

# Fire safety in waste management facilities



**PROCEDURAL**

**GUIDELINE**

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## Review period

This Position is part of a five-year review cycle and should be reviewed by the doctrine owner by 30 April, 2027

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# About AFAC and AFAC Doctrine

## AFAC

The Australasian Fire and Emergency Service Authorities Council (AFAC) is the Australian and New Zealand National Council for fire, emergency services and land management. It is a collaborative network of fire, emergency services and land management agencies that supports the sector to make communities safer and more resilient.

## AFAC Doctrine

AFAC develops doctrine to support the practice of emergency management. The information in doctrine publications is evidence based and drawn from academic research and the collective expert knowledge of member agencies. Doctrine is regularly reviewed and represents the official AFAC view on a range of topics.

Doctrine does not mandate action; rather, it sets aspirational measures. Publishing nationally agreed views, shared approaches and common terminology enhances cooperation and collaboration within and between agencies and jurisdictions.

## Types of AFAC Doctrine

AFAC Doctrine is classified as follows:

**Capstone doctrine** – includes publications, such as 'strategic intents', that are high-level accounts of the concepts of emergency management operations and service delivery. They describe the principles of what is practical, realistic and possible in terms of protecting life, property and the environment.

**Fundamental doctrine** – includes 'positions', which AFAC members are expected to support, as well as 'approaches' and some 'frameworks'. Fundamental doctrine may become agency or jurisdictional policy on a matter if adopted by individual services or jurisdictions.

**Procedural doctrine** – includes 'guidelines', some 'frameworks', and 'specifications'. AFAC members are expected to be aware of procedural doctrine. A guideline is an advisable course of action; a framework provides a linking of elements to create a supporting structure to a system, and specifications are a detailed description of a precise requirement to do something or build something.

**Technical doctrine** – includes 'technical notes', 'training material' and the *Australasian Inter-Service Incident Management System* (AIIMS). Technical doctrine provides guidance of a technical nature: the how to do something, or the technical meaning relative to a situation.

# About this document

This publication is a guideline (procedural doctrine). Other AFAC Built Environment doctrine at the time of publishing includes:

- Fire safety in the built environment position
  - *Fire Safety for road tunnels* guideline
  - *Fire safety requirements for automated vehicle parking systems* guideline
  - *Fire safety for impulse (jet) fans in carparks* guideline
  - *Fire safety principles for massive timber building systems* guideline
  - *Fire brigade intervention model manual*

## Source of authority

AFAC National Council endorsed *Fire safety in waste management facilities* on 5 May 2022.

## Purpose

The purpose of this document is to provide guidance on fire safety in waste facilities that receive, store or process combustible waste material, including adequate provision for fire safety and facilitate safe fire service intervention to protect life, property and the environment. This does not apply to general waste or landfill but does include variable combustible recyclable materials.

## Scope

This guideline details the requirements of AFAC members for:

- consideration of fire safety during all stages of a waste facility including site selection, planning, design, assessment and operation
- fire safety systems to be adequate to the special hazards identified within a waste facility and which also meet the operational needs of firefighters
- safe storage and stockpiling of combustible waste material based on expected combustibility and maximum pile size
- workplace fire safety and emergency management planning, including procedures for the event of fire or emergency incident.

The intention of the document, when read, understood and applied is to reduce the likelihood and consequence of fire, assist with firefighting intervention and protect life, property and environment from fire.

This guideline applies to any waste facility within Australia and New Zealand involved in the storage, processing or resource recovery of combustible waste material.

This guideline applies to any proposed development of a waste facility that involves a change of building use or building work that intends to meet the National Construction Code (NCC).

Waste management facilities may include a complex range of processes and waste materials that require significantly different responses. As a result, this guideline does not cover all waste management facilities, specifically, it does not apply to any waste facility, or areas of, that are being used for:

- landfill (but, may apply to a waste facility on the landfill site)
- composting, including in-vessel, green waste and anaerobic digestion
- liquid waste treatment
- hazardous chemicals or special waste treatment (e.g. waste tyres)
- less than 50 m<sup>3</sup> of combustible waste material.

**Note:** Fire safety requirements may still apply to waste facilities not covered by this guideline (e.g. composting, waste tyres). Refer to the applicable statutory provisions by the authority having jurisdiction (AHJ) for further information.

This guideline does not overrule any other requirement that specifically relates to the business or undertaking (e.g. guidelines for rubber tyre storage, dangerous goods code), nor does this guideline overrule any other specific condition that has been imposed on the waste facility.

This guideline is not a statutory document and should be given due consideration by each stakeholder as it relates to their role and responsibility in operating, managing, planning, designing, consulting, assessing or determining the case of any applicable waste facility.

Application of this guideline does not automatically provide an acceptable solution that avoids the involvement of fire authorities in the process. Fire services should always be involved early in the consultation phase of any development or risk management process.

**Note:** It is the responsibility of the designer to ensure compliance with the required jurisdictional legislation. Every project is unique and the information in this document should be used as a guide only. The designer should justify design solutions using performance based design briefs and processes outlined in the *Australian Fire Engineering Guidelines*.

This guideline is developed in the public interest and should be taken into consideration by any AHJ when determining a development application for a waste facility (refer to statutory provisions applicable to the site or proposed site).

**Note:** Under legislation, the AHJ may impose requirements from this guideline (in part or full) as a condition on the development.

It is recommended that site management conducts a risk management process for any given waste facility. This guideline should be read, understood and applied in conjunction with fire authority consultation. It is also recommended that an external consultant be engaged to provide specialist advice and support in the risk management process.

## Statement of engagement

This Position was prepared by AFAC's Built Environment and Planning Technical Group. Members of the group contributed information and guidance from their jurisdictions and also provided feedback during the development of the publication.

Special thanks to Fire and Rescue NSW for the use of their guideline as a foundation for the national doctrine, including the use of tables and graphs.

## Audience

This guideline is intended to be used by fire authorities to support a collaborative approach with any person conducting a business or undertaking, owner, development proponent (e.g. builder, fire engineer), planning/ environmental consultant, regulatory authority, or AHJ.

## Definitions, acronyms and key terms

**Authority having jurisdiction (AHJ)** – the council, government agency, state or territory development/ planning authority or person having the statutory authority to determine the outcome of an application as related to land use. This may vary depending on local legislation.

**Combustible waste material** – any solid waste material that can readily ignite and burn under normal conditions, which includes, but is not limited to:

- paper and cardboard
- wood and wood-based products
- plastic
- rubber, tyres and tyre-derived waste
- textiles
- organic material
- electronic waste (e-waste), such as:
- rechargeable batteries
- cathode ray tube monitors and televisions

- flat panel monitors and televisions
- information technology and telecommunications equipment
- lighting
- photovoltaic panels
- waste derived fuels such as refuse derived fuels (RDF), solid recovered fuels (SRF) and processed engineered fuels (PEF)
- metal and other materials with combustible contaminants
- any other waste material which may pose a notable fire risk like above.

Combustible waste material may include industrial or municipal waste.

**Note:** Unsorted mixed combustible waste material generally presents a greater ignition hazard than most other combustibles.

**Development authority** – the authority responsible for planning and/or development in your jurisdiction. Refer to local legislation for further guidance.

**Emergency plan** – a written plan which details the actions required to be undertaken by occupants of a premises during a fire or other emergency incident.

**Emergency response procedures** – written procedures outlining the response to an emergency, such as evacuation and/or activation of the emergency response team etc.

**Emergency services information folder** – a folder containing concise information necessary to allow emergency services to commence operations and develop effective strategies and tactics to manage a fire or other emergency incident.

**Fire service** – a statutory authority constituted under an Act of Parliament having as one of its functions, protect life and property from fire and other emergencies. In this document, the term fire service is interchangeable with fire brigade and fire authority.

**Fire service booster assembly** – a connecting device enabling the fire service to pressurise or pump water into a fire hydrant or fire sprinkler system.

**Fire service station** – a state government operated premises which is a station for a fire brigade.

**Fire service vehicle** – any vehicle that forms part of the equipment of a fire brigade and that is equipped with an audible warning device and flashing lights.

**Fire compartment** – as defined in the NCC.

**Fire hydrant** – an assembly installed on a mains water or private water pipeline, which provides a valved outlet to permit a supply of water to be taken for firefighting.

**Fire safety system** – an active and/or passive system which warns people of an emergency, provides safe evacuation, restricts or extinguishes fire.

**Fire-source feature** –

- the far boundary of a road, river, lake or the like adjoining the premises
- a side or rear boundary of the premises
- an external wall of another building which is not a Class 10 building.

**Fire water run-off** – residual water used in fighting the fire, which is contaminated with the products of combustion and unburnt materials washed off fire debris.

**Hazardous materials** – anything that, when produced, stored, moved, used or otherwise dealt with without adequate safeguards to prevent it from escaping, may cause injury or death or damage to property.

**Note:** Hazardous materials include hazardous chemicals under the *Globally Harmonised System (GHS)* and dangerous goods under *Australian Dangerous Goods Code*.

**Indoors** – any facility that processes and/or stores waste in any fully or partially enclosed building, warehouse, shed, hangar or other structure.

**National Construction Code (NCC)** – the *National Construction Code (NCC) 2019, Building Code of Australia Volume One*, as amended.

**Performance solution** – a method of complying with the performance requirements of the NCC other than by a ‘deemed-to-satisfy’ solution.

**Person conducting a business or undertaking** – the person or company who owns and manages the waste facility business.

**Premises** – any applicable building, facility or site (land) comprising a waste facility.

**Owner** – the person or company who owns the premises being used as a waste facility.

**Regulatory authority** – an authority having the statutory responsibility to administer and enforce related legislative provisions as prescribed.

**Site** – any place within the perimeter of a premises including those occupied by buildings comprising a waste facility.

**Stockpile** – any piled storage of waste material or processed waste product, whether loose, baled, sorted, and irrespective of storage duration (e.g. temporary or long-term).

**Waste** – the definition varies according to the environment protection acts in each jurisdiction, however they generally refer to matter that is discarded, rejected, abandoned, unwanted or surplus, irrespective of any potential use or value; and/or anything declared by regulation/prescribed to be waste.

**Waste facility** – any premises used for the storage, treatment, processing, sorting or disposal of waste material, and includes both waste facilities that hold an environment protection licence and waste facilities that are unlicensed sites.

## 1 Introduction

Historically, fire services have attended numerous fires at waste facilities across Australia. These fires are often quite large and have a detrimental impact on firefighting intervention, the environment, local community and the waste industry itself. The potential fire size correlates with the nature of the combustible waste material being processed, stockpile arrangements, on-site fire safety systems, emergency procedures and training specific to each facility.

Examples of a waste facility includes but is not limited to:

- recycling centres
- resource recovery
- materials recovery facility
- reprocessors (e.g. paper, cardboard, plastic, e-waste)
- energy recovery centres
- transfer stations.

A fire involving bulk storage of mixed, loose material presents a high and volatile fire load and causes significant challenges for firefighting intervention. It is a strain on firefighting services as these fires involve a long campaign type incident (Fattal, Kelly, Liu, & Giurco, 2016). Effective risk management frameworks and practices ensure the frequency and severity of fires at waste facilities is reduced.

Waste fires have demanded significant fire service resources and intervention over multiple days to extinguish the fire. The largest and longest-lasting fires often involve large stockpiles of unsorted waste with inadequate separation, where physical removal, separation and extinguishment is required. These fires also result in major pollution impact on the community and environment, especially from smoke and fire water run off, which at times is unable to be contained.

Combustible waste therefore generally presents ‘special problems of firefighting’ that warrant classification and consideration of ‘special hazards’ provisions under Clause E1.10 and E2.3 of the National Construction Code (NCC). Fires in waste facilities present specific issues for firefighting, including:

- the physical nature of combustible waste and waste by-products, including fire properties and ignition potential of both unsorted and sorted materials
- unsuitable storage method, stockpile size, separation distances and accessibility

- c. mechanised waste handling, sorting and processing systems, including vehicles
- d. poor fire service vehicle and/or firefighter access for firefighting intervention
- e. facilities having an inadequate or no fire hydrant system, including water capacity
- f. facilities having an inadequate automatic fire suppression system installed
- g. buildings having an inadequate smoke hazard management system installed
- h. facilities having inadequate provision to contain fire water run-off.

Because there are no DTS provisions, it is outside the scope of the DTS and performance solutions will be necessary to demonstrate compliance with performance requirements of the NCC.

Guidance on fire safety for waste facilities requires case-by-case consideration of the special hazards unique to each facility. It is the intention of this guideline to provide broad principals to assist the responsible person to plan, manage, advise, assess or determine the risks and measures applicable to any given facility in the absence of any other requirements.

Specific requirements may be imposed on the waste facility, or any processes undertaken (e.g. storage, processing, transportation), by the relevant regulatory authority, such as local council, planning departments, environmental regulators or workplace health and safety regulators.

**Note:** Local regulations may apply to licensing or development of a waste facility, and a regulatory authority may impose requirements from this guideline on the waste facility as a condition of consent, licensing, etc. as they see fit.

## 2 Doctrine concepts

### 2.1 New development and planning

This section:

- 2.1.1 Applies to new development of any waste facility that is being determined by the relevant AHJ, such as the planning department or the local Council.

**Note:** Development includes any application for land use or building works involving demolition, erection, rebuilding, alteration, enlargement or extension.

- 2.1.2 May apply to an existing waste facility that is subject to a development control order issued by the relevant regulatory authority (e.g. Council fire safety order if the facility does not have adequate provision for fire safety).

- 2.1.3 Takes guidance from *Reducing fire risk at waste management sites and Waste fire burn trials summary non-technical report* (Waste Industry Safety and Health Forum, 2019).

- 2.1.4 Addresses the NCC and its performance requirements to be determined by the relevant authority having jurisdiction, including Clause E1.10 and E2.3

- 2.1.5 May be addressed by a performance solution under the NCC; the proposed performance solution may need to be referred to the fire service under specific local legislation.

**Note:** The fire Service may provide comments to the authority having jurisdiction for consideration when determining development. The proponent is encouraged to consult with the fire service when the performance-based design brief is developed.

- 2.1.6 The owner and/or person conducting a business or undertaking should attain development and planning approval through the most appropriate pathway for their given circumstance (see Figure 1).

**Note:** Any leased premises must be fit for the intended use and have provision for fire safety appropriate to the business or undertaking.

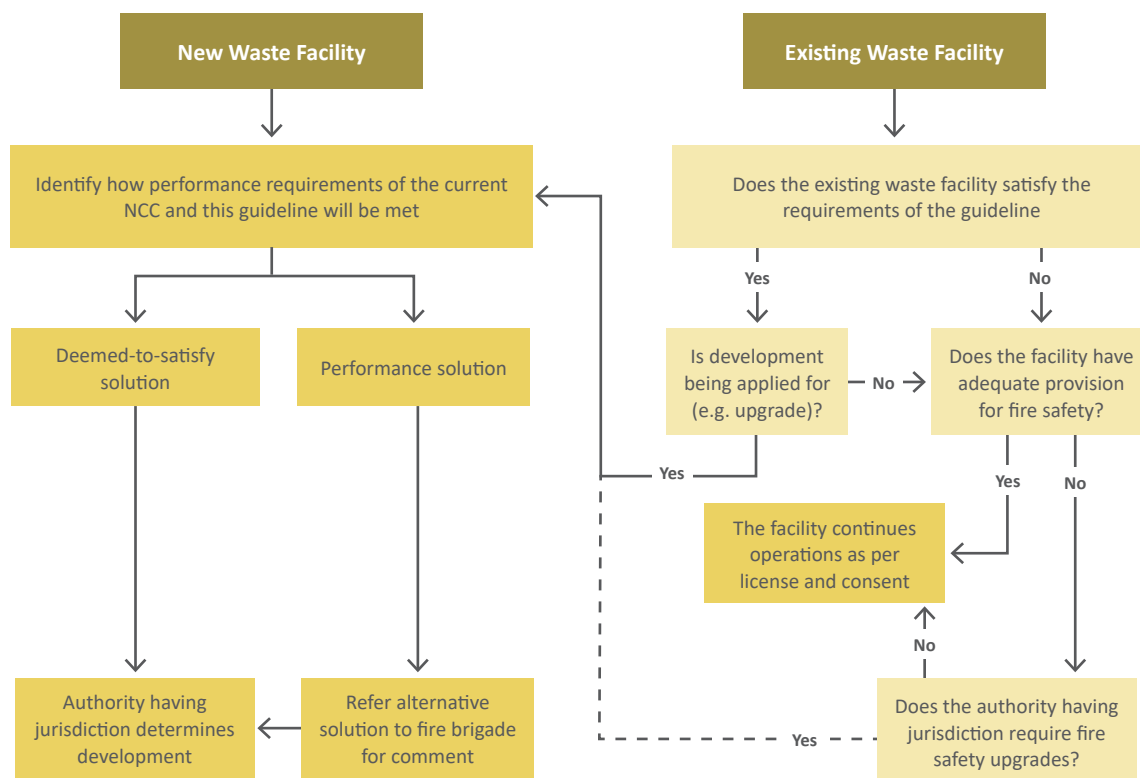


Figure 1: Development and planning pathways for waste facilities

## 2.2 Designing for special hazard

- 2.2.1 Combustible waste should be considered a special hazard and the AHJ should impose the condition on development that Clause E1.10 and E2.3 of the NCC be complied with to the satisfaction of the fire service.

**Note:** Please consult the relevant hazardous industry planning guidelines in the relevant jurisdiction

- 2.2.2 Development should make adequate provision for fire safety as prescribed by this guideline and provide a 'performance solution' that complies with NCC performance requirements and the requirements of this guideline (refer to Clause 2.1.5).

**Note:** The fire service should be consulted on any performance solution.

- 2.2.3 All fire risks and hazards of the waste facility should be identified. A fire safety study should be done in accordance with relevant hazardous industry planning guidelines if deemed appropriate by the relevant authority having jurisdiction.

**Note:** If not already included in the relevant jurisdiction's hazardous industry planning guidelines, the fire safety study should include (but not be limited to):

- Ignitability
  - to include the combustibility properties required in Section 2.2.5 for the performance solution, and to support the assessment required for 2.4.2 relating to firefighting intervention
  - flash point (if liquid- where also present)
  - capable of causing fire through friction, absorption of moisture, spontaneous chemical changes, vigorous and persistent ignition
  - presence of flammable compressed gases
  - presence of oxidisers such as chlorate, permanganate, inorganic peroxide or a nitrate that yield oxygen readily to stimulate combustion of organics.
- Corrosivity, particular in relation to firefighting infrastructure.
- Reactivity
  - in particular from firefighting perspective, does it react violently with water e.g. reactive metals
  - is there an explosion potential?

- propensity for spontaneous combustion or undetected smouldering toxicity, particularly during a fire event e.g. Polychlorinated Biphenyls (PCBs).

- 2.2.4 The development proponent is encouraged to engage a fire safety engineer or other suitably qualified consultant to develop a performance solution specific to the waste facility and its proposed operations.

**Note:** The design should consider all reasonable and foreseeable fire scenarios.

- 2.2.5 All reasonable and foreseeable combustible waste materials should be identified and considered in any performance solution (i.e. the fire engineered design should consider burn temperature, heat release rate and heat flux, total fire load and burn duration, ease of ignition and flame spread that would be expected from each stockpile).

**Note:** The maximum sizes and minimum separations of all stockpiles should be detailed in an operations plan for the waste facility (refer to section 3.6).

- 2.2.6 For simplification in designing for special hazards, the following surface burning temperatures and fire risk rating should be applied to stockpiles of commons, as given in Table 1 (Waste Industry Safety and Health Forum, 2018).

**Table 1: Typical burn temperature and fire risk of combustible waste material.**

Type of waste material	Burn temperature	Fire risk
Paper and cardboard	850°C	Ordinary
Wood products	860°C	Ordinary
Plastic	1,200°C	High
Rubber	1,130°C	High
Refuse derived fuels	900°C	Ordinary
Solid recovered fuels	950°C	Ordinary

- 2.2.7 Where a stockpile contains a mixture of combustible waste materials, the burn temperature and fire risk of the most predominant waste material should be used for the whole stockpile, and in the case of no clear majority then the worst-case material should be used.

**Note:** The composition and types of materials in e-waste varies significantly, and may include metals, circuit boards, plastic casing, batteries, magnets, cathode ray tubes. Literature published on burn temperatures of e-waste is limited to separated components of e-waste.

## 2.3 Upgrading existing waste facilities

- 2.3.1 When development is being applied for, the owner or person conducting a business or undertaking should undertake an assessment of the design and performance of their existing waste facility against the requirements specified within this guideline and provide this to the relevant AHJ for determination.

- 2.3.2 If the assessment determines that an upgrade is required to address a deficiency in the design or performance, the relevant authority should impose an appropriate condition (e.g. licensing) or direction (e.g. issue an Order) on the owner.

**Note:** In some jurisdictions, fire service officers are empowered to issue a Fire Safety Order.

- 2.3.3 When an existing waste facility undergoes demolition, erection, rebuilding, alteration, enlargement or extension (i.e. development), the relevant AHJ should consider imposing this guideline (in part or full) as a condition on the development.

- 2.3.4 When an existing waste facility has restrictions on stockpile sizes and separations, control measures should be implemented to maintain such limits and ensure the fire load remains appropriate to the building and installed fire safety systems.

**Note:** Restrictions may be imposed by an authority including condition of consent, an order, or a licence condition. Installing or upgrading fire safety systems may remove or reduce any restrictions on operations (e.g. larger stockpiles).

## 2.4 Firefighting Intervention

- 2.4.1 The waste facility is to provide safe, efficient and effective access as detailed in consultation with the fire service. This can at times include key access given to local fire unit for guaranteed easy access 24/7

- 2.4.2 Performance requirement CP9 of the NCC requires access to be appropriate to the building function/use, fire load, potential fire intensity, fire hazard, active fire safety systems and fire compartment size (ABCB, 2019).

- 2.4.3 Enhanced fire service vehicle access should be provided for firefighting intervention, including a perimeter ring road around any large non-sprinklered building and access roads between external stockpiles.

- 2.4.4 The facility should cater for a large emergency service response (e.g. multiple alarm and multiple agency) if the potential hazard may result in a large emergency.

**Note:** This includes from any pollution event requiring a protracted hazardous materials response (e.g. contain and remove fire water run-off).

- 2.4.5 A building not fitted with an automatic fire sprinkler system should have a dedicated external quarantine area not less than four times the floor area of the largest internal stockpile to receive, breakdown and extinguish that stockpile.
- 2.4.6 Any development application should be accompanied by a flow rate and pressure test of the water main connected to the fire hydrant system.
- 2.4.7 Firefighter access should be provided to buildings, structures and storage areas, including to any fire safety system or equipment provided for firefighting intervention.

## 2.5 Decontamination

For new waste developments and existing sites undergoing any changes or expansion, the person conducting a business or undertaking must develop a decontamination plan for the decontamination of vehicles and personnel that may be contaminated by waste materials or runoff. (which may be part of the gate plan). This plan may include:

- decontamination site type – temporary, permanent facility (e.g. at waste depot), commercial facility (e.g. truck wash)
- level of decontamination required
- scale/usage – consider engaging the Engineering Functional Area (for design and/or establish)
- chemical type(s)
- resources including personnel, PPE, equipment, water supply
- topography and layout, including water systems
- environmental impacts and mitigation e.g. liquid and PPE waste disposal, chemical spill plan, fire water run off plan.
- types and sizes of vehicles being contracted or used e.g. preference for enclosed cabins and non-tracked machinery (to reduce decontamination times)
- organic status of site as use of decontamination chemicals may be restricted

**Note:** Persons conducting a business or undertaking should consult with the relevant AHJ and fire service for further information.

## 2.6 Fire hydrant system

- 2.6.1 The waste facility is to have a fire hydrant system installed appropriate to the risks and hazards for the waste facility.

**Note:** Consult with the local fire authority regarding the fire hydrant system required.

- 2.6.2 The fire hydrant system should consider facility layout and operations, with fire hydrants being located to provide compliant coverage and safe firefighter access during a fire, including having external fire hydrants to protect any open yard storage (i.e. external stockpiles).
- 2.6.3 The design of the fire hydrant system is to have an enhanced standard of performance when the building and/or combustible waste material is not protected by a fire sprinkler system, including having an additional fire hydrant outlet required to flow simultaneously for any open yard storage and for any non-sprinklered internal stockpiles, as given in Table 2.

**Table 2: Minimum fire hydrants for non-sprinklered buildings and external storage.**

Fire compartment floor area of non-sprinklered building	Area of open yard (used for stockpiles)	No. of fire hydrants required to flow
≤ 500 m <sup>2</sup>	≤ 3,000 m <sup>2</sup>	2
> 500 m <sup>2</sup> ≤ 5,000 m <sup>2</sup>	> 3,000 m <sup>2</sup> ≤ 9,000 m <sup>2</sup>	3
> 5,000 m <sup>2</sup> ≤ 10,000 m <sup>2</sup>	> 9,000 m <sup>2</sup> ≤ 27,000 m <sup>2</sup>	4
> 10,000 m <sup>2</sup>	> 27,000 m <sup>2</sup>	5 (or more)

**Note:** Refer to Australian Standard AS 2419.1 for fire hydrant system design requirements of buildings that are protected by a fire sprinkler system.

- 2.6.4 Fire hydrants should not be located within 10m of stockpiled storage and must be accessible to firefighters entering from the site and/or building entry points.
- 2.6.5 Where appropriate to protect against high risks and hazards, suitable on-site fixed external fire monitors may be provided as part of the fire hydrant system.
- 2.6.6 The fire service booster assembly should be located within sight of the designated site entry point, or other location approved by the fire service, and be protected from radiant heat from any nearby stockpile (e.g. by a masonry wall).
- 2.6.7 The fire hydrant system is to have a minimum

water supply and capacity providing the maximum hydraulic demand (i.e. flow rate) for not less than four hours.

- 2.6.8 The fire hydrant system should incorporate fire hose reels installed in accordance with Clause E1.4 of the NCC and externally to cover open yard storage areas to enable effective first attack of fires by appropriately trained staff.

**Note:** First attack firefighting is often critical to extinguishing minor fire ignitions.

- 2.6.9 Fire hydrants/boosters must at all times be clearly marked and identifiable and remain unobstructed for attending fire crews.

## 2.7 Automatic fire sprinkler systems

- 2.7.1 The waste facility is to have an automatic fire sprinkler system installed in any fire compartment that has a floor area greater than 1000 m<sup>2</sup> and contains combustible waste material.
- 2.7.2 The fire sprinkler system should be demonstrated as being appropriate to the risks and hazards identified for buildings, including externally as necessary (e.g. drenchers to protect plant/equipment, exposures, high-risk external storage).
- 2.7.3 The fire sprinkler system design should be appropriate to the hazard class (e.g. 'high hazard class') and have enhanced standard of performance as appropriate to the special hazard.

**Note:** Any system design limitation set by specifying content and percentages should be maintained for the building's operating life unless the system is upgraded.

- 2.7.4 To protect vital systems, storages or equipment or protect against high risk hazards, a deluge, drencher, fast response, mist or foam system should be provided.

**Note:** A localised system may be installed to protect specific areas or equipment if the whole building is not sprinkler protected.

- 2.7.5 The fire service booster assembly for the fire sprinkler system should be co-located with the fire hydrant system booster within sight of the designated site entry point, or in a location approved by the fire service.

- 2.7.6 The fire sprinkler system is to have a minimum water supply and capacity providing the maximum hydraulic demand (i.e. flow rate) for not less than two hours.

**Note:** The fire sprinkler system should contain fire spread and allow firefighters to enter the building, remove burning waste material and extinguish the fire.

## 2.8 Fire detection and alarm systems

- 2.8.1 The waste facility is to have a fire detection and alarm system installed appropriate to the risks and hazards identified for each area of a building.
- 2.8.2 The fire detection and alarm system should warn all occupants of fire and to evacuate the facility, with each component being appropriate to the environment (e.g. flame detector or infrared detector in sorting area, visual alarms around noisy machinery).
- 2.8.3 Upon positive detection of fire, the system is to activate any required alarm, fire suppression system, passive measure (e.g. fire door, fire shutter) or plant/machinery override (e.g. shutdown of conveyor, shredder) as appropriate to the detector.

**Note:** The system may incorporate multiple levels of detection (e.g. fast acting IR detector to shutdown machinery and activate a local deluge system, and medium acting aspirating system to provide broad area detection).

- 2.8.4 Manual alarm points should be provided in clearly visible locations as appropriate to the environment so that staff can initiate early alarm of fire.

## 2.9 Smoke hazard management

- 2.9.1 Buildings containing combustible waste material are to have an automatic smoke hazard management system appropriate to the potential fire load and smoke production rate installed within the building.
- 2.9.2 Under Clause E2.3 of the NCC, additional smoke hazard management measures should be provided to vent or exhaust smoke so that in at least 90% of the compartment, the smoke layer does not descend below 4m above floor level.

**Note:** To undertake firefighting intervention, visibility is needed so that piled waste can be safely removed using machinery.

- 2.9.3 Natural low-level openings, either permanent or openable such as roller doors, should be provided on two or more walls to assist with venting de-stratified (i.e. cooled) smoke and ensure minimum visibility under the BCA is maintained during a fire.

**Note:** Roller doors should have manual override so that the door can be opened in the event of electrical isolation or failure during fire.

- 2.9.4 Any smoke exhaust system installed should be capable of continuous operation of not less than two hours in a sprinkler-controlled fire scenario, or four hours in any non-sprinkler-controlled fire scenario.
- 2.9.5 Automatic operation of the smoke hazard management system from smoke detection should not cause undue delay to the activation of any automatic fire sprinkler system.

## 2.10 Fire water run-off containment

- 2.10.1 The waste facility should have effective and automatic means of containing fire water run-off, with primary containment having a net capacity not less than the total hydraulic demand of installed fire safety systems.

**Note:** The total hydraulic demand is the net discharge of water from both the fire hydrant system and fire sprinkler system.

- 2.10.2 An alternative means of fire water run-off containment may be proposed, particularly for development of an existing waste facility, including being validated by hydrological engineering assessment where appropriate.

**Note:** Bunding of the processing areas may be a containment option.

- 2.10.3 The containment system is to wholly incorporate any dedicated external quarantine area required to extinguish any internal stockpile from a building (refer to clause 2.4.5).
- 2.10.4 The containment system, which includes the base of any storage area, should be impermeable (i.e. sealed) and prevent fire water run-off from entering the ground or any surface water course (e.g. river, stream, lake, estuary, open sea).
- 2.10.5 The containment system should include secondary/tertiary facilities such as impermeable bunds, storage lagoons, isolation tanks or modified site design (e.g. recessed catchment pit, drainage basin) as appropriate to the facility.

**Note:** Any external pit/basin used to breakdown and extinguish burning waste from within a building must form part of the containment system.

- 2.10.6 Pollution control equipment such as stormwater isolation valves, water diversion booms, drain mats, should be provided as necessary for the facility's emergency response procedures, and be kept readily accessible for the event of fire.

**Note:** Failure to contain fire water run-off can result in significant pollution of the environment, which may incur substantial remediation costs and/or fines.

## 2.11 Bushfire prone areas

- 2.11.1 Check with the local fire service regarding regulations and guidance for bushfire planning that may apply to bushfire prone areas.
- 2.11.2 Bushfire prone areas are mapped by respective councils under local legislation.
- 2.11.3 Suitable fire service vehicle access should be provided to within 4 m of any static water supply if no reticulated water supply is otherwise available (e.g. bulk water tank, dam).
- 2.11.4 Consideration should be given to possible Asset Protection Zone requirements impacting the waste facility. Hazard separation will be required to provide passive protection against bushfire attack. Ensure to consult with the relevant fire service.

# 3 Facility operation and management

## 3.1 General

- 3.1.1 This whole section, being *Facility operation and management*, applies to new and existing waste facilities as determined by the relevant regulatory authority as a condition of licence or the local Council as a condition of consent.
- 3.1.2 This whole section takes guidance from the documents *Reducing fire risk at waste management sites* and *Waste fire burn trials summary non-technical report*, both published by the Waste Industry Safety and Health Forum.
- 3.1.3 This whole section addresses the operation and management of a waste facility to ensure the fire hazard from combustible waste material fire is controlled.
- 3.1.4 This whole section should not override any existing licence or consent in-force if the conditions are being met.
- 3.1.5 This whole section may be addressed by performance outcomes identified through risk management, including identification of fire hazards, assessment of risks, implementation of controls, and documented review/audit process.

## 3.2 Storage and stockpiles

- 3.2.1 Storage and stockpiling of combustible waste material should be limited in size and volume appropriate to the given combustible waste material, fire risks, building design and installed fire safety systems.
 

**Note:** The size, volume and type of waste of all stockpiles should be identified on a site/floor plan and submitted with any development application.
- 3.2.2 Variations to storage and stockpile requirements, including maximum size and volume, movement, separation distances etc., will be considered through an appropriate pathway such as a performance solution.
- 3.2.3 The maximum height of any stockpile, loose piled or baled, should not exceed 4 m (see Figure 2).
- 3.2.4 The uncontained vertical face of any stockpile (i.e. any face not being retained by a masonry wall) should recede on a slope no greater than 45° to minimise the risk of collapse and fire spread (see Figure 2).

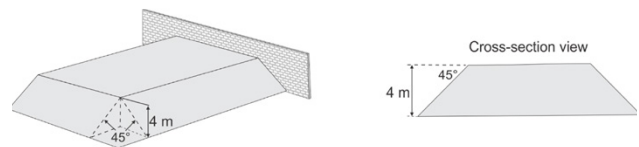


Figure 2: Maximum stockpile height and face angle.

- 3.2.5 The storage method and arrangement of stockpiles is to minimise the likelihood of fire spread and provide separation which permits access for firefighting intervention.

**Note:** Fire separating masonry walls (e.g. bunkers) and automatic fire sprinkler systems may allow larger stockpile sizes and/or shorter separation distances.

- 3.2.6 A separating masonry wall, revetment or pen should extend at least 1 m above the stockpile height and at least 2 m beyond the outermost stockpile edge (see Figure 3).

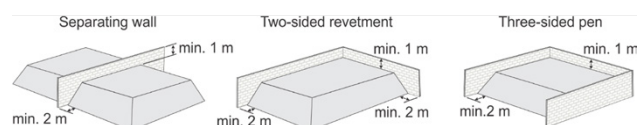


Figure 3: Example separating masonry wall, revetment or pen.

- 3.2.7 Stockpile boundary limits should be permanently marked to clearly identify limits that maintain maximum stockpile sizes and/or minimum separations.
- 3.2.8 E-waste handling and storage should eliminate or reduce the risk of harm to human health and environment from fire.
- 3.2.9 E-waste should be separated and stored away from other waste, in clearly designated areas with signage.
- 3.2.10 E-waste should be stored on an impermeable surface and protected from the weather, to help control hazardous materials, runoff and dust being released.
- 3.2.11 Lithium batteries should be stored away from heat sources, including direct or reflected sunlight, water and humidity.
- 3.2.12 Lithium batteries should not be physically damaged or crushed during storage, transport and handling.
- 3.2.13 E-waste activities should have engineering controls installed to capture liquids, vapours or dust.

## 3.3 Stockpile movement

- 3.3.1 Stockpiles of combustible waste material should be rotated to dissipate any generated heat and minimise risk of auto-ignition as required.

**Note:** Requirements for e-waste will differ. It is recommended that consultation take place with specialist advice, such as local environment protection authorities.

- 3.3.2 Any stockpile of combustible waste material prone to self-heating should have appropriate temperature monitoring to identify localised hotspots; procedures outlined in the operations plan should be implemented to reduce identified hotspots.

**Note:** Temperature should ideally be measured at the core of the stockpile where thermal confinement will be highest.

- 3.3.3 Any processing or handling or treated waste material, such as chipping, shredding, baling or producing crumb should be cooled before being stockpiled.
- 3.3.4 Procedures for stockpile rotation and monitoring of temperature during hot weather should be included in the operations plan (refer to section 3.6).
- 3.3.5 E-waste should be secured during transport to avoid or minimise breakage and prevent material or dust escape.
- 3.3.6 Breakable e-waste should be packaged to ensure materials are not damaged during handling and transportation.
- 3.3.7 Staff should be trained to appropriately handle types of e-waste and combustible waste.

## 3.4 External stockpiles

- 3.4.1 The maximum width of an external stockpile should be 20m if fire service vehicle access is provided down both sides of the stockpile, and 10m if access is provided down one side of the stockpile only (see Figure 4).

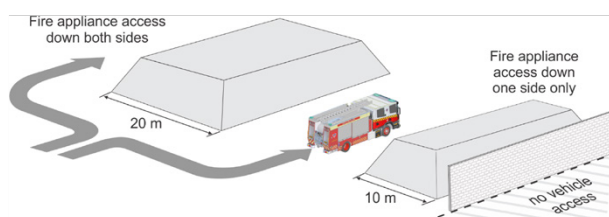
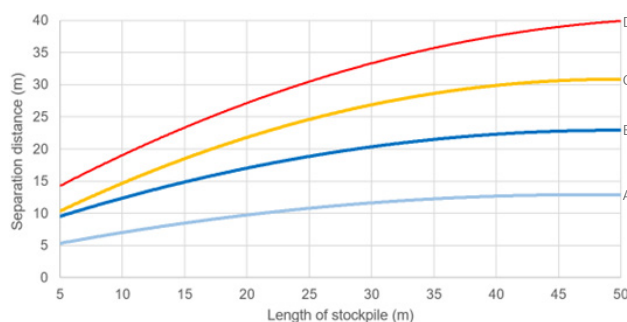


Figure 4: Maximum external stockpile widths.

- 3.4.2 The maximum length of an external stockpile should be 50m, or as determined from required minimum separation distances (refer to clauses 3.4.3 and 3.4.5).

- 3.4.3 Minimum separation should be maintained between external stockpiles, depending on storage method and fire risk of materials, as given in Table 3 (see also Figure 5).

**Table 3: Minimum separation distances between external stockpiles.**



Length of stockpile (m)	Ordinary fire risk (i.e. $\leq 1000^{\circ}\text{C}$ )		High fire risk (i.e. $>1000^{\circ}\text{C}$ )	
	Loose pile (A)	Baled (B)	Loose pile (C)	Baled (D)
5	5 m	9 m	10 m	14 m
10	7 m	13 m	15 m	19 m
15	9 m	15 m	18 m	24 m
20	10 m	17 m	23 m	27 m
30	11 m	20 m	26 m	34 m
50	13 m	23 m	31 m	40 m

- 3.4.4 If two separation distances apply between different stockpiles (i.e. due to different lengths of each stockpile), the greatest distance should be used (see Figure 5).

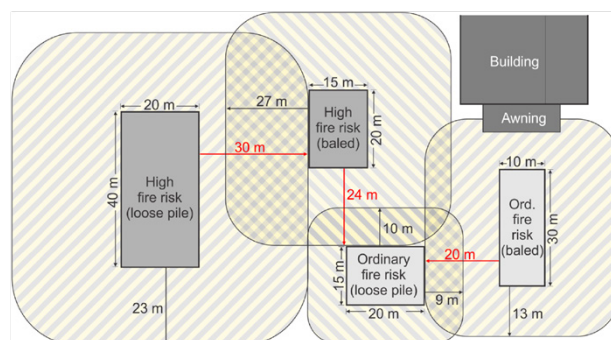
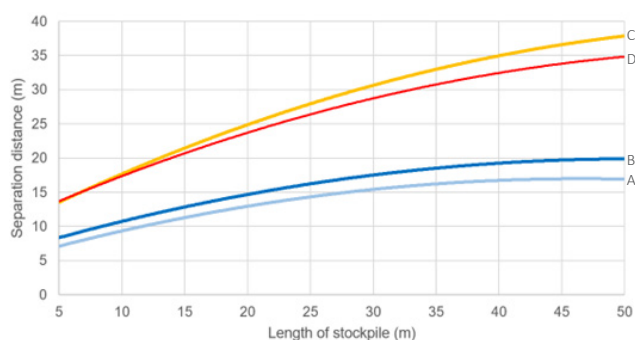


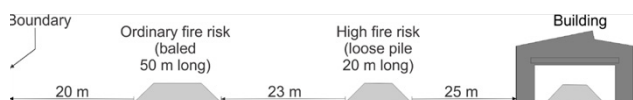
Figure 5: Examples of minimum separation between external stockpiles.

- 3.4.5 Minimum separation should be maintained between external stockpiles and any fire-source feature, depending on storage method and fire risk of materials, as given in Table 4 (see also Figure 6).

**Table 4 Minimum separation between external stockpile and any fire-source feature**



Length of stockpile (m)	Ordinary fire risk (i.e. $\leq 1000^{\circ}\text{C}$ )		High fire risk (i.e. $>1000^{\circ}\text{C}$ )	
	Loose pile (A)	Baled (B)	Loose pile (C)	Baled (D)
5	7 m	8 m	13 m	13 m
10	9 m	11 m	18 m	18 m
15	12 m	13 m	22 m	21 m
20	13 m	15 m	25 m	24 m
30	15 m	17 m	30 m	28 m
50	17 m	20 m	38 m	35 m



**Figure 6: Examples of separation between stockpile and fire-source features.**

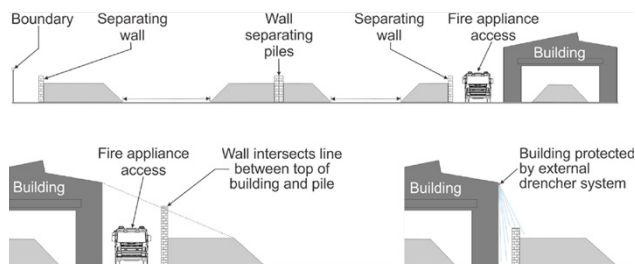
- 3.4.6 Covered areas attached to buildings or structures, such as areas under awnings and undercrofts, should not encroach into the minimum separation distance unless protected by an automatic fire sprinkler system (see Figure 7).



**Figure 7: Example of separation from any covered building part or structure.**

- 3.4.7 The minimum separation between external stockpiles or an external stockpile and any fire-source feature may be reduced when the stockpile is separated by masonry wall or protected by an automatic fire sprinkler system (i.e. drenchers) (see Figure 8).

**Note:** The masonry wall should intersect the direct line between the fire source feature (e.g. building) and top of the stockpile, and be located to provide fire appliance access as necessary.



**Figure 8 Examples of reduced separation using masonry wall or sprinkler system**

- 3.4.8 External stockpile limits should be maintained and not exceeded as per the operations plan, and as appropriate to the facility, boundaries, exposures, buildings, terrain, drainage, vegetation, prevailing winds, vehicular access etc.
- 3.4.9 External stockpiles should be protected from external hazards (e.g. bushfire, adjacent property fire, arson, self-combustion in hot weather).
- 3.4.10 External stockpiles should be maintained so that all buildings access and egress points are always kept clear and unobstructed.
- 3.4.11 External stockpiles should be maintained so that all required fire service vehicle access (e.g. around buildings, between stockpiles and to hardstand areas) is always kept clear and unobstructed.

## 3.5 Internal stockpiles

- 3.5.1 Internal stockpiles of combustible waste material should be maintained as determined by the operations plan, and appropriate to the building size/layout, compartmentation, installed safety systems, process equipment and plant etc.
- 3.5.2 The maximum internal stockpile size in a building fitted with an automatic fire sprinkler system should be evaluated and limited.
- 3.5.3 Internal stockpiles should have a minimum of 6 m unobstructed access on each accessible side in a building fitted with an automatic fire sprinkler system, or a 10 m in a building not fitted with an automatic fire sprinkler system (see Figure 9).
- 3.5.4 Internal stockpiles may be located side by side when separated by a masonry wall (refer to clause 3.2.6).

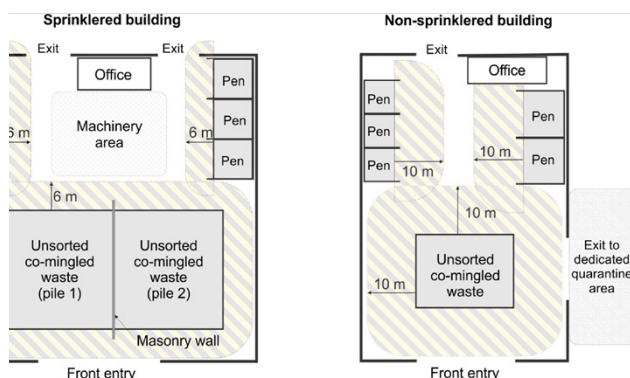


Figure 9: Example of unobstructed access around internal stockpiles.

- 3.5.5 The internal stockpile of a building not fitted with an automatic fire sprinkler system should be limited in size to be able to be moved to the dedicated external quarantine area using on-site resources within one hour or less (refer to clause 2.4.5).

**Note:** The designer should justify the ability to move the waste to the dedicated external quarantine, for example, two waste handlers with 5m<sup>3</sup> bucket capacity taking two minutes per return trip can move a 300m<sup>3</sup> stockpile in an hour (i.e. 2 x 5 m<sup>3</sup> x 30 trips).

- 3.5.6 Internal stockpiles should be protected from high or unnecessary ignition risks (e.g. friction/heating from conveyors, waste movers, heaters, chippers, shredders, balers, sorters, other machinery etc.).
- 3.5.7 Internal stockpiles should be maintained so that all building egress points and required paths of travel are not blocked or impeded at any time.
- 3.5.8 Internal stockpiles should be maintained so that access to the dedicated external quarantine area is always kept clear and unobstructed (i.e. by waste handlers).

**Note:** Any door opening (e.g. roller door) providing access to the quarantine area must be able to be readily opened at any time, including when power is lost.

## 3.6 Operations and Maintenance plans

- 3.6.1 The waste facility should develop and implement a written operations plan outlining the daily operations of the waste facility, including describing the combustible waste material likely and the method of storage, handling or processing at the facility.

- 3.6.2 The operations plan should include a site plan drawing that identifies the layout of the waste facility and all locations of storage, handling and processing of combustible waste material.

- 3.6.3 The operations plan should identify the expected daily and holding inventory of combustible waste material including daily capacities and maximum stockpile limits.

- 3.6.4 The operations plan should define procedures that ensure maximum stockpile limits are not exceeded by operations at the waste facility.

- 3.6.5 The operations plan site plan should identify separate and clearly designated areas for materials drop-off, transfer and storage method of combustible waste material (e.g. internal or external, sorted or unsorted, loose stockpile, bailed stockpile, binned, bundled, bunkered, container etc.).

- 3.6.6 The operations plan should identify all primary and secondary methods of combustible waste material transfer and stockpile movement (e.g. operational and reserve plant and equipment available at the waste facility).

- 3.6.7 The operations plan should include procedures for turnover of stockpiles to dissipate internal heat confinement, with the frequency determined by combustible waste material, storage environment and ambient conditions.

**Note:** Turnover may relate to temperature monitoring where provided. Consideration should be given to periods of hot weather and high ambient temperature, where heat generation and self-combustion is more likely.

- 3.6.8 The operations plan should be regularly reviewed and updated (i.e. annually from the date of implementation) upon any change in combustible waste material, storage, handling, processes or other conditions affecting daily operations.

- 3.6.9 The operations plan should be stored on site at the waste facility and kept in a readily accessible location (e.g. with the emergency plan).

- 3.6.10 A copy of the operations plan should be placed within an emergency services information folder (refer to section 4.4).

**Note:** If the operations plan is prescribed and daily inventory constant, such details can be added to an emergency services information folder rather than a copy of the operations plan.

- 3.6.11 The waste facility should develop and implement a maintenance plan which includes:
- 3.6.11.1.1 a schedule of activities for the upkeep of all equipment used at the facility
  - 3.6.11.1.2 a schedule of activities for the checking of safety features and essential safety measures.

**Note:** Poor maintenance and housekeeping can be a cause of fire in these facilities.

information, instruction and training to employees and other persons as necessary to ensure health and safety (e.g. an emergency plan).

- 4.3.2 The person conducting a business or undertaking should implement management procedures for general safety including staff induction, safe plant/equipment use, maintenance checks, safety inspections, clear reporting and communication, emergency drills etc.
- 4.3.3 The person conducting a business or undertaking should implement housekeeping procedures to ensure all emergency access, equipment and exits are kept clear, including regular cleaning undertaken to prevent stockpile creep or litter build-up.
- 4.3.4 The person conducting a business or undertaking should implement procedures to control potential ignition sources (e.g. friction, sparks, heating) including 'no open fire' policy, smoking restricted to designated areas or banned, 'hot-works permit' procedures in place.

**Note:** Plant and equipment such as conveyors, waste movers, heaters, chippers, shredders, balers, sorters etc. should be regularly inspected and maintained.

## 4 Workplace fire safety

### 4.2 General

- 4.2.1 This whole section, being *Workplace fire safety*, applies to any person who conducts the business or undertaking of owning, operating or managing a waste facility.
- 4.2.2 This whole section addresses the requirements on the person conducting a business or undertaking to operate the waste facility as a safe workplace, especially regarding provision of fire safety.
- 4.2.3 This whole section does not override any other existing statutory requirement, code of practice or guideline that directly applies to the person conducting a business or undertaking.

**Note:** Refer to your state or jurisdictions legislative requirements to determine your workplace safety obligations.

- 4.2.4 This whole section should be addressed by thorough risk management, including identification of hazards, assessment of risks, implementation of controls, and documented review/audit process.

### 4.3 Risk assessment and mitigation

- 4.3.1 The person conducting a business or undertaking should implement a hierarchy of control measures for the waste facility including providing

- 4.3.5 Vehicles and other machinery (e.g. waste movers) are to have appropriate heat shrouds and spark arrestors fitted and be kept, maintained and refuelled in designated areas away from combustible waste material.
- 4.3.6 The person conducting a business or undertaking should implement procedures to ensure hazardous materials and highly combustible materials (e.g. gas cylinders, fuels, paints, solvents, lithium batteries) are stored in accordance with any relevant statutory requirement, code or standard and away from combustible waste material.
- 4.3.7 The person conducting a business or undertaking should implement appropriate signage and markings, including facility layout plan at main site entry, warning signs (e.g. 'no smoking'), stockpile and clear space markings, emergency and evacuation area signs, fire safety system signs etc.
- 4.3.8 The person conducting a business or undertaking should implement security arrangements (e.g. fencing with locked gate, lighting, alarm system, video surveillance, 24/7 security) to restrict unauthorised access and deter arson, including after-hours when staff have left the facility.

**Note:** Firefighter access must not be prevented (e.g. non-hardened metal chain and lock with key deposited at two nearest fire stations or 24/7 security).

## 4.4 Emergency plan

- 4.4.1 The person conducting a business or undertaking is required to develop an emergency plan for the waste facility, which is done in accordance with *AS 3745 Planning for emergencies in facilities*.

**Note:** The emergency plan is developed for staff and occupants in the workplace. An external consultant should be engaged to provide specialist advice and services in relation to fire safety planning and developing an emergency plan.

- 4.4.2 The emergency plan is to assess fire safety risks and identify appropriate responses and controls (i.e. a fire safety management plan) and include emergency response procedures for staff and other persons at the waste facility in the event of fire.
- 4.4.3 The emergency plan is to identify an emergency control organisation for the facility including staff nominated as fire wardens in the emergency response procedures.
- 4.4.4 The emergency plan is to identify safe evacuation routes and assembly area (and alternates), shutdown processes, firefighting team activation, removal of uninvolved vehicles, activation of pollution control measure etc.
- 4.4.5 The person conducting a business or undertaking is to ensure all staff receive appropriate training in fire safety including emergency response procedures, use of first attack firefighting equipment (e.g. fire hose reels, fire extinguishers), evacuation drills etc.
- 4.4.6 Training in the use of first attack firefighting equipment must include education of fire awareness, including when to cease firefighting and to evacuate.
- 4.4.7 The emergency plan is to identify a process of regular fire safety audits to ensure fire safety requirements are being met, including reviewing stockpile limits, safe work practices, clear access, firefighting and emergency equipment.

**Note:** The person conducting a business or undertaking should nominate a responsible person to conduct the fire safety audit, including check first attack firefighting equipment, stockpiles, access are kept clear and free of obstructions.

- 4.4.8 Emergency plan to contain all relevant contact information, including after hours emergency contact information for attending fire crews.
- 4.4.9 The PCBU should provide a copy of the Emergency Plan to the local Fire Service to enable pre planning of an emergency response

## 4.5 Emergency services information folder

- 4.5.1 An emergency services information folder should be developed and provided by the person conducting a business or undertaking.

**Note:** An emergency services information folder is intended for use by emergency service personnel only and supplements the emergency plan.

- A copy of the agreed emergency service information folder to be provided in a suitable all-weather container located in a position agreed to by the local fire service. The container should be clearly visible and marked as such.
- 4.5.2 An emergency services information folder should provide firefighters with specific information that can be used to develop strategies and tactics for firefighting intervention, including:
- the operations plan (refer to section 3.6)
  - facility processes and systems including emergency shutdown procedures
  - facility evacuation plan including ward areas and safe assembly area/s
  - fire safety systems including on-site fixed fire monitors, deluge or drenchers static water supplies, special extinguishing agents or systems
  - firewater containment system including secondary/tertiary facilities
  - pollution control equipment including location and procedures, and
  - machinery available for waste removal (e.g. waste movers) and location of designated quarantine area/s.

## 4.6 Fire safety statements

- 4.6.1 The premises owner is to have fire safety systems inspected and maintained by an accredited practitioner, in accordance to AS 1851 and any other applicable codes, standards and requirements.
- 4.6.2 An annual fire safety statement must be completed once every year for all essential fire safety measures installed, and where applicable,

a supplementary fire safety statement completed for all critical fire safety measures installed (e.g. every six months).

**Note:** The fire safety statement is a record of maintenance of the fire safety system. The premise owner should review jurisdictional requirements as they may be required to issue the fire safety statement to their local council or fire services.

- 4.6.3 The premises owner is responsible for choosing the accredited practitioner to undertake the inspection and maintenance and must provide a written opinion that the person or persons chosen are accredited to perform the fire safety inspection.
- 4.6.4 The person conducting a business or undertaking is to make allowance for the premises owner to arrange the inspection and maintenance of fire safety systems for the purpose of a fire safety statement.

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