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|------------------------------------|---|
| Licence number | L9210/2019/1 |
| Licence holder | AMC Metals Recyclers Pty Ltd |
| ACN | 610 071 111 |
| Registered business address | Suite 23/328 Albany Highway Victoria Park WA 6100. |
| DWER file number | DER2019/000315 |
| Duration | 23/06/2020 to 22/06/2040 |
| Date of issue | 23/06/2020 |
| Premises details | AMC Metals Recyclers Pty Ltd Lot 1943 on Deposited Plan 213940 Anderson Rd Karratha Industrial Estate, WA 6714 Certificate of Title Volume 1806 Folio 356 |

| Prescribed premises category description (Schedule 1, <i>Environmental Protection Regulations 1987</i>) | Assessed production / design capacity |
|---|--|
| Category 47: <i>Scrap metal recovery</i> | 2,000 tonnes per year |
| Category 57: <i>Used tyre storage</i> | 2,000 tyres at any one time |
| Category 61A: <i>Solid waste facility</i> | 5,000 tonnes per year |
| Category 62: <i>Solid waste depot</i> | 10,000 tonnes per year |

This licence is granted to the licence holder, subject to the attached conditions, on 23 June 2020, by:

Stephen Checker
MANAGER, WASTE INDUSTRIES
REGULATORY SERVICES

Delegated Officer
under section 20 of the *Environmental Protection Act 1986* (WA)

Licence history

| Date | Reference number | Summary of changes |
|------------|------------------|-------------------------|
| 23/06/2020 | L9210/2019/1 | <i>Licence granted.</i> |

Interpretation

In this licence:

- (a) the words 'including', 'includes' and 'include' in conditions mean "including but not limited to", and similar, as appropriate;
- (b) where any word or phrase is given a defined meaning, any other part of speech or other grammatical form of that word or phrase has a corresponding meaning;
- (c) where tables are used in a condition, each row in a table constitutes a separate condition;
- (d) any reference to an Australian or other standard, guideline, or code of practice means the version of the standard, guideline, or code of practice in force at the time of granting of this licence and includes any amendments to the standard, guideline or code of practice which may occur from time to time during the course of the licence;
- (e) unless specified otherwise, any reference to a section of an Act refers to that section of the EP Act; and
- (f) unless specified otherwise, all definitions are in accordance with the EP Act.

NOTE: This licence requires specific conditions to be met but does not provide any implied authorisation for other emissions, discharges, or activities not specified in this licence.

Licence conditions

The licence holder must ensure that the following conditions are complied with:

Infrastructure and equipment

1. The licence holder must ensure that the site infrastructure and equipment listed in Table 1 and located at the corresponding infrastructure location is maintained and operated in accordance with the corresponding operational requirement set out in Table 1.

Table 1: Infrastructure and equipment requirements

| Site infrastructure and equipment | Operational requirement |
|---|--|
| Workshop | <ul style="list-style-type: none"> Constructed of metal with a concrete, impermeable, base; Enclosed. |
| Dual shaft tyre shredder | <ul style="list-style-type: none"> Will produce a tyre output of approximately 25mm to 30mm shreds. The combined throughput capacity from the shredders is approximately 3 tonnes per hour and will be operating for 8 hours per day. Maintained in accordance with manufacturers recommendations. Equipped with misters or water sprays |
| Y82LT Series scrap tyre bailing machine | <ul style="list-style-type: none"> Used to bale tyres and plastics Maintained in accordance with manufacturers recommendations |
| Fire hydrants | <p>The fire hydrants must be installed, operated and maintained in accordance with:</p> <ul style="list-style-type: none"> AS 2419.1; AS 1851-2012. Minimum of two fire hydrants are to be located within the premises boundary, for use in the event of a fire within the container storage area or workshop area; and Minimum hydrant flow rate of 20L/s is provided at suitable pressure in accordance with AS2419.1. |
| Trucks/Forklifts/ Excavator with sorting grab | <ul style="list-style-type: none"> Vehicle speeds limited to $\leq 10\text{km/ hour}$ within the premises boundary. |
| Six sea containers | <ul style="list-style-type: none"> Constructed of metal. Equipped with doors and able to be fully closed, sealed and locked. Used for the storage and/ or exporting of shredded and baled tyres, shredded and baled plastics and scrap metals from the premises. |

2. The Licence Holder must ensure that:
 - (a) individual tyre stacks do not exceed:
 - i. 60 square metres (60m²);
 - ii. 12.5 tonnes in weight;
 - iii. 3 metres in height;
 - (b) there must be no more than two individual stacks grouped together in the shredding area;

- (c) there must be a separation distance of 2.5m between tyre stacks.
- (d) shredded tyres are immediately placed into shipping containers that will be sealed when full or when daily shredding activities cease.
- 3. The Licence Holder must ensure contaminated firefighting water is not discharged beyond the boundary of the Premises in the event of a fire.
- 4. The Licence Holder must ensure that following a fire any contaminated liquid is removed from the premises by a carrier licensed under the *Environmental Protection (Controlled Waste) Regulations 2004*.

Waste processing specifications

- 5. The Licence Holder shall ensure that wastes accepted onto the Premises are only subjected to the processes set out in Column 2 and in accordance with any process limits described in Column 3 of Table 2.

Table 2: Waste Processing

| Column 1 | Column 2 | Column 3 |
|---|--|--|
| Waste Type | Process | Process Limits |
| Scrap metal (ferrous and non-ferrous metals, other than fire extinguishers) | Receipt, handling, sorting and storage prior to removal offsite. | All Ferrous metal is to be stored inside the steel container as defined in Figure 2 of Schedule 1. |
| Tyres | Receipt, handling, shredding, compacting/bailing and storage prior to removal offsite. | <p>Tyres arriving on site must be stored inside the steel shipping containers and in accordance with Department of Fire & Emergency Services Guidance Note 02: <i>Bulk storage of rubber tyres including shredded and crumbed tyres</i>.</p> <p>The tyre shredding equipment must be equipped with sprays or be otherwise regularly sprayed with water to prevent heat build-up that could result in combustion.</p> |
| Plastics | Receipt, handling, shredding, compacting/bailing and storage prior to removal offsite. | Plastics arriving on site must be stored inside the steel shipping containers |

Fire controls

- 6. The Licence Holder must actively manage the risk of fire and fire hazards at the Premises. Minimum management controls include:
 - (a) maintaining an emergency response plan with respect to fire, in accordance with AS 3745;
 - (b) tyres must not obstruct or obscure fire protection equipment or related signage; and
 - (c) maintaining one carbon-dioxide, three dry chemical powder and four foam type fire extinguishers onsite in good working order.

Dust management

7. The Licence Holder must ensure that:
- (a) all waste stockpiles; and
 - (b) all unsealed access roads are maintained in a damp state at all times during operation.

Noise management

8. The Premises must only operate the shredder and the bailer between the hours of 08:00 to 16:00hrs Monday to Friday, and 08:00 to 12:00hrs Saturday, not including public holidays.

Waste monitoring requirements

9. The licence holder must record the total amount of waste accepted onto the premises, for each waste type listed in Table 3, in the corresponding unit, and for each corresponding time period, as set out in Table 3.

Table 3: Monitoring of inputs and outputs

| Waste type | Unit | Frequency |
|---------------------------------------|------------------|---|
| Scrap Metal (Ferrous and Non-Ferrous) | Tonnes | Each load arriving and leaving the Premises |
| Plastics | | |
| Tyres | Individual units | |

Noise monitoring requirements

10. The licence holder must notify the CEO of the commissioning date of the shredder within 14 days after the commissioning of the shredder.
11. Within 120 days after the commissioning date of the shredder, the Licence Holder must retain the services of a person qualified and experienced in the area of environmental noise assessment and who by their qualifications and experience is eligible to hold membership of the Australian Acoustical Society or the Australian Association of Acoustical Consultants to:
- (a) assess in accordance with the methodology required in the *Environmental Protection (Noise) Regulations 1997*, the compliance of the noise emissions from the primary activities, against the relevant assigned levels specified in those Regulations; and
 - (b) compile and submit to the licence holder within 120 days after the commissioning of the shredder, a report in accordance with condition 12.
12. A report prepared pursuant to condition 11(b) is to include:
- (a) a description of the methods used for monitoring of noise emissions from the premises; and
 - (b) details and results of the assessment of the noise emissions from the premises, against the relevant assigned levels in the *Environmental Protection (Noise) Regulations 1997* undertaken pursuant to condition 10(a); and
13. The Licence Holder must submit to the CEO the report prepared pursuant to condition 11(b) within 14 days of receiving it.

- 14.** Where an assessment pursuant to condition 11(a) indicates that noise emissions do not comply with the relevant assigned levels in the *Environmental Protection (Noise) Regulations 1997*, the license holder must:
- (a) within 60 days of receiving an assessment report pursuant to condition 11(b), prepare a plan to ensure the undertaking of the licensed activity will no longer lead to any contravention of the *Environmental Protection (Noise) Regulations 1997*; and
 - (b) provide to the CEO a copy of the plan prepared pursuant to condition 14(a) within 30 days of its preparation.

Site security

- 15.** The licence holder must:
- (a) erect and maintain suitable fencing to prevent unauthorised access to the site;
 - (b) ensure that any entrance gates to the premises are securely locked when the premises is unattended; and
 - (c) undertake regular inspections of all security measures and repair damage as soon as practicable

Records and reporting

- 16.** The licence holder must maintain accurate and auditable books including the following records, information, reports, and data required by this licence:
- (a) the calculation of fees payable in respect of this licence;
 - (b) any maintenance of infrastructure that is performed in the course of complying with condition 1 of this licence;
 - (c) complaints received under condition 18 of this licence.
- 17.** The books specified under condition 16 must:
- (a) be legible;
 - (b) if amended, be amended in such a way that the original version(s) and any subsequent amendments remain legible and are capable of retrieval;
 - (c) be retained by the licence holder for the duration of the licence; and
 - (d) be available to be produced to an inspector or the CEO as required.
- 18.** The licence holder must record the following information in relation to complaints received by the licence holder (whether received directly from a complainant or forwarded to them by the Department or another party) about any alleged emissions from the premises:
- (a) the name and contact details of the complainant, (if provided);
 - (b) the time and date of the complaint;
 - (c) the complete details of the complaint and any other concerns or other issues raised; and
 - (d) the complete details and dates of any action taken by the licence holder to investigate or respond to any complaint.

- 19.** The licence holder must:
- (a) undertake an audit of their compliance with the conditions of this licence during the preceding annual period; and
 - (b) prepare and submit to the CEO by no later than 30 days after the end of that annual period an Annual Audit Compliance Report in the approved form.

Definitions

In this licence, the terms in Table have the meanings defined.

Table 5: Definitions

| Term | Definition |
|---------------------------------------|---|
| ACN | Australian Company Number |
| Annual Audit Compliance Report (AACR) | means a report submitted in a format approved by the CEO (relevant guidelines and templates may be available on the Department's website). |
| annual period | a 12 month period commencing from 1 February the previous year until 31 January of the immediately following year. |
| books | has the same meaning given to that term under the EP Act. |
| CEO | means Chief Executive Officer of the Department. "submit to / notify the CEO" (or similar), means either: Director General Department administering the <i>Environmental Protection Act 1986</i> Locked Bag 10 Joondalup DC WA 6919 or: info@dwer.wa.gov.au |
| Department | means the department established under section 35 of the <i>Public Sector Management Act 1994</i> (WA) and designated as responsible for the administration of the EP Act, which includes Part V Division 3. |
| discharge | has the same meaning given to that term under the EP Act. |
| emission | has the same meaning given to that term under the EP Act. |
| EP Act | <i>Environmental Protection Act 1986</i> (WA) |
| EP Regulations | <i>Environmental Protection Regulations 1987</i> (WA) |
| licence | refers to this document, which evidences the grant of a licence by the CEO under section 57 of the EP Act, subject to the specified conditions contained within. |
| licence holder | refers to the occupier of the premises, being the person specified on the front of the licence as the person to whom this licence has been granted. |
| Premises | refers to the premises to which this licence applies, as specified at the front of this licence and as shown on the premises map (Figure 1) in Schedule 1 to this licence. |

| Term | Definition |
|---------------------|---|
| prescribed premises | has the same meaning given to that term under the EP Act. |
| Waste | has the same meaning given to that term under the EP Act. |

END OF CONDITIONS

Schedule 1: Maps

Premises map

The boundary of the prescribed premises is shown in the map below (**Error! Reference source not found.**). The red line represents the Premises boundary.

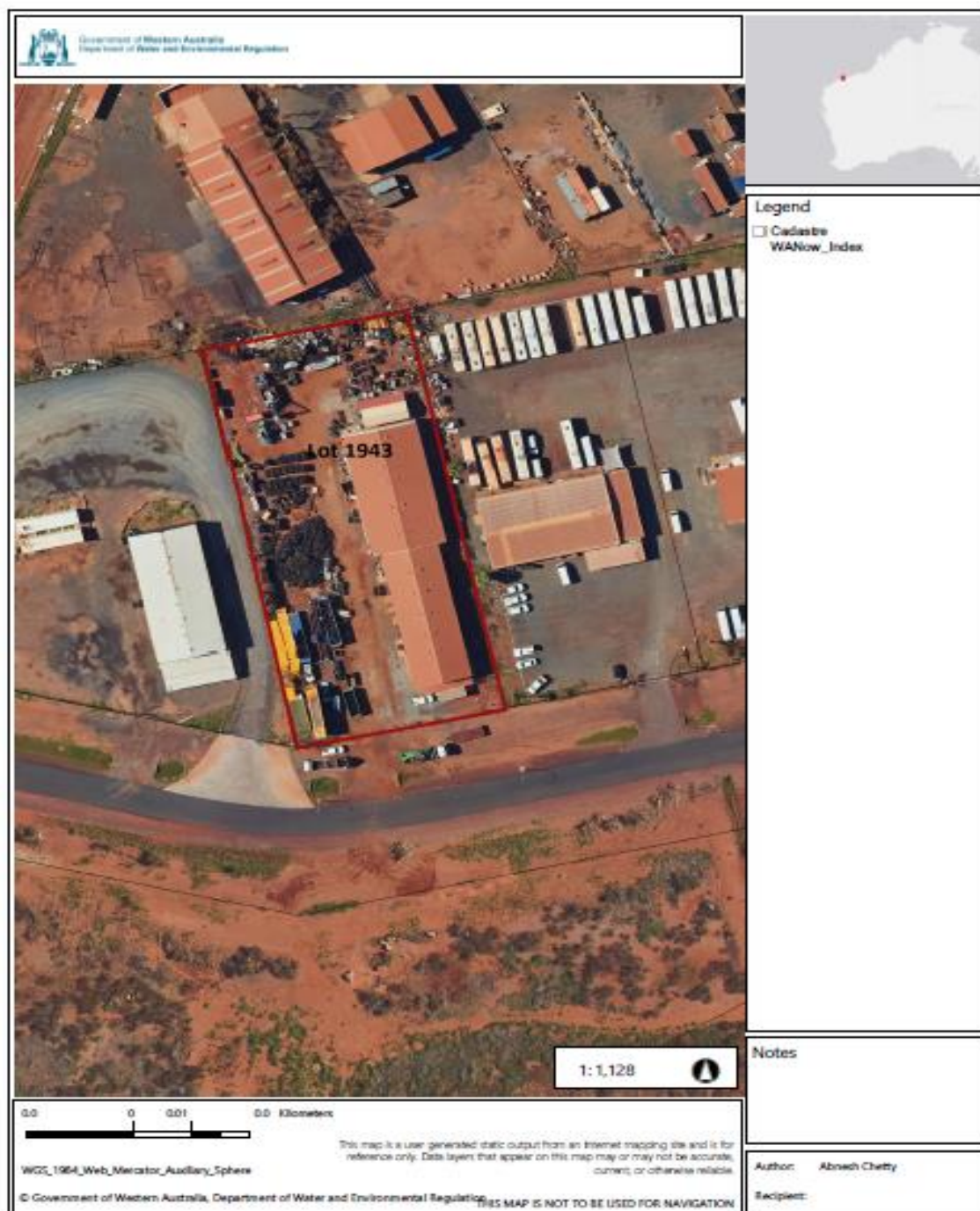


Fig 1: Premises boundary

Site layout

The Primary Activity infrastructure and equipment is set out on the Premises in accordance with the site layout specified on the Premises map in Schedule 1.

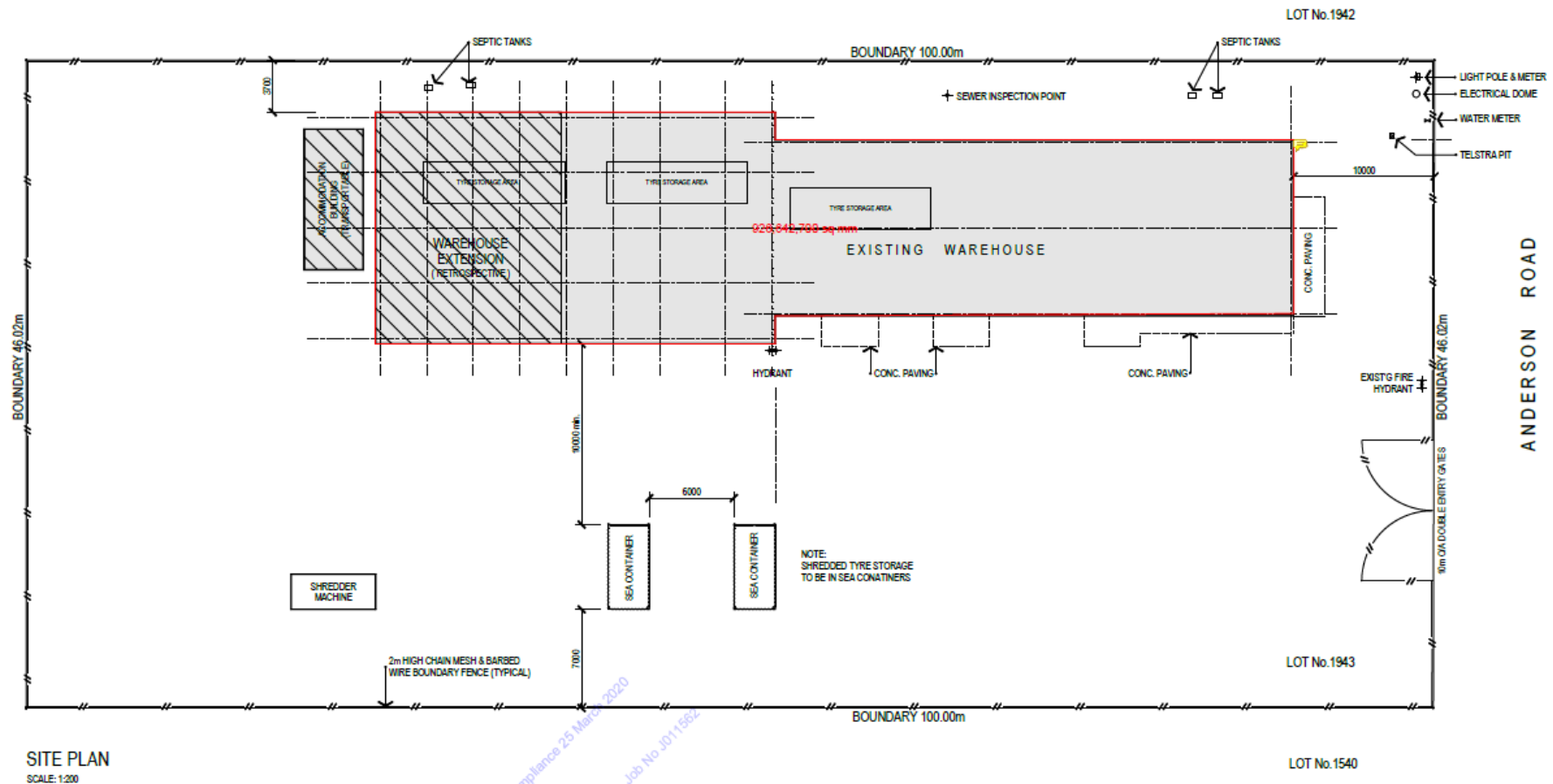


Fig 2: Site layout

Schedule 2: GN02

BULK STORAGE OF RUBBER TYRES INCLUDING SHREDDED AND CRUMBED TYRES



Government of Western Australia
Department of Fire & Emergency Services



DFES Special Operations Responses

Revised: 1st Issue
Valid: November 2019
Authorised: DFES Manager HAZMAT CBRN

GUIDANCE NOTE: GN02 BULK STORAGE OF RUBBER TYRES including SHREDDED and CRUMBED TYRES

1. INTRODUCTION

This Guidance Note (GN) focuses on collectors and recyclers of used tyres. These facilities generally store large quantities of tyres in stockpile and usually carry more risk than storage of new product. However, this GN may be used by any business which stores a significant amount of tyres on a permanent or temporary basis.

The general principals within this GN may be applied to storage practices of any other combustible materials that are stored for future processing or removal.

2. PURPOSE

This GN sets out the minimum fire safety recommendations for the storage of rubber tyres, including those in open yards (external) or stored within buildings and structures (internal).

Operators of any new facility intending to store new or used rubber tyres and related subsidiary products (including shredded and/or crumbed tyres) and existing facilities that are being modified to store rubber tyres, should comply with these recommendations.

3. ISSUES

Rubber tyres are not easily ignitable, however when on fire, they are extremely difficult to extinguish. The calorific value of rubber tyres is nearly 35,000 kilojoules/kilogram, which is generally twice that of other common combustible materials.

Tyres are considered a "Special/High Hazard" when burning; the high calorific value stored in tyres is released during combustion as heat and smoke and typically results in a very hot fire with enormous volumes of black smoke being generated. This presents a high hazard to the community, firefighters and environment.

Pyrolytic oil is also produced by tyre fires and needs to be recovered to minimise the environmental impact to soil and water. The physical properties of rubber tyres makes extinguishing tyre fires very difficult. Tyres are designed to absorb and retain heat and as such they do not readily cool when doused with water. The shape of tyres and informal stacking arrangements result in protected areas within the stack which are difficult to penetrate with extinguishing media. Rubber naturally repels water resulting in extinguishing media quickly being shed and drained away.

Due to these properties, tyre stacks involved in fire must be physically separated in order to be extinguished. Adopting the recommendations provided in this GN will assist DFES to effectively contain and extinguish tyre fires.

4. LEGISLATION

The storage, handling, transportation and disposal of used tyres are specifically controlled under the following Western Australian legislation:

- Currently, all facilities that store 100 tyres or greater of old (used) rubber tyres are required to be licensed by the Department of Water and Environment Regulations (DWER)
- *Environmental Protection Regulations 1987 (Part 6, Schedule 1 and Schedule 5) - Storage, Handling, Transportation and Disposal*
- *Environmental Protection (Controlled Waste) Regulations 2004 – Transport*
- 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
- Due to the hazardous nature of rubber tyre storage, the Western Australian Planning Commission may require any proposed facility be subject to a 'Fire Safety Study'
- *Building Act 2011 & Building Regulations 2012 - empowering legislation of the National Construction Code (NCC)* where there are structures involved with the storage / processing facility.

DFES encourages Fire Safety Studies to be undertaken in line with the New South Wales Department of Planning - Hazardous Industry Planning Advisory Paper (HIPAP) No.2.–[Fire Safety Study Guidelines](#)

If the facility includes a proposed NCC Class 7 Warehouse Building or NCC Class 8 Process/Production Building having a floor area greater than 500m², the building surveyor engaged to oversee compliance will be required under *the Building Regulations 2012* to submit plans to the FES Commissioner (DFES Built Environment Branch) for comment prior to issuing a Certificate of Design Compliance to the Permit Issuing Authority. Building surveyors should immediately consider a bulk tyre storage facility as a Special Hazard under the provisions of *BCA Part E1.10 "Provisions for Special Hazards"* when ensuring compliance with the BCA.

5. PLANNING A TYRE STORAGE AND/OR PROCESSING FACILITY

The prevention of a fire is the primary defence for any facility where tyres are stored, repurposed and disintegrated and therefore the design of the facility is crucial.

A good design must 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.

Whether designing a new facility, or upgrading an existing site, good fire emergency preparation involves engaging with your local DFES Career Fire Station or DFES Regional Office at design stages and continuing this liaison during operation.

Operators must also collaborate with all other relevant authorities incorporating all possible fire prevention methods into the layout and design of a facility.

5.1 Fire Risk Assessment

A fire risk assessment should be performed to identify all fire hazards at the site, determine the likelihood that a fire will occur, then determine the consequences of credible fire scenarios in terms of life safety, property protection, e.g. closure of runways, roads or rail and the environment.

The fire risk assessment will determine all the resources and equipment required to manage the consequences of the identified fire scenarios. The fire risk assessment should be performed in consultation with DFES Operations, and with the Built Environment Branch where there are buildings involved.

It is expected that, depending on site conditions, equipment available, emergency response procedures, available staff and level of training, etc., the fire risk assessment may require appropriate fire modelling and emission and dispersion modelling to determine possible off site extents of toxic products of combustion.

5.2 Emergency Preparedness

Pre-incident Emergency Plan

It is recommended that operators develop and document a pre-incident plan or a Fire and Emergency Services - Emergency Response Guide (FES-ERG) for the site that includes,

- Location of fire hydrants, sprinkler/hydrant boosters, fire service tapping(s), sprinkler control valves, fire pumps, static water tanks, etc.
- Location and quantity of any stocks of Class A and Class B foam concentrate held
- Firefighting actions appropriate to the site
- Control of firefighting water run off
- Location of drains, isolation valves, etc.
- Location of access points to the site
- Location of Hazardous Materials or Dangerous Goods stored on site
- Deployment procedures for fork lift trucks, earthmoving equipment, operators, etc.

Operators should also ensure that an appropriate number of trained equipment operators with the required personal protective equipment (PPE) are available to operate the fork lift trucks and like machinery. DFES personnel will not operate fork lift trucks, nor will they provide PPE for operators of a facility's fork lift truck during a fire emergency.

6. ACCEPTABLE AND UNACCEPTABLE RUBBER TYRE STORAGE

The following pictures are examples of acceptable and unacceptable storage configurations for both new and used tyres.

6.1 Acceptable Storage

Bundled Tyres

A number of tyres strapped together in bundles and stacked either within a racking system or on their sides.



Fig. 6.1.1 Tyres Bundled and Stacked – Adequate Separation

Pallet Systems

A system containing a number of tyres which includes stringers for material handling equipment.



Fig.6.1.2 Rack and Pallet System

Horizontal Systems

A system (e.g. pallets, shelving, and racks) where tyres are stacked upright along a horizontal length exceeding 1.5m.



Fig.6.1.3 Horizontally Stored Tyres

Laced Storage - For Outdoor Storage Only!

Tyres are stacked in an overlapping manner to create a woven or laced arrangement. This configuration helps limit fire spread as it reduces ability of burning tyres to fall and roll into unignited stock



Fig. 6.1.4 Tyres Stacked in Laced Arrangement - Outdoor Storage Only

Portable Systems

Small portable systems can be readily moved by fork lift.



Fig. 6.1.5 Portable Systems

6.2 Unacceptable Storage

Storage of Rubber Tyres - Internal and External

Tyres stacked on their treads, known as “Tread up” storage, is not acceptable (unless they are retained within a suitable rack storage system). In the event of fire, tread up tyres easily roll away and ignite neighbouring stacks.



Fig. 6.2.1 “Tread up” Storage with Inadequate Separation Gaps

Uncontrolled Storage

Fire Service access to a fire in this storage facility in the United States has not been provided. Timely extinguishment of an established fire would not be possible. Also, establishing an adequate fire-fighting water supply would be extremely challenging, or impossible.



X

Fig. 6.2.2 Extremely Challenging Firefighting Scenario

This haphazard method of storage has vegetation growing throughout which will provide an ignition source during summer months.



X

Fig.6.2.3 Haphazard Storage with Possible Ignition Source.

7. GENERAL REQUIREMENTS

7.1 External Storage

An external storage site should be level, clear of all rubbish and combustible material, and enclosed by fences or walls constructed of non-combustible materials.

The fence or wall should be sufficiently high and secure to keep unauthorised persons from entering the site.

A hydrant system complying with *Australian Standard (AS) 2419.1 Fire Hydrants Systems* should be provided when total quantity of outdoor storage exceeds 50 tonnes. Where the storage facility has or may be deemed a Special Hazard, i.e. large tyre facility.

NOTE: For further details regarding the provision of an adequate firefighting water supply, refer to: [DFES Guidance Note GN 1 Firefighting Water Supply Considerations for Special Hazards](#)

7.2 Size of Tyre Stacks and Piles

Individual stacks should not exceed 3.7m in height, 60m² in area and/or 12.5 tonnes in weight.

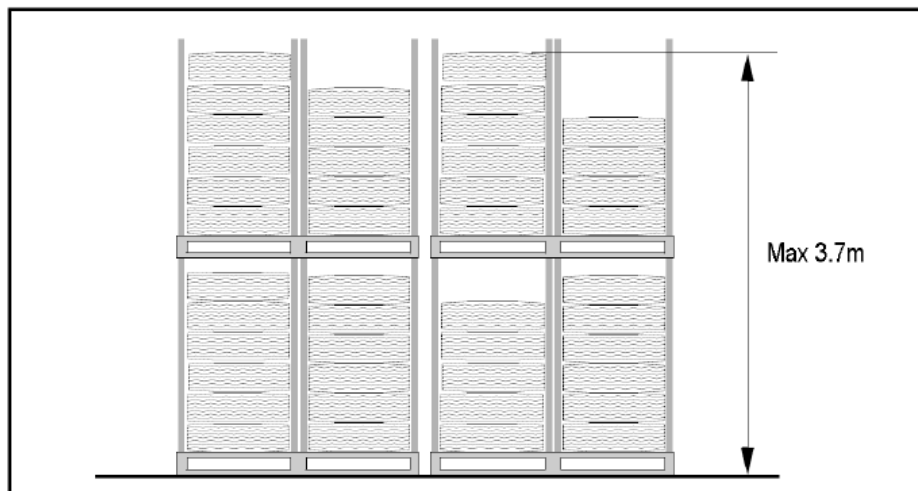


Fig. 7.2.1 Maximum Tyre Stack Height (elevated view)

7.3 Stacks and Piles

A maximum of four (4) individual stacks can be grouped. Each group of 4 stacks is referred to as a pile. A clear separation distance of not less than 2.5m at the base must be maintained between each stack.

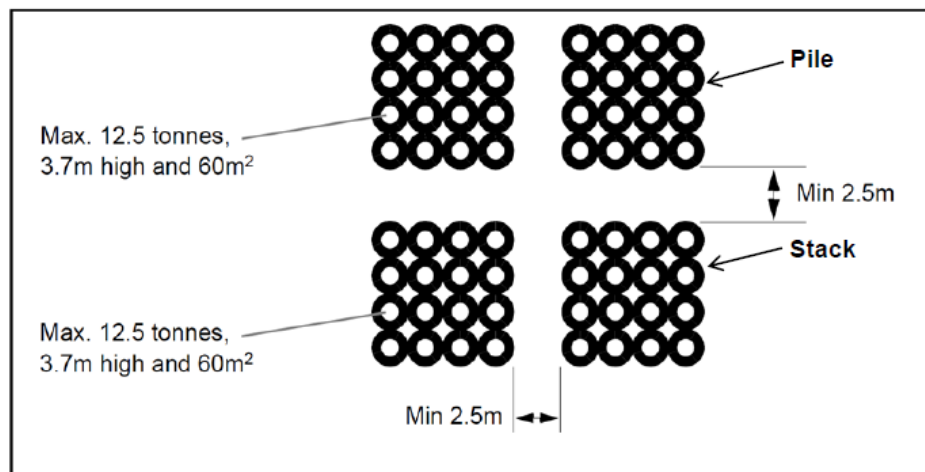


Fig. 7.3.1 Minimum Separation Distances Between 4 Stacks in 1 Pile.

A clear separation distance of not less than 18 metres must be maintained between each pile (4) stacks.

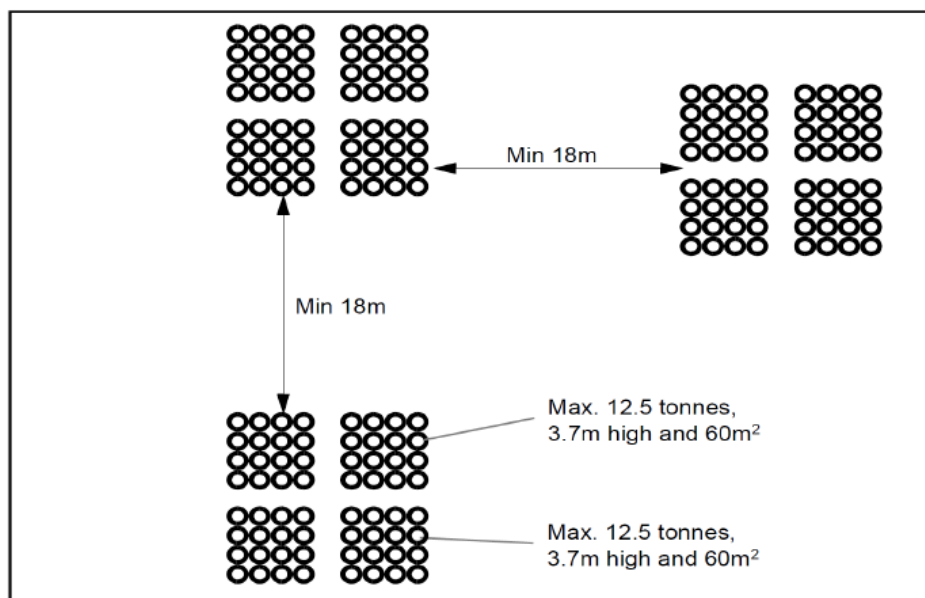


Fig.7.3.2 Minimum Separation Distance Between Piles

7.4 Licensing of Tyre Storage facilities

If rubber tyre storage is required to be greater than one pile (>1 x group of 4 stacks), the tyre storage facility is required to be licenced by the Department of Water and Environment Regulation (DWER) as the storage capacity may exceed 50 tonnes in weight.

Classification of External Storage

- A facility having a tyre storage capacity not greater than one pile (i.e. less than 50 tonnes) is classified, (i.e. for the purpose of this GN or DWER Legislation) as a “**Small Tyre Facility**”.
- A facility having a tyre storage capacity greater than one pile (i.e. 50 tonnes or more) is classified, (i.e. for the purpose of this GN or DWER Legislation) as a “**Large Tyre Facility**”.

7.5 Internal Tyre Storage

7.5.1 Provisions for Special Hazards

Bulk volumes of tyres stored inside a building are considered by DFES to be a Special Hazard in line with the provisions of the Building Code of Australia (BCA) **Part E1.10, “Provisions for Special Hazards”**. The following is provided as the DFES position to ensure the Special Hazard is adequately addressed to meet compliance with the BCA.

7.5.2 Smoke and Heat venting

Buildings which have a fire compartment floor area of 2000m² or more and contains more than 10 tonne of tyres are to have (in addition to other BCA requirements) smoke and heat vents complying with BCA specification E2.2c.

7.5.3 Sprinkler Protection

Buildings which have a fire compartment floor area of 2000m² or more and contain more than 20 tonnes of tyres are to have a sprinkler system complying with *Australian Standard (AS) 2118.1. Automatic Fire Sprinkler Systems* (as amended), in particular Clause 11.7.2, Rubber Tyre Storage.

7.5.4 Storage Configuration

Individual tyre stacks within buildings or structures should not exceed 3.7m in height and 30m² in area.

Stored tyres must remain at least 1m clear in all directions from the underside of the building's roof or ceiling, roof structure members, lights (including light fixtures) and sprinkler heads. This minimum clearance is to be increased as necessary to facilitate operation of sprinkler systems as designed.

A minimum clearance of 1m must be maintained along paths of travel to required exits and firefighting equipment (e.g. fire hose reels, fire extinguishers & fire hydrants). The paths of travel must be kept clear and unobstructed at all times.

7.5.6 Non sprinkler protected buildings

A minimum clearance of 3m should be provided between stacks and any load bearing building elements in a non-sprinkler protected building. This will increase the time the building will remain structurally adequate during a fire incident and possibly facilitate an internal fire attack by DFES.

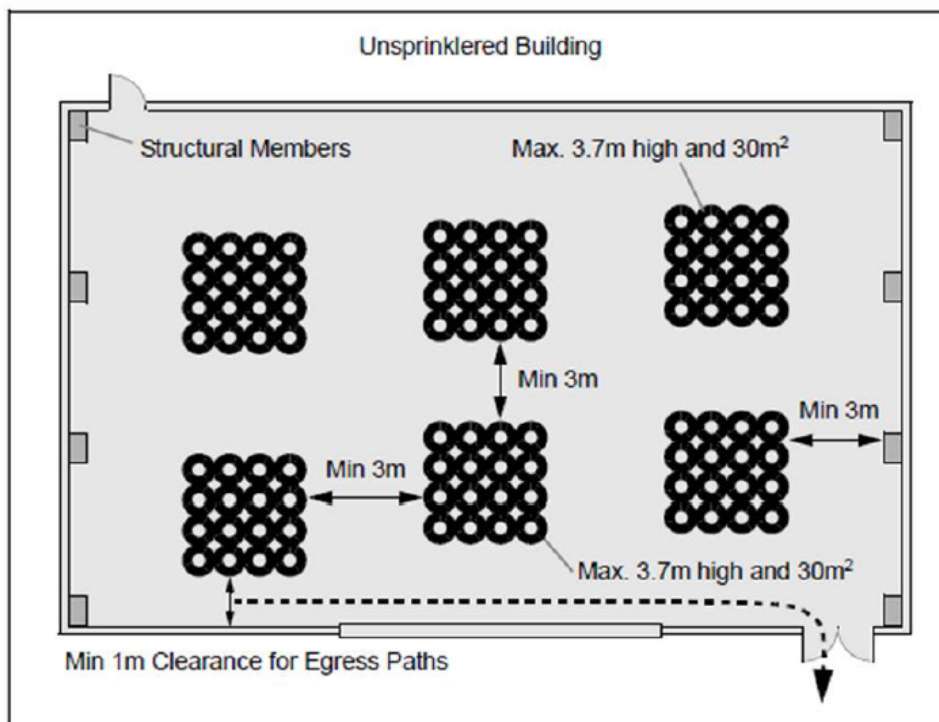


Fig.7.5.6.1 Minimum Clearance Distances – Non Sprinkler Protected buildings

7.5.7 Sprinkler Protected Buildings

Sprinkler system design must be suitable for the hazard to be effective. AS 2118.1 *Automatic Fire Sprinkler Systems* recognises the problematic nature of tyres involved in fire and as such AS 2118.1 *Automatic Fire Sprinkler System* Table A4.4 (A) lists tyre storage as a "Special Commodity" requiring specific storage considerations. Storage configuration guidance is provided in AS 2118.1 *Automatic Fire Sprinkler System* Section 11.

It is important for tyre storage operators taking occupancy of new or existing premises where an automatic fire sprinkler system is installed to ensure the storage config-

uration used is in line with the guidance provided by *AS 2118.1 Automatic Fire Sprinkler System*

It is also important that when taking occupancy of existing premises having an automatic fire sprinkler system installed that the design of the sprinkler system is suitable for the risk being introduced to the building. It is recommended that where this occurs, the building owner engages the original installer (where available) to inspect the sprinkler system, having consideration for tyre storage, and if found to be satisfactory to issue certification to the building owner to that effect - refer *AS 2118.1 Automatic Fire Sprinkler System* Sect 14.2.4 & Appendix G.

7.6 EXTERNAL TYRE STORAGE

Minimum Boundary Clearances

7.6.1 Small Tyre Facilities (less than 50 tonnes)

1. Tyre stacks should be no closer than 6m to all buildings on the same allotment having non-combustible external walls.
2. Tyre stacks should be no closer than 18m to all buildings on the same allotment having combustible external walls.
3. Tyre stacks should be no closer than 18m to allotment boundaries, except in the following circumstances;

The far side of a public road reserve that adjoins the site may be considered the allotment boundary for the purposes of clearance, however tyre stacks must remain at least 6m back from the actual allotment boundary/s facing the public road/s

Where boundaries have non-combustible walls/windows/doors e.g., masonry, of equal or greater height to the tyre stacks (3.7m), the separation distance may be reduced to 6m.

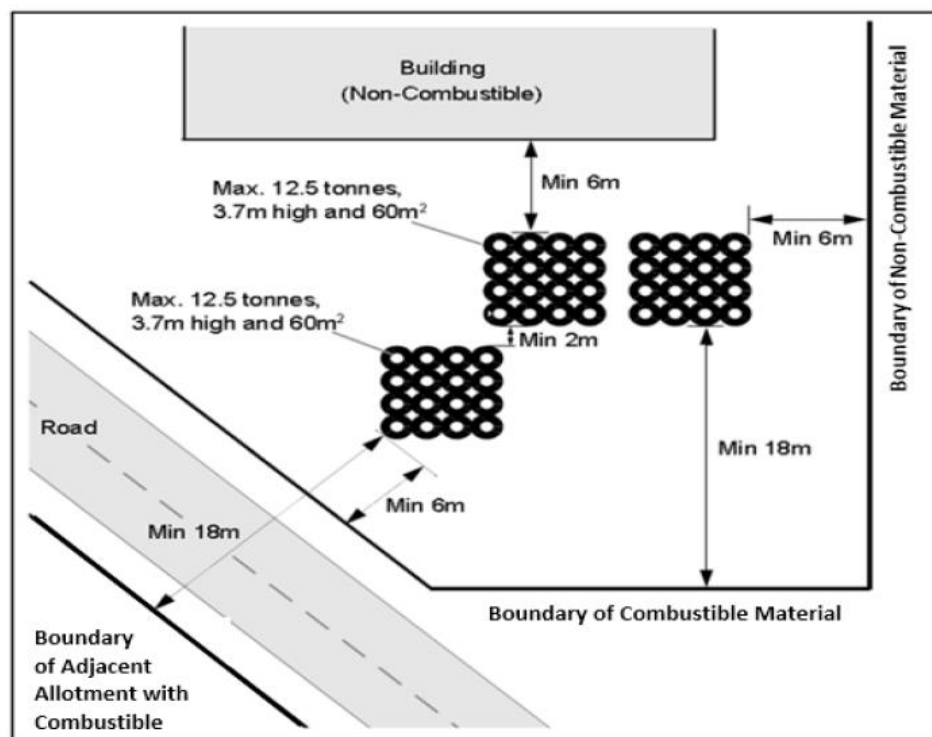


Fig. 7.6 Minimum Boundary Clearances for Small Tyre Facilities

7.6.2 Large Tyre Facilities (50 tonnes or more)

Tyre stacks should be at least 18m from any boundary or building on the allotment, except that the far side of a public road reserve that adjoins the site may be considered the allotment boundary for the purposes of this GN, however tyre stacks must remain at least 6m back from the actual allotment boundary/s facing the public road/s.

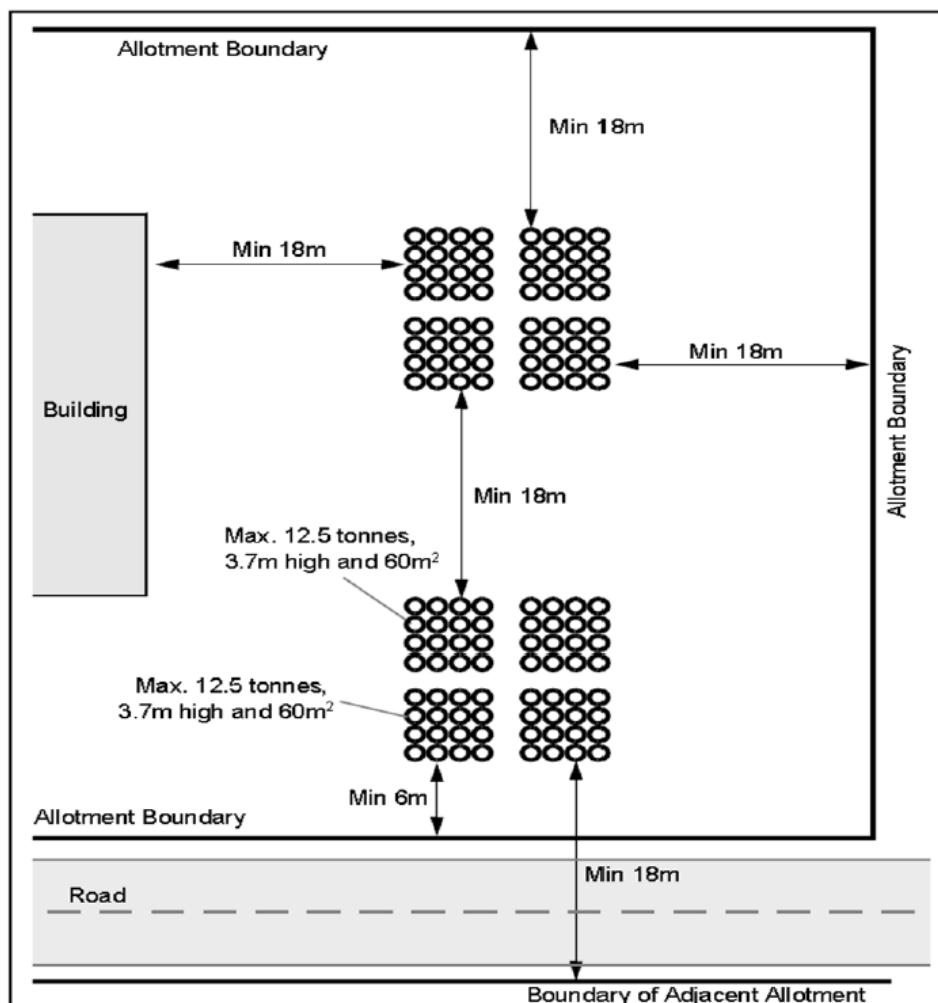


Fig. 7.3.2 Minimum Boundary Clearances for large Tyre Facilities

8. SITE ACCESS FOR EMERGENCY FIRE SERVICE APPLIANCES

Any external tyre storage facility should have at least two site access points, each being not less than 4m wide, refer figure 8.1.

NOTE: Where the facility includes a structure that has been constructed to meet BCA Part C2.3 "Large Isolated Buildings", in particular where a 6m wide vehicular access path and an 18m clear unobstructed distance around the building is required, or the building is subject to a performance solution that includes an emergency vehicular access strategy, the requirements will be the more stringent of either this GN or the BCA. This will ensure BCA compliance benchmarks are either met or exceeded.

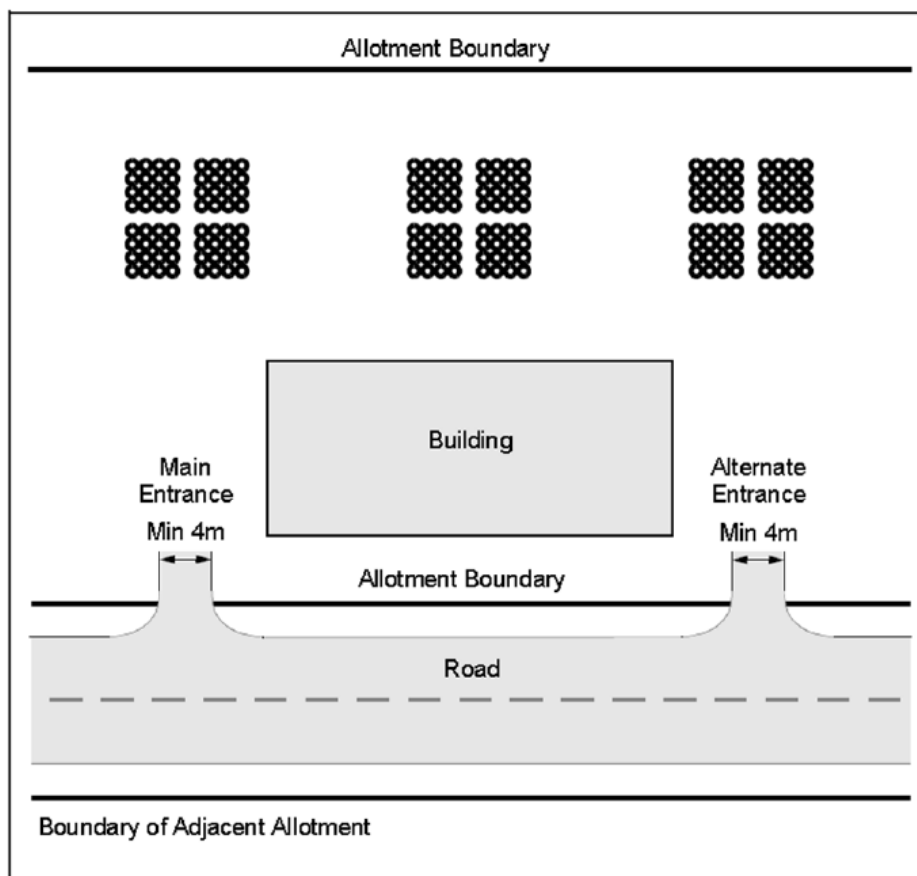


Fig. 8.1 Site Entry Requirements – Any External Storage

9. SITE CONTAINMENT OF ENVIRONMENTAL CONTAMINANTS

9.1 Containment of Firefighting Water, Oil and Other Liquid Products of Combustion.

If the tyre storage facility has a hydrant and/or sprinkler system, provision must be made for the retention of contaminated water run-off. Where the design of the systems does not demand a greater flow as determined through consideration of [DFES Guidance Note GN1 Firefighting Water Supply Considerations for Special Hazards](#) then the following provisions are to be met.

9.2 Sprinkler Protected (internal storage)

Capacity for firefighting water run-off is to be a calculated design. Determine the number of hydrants operating simultaneously at 10 L/sec for four (4) hours using [Table 10.1](#). The calculated maximum sprinkler design output operating for a period of

90 minutes (simultaneous operation with hydrants) is to also be included in the total fire water run-off.

9.3 Non Sprinkler protected (internal and external storage)

If the storage facility does not have a sprinkler system, or the storage is in an external yard the demand from a hydrant system will be greater. In this case, the number of operating hydrants should be determined using **Table 10.1** and calculated for an operating time of four (4) hours. The total containment capacity should be determined as part of a site fire risk assessment and in conjunction with DFES Operations Command.

NOTE: Where adherence to AS 2419.1 Fire Hydrants Systems, is required by the BCA due to the presence of structures, the flow rates used to determine retention requirements will be the greater of this GN or AS 2419.1 Fire Hydrants Systems.

9.4 Fixed Monitors

Where fixed monitors are installed, the containment requirements for their discharge should be determined using the design flow rate based on the design data available from the system installer and determination of the number of monitors likely to be used simultaneously, or where the number likely to be used is unknown, the highest flow capacity of the system.

10. WATER SUPPLY (FIRE HYDRANT) REQUIREMENTS

Maintaining an adequate water supply source for use by DFES in the event of a tyre fire is a critical component of site operations. The availability of fire hydrants is essential to fire protection. Fire hydrants may be used to control the spread of fire, protect neighbouring properties and extinguish an outbreak of fire, or extinguish a fire controlled by an automatic fire protection system, such as sprinkler and foam systems.

Although fire hydrants are installed within properties for use by DFES, they may also be used by trained personnel.

An adequate source of water is a fundamental consideration in the design of a fire hydrant installation and may comprise water from more than one source. A source based on four (4) hour duration at the flow rates determined using **Table 10.1**, or through consideration of **DFES Guidance Note GN 1 Firefighting Water Supply Considerations for Special Hazards** (whichever is the greater) is regarded as the minimum safe quantity to enable DFES to commence an initial attack to limit fire spread, protect neighbouring properties and extinguish the fire.

NOTE: The flow rates given in AS 2419.1 Fire Hydrants Systems Table 3.3 for Protected Open Yards should not be considered adequate to protect "Tyre Storage" open yards. Rubber tyres involved in fire present greater extinguishment and control challenges than the flow rates prescribed in Table 3.3 will support.

It is suggested that the number of hydrants required to flow simultaneously for effective control of a fire in open yard tyre storage would be better determined using [DFES Guidance Note GN1 Firefighting Water Supply Considerations for Special Hazard & Dangerous Goods Sites](#), or Table 10.1 below, whichever concludes the highest flow rate.

| Table 10.1 | | |
|--|-----------------------------|--|
| Number of Fire Hydrants Outlets to Discharge Simultaneously @ 10 litres / second According to Size and Type of Tyre Storage Facility | | |
| Internal Storage | Fire Compartment Floor Area | Number of Outlets |
| Non-Sprinklered internal | <5000 m ² | 3 |
| Non-Sprinklered Internal | ≥5000 m ² | 4 Plus one additional outlet for each additional 5,000m ² or part thereof |
| Sprinklered Internal | <5000 m ² | 2 |
| Sprinklered Internal | ≥5000 m ² | 3 |
| External Storage | Area Used For Storage | Number of Outlets |
| Open Yard | <5000 m ² | 3 |
| Open Yard | ≥5000 m ² | 4 Plus one additional outlet for each additional 5,000m ² or part thereof |
| Fixed Monitor Protection | Area protected | Flow rate |
| | As per design | Refer installer |

Note: Except where modified by this GN, the fire hydrant system is to be otherwise designed, installed, and commissioned in accordance with AS 2419.1 Fire Hydrants Systems.

11. SHREDDED AND CRUMBED TYRES *(Referenced, UK Health and Safety Executive Briefing Note)*

Further to the provisions above, additional provisions should be considered for facilities storing and handling crumbed or shredded tyres. In the production of rubber shred or crumb whole tyres have to be chopped into small chips. In some cases chips are ground much more finely and the metal content of the tyres is removed so that it can be safely used for human contact, e.g., playground soft-fall surfacing.

Chopping and grinding of tyres produces a low density, porous material through which air may percolate. The total surface area of tyre chips or crumb particles may also be large compared with the volume occupied. The combination of permeability to air-flow and a high exposed surface area means that a combustible material such as rubber is potentially susceptible to spontaneous combustion.



Fig. 11 Raw material (whole tyres), tyre shred, and tyre crumb

11.1 Practical experience

In practice spontaneous ignition of large stockpiles of tyre shred or deep landfill deposits has occurred on numerous occasions. Practical experience suggests auto-ignition normally occurs in large stockpiles (more than 3m deep).

Surface symptoms of the onset of spontaneous combustion can be subtle: a slight sulphurous odour, condensation aerosols emerging from vents or evidence of oil contamination of rainwater draining through the tyre shred. The fire may intensify from smouldering to flaming as the combustion wave reaches the surface or if the pile is disturbed allowing ingress of additional air.

11.2 Comparisons with other materials

Laboratory experiments show that rubber crumb and tyre shred are more susceptible to self-heating than cellulosic materials (like hay and straw) in conditions of high ambient temperature. Typically a given volume of tyre shred will spontaneously ignite at a lower ambient temperature than an equivalent volume of hay. On the other hand tyre shred is not as prone to biological heating that raises the internal temperature above ambient and may act as a trigger to spontaneous combustion.

Controlled experiments suggest that even piles of clean tyre shred or rubber crumb with a depth greater than around one metre may spontaneously ignite from ambient temperatures, if the level of ventilation is unfavourable. The initiation times are generally long (many weeks).

11.3 Factors increasing risk

The risk of ignition in practical circumstances may be raised by contamination of the tyres (which may allow biological heating in damp conditions) or by the rusting of exposed wires (which also generates heat). The stripping of rubber from wire in the tyre chopping process may be associated with blunting of blades in the shredding machine.

11.4 Mitigation of ignition risk

Many of the standard methods of protection against spontaneous combustion are applicable to tyre shred:

- Control of material risk factors e.g. exposed metal content
- Piles should not be deeper than 3m
- Control of moisture levels
- Management of stock to prevent piles being left for long periods
- Sub-surface temperature monitoring
- Turning of piles at risk of spontaneous heating
- Minimising external heating e.g. shading from direct sunshine
- Control of ventilation by enclosure - if possible
- Localised sources of heat e.g. heated pipes, hot light bulbs, space heaters, braziers, shrink-wrapping equipment etc. should all be kept away from tyre shred piles.

12. Fire fighting

Once established, combustion in large piles of tyre shred and rubber crumb is difficult to suppress. Direct application of water or foam in situ does not generally provide effective extinguishment and may hamper control of oily runoff pollution.

The first priority is separation of unburned material from the fire to restrict the extent of spread. It may be possible to remove burning material from the fire and finally extinguish with water or by burial.

Without appropriate controls during fire-fighting there is potential for serious occupational exposure for fire service personnel and heavy equipment operators, from poly-aromatic hydrocarbons, oxides of sulphur and other harmful combustion products.

12.1 Design guidelines to minimise internal heating of tyre shred fills

The following recommendations apply to tyre chip layers less than 3m deep and greater than 1m deep. Layers deeper than 3m are not recommended.

Lower standards may be acceptable for layers thinner than 1m.

- Tyre shreds shall be free of contaminants such as oil, grease, petrol, diesel fuels etc., that could create a fire hazard

- In no case should the tyre shreds contain the remains of tyres that have been subjected to fire
- Tyre shreds shall have a maximum of 25% (by weight) passing a 38mm sieve
- Tyre shreds shall have a maximum of 1% (by weight) passing a 4.75mm sieve
- Tyre shreds shall be free of fragments of wood, wood chips and other fibrous organic matter
- Tyre shreds shall have less than 1% (by weight) of metal fragments that are not at least partially encased in rubber
- Metal fragments that are partially encased in rubber shall protrude no more than 25mm from the cut end of the tyre shred on 75% of the pieces and by no more than 50mm on 100% of the pieces
- No direct contact between tyre shred and soil containing organic material e.g. topsoil
- Tyre shred should be separated from soil with a geotextile
- Use of drainage features at the base of the fill that could provide air access should be avoided

If temporarily stored on ground in piles with no containerisation, (internal or external) the preferred configuration of piles for firefighting purposes is for long thin rows rather than square or round piles. This configuration permits the rapid creation of a fuel break in the material either side of the burning area resulting in a more manageable fire size.

12.2 Maximum dimensions and minimum separation distances for rows of shred or crumb

- Max 20m long (followed by 5m gaps at ends)
- 3m high (to avoid heating & spontaneous combustion)
- Width of base 5m (approximate maximum)
- 6m between rows (to permit movement of earth moving equipment to create fuel break)
- No closer than 10m to structures (either same lot or neighbouring)

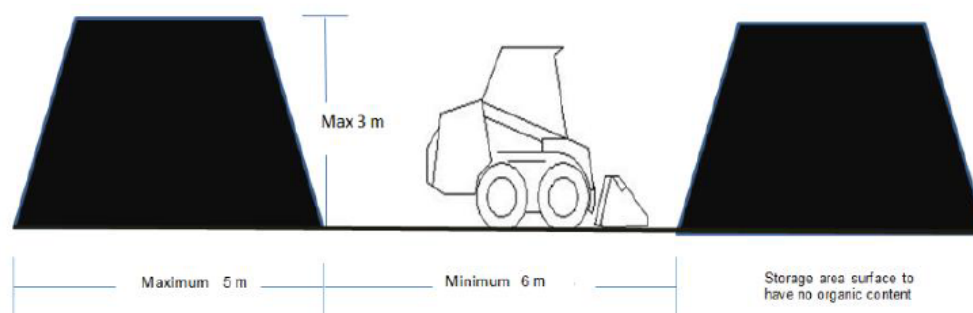


Fig 12.2.1 Cross sectional dimensions of shred and crumb rows

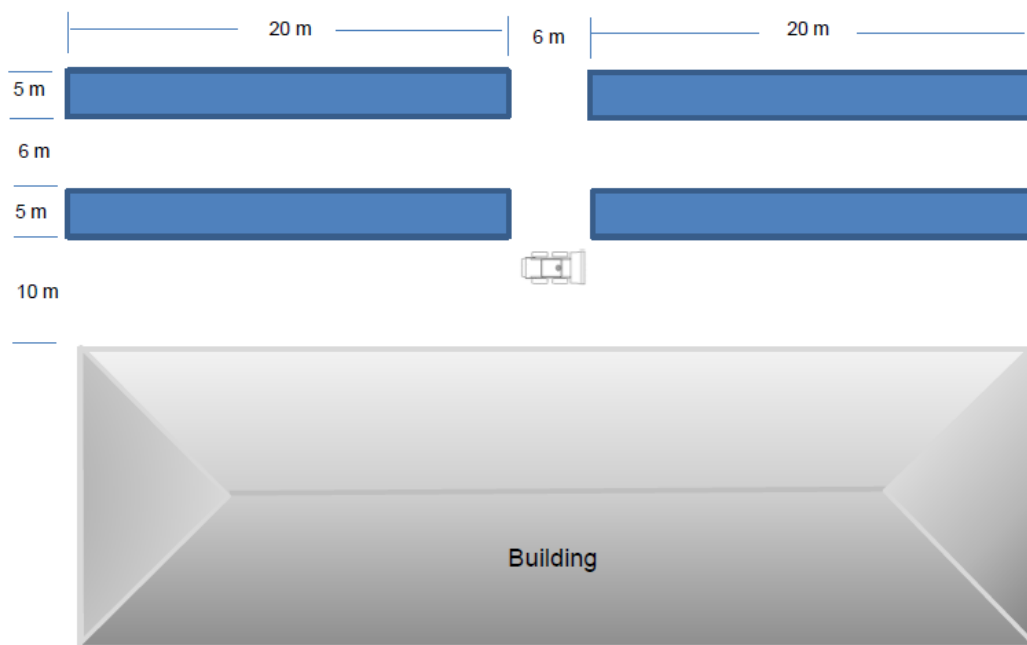


Fig 12.2.2 Plan view of separation distances

12.3 Firefighting water supply for shred and crumb storage

Where a facility is used for storing crumbed or shredded tyre product only (not manufactured from whole tyres stored at the same site) and storage/handling of the product is managed in accordance with these guidance notes, compliance with the Deemed to Satisfy hydrant flow provisions of *AS 2419.1 Fire Hydrants Systems* need only be met.

Fires in piles of tyre shred or crumb (as described above) are less intense than those in whole tyres and generally only produce a flame height of between 30 to 90cm making extinguishment possible with a fire water supply meeting the minimum requirements of *AS 2419.1 Fire Hydrants Systems*

12.4 Fire Water Containment

Fire water containment capacity at a shred or crumb storage facility should be calculated in line with the fire hydrant flow rates prescribed in the *AS 2419.1 Fire Hydrants Systems* and cumulatively the discharge densities prescribed in *AS 2118.1 Automatic Fire Sprinkler System* where the facility is sprinkler protected.

NOTE: If whole tyres are present, the run-off containment must be considered in line with Part 9 of this GN.

13. CONCLUSION

It is anticipated by DFES that adherence to this GN by industry and regulators will be adequately prioritised and be considered an integral part of business continuity and environmental sustainability rather than an impost.

It is DFES' view that if all of the strategies outlined in this GN are adopted in the design and management of a tyre storage or handling facility it will be as best as practicably possible operationally ready to support DFES objectives when responding to a fire incident.

This GN should be read in conjunction with [DFES Guidance Note GN3 Fire Safety Considerations for Open Yard Storage](#).

References;

National Construction Code / BCA, ACT, Australia. Australian Building Codes Board.
Australian Standard 2419.1 Fire Hydrants Systems: Design, Installation, and Commissioning
Australian Standard 2118.1 Automatic Fire Sprinkler Systems
HIPAP 2: Fire Safety Study Guidance Note January 2011 State of New South Wales Dept. of Planning.
DFES Guidance Note GN1 Firefighting Water Supply Considerations - Special Hazard & Dangerous Goods Sites
UK Health and Safety Executive. Spontaneous Heating of Piled Tyre Shred and Rubber Crumb – Briefing Note.

Legislation:

WA Building Act 2011
WA Building Regulations 2012 (as amended)
Fire Brigades Act 1942
Environmental Protection Regulations 1987
Department of Water and Environment Regulations
Environmental Protection (Controlled Waste) Regulations 2004 – transport
Environmental Protection Regulations 1987 (Part 6, Schedule 1 and Schedule 5) - storage, handling, transportation and Disposal
Environmental Protection Act 1986
Waste Avoidance and Resource Recovery Act 2007

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Should the information provided in this Guidance Note require further clarification, please contact DFES Manager Hazmat CBRN (08) 9395 9300.

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Contact us

Department of Fire and Emergency Services
Emergency Services Complex
20 Stockton Bend COCKBURN CENTRAL
PO Box P1174 Perth WA 6844
Tel: +61 8 9395 9300
Email: dfes@dfes.wa.gov.au
Web: www.dfes.wa.gov.au