Management and storage of combustible recyclable and waste materials – guideline

Publication 1667.3 July 2021

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Authorised and published by EPA Victoria
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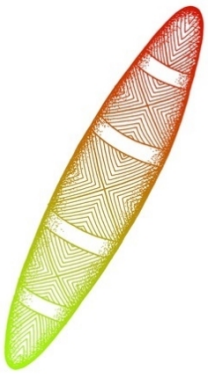


EPA acknowledges Aboriginal people as the first peoples and Traditional custodians of the land and water on which we live, work and depend. We pay respect to Aboriginal Elders, past and present.

As Victoria's environmental regulator, we pay respect to how Country has been protected and cared for by Aboriginal people over many tens of thousands of years.

We acknowledge the unique spiritual and cultural significance of land, water and all that is in the environment to Traditional Owners, and recognise their continuing connection to, and aspirations for Country.

Contents

Chapter 1. About this guide

1.1 Introduction

Many things we do can cause pollution and create waste. This can put our health and our land, air and water at risk of harm.

New environment protection laws take effect in Victoria on 1 July 2021. These new laws include the *Environment Protection Act 2017* (EP Act) and the Environment Protection Regulations 2021 (EP Regulations).

The EP Act outlines your environmental duties. For the management and storage of combustible and recyclable waste materials (CRWM) the EP Regulations support the EP Act by clarifying details for duty holders (anyone with obligations under the EP Act) on how to fulfil their obligations. This includes specific requirements for particular hazards, where appropriate.

This guideline is designed to support the management and storage of CRWM in a manner that minimises the risk of harm to human health and the environment from fire. The guideline will help to support compliance with the new Victorian environment protection laws.

This guideline is designed to help:

- duty holders of waste and resource recovery facilities (WRRFs) who receive, store and process waste including CRWM to understand their obligations under the EP Act. These obligations include approaches to identifying their risks and practical measures that can be taken to minimise risk of harm to human health and the environment from fire as far as reasonably practicable
- any business responsible for receiving, reprocessing or storing of CRWM where there is a risk of fire, for example, metal recycling, organics processing, reprocessing of electronic or glass waste and tyre storage, to minimise their risk of harm to human health and the environment from fire as far as **reasonably practicable**.

1.2 Purpose

Major CRWM fires at WRRFs can take days to control and have resulted in evacuations of local communities, long-term health impacts, and first aid and hospital treatments. They can also cause short and long-term environmental harm (Figure 1).

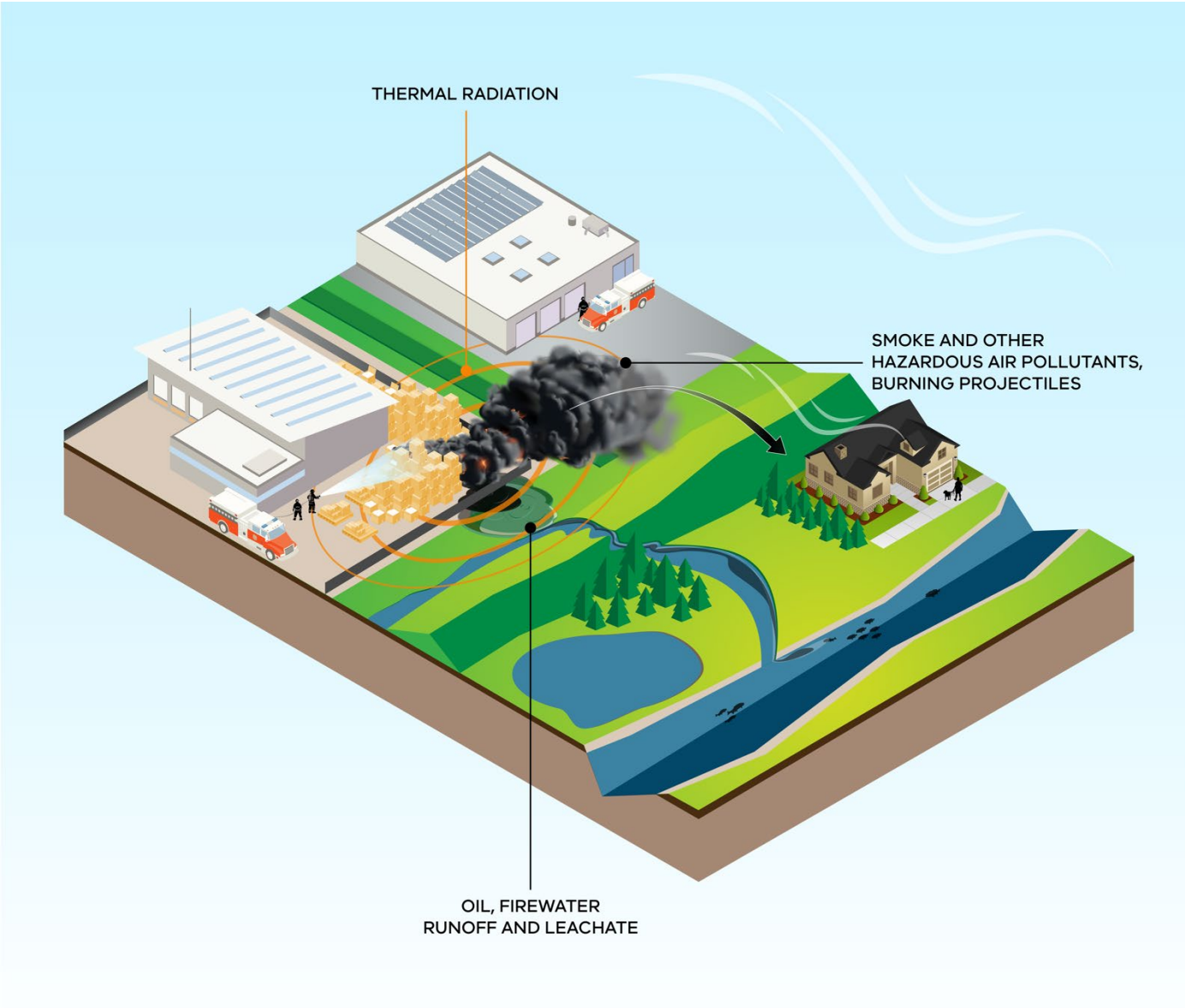


Figure 1: Impacts from fires at WRRFs on communities, environment, businesses and fire-fighting authorities.

To support compliance with the Victorian environment protection laws, or as a guide to implementing best practice, this guideline provides advice for how to:

- design and meet performance objectives and expected outcomes for managing and storing CRWM at WRRFs
- select a site and designing a new WRRF
- improve management of CRWM at an existing WRRF.

Specifically, it:

- outlines a process for fire risk assessment
- identifies controls to prevent and mitigate fires at WRRFs
- sets out CRWM storage guidance
- outlines emergency management plan requirements for fires at WRRFs.

Duty holders should apply the performance objectives and expected outcomes outlined throughout this guideline when:

- selecting a site and designing a new facility
- managing and storing CRWM at an existing facility.

1.3 Guideline development

EPA has prepared this guideline in conjunction with the Country Fire Authority (CFA), Fire Rescue Victoria (FRV), Emergency Management Victoria (EMV), WorkSafe Victoria (WSV) and the Department of Environment, Land, Water and Planning (DELWP). Fire Protection Association Australia (FPA Australia) provided additional technical advice.

This guideline was initially developed to support the interim Waste Management Policy (Resource Recovery Facilities) in 2017 then the Waste Management Policy (Combustible Recyclable and Waste Materials) (WMP CRWM) in 2018.

The WMP CRWM has been superseded by the new Victorian environment protection laws and therefore, this version of the guideline has been updated to reflect this.

1.4 Using this guideline

Symbols used in this guideline

Performance objectives and expected outcomes.

Key message.

External links and further reading.

Focus on additional definitions, explanations and examples.

This guideline is in a workbook format to assist those responsible for the management and storage of CRWM where there is a risk of fire, to implement systems and processes that will enable compliance with the Victorian environment protection laws. It contains:

- performance objectives and expected outcomes to be achieved to comply with the Victorian environment protection laws, which appear throughout this guideline
- process flows which walk the reader through a thought or assessment process
- key messages and summaries of the main information
- links to additional external information which further support site specific compliance with the Victorian environment protection laws

- additional definitions and examples.

There is checklist to support duty holders to implement the guideline (Appendix 1). We recommend duty holders complete the checklist as part of a gap analysis of existing systems and processes before starting any implementation activities.

The guideline provides technical information about burn temperatures, ignition points and the nature of fires in CRWM storage to support discussion of the content. When applying the principles within this guideline WRRFs should seek independent information that will be relevant to their site, specific to waste types, setting and activities.

1.5 Glossary

Combustible recyclable and waste materials (CRWM): are recyclable and waste materials that could create a fire hazard. CRWM may include specified CRWM (reg 4, EP Regulations), organic materials, industrial and municipal waste (refer to the definition for municipal waste below).

Types of waste materials which may be considered CRWM includes but is not limited to the following:

- paper and cardboard
- wood
- plastic
- rubber, tyres, and tyre-derived waste
- textiles
- green waste / organic material
- refuse-derived fuel (RDF)
- electronic waste (e-waste)
- metal and other materials with combustible contaminants
- combustible by-products of metal processing activities (that is floc).

Duty holder: any person or group of people that has duties and obligations under the EP Act.

Firefighting authorities: members of the Country Fire Authority (CFA), Fire Rescue Victoria (FRV) or Forrest Fire Management Victoria (FFMV).

Fire safety specialists: play a key role in providing expert fire safety advice to assist with the development and understanding of fire safety principles and may be considered a suitably qualified person. They also assist with reducing potential risks to life, property and environment. Fire safety specialists must have:

- practical expertise in undertaking fire safety inspections, with knowledge of ignitions sources, risks and controls, and ensuring necessary codes and regulations are met
- an applied knowledge of risk assessment and management in the field of fire safety management
- sound knowledge of relevant fire safety codes and Regulations
- tertiary qualifications/competencies in fire safety, fire engineering, risk management or extensive experience in a relevant field/discipline

General environmental duty (GED): The EP Act defines the GED as requiring any person who is engaging in an activity that may cause risks of harm to human health or the environment from pollution or waste to minimise those risks, so far as reasonably practicable.

Industrial waste: The EP Act defines industrial waste as waste from commercial, industrial or trade activities or from laboratories; or waste prescribed as industrial waste where waste from any source received at a place or premises which stores or handles waste generated at another site for the purpose of resource recovery (for example municipal waste received by a WRRF) or off-site transfer or disposal is deemed industrial waste.

Lawful place: a place authorised to receive industrial waste under the EP Act and EP Regulations. If you create, transport or receive waste, you must ensure it ends up at a lawful place.

Licence: a type of permission that addresses complex activities that justify the highest level of regulatory control due to the significant risk of harm to human health and the environment or a high potential for mismanagement. Decisions on licence applications will involve a detailed assessment and a licence that is granted will include customised conditions and undergo ongoing oversight by EPA.

Municipal waste: The EP Act defines municipal waste as waste from municipal or residential activities, and includes waste collected by, or on behalf of, a council, but does not include industrial waste. Once municipal waste is received at a place or premises which stores or handles waste generated at another site for the purpose of resource recovery or off-site transfer or disposal, this waste becomes industrial waste.

Owner: usually the person who is listed as the registered proprietor on the certificate of title.

Permissions: refer to licences, permits and registrations, collectively. EPA may issue a permission or allow an entity to undertake a particular activity. Permissions also help set performance standards under the GED.

Permit: apply to activities that are of moderate risk or high risk with low complexity and are not adequately addressed through the GED alone. The conditions of a permit can also provide additional direction and clarity for duty holders on risk management using a lower-burden instrument than licensing.

Premises: includes a structure, building or vehicle.

Prescribed permission activity: a type of activity that can cause harm to human health and the environment and therefore, requires an EPA permission such as a licence, registration or permit to ensure performance standards and conditions are met across a range of activities. Refer to Schedule 5 of the EP Regulations (https://www.legislation.vic.gov.au/as-made/statutory-rules/environment-protection-regulations-2021) for further information on the different types of prescribed permission activities.

Priority waste: any municipal and industrial waste, that is prescribed to be priority waste for :

- eliminating or reducing risks of harm to human health or the environment posed by the waste;
- ensuring the priority waste is managed in accordance with the waste duties
- facilitating waste reduction, resource recovery and resource efficiency

Reasonably practicable: implementing controls that are proportionate to the risk and considers:

- eliminating or reducing the risk
- likelihood of the risk
- degree of harm

- state of knowledge
- available suitable controls
- costs of suitable controls.

Registration: a simple mechanism that is automatically granted upon application and may include standard conditions for the relevant activity. They are suited to activities that pose moderate to low risks and in instances where applying standard controls across a sector may raise the standard of compliance and minimise risks to human health and the environment (including as a precautionary approach to the management of emerging risks).

Reportable priority waste: a subset of priority waste that carries the highest levels of controls. It poses the greatest level of risk to human health and the environment.

Sensitive uses: land that is considered to have a sensitive use due to either the environmental values or human activities that need protection from the effects of pollution and waste. They include, but are not limited to:

- ecosystem protection
- human health and wellbeing
- buildings and structures, for example, accommodation, childcare centres, education centres
- local amenity, for example outdoor recreation sites
- aesthetic enjoyment
- production of food, flora and fibre.

Site: specified land or a specified parcel of land.

Specified electronic waste (e-waste): defined by the EP Regulations to be waste rechargeable batteries, cathode ray tube monitors and televisions, flat panel monitors and televisions, information technology and telecommunications equipment, lighting and photovoltaic panels.

State of knowledge: the body of accepted and/or available knowledge that is known or ought to be reasonably known about the harm or risks of harm to human health and the environment, and the controls for eliminating or reducing those risks.

Suitably qualified person: provides expertise in specialised areas such as contaminated land, noise, and odour. Services they provide include environmental assessments, audits, advice on due diligence, assessment of risk, and designing environmental management plans.

Waste and resource recovery facility (WRRF): is a facility that receives, stores or processes waste generated at another site for the purposes of resource recovery or offsite transfer or disposal, including but not limited to:

- transfer stations
- materials recycling facilities
- resource recovery centres
- re-processors (for example, recyclers of paper, cardboard, plastic and e-waste).

Table 1: List of acronyms used throughout this guideline

CFA	Country Fire Authority
CRWM	Combustible recyclable and waste materials
DELWP	Department of Environment, Land, Water and Planning
EIB	Emergency Information Book
EIC	Emergency Information Container
EMV	Emergency Management Victoria
EPA	Environment Protection Authority Victoria
EP Act	Environment Protection Act 2017
EP Regulations	Environment Protection Regulations 2021
FPA (Australia)	Fire Protection Association Australia
FRV	Fire Rescue Victoria
GED	General environmental duty
WSV	WorkSafe Victoria
WRRF	Waste and resource recovery facility
WRRG	Waste and resource recovery group

Chapter 2. Duty holder's responsibilities

All Victorians have duties and obligations under the EP Act.

2.1 General environmental duty

The cornerstone of the EP Act is the general environmental duty (GED). This duty requires you to eliminate the risks of harm to people and the environment from pollution and waste. Where it is not reasonably practicable to eliminate you must reduce the risks of harm to people and the environment from pollution and waste as much as reasonably practicable. The GED is a new approach that focuses on preventing harm from waste and pollution rather than managing impacts after harm has already occurred.

The GED requires anyone conducting an activity that poses risks to human health and the environment to understand and minimise those risks from pollution and waste so far as reasonably practicable. The GED requires you to:

- use and maintain plant, equipment, processes and systems in a manner that minimises risks of harm
- use and maintain systems for identification, assessment and control of risks of harm that may arise in connection with the activity, and for the evaluation of the effectiveness of controls
- use and maintain adequate systems to ensure that if a risk were to eventuate, its harmful effects would be minimised
- ensure that all substances are handled, stored, used or transported in a manner that minimises risks of harm
- provide information, instruction, supervision and training to any person engaging in the activity to enable those persons to comply with the GED.

2.2 Waste duties

It is up to everyone to safely manage their waste. From 1 July 2021, waste generators, transporters and receivers must all make sure waste goes to a place authorised to receive it.

If your business produces industrial waste, there are specific requirements you must meet. If you have high risk industrial waste, even more care and controls are needed.

Follow these three steps to help you meet your waste duties:

- **Classification:** properly identify and classify your waste so that it is clear what duties apply to the waste and how to manage it.
- **Transportation:** provide enough information about the waste to the transporter. Priority waste has further containment and isolation requirements. Each time reportable priority waste changes hands, EPA must be informed through the electronic waste tracker system.
- **Lawful place:** ensure that industrial waste only goes to a place that has lawful authority to receive it. Lawful authority can be via a permission, declaration of use, determination or as authorised under Regulation 63 of the EP Regulations.

There are three different waste types:

- **Industrial waste**: waste from commercial, industrial or trade activities or from laboratories; or waste prescribed as industrial waste where waste from any source received at a place

or premises which stores or handles waste generated at another site for the purpose of resource recovery or off-site transfer or disposal is deemed industrial waste. *Guide to classifying industrial waste* (publication 1968) (https://www.epa.vic.gov.au/about-epa/publications/1968) has more information on the process for classifying industrial waste.

- **Priority waste**: any municipal and industrial waste, that is prescribed to be priority waste for the purposes of:
  - eliminating or reducing risks of harm to human health or the environment
  - ensuring the waste is managed in accordance with the waste duties
  - facilitating waste reduction, resource recovery and resource efficiency.
- **Reportable priority waste**: a subset of priority waste with the highest levels of controls. It poses the greatest level of risk to human health and the environment.

Each waste type has duties and controls that apply to that type of waste (Figure 2). The duties and controls associated with these waste types accumulate. For example, reportable priority waste must be managed in accordance with the industrial, priority and applicable reportable priority waste duties. Refer to *Summary of waste framework* (publication 1756.2) (https://www.epa.vic.gov.au/about-epa/publications/1756-2) for further information on each duty and where they can be found in the EP Act.

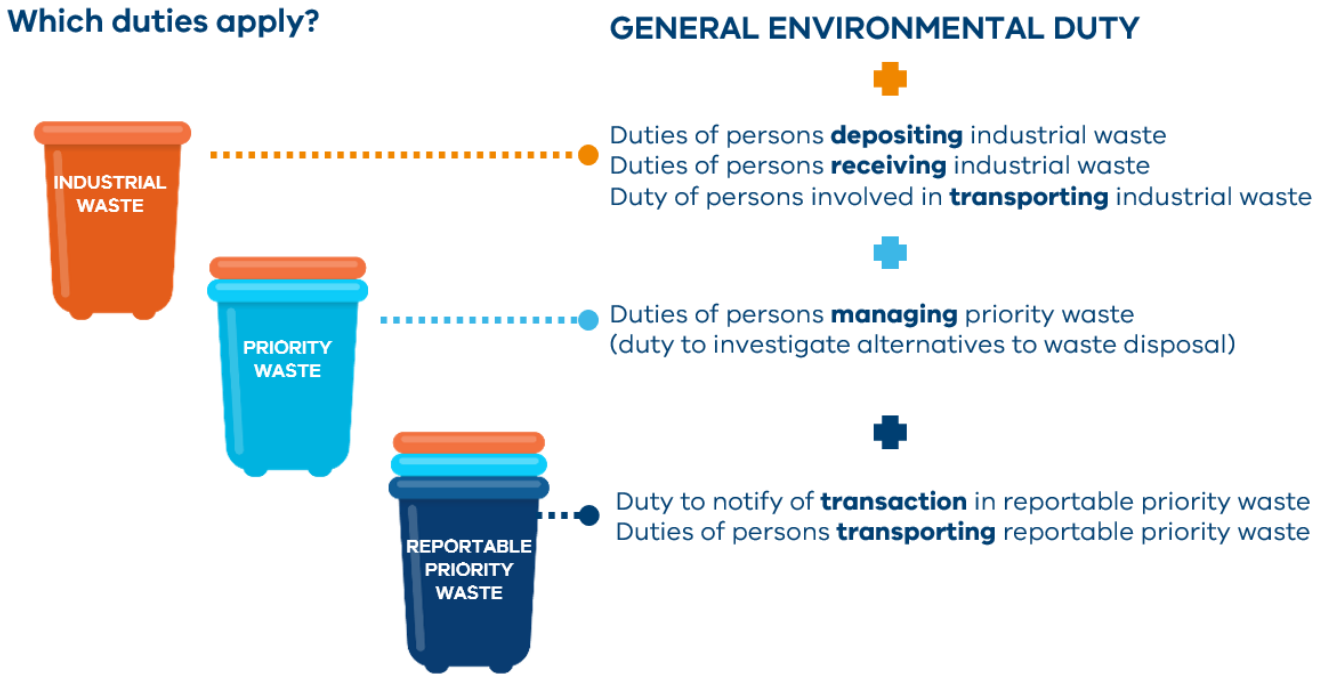


Figure 2: Duties and controls specific to waste type.

2.3 Permissions

Under the Victorian environment protection laws, EPA issues licences, permits and registrations. These are collectively referred to as 'permissions'. Permissions complement and support the GED and waste duties by providing greater assurance that high-level risks are being effectively managed (Figure 3). They ensure certain standards and conditions are met across a range of activities. Permission holders must comply with the GED and their waste duties as well as conditions stipulated in their permissions.

Refer to *Permissions scheme policy* (publication 1799.2) (https://www.epa.vic.gov.au/about-epa/publications/1799-2) for further information on how each permission type works, or EPA permissions webpage (https://www.epa.vic.gov.au/for-business/new-laws-and-your-business/permissions) for more information on EPA permissions and prescribed permission activities.

The nature of your activities determines if you need a permission, and the level of control that needs to be put in place.

The EPA website has more information. (https://www.epa.vic.gov.au/for-business/new-laws-and-your-business/permissions/check-if-you-need-a-permission)

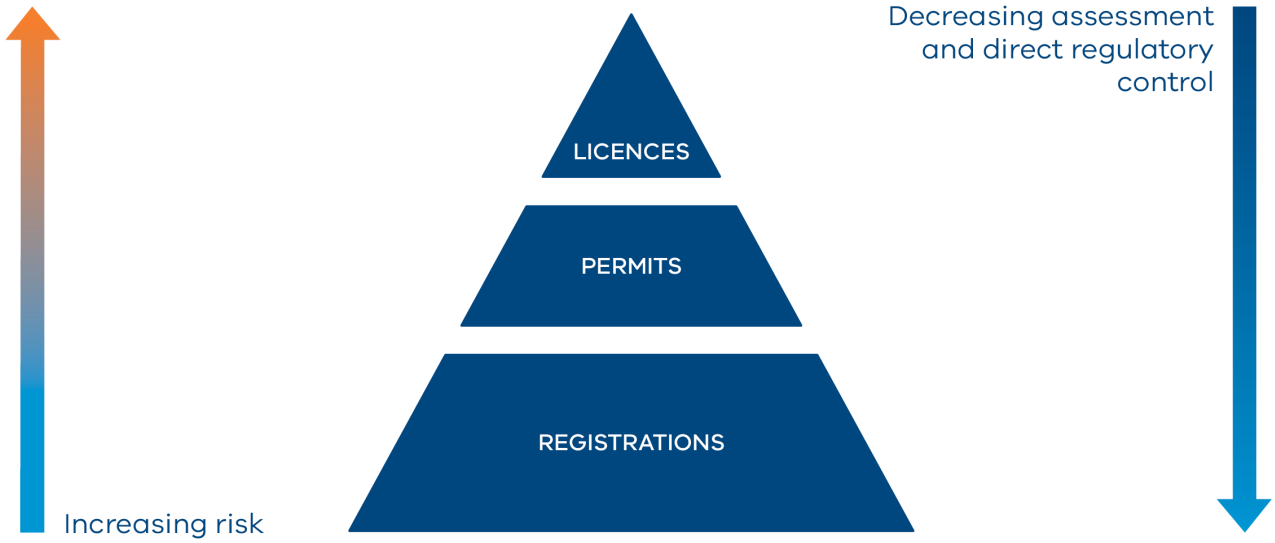


Figure 3: Figure 3: The 3 tiers of the permissions scheme

Licences: are for prescribed permission activities that need the highest level of regulatory control. Applications involve a detailed assessment. Licences granted will include customised conditions that EPA regularly checks compliance with.

There are three types of licences: pilot project licence; development licence, and operating licence. The type of licence you may need will depend on your activities.

- A pilot project licence is for research and development of a new technology or technique.
- A development licence is for the design, construction and modification of high-risk activities.
- An operating licence is for the operation of high risk and complex activities.

Permits: are for prescribed permission activities that are moderate to high risk but low complexity. The conditions of a permit can provide additional direction and clarity about how to manage your risks.

Registrations: are for low risk prescribed permission activities. Registrations are automatically granted upon application and may include standard conditions to help you manage your risks.

2.4 Waste and resource recovery facility permissions

WRRFs that receive, store or process waste generated at another site, require an EPA permission. This is referred to in the EP Regulations as prescribed permission activity A13 – waste and resource recovery. The Check if you need a permission (https://www.epa.vic.gov.au/for-business/new-laws-and-your-business/permissions/check-if-you-need-a-permission) webpage has more information.

The type of permission you need will depend on the amount of waste you receive and process. There are threshold limits for each permission type as follows:

- **Licence**: *including* specified CRWM but *excluding* reportable priority waste (transport), for the purposes of resource recovery or off-site transfer or disposal, if:

  (a) 4000 tonnes or more of waste is received in any month; or
  (b) 10 000m3 or more of waste is stored on the site at any time

- **Permit**: (1) *excluding* CRWM and reportable priority waste (transport), for the purposes of resource recovery or off-site transfer or disposal, if:

  (a) 4000 tonnes or more waste is received in any month; or
  (b) 10 000m3 or more of waste is stored on site at any time.

  (2) *including* CRWM but *excluding* reportable priority waste (transport), for the purposes of resource recovery or off-site transfer or disposal, if:

  (a) less than 4000 tonnes waste is received in any month; and
  (b) between 5000m^3 and 10 000m^3 of waste is stored on the site at any time.

- **Registration**: *including* CRWM but *excluding* reportable priority waste (transport), for the purpose of resource recovery or off-site transfer or disposal, if between 5m^3 and 5000m^3 of any waste is stored on the site at any time.

Schedule 1 of the EP Regulations is the regulatory reference and shows the associated base fees for A13 prescribed permission activities.

Refer to *Changes to permissions in the waste and resource recovery sector* (publication 1984) (https://www.epa.vic.gov.au/about -epa/publication/1984) for further information.

2.5 Waste and resource recovery facility permission activity conditions

In addition to complying with your obligations under the GED and waste duties, you must also ensure you comply with conditions in your permission. The conditions detail control measures as well as administrative and reporting requirements which you must comply with. The conditions also build your state of knowledge about your prescribed permission activity.

The type and number of conditions in your permission will depend on the type of permission you hold which is dependent on the size of your premises and volumes of CRWM stored and managed on your site.

There are several administrative and reporting requirements in the A13 permission conditions. They include the requirement to:

- keep a copy of your permission at the activity site and be easily accessible to anyone engaging in an activity conducted at this site. In addition, you must include information relating to the permission and the Act duties in all site induction and training
- Immediately notify EPA in the event of a discharge, emission or deposit which gives rise to, or may give rise to, actual or potential harm to human health or the environment
- for licences and permits, EPA must be immediately notified if there is a malfunction, breakdown or failure of risk control measures at the activity site which could reasonably be expected to give rise to actual or potential harm to human health or the environment or if there is any breach of the licence or permit
- notify EPA if company or business details change (for example name, address, company status or officers). This information must be updated in the EPA Interaction Portal. The level and type of notification will depend on the permission type (i.e. licence, permit or registration)
- for licences and permits, you must provide EPA with a Permission Information and Performance Statement (PIPS) in the form determined by EPA within two months of receiving notification in writing from EPA. The PIPS may be released to the public (in whole or in part)
- for licences and permits, information and monitoring records used for the preparation of, inclusion in, or support of any reporting or notification that is required of you by EPA (including data reporting, performance reporting, documents evidencing any risk and monitoring program) must be:

  (a) retained for five years
  (b) made available to EPA on request.

It is important that you understand and comply with all the conditions in your permission.

2.6 Financial assurance

A financial assurance is a regulatory tool intended to prevent the Victorian community bearing the financial cost of cleaning up a site. Financial assurances ensure that in the event remediation or clean-up is required, appropriate funds from the responsible person are available if the site becomes insolvent or incurs liabilities beyond its financial capacity.

The EP Regulations specify which prescribed permission activities may be required to submit financial assurance. These include WRRFs holding a licence or permit. The Financial assurance for permissions and contaminated land management (publication 2002) guideline has more information. The prescribed permission activities that may require a financial assurance are set out in the EP Regulations.

2.7 Your legal responsibilities in managing risks from fire

Duty holders are responsible for minimising harm to human health and the environment from fire at their sites so far as reasonably practicable, irrespective of how the fire starts. Fires can start elsewhere, such as in a neighbouring yard or a bushfire, and could spread to your facility.

Table 2 outlines the basic responsibilities of duty holders to ensure they minimise the risk from fire at their sites so far as reasonably practicable, including responsibilities to their staff, authorities and the public.

Table 2: Responsibilities of duty holders of WRRFs to minimise the risks to human health and the environment from fire so far as reasonably practicable.

Responsibilities to authorities	Comply with the Victorian environment protection laws to store and manage CRWM in a manner that minimises risks to human health and the environment from fire so far as reasonably practicable. Ensure new buildings and significant refurbishments (that is. for indoor CRWM storage) meet requirements of local planning and building authorities. Sign off on essential safety measures for buildings. Display safety measures, routine service records, and emergency plans onsite and supply these to relevant authorities on request. Ensure fire protection service providers are recognised as competent individuals for the tasks they undertake. Respond to fire prevention notices, EPA notices and WorkSafe Victoria improvement notices to improve fire safety onsite and reduce risks to human health and the environment from fire so far as reasonably practicable. Comply with relevant Victorian occupational health and safety (OHS) legislation, including ensuring a safe working environment and that the means of entering and leaving the workplace are safe and without risks to health.
Responsibilities to employees and other people on site (contractors, visitors, public)	Actively involve employees in site safety, for example, risk assessments and site walks. Ensure there are adequate emergency exits from indoor storage facilities and that access to these is maintained. Ensure that non-employees (for example, members of the public, contractors and nearby communities) are not exposed to risks to their health and safety. Provide adequate training and equipment for staff to respond to fire hazards, for example, training employees on the emergency management plan and how to safely use fire extinguishers.
Responsibilities in an emergency (fire in CRWM storage)	Manage emergencies according to the site's emergency management plan. Ensure suitable access to/within site for emergency services and staff implementing the emergency management plan. Ensure that the resources described in the emergency management plan exist, are functional and available.

2.8 Staff training

If you are an employer, under the *Occupational Health and Safety Act 2004* (OHS Act) you must provide employees with the appropriate information, instruction, training and supervision to perform their work safely and without risks to health. You must also consult with employees about matters related to health or safety, including site fire safety. This includes involving them in fire hazard identification and risk assessment, updating the hazard and risk register when new hazards and risks arise, making decisions about measures to control risks, checking controls are still effective and working correctly, and proposing changes that may affect the health or safety of employees.

	Summary of employer duties to staff	https://www.worksafe.vic.gov.au/occupational-health-and-safety-your-legal-duties

It is important that staff are involved in the development of the WRRF's emergency management plan and understand their roles in applying it. The emergency management plan may include options for staff to initially respond to fire or to evacuate the facility. Whether or not staff actively respond to fires (using fire extinguishers, fire hose reels or other means) depends on their role, and specific circumstances of the fire and the threat it poses.

If staff are assigned roles to respond to fire it is crucial that the right training is provided. It is important that they are aware that their first obligation is to their own safety, and trained staff are under no obligation to respond to fires if they believe it unsafe to do so.

In the event of fire, dial 000 as soon as possible, regardless of any first response from onsite staff.

	Useful staff training resources	www.cfa.vic.gov.au/plan-prepare/training-services https://www.fes.com.au/emergency-training

2.9 Explanation of regulatory powers

In addition to the Victorian environment protection laws, the following Acts are relevant to duty holders for managing risk from fire at WRRFs:

- Country Fire Authority Act 1958 and Fire Rescue Victoria Act 1958 – defines powers and duties of CFA and FRV respectively.
- *Occupational Health and Safety Act 2004* – WorkSafe has oversight of occupational health and safety matters in all workplaces, including workplaces that provide recycling and waste management operations, as well as workplaces that deal with dangerous goods and therefore, duty holders have obligations to provide safe workplaces (for example, through minimising risk from fire).
- *Building Act 1993* – minimising risk from fire in indoor storage through infrastructure and planning.

- *Planning and Environment Act 1987* – requirements for use of land to run a WRRF.
- *Australian Dangerous Goods Code, Edition 7.6,* and *Dangerous Goods Act 1985* and relevant regulations – understanding what dangerous goods are, including flammable liquids and solids that may pose a fire hazard and the requirements for managing them.

Authorities may also use other Acts and regulations to enforce fire safety at WRRFs, and it is the responsibility of the duty holder to ensure they are compliant with all relevant laws and policies.

2.10 Who to contact for advice

Questions about implementing this guideline can be directed to EPA Victoria (https://www.epa.vic.gov.au). Duty holders of WRRFs can also seek further information about fire safety from:

- other authorities and agencies
    - Country Fire Authority (CFA) (https://www.cfa.vic.gov.au/home)
    - Local Waste and Resource Recovery Groups (WRRGs)
    - Fire Rescue Victoria (FRV) (https://www.frv.vic.gov.au/)
    - Victorian Building Authority (VBA) (https://www.vba.vic.gov.au/)
    - WorkSafe Victoria (WSV) (https://www.worksafe.vic.gov.au)
    - Sustainability Victoria (SV) (https://www.sustainability.vic.gov.au/)
- industry associations
    - Victorian Waste Management Association (VWMA) (https://www.vwma.com.au/)
- subject matter experts
    - fire safety specialists
    - suitably qualified person *Engaging consultants* (publication 1702) (https://www.epa.vic.gov.au/about-epa/publications/1702)

Chapter 3. Hazard identification and assessing risks from fire

3.1 Performance objectives and expected outcomes for assessing risks from fire

Objectives:

- ☑ Identify all possible fire hazards and their potential causes at your site.
- ☑ Assess all the risks of fire to human health and the environment from identified hazards at your site.
- ☑ Identify and describe how you will continue to eliminate or minimise the risks so far as reasonably practicable.

- ☑ Licence and permit holders must meet additional objectives pertaining to the **risk management and monitoring program (RMMP)** as outlined in *Implementing the general environmental duty: a guide for licence holders* (publication 1851) (https://www.epa.vic.gov.au/about-epa/publications/1851-1)
- ☑ Expected outcomes include:
  - ☑ Your hazard and risk register is comprehensive and is updated when new hazards and/or risks are identified.
  - ☑ You understand all the risks to human health and the environment from identified hazards at your site with consideration of the consequence and likelihood of the identified fire hazards assessed and documented, and why the fire risks exist.
    - You have identified and described how you will continue to eliminate or minimise the risks so far as reasonably practicable.

3.2 Introduction to a fire risk management framework

Well-developed and well-communicated fire risk management ensures all WRRF stakeholders, including staff, are aware of the fire hazards, the associated risks and the controls implemented to reduce the risk of harm to human health and the environment from fire so far as reasonably practicable.

There are three important elements to implementing this fire risk management framework:

1. **Hazard** is something that has the potential to cause harm or detriment to people or the environment.
2. **Risk** is the possibility of harm that could happen because of an event. The level of risk is influenced by two factors: consequence and likelihood.
   - Consequence is an outcome or impact of an event.
   - Likelihood is the probability of that outcome occurring.
3. A **control** is something which eliminates or reduces a hazard or risk. This includes equipment, work processes or monitoring systems.

One option for undertaking risk management is outlined in Figure 4. This is a continuous and circular framework that can facilitate effective risk management.

You may wish to incorporate this risk assessment process into your existing OHS framework or use the hazard and risk register template provided in this guideline.

	Risk management for businesses	There are many documents that can support development of general risk management for businesses. These can include Australian/New Zealand or International Standards, such as ISO 31000, Risk Management, which address risk across all business activities. Others have been developed to address specific aspects of a business's activities, for example Assessing and controlling risk: a guide for business (publication 1695) www.epa.vic.gov.au/our-work/publications/publication/2018/may/1695

Step	Action	Description
1	Identify fire hazards	What fire hazards are present that might cause harm to human health and the environment.
2	Assess risks from fire	What your understanding of the level or severity of a fire risk is, based on consequence and likelihood, and your understanding of why the risks exists.
3	Implement controls	What measures can be put in place to eliminate or reduce a risk (e.g. engineering, equipment, work processes or monitoring systems).
4	Check controls	Review controls to ensure they are effective. Independently check that monitoring activities are being conducted properly and verify that the activities are suitable (that is, actively manage the risk).

Figure 4: Steps in controlling hazards and risks.

Robust fire risk management requires a regular review of the hazard identification, risk assessment and controls that have been implemented at the facility.

3.3 Identifying fire hazards

When identifying hazards which could start a fire, several different approaches can be taken.

For example, you could consider the three elements required for a fire to start – oxygen, heat and fuel (Figure 5) – then identify potential sources of these elements and implement controls to isolate them.

Figure 5: Figure 5: The fire triangle.

When identifying hazards (Table 3), you may ask the following questions:

- Where are the potential fuel sources onsite and where are they relative to other flammable items?
- What happens to those fuel sources which could create a hazard? Are they managed in a way that creates a hazard?
- What are the potential ignition sources?
- What activities are occurring around these fuel sources that might ignite the fuel?

Table 3: Examples of fire hazards at waste and resource recovery facilities.

Examples of components for a fire to start		
 **IGNITION (HEAT) SOURCES**	 **FUEL SOURCES**	 **OXYGEN SOURCES**
Ignition (heat) sources	**Fuel sources**	**Oxygen sources**
Lit cigarettes/butts, matches, lighters. Improperly stored batteries. Bushfire. Self-heating piles. Hot loads/contaminated waste. Hot work operations. Arson. Lightning. Fires from neighbouring activities. Faulty electrical wires. Poorly maintained equipment. Naked flame. Friction from seized conveyor rollers or caught wire on machinery.	Flammable liquids, gases and solids. Combustible goods and waste materials . Contamination in CRWM storage. Poorly managed, high volumes of CRWM. Dry and unmanaged vegetation.	Oxidising chemicals such as oxy-acetylene sets, bleach, hydrogen peroxide, nitrates. Physical introduction of oxygen through unbaling or turning loose piles.

How to identify hazards

Identifying hazards is a very important first step in risk management. If a hazard is not identified, the risk cannot be managed. It is therefore important to ensure that your hazard list is comprehensive and that new hazards are added as they are identified. You should look to several sources and activities to identify your hazards (Figure 6).

Figure 6: Potential resources and activities for hazard identification.

The risk management steps to identify hazards require consultation with the workforce and periodic review. This ensures there is a collective understanding of the hazards and that newly identified hazards are communicated.

3.4 Assess fire risks

Once fire hazards are identified they should be assessed. Assessing identified hazards informs decisions on the implementation of the most appropriate control strategies and methods. Establishing consequence and likelihood provides WRRF operators with a framework in which to develop, select and apply controls.

3.5 Understanding consequences

When considering consequence, look at how your organisation operates. Figure 7 provides concepts that may be of use.

Figure 7: **Concepts in understanding consequences of fire.**

Once you have considered various consequences of fire, Table 4 lists some questions which might help you work out:

- the harm each identified fire hazard could cause
- the potential severity of the harm to human health and the environment.

Table 4: Typical questions that could help identify consequences.

Question types	Question examples
What environmental harm could occur when a major fire breaks out?	Could the hazard cause a major fire that would impact the community or environment?
What circumstances could influence the severity of harm?	Are there adequate distances between storage piles? Is there adequate access to/around the site for firefighting authorities? Have the minimum site access requirements stipulated by the firefighting authorities been adapted onsite?
What is the potential for people at your site to be harmed?	Are there enough exits to allow everyone to escape safely? Does the business keep a register of people onsite?
What is the potential impact to the surrounding communities if a fire occurred?	Are there sensitive community members (e.g. young children and the elderly) nearby that could be harmed?
What are the potential impacts of any firefighting activities?	How could firewater run-off enter the environment? How far away is the nearest waterway?
Are there circumstances that could increase the severity of a fire?	If a fire plan depends on using an excavator to separate burning material, and this excavator can't be used, what affect would this have on the outcome?

3.6 Understanding likelihood

Likelihood is a measure of probability of a consequence following an event. For example, if a fire occurs, what is the likelihood of that fire causing property damage?

Table 5 sets out general questions and examples that can help with the process of assessing likelihood.

Table 5: Typical questions to ask to assess likelihood of particular consequences occurring.

Key concepts	Questions	Explanation
Previous occurrence	Has a fire occurred in your industry in the past, and if so, what were the consequences? Have there been any near misses at your site?	Assessing incidents or *near misses* provides an understanding of the context in which the incident occurs. This provides a good indication of how to prevent it in the future. It is important not to just consider your site but think about occurrences across the CRWM industry. *For example, if you have had a fire at your facility, it is important to ask what are the circumstances that led to the fire and what are the lessons learnt?*
Frequency	How often does the outcome of a fire have the potential to cause harm to human health and the environment?	A negative consequence of fire may exist all the time or only sometimes. If not managed effectively, the more often the fire risk is present, the greater the likelihood that it will cause harm. *For example, the likelihood of a fire spreading through CRWM storage is more likely at a site that frequently exceeds their operational capacity.*
Changes in operational conditions	How could variations in operating conditions increase the risk?	Operating conditions change over time and vary throughout the year, these changes can influence the likelihood of a negative outcome if an event occurs. *For example, a site located close to a school may receive lots of material in a short period of time creating a large volume of CRWM – increasing the likelihood of the school being evacuated when the material burns.*
Changes in environmental conditions	Can environmental conditions influence fire risk? How would external factors (such as bush fire) increase the risk?	The probability of a fire having a greater impact can increase in summer when conditions are hot and dry. *For example, if you store materials that have a high risk of self-combustion in warm conditions (for example, organic waste), do you have any measures in place to cool or otherwise manage these materials during hot and dry conditions?*

Key concepts	Questions	Explanation
Behaviour	Could the way people act and behave affect the likelihood of a hazard causing harm?	People may make mistakes, misuse items, act spontaneously or panic during a fire. Review staff emergency management training to ensure that staff receive adequate and updated training. *For example, staff that have received adequate training will have experience in implementing the emergency management plan and will be able to notify relevant emergency services as soon as reasonably possible.*

3.7 Building your hazard and risk register: identifying hazards and assessing risks

To ensure the ongoing management of risks, it is important to document all identified fire hazards and risks, and their controls. One method of doing this is through a hazard and risk register. Table 6 provides an example of how to record hazards, identify their potential causes, and consider the consequence and likelihood of an uncontrolled event.

Identifying hazards and assessing risk is an ongoing exercise. Risk assessment involves understanding the relative likelihood should an event occur and the scale of potential consequences. Understanding the likelihood and consequence of a hazard leading to an event can support and inform the selection, development and application of controls.

Table 6: Initial steps of the hazard and risk register.

Hazard	Potential causes	Initial risk	
		Consequence	Likelihood
Fire in drop-off area skip bin.	Arson Illegal dumping Self-combustion.	Fire spreading to processing area/CRWM storage/adjacent bushland, causing loss and damage to property, harm to staff, damage to environment, wildlife and nearby community.	Small fires have happened several times within the last year and threatened boundary vegetation.

	Alternatives to the hazard and risk register	There are other tools for capturing and effectively managing risks which may be more appropriate for your organisation than a hazard and risk register. For example, SA/SNZ HB 89 *Risk management - guidelines on risk assessment techniques* and the *National Emergency Risk Assessment Guidelines (NERAG) Handbook* provide alternative risk management tools for consideration if you choose not to follow the hazard and risk register method. www.standards.org.au/standards-catalogue/sa-snz/publicsafety/qr-005/sa--snz--hb--89-2013 National Emergency Risk Assessment Guidelines (NERAG) Handbook (https://knowledge.aidr.org.au/resources/handbook-national-emergency-risk-assessment-guidelines/)

Chapter 4. Controlling your fire hazards and risks

4.1 Performance objectives and outcomes for controlling your fire hazards and risk

Objectives:

- ☑ Identify appropriate controls to minimise the risk of harm from fire so far as reasonably practicable.
- ☑ Describe how the controls will be implemented.
- ☑ Describe how controls will be checked for their effectiveness, any actions to improve your site's risk management and how this process will be verified.
- ☑ Licence and permit holders must meet additional objectives pertaining to the risk management and monitoring program (RMMP) (*Implementing the general environmental duty: A guide for licence holders* (EPA publication 1851.1) (https://www.epa.vic.gov.au/about-epa/publications/1851-1).

Expected outcomes include:

- ☑ Choose and implement controls based on their effectiveness in managing hazards and risks so far as reasonably practicable.
- ☑ Assess and document the effectiveness of your selected controls.
- ☑ Re-evaluate the consequence and likelihood of the identified fire hazards, with consideration of how the implementation of controls are reducing the initial risk and what the remaining residual risk there would be.
- ☑ Document your implemented controls, measures of effectiveness and how these will be regularly checked and maintained in accordance with the manufacturer's specifications.
- ☑ Licence and permit holders must meet additional expected outcomes pertaining to the risk management and monitoring program (RMMP) (*Implementing the general environmental duty: A guide for licence holders* (EPA publication 1851.1) (https://www.epa.vic.gov.au/about-epa/publications/1851-1).

4.2 Choosing and implementing controls

Fire in CRWM storage and management is a principal hazard to human health and the environment. Effective risk management requires that all reasonable steps be taken to eliminate fire hazards at your site and, where fire does occur, to mitigate the consequences of these fires by reducing their burn time, intensity and ability to spread. This is achieved by applying effective controls.

Controls for specific hazards or risks may be determined as part of statutory or regulatory requirements: for example, dangerous goods storage and handling, and depending on the type of permission you hold, you will have conditions around control measures which you must comply with. Controls may also be outlined in other guidance documents: for example, WorkSafe publications, operating manuals, Australian Standards or safety data sheets.

In addition to meeting these requirements, developing and implementing a site management plan can help ensure you apply a methodical approach that includes staff involvement and aligns with your obligations under the GED and waste duties (refer to Chapter 2 Duty holder's responsibilities).

The **hierarchy of controls (HOC)** can be used to support the identification and choice of controls through a prioritisation framework (Figure 8).

Figure 8: Hierarchy of controls for hazards and risks.

When choosing a control for an identified risk or hazard, the HOC can be used to review a control's effectiveness and support the selection of the most appropriate control. This selection should also include an assessment of the practicality of each control option, which should always be the primary consideration when implementing a control. For example, Table 7 shows that the risk of 'ignition from the equipment' can be eliminated by the 'removal of the equipment'. This may not be possible if no replacement option exists, or if it is not practical due to the equipment being essential for operational activities.

The same can be said for your CRWM storage and management: it is not possible to eliminate the fire hazard that stored CRWM poses, but you can apply other controls to reduce the likelihood of fires starting (prevention controls) or reduce their consequence (mitigation controls) so far as reasonably practicable.

Table 7: Examples of controls across the HOC for addressing a single risk.

Risk	Elimination	Substitution	Engineering	Administrative	PPE
Ignition of CRWM from equipment.	Remove the equipment.	Substitute the equipment with a safer alternative.	Scheduled maintenance of the equipment in accordance with manufacturer's specifications.	Procedures to support routine inspections and regular maintenance of the equipment.	N/A

The following principles should be considered when assessing risk controls:

- Does it provide the highest level of protection for human health and the environment as well as being the most reliable (for example, does it sit at the highest possible level of the HOC given your site conditions)?
- Is it readily available or can it be manufactured to suit?
- Is it suitable for the specific situation/task/application and is it suitable for the intended work environment?
- Does it introduce significant new hazards?

Risk controls should be adopted and consider the site's capacity, inventory, location and proximity to sensitive land uses to minimise risk so far as reasonably practicable.

	**Using a cautious approach to select adequate controls**	An example of a reasonably practicable control that all sites could use is to apply a no-smoking policy. This control is low-cost and requires minimal effort to maintain. Another example of a reasonably practicable control is conducting regular site walks of where CRWM is stored and managed onsite. This can also include checking plant and equipment are working and well maintained.

4.3 Key controls to be used at a WRRF to manage fire risk

Controls are implemented to reduce the occurrence of fire (prevention) and detect as well as suppress fire (mitigation).

To ensure compliance, many of the fire protection system and equipment controls listed in the tables below may have Australian Standards (AS) that apply (Appendix 2). Please note that although compliance with AS for fire protection systems and equipment should be adhered to, especially when referenced by applicable legislation, you must implement control measures which minimise risks of harm to human health and the environment so far as reasonably practicable. International Standards or other appropriate guidance can help you with identifying and implementing these controls.

	**Minimising fire risk**	*The International Fire Engineering Guidelines (IFEG), Part 1*, published by the Australian Building Codes Board, is a useful resource for minimising your risk of harm to human health and the environment from fire so far as reasonably practicable. www.abcb.gov.au/Resources/Publications/Education-Training/International-Fire-Engineering-Guidelines

Some types of systems and equipment may not be considered in AS but could still provide an appropriate level of fire protection. These might include thermal detection camera systems, video imaging detection camera systems, static and portable fire water monitors, and water spray systems.

4.4 Fire prevention

Controls to consider for preventing fires at your site can include (but are not limited to) the following types of engineering and administrative controls. Some of these controls may be referenced in your permission conditions.

Effective storage management (engineering controls) – see Chapter 5 for more detail

Examples to consider	Purpose
Separation of activities, for example separate drop off, processing and storage areas by distance, containment walls etc.	Prevent risk of contamination and hot loads in drop-offs and other parts of the operation being introduced to CRWM storage.
Good layout of site arrange your site to consider spontaneous combustion and the flammable nature of your waste types.	Reduce the risk of fires starting through self-heating in oversized piles or from ignition sources.

Monitoring hazards (engineering controls)

Examples to consider	Purpose
Security systems such as CCTV to monitor sites for illegal dumping, vandalism, other potential sources of ignition.	Identify and respond to fires that occur when sites are unmanned/fire starts without anyone noticing.
Early detection devices such as thermal probes to monitor temperature of CRWM storage; and external thermal detection, video smoke detection and flame detection to detect fire in the early stages.	Alert staff to a potential fire or when a fire has started but has not yet been spotted. Crucial for organic storage or for long term storage of other self-heating materials.

Site arrangement (engineering controls)

Examples to consider	Purpose
Separation of combustible non-waste materials from CRWM storage through removing gas cylinders, dangerous goods, electrical devices, batteries, flammable substances, etc. from areas where CRWM is stored.	Avoid introducing an ignition source to combustible materials stored onsite.
Quarantine areas for hazardous waste and hot loads through separating combustible hazardous wastes from where CRWM is stored and having designated areas for depositing and controlling hot loads.	Avoid introducing an ignition source to combustible materials stored onsite.
Adequate and maintained security fencing to restrict unauthorised access.	To deter arson, illegal dumping, or harm to public onsite when site is unmanned.

Policies and procedures (administrative controls)

Examples to consider	Purpose
Good housekeeping and equipment maintenance through a regular maintenance program and records.	Reduce dust, litter and other combustible materials building up around the premises. To maintain equipment to reduce the likelihood of overheating or creation of an ignition source.
Permits and policies, for example hot works in place and utilised (including exclusion zones).	Avoid sparks/molten metal from hot works igniting any combustible materials.
Site walks conducted regularly including inspections of equipment/vehicles.	Identify new or changing hazards, ignition sources etc. and respond to them before they cause problems.
Record keeping of staff training, staff roles, and maintenance of vehicles and routine service of fire protection equipment and systems.	Maintain essential equipment to the relevant standard and track issues to satisfactory completion.
Routine service of fire protection equipment is carried out to the latest edition of AS 1851 by individuals considered competent by VBA recognised qualifications or industry accreditation schemes such as Fire Protection Accreditation Scheme. Critical defects are to be rectified within 30 days.	Ensure essential safety measures remain in effective working order.
Review and make updates to safety documents in a timely manner/when introducing new equipment or tasks to the site/in the event of a fire.	Ensure risk assessments are accurate, reflect the arrangements on-site, and up to date.
Develop and enforce a smoking policy that prevents smoking on site or includes no-smoking zones near combustible materials.	Avoid introducing an ignition source to combustible materials stored onsite.

4.5 Fire mitigation

Fires may occur in CRWM despite taking all reasonably practicable steps to prevent them. It is therefore also important to identify management controls that detect and suppress the fire, thereby reducing the impact to human health and the environment. Mitigating controls to consider at your site include but are not limited to the following types. Some of these controls may be referenced in your permission conditions.

Effective storage management (engineering controls) – see Chapter 5 for more detail

Examples to consider	Purpose
Using bunker fire walls or separation/free air gaps to create barriers between piles.	To reduce potential heat transfer and fire spread.
Manage pile size and arrangement of waste types	Use the placement of materials considering the combustible nature and size of piles to manage the risk of fire spread.
Interlace baled material	Increase stack stability and makes it easier to control fire in the early stage.

Fire protection systems (engineering controls)

Examples to consider	Purpose
Fire protection systems (for example, hydrants, fire water monitors, fire sprinklers) provided to respond to hazards on the site (compliant with applicable standards and appropriate to the potential fire hazard).	To allow fire authorities to effectively respond to fires.
Water supply (for example, dams, reticulated or tanks) provided onsite. Where a reticulated supply is not available, cannot meet the requirements of AS 2419.1, or is the worst credible fire scenario, it is important to provide a static water supply that is fit for purpose. Water for fire systems should be potable or Class A recycled water and salt-free.	To allow fire authorities to effectively respond to fires.
Fire warning systems (for example, bells, alarms, alarm signalling equipment) that can be automatically or manually triggered by the fire detection and protection systems, providing both local alarms and automatic notification to the CFA or FRV of the fire.	To alert staff/public/firefighting authorities and instigate fire response/evacuation.

Examples to consider	Purpose
First aid firefighting equipment (for example**,** fire extinguishers, fire hose reels) that is both accessible and in effective working order.	To allow staff to safely egress where necessary.
Firefighting support equipment (for example, excavators) that is stored on site and fitted with AS 5062-compliant vehicle fire suppression systems to separate burning materials or build containment ponds.	To manage fires in larger piles and prevent the spread of fire throughout the site.
Automatic fire deluge systems in bunkered storage within the site.	To ensure piles are doused in the event of fire.

Selecting appropriate fire protection systems for your WRRF

Fire protection systems for a WRRF should be fit-for-purpose. It is important for duty holders to take all reasonably practicable measures to ensure that there is adequate infrastructure, water supply and water pressure to combat all credible, high-risk fire scenarios identified in a risk assessment.

Large volumes of water are often necessary to extinguish fires in CRWM storage. An adequate water supply is crucial to maintaining effective controls. For example, if you install a hydrant system it should be sufficient to deliver flowrates and pressure to feed the minimum number of hydrants needed to deal with the worst credible fire hazard, which may exceed the design requirements specified by AS 2419.1.

Fire water containment (engineering controls)

Examples to consider	Purpose
Liquid run-off management including bunding, drainage basins/catchment pits, contingency plans to divert from storm drains to sewers, use of booms, extinguishing fires with sand instead of foam/water, eductor pumps to pump firewater off site for disposal, and/or monitoring of waterways.	To prevent firewater that has been contaminated by waste and burnt residues from entering the environment (for example, nearby waterways).

Policies and procedure (administrative controls)

Examples to consider	Purpose
Pre-approval with relevant authorities for collection/disposal of fire water prior to an incident occurring.	To prevent firewater that has been contaminated by waste and burnt residues from entering the environment (for example, nearby waterways).
Maintenance of firefighting equipment, including a regular inspection and maintenance program.	To ensure firefighting equipment is fit for purpose and working when a fire occurs.
Routine service of firefighting equipment, in compliance with the latest edition of AS 1851 by individuals considered competent by VBA-recognised qualifications or industry accreditation schemes such as FPAS. Critical defects are to be rectified within 30 days.	To ensure firefighting equipment is fit for purpose and working when a fire occurs.
Arrangements to access offsite firefighting equipment prior to an incident occurring if you expect to use equipment from a neighbouring operation (for example**,** council depot) during a fire.	To ensure that specialised plant/other firefighting equipment to control and suppress burning waste materials will be available in the event of a fire.
Staff training, including awareness of procedures in the event of a fire (as per the site's Emergency Management Plan) and awareness of the procedures for ongoing maintenance of firefighting equipment, including inspections by accredited persons.	To ensure staff are competent to fight fires/follow emergency procedures including alerting authorities and emergency evacuation.
Readily available records of risk assessments, staff training, emergency management plan, maintenance etc.	To ensure staff are up to date on relevant training; equipment is maintained; that staff/visitors are aware of potential fire hazards and controls.
Keeping an Emergency Information Book (EIB) stored in a red Emergency Information Container (EIC) somewhere readily accessible by fire authorities, such as at all vehicle entrances.	To allow fire authorities to quickly assess the threat from fire when they arrive on site, enabling them to fight the fire with greater efficiency.
PPE such as self-contained breathing apparatus kept onsite, and easily visible to and accessible by staff who have the training and (where necessary) accreditation to use them.	To reduce the risk of harm (for example, through smoke inhalation, extreme heat) to staff who are engaging in firefighting activities.

Effective fire risk management requires implementing preventative and mitigating controls to provide layers of protection; the effectiveness of these individual barriers combined determines the degree of protection.

4.6 Are my controls adequate?

Following the risk assessment of fire (step 2) and the identification of control measures (step 3) the next step is to go through an assessment to determine whether the controls you've selected are adequate in reducing the different fire risk scenarios. To complete this assessment for a control you should determine:

- how effective your selected control can be
- what circumstances could contribute to its failure (i.e. 'failure modes')
- what contingencies you have in place if the control fails.

If fire safety relies upon a control, assess that control to identify ways it could fail. This enables the establishment of practices to prevent failure such as inspection, testing and maintenance, or contingencies that effectively mitigate the risk in the event of that failure.

Figure 9 outlines a decision diagram that is aimed at helping you think through the process of identifying the effectiveness of your selected controls.

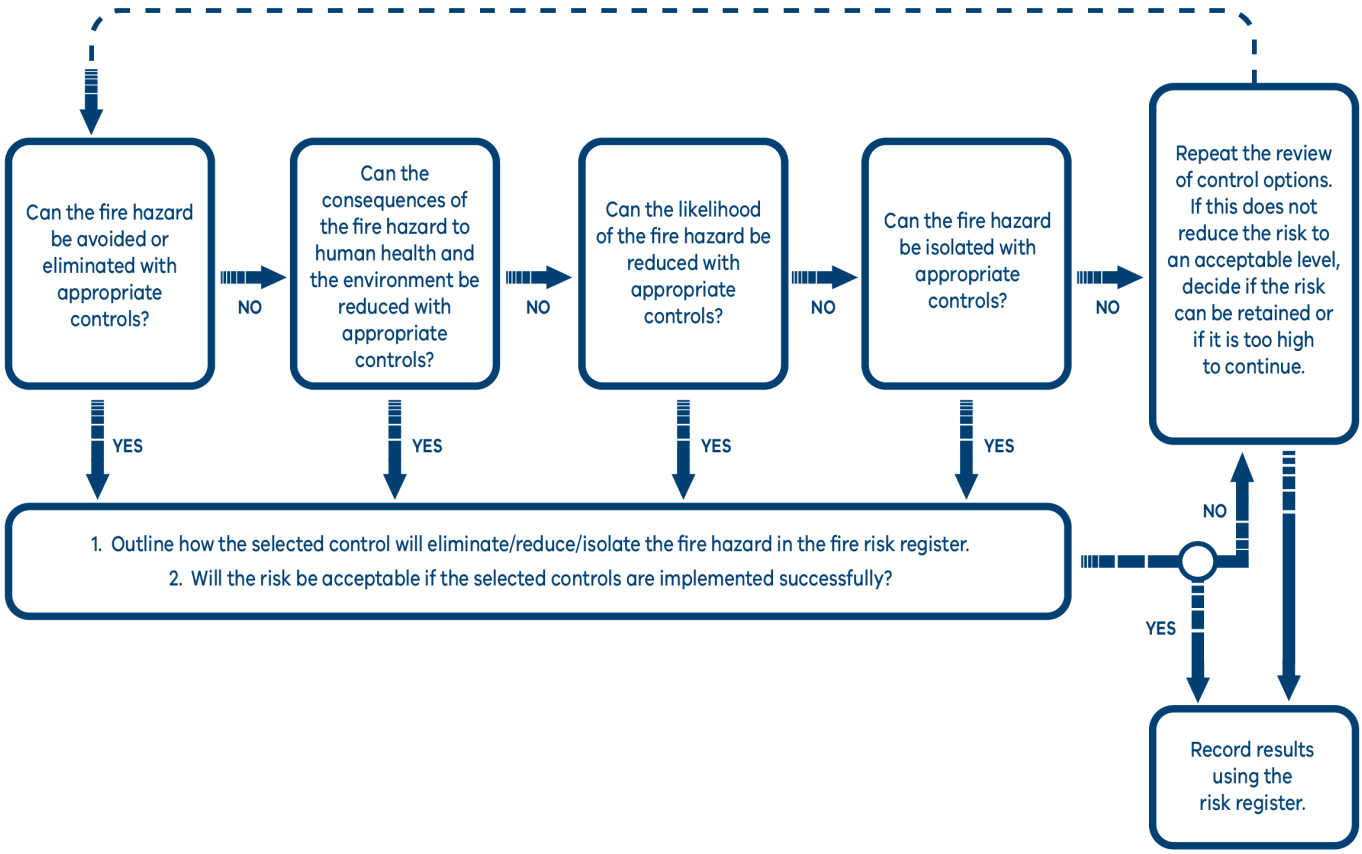


Figure 9: Determining if your controls are adequately managing fire hazards.

	**Checking the adequacy of controls**	If you rely on a piece of machinery to process materials and keep your storage volume to a minimum, what happens if it breaks down? Do you have infrastructure in place to deal with higher pile volumes such as deluge systems or other firefighting equipment, or arrangements to move materials offsite? Reporting and recording incidents and near-misses allows you to identify failures in your controls and identify ways to improve these controls to prevent future incidents occurring.

4.7 Building your hazard and risk register: capturing controls and residual risk

Once you have identified the appropriate controls to implement, update the hazard and risk register. Repeat the process of identifying the consequence and likelihood of the fire hazards as you did in step 2 (Table 8), but with consideration of how the implementation of controls is reducing the **initial risk** and what the remaining risk will be**.** This re-evaluation of risk is capturing **residual risk**. The purpose for re-evaluating risk is to assess the effectiveness of your controls and to determine the need for any further actions (for example**,** any infrastructure upgrades you will need), which is discussed in the next section.

Table 8: Adding controls and re-evaluating risks in the register.

Hazard	Potential causes	Initial risk		Controls implemented	Residual risk	
		Consequence	Likelihood		Consequence	Likelihood
Fire in drop-off area skip bin.	• Arson • Illegal dumping • Self-combustion.	Fire spreading to processing area/CRWM storage/adjacent bushland, causing loss and damage to property, harm to staff, damage to environment, wildlife and nearby community.	Small fires have happened several times within the last year and threatened boundary vegetation.	• Fit for purpose fire protection system. • Skip bin locked up behind gate outside operating hours. • Separation of bin from nearby buildings and site boundary to be maintained at all times. • Removal and/or maintaining boundary vegetation and weed control added to general site maintenance procedures.	Any fire is likely to be confined to the skip bin. The result would be minor damage to bin and surrounds, and a small risk to staff from exposure to harmful smoke.	Access is significantly limited, preventing illegal dumping, but bin may still be exposed to other ignition sources.

The implementation of controls may not always reduce the risk to an acceptable level. Further controls may be needed to adequately manage a risk so far as reasonably practicable.

4.8 Checking and verifying your controls

Once controls have been implemented, it's important to monitor them to ensure they stay effective. Checking the effectiveness of controls may involve regular physical inspections, routine maintenance, consultations and recording incidents/near-misses. Testing administrative controls is also critical, by conducting exercises (for example fire drills) and other scenarios from your Emergency Management Plan to see whether procedures are fit-for-purpose and effective. This will allow you to address and prevent controls from failing.

All processes to check the effectiveness of controls should have a follow-on verification step. This verification step is generally the responsibility of senior or site management and confirms that the loop in the risk assessment process has been closed. For example, if handheld fire extinguishers are installed throughout a site, control effectiveness would be maintained by ensuring that the extinguishers are unobstructed during the weekly site walk. The verification includes accountability measures that confirm the process has occurred (such as senior management signing off in a register that the weekly site walk had been completed).

Checking the effectiveness of controls

Design effectiveness

Design effectiveness is a measure of the extent to which a control is designed to reduce the likelihood and/or the impact of the underlying risk. The control must be designed to operate reliably and/or sufficiently frequently to reduce the risk as intended. Design includes a requirement that ensures that the persons operating the control are adequately informed and trained, and that the effectiveness of the control is overseen by management and independently validated.

Operating effectiveness

Operating effectiveness is established when it can be demonstrated that a control has operated as designed, without interruption or failure throughout the period it was relied upon to achieve its objective.

Appropriate to the hazard/risk +

Designed effectively + Operating effectively = Effective control

A site self-audit can help identify issues with your current controls and form the basis of a review of your current fire risk management framework. You should consider conducting self-audits on a regular basis for the level of fire risk associated with your site, once every 12 months or more frequently such as in the event of an incident, or when there are changes to processes/storage activities, etc.

Figure 10 outlines some of the steps you can take to check the effectiveness of your controls.

Figure 10: **Checking, maintaining and verifying your controls to meet performance objectives and expected outcomes for managing risk from fire so far as reasonably practicable.**

Table 9 provides an example of how to check and verify a common control for managing hazards in CRWM storage. For any control, how and what checks you decide to implement together with verification will depend on the risks identified at your site.

Table 9: **Example of checking recommendations for a common fire prevention control.**

Example of a control	Type of control	How this control will be checked and verified
Standard operating procedures for storing CRWM.	Fire prevention-administrative control.	Checks • Record inventory of combustible waste materials and storage locations (could use photographs/videos to support this). • Regularly review Standard Operating Procedure (SOP) to ensure it is appropriate to the volume and arrangement of materials on-site (fit for purpose). • Conduct site walks and self-audits to determine if SOPs are being followed. Verification • Review of CRWM inventory by senior management (i.e. capture of volumes within weekly report to management). • Ensuring that all SOPs are up to date and current.

Example of a control	Type of control	How this control will be checked and verified
		• Site walks and self-audits signed off by management.

Including additional items on your site's housekeeping checklist(s) or including a discussion point for toolbox meetings can assist in identifying if the site procedure or process is being followed.

4.9 Building your hazard and risk register: creating and recording checks, verification and further actions

Your hazard and risk register should now contain existing controls for each hazard and the associated risk. It can also be used to identify when there is a need to introduce new controls to address residual risks (Table 10).

Table 10: Checking controls and completing the hazard and risk register.

How controls will be checked	Any further controls/actions required	Actions	
		Due date	Date complete
• Gate lock sign-off procedure to be added to daily tasks (dd/mm/yy). • Review of site maintenance procedures at weekly toolbox meetings. • Incident register to document nature/times of fires in drop-off area (dd/mm/yy).	Incident register indicates arson still occurring – for example flares being found in drop-off area, small fire (dd/mm/yy). • CCTV to be installed in drop-off area. • Skip bin lid to be shut and locked outside operating hours.	dd/mm/yy dd/mm/yy	dd/mm/yy signed:

Finally, the hazard and risk register can be used to track controls and related actions. Any inspections/maintenance or issues should be identified and signed off by nominated staff members. This will allow you to track the effectiveness of your selected controls, maintain them to an adequate standard and decide on any adjustments/improvements. An example of a completed risk management process using the hazard and risk register approach is provided in Table 11.

A completed hazard and risk register for all site hazards will allow staff and other relevant personnel to understand the fire risks at your site and address these risks as part of the decision-making process. The hazard and risk register, and any updates to this register should be signed off by your managing director, most senior executive or other authorised senior representative of the business.

Table 11: Example of a completed risk management process using the hazard and risk register approach

Revision:		**Date:**		**Attendees:**		**Signed:**	

Hazard	Potential causes	Initial risk		Controls implemented	Residual risk		How controls will be checked	Any further controls/actions required	Actions	
		Consequence	Likelihood		Consequence	Likelihood			Due date	Date complete
Fire in drop-off area skip bin.	• Arson • Illegal dumping • Self-combustion.	Fire spreading to processing area/CRWM storage/adjacent bushland, causing loss and damage to property, harm to staff, damage to environment, wildlife and nearby community.	Small fires have happened several times within the last year and threatened boundary vegetation. Once vegetation is on fire, could easily spread into surrounding buildings and bushland.	• Skip bin locked up behind gate outside operating hours. • Separation of bin from nearby buildings and site boundary to be maintained at all times. • Removal and/or maintaining boundary vegetation and weed control added to general site maintenance procedures.	Any fire is likely to be contained to skip bin. Minor damage to bin and surrounds, small risk to staff from exposure to harmful smoke.	Access is significantly limited, preventing illegal dumping, but bin may still be exposed to other ignition sources.	• Gate lock sign-off procedure to be added to daily tasks (dd/mm/yy). • Review of site maintenance procedures at weekly toolbox meetings. • Incident register to document nature/times of fires in drop-off area (dd/mm/yy).	Incident register indicates arson still occurring (flares being found in drop-off area, small fire dd/mm/yy). • CCTV to be installed in drop-off area. • Skip bin lid to be shut and locked outside operating hours.	dd/mm/yy dd/mm/yy	dd/mm/yy signed:

Note: This example is reflective of a minor fire hazard. For an example of a major fire hazard, refer to appendix 4.

Chapter 5. Effective storage management controls

5.1 Performance objectives and expected outcomes for effective storage management controls

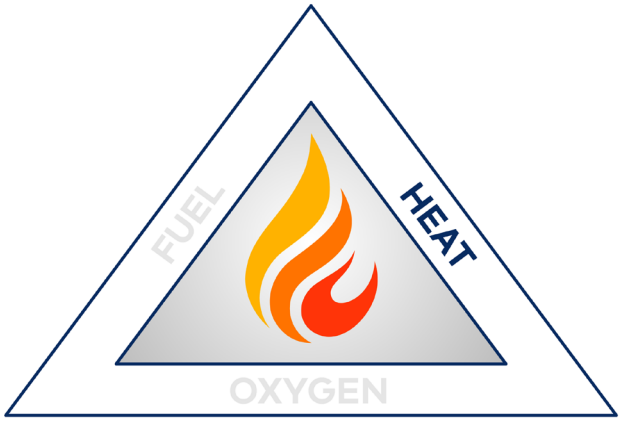
Objectives:

- ☑ Comply with your waste storage permission thresholds or store and manage your waste in a manner which minimises the risk of fires so far as reasonably practicable.
- ☑ Comply with your permission conditions.
- ☑ Facilitate safe and efficient evacuation of occupants.
- ☑ Allow emergency vehicle access in and around the site.
- ☑ Allow emergency responder access to fire protection systems and equipment.
- ☑ Allow effective and safe fire-fighting operations.
- ☑ Limit the potential for fire spread between piles, to buildings or surrounding areas.

Expected outcomes include:

- ☑ Compliance with your waste storage permission thresholds or your waste is stored and managed which minimises the risk of fires so far as reasonably practicable.
- ☑ Compliance with your permission conditions.
- ☑ Providing information on the site to emergency services.
- ☑ Ensuring site access points (including any rear access) are evident and unobstructed.
- ☑ Laying out your storage to reduce heat transfer. Lay out your storage to reduce potential ignition sources
- ☑ Managing your storage layout according to the site plan and permission conditions including pile dimensions where applicable.

To understand how to meet these objectives you need to consider your site capacity, throughput, activities, waste storage thresholds and any permission conditions.



5.2 Understanding how fires start and burn

This section provides some background information on how fires can start and spread through CRWM storage. It is intended to help you design effective storage layouts, select adequate controls to manage the risks posed by the materials you store, and understand how these risks are influenced by the specifics (for example, location, size and infrastructure) of your site.

Combustion of stored materials

CRWM storage has the potential to be ignited by external factors (ignition sources), or by spontaneous combustion. Spontaneous combustion occurs due to internal heating, where an exothermic process (such as that which can occur during decomposition) generates heat faster than it is lost to the surroundings.

All CRWM will burn if their temperature exceeds their ignition point. Once alight, burning material can form an ignition source for other materials which have higher ignition points. These ignition points will vary with material type (Table 12). Identifying ignition points of stored materials may help you effectively monitor their temperatures and reduce the risk of spontaneous combustion. Additional controls to reduce the risk of spontaneous combustion are listed in Table 13.

	Ignition points and burn temperatures	**Ignition point** refers to the temperature a material must reach before it catches fire. **Burn temperature** in this document refers to the temperature of a material when it is burning.

Table 12: Ignition points (°C) for various CRWM. The ranges may depend on the specific type of CRWM (for example, type of wood), range of real-world measurements, and should be treated as approximates. Adapted from T.C Forensics (www.tcforensic.com.au/docs/article10.html).

Material	Ignition point (°C)	Material	Ignition point (°C)
Compost	150-200	Nylon	424-532
Wood	190-260	Polyester	432-488
Paper	218-246	Polystyrene	488-496
Rubber	260-316	Acrylic plastic	560

Types of processing and storage of materials can increase the risk of combustion in long- term storage (Figure 11).

		
Unprocessed materials containing hazards such as exposed rust (as oxidisation of metals generates heat).	Treated materials which have not been cooled before storage, requiring lower heat inputs (e.g. from the environment) before they reach ignition temperature.	Materials that have been shredded to reduce particle size (e.g. shredded tyres).

Figure 11: Type of processing of CRWM and method of storage can increase combustion risk.

The particle size of stored CRWM will influence the potential for spontaneous combustion, with smaller particle sizes having a higher risk (Figure 12).

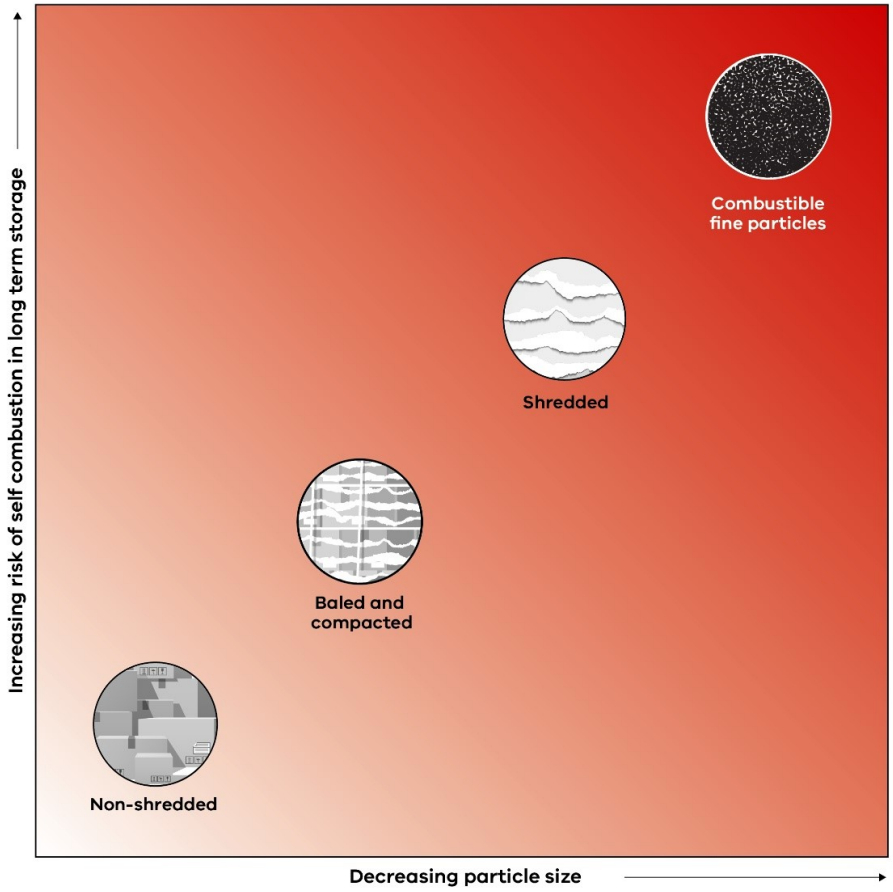


Figure 12: Level of processing prior to storage can increase combustion risk.

Table 13: Controls to reduce the risk of spontaneous combustion in CRWM storage.

Managing CRWM storage to reduce risk of self-combustion		
		
Monitoring storage	**Reducing temperature**	**Storage type and activities**
Monitor internal temperatures and moisture content. Detect hot spots with thermal imaging cameras, especially when turning piles, so that hot spots can be managed.	Allow processed material to cool prior to baling/storage. Where appropriate for the materials you are storing, introduce moisture by spraying piles down during warm and dry periods/high fire risk days. Manage environmental factors (for example, shading storage during hot weather). Routinely turn piles/break up bales in quarantined areas.	Stock rotation. Minimise pile size and split larger piles. Only store material in its largest form prior to processing. Reduce exposed metal content and other combustible hazards.

	Storing organic CRWM	Food organics and garden organics (FOGO) decompose through microbial and chemical action, which can generate considerable heat. They will spontaneously combust when the heat generated is higher than that lost to the surrounding environment. Allowing a pile to get to an internal temperature of over 90°C can trigger rapid self-heating and eventual combustion. FOGO undergoing composting typically ignite between 150°C and 200°C. Moisture content will also influence spontaneous combustion - low moisture levels will stop biological activity (stopping self-heating), and high moisture levels will allow for evaporative cooling of the pile. To reduce the risk of spontaneous combustion, organics storage (that is, any FOGO not being otherwise actively managed) should be kept **below 70°C** and moisture content should be maintained at either **less than 20 per cent OR more than 45 per cent** (Rynk, 2000)**.**

		Any storage of organic material should be supported by a monitoring process. Remember: If smouldering fires are detected in CRWM storage (organic or otherwise), the introduction of oxygen (for example, . through turning the pile) may cause flames to develop. Suitable firefighting equipment should be set up and ready for use at the scene if turning CRWM that is self-heating, or that you suspect is already smouldering. Firefighting authorities should be called in the event of an emergency.
	Further advice for managing organic CRWM	*Guide to Biological Recovery of Organics,* Sustainability Victoria (2017):(https://assets.sustainability.vic.gov.au/susvic/Guide-Waste-Biological-Recovery-of-Organics.pdf) *Designing, constructing and operating composting facilities*, (publication 1588.1):(www.epa.vic.gov.au/our-work/publications/publication/2017/june/1588-1) *Rynk Fires at composting facilities: causes and conditions*. *BioCycle*. 41. (2000); 54-58. (https://www.biocycle.net/fire-prevention-at-composting-mulch-facilities/)

	The risk of spontaneous combustion is influenced by the type of CRWM, processing practices, storage practices and particle size. Each site must identify the conditions required for spontaneous combustion within their CRWM storage and implement controls (for example screening practices, ongoing monitoring) to prevent or quickly mitigate potential incidents so far as reasonably practicable.

How fires spread in CRWM storage

The duration and intensity of a fire will largely depend on the type of CRWM and the total volume of burning material. High volumes of burning CRWM will be harder for you to manage, as the size of the pile will impact on the effectiveness of firefighting systems or equipment in controlling the fire and stopping its spread.

Fires can spread between storage piles several ways, including:

- collapse of burning baled stacks
- burning, molten material running along the ground
- firebrands/embers being blown into other CRWM storage
- heat output from a burning pile (the 'emitter') raising the temperature of a nearby pile (the 'receptor') to ignition point (Figure 13).

Heat output from burning CRWM can be very high over a significant distance. The heat from burning plastic can blister the paint on a building 30 metres away (WISH 2017). Factors that influence the amount of heat output from a pile during a fire include:

- wind conditions
- ambient temperature
- pile structure/stacking layout
- the type of material (for example., plastics and rubber have burn temperatures over 1200°C, while other CRWM have burn temperatures in the range of 850-950°C).

The amount of heat output in any one direction (the amount of heat another pile can receive) will depend on the 'burn-face' of the pile – the side of the burning pile that is facing other combustible objects. As Figure 13 shows, the overall volume of the pile may not be as important as the dimensions of the burn-face (for example, pile length and height) in determining whether heat output will ignite nearby objects.

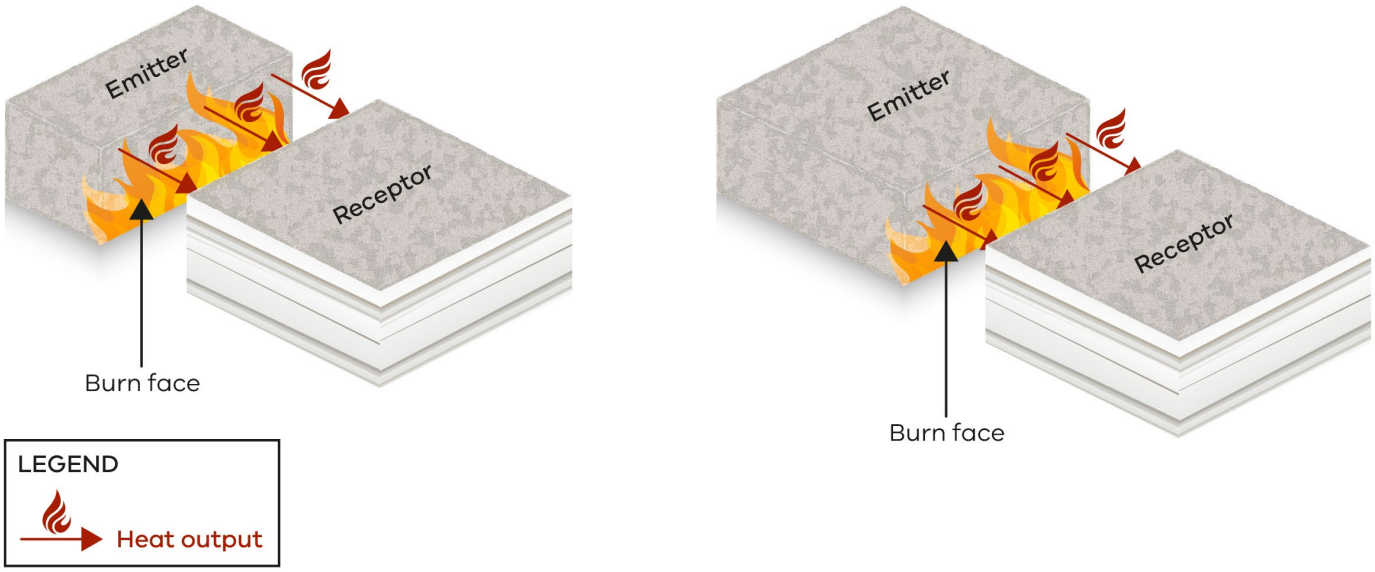


Figure 13: The burn-face of a pile of burning CRWM has a greater effect than pile volume on heat received by another pile. Adapted from *Reducing Fire Risk at Waste Management Sites* WISH (2017).

The shape of storage piles, along with environmental conditions, will influence the risk of fire spreading throughout your CRWM storage area.

Layout of storage can increase risk of harm from fire

The mixing or arrangement of different materials can increase combustion risk or facilitate the spread of fire throughout your CRWM storage. Some materials may have a low risk of spontaneous combustion when stored separately but become combustible when mixed. Other materials may have a low risk of spontaneous combustion but burn rapidly when ignited by external sources. For example, storing highly combustible materials (for example, paper) right next to materials with a high risk of self-combustion (for example organics) is not recommended, as a fire in the organic storage could quickly spread to your paper storage.

If you store your CRWM separated by type, you should consider the placement of materials to reduce the risk of fire spreading from one material type to another. You may even want to

consider storing non-combustible material (for example, loose glass, non-reactive metals) between combustible materials to reduce the spread of fire (Figure 14).

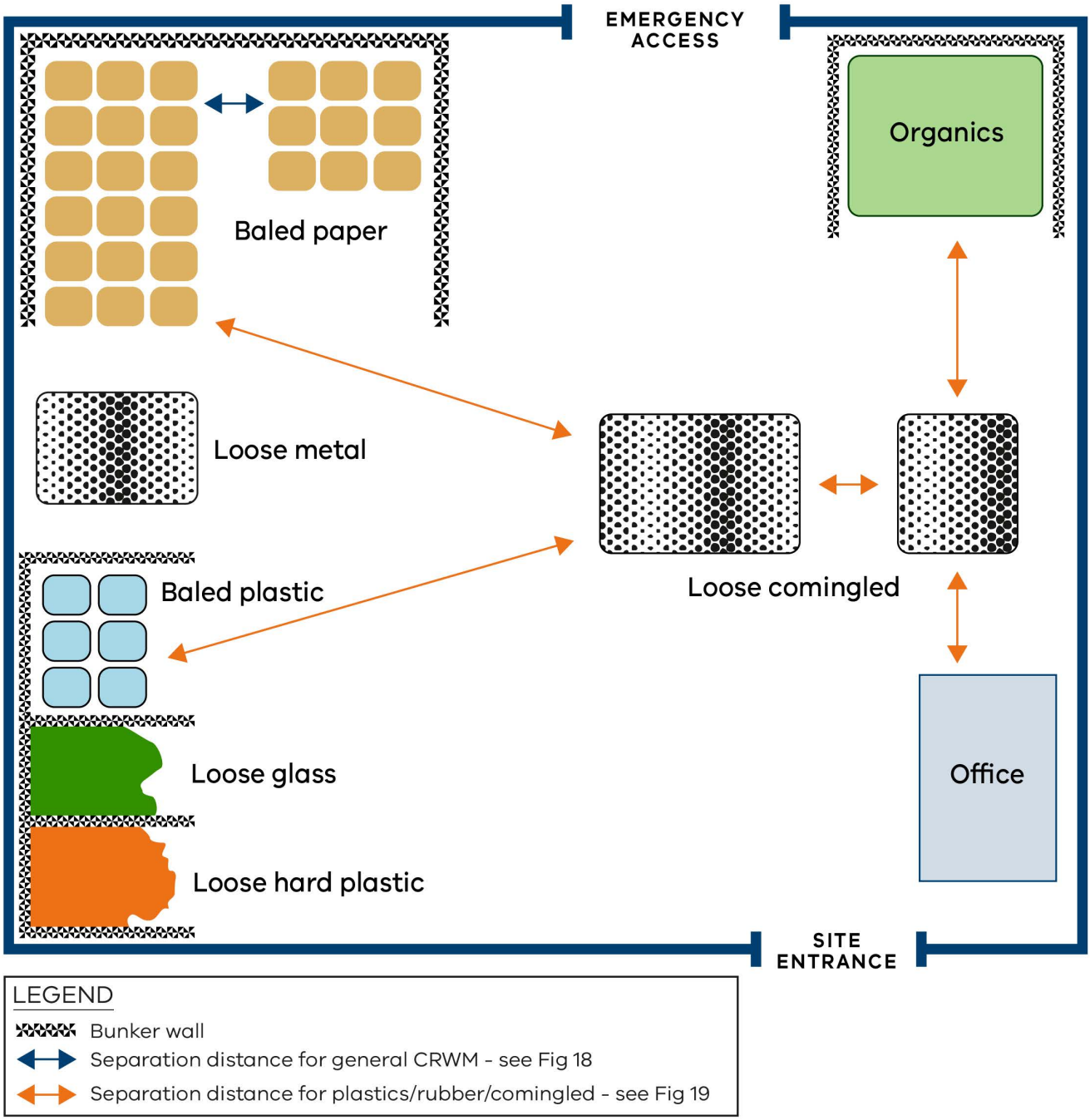
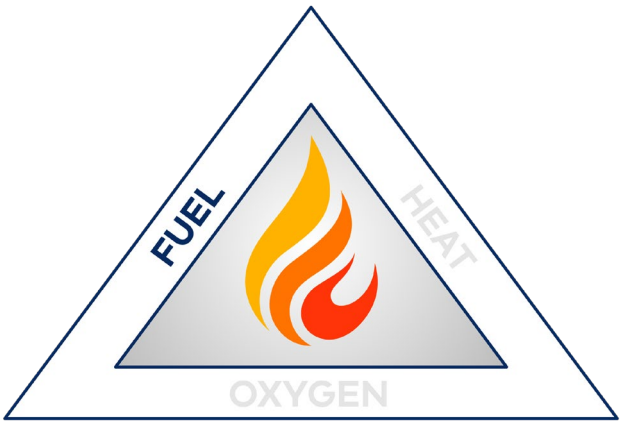


Figure 14: Considerations for separation of CRWM by material type. Adapted from *Reducing fire risk at waste management sites*, WISH (2017). Distances/pile sizes are not to scale and are representative only.

In Figure 14, baled paper is separated both within and between bunkers of other storage through sufficient free-air gaps and bunker walls. Loose plastic is also bunkered. Non-combustible materials such as metals and glass create an additional gap between different types of CRWM. Loose comingled CRWM storage is separated using appropriate free-air gaps from bunkered organic storage, other piles and the office building. There is access for firefighting on at least one side of the bunkered materials and on all four sides of the larger, comingled piles.

When designing CRWM storage layout, you should consider separating out materials that have a high risk of spontaneous combustion and use appropriate materials or free-air gaps to create barriers between storage piles.

5.3 Reducing the impacts of fire



Inventory

Developing and maintaining an accurate inventory or manifest of all materials held at a WRRF supports operations at the site, informs the risk management process, and provides essential information for fire-fighting authorities in an emergency. As per Victorian environment protection laws, Inventory obligations are outlined in Table 14.

Table 14: Inventory obligations.

CRWM inventory obligations	
The types of CRWM accepted, stored and managed at the premises.	☑ Only accept waste at your site stipulated in your permission. ☑ Any waste not stipulated in your permission that is accepted breaches your permission. As such, you must place this waste in a designated and sign-posted temporary storage area and then dispose this waste at a site authorised to receive it within 21 days of the date it was received.
The volume of CRWM accepted, stored and managed at the premises.	☑ For licence and permit holders, you must submit a report to EPA by the 15th day of every month which includes the total amount of each waste type listed in your permission that: a) you have received at your activity site for the previous month; b) is stored or is being processed at your activity site, including any wastes that you have separated and/or processed that is still at your activity site; and

CRWM inventory obligations	
	c) has been removed from your site for the previous month. The report must be in the approved form provided to you by EPA for this purpose and emailed by close of business on the required date to: compliance.reporting@epa.vic.gov.au. ☑ For registrations, you must immediately notify EPA by calling 1300 EPA VIC (1300 372 842), if the volume of waste stored on the activity site exceeds 4500m3 at any time.
CRWM record keeping	☑ Keep records for all waste types as stipulated in your permission detailing: a) incoming and outgoing movements of waste; b) the current location of waste at your activity site; and c) the waste type of any waste located at your activity site. These records must be retained for five years and be made available to EPA on request.

For an inventory to be effective in an emergency, it must be maintained at a frequency that ensures data accuracy so far as reasonably practicable. For sites with regular, small fluctuations in material volume, a range or average may be adequate, for example, listing material "x" as <100 tonnes or between 800-1000 tonnes at all times. It is important to provide a copy of the primary information recorded in the inventory within your site Emergency Information Container (Chapter 6).

Selecting storage type and layout to reduce the impacts of fire

To reduce the risk of fire spreading throughout your CRWM storage:

- ☑ Set out your piles in a way that would reduce the heat being transferred from emitter to receptor (Figure 15A).
- ☑ Consider the effect of pile slope on heat transfer and pile stability (Figure 15B).
- ☑ Separate your piles by sufficient free-air gaps (separation) or physical barriers made from non-combustible materials (bunker walls).
- ☑ Arrange any baled storage in a way that restricts the growth of a fire burning within baled stacks.

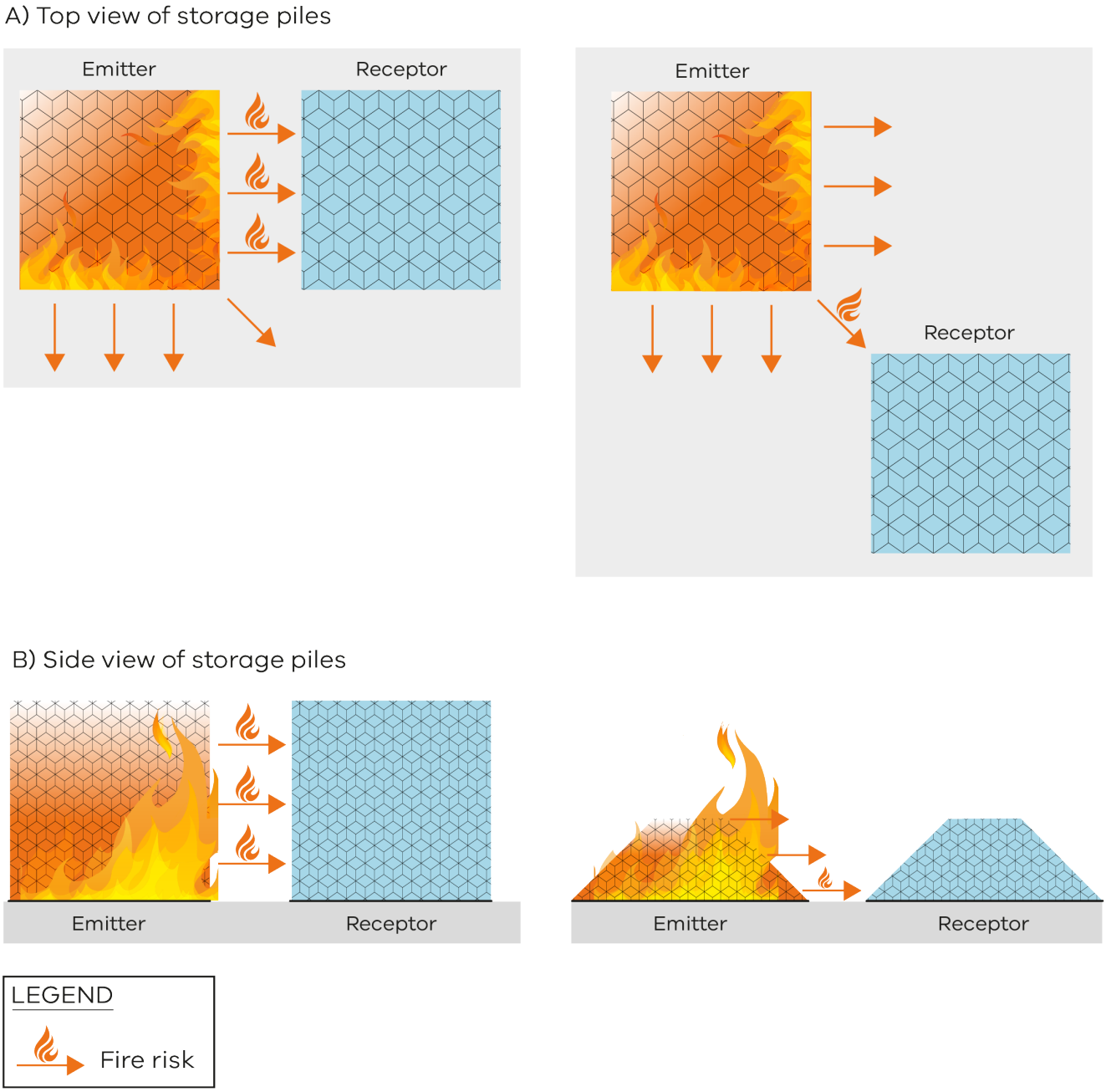


Figure 15: The effect of storage layout and shape on thermal energy transfer.

a) If piles of CRWM are parallel, more of the emitted heat from the burning pile will transfer to a neighbouring pile, increasing its temperature and the likelihood that it will also ignite. Setting piles diagonally from each other will reduce the intensity of heat being radiated from the emitter to the receptor.
b) You can also reduce the amount of heat transferred between emitter and receptor by ensuring that uncontained vertical faces of piles have shallow slopes (≤45°). This will also help to stabilise a pile and reduce the risk of collapse.

Using fire bunker walls to separate storage

Fire bunker walls can be used instead of free-air gaps to reduce/prevent heat emitted from burning CRWM from reaching other piles (Figure 16). However, it is important that bunker walls:

- ☑ always allow access for firefighting (for example have at least one open side accessible with appropriate free-air separation from other combustible materials).
- ☑ be appropriately sized for the fire protection systems in place (for example, no more than 10m wide to allow for control of fire using first-response firefighting equipment, or wider if additional fire protection systems such as water deluge systems or fire water monitors have been installed).
- ☑ allow a suitable freeboard gap (recommended ≥ 1m) between the maximum pile height and the top of the bunker wall to account for flame height during a fire.
- ☑ be higher than any material they are abutting against (for example, building, boundary fence) to adequately minimise risk of fire spread/damage to nearby structures.
- ☑ be made of an appropriate non-combustible material for the CRWM being stored, thick enough to reduce heat transfer, and inspected regularly so that cracks and other holes that would increase air flow are repaired. Concrete is recommended. Ensure bunker walls meet fire ratings for Australian Standards (for example, AS1530.4 'Methods for fire tests on building materials, components and structures - Fire-resistance test of elements of construction' and AS3959 'Construction of buildings in bushfire-prone areas') and the Building Code of Australia.

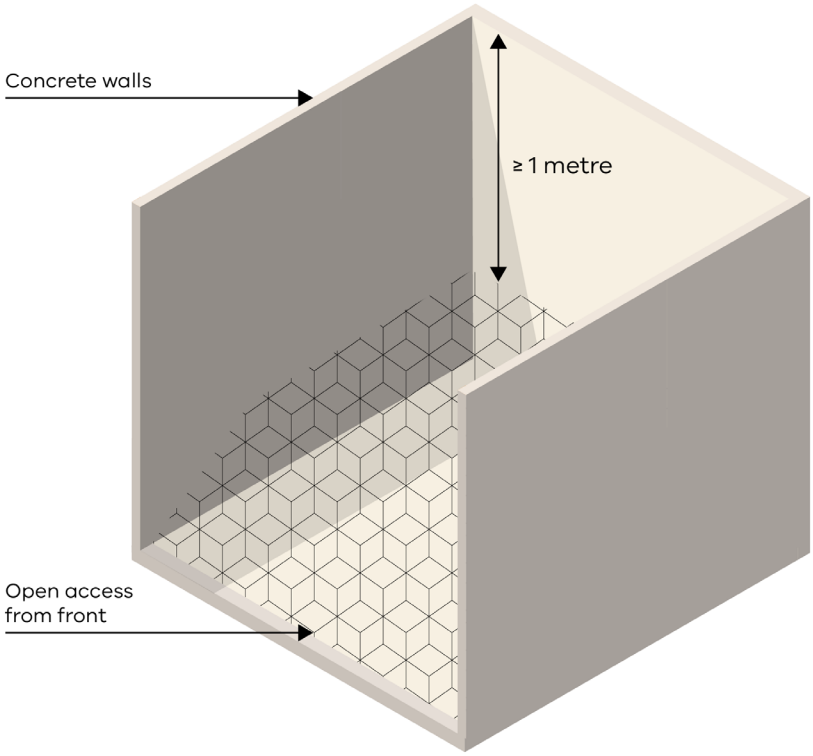


Figure 16: Recommendations for separating CRWM using bunker (fire) walls.

Using free air gaps/separation to manage fire spread

Pile height, length and width play a key role in the severity, duration and intensity of fires. When using free air gaps or separation as your primary control, follow the storage dimensions as outlined in Figure 17. This will ensure you will effectively manage your fire risk and minimise harm from fire by limiting fire spread between piles and buildings and limiting fuel loads within piles. These dimensions also take into consideration pile stability as larger piles may be more prone to collapse, impeding access and spreading burning materials to other areas. Figures 18 and 19[1] provide guidance on the storage dimensions and gaps to be incorporated into a site plan. Where site plans have free air gaps/separation less than the distances presented in figures 18 and 19, or where storage dimensions do not follow Figure 17, further controls are required to minimise your fire risk to at least an equivalent level so far as reasonably practicable. A suitably qualified person may be able to assist you with this.

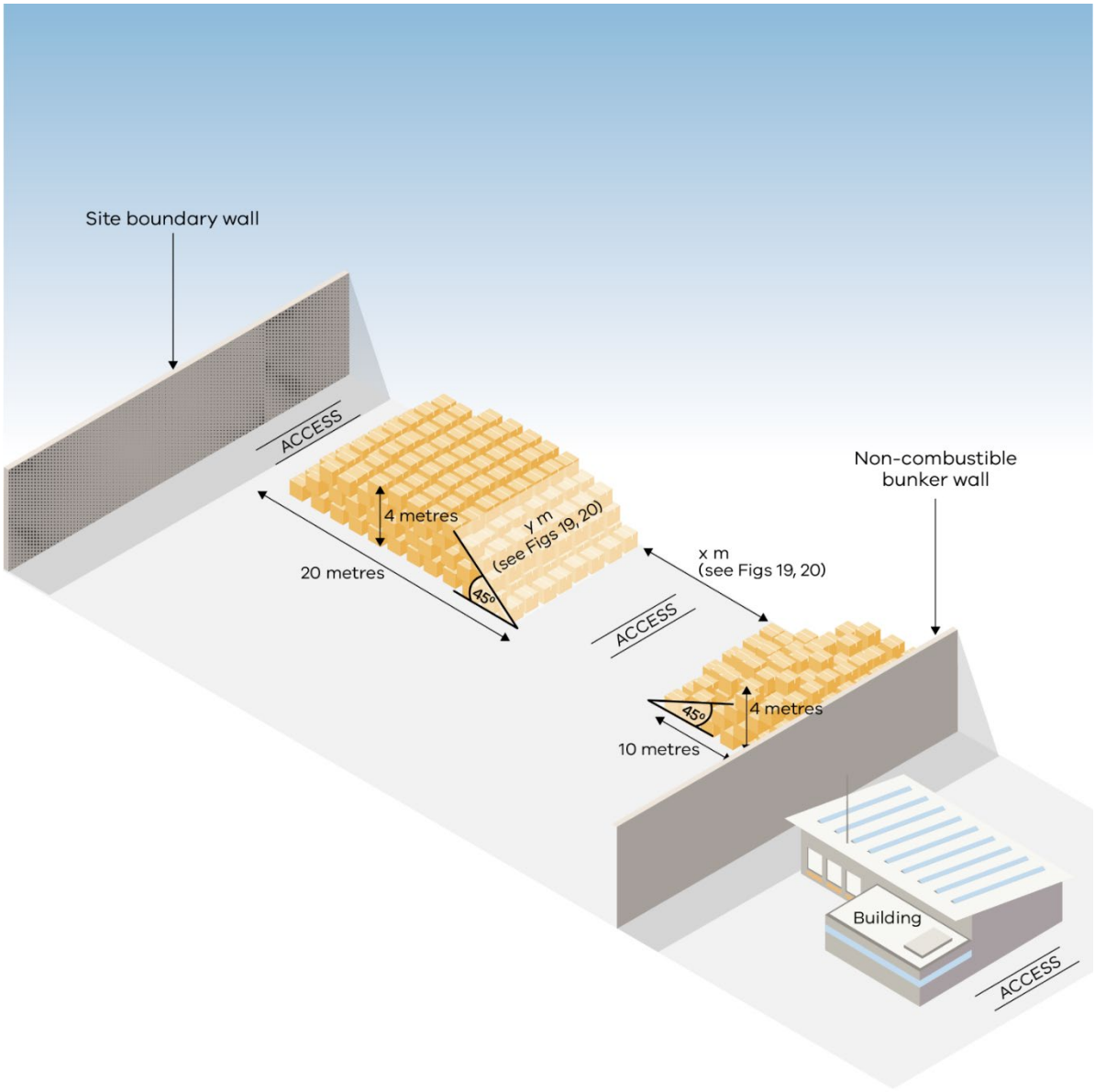
	**Notes on storage separation distances and dimensions**	Distances given in the tables included as part of figures 18 and 19 as determined by the storage curves are rounded up to the nearest metre. Pile height is assumed to be at a maximum of 4 metres and pile width is at a maximum of 20 metres.

	**Scenarios used to generate storage dimension graphs**	To avoid overcomplicating this guideline, a limited number of scenarios have been used in figures 18 and 19. These reflect common scenarios at WRRFs. For more information about other scenarios, Refer to waste fire burn trials summary non-technical report, WISH (2017). https://www.wishforum.org.uk/wish-guidance/

The assumptions underpinning figures 18 and 19 may not reflect the conditions and circumstances of your site. This should be taken into consideration when applying the dimensions and distances given.

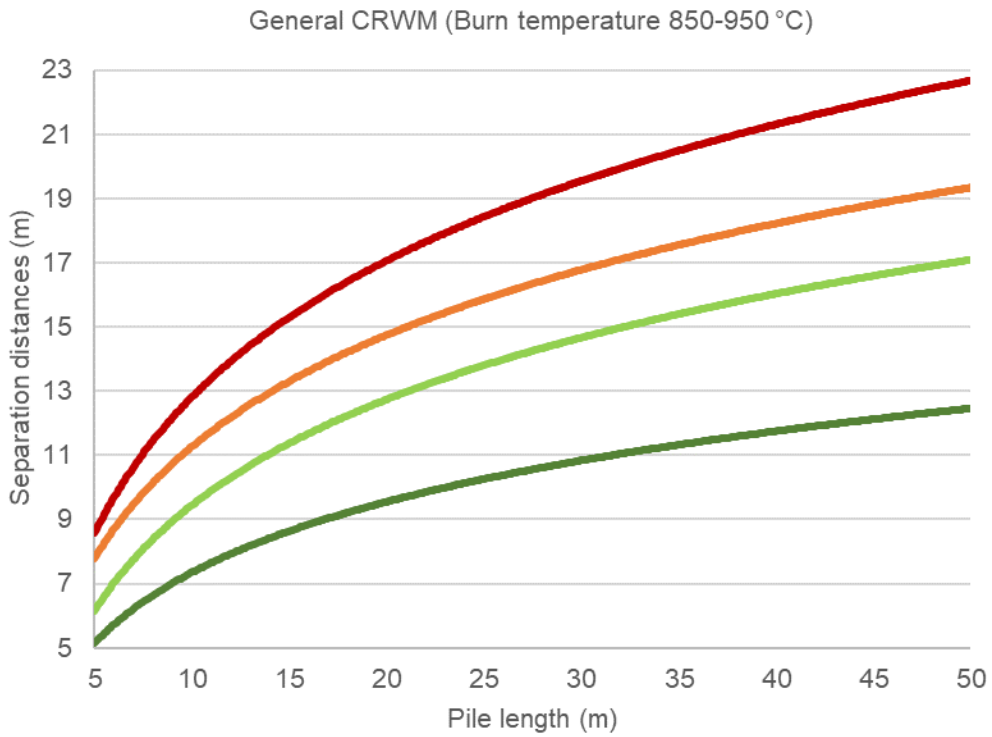
Be conservative when using the graphs in figures 18 and 19 to determine separation distances and consider these distances as a minimum. For example, round up separation distances to the nearest whole number. **Comingled waste containing rubber and plastics should be separated using Figure 19.** Likewise, if you have a baled pile facing a loose pile, use the separation distances for baled-to-baled piles.

[1] Figures 18 and 19 are adapted from the 2017 WISH report, *Reducing Fire Risk at Waste Management Sites* and were determined using data collected during waste burn trials. Additional assumptions for the curves given for standard storage dimensions can be found in Appendix 3.



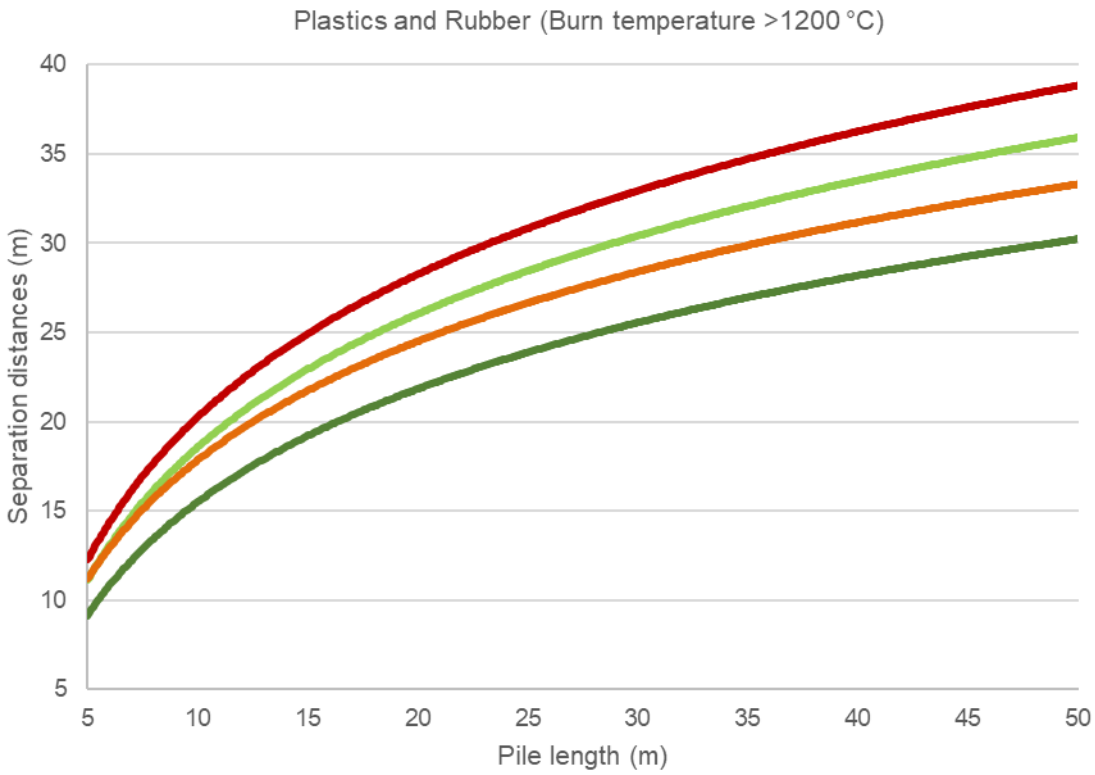
Pile dimension	Baled or loose CRWM
Maximum pile height	4 metres or 4 bales, whichever is lower
Maximum pile width (easy access to pile from both sides)	20 metres
Maximum pile width (easy access to pile from only one side)	10 metres
Pile length	Calculate using figures 18 and 19

Figure 17: Limiting pile height, length and width to reduce fire risks.



		Storage type			
		Loose pile to loose pile	Loose pile to building	Baled pile to baled pile	Baled pile to building
		Separation distance (m)			
Pile length (m)	5	5	7	9	8
	10	7	9	13	11
	15	9	11	15	13
	20	10	13	17	15
	30	11	15	20	17
	50	12	17	23	20

Figure 18: Separation distances for storage of general CRWM types (burn temperatures of 850-950 °C). Figure adapted from *Reducing Fire Risk at Waste Management Sites*, WISH (2017).



		Storage type			
		Loose pile to loose pile	Loose pile to building	Baled pile to baled pile	Baled pile to building
		Separation distance (m)			
Pile length (m)	5	10	13	14	13
	10	15	18	19	18
	15	18	22	24	21
	20	23	25	27	23
	30	25	30	34	28
	50	31	38	40	35

Figure 19: Separation distances for storage of plastic and rubber CRWM (burn temperatures of > 1200 °C). Figure adapted from *Reducing Fire Risk at Waste Management Sites*, WISH (2017).

Baling wastes and fire risks

Baling CRWM may reduce the likelihood of fires starting. The material should be screened prior to baling, removing contaminants that could ignite a fire. Bales may also be harder to ignite through external sources. However, once established, fires in bales are harder to extinguish because the fuel is more concentrated.

Fire is likely to develop more rapidly in vertically stacked bales as this creates a 'chimney' of high energy air flow between stacks, allowing fires to spread quickly throughout a pile (Figure 20). One way to reduce this chimney effect is to interlace bales. Interlacing bales does not reduce peak burn temperatures once the fire is fully developed. However, it can double the time taken for the pile to reach peak burn temperature, making it easier to control the fire in its early stages. If you decide to bale your CRWM, you should consider interlacing stacks.

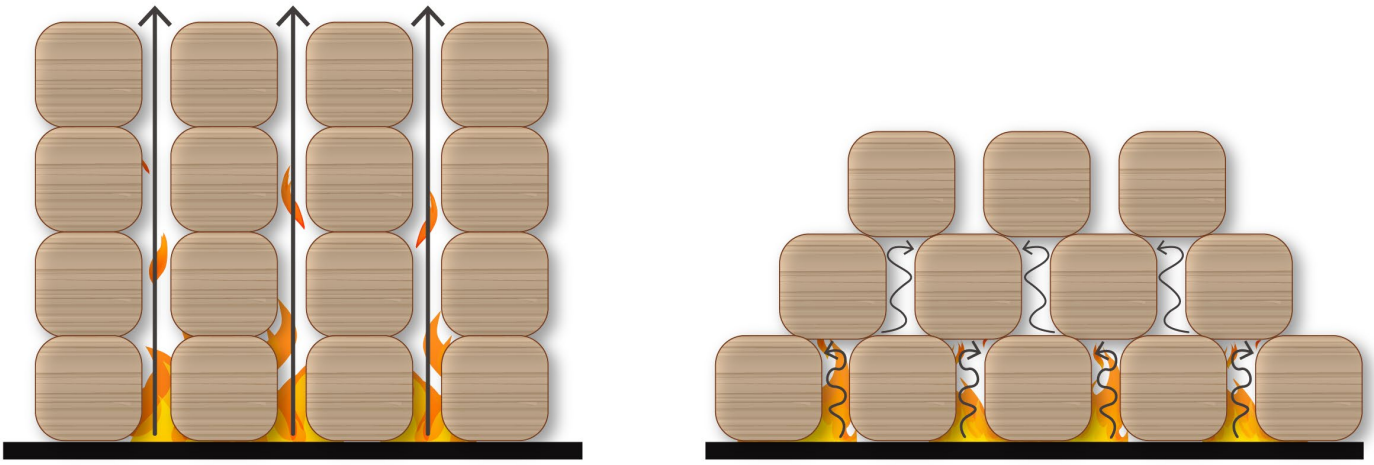


Figure 20: Interlacing bales to disrupt chimney effects in a fire and make it easier to control a fire in its early stages. Interlacing may also increase stack stability. Source: *Waste fire burn trials summary report*, WISH (2017).

5.4 Indoor storage

If you are using a building to store CRWM, the building needs to be fit for purpose and compliant with relevant local planning and building authority requirements such as the *Building Act 1993* and Building Regulations 2018, including the National Construction Code Series Volume 1 (NCC). CRWM that you store indoors may trigger specific design requirements under the NCC based on the height and volume of that storage.

Additionally, you must ensure your building is designed to be safe and fit for purpose under the OHS Act 2004 and the Dangerous Goods Act 1985. WorkSafe Victoria (WSV) administers these acts as well as other related Regulations. To monitor compliance, WSV may inspect workplaces and work with employers and employees to ensure that the risks of harm to human health and safety from storing CRWM indoors are reduced so far as reasonably practicable.

The Regulations above outline the minimum requirements for the safety of people working in them, including their ability to safely evacuate in case of fire. They do not provide an exhaustive list of requirements or recommendations to prevent fire occurring. Your risk assessment should clearly identify all preventative and mitigating controls relied upon to manage the risks specific to the building and storage activities.

All buildings should have an Essential Safety Measures (ESM) record of the fire items installed or constructed in the building (such as sprinklers, fire doors and paths of travel to exits). This list should be referenced to ensure adequate levels of routine service are being carried out on all essential safety measures. The required Essential Safety Measures Routine Service Records for a building, as well as the Annual Essential Safety Measures Report (completed by the owner), should be kept onsite and produced upon request.

	**Roles and responsibilities for indoor storage facilities**	Duty holders have a responsibility to ensure their site complies with the Victorian environment protection laws and other relevant laws. For example, duty holders have obligations around essential safety measures, fire safety items, conducting and documenting plant and equipment routine inspections and regular maintenance, and maintaining exits and paths to exits so that people can leave the building if there is a fire. This means ensuring proper housekeeping. For example, keeping paths clear and maintaining exits and safety doors.

Considerations for your indoor storage design

When choosing or designing indoor storage of CRWM, check that:

- ☑ the building is compliant and remains compliant with the requirements of the latest edition of the Building Regulations.
- ☑ any changes to the use of the building comply with the requirements of the latest edition of the Building Regulations in force at the time of the change when implementing additional requirements.

- ☑ the service records and annual Essential Safety Measures Reports are current.
- ☑ essential safety measure critical defects reported during routine service activities will be corrected within 30 days and the performance of each essential safety measure is endorsed by a qualified competent fire safety practitioner after the yearly routine service.
- ☑ there are adequate exits and pathways to exits.
- ☑ exit signs can be seen clearly; or directional lights are installed to guide people to exits when exit signs are obscured (for example, by storage or walls).
- ☑ pile stability is maintained either through limiting pile height or adequate bunding/shoring, and that piles are not obstructing firefighting equipment, firefighting systems or limiting firefighting access or paths of travel to exits.
- ☑ your overall floorspace/compartment size and volume and type of materials stored do not trigger prescriptive requirements as per the NCC.
- ☑ the height of your storage is not blocking any sprinkler systems by leaving an adequate gap (more than 1 metre) between height of a pile and sprinkler heads.
- ☑ any sprinkler system designed to deal with fires in indoor CRWM storage is compliant with AS 2118.
- ☑ there is adequate water supply for fire suppression systems and that access to hose reels and extinguishers is maintained (leaving at least a one-metre clear space around them).
- ☑ automatic alarm systems will alert the fire brigade and alert building occupants of a fire in fire compartments or areas with CRWM.
- ☑ all buildings involved in the receival, storage and processing of waste are maintained under negative pressure when odour and dust are a risk.

	**Indoor fire safety resources**	CFA Publication – Management and storage of combustible recyclable and waste materials – indoor storage guideline https://www.cfa.vic.gov.au/about/guides and https://www.vba.vic.gov.au/consumers/guides/essential-safety-measures

	**It is your responsibility to ensure that your building's specific safety measures meet your obligations under the Victorian environment protection laws and other relevant laws, and your CRWM is stored and managed in a manner which minimises the risk to human health and the environment from fire so far as reasonably practicable.**

Chapter 6. Emergency management plan

6.1 Performance objectives and outcomes for developing your emergency management plan

Objectives:

- ☑ Contains current, concise information about the site's operation, infrastructure, hazards and emergency resources.
- ☑ Contains actions to be taken during and immediately after an emergency, including notification and escalation procedures.
- ☑ Identifies specific personnel roles and/or a warden structure so that WRRF personnel are clear on the notification and escalation procedures during an emergency.
- ☑ Identifies all persons involved in activities onsite who have completed emergency response and other relevant training applicable to responding to an emergency.
- ☑ Contains a clear emergency management communication plan to internal staff, external emergency responders and surrounding sites.
- ☑ Contains a schedule and process for reviewing, updating and testing (exercising) the emergency management plan, including updating contact details of existing and new staff.
- ☑ Contains procedures, schedules and information pertaining to safety equipment stored onsite to control an emergency, and routine inspections and regular maintenance of such equipment in accordance with manufacturer's specifications.
- ☑ Reviewed by a suitably qualified person. *Engaging consultants* (publication 1702) (https://www.epa.vic.gov.au/about-epa/publications/1702) has more information on engaging a person to assist you with developing and/or reviewing your emergency management plan.

Expected outcomes include:

- ☑ Perform a practical assessment of hazards associated with WRRF activities and the possible consequences of an emergency occurring because of those hazards.
- ☑ Provide procedures and training to all staff on actions to be taken during and immediately after an emergency.
- ☑ Provide emergency response and other relevant training for all personnel involved in the activities conducted onsite including evacuation procedures and alerting colleagues, emergency response teams and emergency services.
- ☑ Provide emergency information (for example, the Emergency Information Book (EIB)) in a clearly identifiable container (for example, the Emergency Information Container (EIC)).
- ☑ Provide details of all persons involved in activities onsite who have completed emergency response and other relevant training.
- ☑ Implement a schedule and process for reviewing, updating and testing the emergency management plan.
- ☑ Conduct drills to test and improve the emergency management plan.
- ☑ Conduct and document routine inspections and regular maintenance of safety equipment stored onsite in accordance with manufacturer's specifications or essential safety measures.
- ☑ Engage a suitably qualified person to review the emergency management plan.
- ☑ Ensure the emergency management plan is readily available to EPA on request.

6.2 Developing your emergency management plan

An emergency management plan is a written set of instructions that outlines what actions WRRF owners, employees, contractors and visitors should take in any type of emergency.

	Further advice for developing an emergency management plan	*Safe Work Australia: Emergency Plans – Fact Sheet (2012):* www.safeworkaustralia.gov.au/doc/emergency-plans-fact-sheet *Australian Standard 3745-2010 Planning for emergencies in facilities*

	An effective emergency management plan addresses all hazards including pollution incidents, not just fire-related, where the consequence of the hazard could significantly have an impact on human health and the environment.

This chapter provides general guidance on how to develop an emergency management plan to help WRRF duty holders and employees respond to a fire emergency.

A well-developed emergency management plan for WRRFs will consider fire in relation to information provision, risk management and emergency response.

The emergency management plan should be based on a practical assessment of hazards associated with WRRF activities and the possible consequences of an emergency occurring because of those hazards. Chapter 3 outlines the steps to identify, assess and document fire hazards, and Chapter 4 outlines how to implement controls to minimise harm to human health and the environment.

In developing the plan, consideration should be given to all relevant laws, including public health laws and state or territory disaster plans.

6.3 Factors to consider when developing your emergency management plan

A clear, concise and effective emergency management plan ensures effective and efficient management of emergencies that may arise at a WRRF. Emergency management plans are underpinned by a comprehensive risk management process that considers all hazards and risks pertaining to the facility. Emergency management plans do not have to be lengthy or complex but at a minimum, should include the following.

General facility information

- Size and location of the WRRF (for example, rural vs. urban location, distance to sensitive land uses).
- Map of the WRRF and surrounding areas (including sensitive receptors) that could be potentially impacted during an emergency.
- Inventory/manifest of CRWM materials (including type, incoming and outgoing movements, tonnage accepted and processed per day and current locations).

- Total number of personnel expected at the premises.
- If the WRRF stores dangerous goods, a manifest/inventory of the location of the dangerous goods.
- Plant/machinery and safety equipment available onsite.
- Accessibility points for fire brigade access.
- Areas suitable as hardstand surfaces for fire brigade use.

Nearby key infrastructure

Examples of nearby key infrastructure and other sensitive uses are:

- airports, major roads, railways, waterways, drains
- hospitals, schools, childcare and aged care facilities
- residential areas
- ecosystems
- powerlines
- major hazard facilities (for example, oil refineries, gas plants, chemical plants).

Evacuation procedures

- Raising the alarm onsite in the event of an emergency.
- Safe evacuation and accounting for personnel.

Fire procedures

- List details of actions to be taken during and immediately after an emergency. Make sure your plan includes actions for these situations:
    - Isolation points for essential services (for example, gas and electricity) and isolation procedures.
    - the event of a vehicle or plant fire, including containment (if safe to do so).
    - the event of stockpile smouldering, or hot spot identification.
    - the event of a smouldering truck/delivery (hot load).

Grassfire/bushfire procedures

- Details of monitoring for bushfires; triggers for limiting staff access to the facility; and evacuation of personnel from the facility, all linked to 'fire danger ratings'.

Fire water runoff/containment procedures

- Details of containment systems for any liquids that if spilt are likely to cause pollution or pose an environmental hazard, including fire water runoff.

	Bunding guidelines	Further details that may assist you in providing a secondary containment system can be found in EPA's *Liquid storage and handling guidelines* (publication 1698). www.epa.vic.gov.au/our-work/publications/publication/2018/june/1698

- The location and capacity of fire water containment systems (for example, drain covers, isolation valves, bunds and sumps).

- Details of resources and procedures necessary for decontamination following incidents (that is, decontamination equipment and its location onsite; procedures for decontamination of personnel, plant or equipment).

	Fire water run-off control	Further details that may assist you in controlling fire water run-off can be found in FRV's Fire Safety Guideline, *Guideline No. GI-12: Control of Fire Water Run-Off*. https://www.frv.vic.gov.au/fire-safety-guidelines

Emergency equipment and resources

- Details of emergency resources onsite (for example, fire protection systems and water supply, alarms, emergency shut-down systems, vehicles/equipment for separating stored CRWM, spill kits, fire water containment systems, warden intercommunication phone (WIP), eye wash/safety showers, evacuation diagrams).
- Arrangements for obtaining additional external resources, including any 'mutual aid agreements'. Mutual aid agreements are agreements between two or more emergency services or between duty holders to provide emergency assistance during a particular emergency event.
- Deployment procedures for equipment and resources (if applicable).
- Details of routine inspections and regular maintenance of plant or equipment.

Fire protection systems and equipment

- The location of fire extinguishers and fire hose reels.
- The location of fire-fighting equipment, for example hydrants, hoses and boosters…
- Regular inspections, servicing requirements for fire protection systems.
- Block plan detailing fire ring main and isolation valves, sprinkler room and sprinkler main valves, and fire indicator panel where present.

Fire water supply

- The location of any access point to reticulated water supply.
- The location and capacity of fire water tanks (and pumps).
- Performance specifications for water supply.
- Servicing requirements and schedule for water tanks and pumps.

6.4 Site layout plan

To assist emergency services, it is important that specific site information is captured as a single or series of site layout drawings (Figure 21) which include the following information:

General layout

- Buildings, roads and boundaries.
- Site entrances and exits, including emergency gates and access points.
- Evacuation diagrams that provide emergency and evacuation information displayed in locations where staff and visitors can view the diagrams.
- The name or purpose of each building and area (for example, office, workshop, organics storage).

- The name or description of site neighbours (residential, commercial, industrial) and other sensitive receptors that could be impacted during an emergency.
- Adjacent street names.
- The direction of north.

Fire protection systems and emergency resources

- Fire protection systems and equipment (for example, hydrants, water supply, booster connection, fire hose reels).
- Emergency resources and equipment (for example, neutralising agents, absorbents, spill kit, PPE).
- Emergency evacuation assembly points.
- Facility emergency control centre (if applicable).
- Relevant emergency information and safety information.

Dangerous goods storages

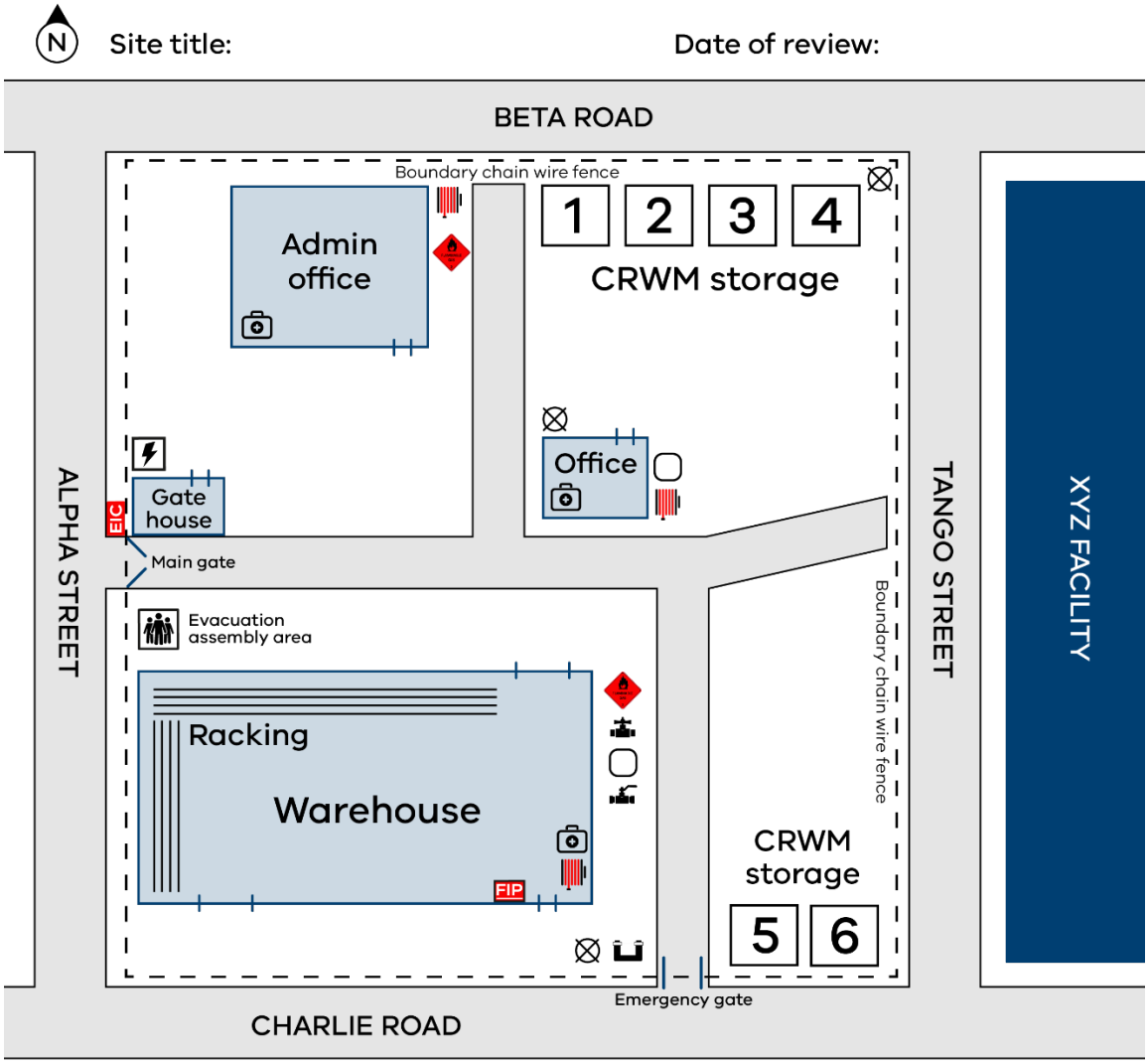
- Tanks and package stores of dangerous goods.

Isolation valves and drainage systems

- Electrical supply isolation.
- Gas supply isolation valves.
- Town water isolation valves.
- Stormwater drainage points.
- Site topography (including bunding and site drainage).
- Open uncovered land (that may act as run-off sinks).
- Sewage system outlets.

Other information

- First aid stations.



LEGEND

1: Glass
2: Paper
3: Processed metal
4: Wood
5: Organics one
6: Organics two
First Aid
Spill containment
Booster point

Fire hydrant
Fire hose reel
Evacuation assembly area
Electrical mains connector box
Town water connection point
Town gas isolation valve
Dangerous goods storage
Fire indicator panel
Emergency information container (EIC)

Figure 21: A simplified concept map of a site layout plan that includes key site information for internal staff and external emergency responders. Note that your site plan should contain site-specific information, such as location of any stormwater drains (where applicable).

	Developing a site facility plan for your emergency management plan including guidance for hardstand and emergency vehicular access for fire-fighting appliances	FRV has detailed guidance GL-13 Hardstand and Emergency Vehicular Access for Fire Fighting Appliances. https://www.frv.vic.gov.au/fire-safety-guidelines

6.5 Roles and responsibilities

The following information focuses on emergency management personnel roles and responsibilities. It outlines procedures for notifying the emergency services and the responsibilities of suitably qualified personnel for implementing the emergency management plan.

An emergency management plan should identify and communicate specific personnel roles and/or a warden structure so that WRRF personnel are clear on what should happen during an emergency.

Warden structure/personnel roles

- The contact details of key personnel in the event of an emergency, including after-hours telephone numbers of at least two additional people.
- The roles and responsibilities of personnel for actioning the emergency management plan, that clearly identifies:
    - who notifies emergency services during emergencies
    - activities for liaising with emergency services – for example, a dedicated emergency coordinator to meet responding emergency services at the main gate
    - personnel with specialised knowledge of the WRRF and its operations to support emergency services operations.

Emergency services and surrounding sites notification

Circumstances for reporting all incidents to emergency services and surrounding sites are to be included in emergency procedures. Examples of these circumstances would be fires, explosions, workplace accidents/injuries and pollution incidents such as spills and leaks.

	Key concept: All emergency procedures encompassing fire (or the potential for fire) are to include a notification to emergency services at the earliest possible stage of the incident, to allow efficient intervention and reduce the potential for escalation. **Procedures should also include the notification process to surrounding sites.**

6.6 Training requirements and activities

It is important that all personnel who are involved in activities onsite receive appropriate emergency response and other relevant training, including refresher training.

Emergency response and other relevant training for all personnel may include the following:

- individual roles and responsibilities

- emergency response procedures
- evacuation, shelter and accountability procedures
- notification, warning and communications procedures
- location and use of common emergency equipment.

Documentation and a description of the training program for all personnel should be included in the emergency management plan.

6.7 Storage of emergency information

An Emergency Information Book (EIB) provides responding emergency services with important WRRF site emergency information. To assist emergency services, ensure that your book includes the following information:

- Drawings/plans that lay out the entire site/facility (including its fire protection systems) and surrounding areas (including sensitive receptors) that could be potentially impacted during an emergency.
- Evacuation diagrams that provide emergency and evacuation information.
- An inventory of materials at the premises (for example, types, location and volume of CRWM).
- Contact details for facility personnel, emergency services, utility service providers, regulatory authorities and facility neighbours.
- Procedures for management of emergencies, including evacuation, fire, spills and leaks and any other risks or potential hazards for the facility.

Figure 22: The Emergency Information Container (EIC) should be located at your site as close as reasonably practicable to all vehicle entrance(s).

The EIBs should be stored in an Emergency Information Container (Figure 22). To assist emergency services, locate these at all site entrances.

The Emergency Information Container needs to be:

- painted red and marked 'EMERGENCY INFORMATION' in white contrasting lettering not less than 25 mm high
- installed at all vehicle entrances, including emergency access

- installed at a height of 1.2 m – 1.5 m
- accessible with a fire brigade standard '003' key
- kept clear of obstructions (including products, vehicles and vegetation).

	Useful resource for developing an Emergency Information Book:	www.cfa.vic.gov.au/plan-prepare/dangerous-goods

6.8 Review and testing of the emergency management plan

For emergency plans to remain accurate, current and effective, they must be reviewed, (if necessary) revised and tested on a regular basis. For example:

- when there are changes to the workplace such as an increase in the CRWM volumes or processing quantities, types of CRWM received, incoming and outgoing movements of CRWM and location of CRWM.
- when there are changes in the number, composition or contact details of staff including an increase in the use of temporary contractors.
- after the emergency management plan has been tested (for example, conduct emergency response exercises to determine the effectiveness of the emergency management plan).

Emergency management plans may be developed in conjunction with the relevant fire authority, emergency management consultant or a suitably qualified person.

Emergency management plans must be reviewed by a suitably qualified person.

The development of the following supports effective emergency management planning:

- A schedule and process for reviewing, updating and testing the emergency management plan.
- Open and transparent communication of the emergency management plan with internal staff, emergency responders and surrounding sites.

Appendix 1: Waste and resource recovery facility – fire risk management framework checklist

This checklist has been developed to support duty holders to identify gaps in their risk management framework systems and processes. The aim of the checklist is to:

- provide a 'snapshot' of the fire risk management framework and outline process requirements to ensure WRRFs consistently apply and align with the Victorian environment protection laws.
- inform WRRFs of the tasks required to be completed if they wish to demonstrate compliance with the Victorian environment protection laws.

The checklist is designed to be used in conjunction with the guideline and serves as a guide to support implementation. The checklist should not be used on its own to demonstrate compliance.

This checklist has been broken up into four parts:

1. Assessing the risk from fire.
2. Controlling your fire hazards and risk.
3. Effective storage management controls.
4. Emergency management plan.

Who the checklist is for

Current or new WRRFs that store CRWM waste and want to understand the process and system requirements which need to be implemented if a site is to comply with the Victorian environment protection laws.

When to use/review this checklist

- At the start of your implementation program to comply with the Victorian environment protection laws.
- To support the review of your fire risk management framework.
- After the event of a fire or after significant operational change.

Assessing the risk from fire	Response	For support refer to:
Have you identified and documented all hazards, both onsite and offsite that pose a fire risk to your CRWM storage?	Yes No	Section 3.3
Have you assessed the initial fire risks associated with each of your identified hazards?	Yes No	Section 3.4
Have you documented the consequence and severity associated with each of your identified hazards causing an impact to human health, community, businesses, infrastructure and the environment?	Yes No	Section 3.5

Assessing the risk from fire	Response	For support refer to:
Have you documented the likelihood associated with each of your identified hazards causing an impact to human health, community and the environment?	Yes No	

Controlling your fire hazards and risks	Response	For support refer to:
Have you identified management controls for each of your identified hazards appropriate to the documented consequence and likelihood?	Yes No	Section 4.2
Have you implemented and documented your controls?	Yes No	Section 4.5
Have you assessed if the controls are adequate in reducing the likelihood and consequence/severity of your identified fire hazards based on the effectiveness of the control, potential ways the control can fail and appropriate contingencies?	Yes No	Section 4.6
Do you have a documented process in place to check the effectiveness of your implemented controls and verify that the checks are being completed?	Yes No	Section 4.7

Effective storage management controls	Response	For support refer to:
Do your storage management controls meet the performance outcomes within this guideline?	Yes No	Section 5.1
Have you considered how CRWM management activities influence the severity of a fire?	Yes No	Section 5.2
If your site is storing and processing CRWM outdoors, have you determined and documented your site storage design approach?	Yes No	Section 5.4
For indoor storage activities – is your building fit for purpose and compliant with the relevant local Planning and Building Authority requirements such as the *Building Act 1993* and Building Regulations 2018, including the National Construction Code Series Volume 1 (NCCI)?	Yes No	Section 5.4

Effective storage management controls	Response	For support refer to:
Does your site have an Essential Safety Measure Report?	Yes No	
Have all the actions on that report been addressed?	Yes No	

Emergency management plan	Response	For support refer to:
Do you have an emergency management plan?	Yes No	Section 6.1
Are your staff trained in the implementation of the emergency management plan?	Yes No	Section 6.2
Have you set up an Emergency Information Container that contains the Emergency Information Book?	Yes No	Section 6.4
Have you reviewed and tested your emergency management plan?	Yes No	Section 6.5

Appendix 2: Australian Standards relevant to fire protection systems and equipment for WRRFs

Australian Standard	Description
AS 1851-2012	Routine service of fire protection systems and equipment.
AS/NZS 1668.1-2015	The use of ventilation and air conditioning in buildings – fire and smoke control in buildings.
AS 1670.1:2015	Fire detection, warning, control and intercom systems – system design, installation and commissioning fire.
AS 1670.3-2004	Fire detection, warning, control and intercom systems – system design, installation and commissioning fire alarm monitoring.
AS 1670.4:2015	Fire detection, warning, control and intercom systems – system design, installation and commissioning emergency warning and intercom systems.
AS 1905.1:2015	Components for the protection of openings in fire-resistant walls fire-resistant doorsets.
AS 1905.2-2005	Components for the protection of openings in fire-resistant walls fire-resistant roller shutters.
AS 2118.1:2017	Automatic fire sprinkler systems – general systems.
AS 2293.1-2005	Emergency escape lighting and exit signs for buildings – system design, installation and operation.
AS/NZS 2293.2:1995	Emergency evacuation lighting for buildings – inspection and maintenance.
AS 2293.3-2005	Emergency escape lighting and exit signs for buildings – emergency escape luminaires and exit signs.
AS 2304	Water storage tanks for fire protection systems.
AS 2419.1-2005	Fire hydrant installations – system design, installation and commissioning.
AS 2441-2005	Installation of fire hose reels.
AS 2444-2001	Portable fire extinguishers and fire blankets – selection and location.
AS 2665-2001	Smoke/heat venting systems – design, installation and commissioning.

Australian Standard	Description
AS 2941	Fixed fire protection installations – pumpset systems.
AS 3745-2010	Planning for emergencies in facilities.
AS 4072.1-2005	Components for the protection of openings in fire-resistant separating elements, service penetrations and control joints.
AS 5062:2016	Fire protection for mobile and transportable equipment.

Appendix 3: assumptions for the curves used in calculation standard separation distances and dimensions

- Emitters and receptors are parallel to each other.
- The slope of your pile is 45° for loose waste piles and 90° for baled stacks.
- Typical maximum burn temperature for the two broad categories of waste types noted (general wastes and plastics/rubber wastes) have been used. These reflect the typical worst-case fire scenarios observed during burn trials.
- A receptor ignition property of 10 kW/m^2 has been used for waste stacks, based on research into the ignition properties of baled refuse-derived fuel.
- A receptor ignition property of 12.6 kW/m^2 has been used for buildings. This is the value commonly used for buildings with unprotected surfaces.
- 'Adequate access to allow fire-fighting' is generally a minimum of five metres. This may be varied dependent onsite conditions, such as obstacles etc. – which would make five metres too narrow. In addition, access should be good on **all** sides of a stack, not just its length.
- All the dimensions and distances given are for standard CRWM storage – that is, an open or baled pile of material on the ground in a storage yard, in a bunker or in a building. They would not apply for specialised storage such as silos, racked storage (e.g. for end-of-life vehicle storage), or treatment systems.

Appendix 4: An example of a major hazard entry using the hazard and risk register approach

Revision:		**Date:**		**Attendees:**		**Signed:**	

Hazard	Potential causes	Initial risk		Controls implemented	Residual risk		How controls will be checked	Any further controls/actions required	Actions	
		Consequence	Likelihood		Consequence	Likelihood			Due date	Date complete
Ignition/combustion of baled CRWM stored externally in Yard ZZ.	• Malicious act (for example. arson). • Embers from offsite source (for example. grass fire). • Discarded cigarette butts. • Improperly supervised Hot Work. • Self-combustion. • Friction, for example, baling wire on forklift tyres or sorting conveyors • Unidentified ignition sources during sorting/screening • Overheating of machinery	• Major fire – loss of life (staff/contractors/emergency responders). (Expand on other consequences that may arise)	Major fires have happened several times within the past few years across the industry. (Expand on other likelihoods that may occur)	• Enforced a non-smoking policy onsite. • Erected non-combustible bunker walls to separate storage piles and adjacent site buildings. • Adhered to the maximum storage dimensions of height 4 meters, width 20 or 10 meters (dependant on pile access) and calculate pile length using figures 19 and 20 from EPA 's *Management and storage of combustible recyclable and waste materials – guideline* (publication 1667.3). • Use low friction baling wire • Automatic extinguishing system on loading machines • Maintain rollers on conveyors • Use electric forklifts/loaders (Expand on other controls that may be implemented)	A fire that occurs should be contained within a specific pile and not spread to adjacent piles and site amenities. (Expand on other residual consequence that may arise)	A fire could still break out (for example, through self-heating) but the likelihood of the fire spreading is reduced. (Expand on other residual likelihoods that may occur)	• Review the volume of waste on site to ensure site inventory is not exceeded and that pile dimensions are maintained within site plan requirements. • Review of site maintenance procedures at weekly toolbox meetings. • Site walks to check that non-smoking policy is being followed. (Expand on other ways controls can be checked)	Had a near-miss (small smouldering fire in pile XZ), fire caused by self-heating) on dd/mm/yy. • Purchasing thermal probes to monitor temperature of CRWM storage. • Interlace bales to disrupt chimney effect	dd/mm/yy	dd/mm/yy (signed by:)

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