditions, amendment of licence management and works approval guidelines and training for assessors and field costs, which do not change with the threshold assumed.

[82] This range is taken from two sources. The 5 per cent figure is from PwC (2011), *Financial assurance options analysis*, prepared for EPA Victoria, page 15. The 1.5 per cent figure is sourced from http://www.suncorpbank.com.au/financial-services/bank-guarantee, Accessed 11 April 2014.

Table 14: Summary of the estimated costs ($ million 10-year NPV)

Cost		Option 3b		Option 3c	
		2,000 EPU	5,000 EPU	2,000 EPU	5,000 EPU
Government implementation costs		$0.02	$0.02	$0.03	$0.03
Transition costs associated with businesses that choose to leave the industry					
	Disposal costs	$21.41	$21.35	$21.41	$21.35
	EPA management costs	$0.28	$0.19	$0.28	$0.19
Administrative and compliance costs to business and government associated with businesses that comply					
	Works approval	$0.16	$0.09	$0.16	$0.09
	Licensing	$4.12	$2.50	$4.12	$2.50
	Financial assurance	n/a	n/a	$1.08	$1.04
Total costs		**$25.99**	**$24.15**	**$27.07**	**$25.19**

5.2 Benefits

The main benefit from the proposed options is the reduction in the fire hazard and the potential avoided costs of tyre fires. Given the uncertainty in assessing the potential likelihood and consequences of future fires, it is difficult to identify the exact reduction in the fire hazard and the number and size of fires that would be avoided. Therefore, this benefit has not been quantified, but rather, a break-even analysis is used. A break-even analysis is commonly used in these circumstances as it does not directly seek to value benefits, but tests the reasonableness of potential levels of benefits required to cover the costs.

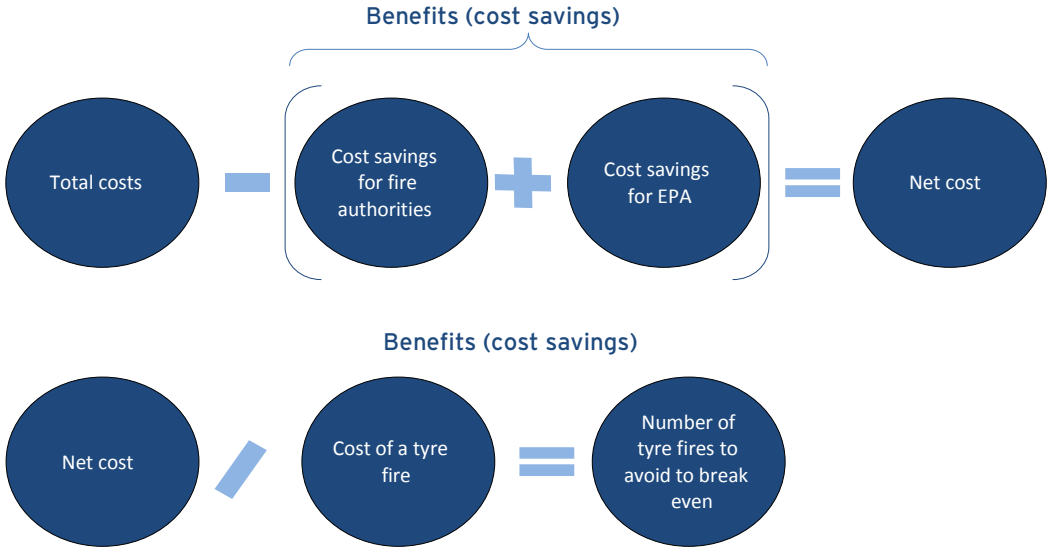
Before undertaking the break-even analysis however, some other additional benefits have been captured, including:

- cost savings for fire authorities from a reduced need to actively manage high-risk tyre stockpiles as a preventative action
- cost savings for EPA from an improved regulatory framework and more efficient and effective compliance and enforcement regime.

These additional benefits are discussed and where possible, quantified, in the sections below. After accounting for these benefits, a break-even analysis is undertaken to identify whether the options would result in a net benefit. The break-even analysis is only able to account for the *direct* costs of tyre fires that may be avoided by the proposed Regulations. There are other benefits that cannot be captured in the quantitative analysis. This includes the *indirect* costs of tyre fires that may be avoided, as well as the reduced risk from cleaning up waste tyres in a timelier manner. These benefits are discussed in more detail in section 5.3 – Break-even analysis. They are also discussed as part of the cost of the problem in Chapter 2 and Appendix C.

This approach is illustrated in figure 4 and is explained in greater detail in Appendix H.

Figure 4: Overview of benefits



5.2.1 Cost savings for fire authorities

Under both options, the Victorian Fire Services (CFA and MFB) are likely to save time and resources because of the reduced need to proactively manage the fire risk associated with waste tyre stockpiles. For example, the CFA currently undertakes works in preparation for fires, including emergency management planning, vegetation management and site inspections for some large and high-risk sites.[83] Under the proposed Regulations, the business would be required to inform the MFB or CFA of its sites' emergency management plans. Based on the CFA's estimates, under both thresholds, the total estimated cost savings to fire authorities from reduced preventive site management is approximately $60,000 over 10 years. This value applies to both thresholds as the preventative action is directed to the large or high-risk stockpiles that would be well above either of the set thresholds.

5.2.2 Cost savings for EPA to undertake enforcement

Under both options, there could be a cost saving for EPA from the increased effectiveness of the proposed regulatory regime. Fewer resources would be required to deliver a comparative level of compliance at licensed businesses than under the base case. The established licensing regime would include existing processes of risk-based compliance inspections and annual verification of a licensee's Annual Performance Statement. These processes require an increased level of administrative effort and costs to both the regulator and duty holder; however, they are also likely to result in improved understanding of regulatory requirements and access to associated guidance to support compliance. The regular compliance monitoring interactions with EPA also produce, on average, greater levels of compliance than comparable unlicensed industries.[84]

One of the drivers for this cost saving is the number of businesses that require compliance monitoring and enforcement. If the threshold is set at 5,000 EPU, the number of businesses that require compliance monitoring and enforcement is predicted to decrease when compared to the base case. It is estimated that a cost saving of approximately $30,000 would result from the reduced compliance and enforcement needs under the proposed regulatory options.

Under a threshold of 2,000 EPU however, the costs for compliance and enforcement are predicted to increase by approximately $24,000 because of the greater number of licensed businesses.

5.2.3 Avoided cost of tyre fires due to the reduction in the fire hazard

Both options are expected to decrease the fire hazard associated with the storage of waste tyres across Victoria. This will mostly be achieved from the following:

- Large high-risk stockpiles are expected to be cleaned up and the waste tyres disposed of in an appropriate manner. This removes the fire hazard from these stockpiles altogether.
- The remaining stores of waste tyres initially above the threshold will be managed in accordance with the recommendations in the Victorian Fire Services Guidelines or further reduced in volume to a level below the threshold.
- Under option 3c, the financial assurance requirement will ensure that for those businesses operating under a licence, sufficient funds are available in the event that cleanup is required.

In addition to the specific controls applied to sites that may operate under a licensing regime proposed by these options, the introduction of the proposed Regulations are likely to alter the make-up of businesses and the scale of waste tyre storage practice. For example, businesses may adjust their operations so that their tyre storage is maintained at a level below the EPU threshold. As noted previously (in section 5.1.3) tyre retailers could organise collections of waste tyres to occur more frequently, which would aid tyre recyclers and processors to manage a more consistent flow of smaller volumes. This is a positive outcome as it decreases the size of tyre stores and therefore the risk from fire.

5.3 Break-even analysis

Given the uncertainty about future fire events, a break-even analysis has been undertaken to demonstrate the number of tyre fires that would need to be prevented over the next 10 years in order for the proposed Regulations to provide a net benefit to society. For this analysis, the break-even point is calculated based on the remaining net cost after accounting for all costs and benefits that can be quantified. In relation to costs, these are the costs of the options as set out earlier in this chapter, and in terms of benefits these are the cost savings to government outlined above.

The break-even analysis of the two options assessed is summarised in Table 15. The break-even points represent the number of tyre fires that would need to be prevented over the next 10 years in order for the proposed Regulations to provide a net benefit to society. The calculations use the estimated costs of tyre fires presented in Appendix H, Table 36.

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[83] Country Fire Authority (2014), Operational information.

[84] EPA inspections at small to medium sized, strategic priority non-licensed sites, result in a higher proportion of remedial Pollution Abatement Notices (PAN) being issued, than at similar sized licensed sites, 33 per cent compared to 18 per cent respectively (from August 2012 to Feb 2014).

Table 15: Break-even analysis

		Option 3b		Option 3c	
		2,000 EPU	5,000 EPU	2,000 EPU	5,000 EPU
Estimated cost and benefits ($ million 10-year NPV)					
	Costs	$25.99	$24.15	$27.07	$25.19
	Benefits – cost savings*	-$0.18	$0.10	-$0.18	$0.10
	Total	$26.17	$24.06	$27.25	$25.10
Number of fires avoided over the next 10 years to break even					
	Tyre fire with < 0.5m EPU	177	163	185	170
OR	Tyre fire with 0.5–1m EPU	8.3	7.7	8.7	8.0
OR	Tyre fire with 1– 4m EPU	5.2	4.8	5.5	5.0
OR	Tyre fire with > 4m EPU	1.20	1.10	1.24	1.15

Note: * Negative cost savings represent an increase in costs.

The greatest fire risk from tyre storage in Victoria comes from large stockpiles. Given this, it is useful to estimate the remaining break-even point if we assume that the proposed Regulations would avoid one large tyre fire sometime in the next 10 years. Table 16 provides the outcomes of this analysis, which show the number of smaller fires that would also need to be avoided (in addition to avoiding a large tyre fire in the order of more than 4 million EPU) for the options to result in a positive net benefit for society.

Table 16: Break-even analysis assuming that one large tyre fire is avoided (more than 4 million EPU)

		Option 3b		Option 3c	
		2,000 EPU	5,000 EPU	2,000 EPU	5,000 EPU
Additional number of fires avoided in the next 10 years over and above avoiding one large tyre fire					
	Tyre fire with < 0.5m EPU	29	15	36	22
OR	Tyre fire with 0.5–1m EPU	1.4	0.7	1.7	1.0
OR	Tyre fire with 1–4m EPU	0.9	0.4	1.1	0.6

5.3.1 How likely is it that a net benefit would result?

Table 15 shows that option 3b (with a 5,000 EPU threshold) would need to avoid, for example, one tyre fire with more than 4 million EPU, five tyre fires with 1–4 million EPU or 8 tyre fires with 0.5–1 million EPU, over 10 years to provide a net benefit to society.

Alternatively, Table 16 sets out the number of tyre fires that would need to be avoided, in addition to one tyre fire greater than 4 million EPU, in order for the options to provide a net benefit to society. It demonstrates that option 3b (with a 5,000 EPU threshold) would need to avoid the direct costs of, for example, one tyre fire with 0.5–1 million EPU, or 15 tyre fires with less than 0.5 million EPU over 10 years, in addition to one large fire (greater than 4 million tyres), to cover its costs. The latter scenario equates to 1.5 fires during each year of the 10-year period, among the 39 sites estimated to be in this category.[85]

While it is important to consider the likelihood of future fires occurring under the base case and proposed regulatory scenarios, due to the nature of low-frequency, high-consequence events, there is little available historical data on fires associated with large stores of whole waste tyres in Victoria. In addition, tyres are not always specifically identified in fire data, for example, where they are not the primary ignition source but subsequently catch on fire.

However, an aspect that can be assessed is the reduced risk of a tyre fire under the proposed options. For some of the large stockpiles, it is expected that the risk will be reduced as the sites would not be economically viable under the proposed Regulations, resulting in the stockpile being removed. Compliance with the recommendations of the Victorian Fire Services Guidelines would then act to reduce the fire risk at the remaining sites.

[85] It is estimated that there are approximately 43 sites holding more than 5,000 EPU under the base case (see Table 23 of Appendix H). Of these, four sites are estimated to hold more than 0.5 million EPU.

While the break-even analysis incorporates the direct costs of a tyre fire, it does not account for the indirect costs, as these could not be quantified in a robust way as part of this analysis. If these indirect costs were able to be quantified and included in the break-even analysis, the number of avoided fires to break even would be lower.

Similar to other emergency and disaster-related events, the indirect costs of tyre fires include health impacts, nuisance costs (i.e. evacuation of local residents and disruption to businesses) and environmental damage.

For example, if a large tyre fire occurred, CFA has indicated that the following could occur:

- closure of roads and railway lines to the public
- local residents and businesses may need to be evacuated – the extent of the evacuation would depend on the conditions of the fire and weather
- advise the community not within the evacuation zone to stay inside, turn off all air conditioning and close all doors and windows
- in terms of the environmental impacts, there is potential for groundwater, surface water and soil contamination to occur. There are also costs associated with blocking up the drainage system around the stockpile and creating a temporary dam to capture run-off for removal and treatment.[86]

[86] Country Fire Authority (2014), Operational information.

6 Preferred option

6.1 Determination of the preferred option

Given the existing data limitations about tyre related fires in Victoria, there is a high level of uncertainty about how many tyre fires would be avoided by each option. Given this uncertainty a conservative approach has been taken and the lowest cost option preferred. Subsequently, the preferred option is 3b with a threshold of 5,000 EPU. The proposed Regulations would therefore incorporate works approvals and licensing requirements, without a financial assurance requirement.

It is acknowledged that option 3c may decrease the fire risk by more than option 3b, as it provides access to funds that may enable a faster response and cleanup of waste tyres by a licensee or EPA in the case of business failure. However, including a financial assurance requirement on top of a licensing requirement, is only expected to reduce fire risk marginally, and will potentially result in higher costs for small businesses.

It is also acknowledged that a lower threshold of 2,000 EPU would decrease the fire risk by more than the preferred option; however, it is unclear if this additional benefit would offset the additional costs.

6.2 Impact on small businesses

The threshold under the preferred approach has been chosen to target large processors and handlers of waste tyres, while minimising the regulatory burden on smaller or intermittent operators, or those with strong private incentives to manage the fire hazard from stores of waste tyres held onsite (for example, tyre retailers). If the threshold is set at 2,000 EPU (instead of 5,000 EPU), the Regulations are likely to apply to some retailers and other smaller scale businesses in the industry.

It is estimated that the proposed Regulations, with a threshold of 5,000 EPU, will apply to approximately 20 businesses. This consists of five tyre recyclers and 15 waste tyre collectors. Tyre recyclers are generally larger businesses such as Tyrecycle and Tyre-A-Way. Waste tyre collectors are more likely to be small businesses. It is possible that the proposed Regulations could impact disproportionately on these small businesses because there are fixed costs incurred (i.e. the time and fees to obtain a works approval and/or licence). The largest cost for businesses however, is to comply with the recommendations of the Victorian Fire Services Guidelines, which would vary depending on the number of tyres being stored.

6.3 Competition assessment

As a matter of good public policy, it is necessary to include an identification of any restrictions to competition in the preferred option, showing that the restriction is necessary to achieve the objective, and assessing whether the benefits of the restriction outweigh the costs in each particular case. Any new Regulations in Victoria must not restrict competition unless it can be demonstrated that:

- the benefits of the restriction, as a whole, outweigh the costs
- the objectives of the legislation can only be achieved by restricting competition.

A legislative amendment is considered to have an impact on competition if any of the following questions in the table below can be answered in the affirmative. The table shows the rationale and significance of those areas where there is an impact on competition.

Based on the assessment, the preferred option will have an impact on competition because it will affect the market structure and impose a barrier to entry. These elements of the policy are deemed to be necessary for the option to address the underlying problem.

Table 17: Criteria for determining adverse competition impacts

Question	Answer	Significance
Is the proposed measure likely to affect the market structure of the affected sector(s) – i.e. will it reduce the number of participants in the market, or increase the size of incumbent firms?	Yes	The number of participants in the market is expected to decrease because the cost on business of the Regulations will encourage some participants to leave this industry. This is a necessary consequence of the policy, designed to target the highest risks from the storage of waste tyres.
Would it be more difficult for new firms or individuals to enter the industry after the imposition of the proposed measure?	Yes	Costs associated with works approvals and licensing will act as a barrier to entry, however, similar transitional costs will also be incurred by existing businesses.
Would the costs/benefits associated with the proposed measure affect some firms or individuals substantially more than others (for example, small firms, part-time participants in occupations, etc)?	Yes	The introduction of the proposed measure will require investment in facilities that will satisfy an EPA works approval and comply with future licensing conditions. This may affect small firms more than larger firms.
Would the proposed measure restrict the ability of businesses to choose the price, quality, range or location of their products?	Yes	Conditions for an EPA works approval and future licensing conditions may affect the decision to locate in particular sites. The proposed measures may also affect the price that operators charge retailers to collect tyres.
Would the proposed measure lead to higher ongoing costs for new entrants that existing firms do not have to meet?	No	
Is the ability or incentive to innovate or develop new products or services likely to be affected by the proposed measure?	No	

Source: Department of Treasury and Finance (Victoria), *Victorian guide to regulation*, Edition 2.1, Melbourne, August 2011, page 88.

6.4 Implementation and enforcement

EPA Victoria will be responsible for administration and enforcement of the proposed regulatory amendments, primarily as part of its works approval and licensing regime, and more broadly as part of its focus on the illegal dumping of wastes.

6.4.1 Compliance and enforcement

Under the EP Act, EPA can appoint authorised officers who have rights of entry to premises to ensure duty holders comply with requirements. EPA uses a balanced regulatory approach with a mix of compulsory and voluntary methods. EPA's Compliance and Enforcement Policy[87] describes the approach adopted in the enforcement of the Act, Regulations and other environment protection legislation.

Notices, such as pollution abatement notices and clean up notices, are legal directions to carry out works, stop activities or carry out investigations. Statutory notices are often issued in response to a breach of licence conditions, but are not punishments. Notices ensure there is a formal record that EPA has required action to remedy a risk or prevent further harm, and that people are treated consistently. They will often hold recipients to a given timeframe to comply with the requirements. Notices are not usually issued for minor risks.

While notices are a powerful tool, they are reactive and not effective in preventing pollution in the first place. Notices may be accompanied by other enforcement measures, or failure to comply with a notice can lead to enforcement, such as an infringement notice or prosecution.

Penalty infringement notices may be applied where an offence is of a well-defined nature and usually present a low level of danger to the environment and human life. More serious incidents are prosecuted through the court system, particularly where serious harm or risk to the environment, human health or welfare occurs, or repeated offences have occurred.

[87] EPA Victoria (2011) *Compliance and enforcement policy* (EPA Publication 1388, June 2011).

Enforcement actions are only taken where, after investigation, it is determined that an offence appears to have been or is likely to be committed. Measures such as warnings; oral or written directions issued by an authorised officer; statutory notices; infringement notices; prosecutions; licence suspension or revocation; injunctions; and the calling-in of financial assurances are available to enforce the Act. The decision as to which enforcement measure is appropriate is a matter of judgment on a case-by-case basis and will consider seriousness and impact of the offence and previous history of the offender.

While the requirements for industry are set out in the Act, statutory policies and regulations, a licence is a convenient document that specifies these requirements and provides assurance to the Victorian community that the industry is being managed appropriately. The administration of works approvals and licensing is specifically included in EPA's statutory powers and is integral to the operation of the Act.

6.4.2 Works approvals

EPA's works approval process is designed to ensure the best and most cost-effective environmental outcomes of projects are achieved. Without works approvals there is an increased risk of industrial projects causing pollution and requiring expensive retrofitting. Works approvals are an opportunity to save energy and water and to reduce waste at the project design stage, creating value for a business. As the nature of these activities can often present a risk to the environment or the public, conditions are set on all approvals and compliance is monitored.

EPA may conduct both desktop assessments and inspections to ensure the works approval and its conditions are complied with. Officers use published guidance materials to inform their assessments.

6.4.3 Licensing

Licensing is a regulatory tool used to manage the ongoing operations of scheduled premises that pose significant environmental risk. In addition to meeting their general obligations under the Act and the various SEPPs and WMPs, licensees are subject to conditions that aim to control the operation of premises. The conditions vary based on the type of operation but are likely to include:

- limits on the amount of whole waste tyres to be stored onsite at any one time
- requirements for storing whole waste tyres in a safe manner
- monitoring requirements
- housekeeping conditions
- reporting of incidents and monitoring data.

Section 31D of the EP Act requires licence holders to submit annual performance statements (APS) to EPA to demonstrate their environmental obligations under the Act and under the licence are being met. An APS is the way licence holders publicly report their environmental performance for the previous financial year. It requires a public declaration of the licence holder's compliance performance against each licence condition and must be signed by the most senior executive in the company. Significant penalties exist, including jail terms, for executives providing false or misleading information.

In addition, based on the relative risk posed by the site determined by the Licensed Operator Risk Assessment , EPA authorised officers will inspect each licensed site over a defined period to check compliance and will expect to see evidence that validates the level of compliance declared in the APS. They will also ask a series of questions relating to the site's management practices. If officers detect any risk of harm to the environment they will either request it be remedied in their presence if the risk is minor, or issue a remedial notice if the risk is significant. EPA will actively enforce against sites that non-comply with a licence condition, do not have suitable controls or have failed to remedy any outstanding compliance issues identified in their APS.

6.4.4 Implementation activity

To raise awareness of the changes to regulations and facilitate compliance with new requirements, a number of implementation activities are planned by EPA Victoria, in conjunction with the Victorian Government environment portfolio, for once the proposed Regulations have been made, including:

- a six-month transition period for currently unscheduled sites that will require a licence under the revised Regulations to obtain one
- a promotional campaign directed at specific groups affected by the Regulations and the associated changes, including direct mail outs to businesses that may need to seek licensing and information provided to councils when advising and assessing applications for new sites.
- meetings with industry groups and associations affected by the Regulations
- development of guidance material and information to assist duty holders to understand the new regulatory obligations.

6.5 Evaluation strategy

EPA will measure the performance of the proposed regulatory amendments as part of the broader objective of ensuring the integrity of Victoria's environmental framework, and specifically against the objective of minimising the environmental and public health impacts (particularly those as a result of fire) from inappropriate storage of waste tyres in Victoria. EPA will do this in a number of ways, including the measurement of the:

- number of reported instances of illegal dumping or abandonment of whole waste tyres,
- number of site storing more than 5,000 EPU of whole waste tyres
- levels of compliance reported in APSs (relative to other scheduled industry categories), and levels of non-compliance relating to fire management requirements
- number of statutory remedial notices and directions issued on licensed waste tyre storage sites (relative to other licensed and unlicensed businesses)
- number and severity of sanctions issued for works approval and licence non-compliances (relative to other licensed and unlicensed businesses)

The Environment Protection (Scheduled Premises and Exemptions Regulations) 2007 will sunset in mid-2017. As part of the review of these regulations, EPA will also evaluate the effectiveness of the works approval and licensing requirements relating to waste tyre storage. It is envisaged that this evaluation will involve a review of the data listed above, and engagement with stakeholders, including Victorian Fire Services in relation to their ongoing costs for fire management at sites storing waste tyres. This will seek to determine the effectiveness of the Regulations in meeting the stated objectives, the levels of compliance and whether the risks associated with the storage of whole waste tyres still requires government regulation.

To support the review of the effectiveness of the Regulations and Victorian Fire Services Guidelines, EPA, CFA and MFB will continue to share information on tyre storage and processing sites. In particular, the CFA are examining opportunities to improve operational processes, and are considering:

- flagging in their Fire Incident Reporting System (FIRS), sites storing more than 5,000 EPU of whole waste tyres (including EPA licensed sites)
- adding a new category to their FIRS to more specifically capture and report fire events associated with sites storing or handling large volumes of waste tyres (differentiating these events from other or smaller fire events involving rubber tyres)
- recommending to Brigades that, in the event of a fire at premises storing more than 5,000 EPU of whole waste tyres, a fire investigation should be undertaken.[88]

These changes would improve the ability to assess trends in the causes, frequency and severity of fires at sites handling or storing waste tyres, and the scale of emergency services' responses to these events.

It is also likely that the national Tyre Product Stewardship Scheme, and SV in its role in improving data on the collection and storage of waste in Victoria and development of further market opportunities for waste tyres, will, over time, commission and produce more recent and detailed estimates of the movement and end destinations for waste tyres (including export volumes).[89] This will further clarify the fire-risk profile from the various activities associated with the storage of waste tyres.

[88] Country Fire Authority, Personal communication, 29 July 2014
[89] Sustainability Victoria, Personal communication, 29 July 2014

Appendix A: Assessment of industry sectors

In the table below, each of the activities that commonly store whole waste tyres is examined in more detail to identify the number and type of parties contributing, their incentives for storing waste tyres, the typical scale of these stores and the likely fire risk that they represent based on their location and activities. The table below presents the outcomes of the risk assessment undertaken on each of the groups in the tyre supply chain contributing to tyre stockpiles.

Table 18: Tyre storage sector analysis

Priority rating	Storage / stockpiling location	Incentive to store/stockpile waste tyres	Indicative quantity of waste tyres	Fire risk factors
High	Stockpiles as an end point or for long-term storage	• Avoid disposal costs of waste tyres, including shredding costs and landfill fees. • Capture difference between disposal fees paid by retail customers and transport costs to stockpile locations.	40,000–9,000,000 EPU	• Scale of storage – There are a number of very large stores of whole waste tyres located in outdoor and indoor stockpiles around the state of Victoria. • Proximity to receptors – Outdoor stockpiles can be found in rural areas close to townships, with many smaller indoor stockpiles contained in industrial warehouses. When in close proximity to townships or industrial areas, fires may result in access restrictions for neighbouring workplaces, infrastructure and significant disruptions to small businesses and communities. • Potential for ignition – The main source for rural or regional sites is arson or bushfires. Those sites located in industrial areas are prone to general ignition sources from neighbouring workplaces, and from other onsite industrial ignition and heat sources. • Incentive to self-manage – The relatively low barriers to entry currently allow for rapid business establishment on premises without suitable fire suppression and management systems.
High	Collection and other intermediate storage	• Achieve economies of scale in transport. • Supply end markets with high feedstock requirements. • Accumulate and store additional volumes when supply is cheap and demand is low.	2,500–10,000 EPU	• Scale of storage – Unlikely to store excessive volumes over a sustained period, however, volumes fluctuate due to variations in supply and demand. • Proximity to receptors – Waste tyre collection and storage businesses tend to be located near where waste tyres are generated and close to end points such as ports (for example, for export), landfills and recycling businesses. These are often located near industrial and population centres, increasing the risk of property damage and health impacts in the event of a waste tyre-related fire. • Potential for ignition – Those sites located in industrial areas are prone to general ignition sources from neighbouring workplaces, and from other onsite industrial ignition and heat sources. • Incentive to self-manage – The relatively low barriers to entry currently allow for rapid business establishment on premises without suitable fire suppression and management systems.

Priority rating	Storage / stockpiling location	Incentive to store/stockpile waste tyres	Indicative quantity of waste tyres	Fire risk factors
High	Tyre recycling / reprocessing	• Achieve economies of scale as a feedstock for recycling.	10,000 EPU	• Scale of storage – Unlikely to store excessive volumes over a sustained period, however, volumes fluctuate and have the potentially to rapidly increase due to variations in supply and demand, or processing interruptions. • Proximity to receptors – Waste tyre processors are generally located in outer metropolitan or regional centres, near where waste tyres are generated and also close to end points and markets. These locations tend to be near industrial and population centres, increasing the risk of property damage and health impacts in the event of a waste tyre-related fire. • Potential for ignition – Those sites located in industrial areas are prone to general ignition sources from neighbouring workplaces, and from other onsite industrial ignition and heat sources related to their processing operations. • Incentive to self-manage – Existing businesses are likely to operate under regulatory controls commonly associated with manufacturing industry (for example, occupational health and safety requirements, planning framework, building regulations, business and tax laws, etc), and other general business requirements (for example, insurances) are likely to maintain management processes and infrastructure to reduce the consequences from a fire.
Medium	Tyre retailing	• Tyre retailers temporarily consolidate tyres onsite prior to collection or transport for disposal, recycling or reuse. • To minimise the costs of disposal, which may indirectly lead to inappropriate disposal methods such as abandonment or illegal dumping. • There are currently limited requirements to maintain evidence that waste tyres have been disposed of appropriately, with retailers potentially unaware of the end point for tyres collected from their stores.	500–2,000 EPU	• Scale of storage – While generating a reliable stream of waste tyres, retailers are unlikely to store significant volumes onsite. The common practice is to engage tyre collectors for periodic collections. • Proximity to receptors – Tyre retailers are usually located within population centres near other businesses, infrastructure and residents, increasing the consequences in the event of a tyre related fire (for example, property damage and health impacts). • Potential for ignition – There are often associated activities relating to vehicle servicing that involve electrical equipment and hot works, such as cutting, welding and grinding. • Incentive to self-manage – Many tyre retailers charge customers a fee for the disposal of each waste tyre, which the national Tyre Product Stewardship Scheme will likely help to standardise. Major brands and franchise operations may also be mindful of potential impacts on brand and reputation from connections to environmentally harmful activities.
Low	Independent generators of	• To avoid the potential costs of permitted disposal	Less than 1,000 EPU	• Scale of storage – The size of a stockpile is likely to be relatively small given the infrequent need to purchase new tyres for vehicles and machinery at an

Priority rating	Storage / stockpiling location	Incentive to store/stockpile waste tyres	Indicative quantity of waste tyres	Fire risk factors
	waste tyres	of waste tyres. • Unaware of appropriate methods of reuse or disposal. • Storage prior to legitimate reuse.		individual site. • Proximity to receptors – Locations are likely to be isolated and reasonably dispersed, commonly in rural areas associated with agriculture, forestry or quarrying. • Potential for ignition – The main ignition source in rural and regional areas is bushfire. • Incentive to self-manage – Remote locations and infrequent generation rates can result in increased transportation costs for consolidation or processing. However, given the small volumes, relatively simple actions can provide suitable management of the fire risk.
Low	Illegally dumped or abandoned waste tyres	• To avoid the potential costs of permitted disposal of waste tyres, individuals may dump or abandon an entire stockpile on someone else's land (for example, where leased). • Land owners may accept tyres due to payment, a lack of understanding of the fire risks associated with tyre stockpiles or perceived reuse opportunities which are not in fact permitted.	Highly variable (100–10,000 EPU)	• Scale of storage – While not technically considered storage, cases of identified illegal dumping transfer the responsibility for cleanup to third parties. Most examples of illegal dumping involve small volumes, however, in some cases a small volume 'attracts' further loads, causing a build-up over time. • Proximity to receptors – Illegal dumping sites are reasonably dispersed across the state, often in remote areas (for example, road sides, parks and reserves) or isolated areas (for example, vacant land, rail reserves). • Potential for ignition – The main ignition source for rural and regional area is bushfire. Abandoned waste tyre stores in industrial sheds and warehouses are susceptible to arson. • Incentive to self-manage – Each case of illegal dumping of waste tyres is dealt with through the existing investigatory processes by local councils and EPA. In the first instance, it is the polluter's responsibility to remedy pollution. However, EPA may, if it considers necessary, conduct a cleanup or cause a cleanup to be conducted.

Appendix B: Other externality costs

Disease from mosquitoes and vermin breeding in whole tyres

Whole tyres can trap stagnant water and act as a breeding ground for mosquitoes and vermin.[90] In tropical parts of Australia, these pests can be transmitters of diseases that are life-threatening to humans.[91] In the United States, a study showed that 80 per cent of the children suffering from mosquito-vectored disease lived within 30 metres of a tyre dump.[92] However, it is unclear the extent to which this is a problem in Victoria.

Reduced visual amenity

Large outdoor tyre stockpiles reduce the value that people place on observing the natural environment ('visual amenity'). This has a direct adverse impact on local residents. There are no specific estimates available for the negative visual impact of tyre stockpiles; however, estimates for landfills offer a useful proxy. In a 2006 enquiry on waste management, the Productivity Commission estimated the externality cost associated with lower visual amenity was about $1 per tonne of landfill.[93] Another study, undertaken by the BDA Group estimated the cost was between $1 and $10 per tonne.[94]

Leaching and emissions from inert tyres into the environment

There is some evidence to suggest that stockpiling of tyres can create leaching that could be toxic to the environment by contaminating soil, surface water and ground water.[95] Research has been undertaken in Canada, United Kingdom and the United States through laboratory research and field trials. This research suggests that chipped and crumbed tyre stockpiles may increase the rates of leaching, however for stockpiles of whole tyres there is likely to be a minor increase in the concentration in soil and groundwater of some heavy metals (for example, iron and manganese), especially where steel is exposed.

Cleaning up tyre stockpiles

Due to the above hazards and the current market incentives, there is also a risk that when a stockpile is abandoned or tyres are illegally dumped, the costs of cleaning up or mitigating the risks of the tyre stockpile (which is necessary to avoid the costs associated with the above hazards) are transferred to landowners (in cases where the person stockpiling the tyres is not the owner of the land) or state governments.

The costs of cleaning up a stockpile will vary according to the location and the transport costs required however, EPA estimates the cost is between $0.90 and $3.20 per EPU depending on the method of disposal.[96]

[90] United Nations, *Revised technical guidelines for the environmentally sound management of used and waste pneumatic tyres*, 2011; Atech Group, (2001), *A national approach to waste tyres*, prepared for Environment Australia.
[91] Atech Group, (2001), op cit.
[92] Lie, H, Mead, J & Stacer, R, University of Massachusetts, *Environmental impacts of recycled rubber in lightweight fill applications: Summary and evaluation of existing literature*, Technical Report #2, 1998.
[93] Productivity Commission (2006), *Waste Management*, Inquiry Report no. 38, 20 October, Canberra.
[94] BDA Group (2009) DRAFT, *The full cost of landfill disposal in Australia*, prepared for DEWHA, 22 June.
[95] PwC and Hyder Consulting, (2010), *Draft decision Regulatory Impact Statement: end-of-life tyres*, prepared for the Environment Protection and Heritage Council (now National Environment and Protection Council), p 141.
[96] Disposal to a processing facility ranges between $ 0.90 and $2.0 per EPU. Disposal to a landfill as a shredded tyre costs between $1.90 and $3.20 per EPU – this is comprised of the shredding cost $0.90–$2.0 per EPU, the landfill levy of $0.47 per EPU and the landfill gate fee of $0.5–$0.7 per EPU. Source: Boomerang Alliance, Personal communication, November; EPA Victoria, *Landfill levy rates*.

Appendix C: Costs of tyre fires

Fire response

The estimated costs of fighting three different tyre fires are shown in the following table.[97] Two Australian examples would support these estimates; the Numurkah (VIC) fire required more than 20 tankers and two pumpers as well as about 100 firefighters[98] while the 1992 Salisbury (QLD) tyre fire is reported to have cost the fire brigade $750,000 (or $1,315,300 in 2014 dollars).[99]

Table 19: Financial costs of fighting a tyre fire[100]

	Fire A	Fire B	Fire C
Description of size of tyre pile	A tyre pile of 35 metres by 100 metres by 3–4 tyres deep	An A-frame building 15 metres by 20 metres by 6–7 metres high (at the peak) was filled with tyres and tyres were also stacked 20 metres in front and 5 metres to side	A tyre dump 80 metres by 150 metres by 12 metres high
Approximate Number of tyres	22,000 EPU	28,000 EPU	1.8 million EPU
Number of hours	5	20	60
Number of units	3	24	41
Cost of units at $120 /hour	$1,800	$57,600	$295,200
Number of firefighters	15	120	288
Cost of firefighters at $30 per hour	$2,250	$72,000	$813,600
Total costs (2001 dollars)	$4,050	$129,600	$813,600
Total costs (2014 dollars)	$5,700	$181,200	$1,137,300

Source: Adapted from Atech Group (2001), *A national approach to waste tyres*, Environment Australia, Appendices page 2. The volumetric measure of tyre stockpiles in each case has been converted to EPU a ratio of 1 m^2 = 13 EPU, See California Department of Resources Recycling and Recovery (CalRecycle), Determining the Number of Tires, (2012), http://www.calrecycle.ca.gov/tires/enforcement/inspections/NumberTires.htm accessed 14 May 2014. Costs have been inflated using Australian Bureau of Statistics 2014, *Consumer Price Index, Australia, Mar 2014*, Canberra.

Air pollution

A tyre fire emits large amounts of thick black smoke and noxious gases, including carcinogens.[101] This pollutes the surrounding air, which can lead to adverse health impacts for residents as well as disruptions to communities from evacuations or other measures to avoid the pollution.[102] Air pollutants formed by burning tyres can have significant impacts on human health which can include particles (PM_{10} and $PM_{2.5}$), carbons dioxide, air toxins (such as benzene), polycyclic aromatic hydrocarbons, dioxins, furans, polychlorinated biphenyl, arsenic, cadmium, nickel, zinc, mercury, chromium and vanadium. Particles have been linked to increases in mortality and morbidity from both respiratory and cardiovascular causes[103] In addition, many of the air toxins and metals are carcinogenic and may affect health at low levels. The inhalation of sulfur dioxide released into the air can cause wheezing, shortness of breath, coughing, chest tightness and reductions in lung function.[104]

[97] Atech Group (2001), op cit., Appendices page 1.
[98] Thals K (2013), *Toxic fire threatens Numurkah*, Shepparton News, May 3.
[99] URS (2006), op cit., p 4-4. Costs have been inflated using Australian Bureau of Statistics (2014), *Consumer Price Index, Australia, Mar 2014*, Canberra.
[100] Adopted from Atech Group (2001), op cit., Appendices page 2.
[101] Ibid.
[102] URS (2006), op cit.; Syneca Consulting and Connell Wagner (2008), op cit.
[103] Tham, R., Erbas, B., Akram, M., Dennekamp, M. and Abramson, M. J. (2009) *The impact of smoke on respiratory hospital outcomes during the 2002–2003 bushfire season,* Victoria, Australia. Respirology 2009; 14: 69–75.
[104] EPA Victoria – Internal communications.

There are several examples of tyre fires that have led to adverse health impacts and community disruption from air pollution:

- As a result of a tyre fire at Bindoon in WA in 1990, it was reported that recreational activities and businesses in neighbouring properties were disrupted by the air pollution.[105]
- A fire in Salisbury in Queensland in 1992 caused the hospitalisation of people from surrounding areas due to respiratory concerns.[106]
- A 2002 fire at a tyre retail outlet in Sydney caused the hospitalisation of people in the surrounding areas.[107]
- The Tasmanian fire at Longford in 2012 required about two dozen residents to be moved during the night while other residents and school students were advised to stay indoors[108], turn off their air-conditioning (mid-summer)[109] and to not consume home-grown vegetables if they were visibly contaminated.[110]
- In 2010 at Mexborough in the United Kingdom, a fire broke out in a tyre storage facility with 70,000 to 120,000 tyres. During the fire, which lasted for nine days, the local residents were advised to shelter from the smoke by either staying inside or evacuating the area. Particle levels in the air (PM_{10}) reached 24-hour averages of 194↔g/m^3, well above the Victorian air quality objective of 50↔g/m^3 and falling within the very unhealthy category. On the first day of the fire, levels reached a peak reading of 6000↔g/m^3 and a maximum hourly level of 880↔g/m^3. These readings are within the hazardous category used by EPA Victoria and the USEPA based on the risk to human health.[111]

While not a tyre fire, the impacts of the Hazelwood coal mine fire in 2014 also offer a useful proxy for the impacts of a fire on the local community. As a result of the coal mine fire, as at 28 April 2014, Morwell residents had received 4,202 respite assistance payments totalling about $2.1 million and 1,307 relocation payments totalling about $1.3 million. In addition, as at 30 April 2014, over $1 million worth of grants had been approved to provide relief to 156 small businesses.[112]

The people most vulnerable to the health impacts of pollutant smoke are children, elderly and people with asthma or existing health and lung disease.[113] As indicated by the UK example above, the health impacts of a tyre fire mean it can be necessary to evacuate local residents or ask them to stay inside. This has been the case in a number of Australian fires too. Evacuation may become particularly necessary if the fire occurs in a metropolitan area.[114] As the first example highlights, evacuation or sheltering inside can disrupt the operation of local businesses, reducing their productivity and potentially resulting is lost revenue. It is estimated that if the Stawell tyre pile caught fire, the smoke plume and fire could be large enough to require the closure of the nearby highway and railway for some days. This would affect not only local residents and businesses but also those travelling between Adelaide and Melbourne.[115] It also prevents local residents from engaging in recreational or social activities and getting full value from their leisure time. Tyre fires can have serious health effects on firefighters as well, with reported respiratory problems after fighting tyre fires.[116]

Run-off of oil and toxic materials

The heat from a tyre fire can cause the rubber to break down through a process known as pyrolysis[117]. In a fire, this process is uncontrolled and produces a mixture of oil and other toxic materials such as mutagens and carcinogens that may contaminate the air, soil, surface water and groundwater including polycyclic aromatic hydrocarbons, benzene, styrene, phenols, butadiene and heavy metals such as arsenic, cadmium, nickel, zinc, lead and mercury.[118]. The oils and toxic materials create a run-off from the fire that contaminates the land and associated groundwater, as well as surface water such as rivers

[105] URS (2006), op cit., p 4-4.
[106] Ibid., p 4-4.
[107] Ibid., p 4-4.
[108] ABC (2012), *Tyre fire tipped to smoulder on,* February 17. Available at: http://www.abc.net.au/news/2012-02-15/tyre-fire-tipped-to-smoulder-on/3831086
[109] The Examiner, *Longford tyre depot fire still burning*, February 14. Available at: http://www.examiner.com.au/story/430510/longford-tyre-depot-fire-still-burning/
[110] Mounster B 2012, *Health alert over tyre fire*, The Mercury, February 15. Available at: 'http://prelive.themercury.com.au/article/2012/02/15/301365_tasmania-news.html
[111] EPA Victoria – Internal communications.
[112] Victorian Government 2014, *Hazelwood Coal Mine Fire Inquiry: Submission from the Victorian Government*, May 2014. Available at http://hazelwoodinquiry.vic.gov.au/wp-content/uploads/2014/06/SO_0160_VICTORIAN-GOVERNMENT.pdf
[113] EPA Victoria – Internal communications.
[114] Syneca Consulting and Connell Wagner (2008), op cit.
[115] Country Fire Authority (2014), *Consultation with EPA,* 8 May.
[116] Atech Group (2001), op cit., Appendices page 1.
[117] URS (2006), op cit., p 4-4.
[118] United States Environmental Protection Agency (2013), *Tire fires*, available at http://www.epa.gov/osw//conserve/materials/tires/fires.htm, accessed 29 April 2014; and URS 2006, *Market failure in end-of-life tyre markets*, pp 4-4.

or lakes.[119] When burned, the average passenger tyre is estimated to produce more than 7.5 litres of oil.[120] Experience of large tyre fires indicates that burning one million tyres produced about 200,000 litres of run-off oil.[121]

This problem is magnified by the difficulty in controlling and extinguishing a large tyre fire. The shape of whole tyres, especially the large air space in the centre, means it can be difficult to cut off the oxygen supply or get water inside the tyre. If firefighters use water to extinguish the flames, the water often increases the production of oil (through pyrolysis), as well as creating water run-off that carries the oils offsite and speeds up the contamination of soils and water.[122] There are a number of examples of tyre fires in Australia and overseas causing impacts to downstream environments, including:

- A 2013 Chester Hill/Villawood (NSW) tyre fire resulted in the water used to battle the fire, running-off into a nearby creek. At least 200,000 litres of run-off and foam entered the creek, killing at least 20 eels and a number of fish.[123]
- The 1990 fire at Bindoon (WA) led to direct costs of $600,000 to clean up a contaminated watercourse.[124]
- The 2010 tyre fire at the Perth (WA) Airport (which cost $170,000 in total or $185,000 in 2014 dollars[125]) required a major clean up of drains and the rehabilitation of wetlands.[126]
- In a large 1999 Ohio tyre fire, the oily run-off from the fire fighting washed into a nearby creek and killed nearly 20,000 fish for 5 miles downstream (see Box 3).
- In the 1983 Washington fire, US$1.74 million ($6,458,300 in Australian dollars) was spent controlling and containing 800,000 gallons (over 3 million litres) of pyrolytic oil run-off, conduct environmental monitoring, and associated activities.[127]

The oily run-off from a tyre fire is also flammable and creates a risk of the fire spreading.[128] There is also potential for the tyre fire to ignite vegetation (either directly or from the oily run-off) and start a bushfire, which poses a further risk to the health and safety of nearby communities.[129]

Site cleanup costs

After a fire is put out, there are often additional costs associated with site cleanup as the ash and debris left behind could continue to cause environmental damage. Indeed, these costs can be much higher than the initial fire suppression costs (in two Californian cases, the cleanup costs were six and 26 times greater than the cost of fire suppression).[130] Cleanup costs for fires include:

- The Californian tyre fires in Westley and Tracy had cleanup costs of US$15 million and US$12 million respectively ($26,348,600 and $21,078,900 in 2014 Australian dollars respectively).[131]
- In the Kirby, Ohio tyre fire, US$11 million ($14,718,000 in 2014 Australian dollars) was spent on site cleanup (see Box 3).
- EPA US reports into two 1980s US tyre fires (Box 1 and Box 2), one of which took two decades to clean up, estimated the costs to clean up the ash and residue were expected to total US$2 to US$3 million ($7,423,400 to $11,135,100 in 2014 Australian dollars).[132]

[119] US Department of Homeland Security (1998), *Special Report: Scrap and shredded tire fires*, US Fire Administration/Technical Report Series, USFA-TR-093/December 1998.; URS 2006, *Market failure in end-of-life tyre markets*, prepared for DEWHA; United Nations 2011, *Revised technical guidelines for the environmentally sound management of used and waste pneumatic tyres*.
[120] US Department of Homeland Security (1998), op cit.
[121] Ibid.
[122] URS (2006), op cit.
[123] New South Wales Environment Protection Authority, Correspondence with EPA Victoria, October 18; ABC (2013), *Factory fire burning in Western Sydney*, January 1. Available at: http://www.abc.net.au/news/2013-01-01/factory-fire-burning-in-western-sydney/4449024
[124] URS (2006), op cit., p 4-4.
[125] Costs have been inflated using Australian Bureau of Statistics (2014), *Consumer Price Index, Australia, Mar 2014*, Canberra.
[126] Western Australian Department of Environment Regulation (2013), Correspondence with EPA Victoria, October 16.
[127] United States Environmental Protection Agency (2012) *NPL Site Narrative for Rhinehart Tire Fire Dump*, http://www.epa.gov/superfund/sites/npl/nar365.htm Accessed 29 April 2014.
[128] Atech Group, (2001), op cit.
[129] EPA Victoria – Internal communications.
[130] Office of the State Fire Marshall (2004), *Rings of fire revisited: Tire fire prevention and suppression*, State of California, page 39.
[131] Ibid., page 39. Costs have been inflated using Australian Bureau of Statistics (2014), *Consumer Price Index, Australia, Mar 2014*, Canberra. Costs have been converted using Reserve Bank of Australia, *Historical Exchange Rate Data*.
[132] United States Environmental Protection Agency (1985), *The scrap tire problem: A preliminary economic analysis*, October 29, page 28.

Box 1: The Everett, Washington (US) tyre fire of 1984

In Everett, Washington from 1977 onwards, tyres begin piling up at the site of the city's former landfill. The site was used as a recycling operation that included the storage of discarded tyres. By 1984, as many as 4 million tyres had been collected in a large stockpile on the 10-acre site next to the Snohomish River. It became known as 'Mount Firestone'.

In the early hours of one September morning in 1984, although never proven, it is believed it was set alight by partying teens.

The next day, Everett's northern end was covered in a grimy coat of soot and the smoke was so thick it blocked out the sun. The Snohomish Health District issued a warning to people with chronic lung conditions to stay indoors. The North Middle School briefly closed.

Firefighters tried cutting a fire break into Mount Firestone, but the pile of tyres had liquefied in many spots, and then reformed into 8-foot thick mats of black 'glop'. By mid-morning, the fire had grown hotter and more dangerous; pent-up methane gas shot from the pile 'like 30-foot-high blasts from a blowtorch'. The updrafts were so strong they picked up flaming tires and sent them hundreds of feet up into the air.

After two days of firefighters attempting to extinguish the fire water, the Department of Ecology ordered the city to shut off the hoses as it was flushing toxic matter straight into the nearby Snohomish River.

The firefighters remained onsite to monitor it 24 hours a day for weeks.

It was not officially put out until February 1985. In a 1985 EPA report, the Washington State Department of Ecology Onsite Coordinator estimated costs of'at least US$1 million.' An additional US$2 million were estimated to be required to clean up the site.[133] The cleanup took two decades.

Box 2: The Winchester/Rhinehart, Virginia (US) tyre fire of 1983

The Rhinehart Tire Fire Dump Site originally served as a storage area for 5 to 7 million tyres. The 4.5-acre site is located in an agricultural area on the outskirts of Winchester, Frederick County, Virginia.[134] In October 1983, stockpile caught fire in what is believed to be a case of arson.[135] It burnt for nine months and much of the run-off polluted nearby water sources with lead and arsenic.[136]

According to US EPA analyses, a variety of hazardous substances have been released to the air. In addition, monitoring by the state has indicated local ground water contamination from similar hazardous substances, including benzene.

EPA spent US$1.74 million to control and contain the fire and collect 800,000 gallons of pyrolytic oil run-off, conduct environmental monitoring, and perform associated activities.[137] However this estimate of costs is unlikely to cover all costs as the complexity of the task and the large number of parties involved means it is unlikely that it fully accounts for all expenditures at the Winchester site.[138] For example, costs incurred by the American Petroleum Institute which provided technical assistance and advice on the collection and processing of the tyre run-off are not included in the total. Although all the tyres were destroyed there remains a considerable amount of ash and residue on the site.

[133] Ibid, page 28.
[134] United States Environmental Protection Agency (2012), op cit.
[135] United States Environmental Protection Agency (1985), op cit., page 28.
[136] United States Environmental Protection Agency (2013), op cit.
[137] United States Environmental Protection Agency (2012), op cit.
[138] United States Environmental Protection Agency (1985), op cit., page 28.

Box 3: The Kirby, Ohio (US) tyre fire of 1999[139]

In Wyandot County, Sycamore, Ohio, a tyre stockpile of 21 million EPU had been accumulating since the 1950s. There had been periodic efforts from the local Health Department to create fire lanes (see Figure A) and limit the sizes of the piles, some of which were up to 40-feet high. Various orders were handed down and laws passed to remove the tyres. But only a month after tyres were finally beginning to be moved on and in spite of security measures, a fire was lit by arsons on 21 August 1999.

Figure A: Separated tyre stockpiles and tyres on fire

It is estimated the fire affected about 7 million of the 21 million EPU. The response included 20 local fire departments, 22 pieces of heavy equipment and 34 local citizens. A nearby waterway, the Sycamore Creek, was affected by the run-off from the fire fight. In the first four days of the fire, the oily run-off killed nearly 20,000 fish for more than 5 miles downstream. As a result, various clay barriers were created to stop further pollution (see Figure B). Siphon dams and aeration systems were also installed to clean the creek.

Figure B: Oily run-off from the tyre fire

The tyre piles were covered in clay after three weeks to smother the fires. The pyroltic action continued for another six months however and, after heavy rains, oil was seen running out of the base of piles.

After the fire, further security measures were installed. These included a 6-feet high chain link fence, perimeter lighting and security cameras. The ground water continued to be monitored on a semi-annual basis and various other measures were undertaken to mitigate the cost of any lingering environmental impacts.

The site cleanup was completed by April 2008, almost nine years after the fire started. The total cost to Ohio and the United States Government was US$34.3 million. This cost comprised: US$2.3 million fire fighting, US$13.9 million removing tyres, US$7.3 million treating contaminated water, US$11 million in site remediation to remove burnt tyres and contaminated soil.

[139] Ohio Environmental Protection Agency (2004), *Kirby tire fire and cleanup*, Division of Solid and Infectious Waste Management; State of Ohio Environmental Protection Agency (2008), *Fact Sheet: Kirby tire recycling, Inc., Wyandot County*.

Appendix D: Detailed options assessment

Table 20: Preliminary assessment of options

Type of regulatory option	Ref.	Option description	Ability to address potential fire risk			Comments (regarding assessment of option against its ability to address the potential fire risk present at each sector of the industry engaged in the storage of waste tyres)
			Waste Tyre Processors / Recyclers	Stockpiles as an end point or long-term storage	Collection or intermediate storage	
Explicit government regulation (legislation)	**1**	**Waste Management Policy** – an ongoing statutory policy, declared under section 16A of the EP Act. The development of this option would be subject to the policy impact assessment process under section 18A of the EP Act. As with the interim Waste Management Policy (Storage of Waste Tyres), this instrument would apply to premises that store more than a defined quantity of waste tyres. It would require waste tyres on these premises to be stored only for purposes such as transfer, reuse, recycling, reprocessing or energy recovery, and to be stored in a manner that minimises risks to the environment and human health, predominantly due to the risk of fire. The 'fire safe storage duty' would be complied with if the waste tyres were stored in accordance with the recommendations in the Victorian Fire Services' Guidelines. If the Waste Management Policy requirements were not complied with, EPA would be able to issue a pollution abatement notice (PAN) under section 31A of the EP Act. If the PAN was not complied with, EPA would escalate its response in line with its Compliance and Enforcement Policy. Non-compliance with a PAN is an offence under section 31A(7) of the EP Act that can result in a penalty infringement notice or a prosecution.	**X**	**X**	**X**	**Key attributes for continuation:** • Provides mechanism to prescribe (through incorporation of the Victorian Fire Services Guidelines) standards, enforceable by EPA, for the safe storage of waste tyres, based on an application threshold of waste tyres, irrespective of sector or activity.

Type of regulatory option	Ref.	Option description	Ability to address potential fire risk			Comments (regarding assessment of option against its ability to address the potential fire risk present at each sector of the industry engaged in the storage of waste tyres)
			Waste Tyre Processors / Recyclers	Stockpiles as an end point or long-term storage	Collection or intermediate storage	
	2	**New direct regulations** – a new Regulation made under the EP Act with prescriptive duties on owners and occupiers of premises storing more than a defined quantity of waste tyres. Making this Regulation would be subject to confirmation that there are adequate heads of power under section 71(1) of the EP Act. As the EP Act (sections 72(1) and section 71(3)) significantly restricts what can be incorporated by reference into a Regulation, it would not be possible to simply incorporate the Victorian Fire Services' Guidelines into this Regulation by reference. It would instead be necessary for the Regulation to itself set out in some detail requirements relating to fire suppression equipment, maximum tyre stockpile sizes, emergency management procedures, etc. There would be direct penalties written into the Regulation for non-compliance with the duties that it would prescribe.	X	X	X	**Key attributes for continuation:** • Provides mechanism to prescribe directly in regulation, standards enforceable by EPA, for the safe storage of waste tyres, based on an application threshold of waste tyres, irrespective of sector or activity.
Extending the coverage of existing legislation	3a	**Scheduled Premises and Exemptions Regulations** – amending the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 so that premises storing more than a defined quantity of waste tyres become scheduled premises, **with a works approval requirement only** but exempt from a licensing requirement. This approach is used for some other scheduled premises categories under the Regulations – for example, bitumen or asphalt batching works (category HO2) and contaminated sites – onsite soil containment (category LO2).	X	X	X	**Key attributes for exclusion:** • The nature of a works approval is that is applies to the future development and use of a site, and therefore would not address the risk from existing stockpiles or the ongoing waste tyre storage activities.

Type of regulatory option	Ref.	Option description	Ability to address potential fire risk			Comments (regarding assessment of option against its ability to address the potential fire risk present at each sector of the industry engaged in the storage of waste tyres)
			Waste Tyre Processors / Recyclers	Stockpiles as an end point or long-term storage	Collection or intermediate storage	
	3b	**Scheduled Premises and Exemptions Regulations** – as with option 3a, amending these Regulations so that premises storing more than a defined quantity of waste tyres become scheduled premises, but **with both works approval and licensing requirements**. Both of these requirements apply to most categories of scheduled premises under the Regulations.	**X**	**X**	**X**	**Key attributes for continuation:** • Provides a preventative trigger to ensure that any new development is adequately designed to enable ongoing compliance with prescribed licence conditions (referencing the Victorian Fire Services Guidelines). Based on a volumetric threshold, irrespective of sector or activity, the licence would be directly enforceable by EPA.
	3c	**Scheduled Premises and Exemptions Regulations** – as with options 3a and 3b, amending these Regulations so that premises storing waste tyres become scheduled premises, with works approval, licensing requirements **and a financial assurance requirement**. A financial assurance ensures that money is available for cleanup at licensed premises in the event of insolvency or insufficient resources. The most common form of financial assurance is a bank guarantee. The amount a licence holder is required to provide in a financial assurance is based on the activities occurring at the premises and the quantity and type of wastes stored, treated or disposed.	**X**	**X**	**X**	**Key attributes for continuation:** • As for option 3b, with the added ability to ensure funds are available to the duty holder or government to clean up and dispose of stores of waste tyres in the event of business failure or abandonment.

Type of regulatory option	Ref.	Option description	Ability to address potential fire risk			Comments (regarding assessment of option against its ability to address the potential fire risk present at each sector of the industry engaged in the storage of waste tyres)
			Waste Tyre Processors / Recyclers	Stockpiles as an end point or long-term storage	Collection or intermediate storage	
	4	**Classify waste tyres as Prescribed Industrial Waste (PIW)** – EPA issuing a classification under regulation 11(1)(a) of the Environment Protection (Industrial Waste Resource) Regulations 2009 that classifies waste tyres as prescribed industrial waste (PIW). This classification could specify conditions and limitations and determine management options. Waste producers would be required to manage waste tyres in accordance with the classification. This option would trigger various regulatory requirements associated with PIW. This includes transport permit requirements under the Industrial Waste Resource Regulations. Significantly, under the Scheduled Premises Regulations, storage, treatment, reprocessing, containment or disposal facilities handling any PIW not generated at the premises are subject to EPA works approvals and licensing requirements (scheduled premises category A01).	X	X	X	**Key attributes for continuation:** • As for option 3c, with the further inclusion of requirements to track the movement of waste tyres from the point of generation through to appropriate end points.
Increased enforcement of existing provisions	5	**Increase inspection and compliance activity** – increase resources for joint inspection and compliance activity by EPA, the Fire Services, municipal fire prevention officers and/or municipal building surveyors. This option relies on an increased and more effective use of existing regulatory tools – in particular, the issuing of remedial and infringement notices under the EP Act, fire services legislation and building regulations.	X	X	X	**Key attributes for continuation:** • General provisions under the EP Act, supported by advice and guidelines by the Victorian Fire Services and other regulators (for example, municipal building surveyors and fire prevention officers), can provide coverage to all sectors of the industry engaged in the storage of waste tyres (albeit with limited or indirect enforcement powers, and requirements to coordinate compliance monitoring across numerous agencies).

Type of regulatory option	Ref.	Option description	Ability to address potential fire risk			Comments (regarding assessment of option against its ability to address the potential fire risk present at each sector of the industry engaged in the storage of waste tyres)
			Waste Tyre Processors / Recyclers	Stockpiles as an end point or long-term storage	Collection or intermediate storage	
Information disclosure	**6**	**Environmental Rating Scheme for Tyre Retailers** – a government agency publicly rates tyre retailers according to their waste tyre management practices. This option relies on reputational risks to encourage (but not legally mandate) tyre retailers to dispose of waste tyres through appropriate channels.		**X**	**X**	**Key attributes for exclusion:** • Reputational motivators have proven to be successful in increasing the awareness of major brand tyre retailers, of risks and responsibilities for appropriate disposal of waste tyres. However, such a campaign is unlikely to have a significant impact on remote and regional, and/or independent tyre retailers. • While supporting the reduction in flow of waste tyres to sources of illegal dumping and stockpiling, the option would not address the subsequent hazard from waste tyre storage if stockpiles were to form, or the legitimate volumes stored for processing and recycling operations.

Type of regulatory option	Ref.	Option description	Ability to address potential fire risk			Comments (regarding assessment of option against its ability to address the potential fire risk present at each sector of the industry engaged in the storage of waste tyres)
			Waste Tyre Processors / Recyclers	Stockpiles as an end point or long-term storage	Collection or intermediate storage	
Market-based instruments	**7**	**Used Tyre Buy-back Scheme** – imposing a deposit on new tyres that is refunded when, as waste tyres, they are taken to accredited waste tyre depots. This option would establish a scheme with similarities to South Australia's Container Deposit Scheme. It would require new supporting legislation and significant regulatory and on-ground infrastructure.		**X**		**Key attributes for exclusion:** • Redeemable deposit programs have shown to be successful in applications where the supporting infrastructure is sufficient to enable easy access to deposit locations, and/or the redeemable value is high enough to cover the time and transport costs. The establishment of a program to handle a new material, with significant logistical issues (including the handling of OTR tyres from remote locations) would require substantial time and cost investment to secure a significant amount of the estimated 47,000 tonnes of unrecovered waste tyres each year. • Such a program would also duplicate efforts to establish the National Tyre Product Stewardship Scheme. • While reducing the incentive to maintain large stockpiles, abandon or illegally dump waste tyres, the option would not address the subsequent hazard from waste tyre storage if legitimate volumes are stored for processing and recycling operations.

Type of regulatory option	Ref.	Option description	Ability to address potential fire risk			Comments (regarding assessment of option against its ability to address the potential fire risk present at each sector of the industry engaged in the storage of waste tyres)
			Waste Tyre Processors / Recyclers	Stockpiles as an end point or long-term storage	Collection or intermediate storage	
Public information and education campaigns	**8**	**Highlighting risks to financiers** – highlighting to business financiers the risks to business continuity and third parties when sites do not store waste tyres safely. This option would seek to influence the cost, availability and conditions attached to the provision of finance for premises that store waste tyres.	**X**		**X**	**Key attributes for exclusion:** • While supporting the industry self-management of tyre storage fire risks, this option is depended upon each operation holding a significant financial loan, and the ability to influence a number of financial institutions to take action (in the form of independent assessments of fire risk potentially leading to new loan conditions). These conditions may exist in a range of instances but does not provide adequate security and confidence to deal with a wide range of industry activities, and tyre storage motivations.
	9	**Highlighting risks to insurance providers** – similar to option 8, highlighting to insurers the risks associated with sites that do not store waste tyres safely. This option would seek to influence the cost, availability and conditions attached to the provision of insurance for premises that store waste tyres.	**X**		**X**	**Key attributes for exclusion:** • While supporting the industry self-management of tyre storage fire risks, this option is also depended upon each operation holding relevant insurances, and the ability to influence a number of insurance institutions to take action (in the form of independent assessments of fire risk potentially leading to new insurance conditions). These conditions may exist for those businesses with large infrastructure investments, but are unlikely to address the existing or future accumulation of stockpile sites.

Type of regulatory option	Ref.	Option description	Ability to address potential fire risk			Comments (regarding assessment of option against its ability to address the potential fire risk present at each sector of the industry engaged in the storage of waste tyres)
			Waste Tyre Processors / Recyclers	Stockpiles as an end point or long-term storage	Collection or intermediate storage	
	10	**Increased education to generators of waste tyres** – providing waste tyre generators with increased education and guidance on the options available for disposing of waste tyres and appropriate end uses.		X		**Key attributes for exclusion:** • Specific guidance can assist duty holders in fulfilling general duties set out in legislation. However, without a relevant authorising legislative, such information remains solely advisory, not obligatory. This may be sufficient for highly motivated individuals or low-risk operations, however is unlikely to sufficiently motivate behaviour over existing economic incentives. • While helping to reduce the instances of stockpiling and, abandonment or illegal dumping of waste tyres, the option alone would not provide sufficient incentive to address the subsequent hazard from waste tyre storage if large volumes are stored for processing and recycling operations.

Table 21: Secondary assessment of options

Type of regulatory option	Ref.	Option description	Criteria			
			Minimum timeframe	Regulatory flexibility	Maximum efficiency	improved Equity
Explicit government regulation (legislation)	**1**	Waste Management Policy	Med – subject to a policy impact assessment, the form of an ongoing policy could be based on the interim Waste Management Policy (Storage of Waste Tyres).	Med – as the Policy would incorporate the Fire Services Guidelines by reference, amendments (by the Victorian Fire Services) can be made to the guidelines without requiring an amendment to the Policy.	Med – enables a threshold to be set which provides a mechanism to prescribe (through incorporation of Victorian Fire Services Guidelines) standards, enforceable by EPA, based on a volumetric threshold of waste tyres, irrespective of sector or activity.	Low – in the absence of the ability to charge fees, does not allow for the recovery of costs for the monitoring of compliance from those duty holders creating the risk to environment and human health.
	2	New direct Regulation	Low – under the Act, the Victorian Fire Services Guidelines cannot be incorporated into regulations by reference, therefore the scale of new direct legislative requirements would be substantially higher, along with the necessary time for legal drafting, public exposure and considerations of impacts on industry.	Low – as the Victorian Fire Services Guidelines cannot be incorporated by reference into the Regulations, the key content of the guidelines would need to be replicated in the Regulation, with changes to fire services' standards requiring amendments to the Regulation.	Med – provides a mechanism to prescribe directly in regulation, standards enforceable by EPA, based on a volumetric threshold of waste tyres, irrespective of sector or activity.	Med – the EP Act does allow fees to be charged for providing any service for the purpose of a regulation. Although, the costs in establishing and maintaining a new and stand-alone process for fee recovery would reduce the efficiency of the system.
Extending the coverage of existing legislation	**3b**	Scheduled Premises Regulations, with both works approval and licensing requirements	Med – subject to Regulatory Impact Statement processes, the scale of regulatory amendment required to enact necessary changes would be relatively minor.	Med – the Victorian Fire Services Guidelines would be referenced in each premise's works approval and/or licence document (rather than in the Scheduled Premises Regulations). The EP Act provides clear processes for amending licences (s.20A).	Med – provides a preventative trigger to ensure that any new development is adequately designed to enable ongoing compliance with prescribed licence conditions (referencing the Victorian Fire Services Guidelines), enforceable by EPA, based on a volumetric threshold of waste tyres, irrespective of sector or activity.	High – provides a mechanism to charge application fees and ongoing licence fees in a cost recovery model for the effort involved in monitoring compliance at sites of risk to the environment and human health.

Type of regulatory option	Ref.	Option description	Criteria			
			Minimum timeframe	Regulatory flexibility	Maximum efficiency	improved Equity
	3c	Scheduled Premises Regulations, with works approval, licensing requirements and a financial assurance requirement	Med – As for option 3b.	Med – as for option 3b.	High – as for option 3b, with the added ability to ensure funds are available to the duty holder or government to clean up and dispose of stores of waste tyres in the event of business failure or abandonment.	High – provides a mechanism to charge application fees and ongoing licence fees in a cost recovery model for the effort involved in monitoring compliance at sites of risk to the environment and human health.
	4	Classify tyres as prescribed industrial waste	Low – while the scale of the amendment to the regulations may be relatively small, there would be substantial triggering of additional administrative and management requirements associated with the handling and transport of waste tyres. This would require a longer time for public exposure and considerations of impacts on industry.	Med – as for option 3b – as the classification would trigger the works approval and licensing requirements relating to PIW management (scheduled premises category A01).	Med – as for option 3c, with the further inclusion of requirements to track the movement of waste tyres from the point of generation through to appropriate end points, which would subsequently increase the effort by EPA to administer the additional processes not directly associated with the management of large stores of waste tyres.	Med – provides a mechanism to charge application fees and ongoing licence fees in a cost recovery model for the effort involved in monitoring compliance at sites of risk to the environment and human health. However, would also trigger additional fees for vehicle permitting, and waste tyre transport on sectors that do not generally contribute to the substantiative fire hazard.
Increased enforcement of existing provisions	5	Increase inspection and compliance activity	High – utilising existing legislative instruments and powers, a minimum of time would be required to commence coordinated operational activities across the various agencies.	High – a high degree of flexibility would be available to define approaches through administrative programs that do not require changes to Policy, Regulation, or works approval or licensing documents.	Low – given the largely reactive nature of the existing legislative framework and other noted limitations, it would require significant regulatory effort to enable a comparable level of industry compliance.	Low – in the absence of the ability to charge fees, does not allow for the recovery of costs for the monitoring of compliance from those duty holders creating the risk to environment and human health.

Appendix E: Comparison of regulatory requirements across Australian jurisdictions for the storage of tyres

Jurisdiction	Requirements in relation to the storage of tyres
ACT	>50 tonnes EPA licence required under *Environment Protection Act 1997*.
NSW	A licence is now required under the *Protection of the Environment Operations Act 1997* to store more than 5 tonnes of waste tyres or 500 waste tyres at any time (prior to 1 September 2014, the licensing application threshold was >50 tonnes or 5,000 waste tyres). Licences require compliance with NSW Fire Brigade Storage Guidelines.
NT	Licensed under the Waste Management and Pollution Control Act.
QLD	From 2013, the storage of tyres is no longer licensed. However, various other requirements are in place such as: • the Fire and Rescue Service Act which requires occupants of premises to ensure the risk of a fire occurring at the premised is properly managed to mitigate the risk • the Public Health Act, which prescribes mosquitoes as a public health risk and requires all persons to ensure that there is no breeding ground for mosquitoes through the accumulation of water.[140] Tyre recycling facilities remain licensed – that is, commercial facilities that receive and recycle or receive and reprocess 1,000 or more equivalent passenger units of tyres, or parts of tyres, in a year.[141]
SA	If more than 500 end-of-life tyres a year need to be licensed by EPA and comply with Metropolitan Fire Service Guidelines.[142]
TAS	Landfills licensed by EPA Tasmania have licence conditions specifying that they must not openly store end-of-life tyres at any place in excess of 200 EPU, unless: (i) storage is in accordance with reuse options (ii) as otherwise approved or (iii) at a place that is a legitimate tyre-fitting business, (cannot exceed 500 EPU/year). A number of temporary tyre stockpiles have site-specific conditions within local planning instruments. Any facility using chemical (or similar means) to process large amounts of waste tyres would be assessed and regulated by EPA as a level 2 Activity. The EPA licence for any such facility would include conditions around tyre storage.
VIC	Interim Waste Management Policy, in effect from 30 April 2014 to 29 April 2015. Applies to premises storing than 5,000 EPU or 40 tonnes of waste tyres. It requires the waste tyres to be stored only for purposes such as transfer, reuse, recycling, reprocessing or energy recovery, and in a manner that minimises risks to the environment and human health, predominantly due to the risk of fire. The second duty is complied with if the waste tyres are stored in accordance with the Victorian Fire Services' Guidelines.[143]
WA	Licensed if >500 tyres per year.

Source: Adapted from PwC, *An options framework for end-of-life tyres in Victoria*, Sustainability Victoria, June 2013.

[140] Public Health Act 2005, (Qld) Schedule 2
[141] Environmental Protection Regulation 2008 (Qld), Schedule 2
[142] EPA South Australia (2010), *Waste tyres: Waste guidelines,* available at: http://www.epa.sa.gov.au/xstd_files/Waste/Guideline/guide_tyres.pdf accessed 14 May 2014
[143] Waste Management Policy (Storage of Waste Tyres) 2014, *Victorian Government Gazette,* No S139, 30 April 2014.

Appendix F: Equivalent passenger unit conversion rates

Type of tyre	EPU Value
Motorcycle	0.5
Passenger car	1
Light Truck	2
Truck	5
Super Single	10
Solid small (up to 0.3 m high)	3
Solid medium (>0.3 m up to 0.45 m)	5
Solid large (>0.45 m up to 0.6 m)	7
Solid extra large (>0.6 m)	9
Tractor small (up to 1 m high)	15
Tractor large (>1 m up to 2 m)	25
Fork lift small (up to 0.3m high)	2
Fork lift medium (>0.3 m up to 0.45 m)	4
Fork lift large (>0.45 m up to 0.6 m)	6
Grader	15
Earth mover small (up to 1 m high)	20
Earth mover medium (>1 m up to 1.5 m)	50
Earth mover large (>1.5 m up to 2 m)	100
Earth mover extra large (>2 m up to 3.0 m)	200
Earth mover giant (>3 m up to 4 m)	400
Bobcat	2

Source: Waste Management Policy (Storage of Waste Tyres) 2014, *Victorian Government Gazette*, No S139, 30 April 2014,

Appendix G: Consultation

To inform the draft regulatory amendments and the development of this RIS, EPA undertook targeted consultation with industry associations, peak bodies, tyre recycling businesses, and various government and local government stakeholders. These included:

- Tyre Stewardship Australia (TSA)
- Australian Tyre Recycling Association (ATRA)
- Australian Waste Tyre Resources Association (AWTRA)
- Tyrecycle
- Municipal Association of Victoria (MAV)
- Victorian Fire Services (Country Fire Authority/Metropolitan Fire Brigade)
- Environment Regulators in other Australian jurisdictions.

In 2013, a preliminary investigation of policy frameworks for end-of-life tyres was undertaken by the Victorian Government environment portfolio. This included substantial industry consultation, and identified a range of regulatory gaps that were seen to be hindering the effective management of the environmental and public health impacts of waste tyres and the emergence of a robust market.[144] This research included consultation with ATRA, Tyrecycle, Tyre crumb, the Victorian Automobile Chamber of Commerce and the Cement Industry Federation. Feedback from industry during this investigation and for the RIS identified that industry leaders would like all facilities to be subject to specific requirements for the management of whole waste tyres in order to create a level playing field, and support commercially viable operations.

In addition to specific consultation to help inform the RIS, extensive engagement with the industry was undertaken through activities associated with the implementation of the broader strategic approach to dealing with waste tyres in Victoria. While this RIS has been in development, the interim Waste Management Policy (Storage of Waste Tyres) (the interim WMP) was declared and Sustainability Victoria (SV) has led an investigation into future market development opportunities for waste tyres.

The development of the interim WMP, its requirements and fire services guidelines, involved extensive input by CFA, MFB, Department of Justice, Fire Services Commissioner's office, and DEPI. The release and implementation of the interim WMP has involved consultation with SV, MAV, Department of Transport, Planning, and Local Infrastructure, ATRA, Australian Tyre Industry Council (ATIC) and other businesses involved in the storage and processing of waste tyres. Subsequently, many individual businesses have been engaged with either EPA or SV to clarify particular requirements under the interim WMP, and/or seek opportunities to participate in the brokering between waste tyre stockpile owners and recyclers to safely manage existing stockpiles. In this context, discussions regarding the requirements of the interim WMP have also flagged the intention to assess the best approach to establishing ongoing requirements for the management of waste tyres in Victoria after the interim standards expire.

SV engaged Hyder Consulting to conduct a market analysis for a range of materials (and emerging materials), including tyre-derived products. This market analysis looked to support improved resource recovery, create a clear understanding of the current markets for the emerging materials, and entertain strategic opportunities to overcome any current real or perceived barriers to market development. Hyder Consulting subsequently invited a variety of stakeholders to share their insight into the waste tyre market, across varying sectors, including:

- Manufacturers
- Industry body
- Recyclers
- Collectors
- Retail dealers
- End users
- Government
- Waste to energy technology provider.

[144] PwC (2013), op cit.

Appendix H: Technical appendix for the impact analysis

This appendix sets out the modelling inputs and assumptions – both general assumptions and specific assumptions, used in the cost benefit analysis.

The impact of each option has been estimated on an annual basis and then modelled over a 10-year time period. The annual estimates have been discounted back to today's dollars (2013–14 dollars) using a real discount rate of 3.5 per cent and then reported as an overall 10-year net present value (NPV). The annual estimates consist of impacts from:

- works approval
- licensing
- meeting the recommendations of the Victorian Fire Services Guidelines
- meeting financial assurance requirements
- transitional costs for operators exiting the sector
- implementation costs
- cost savings to EPA and Victorian Fire Services.

The approach to estimating these impacts is discussed below (except for implementation costs and cost savings as these costs are less significant).

Following the overview of the approach to estimating the above costs, information on the costs of tyre fires are presented. This data is used to estimate the number of fires needed to be avoided to make the cost of the options break even. The NPV of each of these estimates is based on that annual cost being incurred each year over 10 years (which results in the estimates shown in the body of the RIS).

Table 22: General assumptions

Assumption	Unit	Value	Source
Discount rate	%	3.5%	Department of Treasury and Finance (2011), *Victorian Guide to Regulation*
Value of a fee unit	2013–14	12.84	Office of Chief Parliamentary Council, *Penalty and Fee Units*, 15 April 2014, http://www.gazette.vic.gov.au/gazette/Gazettes2014/GG2014S123.pdf , Accessed 11 April 2014
Average hourly wage 2005 – 06	$	$54.55	Department of Treasury and Finance (2011), *Victorian Guide to Regulation*, Appendix C, July, page 15.
Average hourly wage 2014 $	$	$66.25	Calculation
CPI – Dec 2005	Index	84.3	Australian Bureau of Statistics (2014), *Consumer Price Index*, Australia: Tables 1 and 2 – Index Numbers; All groups CPI; Melbourne
CPI – Dec 2006	Index	86.7	
CPI – Dec 2007	Index	89.5	
CPI – Dec 2010	Index	96.9	
CPI – Dec 2014	Index	105.3	
Number of working hours per week	hours	41	Department of Treasury and Finance (2011), *Victorian Guide to Regulation*, Appendix, July, page 13.
Number of weeks per year	weeks	44	Department of Treasury and Finance (2011), *Victorian Guide to Regulation*, Appendix, July, page 13.
Number of working hours per year	hours	1804	Calculation
On-costs multiplier	Multiplier	1.165	Department of Treasury and Finance (2011), *Victorian Guide to Regulation*, Appendix, July, page 13.
Overheads multiplier	Multiplier	1.5	Department of Treasury and Finance (2011), *Victorian Guide to Regulation*, Appendix, July, page 14.
Cost per hour for EPA staff VPS 3 (including on-costs and overheads)	$ per hour	$61.95	Calculation based on Victorian Public Service, Workplace Determination 2012, Schedule B – VPS Salaries

Cost per hour for EPA staff VPS 4 (including on-costs and overheads)	$ per hour	$73.93	Calculation based on Victorian Public Service, Workplace Determination 2012, Schedule B – VPS Salaries
Cost per hour for EPA staff VPS 5 (including on-costs and overheads)	$ per hour	$88.32	Calculation based on Victorian Public Service, Workplace Determination 2012, Schedule B – VPS Salaries

Table 23: Estimated number of businesses in the base case by number of waste tyres onsite

Sector	0-2,000	2,000-5,000	5,000+	Total number	Source
Recycling	0	0	5	**5**	AWTRA, Personal communication, 12 June 2014
Retail	580	328	3	**911**	• Kosta Lev 2014, *Flat tyres: Weak revenue growth is expected with fuel prices on the rise*: IBISWorld industry report G3922, Tyre retailing in Australia, IBISWorld; • EPA Victoria (2014), Operational information.
Stockpile	0	30	20	**50**	• EPA Victoria (2014), Operational information.
Waste tyre collectors – transport for export	0	0	15	**15**	AWTRA, Personal communication, 12 June 2014.
Total number	**580**	**358**	**43**	**981**	

Notes on estimate of retailers

Estimate of total number of retailers:

In 2013–14 there were 3,660 tyre retailers across Australia (Kosta Lev, 2014, page 28) of which 24.9 per cent are located in Victoria (Kosta Lev, 2014, page 15). Hence there are 911 tyre retailers in Victoria.

Estimate of number of retailers 2,000– 5,000:

From chapter 2 of the RIS: '' retailers typically sell around 100 tyres per week and stockpiles at tyre retailers are typically in the range of 500–2,000 EPU.'' Assume that the 911 retailers are evenly distributed along the continuum of 500–2,000 EPU onsite at any one point in time.

Estimate of number of retailers over 5,000 EPU:

There were two sites in a survey of waste tyre storage sites conducted by EPA Victoria in 2013 that are retailers, and estimated to have held over 5,000 tyres. Assuming the survey sample is representative of the population of councils and CMAs that did not respond to the survey (approximately 33 per cent), it is estimated that there is an extra one retailer, totalling three retailers that may hold over 5,000 EPU.

Notes on estimate of stockpilers

Estimate of number of stockpilers over 5,000 EPU:

There were seven sites in the survey of waste tyre storage sites that were identified as stockpilers, estimated to hold over 5,000 tyres. There were also a further four sites that have unknown operations but are assumed to be stockpilers. Assuming the survey sample is representative of the population of councils and CMAs, it is assumed that there are an extra two stockpilers and one unknown operation (assumed to be a stockpiler), totalling 14 stockpilers over 5,000 EPU. The estimate of 20 stockpiles in total across Victoria has been used due to the likelihood of further sites being present, but with currently unknown locations.

Estimate of number of stockpilers 2,000–5,000 EPU:

There were no sites in the survey that were identified as stockpilers and holding between 2,000 and 5,000 EPU. However, there were two locations that have unknown operations but are assumed to be stockpilers. Assuming the survey sample is representative of the population of councils and CMAs, an estimated extra one site of an unknown operation (assumed to be a stockpiler), totalling three stockpilers in the 2,000 – 5,000 EPU, based on the survey results. An estimated total of 30 stockpiles across Victoria in this range has been used due to the likelihood of further sites being present, but with currently unknown locations.

Table 24: Estimated number of businesses under preferred regulatory options by number of waste tyres onsite

Sector	0-2,000	2,000-5,000	5,000+	Total number	Source	Notes
Recycling	0	0	7	**7**	EPA Victoria (2014), Operational information	Assumed 2 new recyclers
Retail	911	0	0	**911**		Retailers will reduce number of tyres onsite by having them collected more frequently
Stockpile	0	20	0	**20**		All stockpilers with more than 5,000 EPU will exit. There will remain some stockpilers with between 2,000 and 5,000 EPU
Waste tyre collectors – transport for export	0	5	18	**23**		Assumed five new businesses between 2,000 to 5,000 EPU and three new businesses over 5,000 EPU over 10 years.
Total number	**911**	**25**	**25**	**961**		

Table 25: Estimated compliance levels

Base case compliance				
Sector	**Low (%)**	**Midpoint (%)**	**High (%)**	**Source and notes**
Recycling	40	50	60	EPA Victoria (2014), Operational information. The midpoint is used in the analysis.
Retail	90	95	99	
Stockpile	0	5	10	
Waste tyre collectors – transport for export	7	14	20	

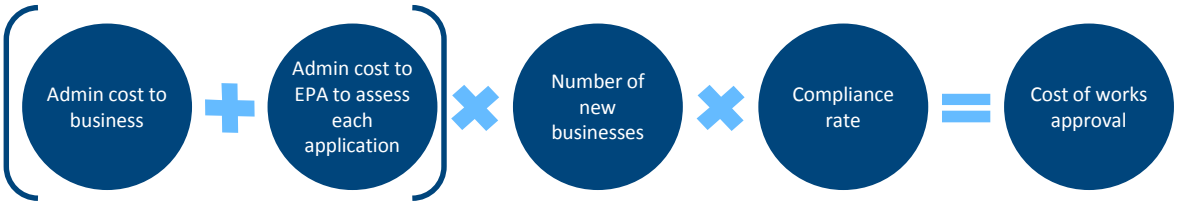
Estimated compliance under preferred regulatory options				
Sector	**Low (%)**	**Midpoint (%)**	**High (%)**	**Source and notes**
Recycling	80	90	100	EPA Victoria (2014), Operational information.
Retail	95	98	100	
Stockpile	0	50	100	
Waste tyre collectors – transport for export	80	85	90	

Totals		
Weighted average expected compliance rate (5,000 tyres plus)	86%	Calculation. The midpoint of the expected compliance rates are weighted by the number of expected operators with 5,000 tyres or more (see Table 26).
Weighted average expected compliance rate (2,000-5,000 tyres)	72%	Calculation. The midpoint of the expected compliance rates are weighted by the number of expected operators with 2,000-5,000 tyres (see Table 26).

Works approval

The below figure illustrates the key components of these costs. Assumptions associated with these costs are provided in the following tables. Box 4 shows an example of how the method in Figure 5 is applied.

Figure 5: Approach to estimating cost of works approval



Box 4: Example calculation using Figure 5

The following provides an example of how the calculation of Figure 5 is applied in the analysis.

This example uses the cost of works approval in Figure 5 to calculate the estimated cost of time new business operators will spend applying for works approval. This is the cost itemised in Table 9 as 'Time spent applying for the approval'. In particular, this example works through the cost estimate for the 5,000 threshold in the central scenario (scenario 1).

- Administration cost to business = $15,000 (see Table 26).
- Number of new businesses = five over a 10-year period over 5,000 EPU = 0.5 per annum (see Table 23, Table 24).
- Compliance rate = weighted average expected compliance rate (see Table 25) = 86 per cent.
- Annual expected cost = $15,000 x 0.5 x 86 per cent = $6,450.
- Net present value of 10 years' of the annual expected cost using a 3.5 per cent discount rate (see Table 22) = $53,642 or $0.05 million (see Table 9).

The administration cost to EPA to assess each application follows a similar method to this.

Table 26: Works approvals costs

Assumption	Unit	Value	Source	Notes
Cost to business to complete, submit and obtain approval for new works: • High • Midpoint • Low	$	• $20,000 • $15,000 • $10,000	Tyrecycle, email, 5 May 2014. EPA Victoria (2014), Operational information.	$10,000 is sourced from Tyrecycle consultation and $20,000 from EPA Victoria. The midpoint is used in the analysis.
Number of works approvals over 10 years	Number / 10 years	10	EPA Victoria (2014), Operational information.	Assuming 10 works approval applications for new waste tyre storage scheduled category over 10 years. Half of these are over 5,000 EPU, half are 2,000–5,000 EPU. Excluding new sites caught by other/existing scheduled premises categories – i.e. waste to energy, emissions to air, landfill.
Number of works approvals per annum (2,000–5,000 EPU)	Number per annum	0.5	Calculation	
Number of works approvals per annum (5,000 EPU)	Number per annum	0.5	Calculation	

Table 27: Works approvals costs to EPA

Processing works approvals stage	Hours per application	Hourly cost	Number per application	Notes
Stage 1 – Pre-application				
Receive and examine applications	10	$73.93	1	VPS 4. Assuming five works approval applications for new waste tyre storage scheduled category over 10 years. Excluding new sites caught by other / existing scheduled premises categories – i.e. waste to energy, emissions to air, landfill.
Stage 2 – Public commentary				
Advertise for comment in newspaper	2	$73.93	1	VPS 4
Receive / pass on comments to applicant	2	$81.13	1	Band rate – combination of VPS 4 and 5
Receive / review response to comments	10	$73.93	1	VPS 4
Hold conference (per section 20B of EP Act)	30	$200.00	0.1	Combination of staff and facilitator. Assuming one in 10 will require a 20B conference.
Request and review further information	20	$81.13	0.3	Band rate – combination of VPS 4 and 5. Assuming 30% of applications will require further information to be sought.
Stage 3 – Assessment and follow-up				
Notify of decision	7.5	$81.13	1	Band rate – combination of VPS 4 and 5.
VCAT challenge	190	$81.13	0.05	Band rate – combination of VPS 4 and 5. Assuming 5% of decisions are reviewed by VCAT.
Issue approval with conditions	50	$73.93	1	
Inspection of works	16	$73.93	1	

Totals		
Average cost to EPA to process one application	$9,134	Calculation of above assumptions

Source: EPA 2014, Operational Information.

Licensing requirements

The below figures illustrate the key components of these costs. Assumptions associated with these costs are provided in the following tables.

Figure 6: Approach to estimating cost of applying for a new licence

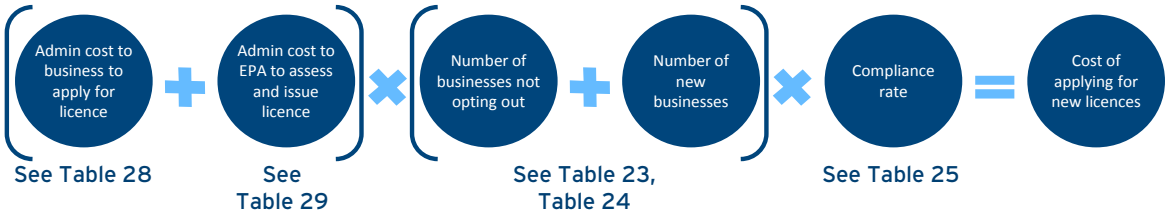


Figure 7: Approach to estimating cost of amending a licence

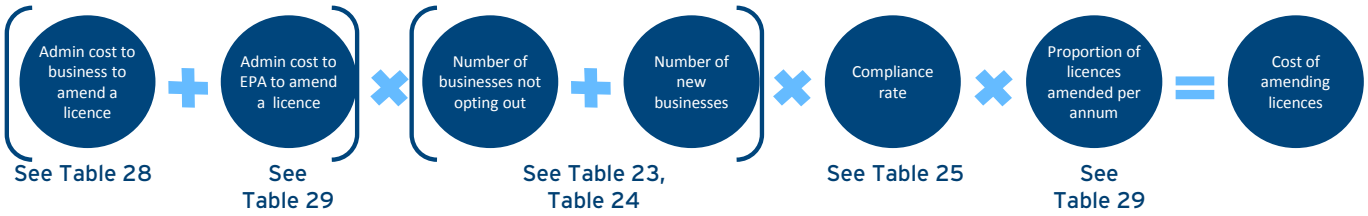


Figure 8: Approach to estimating cost of reporting on compliance with a licence

Table 28: Licence requirement costs to business

Assumption	Unit	Value	Source	Notes
Licence application administrative cost to business	$	$7,853.35	EPA Victoria (2007), *Industrial waste regulation impact statement*, Table D.7, page 134	Source info is in 2007 dollars ($12,500) so is converted into 2013-14 equivalent. A midpoint is taken between that value and a time cost of $1,000.
Time spent reporting on compliance with licence conditions	Hours per annum	12	Tyrecycle, email, 5 May 2014	
Time spent amending licence – assumed proportion of initial licence admin cost	%	50%	Assumption	

Table 29: Licence requirement costs to EPA

Assessing licence applications or amendments stage	Hours per application	Hourly cost	Per cent of licence applications Notes
Processing licence applications			
Issue licence (following works approval)	15	$73.93	100% (of new businesses over 10 years).
Long route licence	82.5	$73.93	100% (of existing operators choosing to 'opt in' to the regulation when proposed regulations first take effect) The long route licences will only be applicable for those existing businesses that will transition directly into the licensing regime in Year 1 of the new regulations because they are already built and operating and therefore do not go through a works approval process, but rather a 'long route licence' process.
Licence amendments			
Amending licences	15	$73.93	10% (per cent of licences amended per annum).

Source: EPA 2014, Operational Information.

Meeting financial assurance requirements

The below figures illustrate the key components of these costs. Assumptions associated with these costs are provided in the following tables.

Figure 9: Approach to estimating cost of applying for financial assurance

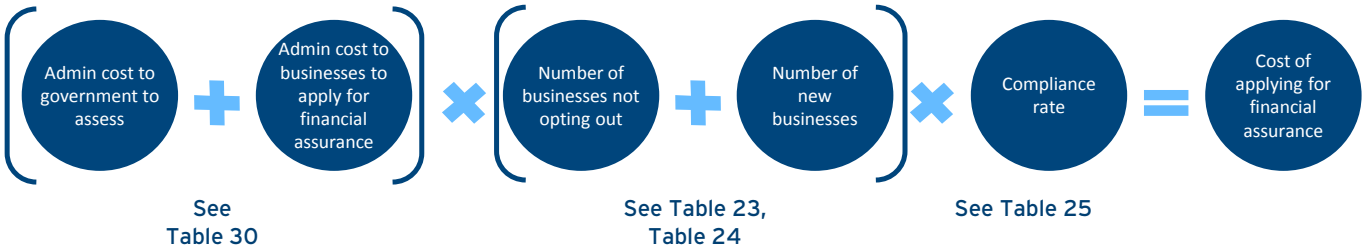


Figure 10: Approach to estimating cost of maintaining financial assurance

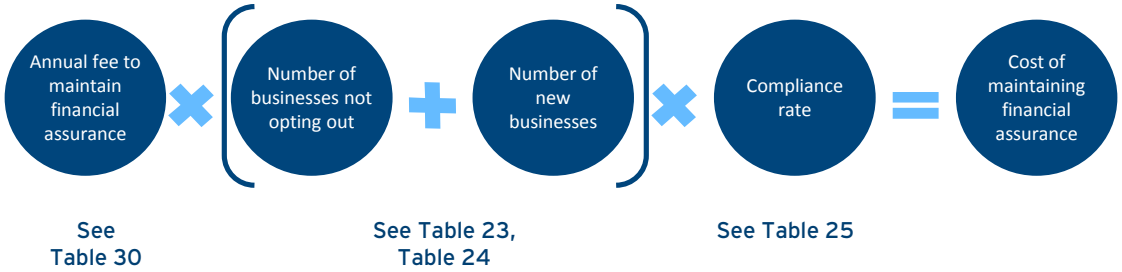


Table 30: Financial assurance costs

Assumption	Unit	Value	Source	Notes
Costs to business				
Cost of financial assurance as percentage of level of assurance sought: • High • Midpoint • Low	%	• 5.0% • 3.3% • 1.5%	High – PwC (2011), *Financial assurance options analysis*, prepared for EPA Victoria, page 15. Low – Suncorp Bank, *Financial Services – Bank Guarantee*, http://www.suncorpbank.com.au/financial-services/bank-guarantee , accessed 18 June 2014.	The midpoint is used in the analysis
Average expected cost of financial assurance (>5,000 tyres)	$	$6,246.09	Calculation	
Average expected cost of financial assurance (2,000–5,000 tyres)	$	$199.88	Calculation	
Application establishment fee	%	0.5%	Suncorp Bank, *Financial Services – Bank Guarantee*, http://www.suncorpbank.com.au/financial-services/bank-guarantee , accessed 18 June 2014.	0.50% of guarantee amount. Minimum $100
Cost of application establishment fee (>5,000 tyres)	$	$960.94	Calculation	
Cost of application establishment fee (2,000–5,000 tyres)	$	$100.00	Calculation is less than $100 so use minimum of $100.	
Estimated amount of time to complete a financial assurance form	Number of hours	2	Commonwealth Bank, *Business Banking*, https://www2.my.commbank.com.au/netbank/BusinessOnline/SBO/AboutBusiness.aspx?productSelection=nnnnnnnnnnny, accessed 18 June 2014.	Estimate based upon assessment of time required to complete Commbank form
Costs to EPA				
Receipt and verification of financial assurance establishment:				
Time	Hours per application	4	EPA Victoria (2014), Operational information.	
Hourly cost	Hourly cost	$73.93		
Frequency per business per 10 years	Number per business	1		

Totals				
Total financial assurance costs to business and EPA per application (5,000 tyres plus)		$1,389.16	Calculation	
Total financial assurance costs to business and EPA per application (2,000–5,000 tyres)		$528.22	Calculation	

Meeting the recommendations of the Victorian Fire Services Guidelines

The below figures illustrate the key components of these costs. Assumptions associated with these costs are provided in the following tables.

Figure 11: Approach to estimating cost of bunding and containment

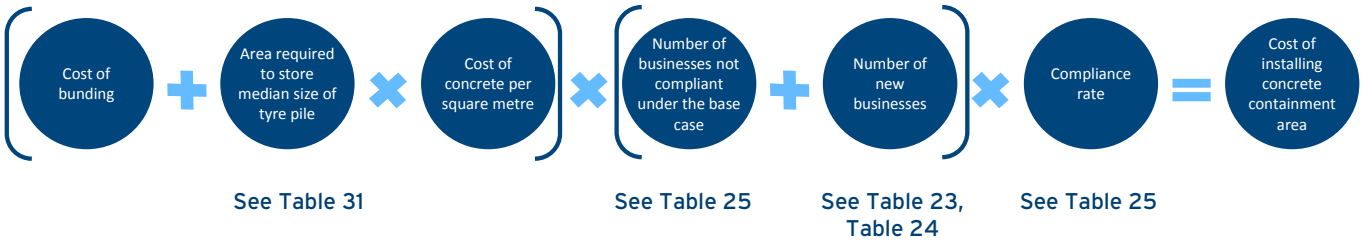


Figure 12: Approach to estimating cost of emergency management plan

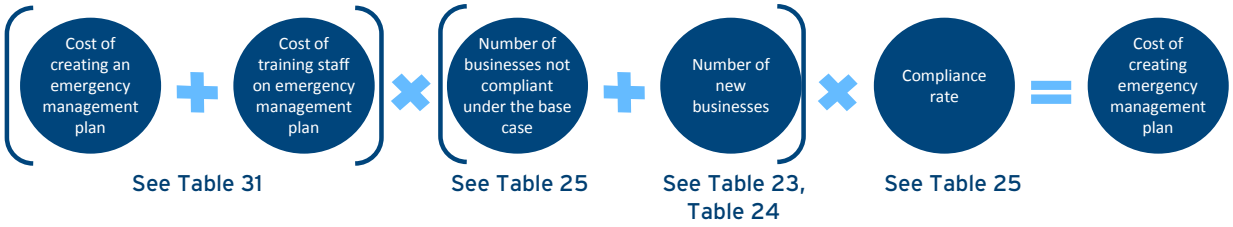


Figure 13: Approach to estimating cost of installing water supply

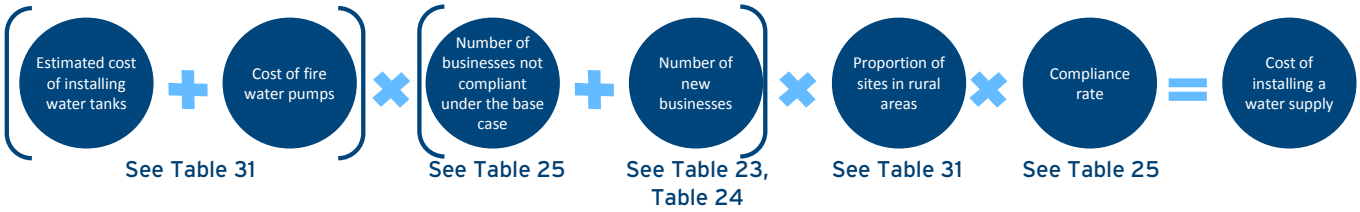


Figure 14: Approach to estimating cost of acquiring heavy equipment/excavators

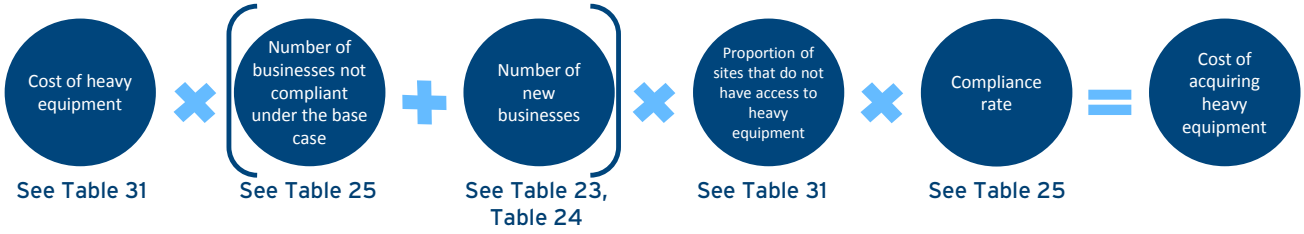


Figure 15: Approach to estimating cost of installing security fences

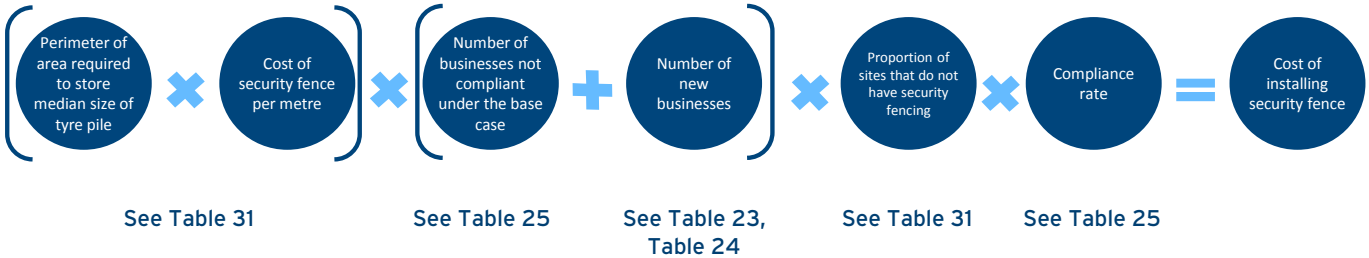


Figure 16: Approach to estimating cost of acquiring self-contained breathing apparatus

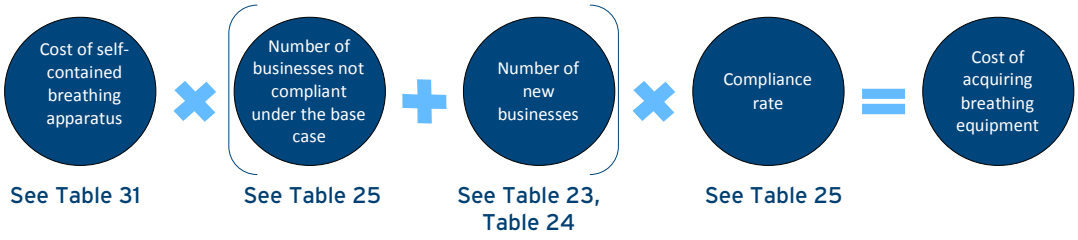


Table 31: Costs of complying with recommendations of Victorian Fire Services Guidelines

Assumption	Unit	Value	Source and notes
Containment area			
Cost of installing concrete bunding	$	$5,000.00	Tyrecycle, email 5 May 2014
Cost of concrete per square meter	$ per square meter	$40.00	Seeking Services, Concrete Slab Quotes, http://www.serviceseeking.com.au/new-job/concreters/concrete-slabs.html?creative=25156898963&keyword=concrete%20slabs%20price&matchtype=b&adposition=1t1&gclid=CjgKEAjwwPabBRCXo46OtM_RhGMSJACgCeqArJ1RCpORLq4yhV7X5MmSWkbMCY2oIceQItIiFuD0PfD_BwE , accessed 18 June 2014 Note – this figure does not account for the depth of concrete required or the installation cost. Assume that operators are able to include these costs within the per square meter cost given the scale of the job required.
Maximum tyre pile volume	Cubic meters	360.00	Country Fire Authority and Metropolitan Fire Brigades (2014) *Fire Services Guidelines – Open Air Storage of tyres*, and *Fire Services Guidelines – Indoor Storage of tyres*, page 3.
Maximum tyre pile area	Square meters	120.00	Country Fire Authority and Metropolitan Fire Brigades (2014) *Fire Services Guidelines – Open Air Storage of tyres*, and *Fire Services Guidelines – Indoor Storage of tyres*, page 3.
Number of tyres per square meter	Tyres / square meter	13.00	CalRecycle, *Determining the Number of Tires*, (8 October 2012), http://www.calrecycle.ca.gov/tires/enforcement/inspections/NumberTires.htm accessed 14 May 2014
Number of tyres in a 20 x 6 x 3 meter pile	Number of tyres	4,680.00	Calculation
Proportion of sites that are assumed to be located in metropolitan areas	%	82%	EPA Victoria (2014), Operational information
Proportion of sites that are assumed to require a concrete pad	%	46%	Assumed that two-thirds of urban sites have an existing concreted area to contain water run-off when extinguishing a tyre fire (i.e. 54% of operators do not need a concrete pad and 46% of operators do need a concrete pad).
Median size tyre pile (2,000–5,000)	Number of tyres	3,000	Calculation
Area of median tyre pile size	Square meters	76.92	Calculation

Cost of concrete pad for a median size tyre pile (2,000–5,000)	$	$3,076.92	Calculation
Median size tyre pile (>5,000 threshold)	Number of tyres	93,750	Calculation
Area of median tyre pile size	Square meters	2,403.85	Calculation
Cost of concrete pad for a median size tyre pile > 5,000 tyres	$	$96,153.85	Calculation
Emergency management plan			
Cost of creating an emergency management plan	$	$4,000.00	Tyrecycle, email 5 May 2014
Cost of training staff for emergency management plans	$	$2,000.00	Tyrecycle, email 5 May 2014
Water supply			
Cost of a 250,000 L water tank	$	$17,897.00	The TankShop.com.au, personal communication, 17 July 2014.
Assumed cost to install a 250,000 L water tank	$	$21,000.00	The TankShop.com.au, personal communication, 17 July 2014.
Assumed cost to purchase and install two 250,000 L water tanks	$	$77,794.00	Calculation.
Cost of a fire water pump Range: • High • Midpoint • Low	$	• $1,200 • $725 • $250	Google, 18 June 2014 search for fire pump, page 1, Accessed at: https://www.google.com.au/search?q=Fire+pump&safe=off&es_sm=122&source=univ&tbm=shop&tbo=u&sa=X&ei=LEGhU_viHtGSuATuwYDoAg&ved=0CLEBELMY#q=Fire+pump&safe=off&tbm=shop&tbs=vw:l,cat:2158 Note – The midpoint is used in the analysis.
Proportion of sites that are located in rural areas (and therefore are unlikely to have access to town water).	%	19%	EPA Victoria (2014), Operational information.
Excavation equipment			
Cost of having bulldozers/ excavators/ loaders available onsite Range: • High • Midpoint • Low	$	• $65,000 • $42,500 • $20,000	'Construction Sales', 18 June 2014 search for Bobcat in Victoria, Page 1, Accessed at: http://www.constructionsales.com.au/buy/results.aspx?Ns=p_StockRankSort_Int32%7C1%7C%7Cp_Make_String%7C0%7C%7Cp_Model_String%7C0%7C%7Cp_Year_Int32%7C1%7C%7Cp_StockPrice_Decimal%7C1&N=1552%201715%201711%201600%201602%201601%204294928477%2082&TabID=2611861&Nne=15 Note – The midpoint is used in the analysis.
Proportion of sites that do not have access to heavy equipment in the base case	%	50%	Assumption.
Security fence			
Security fence per metre: • High • Midpoint	$ per metre	• $123.10 • $102.60 • $82.10	Protective Fencing, Standard fencing estimate, September 2008, http://www.ferret.com.au/odin/pdf/showcases/16869.pdf Accessed 2 July 2014, page 1.

• Low			Note this is for a 1.8-metre chain wire fence with no rails but with three strands of barbed wire. The analysis assumed the low value is applicable given the size of the fence required, operators could negotiate a low price.
Proportion of businesses that may not already have a security fence in place	%	50%	Assumption.
Number of tyre piles in the median size tyre pile (2,000–5,000)	Number	1	Calculation.
Minimum perimeter for a median size tyre pile (2,000–5,000	Number of metres	266	Calculation – Two rows of tyre piles. Each tyre pile must have 20 metres in between it and other tyre piles, boundaries and buildings.
Number of tyre piles in the median size tyre pile (>5,000 threshold)	Number	20	Calculation.
Minimum perimeter for a median size tyre pile (>5,000 threshold)	Number of metres	660	Calculation – four rows of tyre piles. Each tyre pile must have 20 metres in between it and other tyre piles, boundaries and buildings.
Self-contained breathing apparatus			
Cost of self-contained breathing apparatus: • High • Midpoint • Low	$	• $2,990 • $2,432 • $1,874	Seton, Search results for 'self contained breathing', 2006, http://www.seton.net.au/endecasearch/result/query/?q=self+contained+breathing+&x=0&y=0 Accessed 2 July. Note – The midpoint is used in the analysis.

Transitional costs for operators exiting the sector

The below figure illustrates the key components of these costs. Assumptions associated with these costs are provided in the following table.

Figure 17: Approach to estimating transitional costs for operators exiting the sector

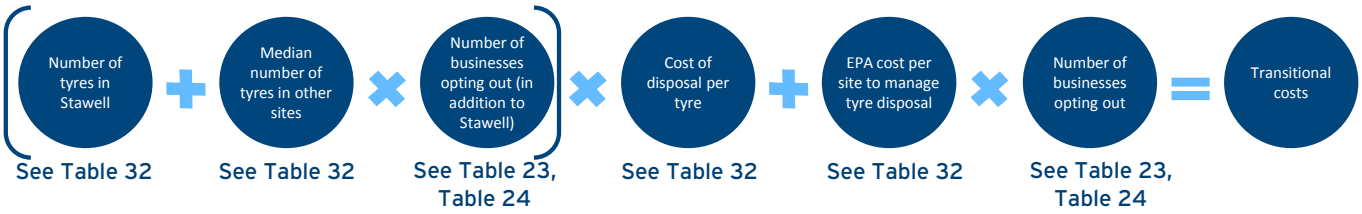


Table 32: Costs to dispose of tyres

Assumption	Unit	Value	Source
Costs of disposing of a tyre: • High • Midpoint • Low	$ per EPU	• $3.20 • $2.05 • $0.90	EPA Victoria. Based on values presented by Boomerang Alliance at NSW Tyre Summit, November 2013. The midpoint is used in the analysis for the central scenario.
Alternative disposal cost for scenarios 2 and 3	$ per EPU	$1.48	Calculation based on midpoint between $0.90 and $2.05.
Size of Stawell tyre pile: • High • Midpoint • Low	Number of EPU	• 12,000,000 • 9,000,000 • 3,000,000	This estimate varies between 3 million and 12 million, anecdotally, depending on the source of the estimate due to factors such as the unknown depth of the site. The midpoint is used in the analysis.
Median over 5,000 (excluding Stawell)	Number of EPU	93,750	Calculation.
Median over 2,000 but less than 5,000	Number of EPU	3,000	Calculation.
EPA costs to project manage a cleanup	Number of hours	120	EPA Victoria (2014), Operational information.
EPA costs to project manage a cleanup	Hourly cost	$81.00	EPA Victoria (2014), Operational information.

Implementation costs

Assumptions associated with these costs are providing in the following table.

Table 33: EPA costs for implementation of options 3b and 3c

Assumption	Unit	Value	Source
Design of licence conditions – time	FTE	0.05	EPA Victoria (2014), Operational information
Design of licence conditions – cost	$	$7,966.20	
Amendment of Licence Management Guideline and Works Approval Guideline – time	FTE	0.05	
Amendment of Licence Management Guideline and Works Approval Guideline – cost	$	$6,668.81	
Preparing and holding training for assessors – time	FTE	0.02	
Preparing and holding training for assessors – cost	$	$2,667.52	
Preparing and holding training for field staff – time	FTE	0.06	
Preparing and holding training for field staff – cost	$	$8,002.57	
Total implementation costs – option **3b – works approval and licensing**		**$25,305.10**	
Design of licence conditions – time	FTE	0.05	EPA Victoria (2014), Operational information
Design of licence conditions – cost	$	$7,966.20	
Amendment of Licence Management Guideline and Works Approval Guideline – time	FTE	0.05	
Amendment of Licence Management Guideline and Works Approval Guideline – cost	$	$6,668.81	
Amendment of financial assurance guidance – time	FTE	0.02	
Amendment of financial assurance guidance – cost	$	$3,186.48	
Preparing and holding training for assessors – time	FTE	0.02	
Preparing and holding training for assessors – cost	$	$2,667.52	
Total implementation costs – option **3c – works approval, licensing and financial assurance**		**$28,491.58**	

Cost savings and costs of tyre fires

The following tables set out the assumptions underlying the estimated cost savings to EPA.

Table 34: Costs and frequency of compliance monitoring of premises under the base case

Activities undertaken by EPA to monitor compliance in the base case				
	Hours per audit	**Hourly cost**	**Per cent of audits**	**Notes**
Preparation				
Prepare paperwork for site visit	1	$73.93	100	All site inspections will involve preparation and site assessment. It is assumed that one-third of site inspections will result in a form of remedial notice being issued, requiring a further follow-up inspection.
Prepare equipment for site visit	1	$73.93	100	
Site assessment				
Travel to and from site	4	$73.93	100	
Undertake site assessment	6	$73.93	100	
Collate information from site visit	1.5	$73.93	100	
Generate response for company	8	$73.93	100	
Follow-up response				
Draft notice	5	$73.93	33	
Prepare paperwork for site visit	3	$73.93	33	
Prepare equipment for site visit	1	$73.93	33	
Travel to and from site	4	$73.93	33	
Undertake site assessment	3	$73.93	33	
Auxiliary compliance				
Prepare site strategies	160	$81.13	n/a	For large numbers of inspections on unlicensed businesses, it is common to coordinate activities in a strategic response. Subsequently a site strategy is prepared prior to a campaign of inspections, which is then evaluated and closed-out through a summary report. It is assumed a frequency of two in a 10-year period.
Sector summary reports	60	$81.13	n/a	

Number of EPA site inspections per year in the base case		
	Per cent of operators audited	**Notes**
Year 1	100	The status quo is expected to involve 80 sites throughout the 10-year period. Therefore in Year 1, 80 sites will be inspected.
Year 2	33	
Year 3	6	
Year 4	6	
Year 5	6	
Year 6	75	
Year 7	25	
Year 8	6	
Year 9	6	
Year 10	6	
Average cost to EPA for one site inspection (including auxiliary compliance costs)	**$2,158**	

Source: EPA 2014, Operational Information.

Table 35: Costs and frequency of audits of premises under regulatory options

Activities undertaken by EPA to monitor compliance under the proposed regulatory option			
	Hours per audit	**Hourly cost**	**Per cent of audits**
Preparation			
Prepare paperwork for site visit	1	$73.93	100
Prepare equipment for site visit	1	$73.93	100
Site assessment			
Travel to and from site	4	$73.93	100
Undertake site assessment	6	$73.93	100
Collate information from site visit	1.5	$73.93	100
Generate response for company	8	$73.93	100
Follow-up and response			
Draft notice	5	$73.93	18
Prepare paperwork for site visit	3	$73.93	18
Prepare equipment for site visit	1	$73.93	18
Travel to and from site	4	$73.93	18
Undertake site assessment	3	$73.93	18
Annual Report Verification			
Verification of Annual Compliance Statements (APS)	5	$73.93	100
Follow up site inspections relating to APS	70	$81.13	5
Notes	All site inspections will involve preparation and site assessment. It is assumed that 18% of site inspections will result in a form of remedial notice being issued, requiring a further follow-up inspection.		
Average cost to EPA of annual compliance monitoring	**$2,456**		
Frequency of compliance monitoring			
Per cent of licences inspected per annum:			
Year 1 and Year 6	100%		
Years 2–5 and 7–10	25%		
Notes	The expected inspection pattern is that all operators would be inspected four times over 10 years (at commencement of licensing and then three-yearly intervals).		

Additional inspections of waste tyre storage premises	
Hours per business	40
Hourly cost	$73.93
Notes	These inspections relate to operators that are storing more than 5,000 EPU that are expected to not be able to obtain an EPA licence. The total hours per businesses considers the need to inspect some businesses may require follow-up activities.
Average cost to EPA for a business that does not progress towards an EPA licence.	**$2,957**
Number of businesses inspected	
Year 1	23
Years 2–10	3

Source: EPA 2014, Operational Information.

The following tables set out assumptions for the costs of tyre fires based on a number of tyre fire case studies from the CFA and other Australian and international examples. This data is used to estimate the number of fires needed to be avoided to make the cost of the options break even.

Table 36: Assumed costs per tyre fire

Assumed Costs of tyre fire	Unit	Value	Source	Notes
Up to 0.5 million tyres	$/fire	$147,500	Appendix C, Table 35 and Table 36	Median of Fire A (Atech), Fire B (Atech) and Charlton (CFA case study)
0.5–1 million tyres	$/fire	$3,139,500		Numurkah (CFA case study)
1–4 million tyres	$/fire	$4,988,200		Median of Fire C (Atech), Everett (US) and Iowa (US)
Greater than 4 million tyres	$/fire	$21,869,400		Median of Winchester/Rinehart (US), California (US), Kirby (US) and Stawell (CFA case study)

For three different waste tyre storage sites, (Stawell, Numurkah and Charlton) CFA have provided estimates of the number of units (for example, pumpers, tankers, ladder platform and hazmat), CFA staff rate per 15 minutes and the time required, for both during, and for site cleanup in the event of a fire. These have been adjusted to include on-costs, overheads and the value of volunteer time.

Table 37: CFA case studies

Assumption	Unit	Value	Source	Notes
Estimated cost to CFA of potential Stawell tyre fire (approximately 9 million tyres)	$	$3,111,200–$13,135,550	Calculation based on CFA, (2014) Operational information; and D. Shaw, 'Searching for the Opportunity Cost of an Individual's Time', *Land Economics*, 68 (1) 1992, pages 107–115.	CFA provided estimates of the number of units (for example, pumpers, tankers, ladder platform and hazmat), CFA staff rate per 15 minutes and time required both during the fire and for site cleanup. These have been adjusted to include on-costs, overheads and the value of volunteer time.
Estimated cost to CFA of potential Numurkah tyre fire (approximately 0.9 million tyres)	$	$3,139,500		
Estimated cost to CFA of potential Charlton tyre fire (approximately 5–10,000 tyres)	$	$147,500		

Other Australian and international examples of tyre fires are provided in the table below.

Table 38: Examples of tyre fires

Year	Location	Cost*/ (year)	Indicative quantity of waste tyres (EPU)	Source of fire	Sources
Victoria					
30-Jan-13	Rockbank, Victoria	n/a	n/a	Grass fire	• Country Fire Authority, 2013, Available at: https://www.facebook.com/cfavic/posts/10151475801389416 accessed 11 April 2014 • Kay R 2013, Photo stream, Available at: https://www.flickr.com/photos/robert-a-kay/8431478973/in/photostream/ Accessed 11 April 2014
2-May-13	Numurkah, Victoria.	$110,000 (2014)	900,000	Suspicious	• CFA Media, Numurkah tyre fire, 2 May 2013, http://news.cfa.vic.gov.au/news/numurkah-tyre-fire.html, accessed 11 April 2014 • Thals, Kaitlin, *Toxic fire threatens Numurkah*, Shepparton News, 3 May 2013, http://www.mmg.com.au/local-news/shepparton/toxic-fire-threatens-numurkah-1.48706, accessed 11 April 2014 • Kimber, Ben, *Tyre dump silver lining*, The Stawell Times-News, 26 November 2013, http://www.stawelltimes.com.au/story/1932677/tyre-dump-silver-lining/, accessed 11 April 2014 • EPA Victoria (2014), Operational information. • CFA (2014), Operational information.
Elsewhere in Australia					
1990	Bindoon, WA	$1,071,900 (2014)	n/a	n/a	• NSW DECCW (2004), *Report on the extended responsibility preliminary conservation program*, cited in URS (2006), *Market failure in end-of-life tyre disposal*, Department of the Environment and Heritage, 8 September 2006, p 4-4.
1992	Salisbury, QLD	$1,315,000 (2014)	n/a	n/a	• URS (2006), *Market failure in end-of-life tyre disposal*, Department of the Environment and Heritage, 8 September 2006.
2002	Sydney, NSW	n/a	n/a	n/a	• URS (2006), *Market failure in end-of-life tyre disposal*, Department of the Environment and Heritage, 8 September 2006.
Sep-10	Perth, Northern Midlands, Tasmania	n/a	2,000	Accident	• ABC News, *Tyre fire sparks investigation*, 24 September 2010, http://www.abc.net.au/news/video/2010/09/24/3021719.htm?site=northtas, accessed 11 April 2014 • Dawtrey, Zara, *Tyre fire forces Perth residents indoors*, The Examiner, 23 September 2010, http://www.examiner.com.au/story/459819/tyre-fire-forces-perth-residents-indoors/, accessed 11 April 2014 .

Dec-10	Perth Airport, Perth, WA	$185,000 (2014)	n/a	n/a	• Western Australian Department of Environment Regulation, communications, 16 October 2013 • O'Connell, Ronan, *Tyre warehouse blaze under control*, The West Australian, 27 December 2010, https://au.news.yahoo.com/a/8568704/tyre-warehouse-blaze-under-control/, accessed 11 April 2014 • Fire and Emergency Services Authority of Western Australia, *2010-11 Annual Report*, 2011, page 52, http://www.dfes.wa.gov.au/publications/AnnualReport201011/10-11-Annual-Report-Section2.pdf, accessed 11 April 2014
Feb-12	Longford, Tasmania	n/a	16,000	n/a	• Innis, John, *The tyre-depot fire at Longford*, Tasmania, 15–17 February 2012: Air quality monitoring by vehicle-based surveys, May 2012, Air Section, EPA Division, Tasmanian Department of Primary Industries, Parks, Water and Environment, Hobart, http://epa.tas.gov.au/documents/report_longford_tyre_fire_aq_chronology_rs.pdf, accessed 11 April 2014 • ABC News, *Tyre fire end in sight*, 17 February 2012, http://www.abc.net.au/news/2012-02-15/tyre-fire-tipped-to-smoulder-on/3831086, accessed 11 April 2014 • Chelkowska, Elzbieta, et al, *A Tyre Fire at Longford, Tasmania – Air monitoring and prognostic air simulations during environmental incident*, 24 August 2013, EPA Division, Tasmanian Department of Primary Industries, Parks, Water and Environment, Hobart, http://emobilise.com.au/files/programs/56/abstracts/10914.pdf, accessed 11 April 2014 • Mounster, Bruce, *Health alert over tyre fire*, The Mercury, 15 February 2012, http://prelive.themercury.com.au/article/2012/02/15/301365_tasmania-news.html, accessed 11 April 2014
1-Jan-13	Villawood/Chester Hill, West Sydney, NSW	n/a	5,000	Arson	• NSW EPA, communications, 18 October 2013 • ABC News, *Tyre factory on fire in Western Sydney*, 1 January 2013, http://www.abc.net.au/news/2013-01-01/factory-fire-burning-in-western-sydney/4449024, accessed 11 April 2014

Sep-13	Bell Bay Port, Tasmania	n/a	n/a	Accident	• ABC News, *Tyre fire toxic smoke closes parts of Bell Bay port operations*, 5 September 2013, http://www.abc.net.au/news/2013-09-05/black-smoke-billows-from-a-tyre-fire-in-the-state27s-north/4936790, accessed 11 April 2014 • ABC News, *Health threat from toxic Bell Bay tyre fire over*, 6 September 2013, http://www.abc.net.au/news/2013-09-06/health-threat-from-bell-bay-tyre-fire-over/4939926, accessed 11 April 2014
Oct-13	Chipping Norton, Sydney, NSW	n/a	10,000	n/a	• Hannam, Peter, *Oil slick danger from tyres in fire*, The Age, 28 October 2013, http://www.theage.com.au/environment/oil-slick-danger-from-tyres-in-fire-20131027-2w9s4.html, accessed 11 April 2014
Apr-14	Yennora, Western Sydney, NSW	n/a	n/a	n/a	• 7 News, *Sydney tyre fire* (webpage), 9 April 2014, https://au.news.yahoo.com/nsw/a/22504556/tyre-fire-in-western-sydney/ accessed 11 April 2014 • Walker, Ian, *Fifty firefighters respond as fire guts factory in West Sydney*, The Daily Telegraph, 9 April 2014 http://www.dailytelegraph.com.au/news/nsw/fifty-firefighters-respond-as-fire-guts-factory-in-west-sydney/story-fni0cx12-1226879140653, accessed 11 April 2014
Overseas					
1983	Winchester/ Rinehart, Virginia, US	$6,636,500 (2014)	7,500,000	Cause unknown but arson (suspected)	• United States Environmental Protection Agency, *Tire Fires* (webpage), last updated 20 August 2013, http://www.epa.gov/osw/conserve/materials/tires/fires.htm, accessed 11 April 2014 • United States Environmental Protection Agency, *NPL site narrative for Rhinehart tire fire dump* (webpage), last updated 28 November 2012, http://www.epa.gov/superfund/sites/npl/nar365.htm, accessed 11 April 2014 • Smith, Debra, *The great Everett fire tyre, 25 years later*, The Herald of Everett, Washington, 13 September 2010, http://www.heraldnet.com/article/20090924/NEWS01/709249870/-1/RSS02, accessed 11 April 2014 • Dower, Roger, Rand, Sally and Scodari, Paul, *The Scrap Tire Problem: A preliminary economic study*, 29 October 1985, Environmental Law Institute, Washington, http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0075-01.pdf/$File/EE-0075-01.pdf Accessed 11 April 2014 • Office of the State Fire Marshall (2004), *Rings of Fire revisited: Tire fire prevention and suppression*, State of California

1984	Everett, Washington, US	$11,135,100 (2014)	4,000,000	Cause unknown but arson (suspected)	• Smith, Debra, *The great Everett fire tyre, 25 years later*, The Herald of Everett, Washington, 13 September 2010, http://www.heraldnet.com/article/20090924/NEWS01/709249870/-1/RSS02 Accessed 11 April 2014 • Dower, Roger, Rand, Sally and Scodari, Paul, *The Scrap Tire Problem: A preliminary economic study*, 29 October 1985, Environmental Law Institute, Washington, http://yosemite.epa.gov/ee/epa/eerm.nsf/vwAN/EE-0075-01.pdf/$File/EE-0075-01.pdf, accessed 11 April 2014
1986	Somerset, Wisconsin	n/a	9,000,000	n/a	Office of the State Fire Marshall (2004), *Rings of Fire revisited: Tire fire prevention and suppression*, State of California
1987	Hudson, Colorado	n/a	3,000,000	n/a	
1988	Cochranville, Pennsylvania	n/a	5,000,000	n/a	
1989	Heyope/Knighton, Wales	n/a	10,000,000	Arson	• Rowe, Mark, *Dumped On,* The Guardian, 15 May 2002, http://www.theguardian.com/society/2002/may/15/environment.waste, accessed 11 April 2014 • Hon Richard Livsey MP, Hansard (United Kingdom), 26 July 1990 vol 177 cc689 – 96, http://hansard.millbanksystems.com/commons/1990/jul/26/heyope-knighton-fire, accessed 11 April 2014 • Brawner, Dan. *Living in Iowa; Iowa City's huge shredded tire fire is an environmental disaster and should be news.* The Sun, 8 June 2012, http://www.mvlsun.com/article.php?viewID=10298, accessed 11 April 2014
1989	Danville, New Hampshire	n/a	3,000,000	n/a	Office of the State Fire Marshall (2004), *Rings of Fire revisited: Tire fire prevention and suppression*, State of California
1989	Catskill, New York	n/a	2,000,000	n/a	
1990	Hagersville, Ontario	n/a	12,000,000	n/a	
1990	Saint-Amable, Quebec	n/a	3,000,000	n/a	
1993	Inwood, West Virginia	n/a	3,000,000	n/a	
1996	Fresno, California	n/a	2,000,000	n/a	
1997	Gila River, Arizona	n/a	3,000,000	n/a	

1998	Tracy, California	$21,869,400 (2014)	8,000,000	n/a	
1999	Kirby, Ohio, US	$27,562,800 (2014)	7,000,000	Arson	• Ohio Environmental Protection Agency, Division of Solid and Infectious Waste Management, *Kirby tire fire & cleanup*, 2004, http://www.epa.gov/region5/waste/solidwaste/tires/miforum/large.pdf, accessed 11 April 2014 • Ohio Environmental Protection Agency, Kirby Tire Recycling Facility Inc. Online Media Kit, http://www.epa.ohio.gov/pic/media/kirby_media2008.aspx, accessed 11 April 2014 • Ohio Environmental Protection Agency, *Fact Sheet – Kirby tire recycling Inc, Wyandot County*, April 2008, http://www.epa.ohio.gov/portals/47/media/Kirby_Factsheet_2008.pdf, accessed 11 April 2014
1999	Westley, California, US	$30,740,100 (2014)	7,000,000	Lightning strike	• United States Environmental Protection Agency, *Tire Fires* (webpage), last updated 20 August 2013, http://www.epa.gov/osw/conserve/materials/tires/fires.htm , accessed 11 April 2014 • Office of the State Fire Marshall (2004), *Rings of Fire revisited: Tire fire prevention and suppression*, State of California
2005	Watertown, Wisconsin, US	n/a	320,000	n/a	U.S. Department of Health and Human Services, *Watertown Tire Fire – Health Consultation* (11 April 2006), http://www.atsdr.cdc.gov/HAC/pha/WatertownTireFire/WatertownTireFireHC041106.pdf , Accessed 1 July 2014
2010	Mexborough , UK	n/a	120,000	n/a	*BBC News*, *Mexborough tyre fire residents spend second night away* (29 June 2010), http://www.bbc.co.uk/news/10430823 , Accessed 1 July 2014
2012	Iowa City, Iowa, US	$4,988,200 (2014)	1,300,000	n/a	• Brawner, Dan. *Living in Iowa; Iowa City's huge shredded tire fire is an environmental disaster and should be news*. The Sun, 8 June 2012, http://www.mvlsun.com/article.php?viewID=10298, Accessed 11 April 2014 • Hermiston, Lee. *After 15 days, landfill fire is extinguished*. Iowa City Press Citizen.

Note: * These costs are often a conservative estimate based on the cost to government to clean up and may not include all costs of inconvenience to communities or wider environmental costs such as the cost of detrimental impacts on ecosystems. Costs are inflated using Australian Bureau of Statistics 2014, *Consumer Price Index, Australia, Mar 2014*, Canberra. Costs have been converted using Reserve Bank of Australia, *Historical Exchange Rate Data*.

Appendix I: Proposed Regulations

Environment Protection (Scheduled Premises and Exemptions), (Industrial Waste Resource) and (Fees) Amendment Regulations

EXPOSURE DRAFT

TABLE OF PROVISIONS

STATUTORY RULES

EXPOSURE DRAFT

S.R. No.

Environment Protection Act 1970

Environment Protection (Scheduled Premises and Exemptions), (Industrial Waste Resource) and (Fees) Amendment Regulations

The Governor in Council makes the following Regulations:

Dated:

Responsible Minister:

RYAN SMITH
Minister for Environment and Climate Change

Clerk of the Executive Council

PART 1—PRELIMINARY

1 Objectives

The objectives of these Regulations are—

(a) to amend the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 to prescribe premises that store waste tyres as scheduled premises; and

(b) to make consequential amendments to the Environment Protection (Industrial Waste Resource) Regulations 2009; and

(c) to make consequential amendments to the Environment Protection (Fees) Regulations 2012.

2 Authorising provision

These Regulations are made under section 71 of the **Environment Protection Act 1970**.

3 Commencement

These Regulations come into operation on 29 April 2015.

PART 2—AMENDMENT OF THE ENVIRONMENT PROTECTION (SCHEDULED PREMISES AND EXEMPTIONS) REGULATIONS 2007

4 Definitions

(1) In regulation 5 of the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007[1], in the definition of ***volatile organic compound***, for "carbonate salts." **substitute** "carbonate salts;".

(2) In regulation 5 of the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 **insert** the following definitions—

"***EPU*** (equivalent passenger units), in relation to a type of tyre in column 1 of the Table in Schedule 3, tyre, means the corresponding value in column 2 of that Table;

waste tyres means whole rubber tyres which are considered waste for the purposes of the Act.".

5 Regulation 16 substituted

For regulation 16 of the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 **substitute**—

"**16 Transitional provision relating to premises used to store waste tyres**

(1) Subject to subregulation (2), section 20(1) of the Act does not apply to an occupier of premises of a type numbered A09 in column 1 of the Table in Schedule 1 until 29 October 2015.

(2) If an occupier of premises who is exempted under subregulation (1) applies for a licence under section 20 of the Act before

30 October 2015, that section does not apply to the occupier until—

(a) the Authority issues a licence to the occupier; or

(b) the Authority refuses to issue a licence to the occupier.".

6 Scheduled premises Table

In the Table in Schedule 1 to the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007, after the row commencing "A08 (Waste to energy)" **insert**—

"A09 (Waste tyre storage)	Storage of more than 40 tonnes or 5000 EPU of waste tyres at any time.	No	No

".

7 New Schedule 3 inserted

After Schedule 2 to the Environment Protection (Scheduled Premises and Exemptions) Regulations 2007 **insert**—

"**SCHEDULE 3**

Reg. 5

EPU VALUES TABLE

Column 1 *Type of tyre*	*Column 2* *EPU value*
Motorcycle	0·5
Passenger car	1
Light truck	2
Truck	5
Super single	10
Solid small (diameter ≤ 0·3m high)	3

Column 1 *Type of tyre*	*Column 2* *EPU value*
Solid medium (diameter >0·3m ≤ 0·45m)	5
Solid large (diameter >0·45 m ≤ 0·6m)	7
Solid extra large (diameter > 0·6m)	9
Tractor small (diameter ≤ 1m high)	15
Tractor large (diameter >1m ≤to 2m)	25
Fork lift small (diameter ≤ 0·3m high)	2
Fork lift medium (diameter >0·3m ≤ 0·45m)	4
Fork lift large (diameter >0·45m ≤ 0·6m)	6
Grader	15
Earth mover small (diameter ≤ 1m high)	20
Earth mover medium (diameter >1m ≤ 1·5m)	50
Earth mover large (diameter >1·5 ≤ 2m)	100
Earthmover extra large (diameter >2m ≤ 3·0m)	200
Earthmover giant (diameter >3 ≤ 4m)	400
Bobcat	2

".

PART 3—AMENDMENT OF THE ENVIRONMENT PROTECTION (INDUSTRIAL WASTE RESOURCE) REGULATIONS 2009

8 Industrial wastes

In Schedule 1 of the Environment Protection (Industrial Waste Resource) Regulations 2009[2], after "Timber" **insert** "Tyres".

PART 4—AMENDMENT OF THE ENVIRONMENT PROTECTION (FEES) REGULATIONS 2012

9 Base fee information

In the Table in Schedule 2 to the Environment Protection (Fees) Regulations 2012[3], after item 6 **insert**—

"6A.	A09 (Waste tyre storage)	Premises on which more than 40 tonnes or 5000 EPU of waste tyres are stored at any time.	210 fee units

".

Endnotes

ENDNOTES

[1] Reg. 4(1): S.R. No. 77/2007.

[2] Reg. 8: S.R. No. 77/2009.

[3] Reg. 9: S.R. No. 115/2012 as amended by S.R. No. 152/2009.