TyreStewardship AUSTRALIA

BEST PRACTICE GUIDELINES FOR TYRE STORAGE AND FIRE AND EMERGENCY PREPAREDNESS

MARCH 2019

CONTENTS

DISCLAIMER

This guideline has been developed to assist businesses understand the main regulations, requirements and best practice methods that apply to the storage of tyres in Australia. The guideline is intended to provide an easy-to-read summary of the key requirements that apply to the storage of tyres nationally, and can be used to identify regulations that may apply to you, your duties and areas where you can improve compliance.

Although the guideline has been written to help businesses understand the relevant legislative and regulatory requirements, it is not a legal document nor a substitute for the regulations. It should not be viewed as a definitive guide to the law; the guideline does not cover every requirement relevant to businesses involved in tyre storage, and should not be used as your only source of information on environmental or fire and emergency regulations. Where there is variation between this guideline and any regulation then the applicable regulation overrides this guideline.

Importantly, the guideline is not intended to replace proper occupational training, which is a requirement under Workplace Health and Safety (WHS)/Occupational Health and Safety (OHS) laws.

Whilst every effort has been made to ensure the accuracy of the information presented in this guideline, the advice presented may not apply in every circumstance. Accordingly, Tyre Stewardship Australia (TSA) cannot be held responsible, and extends no warranties as to:

- the suitability of the information for any particular purpose; and
- actions taken by third parties as a result of information contained in this guide.

If you need help with any of the contents of this guideline or have additional questions, refer to the list of contacts and resources provided in section 7 of this guideline.

ACKNOWLEDGEMENTS

In order to harness existing knowledge and ensure that these guidelines are in line with the expectations of key stakeholders, this guideline was developed in consultation with a range of government and industry stakeholders; background research conducted as part of this project included two workshops and a number of one-on-one consultations with industry representatives (tyre recyclers and collectors), state-based environmental regulators and state-based fire and emergency services (FES) departments. The authors and Tyre Stewardship Australia (TSA) gratefully acknowledge the support and contributions to this guideline from all those who participated in the consultation for this project.

ABOUT THE NATIONAL TYRE PRODUCT STEWARDSHIP SCHEME

The National Tyre Product Stewardship Scheme ('the Scheme') is a voluntary scheme aimed at improving the management of end-of-life tyres in Australia. Its objective is to:

- Increase resource recovery and recycling and minimise the environmental, health and safety impacts of all end-of-life tyres generated in Australia.
- Develop Australia's tyre recycling industry and markets for tyre derived products.

Tyre Stewardship Australia (TSA), is a not-for-profit company established to administer the Scheme. It is funded by tyre importers at a rate proportional to the number of tyres they import into Australia.

Participants in the Scheme commit to play their part in ensuring end-of-life tyres are disposed of in a way that represents environmentally sound use.

There are a number of categories of Participants in the Scheme:

- Tyre importers and vehicle importers and manufacturers
- Retailers
- Fleet operators
- Local governments
- Collectors
- Recyclers
- Miners.

Businesses and organisations apply to become Participants in the Scheme. On becoming Participants, they are required to meet the commitments that are relevant to them. These commitments are set out in the Tyre Product Stewardship Scheme Guidelines.

PARTICIPANT COMMITMENTS

In order to participate in the scheme accredited participants commit to contribute to:

- the environmentally sound use of end-of-life tyres;
- elimination of the inappropriate export of baled tyres from Australia;
- elimination of the illegal dumping of end-of-life tyres;
- elimination of disposal of end-of-life tyres to landfill (except where no viable alternative is available and subject to state and territory legislation; for example, in rural and remote areas where appropriate recycling facilities are not available, or transportation costs are prohibitive).

ABBREVIATIONS

ABBREVIATION	DESCRIPTION
ACTRFS	ACT Rural Fire Service
AS	Australian Standard
BCA	Building Code of Australia
BPA	Bushfire Prone Area
CCTV	Closed-Circuit Television
CFA	Victorian Country Fire Authority
CFS	South Australian Country Fire Service
DFES	Western Australian Department of Fire and Emergency Services
EPA	Environment Protection Authority
EPL	Environment Protection Licence
ERA	Environmentally Relevant Activity
EPU	Equivalent Passenger Unit
ESA	ACT Emergency Services Agency
FRNSW	Fire and Rescue NSW
MFB	Victorian Metropolitan Fire Brigade
MFS	South Australian Metropolitan Fire Service
NCC	National Construction Code
NEPM	National Environmental Protection Measure
NSW RFS	New South Wales Rural Fire Service
NTFRS	Northern Territory Fire and Rescue Service
OHS	Occupational Health and Safety
PAH	Polycyclic Aromatic Hydrocarbons
PPE	Personal Protective Equipment
QFES	Queensland Fire and Emergency Services

ABBREVIATION	DESCRIPTION
RFSQ	Rural Fire Service Queensland
SCBA	Self-Contained Breathing Apparatus
SOP	Safe Operating Procedures
TFS	Tasmania Fire Service
TSA	Tyre Stewardship Australia
TPSS	Tyre Product Stewardship Scheme
UNEP	United Nations Environment Programme
WHS	Workplace Health and Safety

GLOSSARY

TERM	DEFINITION
Access	In the context of this guideline, access refers to provision of space for safe entry point or a way in for emergency vehicles and staff.
Best practice	Best practice represents the current ‘state-of-the-art’; methods or procedures which have consistently shown results superior to other methods. An important aspect of best practice is continuous improvement, as best practice can change and evolve over time, for instance when there are improvements or advances in technology.
Buffer zone	An area of land designated for protection of the environment or surrounding receptors, for instance to protect surrounding residences and businesses from impacts from industrial processes e.g. dust and noise.
Bunding	A constructed retaining wall made from impervious material designed to retain liquid to prevent the escape of potentially polluting substances from that area.

TERM	DEFINITION
Egress	In the context of this guideline, egress refers the provision of space for safe exit for emergency vehicles and staff from a facility.
End-of-life tyres	A tyre that is deemed no longer capable of performing the function for which it was originally made.
Environmentally sound use	The Tyre Product Stewardship Scheme defines environmentally sound use as follows: i. recycling into tyre crumb, shred, chips, granules, steel and other tyre components; ii. use as a fuel (other than direct incineration without effective energy recovery and unsustainable burning for energy recovery) or other means to generate energy; iii. production of tyre derived products, including tyre derived fuel; iv. civil engineering.
Fire and emergency preparedness	The process of planning, preparing and controlling risks for potential fire and emergencies.
Fire risk assessment	A process for: i. Determining all possible fire hazards and scenarios at the site, the likelihood that they will cause a fire and severity of the potential fire; ii. Determining all possible controls which can be implemented to control the identified fire hazards and scenarios; iii. Mitigating fire risks through the identified control measures and by ensuring that all necessary fire safety and emergency equipment is installed.
Hardstand	A paved or stabilized area designed for storage of material or parking for heavy vehicles.

TERM	DEFINITION
Mutual aid	In the context of emergency response, mutual aid is an agreement to lend assistance across property boundaries. For instance, this may occur due to an emergency requiring additional resources, such as a tyre fire at a facility, which may require assistance from neighbouring properties in addition to emergency services.
Reticulated supply	Town water supply or piped water network.
Stockpile	In the context of this guideline, legitimate stockpiling is the bulk storage of tyres on private land, with the permission of the landowner, in compliance with the relevant state or local government regulations and requirements, generally with plans to process those tyres or transfer to another place for environmentally sound use.
Tyre storage	In the context of this guideline, tyre storage refers to the temporary stockpiling or accumulation of tyres prior to processing, or transfer to another place for further processing or some other environmentally sound use. Long-term or indefinite stockpiling of tyres is not supported by TSA.
Work Health and Safety (WHS)	In the context of this guideline, this refers to the WHS framework in Australia, which generally requires businesses to ensure that they provide a safe work place. For tyre storage, this relates to ensuring that all requirements are met so that the health and safety of all stakeholders in the workplace are protected from the exposure to potential hazards and risks resulting from tyre storage activities.

INTRODUCTION 1

The Best Practice Guidelines on Tyre Storage and Fire and Emergency Preparedness (hereafter referred to as the Tyre Storage Guidelines) have been developed to provide tyre collectors and recyclers with a roadmap to comply with the regulations and requirements relevant to tyre storage and move towards best practice methods for storage and fire and emergency preparation.

The guideline presents the Essential Requirements which have been deemed to comply with regulatory requirements across each relevant Australian jurisdiction, however implementation of these Essential Requirements should be undertaken with reference to the regulations and guidelines applicable to your state or territory (see Section 7 for a list of resources). The guideline also presents best practice methods to help businesses reduce risks and be best prepared for fire/emergencies, as far as practicable.

This guideline focusses mainly on the needs of tyre collectors and recyclers, as these businesses tend to store greater quantities of tyres and hence carry more risk; however, the guideline may be used by any business which stores a significant number of tyres on a temporary basis. Whilst the long term storage of end-of-life tyres is not supported by TSA, these Guidelines will have application for those organisations that may be managing or monitoring legacy stockpile sites.

This guideline will help you to:

- Understand Essential Requirements for complying with State or Territory regulations relevant to tyre storage
- Understand environmental and OHS risks associated with tyre storage and best practice mitigation measures
- Understand how to plan, design and operate facilities which incorporate best practice tyre storage, fire and emergency preparation

1.1 CONTEXT

Australia suffers from a legacy of stockpiles of end-of-life tyres that have resulted from the actions of unscrupulous operators and a number of other factors including constrained local markets and highly volatile international markets. These stockpiles have exposed whole communities to risks associated with fire and vermin through the use of inappropriate storage arrangements.

A range of hazards and risks are associated with tyre stockpiles, which increase in likelihood and impact with increasing storage quantities. The risk associated with large stockpiles are such that most Australian jurisdictions have imposed strict limits on the quantity of tyres stored and the manner in which they must be stored at a facility.

Furthermore, when those risks are realised, for example through a major tyre fire, the image and reputation of the entire tyre recycling industry can be adversely affected. Since early 2015, there have been at least three major incidents: two fires in Victoria and one in Queensland, which have brought the issue to the attention of the Australian media and community.

Tyre Stewardship Australia (TSA) does not support long-term or indefinite stockpiling of tyres, however it recognises that temporary storage is a necessary and often unavoidable step in the environmentally sound use of end-of-life tyres. To support industry to reduce the risks associated with tyre storage, TSA engaged Arcadis to develop the Best Practice Guidelines on Tyre Storage and Fire and Emergency Preparedness (Tyre Storage Guidelines). The development and use of the Tyre Storage Guidelines will help tyre collectors, recyclers and other businesses involved in tyre storage activities to significantly reduce the environmental and occupational health and safety (OHS) risks associated with the management end-of-life tyres. It is anticipated that uptake of the guideline by industry will help to lower the risk across industry.

1.2 BENEFITS OF IMPLEMENTING BEST PRACTICE

Aside from managing and reducing the risk of fire at your facility, there are a number of additional benefits to implementing best practice tyre storage, fire and emergency preparation, including:

- Changes made to reduce your fire risk can help to reduce your insurance premiums
- Improve your workplace environment
- Lower your risk of liability (e.g. for pollution, non-compliance)
- Improve your relationship with neighbours and other stakeholders
- Assist with long term regulatory compliance

1.3 GUIDELINE STRUCTURE

The guideline is structured around seven key steps to achieving and maintaining best practice tyre storage and fire and emergency preparedness. There are seven sections to the guideline, as shown in the flowchart below. Each section includes a discussion of the essential requirements, and guidance on best practice methods and procedures.

Best practice represents the current ‘up-to-date’, methods or procedures which have consistently shown results superior to other methods. It is recognised that best practice can change and evolve over time, for instance when there are improvements or advances in technology. The methods presented in this guideline are considered best practice at the time of writing.

1. INTRODUCTION
What is this guideline about, why should you read it, how it is structured.

2. UNDERSTANDING TYRE FIRES AND TYRE STORAGE REGULATIONS
The nature and behaviour of tyre fires, key fire risks at tyre storage facilities and methods for reducing risks. Overview of relevant regulations (see also Appendix A).

3. FACILITY LAYOUT INCLUDING STACKING/ STOCKPILE ARRANGEMENTS
Planning your tyre facility for best practice tyre storage, site selection and layout, site security, water access requirements, stacking and stockpile. Separate guidance for internal/ external storage is provided.

4. FIRE & EMERGENCY PREPARATION
How to develop a best practice fire and emergency plan, conduct a fire risk assessment, develop site management plans and procedures and implement ignition source controls. How to engage with local fire services and provide best practice training for staff including first response firefighting.

5. FIRE SAFETY & EMERGENCY EQUIPMENT
Guidance on the fire safety and emergency equipment that should be provided at tyre storage facilities. Separate guidance for internal/ external storage is provided.

6. FACILITY MANAGEMENT
Once all plans and procedures are in place, how to implement them into facility operations.

7. CONTACTS AND RESOURCES
Contacts and resources for further information.

An important aspect of best practice is incorporating continuous improvement into operations and procedures; that is, taking steps to regularly improve management methods. It is recommended that operators follow this approach to move toward best practice tyre storage and fire and emergency preparedness and ensure that improvements continue into the future.

UNDERSTANDING TYRE FIRES AND TYRE STORAGE REGULATIONS

2

2.1 OVERVIEW OF TYRE FIRES

Although not easy to set alight, the nature and composition of tyres mean that once alight, tyre fires burn strongly, hot and fast and are extremely difficult to control. Since tyres are designed to absorb the heat generated by friction with the road, they are not easy to ignite, however, they retain heat well and are composed of highly combustible materials – which means that, once alight, they produce very high heat, which is further conducted by the high carbon content and steel reinforcement. This ability to absorb heat makes it very difficult to extinguish tyre fires and they can burn for months, generating smoke, oil and leaching toxic contaminants that affect the soil, waterways and air.

Due to the shape of tyres, tyre piles contain many gaps, spaces and air pockets which enable a continued supply of oxygen to fuel a tyre fire. Tyre piles are difficult for firefighters to penetrate with water or foam; since tyres are designed to repel water, and their hollow 'doughnut' shape traps oxygen and can form a barrier to firefighting water. This means that most traditional firefighting agents including water and foam are less effective against a tyre fire.

The way that tyres are stored can produce further complications, as the tyre pile continues to burn the shape of the pile can change, as tyres burn down and compress, and flaming tyres can roll off the pile spreading the fire to other piles or surrounding infrastructure. This creates an ideal fire that burns extremely hot and fast in a manner that is difficult to predict and fight.

While they are inert and not hazardous in their original form, tyres contain a number of hazardous chemicals including oil, benzene, toluene and sulphur. This means that when burnt, tyre fires present significant risks to human health and the environment, producing large volumes of thick and toxic smoke. Eventually, tyres burn down to an oil (sometimes called pyrolytic oil) which can pollute waterways and surrounding land. Water used in firefighting operations also becomes contaminated, with runoff commonly seeping into groundwater and surface water, presenting a serious risk to the surrounding environment.

Tyre fires are commonly caused by arson or resulting from ignition in on-site machinery, or from bush or grass fires in rural areas. Some of the key factors that influence and increase the risk and impact of tyre fires are:

- How facilities on-site machinery are managed and operated
- The size of tyre stockpiles
- Where and how long tyres are stored
- How tyres are stacked, the amount of exposed surface area and air pockets within stockpiles

For these reasons, methods for reducing the fire risk associated with tyre storage must focus on:

- Effective fire prevention and site procedures to minimise the risk of fire occurring
- Limiting the size of tyre stockpiles as far as is practicable
- Maintaining adequate clearance between stockpiles and other infrastructure
- Configuring stockpiles in a way that ensures access for firefighting and maximises its effectiveness
- Protection of human health and the environment in the event of a fire.

2.2 REGULATORY OVERVIEW

While interstate transport of tyres is regulated under the National Environmental Protection (Movement of Controlled Waste between States and Territories) Measure 2004 (Controlled Waste NEPM), there is no federal control over the storage of tyres. However, where tyres are stored internally, buildings must be constructed in compliance with Volume 1 of the National Construction Code (NCC), Building Code of Australia (BCA) (refer to Section 7 for details on where to find this document). In addition, Australian businesses have obligations under the harmonised Work Health and Safety (WHS) framework in Australia, which requires businesses to ensure that they provide a safe work place.

Tyre storage in Australia is generally regulated at a state-level; an overview of the relevant legislation for storage of waste tyres by jurisdiction is presented in Appendix A. In addition, participants in the national Tyre Product Stewardship Scheme are required to meet the commitments of the Scheme guidelines to ensure environmentally sound management of end-of-life tyres.

ESSENTIAL REQUIREMENTS

A comprehensive review and comparison of the requirements in each jurisdiction was undertaken as part of the background research for development of this guideline and, where possible, essential requirements for tyre storage and fire risk management have been identified which are considered to be applicable to most Australian jurisdictions. These are included in boxes like this throughout the guideline. Furthermore, a checklist which provides an overview of all essential requirements has been provided in Appendix B.

This guideline does not seek to replace legislation or regulations. The regulations and guidelines relevant to your state or territory should be considered in conjunction with this guideline.

FACILITY LAYOUT 3

The prevention of a fire is the primary defence for any facility where tyres are temporarily stored, and therefore the layout of the facility is crucial. The best fire and emergency preparation involves engaging with your local fire authority, both at the outset and throughout continuing operations) and collaborating with all relevant authorities and incorporating all possible fire prevention methods into the layout and design of your facility. This section details the essential requirements and best practice layout of tyre storage facilities, both for internal and external storage of tyres.

3.1 COMMON REQUIREMENTS FOR BOTH INTERNAL AND EXTERNAL STORAGE

3.1.1 PLANNING YOUR FACILITY

Whether designing a new facility, or upgrading an existing site, it is important to liaise with all relevant authorities to ensure that your facility meets the requirements of all parties. These include:

- The local planning authority (usually the local council)
- The environmental regulator in your state or territory (e.g. Environment Protection Authority)
- The workplace safety regulator in your state or territory (e.g. WorkSafe)
- The relevant State/Territory fire service.

Best practice is to plan, design or upgrade your facility in close collaboration with the relevant authorities and especially the local fire authority, to ensure that all relevant requirements are met and where possible exceeded and the risk of fire at your facility is minimised as far as practicable.

Site selection

When selecting a site for tyre collection or processing activities, there are a number of factors which should be considered in order to minimise the risk of fire, and impacts to the environment and human health. The location and size of a facility where tyres are stored should consider:

- Site area/size, and whether the site is large enough to accommodate facility infrastructure, and allow access for firefighting vehicles in the event of an incident (see Section 3.3.2) and whether the building can provide adequate tyre storage area. Best practice is to allow for future expansion of your facility.

- Zoning of the site – development of facilities in a Bushfire Prone Area (BPA) should be avoided (note that there are additional requirements under Volume 1 of the NCC for buildings located in a Bushfire Prone Area)
- The quantity of tyres that will need to be stored and whether required separation distances and safe egress or pathways can be maintained (see Section 3.2.3)
- Sensitive receptors within the surrounding area i.e. avoid situating your site within 500m of schools, residences, water bodies, major transportation routes and other sensitive receptors.
- Provision of adequate buffer zones from neighbouring sites.
- Access to utilities, in particular water for firefighting purposes (see Section 5.1.2)
- Condition of adjacent roads and access points and whether these can accommodate emergency services vehicles (see Section 3.2.1).

Best practice site selection would include consideration of smoke plume (smoke column) behaviours, as the prevailing winds and their direction, and where any smoke produced during a fire at the facility would travel should influence where a site is ideally situated. For instance, if it is determined that the prevailing winds would carry the smoke plume from a fire directly across a major transport route, or onto a sensitive receptor like a school or hospital, then it would not be wise to place your site at that location.

3.1.1 ESSENTIAL REQUIREMENTS

Site selection for storage of tyres should include consideration of the following:

- impermeable soil, or addition of sealed surface
- site should be situated away from surface watercourses
- where tyres are stored outside, proximity to infrastructure and ensure site is large enough to account for separation distances and allow for future expansion
- flat, level ground where possible.

Please note:
It is recognised that some of the measures recommended in the guideline may not be immediately achievable by some existing and smaller sites. It is recommended that all sites strive for best practice via continuous improvement, which can be approached via your TSA Action Plan

Building Design and Upgrade

Buildings need to be designed and constructed in compliance with Volume 1 of the NCC. Part E of Volume 1 of the NCC lists requirements and specifications for firefighting equipment and smoke hazard management and, along with other requirements. Tyre storage facilities are a special hazard requiring Clause E1.10 and E2.3 to be considered. An appropriately qualified engineer should be engaged to design or upgrade the building and incorporate all fire protection systems required under the Code. Further detail on building requirements where tyres are stored inside are summarised in Section 3.2 and see Section 5 for further details on fire and emergency equipment.

3.1.1 ESSENTIAL REQUIREMENTS

Tyre storage facilities should comply specifically with Clause E1.10 and E2.3, Part E of Volume 1 of the NCC.

3.1.2 SECURITY AND MONITORING

Since many tyre fires are caused by arson, it is important to implement suitable security arrangements, to prevent unauthorised access to your facility. At a minimum, all access points should have security locks, which should be checked regularly to ensure they are in good condition. Glass panels and windows should be minimised near entry points as these present a weak point through which intruders might gain entry. Additional security measures such as heavy duty security gates, alarms and CCTV cameras are strongly recommended to prevent arson attempts.

In addition, early fire warning detection systems can also be installed to alert maintenance staff and management, and provide sufficient time to contact emergency services and deploy on-site firefighting equipment. This may include incorporation of thermal imaging or smoke detectors at potential ignition sources.

External Storage

When tyres are stored outside, site security is even more important to preventing arson attempts, particularly after hours. The essential requirements listed above meet the requirements of most Australian States and territories, and the following best practice methods are recommended:

- Install intruder controls, such as cyclone wire, at the top of security fences.
- Check security fences and access points regularly to ensure they are in good condition.
- Minimise glass panels and windows near entry points as these present a weak point through which intruders might gain entry.

- Implement additional security measures such as heavy duty security gates, alarms and CCTV cameras.
- Implement a secure access card system to areas where tyres are stored and appoint a qualified security guard to be on site during opening hours (or a staff member that is trained and allocated this responsibility).
- Implement after hours security, such as alarms, CCTV cameras monitored by an external security monitoring company.

3.1.2 ESSENTIAL REQUIREMENTS

Site security should include full enclosure of the site with fence or wall (non-combustible materials) of adequate height to prevent unauthorised access.

3.1.3 WATER ACCESS AND CONTAINMENT

Operators should assess water access at the site and ensure that sufficient water supply is available in the event of a fire. This can be undertaken at the design stage for new sites, while existing sites may implement this as part of your TSA Action Plan.

See Section 5.1.2 for further details on water access and containment

3.1.3 ESSENTIAL REQUIREMENTS

Facilities should refer to both AS2419.1 (Fire hydrant installations) and AS2118.1 (Automatic fire sprinkler systems) for determining water supply requirements.

3.1.4 SITE SPECIFIC RISK ASSESSMENT

It is a requirement in some states (including Victoria and NSW) that a site-specific fire risk assessment or fire safety study be conducted at all sites storing tyres. No one site is the same, and tyre storage facilities vary significantly in the quantity and method of storage, so regardless of your site's location it is considered best practice to conduct a fire risk assessment or fire safety study. The aim of the fire risk assessment is to determine all fire hazards, the likelihood and consequence of these, and appropriate mitigation measures, resources and equipment that should be provided at the site.

Refer to Section 4.3 for further information on how to complete a risk assessment.

3.1.4 ESSENTIAL REQUIREMENTS

All sites storing tyres, regardless of volume or size, should undertake a site-specific fire risk assessment or fire safety study.

3.2 INTERNAL STORAGE

This section provides the minimum and best practice methods for a facility layout where tyres will be stored inside a building.

3.2.1 SITE LAYOUT AND DESIGN

Operators should refer to Part E of Volume 1 of the NCC and the relevant standards when designing their facility to determine fire protection system requirements including fire hydrants, sprinkler systems, smoke hazard management systems and water supply and containment requirements (see Section 5.2). When considering the number of tyres which will be stored at your facility it may be worth considering Clause E1.10 of Volume 1 of the NCC, as storage in excess of certain quantities may trigger additional fire sprinkler requirements. These are determined by the relevant fire authority. based on an assessment of the likely fire scenarios and appropriate risk control measures implemented. Provision of sprinkler systems can be costly, and may not be feasible depending on your circumstances (for instance, where property is under a short-term lease arrangement). If tyre storage requirements can be kept under these limits this may avoid the need for sprinkler systems, although it is noted that some states may require this under state-specific regulations or guidelines, even if the stored volume of tyres is less than the threshold defined for combustible goods.

3.2.1 ESSENTIAL REQUIREMENTS

Site entry points should have at least 4m clearance with access roads designed for large emergency vehicles and their weight limits. Large facilities should have at least 2 separate access points.

You should ensure that site access points, including gates and road surfaces are large enough to allow access for emergency vehicles. See Section 3.3.2 for further detail on this.

Best practice is to determine site layout requirements and fire protection systems based on a site-specific fire risk assessment (see Section 4.3).

3.2.1 ESSENTIAL REQUIREMENTS

Where tyres are stored internally, operators should ensure that they are in compliance with the standards set out in the NCC, Volume 1, especially fire protection systems which are pursuant to Clause E1.10 and E2.3.

3.2.2 STACKING/STOCKPILE ARRANGEMENTS

You should ensure that the storage areas are adequate to allow the required stockpile sizes, and associated separation distances or clearances, either at the design stage or by re-configuring your existing site (see Section 3.2.3 below). Importantly, there should never be any obstruction of fire equipment systems as this will impede their use. The preferred method for indoor storage is barrel stacking.

Best practice examples for tyre storage systems (i.e. pallet systems, portable racks) for indoor, are illustrated in the National Fire Protection Association NFPA 231D Standard for storage or rubber tyres.

Refer to Section 3.3.3 for a comparison of the advantages and disadvantages of each of the stacking options for tyres.

3.2.2 ESSENTIAL REQUIREMENTS

Where tyres are stored internally, at a minimum the following is required:

- Portable storage systems that can be easily moved by forklift
- Horizontal systems using pallets or shelving racks for heights exceeding 1.5m
- No obstruction of fire equipment and storage.

3.2.3 STOCKPILE SIZE, DIMENSIONS AND CONFIGURATIONS

Tyres should be stored in accordance with the essential requirements in your State or Territory, the stockpile configurations listed on p. 25 meet the requirements of most Australian States and Territories. Best practice is to minimise the size of tyre stacks and storage quantities as far as practicable. The site layout diagrams shown in Figure 1 on p. 26 demonstrate the clearance distances which should be maintained when tyres are stored inside.

3.2.3 ESSENTIAL REQUIREMENTS

Tyre stacks within a building should not exceed 3.7m in height or 30m^2 in area. The following boundary perimeters are required (refer to Figure 1 overleaf):

- Building without sprinklers – minimum of 3m between stacks and building structures
- Building with sprinklers – minimum of 2m between stacks and 1.5m between stacks and building structures.

A minimum clearance of 1m should be maintained along paths of travel to exits or firefighting equipment access and stored tyres must be 1m clear of roof or any structures attached to the roof.

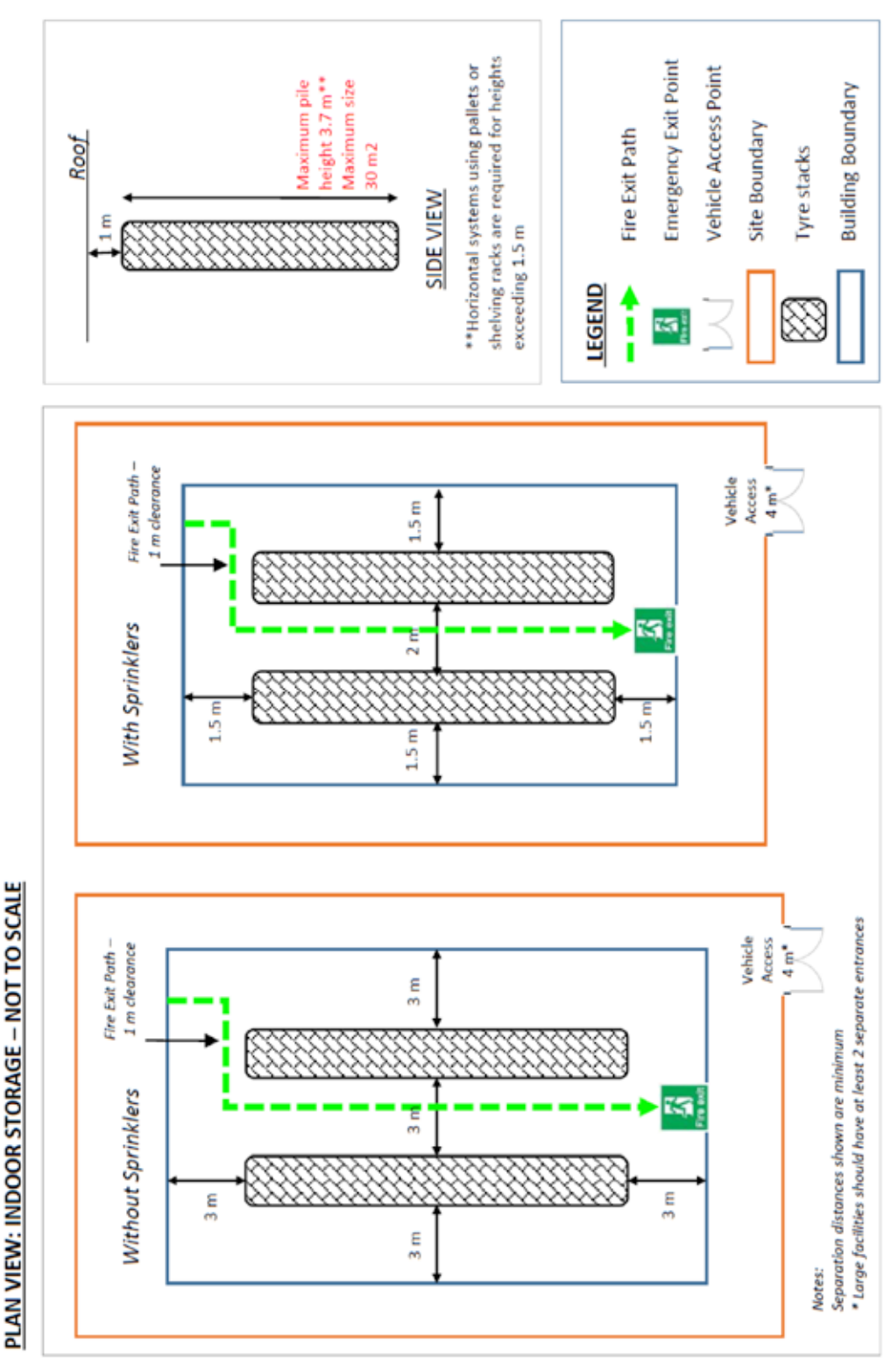

Figure 1 Stockpile configurations and clearance distances for indoor storage of tyres[1]

1 This diagram is indicative and alternative layouts may be deemed to be best practice in particular jurisdictions – check with your local authorities and regulations.

3.3 EXTERNAL STORAGE

This section provides the essential requirements and best practice methods for facility layout for storage of tyres outside.

3.3.1 SITE LAYOUT AND DESIGN

When tyres are stored externally, one of the key considerations is the quantity of tyres that will need to be stored at any one time, how these will be stored and ensuring adequate storage space at the site. If tyres are to be stored in stockpiles, there are restrictions on pile sizes, how these are configured and separation distances from other piles, infrastructure and boundaries (which are required by regulators in most Australian jurisdictions). These restrictions have been based on previous research and knowledge of how tyres burn and examination of optimal arrangements which allow firefighters best access to fight a fire.

While the preferred method for outdoor storage is laced stacking, it is important to consider the following when considering your site's layout regardless of the arrangement:

- The quantity of tyres expected to be stored under normal operating conditions
- Provision of adequate storage space to meet the required stockpile/stacking arrangements (refer to Section 3.3.3)
- Control of runoff water in the event of a fire or incident, and whether adequate containment can be provided on the site (see Section 5.1.3)
- Neighbouring sites/surroundings and their potential as ignition sources (i.e. if located adjacent to an industrial facility, tyres should not be stored on the boundary shared with that facility)
- Sealing surfaces at sites with permeable soils (permeable soils such as sand and gravel)
- Provision of hardstand designed for emergency vehicle weight limits

Best practice is to determine site layout requirements and fire protection systems based on a site-specific fire risk assessment (see Section 4.3).

Questions to ask when designing site layout:

- How many stockpiles will there be?
- How much storage area is needed to maintain adequate separation distances between the piles, site infrastructure and site boundaries?

3.3.2 SITE/FIRE ACCESS

You should ensure that site access points, including gates and road surfaces are large enough to allow access for emergency vehicles, the essential requirements noted in the box below meet the requirements of most Australian States and Territories. Best practice methods include:

- Ensure that access points are provided on opposite ends of the site, ideally either side of the likely path of a potential smoke plume.
- Incorporate a rapid entry feature to access points to allow quick access for emergency services.
- Ensure adequate hardstand areas are provided at the site, to prevent emergency vehicles becoming bogged and unable to access the site to fight a fire.
- Ensure vegetation within close proximity is managed on a regular basis.
- Consider the prevailing winds and potential direction of a smoke plume in the event of a fire when designing access points, given that this may impede emergency services from accessing the site.

3.3.2 ESSENTIAL REQUIREMENTS

Site entry points should have at least 4m clearance with access roads designed for large emergency vehicles and their weight limits. Large facilities should have at least 2 separate access points.

3.3.3 STACKING/STOCKPILE ARRANGEMENTS

The various stacking options for tyres and commentary on associated fire risks are detailed in the table on p. 29 and 30. The preferred method for indoor storage is barrel stacking and laced stacking for outdoor situations.

3.3.3 ESSENTIAL REQUIREMENTS

Tyres should not be stacked on their treads unless there is some means of containing/constraining the stacks.

METHOD	DESCRIPTION	ADVANTAGES	DISADVANTAGES	COMMENTS
	Barrel stacking Whole tyres are stacked on their side, on top of each other in a uniform fashion. This method is typically used for indoor storage on movable pallets or trolleys, or where tyres may be sold for re-use.	A fire in a barrel stack will reportedly burn with a whirlpool effect sending flames straight up in the air, which may reduce the speed of the fire spreading laterally (State of California, 2004).	Tyres can be unstable and can fall off when moving racks or pallets.	This method is recommended for indoor (applicable for outdoor as well) storage and where pallets or trolleys are available.
	Laced stacking Whole tyres are stacked overlapping to create a woven or laced arrangement.	Laced stacking minimises the amount of space needed for storage, and also minimises the amount of surface area exposed in a fire. Tyres are also more stable as they are interlocked in a laced pattern.	This method most effective for stacking tyres of the same size. Stacking takes more time because tyres need to be arranged in a laced pattern.	This is the preferred method of storage in **outdoor** situations.
	Shredded or processed tyres Shredding or crumbing tyres reduces the volume of space required for storage.	Reduces storage space and reduces risks associated with water collecting in tyres providing a breeding ground for mosquitos and other vermin. Fires in piles of shredded tyres are reportedly less intense and produce less smoke, since shredded piles tend to burn at the surface (IWMB, 2002).	Shredding and crumbing is costly.	It is preferable to process tyres as soon as practicable to reduce fire risks.

METHOD	DESCRIPTION	ADVANTAGES	DISADVANTAGES	COMMENTS
	Tread up Stacking Whole tyres are stacked on their treads.	It is easy to access and move tyres that are stacked on their treads, and it is easier to organise tyres of different sizes.	In the event of a fire tyres can easily roll away and spread fire to nearby stockpiles or infrastructure.	Tyres should not be stacked on their treads unless there is some means of containing/ constraining the stacks, given the containment/ constraint is fire resistant.
	Baling Whole tyres are compressed into a 'bale' and secured (usually with steel wire) in preparation for storage, transport or export.	Baling minimises the amount of storage space and tyres are effectively restrained in the bale.	Research has indicated that even after 6 months' compression, baled tyres will spring back to original shape when released. In a fire the steel wires are broken under high temperatures and the quick release of pressure draws oxygen and fire into the interior of tyres as they return to their shape, which can further fuel a fire. (IWMB, 2002).	This method may be used for transport and export however it should not be used for long term storage.
	Random stacking Whole tyres are tossed randomly into a pile.	This method requires less effort as tyres can be stacked quickly without considering where best they should be placed.	This method takes up the most storage space. Due to the random placement of tyres more tyre surface area is exposed and greater amount of air between tyres, which will further fuel and accelerate a fire should one occur.	This method of stacking is not compliant in most Australian jurisdictions and is not in keeping with best practices. This method should not to be used.

Tyres should be stored in accordance with the essential requirements in your state or territory, the stockpile configurations listed on p. 32 meet the requirements of most Australian States and territories. The site layout diagrams shown in Figure 1 on p. 16 demonstrate the clearance distances which should be maintained when tyres are stored inside. It is important that operators ensure that storage areas are large enough to comply with stockpile size restrictions and separation distances (refer to Section 3.3.4 for further guidance on calculating storage space).

Because of the risk of contaminating the surrounding environment in the event of a fire, tyres should be stored on a sealed surface (e.g. concrete), with provisions for containing any runoff or oil generated during firefighting (as detailed in Section 5.1.3).

The following best practice measures are recommended:

- Minimise the size of tyre stacks and storage quantities as far as practical. As a guide it is considered that all tyres should be processed or transferred within 30 days, unless there are extenuating circumstances preventing this.
- Provision of hardstand for storage areas.
- Provision of equipment which can quickly separate and move tyres in the event of an incident (see Section 4.2).
- Ensure adequate clearance between the stockpiles to allow for 2 or more trucks to access the tyre storage area in the event of a fire.

One method of storing tyres includes storage in a pit or contained area, which can be filled with water to submerge and extinguish a fire. While this has been reported to be a successful method of fire prevention (IWMB, 2002), this method may not be supported by some state regulators. Any water used in this method would likely be contaminated and therefore require testing and potential disposal as hazardous liquid waste. Contact your local environmental regulator before implementing this at your site.

3.3.3 ESSENTIAL REQUIREMENTS

Acceptable tyre storage configurations/stacking (refer to Figure 2 on p. 34):

For outdoor storage, tyres should be stored on their sides or laced, with tyres stacked overlapping to create a woven arrangement, unless they are restrained by some means e.g. metal cages or portable systems.

Tyres should not be stacked on their treads unless they are contained by some means.

Unless your licence or local regulator prescribe different requirements, tyre stockpiles should:

- not exceed 3m in height due to potential for instability
- be no more than 6m wide and 20m in length (arrangement in long 'thin' piles will assist firefighting operations)
- Alternatively, the total volume of tyres contained in a pile should not exceed 360m^3.

Aisles between tyre stockpiles should remain clear from all combustible material and allow for fire fighter access. Appropriate separation distances should be determined based on the size of the pile, a minimum separation distance of 20m is recommended between each tyre stockpile.

Differing requirements exist for NSW sites, refer to the NSW guidelines for further detail (see Section 7).

3.3.4 CALCULATING TYRE STORAGE SPACE

For outdoor storage, the following calculations may assist in determining the amount of space needed to store tyres at your facility.

Max. tyre pile size =	6m x 20m = 120m^2
Incl. separation distance (20m) =	46m x 60m = 2760m^2 per pile
Incl. max. height (3m)	6m x 20m x 3m = 360m^3
Tyres[2] per m^3 =	12 EPUs per m^3
Max tyres per stockpile	4,320 EPUs

This means that you should allow about 2760m^2 storage area (including buffer zones) per stockpile or 4,320 EPUs stored. This area may be reduced depending on how the piles are configured – drawing up a site plan will help to determine the number of tyres which can be stored at your site. Operators are encouraged to seek advice from the local fire and emergency services and/or a specialist consultant in determining the amount of space needed.

3.3.4 ESSENTIAL REQUIREMENTS

The following separation distances are recommended (refer to Figure 2 on p. 34):

- Non-combustible boundaries – at least 6m from perimeter
- Combustible boundaries or public roads – at least 20m from perimeter if the stockpile's long sides face the boundary and 12m from perimeter if the stockpile's narrow ends are facing the boundaries.
- If the building is protected with automatic fire sprinkler system that meets the AS2118.1 standards, this distance may be reduced to 10m.

2 EPUs per metre is based on a maximum tyre pile of 3m, whole passenger/ light truck tyres, laced stacking, stored less than 15 years. This number has been converted to metric/ EPUs from information published by Cal Recycle (2015) on determining the number of tyres in stockpiles. See the following link for further information: http://www.calrecycle.ca.gov/tires/enforcement/inspections/NumberTires.htm#Volume

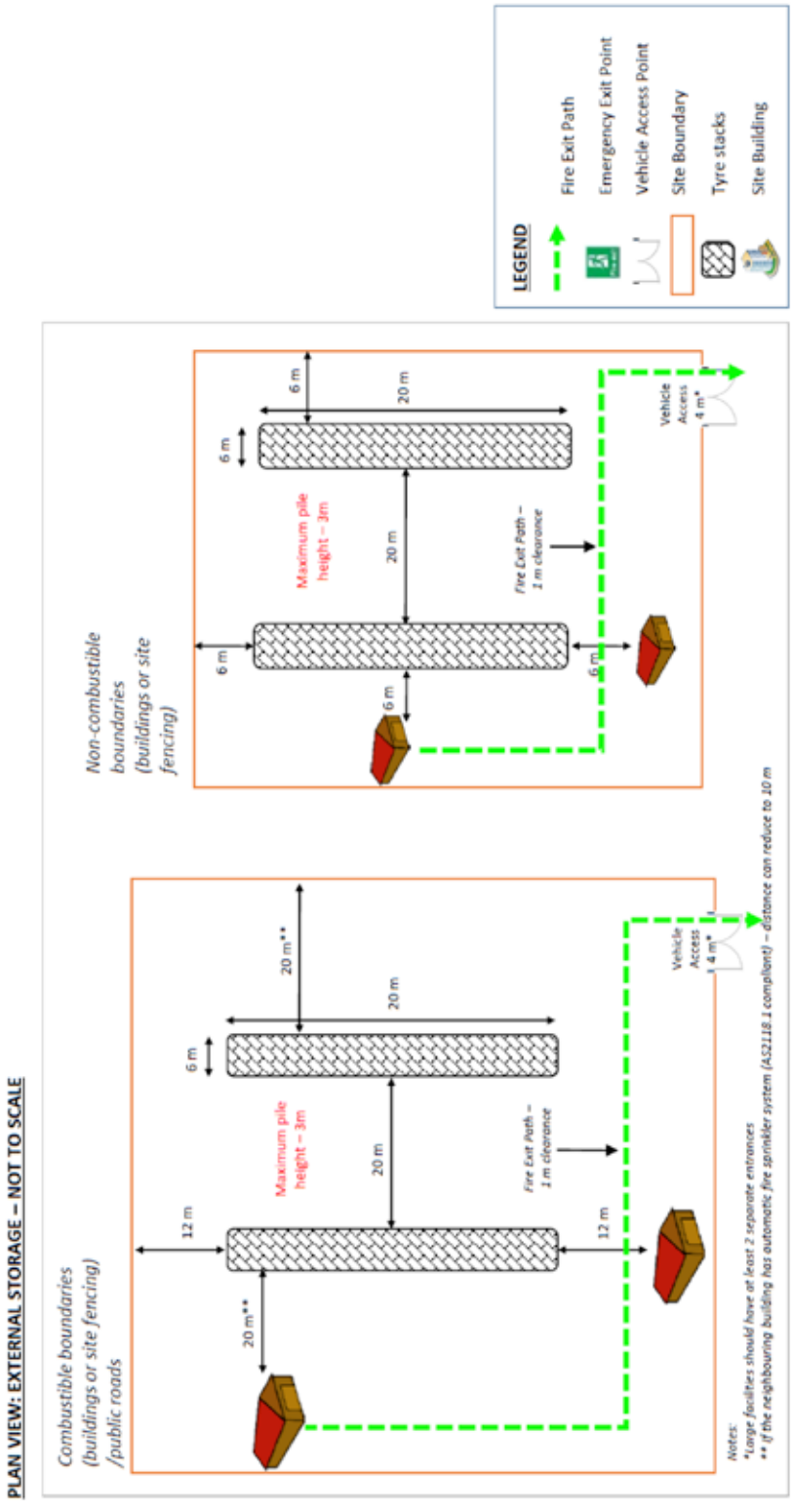

Figure 2 Stockpile configurations and clearance distances for outdoor storage of tyres[3]

3 This diagram is indicative and alternative layouts may be deemed to be best practice in particular jurisdictions – check with your local authorities and regulations.

FIRE & EMERGENCY PREPARATION 4

Fire and emergency planning and preparation is a vital step in the design and operation of your facility, as there are a number of measure which can be implemented to first minimise the risk of fire and then optimise the success of fighting a fire should one occur.

Best practice emergency planning, establishment, validation and implementation of an emergency plan should be done in accordance with AS3745-2012 Planning for emergencies in facilities (Refer to Section 7 for details on where to find this document). Considerations for emergency planning specific to tyre storage facilities are discussed in the following sections.

4.1 SITE EMERGENCY PLAN

An emergency plan should be developed for the site; this is a requirement for all businesses under the WHS/OHS laws. The emergency plan must be documented and set out and expressed in a way that is readily accessible and comprehensible to persons who use it.

An emergency plan should address all aspects of emergency response including:

- Emergency contact details for key personnel (e.g. fire wardens, floor wardens, first aid officers) and local emergency services (e.g. police, fire brigade)
- Appointment of organisation of fire wardens
- Site evacuation procedures
- The location of all fire safety and emergency equipment, and training of all staff in their use
- Maintenance of fire safety and emergency equipment
- Procedures and schedule for regular emergency scenario training such as evacuation drills, firefighting drills, spill response

The emergency plan should set out the management requirements and processes to be followed in an emergency. In the case of a tyre storage facility this should include determining the appropriate number of persons trained in the use of on-site fire safety and emergency equipment and processes for ensuring adequate staff are available at any time (either on-site or on call). Some states (e.g. Victoria) require that the emergency plan is prepared in consultation with the local fire service and this is considered to be best practice.

Given the potential risks to both health and safety and the environment, there are a number of additional items which should be considered when developing your emergency plan, including:

- First attack firefighting/immediate response measures appropriate to the site and which staff members should be trained in these (see Section 4.8)
- Locations of all drains at the site and procedures for ensuring any contaminated firewater cannot enter drains (see Section 5.1.3)
- Locations of all hazardous materials at the site and procedures for ensuring these are isolated and the risk of these.
- Prevailing winds and the direction a smoke plume may travel in the event of a fire as this should be considered in evacuation plans (information on this can be obtained from the Bureau of Meteorology)

A number of states (including NSW, Victoria, WA and South Australia) also require the development of a Tactical Fire Plan as part of the emergency plan, and it is best practice to develop this regardless of your site's location. The main objective of a Tactical Fire Plan is to provide detail of a site's fire protection equipment and provide essential instructions for the use of emergency services in the event of a fire. It is recommended that that Tactical Fire Plans link with your local brigade's fire pre-plans. These take the form of schematic drawings which are colour coded to show locations of fire safety equipment. You should refer to your state fire & emergency services department for guidance on how to develop a Tactical Fire Plan, to ensure that they are consistent with the standards in your state or territory.

Significant publicity can be generated by a tyre fire, which can have a negative impact of both your business and the wider industry. It is important to consider community engagement at the planning stage, and you should develop a Communication Plan or Protocol to ensure media releases/messages to community can be sent out quickly in the event of an incident or fire. This can help to minimise damage to reputation and help allay community fears (and also hasten responses to evacuation notices).

4.1 ESSENTIAL REQUIREMENTS

All sites should develop and document an emergency plan in accordance with WHS/OHS laws that shows the location of all key fire equipment, site evacuation procedures and other emergency services related information. This should include appointment of a dedicated Site Safety Officer, and ensuring that all employees are trained in the emergency procedures and that they are well rehearsed.

Best practice emergency planning, establishment, validation and implementation of an emergency plan should be done in accordance with AS3745-2012 Planning for emergencies in facilities.

4.2 EMERGENCY AND FIRE PROTECTION EQUIPMENT

Provision of fire safety and emergency equipment is a crucial aspect of fire and emergency preparation. Operators should determine and document all site equipment requirements at the planning/design stage or through development of the emergency plan, and best practice is to determine these requirements as part of a fire risk assessment. Section 5 provides greater detail on appropriate fire safety and emergency equipment for tyre storage sites.

4.3 FIRE RISK ASSESSMENTS

Some states have a requirement for a site-specific fire risk assessment (Victoria) or fire safety study (NSW) to be conducted for sites storing tyres. It is considered best practice that all sites complete a fire risk assessment or study as this will ensure that all fire risks can be identified and controlled, and all resources and equipment required at the site can be identified and provided.

The fire risk assessment should be conducted in consultation with your local fire authority and, following a risk assessment method, you should consider all work areas, processes and tasks undertaken at your facility to identify all possible fire hazards at the facility. This might involve a walkthrough of the facility, you should involve employees and managers as appropriate. For each fire hazard identified consider the following:

- Document all possible fire hazards and scenarios at the site, the likelihood that they will cause a fire and severity of the potential fire
- Determine all possible controls which can be implemented to control the identified fire hazards and scenarios
- Mitigate fire risks through the identified control measures and by ensuring that all necessary fire safety and emergency equipment and other controls are installed and implemented.

An example risk matrix is provided overleaf, which can be used as a starting point for conducting your fire risk assessment. As noted above, the fire risk assessment should be conducted in consultation with your local fire authority or an appropriately qualified consultant.

4.3 ESSENTIAL REQUIREMENTS

All sites (new and existing) should undergo a fire risk assessment to identify fire risks and document essential site equipment and resourcing requirements. Refer to Section 5 for further information.

Where possible, this should be completed in consultation with your local fire authority.

Table 1 Example Fire Risk Assessment

FIRE HAZARD	RISK	INITIAL RISK L X C = RR			CONTROLS	RESIDUAL RISK L X C = RR		
		L	C	RR		L	C	RR
Example: Operation of tyre shredder	Example: Loose, worn or broken electrical components may heat up or arc, creating an ignition source	High	Extreme	Extreme	Example: Check electrical connections regularly, repair and replace as needed	Low	High	Medium
Example: Operation of forklifts	Example: Forklifts can generate sparks from exhaust, brakes, tynes striking concrete	Medium	Extreme	High	Example: Only flameproof forklifts to be used in or near tyre storage area	Low	High	Medium

Notes: L = Likelihood
C = Consequence
RR = Risk Rating

Scoring Matrix

Each risk is assigned a likelihood and consequence rating, ranging from low to extreme. The matrix below presents the resulting risk factor. The residual risk is determined by considering the applied control and how this will either reduce the likelihood of the risk or minimise the resulting consequences.

	LOW	MEDIUM	HIGH	EXTREME
Low				
Medium				
High				
Extreme				

OVERALL RISK RATING	
Extreme	Significant or catastrophic impact
High	Major impact
Medium	Moderate impact
Low	Insignificant or minor impacts

4.4 SITE MANAGEMENT PLANS AND PROCEDURES

Operators should have appropriate induction, training and operating procedures that consider and minimise all possible hazards and risks at the site. The following procedures should be documented and implemented:

- Site inductions, to ensure all personnel and visitors are familiar with site operations, emergency procedures
- Hot work permitting, a permit system to ensure adequate controls are in place for all cutting, welding, grinding and other activities which might cause a spark.
- First aid facilities, to ensure all personnel and visitors have access to first aid equipment.
- Staff training, operators should ensure their staff are trained in emergency site procedures and that there are staff available on-site, at all times of operations, who are trained in the use of firefighting equipment and initial response to fires. Best practice is to document a Training Plan specific to your site (see Section 4.9).
- Housekeeping, to ensure that good housekeeping practices are in place, as poor housekeeping can reduce the effectiveness of all other fire and emergency precautions.
- Equipment Maintenance Log, to ensure all electrical equipment, vehicles, machinery and plant at the site are regularly inspected and maintained.
- Police checks of all staff, to reduce the risk of arson attempts by staff.

4.5 IGNITION SOURCE CONTROL

In order to minimise the likelihood of fires occurring, operators should develop, document and implement procedures to control all possible ignition sources specific to your site. This can be done as part of the Fire Risk Assessment, and you can refer to the Code of Practice for the Storage and Handling of Dangerous Goods (Safe Work Australia) for assistance in identifying potential ignition sources.

It is important to consider potential ignition sources, both on- and off-site. For instance, off-site sources may include lightning strikes and grass fires at off-site locations.

Best practice ignition source control methods include:

- Incorporation of ignition source control measures into site emergency plans and procedures
- Regular maintenance of all electrical equipment, vehicles and machinery at the site, which is documented showing inspection dates and repairs undertaken.
- Restriction of smoking to designated areas away from hazards, with ‘No Smoking’ signs clearly visible in appropriate locations.
- Installation of lightning rods in appropriate places, to reduce the risk of lightning strikes causing a fire.

- Thermal imaging equipment and/or heat sensors to scan for heat and ignition sources, particularly in tyre processing areas.

4.5 ESSENTIAL REQUIREMENTS

All potential ignition sources should be eliminated or controlled via reference to Section 25.3 of the Code of Practice for the Storage and Handling of Dangerous Goods (Safe Work Australia) in particular:

- Regular inspection of all electrical equipment and machinery
- Control of smoking at the site (i.e. only in designated areas away from hazards)
- Control/exclusion of open flames or hot work within 3m of tyre storage areas (via hot work permitting)
- Keep site clear or minimise flammable material around tyre storage areas
- Ensuring that storage of flammable or combustible liquids are not within 30m of any tyre storage.

4.6 BUSINESS CONTINUITY PLANS

As previously discussed, best practice is to avoid fires via minimising the size of tyre stacks and storage quantities as far as practicable. However, failure of processing machinery and equipment is not always avoidable (although this can be minimised with proper maintenance and inspection procedures), and breakdowns or other external factors (such as breakdown in a relationship with a major customer) may lead to a dramatic increase in stockpile size.

Since the likelihood and impact of fire increases with increasing storage quantities, it is recommended that operators develop a Business Continuity Plan for managing overflow in the event of a plant breakdown or other external factors.

A Business Continuity Plan is essentially a ‘backup plan’ which you can use to get your business back on track after an incident or disaster (such as a fire). The plan should be well thought out, documented and distributed to all key personnel in advance of any incidents. A copy should be kept off-site to ensure it is not lost in the event of a fire. Typically, a Business Continuity Plan includes:

- An introduction, with key business details and objectives of the plan
- A risk management plan, identifying business activities and potential risks of business disruption
- An incident response plan, with information you will need to respond immediately before and after an incident or crisis.

- A recovery plan, outlining the steps you will need to take to get your business running again after an incident or crisis.
- A review schedule, to ensure the plan is tested and updated as needed.

For example, in the event of a lengthy machine breakdown, your Business Continuity Plan could identify other businesses which have agreed to take on excess tyres until normal operations are restored.

4.7 SITE FAMILIARISATION FOR LOCAL EMERGENCY SERVICES

It is strongly recommended that facility operators liaise with the local fire authority and arrange a site tour with your local fire brigade. This will allow local firefighters to familiarise themselves with the site, operations and available on-site equipment, and allows those that may respond to an incident to be best prepared prior to an incident occurring. The site tour may include:

- Providing a rundown of operations and processes at the site
- Reviewing the location and condition of site entrances and access for emergency vehicles
- Reviewing the location and condition of on-site fire safety equipment and functionality
- Reviewing the location and condition of water access and flows
- Logistical matters such as mobile phone network coverage which will determine the need for firefighters to bring radios to the site in an incident.

4.8 FIRST RESPONSE TO FIRE INCIDENTS

> ‘The first 5 minutes are worth the next 5 hours.’
>
> Alan Brunacini, Retired Chief, http://bshifter.com/

The initial or immediate response can be crucial to averting a major incident. Always call 000 immediately to give the fire services time to arrive for on-site for intervention if it is required.

Research suggests that most tyre fires can be extinguished with water, Class A foam or other wetting agents within the first 5 minutes of detection of a fire (MFB and CFA, 2014). It is therefore important to ensure that adequate firefighting equipment is provided and site staff are trained in first attack firefighting and the use of on-site firefighting equipment, where safe to do so. Best practice is to develop a 5-minute initial response plan, to be incorporated into your Site Emergency Plan, and conduct regular drills to ensure all staff are familiar and capable of responding to an incident. 5 minutes can make a huge difference to the outcome of the fire.

Undertaking first response to fire incidents includes:

- Identifying and assessing the fire
- Alerting all on-site personnel and implementing emergency response procedures
- Determining first attack or evacuation requirements
- Following OHS/WHS guidelines to ensure personal safety
- Using approved Personal Protective Equipment (PPE), including Self Contained Breathing Apparatus (SCBA)
- Selecting the right extinguishing agent
- Operating on-site firefighting equipment
- Reducing the travel and growth of the fire e.g. by separating and reducing the size of stockpiles using moving equipment
- Re-assessing the fire condition and behaviour and responding appropriately
- Seeking off-site support where necessary (i.e. mutual aid)

Personnel should be properly trained in these procedures before considering undertaking first response firefighting. The safety of all people involved is paramount, and therefore it is important that staff are trained to assess the safety of a situation and in first response to fire incidents before undertaking any firefighting. Staff need to be able to assess an incident quickly and understand if they are capable of safely dealing with a fire. Unless staff are adequately trained and experienced, firefighting should be left to those who are qualified, such as trained professionals.

An understanding of the complex behaviour of tyre fires is required to completely extinguish a tyre fire, therefore beyond the first response any firefighting should always be left to professional firefighters.

If possible, take all possible steps to ensure sites can be self-sufficient for firefighting purposes, particularly where these are located at a distance from emergency services. Operators may consider securing off-site support where possible (i.e. mutual aid/shared resources supplied by neighbours) to assist in activities such as reducing the fuel source through movement of tyres. Ensure any providers of mutual aid are properly trained in the use of PPE and firefighting equipment, including SCBA.

4.9 STAFF TRAINING

Even the best fire and emergency preparation can be ineffective if site staff are not properly trained. Minimum training requirements can be found below. It is considered best practice to develop a Training Plan specific for your site which identifies and documents the fire safety and emergency procedures and the training needs of all employees, contractors and visitors to the site. Training should be practised and training refreshers provided. Training relevant to fire and emergency preparation includes:

- Site induction
- Site emergency procedures
- Emergency scenario training such as evacuation drills, firefighting drills, spill response
- Use of fire safety equipment, first attack firefighting/immediate response
- Safe Work Procedures or Safe Operating Procedures (SOPs)

4.9 ESSENTIAL REQUIREMENTS

All staff should also be trained in implementation of the site emergency plan and emergency response procedures, in accordance with the Work Health and Safety Regulations.

It is recommended that all staff are trained in basic fire prevention methods and operation of installed fire equipment.

5 FIRE SAFETY & EMERGENCY EQUIPMENT

Provision of fire safety and emergency equipment is a critical part of fire and emergency preparation. Providing inadequate or unsuitable equipment will drastically reduce your chances of averting a disaster should an incident or fire occur.

Operators should determine and document all site equipment requirements through design of the site and development of the emergency plan, with reference to all relevant regulations, guidelines and standards (see Section 7 for a list of resources). Key requirements are summarised in this section, however since all sites are different, operators should familiarise themselves with these source documents. If you are at all unsure about what equipment you need, contact your local fire authority for advice.

Best practice is to determine fire safety and emergency equipment requirements as part of a fire risk assessment (note that this is already a requirement in Victoria, see Section 4.3 for further details).

5.1 COMMON REQUIREMENTS FOR BOTH INTERNAL AND EXTERNAL STORAGE

5.1.1 EQUIPMENT FOR MOVING TYRES

The ability to move tyres quickly and reduce the fuel source in the event of a fire can be crucial in lessening the size and severity of an incident. For indoor storage situations this may include use of forklifts. For outdoor storage situations this may include use of forklifts, excavators, bulldozers, front-end loaders or other earthmoving machinery. If such machinery is not available at your facility, and the size of your facility does not warrant it, investigate the option of mutual aid: a neighbouring facility may be able to provide moving equipment in the event of a fire.

Tyres should only be moved if it is safe to do so. Ensure that personnel who use moving equipment at your facility are trained in the use of Self Contained Breathing Apparatus (SCBA), to protect their safety during a fire incident. Firefighters may not be able to operate moving equipment or forklifts.

5.1.2 WATER SUPPLY AND ACCESSIBILITY

In most cases, firefighters are unable to bring water to the scene of a fire. Operators therefore need to be able to provide adequate water supply in the event of an incident.

Where tyres are stored in a building, most state guidelines (on tyre storage and fire safety) require a water supply duration of 4 hours for fire hydrants and 90 minutes for sprinkler systems, so water supply should be calculated based on the flow rate of both sprinklers and hydrants at your facility.

If there is no reticulated supply in your area, as is the case in many regional areas, then water tanks or some other form of water storage will be needed. Any fire water storage tank must be served by two on-site fire pumps complying with AS2941. Pumps with a diesel backup supply may be needed as well.

Where tyres are stored outside, the size of facilities varies to such a degree that it is not possible to provide an all-encompassing requirement. It is therefore recommended that the necessary water supply be determined by performing a site-specific assessment to determine supply needs for the firefighting equipment provided.

Water provided for firefighting should be potable or Class A recycled water. Water with high salt levels has been reported to produce dioxins in tyre fires (CFA, MFB, 2014). Dioxins are highly toxic, are a known human carcinogen and if released are a serious and persistent pollutant, and as such their production should be avoided.

5.1.2 ESSENTIAL REQUIREMENTS

Water provided for fire systems should be potable or Class A recycled water.

Internal storage: Operators need to be able to provide adequate water supply for firefighting operations. Facilities should refer to both AS2419.1 and AS2118.1 for determining water supply requirements.

External storage: A site-specific assessment should be undertaken to determine water supply.

As an absolute minimum ensure that there is adequate water supply of 2 x 250,000 L tanks where town water is insufficient.

5.1.3 CONTAMINATED FIREWATER CONTAINMENT

Water used to fight a fire will become contaminated through contact with oil, ash and the smoke produced from the fire and in addition, tyre fires generate highly toxic run-off oil, which is both highly polluting and flammable. Operators need to ensure that contaminated firewater can be contained and not released to sewer, stormwater drains or the environment.

Containment should be provided in the form of bunds or catchment pits, which should have a capacity large enough for a firefighting incident. The capacity can be calculated using guidance provided in South Australia (South Australian Fire Authorities, 2014) and NSW (Fire

& Rescue NSW, 2014), however best practice is to determine the capacity through a site-specific fire risk assessment in consultation with the local fire authority.

Measures need to be implemented to prevent runoff of contaminated firewater to stormwater or sewer, this may include installing a stormwater diversion system or stormwater containment (including 'penstock' isolating valves for stormwater containment). Contact your local authorities for advice about this.

5.1.3 ESSENTIAL REQUIREMENTS

For internal storage the NSW/SA method may be used to determining the required containment capacity:

- **Hydrant and sprinkler system** – calculate containment capacity on the basis of 2 hydrants operating simultaneously at 10L/sec each (no less than 20L/s altogether) (in addition to the buildings maximum sprinkler design output operating for period of 90 minutes).
- **No sprinkler system** – calculate containment capacity on basis of 3 hydrants operating simultaneously at 10L/s each (no less than 30L/s altogether) for a period of 90 minutes.

For external storage (and both situations in Victoria) the capacity should be determined as part of a site-specific fire risk assessment.

You can refer to the NSW and SA guidelines (see Section 7) for guidance and refer to your local regulator for advice specific to your jurisdiction.

5.2 INTERNAL STORAGE

Where tyres are stored internally, the NCC Volume 1, contains a uniform set of technical provisions for the design and construction of buildings and other structures throughout Australia (refer to Section 7). This includes standards for ensuring the fire resistance of a building, the necessary firefighting services and equipment and smoke hazard management.

The building requirements are dependent on the classification of a building; generally speaking a tyre recycling facility would be considered Class 8, while a storage facility (e.g. tyre collector) would be considered Class 7b.

The following sections details some of the requirements specific to tyre storage facilities, however this should not be considered an exhaustive list of requirements under the NCC, Volume 1.

5.2.1 BUILDING CODE/GENERAL REQUIREMENTS

Additional fire safety equipment is necessary for a building which stores tyres, due to the increased hazard and fire risk. While an explanation of these requirements is provided in the following sections, all facilities are different and it is not possible to cover all situations in this guideline. The best way to ensure that your facility is compliant is to engage a qualified engineer or fire safety consultant at the planning stage of your facility.

5.2.1 ESSENTIAL REQUIREMENTS

Tyre storage facilities should ensure that they are in compliance with the standards set out in the National Construction Code (NCC), Volume 1, especially fire protection systems which are pursuant to Clause E1.10 and E2.3.

Ref: National Construction Code Volume One, Building Code of Australia Class 2 to Class 8 Buildings, 2014, Canberra ACT, Australia

5.2.2 FIRST RESPONSE EQUIPMENT

Under Volume 1 of the NCC, a building must be fitted with fire-fighting equipment to allow occupants to respond to a fire and attempt to prevent fire spreading throughout the building. Part E of Volume 1 of the NCC outlines the equipment required.

The equipment used for first response includes portable items designed for responding to low level incidents, the response to such incidents can mean the difference between a minor incident and a major disaster. Operators should refer to Volume 1 of the NCC and seek advice from your local fire authority to determine the needs of your site, and consider additional provisions where appropriate. Additional extinguishers may be required to cover fire risks associated with tyre storage – refer to Clause E1.10 for further information.

Training staff in the use of this equipment is extremely important, and staff should be able to assess a fire and be able to decide when it is appropriate to respond and when to evacuate (see Section 4.8). First response equipment may include:

- portable water and foam fire extinguishers,
- water and foam hose reels
- moving equipment (see Section 5.1.1)
- other provisions as appropriate to your facility.

Best practice is to determine equipment based on a site-specific fire risk assessment.

5.2.3 FIRE HYDRANT SYSTEMS

Under Volume 1 of the NCC, a fire hydrant system must be provided for a building with a footprint greater than 500m^2 (and in a location where a fire brigade is available to attend a fire). The fire hydrant system must be installed in accordance with AS2419.1. Where a fire hydrant is not required it is recommended that you install one in any case, as this will improve firefighting capacity in the event of a fire. Alternatively, a fire hose reel system should be provided in accordance with AS2441.

Part E of Volume 1 of the NCC lists requirements and specifications for firefighting equipment, and tyre storage facilities must comply specifically with Clause E1.10 (Provision for special hazards, additional extinguishers). Operators should refer to the requirements relevant to your state or territory to determine fire hydrant requirements.

5.2.3 ESSENTIAL REQUIREMENTS

Depending on your building size, a fire hydrant system complying with AS2419.1 (greater than 500m^2) and a fire hose reel should be installed. The flow rate of each hydrant should be based on a minimum flow rate of 10L/s per hydrant. The number of hydrants required should be based on Standards Australia, 2004, AS 2419.1 (Amend Nos 1 and 2) Fire hydrant installations – Part 1: System design, installation and commissioning

5.2.4 SPRINKLER SYSTEMS

Table E1.5 of Volume 1 of the NCC lists the conditions under which sprinklers are required. There are additional fire sprinkler and smoke hazard management provisions for special hazards, and sprinkler systems may be necessary due to the 'nature or quantity or materials stored' e.g. additional fire sprinkler requirements where combustible goods exceed certain limits (generally 1,000m^3, with slightly differing limits for some states). Some states may specify a requirement (under state-specific guidelines) even if the stored volume of tyres is less than the threshold defined for combustible goods (such as Victoria – see Appendix A for further details).

Research has shown that properly designed sprinkler systems can control a fire at a tyre storage facility, therefore, whatever the quantity of tyre that are stored it is recommended that a sprinkler system is installed.

5.2.4 ESSENTIAL REQUIREMENTS

Indoor tyre storage facilities storing in excess of the threshold defined for combustible goods in Table E1.5 (relevant to your state/territory) of Volume 1 of the NCC should have a sprinkler system complying with AS2118.1. In Victoria, this is required regardless of the quantity stored.

Ref: Standards Australia, 2006, AS 2118.1 Automatic fire sprinkler systems – Part 1: General systems

5.2.5 SMOKE HAZARD MANAGEMENT SYSTEMS

Part E of Volume 1 of the NCC lists requirements and specifications for smoke hazard management, and tyre storage facilities must comply specifically with Clause E2.3 (Provision for special hazards, additional smoke hazard management).

Tyre fires release a number of hazardous substances, including polycyclic aromatic hydrocarbons (PAHs), dioxins, furans, hydrochloric acid, benzene, polychlorinated biphenyls and heavy metals and these can be harmful to human health and the environment.

Studies have been conducted in France to test the composition of smoke generated by tyres fires in warehouses, both with and without sprinklers (UNEP, 2013). Fires controlled by sprinklers were shown to have higher emissions of carbon monoxide and unburned organics. For this reason, it is recommended that smoke hazard management systems should be installed regardless of whether they are required by the NCC.

In Victoria, where smoke and heat vents/exhaust are installed, the MFB and CFA recommend they should be arranged for manual operation by the attending emergency services after the fire is controlled by the sprinkler system. You should liaise with your local fire services to ensure that the smoke hazard management system in your building is compliant with local requirements.

5.2.5 ESSENTIAL REQUIREMENTS

All indoor tyre storage facilities should have smoke hazard management systems in accordance with Clause E2.3 and Specification E2.2c of Volume 1 of the NCC or as a minimum, provision of permanent natural ventilation in accordance with BCA Table 2.2a.

5.2.6 MAINTENANCE OF FIRE PROTECTION SYSTEMS

All fire safety and emergency equipment should be maintained in accordance with AS1851 Routine Service of Fire Protection Systems and Equipment.

5.3 EXTERNAL STORAGE

5.3.1 FIRST RESPONSE EQUIPMENT

The equipment used for first response includes portable items designed for responding to low level incidents, the response to such incidents can mean the difference between a minor incident and a major disaster.

Training staff in the use of this equipment is extremely important, and staff should be able to assess a fire and be able to decide when it is appropriate to respond and when to evacuate (see Section 4.8). Refer to Volume 1 of the NCC and seek advice from your local fire authority to determine the needs of your site. This may include:

- portable water and foam fire extinguishers,
- water and foam hose reels
- shovels for burying smouldering fires
- moving equipment (see Section 5.1.1)
- other provisions as appropriate to your facility

Operators should ensure that staff are available on-site at all operating times that are trained in the use of the equipment provided.

Best practice is to determine equipment based on a site-specific fire risk assessment.

5.3.2 FIRE HYDRANT SYSTEMS

Operators should install a fire hydrant system complying with AS2419.1 Fire hydrant installations – Part 1: System Design, Installation and Commissioning. Ideally this system (i.e. size, storage volume, number of outlets) should be designed based on the outcomes of a fire risk assessment, however SA guidelines may also be used, which provide recommendations for small and large sites.

5.3.2 ESSENTIAL REQUIREMENTS

Sites should install a fire hydrant system complying with AS2419.1

Standards Australia, 2004, AS 2419.1 (Amend Nos 1 and 2) Fire hydrant installations – Part 1: System design, installation and commissioning

5.3.3 MAINTENANCE OF FIRE PROTECTION SYSTEMS

All fire safety and emergency equipment should be maintained in accordance with AS1851 Routine Service of Fire Protection Systems and Equipment.

6 FACILITY MANAGEMENT

6.1 ONGOING FACILITY MANAGEMENT

Once all plans and procedures for tyre storage, and fire and emergency preparation are in place, operators should ensure that these are implemented. Even best practice tyre storage and fire and emergency preparation will be ineffective if it is not properly integrated into facility management and operations.

- Best practice management of tyre storage and fire and emergency preparation means:
- Developing and documenting plans and procedures in relation to tyre storage and fire and emergency preparation
- Implementing all plans and procedures in relation to tyre storage and fire and emergency preparation
- Doing everything practicable to reduce and manage stockpile size
- Managing and controlling all possible ignition sources at the site, and monitoring and controlling all identified off-site sources
- Ensuring good housekeeping practices are in place at all times, because poor housekeeping can counteract fire and emergency preparedness
- Regularly inspecting and maintaining all on-site electrical equipment, machinery, plant and vehicles

Finally, an important aspect of best practice is incorporating continuous improvement into operations and procedures and taking steps to regularly improve management methods. It is recommended that operators implement a regular review of tyre storage, fire and emergency planning and procedures to ensure that site procedures are in line with current best practices now and into the future.

TSA accredited participants should incorporate continuous improvement actions relating to tyre storage and fire and emergency preparedness outlined in this guideline in their annual Action Plan.

CONTACTS AND RESOURCES 7

Reference material has also been drawn and adapted from the following major resources (in addition to a wider range of resources as part of the background research). These should be considered in conjunction to this guideline.

FURTHER INFORMATION

http://www.tyrestewardship.org.au/

http://www.safeworkaustralia.gov.au/sites/swa/contact/pages/contact

Fire & Emergency Services, Environmental Regulator in your state or territory

7.1 STATE GUIDELINES

Fire & Rescue NSW (2014), Fire Safety Guideline: Guidelines for Bulk Storage of Rubber Tyres, December 2014.

Metropolitan Fire Brigade (MFB) and Country Fire Authority (CFA) (2014), Fire Services Guideline Indoor Storage of New or Used tyres, March 2014.

MFB and CFA (2014), Fire Services Guideline Open Air Storage of New or Used tyres, March 2014.

South Australian Fire Authorities (2014), Built Environs Section Guideline No.13 General Guidelines for Rubber Tyre Storage, April 2014.

7.2 AUSTRALIAN CODES AND STANDARDS

Australian Standards: SAI Global https://infostore.saiglobal.com/

Australian Building Codes Board (2015), National Construction Code 2015 Volume One, Building Code of Australia, Class 2 to Class 9 Buildings.

Standards Australia (2012), AS1851-2012 Routine service of fire protection systems and equipment.

Standards Australia (2004), AS2419.1-2005 (Amend Nos 1 and 2) Fire hydrant installations – Part 1: System design, installation and commissioning.

Standards Australia (2006), AS2118.1-2006 (A4) Automatic fire sprinkler systems – General system.

Standards Australia (2010), AS3745-2010 Planning for emergencies in facilities.

Safe Work Australia (2001), Code of Practice for the Storage and Handling of Dangerous Goods.

7.3 INTERNATIONAL GUIDANCE

International Association of Fire Chiefs (IAFC), Scrap Tyre Management Council (STMC) and National Fire Protection Association (NFPA) (2000), The Prevention and Management of Scrap Tire Fires.

Integrated Waste Management Board (IWMB) (2002), Tire Pile Fires: Prevention, Response, Remediation.

United Nations Environment Programme (UNEP) (2013), Technical Working Group of the Basel Convention, revised technical guidelines for the environmentally sound management of used and waste pneumatic tyres.

U.S. State of California (2004), Rings of Fire: Revisited Fire Prevention and Suppression of Outdoor Tire Storage.

APPENDIX A

OVERVIEW OF TYRE STORAGE REGULATIONS IN AUSTRALIA

AUSTRALIA (FEDERAL)

TRANSPORT

Nationally, tyres are listed as a 'controlled waste' in List 1 of Schedule A of the National Environmental Protection (Movement of Controlled Waste between States and Territories) Measure 2004 (Controlled Waste NEPM). The NEPM has established a national system to track the transport movements of controlled waste between States and Territories and developed nationally recognised licences for interstate transporters. While, the interstate transport of tyres is regulated via this legislation, there is no federal control over the storage of tyres.

STORAGE

While there are no federal requirements on storage of tyres, where tyres are stored internally, buildings must be constructed in compliance with Part E of Volume 1 of the National Construction Code (Building Code of Australia)[4], which lists requirements and specifications for firefighting equipment and smoke hazard management, and tyre storage facilities must comply specifically with Clause E1.10 and E2.3. Clause E1.10. Some states may specify a requirement (under state-specific guidelines) even if the stored volume of tyres is less than the threshold defined for combustible goods (e.g. *Victorian Fire Services Guideline – Indoor Storage of New or Used Tyres*, see below).

WORK HEALTH AND SAFETY (WHS)

In addition, Australian businesses have obligations under the harmonised Work Health and Safety (WHS) framework in Australia, which generally requires businesses to ensure that they provide a safe work place. However, there are no specific requirements under the WHS framework for tyre storage facilities.

4 Australian Building Codes Board (2015) *National Construction Code Volume One, Building Code of Australia, Class 2 to Class 9 Buildings*.

STATE/TERRITORY BASED REGULATIONS

ACT

Tyre storage regulations	In ACT, the Environment Protection Act 1997 defines the transportation of 2 tonnes or more of end-of-life tyres as a Class A activity and therefore requires the person undertaking the transport to hold an environmental authorisation, however the storage and processing of tyres is not a regulated or licenced activity.
Fire safety requirements	Storage and Disposal of Waste Tyres – Environmental Guidance Note Brief guidance prepared via a joint initiative of the Motor Trades Association ACT and ACT Environment Protection Agency refers operators to the South Australian guidelines for guidance on tyre storage.

NEW SOUTH WALES

Tyre storage regulations	*Protection of the Environment Operations (Waste) Regulation 2014* https://www.epa.nsw.gov.au/your-environment/waste/industrial-waste/tyres A licence is required under the Protection of the Environment Operations Act 1997 to store more than 5 tonnes of waste tyres (being casings, seconds, shredded tyres or tyre pieces) or 500 waste tyres at any time or a business involved in processing more than 5,000 tonnes of waste tyres per year. Licences require compliance with NSW Fire Brigade Storage Guidelines (see p. 59).

Fire safety requirements	The Fire & Rescue NSW *Guideline for bulk storage of rubber tyres* is a guideline that may be imposed in part or in full as a condition by the authority having jurisdiction. This Guideline has minimum requirements for the storage of rubber tyres, including those in an open yard or within buildings and structure. https://www.fire.nsw.gov.au/gallery/files/pdf/guidelines/rubber_tyres.pdf Acceptable rubber tyre storage: • Bundled tyres – tyres strapped together in bundles and stacked together in a system or on their sides • Pallet system – a system containing a number of tyres which includes stringers for material handling equipment • Horizontal system – a system (pallets, shelving, racks) where tyres are stacked upright along a horizontal length exceeding 1.5m • Laced storage (outside only) – tyres which are stacked overlapping to create a woven or laced arrangement • Portable system – small portable systems that can be readily moved by fork lift. External tyre storage: • The site should be level, clear of all rubbish and combustible materials, and enclosed by fences or walls constructed of non-combustible materials. • A hydrant system complying with AS2419.1 should be provided when the total quantity of outdoor storage will exceed 50 tonnes. • Individual tyre stacks should not exceed 3.7m in height, 60m^2 in area and 12.5 tonnes in weight. • A maximum of four small individual tyre stacks can be grouped into a stack pile. A minimum clear separation of 2.5m must be maintained between each stack. • A minimum clear separation of 18m must be maintained between each stack pile of four small stacks. Small tyre facilities (less than 50 tonnes) • Tyres should be stacked at least 6m from all non-combustible boundaries and buildings, and 18m from combustible boundaries or buildings. • Tyre stacks must be at least 6m from the site boundary facing the public road. Large tyre facilities (50 tonnes or more): • Tyre stacks should be at least 18m from any boundary or any building. • Any external tyre storage facility should have at least two site access points each being not less than 4m wide.

Indoor tyre storage:

- Buildings with a floor area of 2,000m^2 or more and containing more than 20 tonnes of tyres should have a sprinkler system complying with AS2118.1.
- Buildings with a floor area of 2,000m^2 or more and containing more than 10 tonnes of tyres should have smoke and heat vents complying with specification E2.2c Volume 1 of the NCC.
- Individual tyre stacks within buildings should not exceed 3.7m in height and 30m^2 in area.
- Stored tyres must remain at least 1m clear in all directions from the underside of the building's roof or ceiling, roof structural members, lights (including light fixtures), and sprinkler heads.
- A minimum clearance of 1m must be maintained along paths of travel to required exits and firefighting equipment (e.g. hose reels, extinguishers, hydrants). The paths of travel must be kept clear and unobstructed at all times.

Unsprinklered buildings:

- A minimum clearance of 3m should be provided between stacks.

NORTHERN TERRITORY

Tyre storage regulations	*Waste Management and Pollution Control Act 1998* https://legislation.nt.gov.au/Legislation/WASTE-MANAGEMENT-AND-POLLUTION-CONTROL-ACT-1998 *Fire and Emergency Regulations 1996* https://legislation.nt.gov.au/Search/~/link.aspx?_id=67B894390726410DBE22B12FE9A40D37&_z=z In the Northern Territory the *Waste Management and Pollution Control Act 1998* is the governing legislation for the collection, transportation, storing and processing of tyres and requires a licence if these activities are undertaken on a commercial or fee basis. The NT EPA grants environment protection approvals and licences for activities listed in Schedule 2 of the Act. Tyre storage is also regulated under the Northern Territory's *Fire and Emergency Regulations 1996*. Section 7A of the regulations contains specific requirements for 'stacked tyres' requiring anyone storing any number of tyres (new or used) to adhere to listed stockpile heights, dimensions and separation distances. Government representatives consulted as part of this project were uncertain whether reprocessors are aware of or following the requirements under the regulations.
Fire safety requirements	Apart from the requirements under the *Fire and Emergency Regulations 1996*, there are no specific guidelines on tyre storage and fire/emergency management published for NT, however a tyre recycling facility's Environment Protection Licence (EPL) generally contains licence conditions on tyre storage requirements.

QUEENSLAND

Tyre storage regulations	In 2013, the Queensland environmental legislative framework underwent significant changes via the Greentape Reduction project (Department of Environment and Heritage Protection (EHP), 2013). The *Environmental Protection (Greentape Reduction) and Other Legislation Amendment Act 2012*, removed the threshold for tyre storage as an environmentally relevant activity (ERA) under ERA 56 – Regulated waste storage. This means that tyre storage in Queensland no longer requires an environmental authority in relation to that activity. ERA 56 previously mandated a licensing requirement for facilities receiving and storing 5 tonnes or more, or 500 or more EPUs. Since removal of ERA 56, only recycling, processing and transportation are under statutory regulation. (refer ERA 57 – Regulated waste transport and ERA 59 – Tyre recycling approval). However, organisations and individuals storing tyres must comply with Fire Services Requirements, which are enforced under their own legislation rather than environmental protection legislation, as summarised below: • The *Fire and Rescue Service Act 1990*, requires occupants of premises to ensure the risk of a fire occurring at the premises is properly managed to mitigate the risk. This is regulated under the *Building Fire Safety Regulation 2008*. There is a requisition under the Act (*Fire and Rescue Service Act Requisition (No. 1) 2011*), this applies to external storage of more than 500 tyres. The requisition prescribes stockpile dimensions and configurations, firefighting equipment, machinery for moving tyres and a number of other requirements. • The *Public Health Act* and more specifically the *Public Health Regulation 2005*, Division 2 prescribes mosquitos as a public health risk and requires all persons to ensure that there is no breeding ground for mosquitos through the accumulation of water.

Fire safety requirements	Queensland Government Gazette No. 78 (1 April 2011) pages 539 – 544 *Fire and Rescue Service Act 1990* Fire and Rescue Service Act Requisition No. 1 2011 https://publications.qld.gov.au/dataset/gazettes-april-2011/resource/bb4a2a9c-c60c-4062-a4ea-85fc264703dd The requisition applies to any person who stores or stockpiles in excess of 500 tyres of any type and in any condition (new, second-hand, re-conditioned, scrap, shredded or crumbed) or their equivalent parts with a dimension exceeding 100 mm in the open. • Single stack tyre dimensions must not exceed the following: - Maximum width of base – 5m - Maximum length of base – 45m - Maximum height – 3m - Maximum distance between stacks – 10m - Average side slope – 1:1. • The longest dimension of a stack must be at right angles to the direction of the prevailing winds • Multiple stacks may be separated by a protective wall with a fire rating of 4 hours provided that: - the protective wall protrudes 1.5 meters above the highest point and 1.5 meters beyond the widest point to each side - only two stacks abut on the longest axis and two stacks on the shortest axis (i.e. four individual stacks in any one group) - any individual stack must not exceed the dimensions specified above (except that tyres may be stacked against such wall with a side slope batter only on the exposed sides) - such groups of stacks do not exceed an aggregate width of 10 meters and an aggregate length of 90 meters - such groups of stacks are separated from any other group of stacks, individual stacks of tyres or any combustible or flammable material including grass and weeds by a distance of 10 meters or more. • Machinery capable of creating a break 10 metres wide between burning and unburnt tyres must be kept on site 24 hours a day. A competent operator for this equipment must be available 24 hours a day.

- A system to have the operator on site within 20 minutes must be in place 24 hours a day. This system must be approved by the Commissioner, Queensland Fire and Rescue Service.
- A stockpile of sand or soil and the resources to load and transport it to the tyre storage site, and to place it on the tyre stacks must be readily available. The volume of sand or soil must be sufficient to completely cover the largest stack to a depth of 1 metre over the entire exposed surface area of the stack.
- A water supply system capable of delivering high volumes of water with minimum delay is required. The source may be reticulated town water or a dam.
- The on-site water reticulation system is to have the following characteristics:
  - A minimum of three standpipes with fittings approved by the Commissioner, Queensland Fire and Rescue Service are to be located so that at least one is no closer than 50 metres and no further than 90 metres from any part of any stack and is up-wind or cross-wind no matter what the wind direction.
  - Each standpipe is to be able to deliver 1,800 litres/minute when any two are operating. This flow rate must be able to be continuously maintained for a minimum of 3 hours.
  - Three 30 metre lengths of 64-millimetre hose and fittings, one branch and one nozzle must be kept readily available at a specified Fire Point.
  - This equipment is to be maintained in accordance with AS1851 and to meet the specifications of the Commissioner, Queensland Fire and Rescue Service.
  - If water is to be drawn from a dam, a volume of 648,000 litres must always be available for pumping.
  - Provision should be made to contain firewater runoff.
- More than one access point to the storage area shall be available to allow for varying wind directions. A perimeter road shall be developed to aid security and access. All roads to, and lanes between stacks, shall be maintained in a condition suitable for Queensland Fire and Rescue Service vehicles.
- If water is to be drawn from a dam, a hard standing area of a design and location approved by the Commissioner, Queensland Fire and Rescue Service must be provided adjacent to the dam for the sole use of a Queensland Fire and Rescue Service pumping unit.
- A security system meeting the approval of the Commissioner, Queensland Fire and Rescue Service is to be provided.

A plan of action for a fire emergency must be developed. This plan must be approved by the Commissioner, Queensland Fire and Rescue Service.

SOUTH AUSTRALIA

Tyre storage regulations	*Environment Protection Act 1993* https://www.legislation.sa.gov.au/LZ/C/A/ENVIRONMENT%20PROTECTION%20ACT%201993.aspx In South Australia, the *Environment Protection Act 1993*, governs the licensing requirements regarding the transportation, storage and processing of waste tyres. Key storage requirements are summarised as follows: • The reception, storage, treatment and disposal of waste tyres (greater than 250 millimetres in size) is listed as a Prescribed Activity of Environmental Significance and therefore requires a licence, unless the amount in question is below 5 tonnes and being used solely for the purpose of recycling, reuse, or if it is conditionally approved by the Authority. • Used tyres should be stored in a manner that minimises risks to the environment, human health and therefore minimising the risk of fire. Businesses are considered to be compliant if they operate in accordance with the following guidelines: - *General Guidelines for the Outdoor Storage of Used Tyres* issued by the South Australian Fire Service Fire Safety Department Some general storage requirements are listed under the *EPA 183/10: Waste guidelines – Waste tyres, updated September 2010*, such as secure fencing and access for emergency vehicles, and there is a specific requirement that all tyre facilities comply with the guidelines issued by the South Australian Fire Service Fire Safety Department. http://www.epa.sa.gov.au/page/view_by_id/4285

Fire safety requirements	General Guidelines for Rubber Tyre Storage (Guideline 013) issued by the South Australian Fire Authorities http://www.mfs.sa.gov.au/site/community_safety/commercial/guidelines.jsp Used tyres should be stored in a manner that minimises risks to the environment and human health, therefore minimising the risk of fire. Tyre storage in buildings must comply with the Part E of Volume 1 of the NCC. Outdoor tyre storage must be arranged as piles of tyres or contained in metal cages, in rows not exceeding the dimensions set out below: • Storage heights should be determined by the stability of the pile and must not exceed 3 metres high due to the potential for instability. • 'on-flat' or 'laced' tyre storage will be employed for all outdoor tyre piles • Tyre piles shall be arranged in 'thin' rows to assist firefighting operations and shall be no more than 6 metres wide. • Tyre pile rows shall be no more than 20 metres in length to limit the total volume of tyres contained in a pile to a maximum of 360m^3. • Tyre piles shall be arranged to provide suitable aisle separation in order to reduce the risk of fire spread between piles, and allow safe travel of fire appliances through the site. These aisles must remain clear at all times, be free from combustible materials and tyre scraps, and shall have a minimum width of 20 metres. • Tyre piles shall be kept from allotment boundaries as follows: - Where the pile narrow ends face the boundary – 12 metres, and where the long sides face the boundary – 20 metres. - Where the allotment boundary adjoins a public road affording perimeter fire appliance access, the total applicable distance may include the far boundary of the roadway and should be not less than 3 metres. - Where the allotment boundary is of fire resisting construction to a minimum height of 3 metres, the boundary distance may be reduced to a minimum of 6 metres. - Separation distances of tyre piles from buildings on the same allotment shall be 12/20 metres (as applicable from above) where the building's exposed facade is not protected. - Where the building's exposed facade is protected with an automatic fire sprinkler system in accordance with AS2118.1, or a wall wetting sprinkler system in accordance with AS2118.2, the separation distance may be reduced to 10 metres.

- Notwithstanding the requirements of AS2419.1, where the total storage volume on site is less than or equal to 750m^3 (up to two piles as defined above), the facility shall have a hydrant system capable of providing simultaneous hydrant flows of two outlets (10L/s each).
- Large storage facilities where the total tyre storage volume on site is greater than 750m^3, the facility shall have a hydrant system capable of providing minimum simultaneous hydrant flows of three outlets (10L/s each).

- Indoor storage:
  - Storage of tyres indoors shall be within open framed fixed or portable racking systems, or palletised, and shall be arranged to prevent tyres from becoming dislodged and falling/rolling from the storage system.
  - Buildings of greater than 500m^2 floor area used as tyre storage facilities should be provided with the following fixed fire suppression/smoke hazard management provisions in addition to any other fire and life safety measures required by Volume 1 of the NCC.
  - Tyre storage >10 tonnes or 1000 tyres (whichever is the lesser)
    - permanent natural ventilation or automatic smoke hazard management systems or automatic smoke and heat vents
  - Tyre storage >20 tonnes or 2000 tyres (whichever is the lesser)
    - automatic fire sprinkler protection and automatic smoke hazard management systems or automatic smoke and heat vents
- Bund walls, sealed kerbing and blind sumps/catchment pits should be provided to contain water run-off from the site during firefighting activities.
  - Non-sprinkler protected premises
    - The bunded capacity shall be designed to cater for a run off of not less than 30 litres a second (fire hydrant flows) for 90 minutes, which equates to 162,000 litres (162kl).
  - Sprinkler protected premises
    - The bunded capacity shall be designed to cater for a run off of not less than the combined volume of 20 litres a second (fire hydrant flows) for 90 minutes (108kl) AND the design sprinkler system flow rate for 20 minutes.

TASMANIA

Tyre storage regulations	*Environmental Management and Pollution Control (Waste Management) Regulations 2010* https://epa.tas.gov.au/policy/acts-regulations/empca/waste-management-regulations In Tasmania waste tyres are classified as a controlled waste under section 3 of the *Environmental Management and Pollution Control Act 1994* and under regulation 5 of the *Environmental Management and Pollution Control (Waste Management) Regulations 2010*. This Regulation requires the registration of handlers of controlled waste and therefore this regulation applies to all parties involved with the production, transportation and receiving of tyres. An Approved Management Method (AMM) for the Storage and Reuse of Waste Tyres 2017 has been developed under the Waste Management Regulations. Key storage requirements are summarised as follows: • Except where approved or provided for in accordance with the Waste Management Regulations, no more than 6,250 EPUs of waste tyres may be stored on any premises. • Waste tyres stored either indoors or outdoors must be stored in accordance with all of the guidelines contained in the Guidelines for Bulk Storage of Rubber Tyres published by Fire & Rescue NSW in 2014. A Companion Document has been developed to assist relevant site operators to comply with the requirements for tyre storage and reuse set out in the AMM. Refer to Storage and Reuse of Waste Tyres: https://epa.tas.gov.au/regulation/waste-management/controlled-waste/handling-controlled-waste-in-tasmania/approved-management-methods/storage-and-reuse-of-waste-tyres
Fire safety requirements	*General Fire Regulations 2010* https://www.legislation.tas.gov.au/view/whole/html/inforce/current/sr-2010-136 No specific guidelines on tyre storage and fire/emergency management have been published for Tasmania. The Tasmanian Government refers to the NSW guidelines where guidance is needed.

VICTORIA

Tyre storage regulations	*Environment Protection (Scheduled Premises and Exemptions) Regulations 2015* http://www.legislation.vic.gov.au/Domino/Web_Notes/LDMS/PubStatbook.nsf/93eb987ebadd283dca256e92000e4069/C729EEA6CD963AF7CA257E27001D2AA8/$FILE/15-025sra%20authorised.pdf *Storage of waste tyres in Victoria* In 2015, the Victorian EPA introduced tighter controls for waste tyre storage to protect Victorians against the fire risk from inappropriately managed waste tyre stockpiles. Premises that store more than 40 tonnes or 5,000 waste tyres are required to obtain a works approval and/or licence from EPA Victoria. http://www.epa.vic.gov.au/business-and-industry/guidelines/waste-guidance/storage-of-waste-tyres-in-victoria *Waste Management Policy (Combustible Recyclable and Waste Materials) (the policy) 2018* The Policy came into effect on 28 August 2018, replacing the interim Waste Management Policy (Resource Recovery Facilities). Compliance with the policy requires combustible recyclable and waste materials (CRWM) at waste and resource recovery facilities (WRRF) to be managed and stored in a manner that minimises risk of harm to human health and the environment from fire. For waste tyre storage premises, the policy applies to unlicensed facilities only. https://www.gazette.vic.gov.au/gazette/Gazettes2018/GG2018S397.pdf To support compliance with the policy, an updated Management and storage of combustible recyclable and waste materials – guideline (publication 1667.2) was developed. https://www.epa.vic.gov.au/business-and-industry/guidelines/waste-guidance/combustible-recyclable-and-waste-materials

Fire safety requirements

The Country Fire Authority (CFA) and Metropolitan Fire Brigade (MFB) have published guidelines for the safe storage of tyres for both outdoor and indoor locations.

https://www.cfa.vic.gov.au/documents/20143/202133/Fire_Services_Guideline_Open_Air_Storage_of_New_or_Used_Tyres.pdf/a3f43247-d643-9b03-4843-2e28f53711be

https://www.cfa.vic.gov.au/documents/20143/202133/Fire_Services_Guideline_Indoor_Storage_of_New_or_Used_Tyres.pdf/b70a3a23-10b0-dbad-0105-8ca4f57e3549

Operators are required to undertake a fire risk assessment which will determine all fire hazards at the site, determine the likelihood that a fire will occur, and then determine the consequences of a fire incident in terms of fire safety, property protection and the environment.

The tyre storage area must be adequately bunded or contained so that, in the event of a fire, no contaminated water is allowed to escape beyond the property boundaries.

Operators should develop and document an emergency plan and tactical fire plan in addition to emergency procedures.

Operators are required to ensure equipment is maintained or easily accessible to contain and manage emergency incidents.

Operators of fork lift equipment should be trained in the use of Self Contained Breathing Apparatus (SCBA) and appropriately trained in the site emergency plan and emergency response procedures.

Storage pile sizes should be minimised to restrict the available fuel in the event of a fire:

- Maximum pile dimensions of 20m long x 6m wide x 3m high is recommended.
- A minimum separation distance of 20m between piles is recommended, but is not guaranteed to prevent fire spread.
- Storage pile heights should be determined by the stability of the pile and must not exceed 3m.
- Separation distance of storage piles to buildings will depend on the building construction. For buildings without appropriate fire resistant construction, this distance should not be less than 20m.
- Separation distance to boundaries facing public roads should be not less than 6m, and not less than 20m to the far boundary of the public road.
- Separation distance between the edges of storage piles to other boundaries should be no less than 20m.

	The premises fire service is required to comply with Australian Standard (AS2419.1) or be in accordance with the requirements of the CFA or MFB.

WESTERN AUSTRALIA

Tyre storage regulations	*Environmental Protection Regulations 1987* https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_1400_homepage.html *Environmental Protection (Controlled Waste) Regulations 2004* https://www.legislation.wa.gov.au/legislation/statutes.nsf/main_mrtitle_1387_homepage.html Both the *Environmental Protection Act 1986* and the *Waste Avoidance and Resource Recovery Act 2007* have provisions that can be relevant to the control of used tyre waste. Up to 500 tyres can be stored at a tyre fitting business (or at a place connected with one) or up to 100 tyres can be stored in any other place. Any premises storing more than 500 tyres per year are required to obtain a licence. The permitted quantity of used tyre storage is stipulated on a site's licence (under category 56 or 57 in Schedule 1 of the *Environmental Protection Regulations 1987*). Refer to Tyres Legislation: http://www.wasteauthority.wa.gov.au/publications/tyres-legislation
Fire safety requirements	In Western Australia, there are no prescribed Essential Fire Safety Measures provisions other than those outlined in Part 1 of Volume 1 of the NCC for new buildings. While WA does not have any specific guidance/fire standards, licences issued by DER contain specific tyre storage conditions such as stockpile heights and separation distances. It is understood this is done on a case by case basis.

APPENDIX B

CHECKLIST OF ESSENTIAL REQUIREMENTS

	ASPECT	ESSENTIAL REQUIREMENT	REFERENCE SECTION
☐	Site selection	Site selection for storage of tyres should include consideration of the following; • impermeable soil, or addition of sealed surface • site should be situated away from surface watercourses • where tyres are stored outside, proximity to infrastructure and ensure site is large enough to account for separation distances and allow for future expansion • flat, level ground where possible.	3.1.1
☐	Building design	Tyre storage facilities must comply specifically with Clause E1.10 and E2.3 of Part E, Volume 1 of the NCC.	3.1.1
☐	Security and monitoring	Site security should include full enclosure of the site with fence or wall (non-combustible materials) of adequate height to prevent unauthorised access.	3.1.2
☐	Fire retardant access and containment	Facilities should refer to both AS2419.1 (Fire hydrant installations) and AS2118.1 (Automatic fire sprinkler systems) for determining water supply requirements.	3.1.3
☐	Site specific risk assessment	All sites storing tyres, regardless of volume or size, should undertake a site-specific fire risk assessment or fire safety study.	3.1.4

	ASPECT	ESSENTIAL REQUIREMENT	REFERENCE SECTION
☐	Internal storage general requirements	Where tyres are stored internally, operators should ensure that they are in compliance with the standards set out in Volume 1 of the NCC, especially fire protection systems which are pursuant to Clause E1.10 and E2.3.	3.2
☐	Internal storage – site layout and design	Site entry points should have at least 4m clearance with access roads designed for large emergency vehicles and their weight limits. Large facilities should have at least 2 separate access points.	3.2.1
☐	Internal storage – stacking/stockpile arrangements	Where tyres are stored internally, at a minimum the following is required: • Portable storage systems that can be easily moved by forklift • Horizontal systems using pallets or shelving racks for heights exceeding 1.5 m • No obstruction of fire equipment and storage.	3.2.2
☐	Internal storage – stockpile size, dimensions and configurations	Tyre stacks within a building should not exceed 3.7m in height or 30m^2 in area. The following boundary perimeters are required: • Building without sprinklers – minimum of 3m between stacks and building structures • Building with sprinklers – minimum of 2m between stacks and 1.5m between stacks and building structures. A minimum clearance of 1m should be maintained along paths of travel to exits or firefighting equipment access and stored tyres must be 1m clear of roof or any structures attached to the roof.	3.2.3

	ASPECT	ESSENTIAL REQUIREMENT	REFERENCE SECTION
☐	External storage – site/ fire access	Site entry points should have at least 4m clearance with access roads designed for large emergency vehicles and their weight limits. Large facilities should have at least 2 separate access points.	3.3.2
☐	External storage – stacking/stockpile arrangements	Tyres should not be stacked on their treads unless there is some means of containing/constraining the stacks. This containment/constraint should be fire resistant.	3.3.3

	ASPECT	ESSENTIAL REQUIREMENT	REFERENCE SECTION
☐	External storage – stacking/stockpile arrangements	**Acceptable tyre storage configurations/ stacking** (to be used in absence of local jurisdiction regulations): For outdoor storage, tyres should be stored on their sides or laced, with tyres stacked overlapping to create a woven arrangement, unless they are restrained by some means e.g. metal cages or portable systems. Tyres should not be stacked on their treads unless they are contained by some means. This containment/constraint should be fire resistant. **Unless your licence or local regulator prescribe different requirements**, tyre stockpiles should: • not exceed 3m in height due to potential for instability • be no more than 6m wide and 20m in length (arrangement in long 'thin' piles will assist firefighting operations) • Alternatively, the total volume of tyres contained in a pile should not exceed 360m^3. Aisles between tyre stockpiles should remain clear from all combustible material and allow for fire fighter access. Appropriate separation distances should be determined based on the size of the pile, a minimum separation distance of 20m is recommended between each tyre stockpile. Differing requirements exist for NSW sites, refer to the NSW guidelines for further detail (see Section 7).	3.3.3

	ASPECT	ESSENTIAL REQUIREMENT	REFERENCE SECTION
☐	External storage – Separation distances	The following separation distances are recommended: • Non-combustible boundaries – at least 6m from perimeter • Combustible boundaries or public roads – at least 20m from perimeter if the stockpile's long sides face the boundary and 12m from perimeter if the stockpile's narrow ends are facing the boundaries. If the building is protected with automatic fire sprinkler system that meets the AS2118.1 standards, this distance may be reduced to 10m.	3.3.3
☐	Site Emergency Plan	All sites should develop and document an emergency plan in accordance with WHS/OHS laws and meeting Australian Standard AS3745-2010 that shows the location of all key fire equipment, site evacuation procedures and other emergency services related information. This should include appointment of an Emergency Control Organisation and a dedicated Site Safety Officer, and ensuring that all employees are trained in the emergency procedures and that they are well rehearsed.	4.1
☐	Fire Risk Assessment	All sites (new and existing) should undergo a fire risk assessment to identify fire risks and document essential site equipment and resourcing requirements. Where possible, this should be completed in consultation with your local fire authority.	4.3

	ASPECT	ESSENTIAL REQUIREMENT	REFERENCE SECTION
☐	Ignition source control	All potential ignition sources should be eliminated or controlled via reference to Section 25.3 of the *Code of Practice for the Storage and Handling of Dangerous Goods (Safe Work Australia)* in particular: • Regular inspection of all electrical equipment and machinery • Control of smoking at the site (i.e. only in designated areas away from hazards) • Control/exclusion of open flames or hot work within 3m of tyre storage areas (via hot work permitting) • Keep site clear or minimise flammable material around tyre storage areas • Ensuring that storage of flammable or combustible liquids are not within 30m of any tyre storage.	4.5
☐	Staff training	All staff should also be trained in implementation of the site emergency plan and emergency response procedures, in accordance with the Work Health and Safety Regulations. It is recommended that all staff are trained in basic fire prevention methods and operation of installed fire equipment.	4.9

	ASPECT	ESSENTIAL REQUIREMENT	REFERENCE SECTION
☐	Fire safety and emergency equipment – general water supply and accessibility	Water provided for fire systems should be potable or Class A recycled water. **Internal storage**: Operators need to be able to provide adequate water supply for firefighting operations. Facilities should refer to both AS2419.1 and AS2118.1 for determining water supply requirements. **External storage**: A site-specific assessment should be undertaken to determine capacity. As an absolute minimum ensure that there is adequate water supply of 2 x 250,000 L tanks where town water is insufficient.	5.1.2
☐	Fire safety and emergency equipment – firewater containment capacity	For best practice **internal storage**, the NSW/SA method may be used to determining the required containment capacity: • **Hydrant and sprinkler system** – calculate containment capacity on basis of 2 hydrants operating simultaneously at 10L/s each (no less than 20L/s altogether) (in addition to the buildings maximum sprinkler design output operating for period of 90 minutes). • **No sprinkler system** – calculate containment capacity on basis of 3 hydrants operating simultaneously at 10L/s each (no less than 30L/s altogether) for a period of 90 minutes. For external storage (and both situations in Victoria) the capacity should be determined as part of a site-specific fire risk assessment. You can refer to the NSW and SA guidelines (see Section 7) for guidance and refer to your local regulator for advice specific to your jurisdiction.	5.1.3

	ASPECT	ESSENTIAL REQUIREMENT	REFERENCE SECTION
☐	Internal storage – fire hydrant systems	Depending on your building size, a fire hydrant system complying with AS2419.1 (greater than 500m^2) and a fire hose reel should be installed. The flow rate of each hydrant should be based on a minimum flow rate of 10L/s per hydrant. The number of hydrants required should be based on Standards Australia, 2004, AS2419.1 (Amend Nos 1 and 2) Fire hydrant installations – Part 1: System design, installation and commissioning	5.2.3
☐	Internal storage – building compliance	Tyre storage facilities should ensure that they are in compliance with the standards set out in Volume 1 of the NCC, especially fire protection systems which are pursuant to Clause E1.10 and E2.3. *Ref: National Construction Code Volume One, Building Code of Australia Class 2 to Class 8 Buildings, 2014, Canberra ACT, Australia*	5.2.1
☐	Internal storage – smoke hazard management system	All indoor tyre storage facilities should have a smoke hazard management system in accordance with Clause E2.3 and Specification E2.2c of Volume 1 of the NCC or as a minimum, provision of permanent natural ventilation in accordance with Table 2.2a, Volume 1 of the NCC	5.2.5
☐	Internal storage – sprinkler systems	Indoor tyre storage facilities storing in excess of the threshold defined for combustible goods in Table E1.5 (relevant to your state/territory) of Volume 1 of the NCC should have sprinkler system complying with AS2118.1 be installed. In Victoria, this is required regardless of the quantity stored. *Ref: Standards Australia, 2006, AS2118.1 Automatic fire sprinkler systems – Part 1: General systems*	5.2.4

	ASPECT	ESSENTIAL REQUIREMENT	REFERENCE SECTION
☐	External storage – fire hydrants	Sites should install a fire hydrant system complying with AS2419.1; Standards Australia, 2004, AS2419.1 (Amend Nos 1 and 2) Fire hydrant installations – Part 1: System design, installation and commissioning	5.3.2