Civil construction, building and demolition guide

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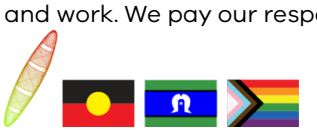

Acknowledgements

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We thank everyone for their contribution and commitment to keeping Victoria prosperous and liveable by preventing and reducing harm from pollution and waste.

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Contents

Tables

Figures

Chapter 1. About this guide

This guide supports the civil construction, building and demolition industries to eliminate or reduce the risk of harm to human health and the environment through good environmental practice.

It is especially relevant if your work involves activities that include:

- land development
- commercial and residential building
- civil construction
- subdivision
- demolition
- decommissioning
- earthworks
- maintenance, repair and renovation of existing structures
- other construction trades.

This guide has been developed for people whose role involves site planning or environmental management in supporting activities and projects of all scales and complexity.

You can use this guide to help inform the decisions and steps you can take to eliminate or reduce risk. It contributes to your **state of knowledge** and is not a compliance document.

EPA developed this guide in consultation with construction companies, industry groups, local councils and government agencies.

1.1. Why is this guide important?

At the centre of the *Environment Protection Act 2017* (EP Act) is the **general environmental duty** which requires anyone engaging in an activity that may give rise to risks of harm to human health or the environment from pollution or waste, must minimise those risks so far as reasonably practicable (EPA publication 1856).

This **general environmental duty** applies to all Victorians. It means you will need to proactively assess and manage the risks of harm from your activities.

Eliminating or reducing risk is important because industry activities could impact, for example:

- **Air** – affecting human health and wellbeing; ecosystems and biodiversity; local amenity and aesthetic enjoyment; visibility; climate systems.
- **Noise** – affecting people's sleep; communication, cognition and learning; domestic or recreational activities; tranquillity and enjoyment inside and outside.
- **Land** – affecting human health; buildings and structures; soil health and the integrity and biodiversity of ecosystems; production of food, flora and fibre; aesthetics.
- **Water and groundwater** – affecting water-dependent ecosystems and species; drinking water, agriculture and aquaculture; water-based recreation; industrial and commercial use; Traditional Owner cultural values; buildings and structures.

Assessing and controlling risk in a structured way will help you:

- prevent harm to human health and the environment
- comply with your legal obligations
- meet community expectations.

The EP Act includes other duties that are relevant to the civil construction, building and demolition industries. We look at these, and your general environment duty, in Chapter 2 Understanding your duties.

1.2. What does this guide cover?

This guide provides an overview of your duties under the EP Act, controls you can put in place to manage your risk and general information to help you manage your obligations associated with:

- **noise and vibration**, including scheduling works, community consultation, managing noise and vibration at the source, and managing noise using offsite controls
- **erosion, sediment and dust**, including managing stormwater flows, minimising dust, managing stockpiles and working within waterways
- **contaminated land and groundwater,** including identifying presence of contaminated land, and preventing contamination of stormwater and groundwater
- **chemical storage and handling,** including managing storage and handling of liquid and solid chemicals, spill response and cleanup, and managing volatile liquids
- **waste,** including managing different types of waste, storage, collection, transport and removal.

The information in this guide is not exhaustive. You can implement other controls not covered in this guide, so long as you can demonstrate you have eliminated or reduced the risk of harm to human health and the environment, from pollution or waste, so far as reasonably practicable.

You may also need to seek additional or more tailored advice from a suitably qualified person or other trusted source if your activities are not covered, or are not adequately addressed, in this guide. It is your responsibility to determine who is suitably qualified to do this (see Work with an environmental consultant, EPA website).

As always, continue to consult other guidance to support your compliance activities under other laws and regulations.

1.3. How to use this guide

This guide follows a risk-based approach to preventing harm. Use this guide to help structure or guide the way you assess and control risk. The approach and steps you take to do this will depend on the scale and complexity of your project, as well as the nature of the risks you need to manage.

We encourage you to use this guide to inform how you:

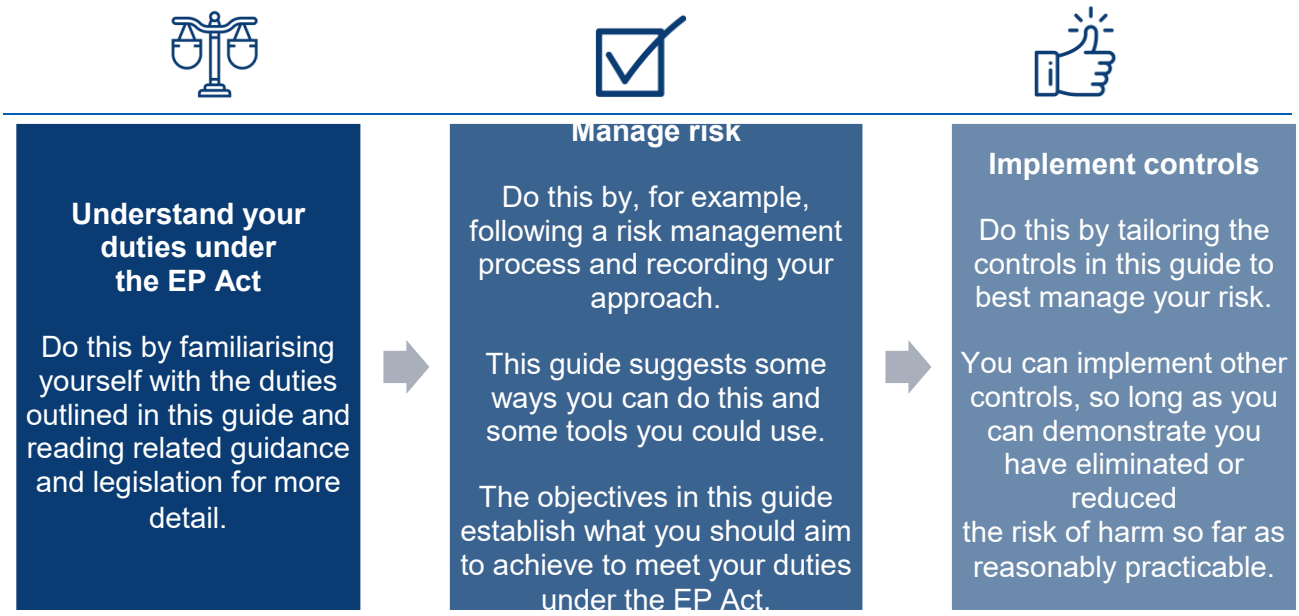


Figure 1.1. How to use this guide.

Symbols used in this guide

Duty under the EP Act	Important point to note	Objective and controls to help you achieve an objective	Focus on additional definitions, explanations or examples	Further information

This guide replaces the following publications:

480	*Environmental guidelines for major construction sites* February 1996
960	*Doing it right on subdivisions: Temporary environmental protection measures for subdivision construction sites* September 2004
981	*Reducing stormwater pollution from construction sites* May 2005
1254	*Noise control guidelines* (Section 2) October 2008
1264	*Noise from large residential subdivision or urban development sites* November 2008

Glossary

Some words in this guide are linked to definitions. Position your cursor over an underlined word. **Ctrl + Click** will take you to the Glossary on p. 110.

Chapter 2. Understanding your duties

In this chapter we look at your duties under Victoria's environment protection laws. It will help you understand your legal obligations and what is expected of you when managing environmental risk on your site.

Victoria's environment protection laws mean that anyone engaging in an activity that poses risk of harm to human health and the environment, from pollution or waste, must eliminate or reduce that risk. The **general environmental duty** applies to all Victorians.

It is your responsibility to understand and assess your risks. This includes understanding how your activities can impact land, water and air quality, or cause harm from waste and excessive noise.

You also need to eliminate or reduce risk so far as reasonably practicable. You can do this by putting appropriate controls in place that are proportionate to the risk.

Your approach to managing risk will depend on the complexity and scale of your activities or project, as well as the nature of the risks you need to manage. We cover one approach to managing risk in Chapter 3 Managing your environmental risk.

Environment Protection Act 2017, sections 25–27

2.1. Duties relevant to the civil construction, building and demolition industries

Additional to your general environmental duty, the EP Act imposes the following obligations or **duties** relevant to the civil construction, building and demolition industries:

Table 2.1. Duties relevant to civil construction, building and demolition.

This duty	Means I have to...	Relevant to...
Duty to respond to harm Section 31	Restore an affected area if pollution or land contamination happens as a result of a leak, spill or other unintended deposit or escape of a substance. The person who engaged in the activity that resulted in the pollution incident must cgenlean it up. It must be restored to the state it was in prior to the pollution event, so far as reasonably practicable. This duty applies regardless of fault.	Chapters 4 – 8: • Erosion, sediment and dust • Contaminated land and groundwater • Chemicals • Waste.

This duty	Means I have to...	Relevant to...
Duty to notify of incidents Sections 32–33	Notify EPA (1300 372 842) as soon as practicable after a pollution incident that causes or threatens material environmental harm occurs. Provide information about the: • nature of the incident • location • harm or threatened harm • circumstances in which it happened • proposed actions to deal with the incident. EPA will then provide you with further instructions.	Chapters 5 – 8: • Erosion, sediment and dust • Contaminated land and groundwater • Chemicals • Waste.
Duty to manage contamination Section 39	Minimise risks of harm to human health and the environment from contamination so far as reasonably practicable if you manage or control contaminated land (including vacant land and groundwater). This duty applies regardless of who caused the contamination or when it happened.	Chapter 6 Contaminated land and groundwater
Duty to notify of contaminated land Section 40	Notify EPA as soon as possible if the land you manage or control is contaminated above the thresholds set out in the regulations. This includes contamination to groundwater. This duty applies regardless of who caused the contamination or when it happened. It applies as soon as you become aware, or ought to have been aware, of the contamination.	Chapter 6 Contaminated land and groundwater
Duties relating to waste Sections 133–135, 139, 140, 142, 143 and 3(1)	There are seven specific duties that apply when managing or controlling waste. These apply when you are depositing, transporting and receiving waste. Any waste produced must be taken to a place that is lawfully able to receive it.	Chapter 8 Waste

You will need to determine who is in management or control of the land on which your activities are being carried out and then refer to the EP Act to identify the duties relevant to you.

2.2. Who enforces environmental law?

EPA authorised officers have powers of entry. Council officers can also be authorised officers under the EP Act. This allows them to inspect businesses and premises, provide advice and guidance about compliance, and enforce environment protection laws.

Authorised officers who visit your business or site will consider issuing you with directions or remedial notice if they believe you are not fulfilling one or more duties. This notice will set out the steps you need to follow to comply with the relevant duty.

- **Directions** – may be issued verbally or in writing when there is an immediate risk of harm. You must follow these directions immediately.
- **Remedial notices** – may be issued if an authorised officer reasonably believes you are not complying with environment protection laws or where there is a harmful or unlawful situation.

  A remedial notice is a formal record of actions you need to take to comply with an obligation or address a risk of harm. They include:

  - **Improvement notice** – requires you to take action to remedy non-compliance.
  - **Prohibition notice** – requires you to stop action that has an immediate risk of harm and remedy the issue.
  - **Notice to investigate** – requires you to investigate potential contamination or harm.
  - **Environmental action notice** – requires you to take action to clean up contamination or industrial waste.
  - **Waste abatement notice** – requires you to remove, dispose or restore a place affected by litter or waste.

- **Site management orders** – used for long-term management or rehabilitation of contaminated land or to undertake a broad range of actions to manage the risk of harm. You could be required under this order to, for example, install and maintain infrastructure, monitor contamination onsite and report on an ongoing basis.

Authorised officers will use this guide to support their assessments. It contributes to your state of knowledge and is not a compliance document.

Unlike similar environment protection laws in other states and territories, a breach of the general environmental duty could lead to criminal or civil penalties. Penalties for breaching the general environmental duty and other duties are set out in the EP Act.

Figure 2.1. An Officer for the Protection of the Local Environment on a site visit.

Compliance and enforcement

See Compliance and enforcement (EPA website)

Chapter 3. Managing your environmental risk

In this chapter we look at ways you can manage risk to help you meet your general environmental duty. This includes some suggested steps to follow and some tools you can use to support the risk management approach you decide to follow.

A well thought out approach to managing risk can help you:

- better identify, assess and control your risks
- prevent harm to human health and the environment
- comply with legal obligations
- meet community expectations.

Planning and managing risk on your site is an ongoing responsibility. Thinking about potential hazards, risks and controls that eliminate or reduce risk *before* you begin your project can help you put more effective controls in place. These may also be more cost effective for your business or project.

For example, good site planning may involve locating noisy works further away from nearby residences, or behind a noise barrier.

When planning, you should also consider the timing of your activities over the lifecycle of your project – risks may change as works onsite progress. Preparing project plans over the lifecycle of your project may help you identify risks and constraints. These can influence the controls you implement to eliminate or reduce environmental risk.

We look at many of the things you should consider in **planning your project** in Chapters 4 to 8 of this guide.

Risk management terms

- **Hazard** – something that could go wrong and can cause harm. In this guide, harm relates to pollution and waste, e.g., dust, noise, sediment.
- **Receptor** – something of value which can be harmed by hazards, including humans and the environment e.g., animals, vegetation and waterways. We use 'receptor' and 'receiver' interchangeably in this guide.
- **Risk** – the threat posed by a hazard to a receptor. Risk can be determined by understanding the likelihood and consequence of the harm.
- **Control** – a measure that can eliminate or reduce the hazard or risk.

3.1. Ways you can manage your risk

Following steps in a structured way will help you better understand the hazards and risks from your activities that could impact human health and the environment. It will also help you identify appropriate controls to put in place.

Assessing and controlling risk: a guide for business (EPA publication 1695) and four short videos take you through four steps to manage risk (see Figure 3.1). You can use a different risk management approach if it is more suited to your needs.

Figure 3.1. Four-step risk management process.

The actions you take at each step in this process may differ depending on the scale and circumstances of your activities and the nature of the risk.

Your actions should not stop at Step four. You should be continually running through these steps to ensure you are managing risk.

If your activities are simple to understand and manage, this might largely involve training staff and following appropriate procedures.

If you are a medium to large operator, you may already have your own approaches to managing risk in place, such as ISO 31000, Risk Management.

3.1.1. Step one: identify hazards

The first step in the risk management process is to identify your hazards (i.e. the activities that could cause harm).

This involves looking at your activities, gathering information about the site and its surrounding areas, and considering if the environment could be impacted.

Activities may include:

- vehicle, equipment and machinery use
- excavation
- management and transportation of waste and other materials
- chemical use
- dewatering.

3.1.2. Step two: assess risks

In this step you assess how the risks associated with each hazard you identified in step one could lead to harm, how severe that harm could be and the likelihood of it occurring.

Likelihood is the probability or chance that a hazard will cause harm. Likelihood is based on what is known, or should be known, about the hazard and the way circumstances and activities affect the hazard.

Consequence, or severity, relates to the degree of harm to human health and the environment that could occur as a result of a hazard.

To understand the **consequence** of a hazard causing harm, think about how pollution or waste resulting from your activities can reach and impact human health and the environment.

Some of the many ways pollution and waste can move through the environment include:

- **Water** – run-off from the site washing material into surrounding land, a nearby drain, or waterway.
- **Soil and groundwater** – contaminants leaching into the soil and groundwater, especially after rainfall.
- **Air** – wind-blown material creates litter and air borne dust, while noise pollution travels through the air reaching people offsite.

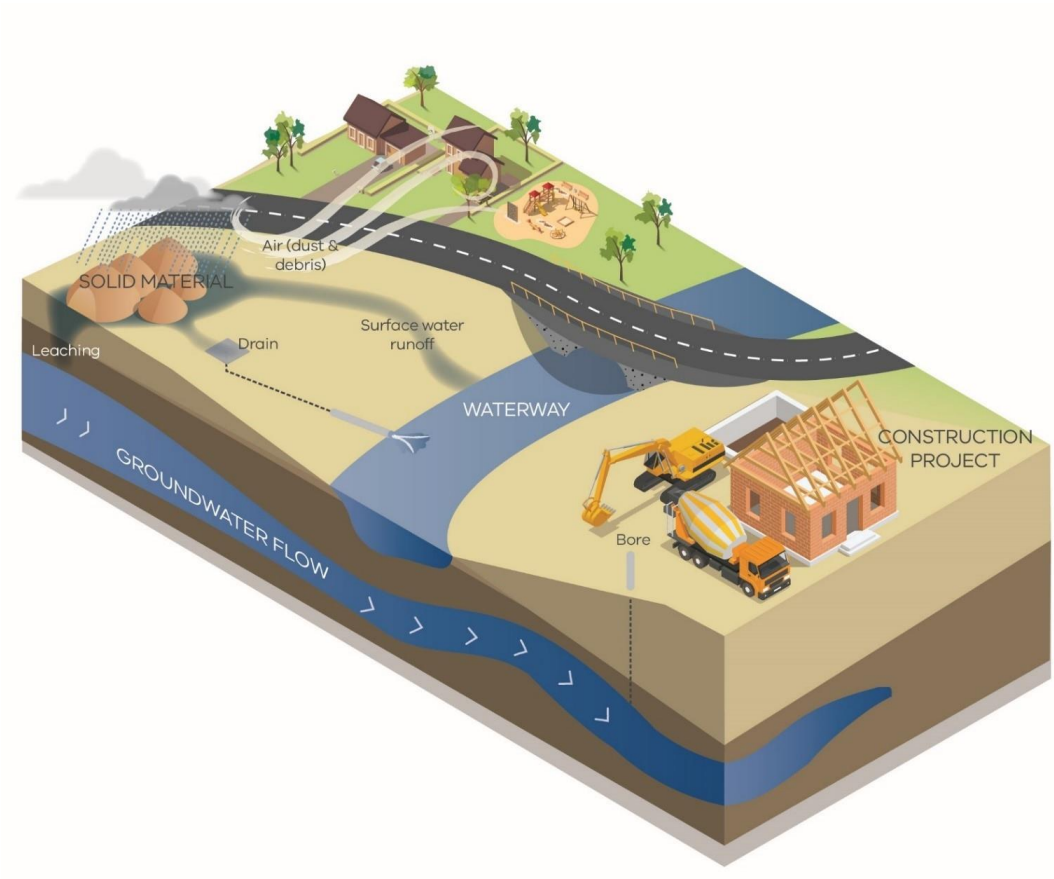


Figure 3.2. How pollution and waste from your activities can impact humans and the environment.

To establish the **likelihood** of the harm occurring, you should find out:

- if the hazard has already caused harm in the past at your site or at similar sites

- the frequency of the hazard (does it exist all the time or only sometimes)
- how changes in your activities may affect the hazard
- the possible behaviour of your staff or others when the hazard occurs
- about the controls currently in place and their effectiveness.

You may also want to rate the risks you identified as **high, medium** or **low** using a risk matrix. This can be a helpful ranking tool to inform your processes and systems.

3.1.3. Step three: implement controls

This step involves identifying the most appropriate controls to manage the risks you assessed at step two. You may need to implement multiple controls to minimise the risk of harm that a single hazard presents.

You can use a hierarchy of controls to help select appropriate controls. Aim to eliminate the hazard as the most preferred approach (see Figure 3.3).

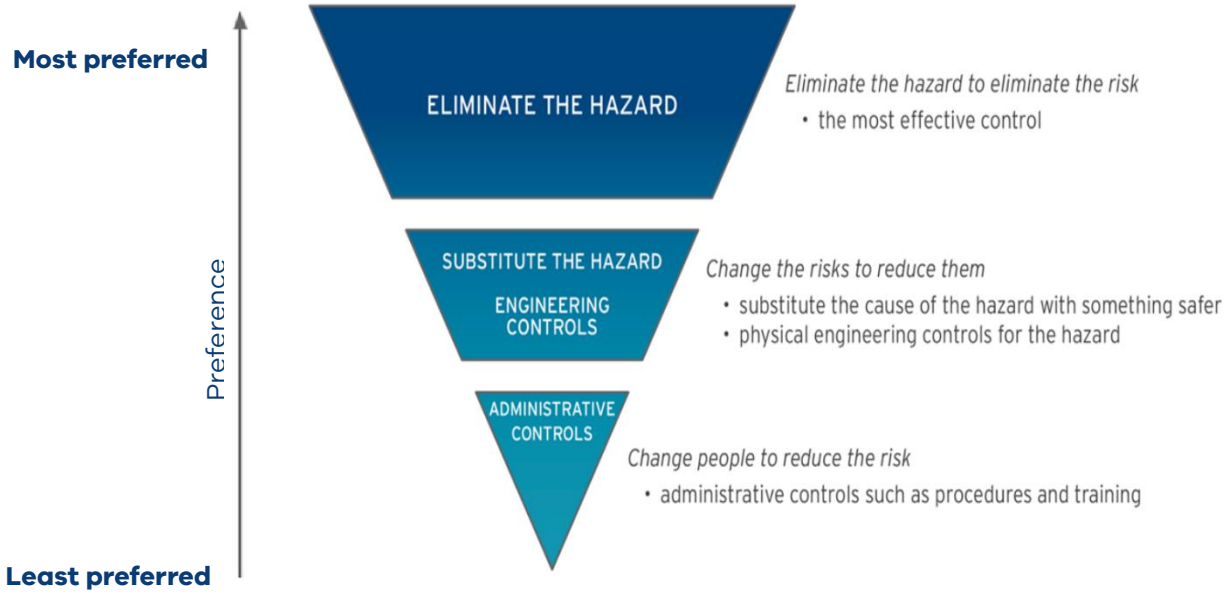


Figure 3.3. Hierarchy for controlling hazard or risk.

See *Assessing and controlling risk: a guide for business* (EPA publication 1695) for more information about the hierarchy of controls.

Staff training

Staff training and procedures can help prevent pollution occurring and enable staff to respond quickly to a pollution incident.

It is a legal requirement under the EP Act s.25(4)(e) to provide information, instruction, supervision and training to staff to minimise risk of harm to human health and the environment. Training can improve the safety of your worksite and protect your business' reputation.

You should also make others onsite aware (e.g., through an induction process) of the environmental site hazards and train them on the precautions they need to take. This includes contractors, maintenance workers, administrative staff and visitors.

Table 3.1 provides some examples of training types you can consider for your project.

Table 3.1. Types of staff training that may assist you.

Training type	Description
Induction training	Provide induction training for site staff, contractors and visitors, informing them of the hazards and risks onsite, incident response procedures, and roles and responsibilities.
Toolbox sessions	Undertake tool-box sessions every day, prior to starting work for that day, where possible.
Procedures	Provide staff with documented procedures or instructions for: • undertaking specific activities onsite, including handling and storage of chemicals and waste • responding to incidents (small and major) • anything else where a procedure will help to reduce risk.
Training plan	Develop and implement a training plan, and review and update as required.

Roles and responsibilities

Defining roles and responsibilities of staff, contractors and visitors can ensure environmental risks are being managed by the most appropriate people, and that relevant training is undertaken.

Chapters 4 to 8 provide examples of controls that may help you manage risk to human health and the environment.

3.1.4. Step four: check controls

Monitoring controls once implemented will allow you to evaluate their effectiveness and identify any changes you may need to make to them and/or your risk assessment process.

Having a procedure in place to support this will help you maintain and improve your risk management practices.

Common activities to check the effectiveness of controls are:

- visual inspections (routine and non-routine)
- consulting with site workers
- environmental monitoring
- analysing near miss and incident reports
- test any administrative controls (e.g., drills) and offer refresher training

- test and maintain engineered controls.

Develop a verification process to ensure these activities have been completed. This process is generally undertaken by senior staff or site management. Some verification examples include:

- ensuring any standard operating procedures are up to date
- signoff/approval by management of visual inspections undertaken, within a register
- capturing and review of training requirements.

What makes a control effective?

Put simply, a control that is designed effectively + operating effectively = an effective control

Design effectiveness is a measure of the extent to which a control is designed to reduce the likelihood and/or the consequence of the hazard. The control should be designed to operate reliably and/or sufficiently frequently to reduce the hazard causing harm.

Operating effectiveness is established when a control is checked and can be demonstrated to have operated as designed, without interruption or failure throughout the period it was relied upon to achieve its objective. Operating includes a requirement that ensures those operating the control are adequately informed and trained.

The effectiveness of controls should be overseen by management and independently validated.

See Assessing and controlling risk: a guide for business (EPA publication 1695) and four short videos for more information on the four-step risk management process.

Other resources to help you develop a risk management approach include Australian/New Zealand or International Standards, such as ISO 31000, Risk Management. This addresses risk across all business activities.

3.2. Optional tools to help you record the way you manage risk

Keeping records is not a legal requirement for most businesses but may help with your business planning. The records you keep can also demonstrate to EPA what steps you have taken to reduce or eliminate the risk of harm if a pollution incident occurs.

3.2.1. Risk register

You can use a risk register to record hazards, risks and controls. This may help ongoing management of your risks and can be used to document actions taken to check controls and any amendments made. Update and add information to your register progressively.

Signoff by senior management of the risk register, and any updates made, can demonstrate understanding of the risks across your business.

It could be more appropriate for your business to use another approach. A risk register is only one way of documenting hazards and risks – there are many other tools for capturing and supporting effective management of risk.

Risk register example

You can adapt 0: Appendix 1 – Risk register – completed example to suit your needs.

Other tools can be found in, for example: SA/SNZ HB 89 *Risk management – guidelines on risk assessment techniques*

A risk register, or other form of recording hazards and risks, would form the basis of an environmental management plan (EMP).

3.2.2. Environmental management plan

An EMP is a site or project-specific plan developed during project planning. It describes how activities onsite will be managed to minimise risk of harm to human health and the environment.

An EMP:

- summarises activities and hazards that may create a risk of harm
- identifies and documents suitable controls to manage the identified risks
- outlines the monitoring required to check controls are effective and verified
- includes a schedule and triggers for reviewing effectiveness of the EMP against your objectives (e.g., ensure you clean up spills as soon as possible) and any regulatory conditions (e.g., there is no pollution of land or groundwater on or beyond your site as a result of your activities)
- outlines the procedure for evaluating and updating the EMP (including controls).

Council and other government agency approval

Many Victorian councils require an EMP to be submitted and approved before site works commence. Other government agencies may have similar requirements. It is your responsibility to find out when an EMP is required.

Multiple EMPs may be required for:

- large work sites divided into smaller areas with different works (e.g., an EMP for each area within the site)
- projects which take place over multiple stages (e.g., an EMP for each stage of the project).

The size, scope and elements of an EMP will vary depending on the size and complexity of your project, and the requirements of the council or government agency.

What's in an EMP?

If you need to develop your own EMP template, see 0: Appendix 2 – Environmental management plan – structure outline. It contains some elements you can consider including.

What makes a good EMP?

- **Concise** – a concise EMP is more likely to be implemented onsite. Use short sentences, bullet points and plain English.
- **Site-specific not generic** – the hazards, risks and controls discussed in the EMP should be specific to the activities that will occur onsite in your project.
- **Dynamic** – update your EMP regularly to reflect current site activities, hazards and risks.
- **Visual** – use detailed and accurate site maps and figures.

3.3. Responding to an incident

A pollution incident is an event that may cause harm to human health and the environment. Inappropriate practices onsite, accidents or climatic events may result in a pollution incident.

Your incident response procedure should outline the steps required to deal with an event outside normal operating conditions (e.g., spills, fire). This will help ensure the event is managed safely – minimising the harm to site personnel, the environment, your business and nearby communities.

Your prompt response to an event will also reduce the impact it may have on human health and the environment.

Systems for recording incidents, their causes and trigger actions can also help you design and implement more effective controls. This can prevent other similar incidents from occurring in the future.

Where pollution has occurred, the **duty to respond to harm** (s.31) means you must restore the affected area to the state it was in before the incident occurred, so far as reasonably practicable.

The **duty to notify of an incident** (ss.32–33) means you must also notify EPA as soon as reasonably practicable after becoming aware of the pollution.

Chapter 4. Noise and vibration

This chapter discusses controls relating to:

- **normal working hours for your activities, including scheduling works during normal hours, consultation with affected people and managing noise**
- **justified unavoidable works that need to be conducted outside of normal work hours**
- **managing noise and vibration that cannot be eliminated or minimised by source controls.**

We look at managing construction noise and vibration for major infrastructure works, large construction sites and residential developments, and ways you can meet your general environmental duty. The maintenance or repair of an existing building is out of the scope of this guidance.

The **general environmental duty** (ss.25 – 27) applies to noise and vibration that presents a risk of harm to human health and the environment.

You are obliged under this duty to eliminate or reduce these risks so far as reasonably practicable. You can do this by putting controls in place that are proportionate to the risks and employing good environmental work practices.

The content in this chapter replaces these EPA publications:

- *Environmental guidelines for major construction sites* (publication 480)
- Section 2 of *Noise control guidelines* (publication 1254)
- *Noise from large residential subdivisions or urban development sites* (publication 1264)

4.1. Background

4.1.1. Construction related noise and vibration

Civil construction, building and demolition related noise can impact the health and wellbeing of people and animals (considered to be sensitive receivers) when not managed appropriately. Vibration may also interfere with scientific equipment or damage buildings and underground services.

You can identify and adopt actions to minimise noise and vibration risks in:

- planning
- site layout
- management, selection and maintenance of equipment
- noise reduction technology
- conduct of workers onsite.

The quality of your communication with those impacted, especially vulnerable groups, will help them reach a more positive acceptance of the noise and vibration and its impact. Vulnerable groups include the elderly, children, pregnant women and people suffering from long term illness or mental health.

Noise is unwanted sound or vibration which disrupts the acoustic environment and can impact health, sleep and daily living, learning, communication and relaxation.

Noise is a form of pollution which risks harming human health and the environment.

4.1.2. Site activities which may cause noise and vibration

Your activities can generate noise and vibration, regardless of the scale of your site. Activities that may cause noise and vibration include:

- demolition work
- site preparation works
- site cleanup and dismantling activities
- site works
- truck and vehicle movement/operation.

4.1.3. Why it's important to manage noise and vibration

Complaints about noise and vibration are some of the most common complaints that EPA, councils and businesses involved in civil construction, building and demolition receive.

Noise and vibration can pose a risk of harm to human health and the environment if it is too loud, continues too long, recurs frequently, suddenly increases in level, or includes disturbing sounds such as:

- impulses (banging, hammering)
- tones (squealing, screeching, humming)
- low frequency sound. This can be more intrusive than high frequency sound as it is less attenuated during propagation and when transmitting into buildings. Noise abatement measures are less effective at low frequencies.

As well as causing annoyance and immediate disturbance to people and animals, environmental noise and vibration is now recognised as a public health issue. It can have serious or long-term health impacts. These impacts may include:

- inability to sleep or reduced quality of sleep
- impaired communication
- reduced cognitive performance (e.g., reduced attention span, memory and concentration in people working and children studying)
- exacerbation of mental health problems (e.g., stress, anxiety and depression)
- changes to the natural behaviour of animals, which affects their ability to survive and reproduce (e.g., reduced ability to hear alarm calls warning of predators)
- discomfort caused by vibration.

In extreme cases, vibration may also result in damage to buildings and infrastructure.

Health and safety of workers

See WorkSafe Victoria for guidance on managing noise risk to the health and safety of workers onsite.

Other factors can also influence the risk of harm, such as:

- proximity of the noise to people
- time of day (e.g., late at night when most people are asleep)
- an individual's duration of exposure and sensitivity to the noise
- background noise levels (e.g., traffic noise which may mask other noises)
- construction fatigue, when people have already been, or will be exposed to impacts from one or several construction sites over a long period of time.

4.2. Planning your project

Under the general environmental duty, anyone who is engaging in an activity that poses risk of harm to human health and the environment, from pollution or waste, must manage that risk. You need to do this by eliminating or reducing your specific risks so far as reasonably practicable (see Chapter 2 Understanding your duties). You can do this by putting appropriate controls in place.

The earlier you consider noise and vibration management in planning your project, the greater the opportunity is for you to identify effective controls.

Key aspects to consider when you are planning include:

- identifying people and sensitive environments (sensitive receivers) that could be affected by your activities
- carrying out appropriate engagement as early as possible
- avoiding the generation of noise and vibration
- facilitating construction during normal working hours, where possible
- reducing noise and vibration by using the most appropriate equipment and work practices for your activities
- choosing alternative equipment or methods that generate less noise or vibration
- maintaining equipment and vehicles according to manufacturer's instructions
- attenuating noise by obstructing the path between noise source and receiver
- mitigating offsite noise with measures such as respite offers and acoustic treatment
- considering alternatives if noise and vibration cannot be reduced through avoidance, reduction or attenuation.

Site planning and management

See *Site planning and management* (EPA publication 1884) for more information on undertaking site planning and management to eliminate or reduce the risk of harm to human health and the environment posed by your site activities.

4.2.1. Noise and vibration impact assessment

You can use a noise and vibration impact assessment to predict the characteristics of noise and vibration generated by planned works. This may need to be performed by an acoustic consultant during the project planning, construction documentation and post tender phases.

Engaging an acoustic consultant

An acoustic consultant will typically be a person who is eligible for membership of the Australian Acoustical Society. The business a consultant works for will typically be members of the Association of Australasian Acoustical Consultants.

See Work with an environmental consultant (EPA website) for general information about how to engage a consultant.

The outcomes of a noise and vibration impact assessment can be used to:

- inform the risk assessment process
- inform plans for managing noise
- predict the effects of implementing noise and vibration controls
- identify the need for noise and vibration monitoring, which can also determine the effectiveness of noise controls.

A noise and vibration impact assessment includes:

- identifying legislated obligations and statutory approvals
- identifying sensitive receivers which include residents, other people and sensitive environments who could be affected
- reviewing activities:
  - considering what works can be done during normal working hours and whether there are likely to be outside normal working hours works, and in particular at night
  - assessing construction or demolition equipment, methods and processes, including undertaking noise modelling as required and depending on the scale of your activities or project
  - considering alternative equipment, methods and processes (including works scheduling) to reduce noise impacts.

Noise and vibration impact assessments can also be useful when providing information to the community and people who could be affected by noise.

Figure 4.1. Be aware of your noise generating equipment.

4.3. Managing noise and vibration during working hours

You are expected to minimise noise and vibration at all times. Limiting times of operation of noisy equipment, vehicles and operations is an effective way of reducing noise and vibration impacts. Use the schedule in

Table 4.1 to inform your project planning.

The primary way of minimising the likelihood of noise and vibration causing harm is to limit the frequency of occurrence and its duration. This applies especially when noise and vibration are likely to have a greater impact.

Unreasonable noise

See *Unreasonable noise guidelines* for further information on how to recognise potentially unreasonable noise. It also contains general information on how the duties under the Environment Protection framework relating to noise may be complied with.

Table 4.1. Working hours schedule for construction, building and demolition noise.

Minimise noise and vibration as far as possible in any situation		
Normal working hours for all civil construction, building and demolition activities.		
	Monday to Friday, 7 am – 6 pm	
	Saturday, 7 am – 1 pm	 Saturday, 9 am – 1 pm
Normal working hours for: • works for commissioning or construction of **major infrastructure projects** • commercial and industrial construction and demolition sites • demolition works on an existing commercial or industrial site that is intended for residential redevelopment • construction works for **large-scale residential developments** in non-residential zones • commercial and industrial land subdivision.	Normal working hours for: • residential construction and demolition sites • residential or mixed-use development in **residential zones,** including urban infill and redevelopments • land preparation on infill and smaller residential developments • land preparation for residential subdivision, not including works to construct or upgrade a road • residential construction in a **large-scale fringe residential subdivision,** once the road servicing the residential development is complete.	
Limited works apply on Saturday, 7 am – 9 am to: • land preparation and infrastructure works for a large-scale fringe residential subdivision **before** the road servicing of the future residential subdivision is completed. See Table 4.2.	Normal working hours for: • land preparation and infrastructure works for a large-scale fringe residential subdivision **after** the road servicing the residential development is complete.	

Table 4.1. Continued

Minimise noise and vibration as far as possible in any situation			
Outside normal working hours as covered in **section 4.4** for all civil construction, building and demolition activities.			
 PM → PM	Monday to Friday, 6 pm – 10 pm		
 PM → PM	Saturday, 1 pm – 10 pm	 PM → PM	Saturday, 1 pm – 8 pm
 AM → PM	Sundays and public holidays, 7 am – 10 pm	 AM → PM	Sundays and public holidays, 9 am – 8 pm
Applies to: • works for commissioning or construction of major infrastructure projects • commercial and industrial construction and demolition sites • demolition works on an existing commercial or industrial site that is intended for residential redevelopment • construction works for large-scale residential developments in non-residential zones • commercial and industrial land subdivision. See **section 4.4** for conditions to apply within these hours and for works outside these hours.		Working hours providing that the activities do not result in **unreasonable noise** for: • residential construction and demolition sites • residential or mixed-use development in residential zones, including urban infill and redevelopments • land preparation on infill and smaller residential developments • land preparation for residential subdivision • residential construction in a large-scale fringe residential subdivision. See **section 4.4.** No works to be conducted after 8 pm unless they are inaudible.	
In identifying the schedule relevant to a specific project from			

Table 4.1, the following definitions apply:

- **Major construction works** can include:
  - development of road, rail, tunnels, bridges, power facilities, residential estates and public facilities such as schools and hospitals
  - sewer replacement works
  - underground power cable laying
  - other public works requiring major excavation.

- **Residential zones** are defined in clause 32 of the Victoria Planning Provision.
- **Large-scale residential developments** are residential developments and mixed-use (residential/commercial) developments with four or more storeys above ground or two storeys below ground, under construction (no part is occupied as a residence while construction is underway).
- **Large-scale subdivisions** are subdivisions that include a new road or works to upgrade an existing road in the subdivision plan.
- **Large-scale fringe residential subdivisions** are *large-scale subdivisions* on:

  - any growth area (as defined in the *Planning and Environment Act 1987*) or Urban Growth Zone identified in any planning scheme (UGZ, as defined in clause 37.07 of the Victoria Planning Provisions)
  - undeveloped land within Metropolitan Melbourne which is covered by a metropolitan fringe planning scheme (as defined in the *Planning and Environment Act 1987*) and is zoned for residential development or identified for future urban development in the Local Planning Policy Framework or in a reference or incorporated document.
  - undeveloped land outside Metropolitan Melbourne, which is zoned for residential development, or identified for future urban development in the Local Planning Policy Framework or in a reference or incorporated document.

  Where relevant, you should check local or site provisions with council planners.

- **Metropolitan Melbourne** is identified as the Metropolitan Waste and Resource Recovery Region defined in the EP Act (ss. 6 (9)).

Table 4.2. Limited works for land preparation and infrastructure works on large-scale fringe residential subdivisions on Saturday, 7 am – 9 am.

☑ Minimise noise and vibration as far as possible in any situation		
Distance from nearest residential property	 AM → AM	Saturday, 7 am – 9 am
< 35 m	• No works, unless inherently quiet	
35 m – 200 m	• No works, unless inherently quiet: – from 20 weeks after commencement or – once the section of road servicing the future residential premises is complete. • Limited works for land preparation and infrastructure works permitted: – during the first 20 weeks, and – before the road servicing the residential development is complete. • Limited equipment can be used: – earthmoving machinery that does not use an impacting, vibrating or rotating implement operated by hydraulic or pneumatic means – concrete dispensing trucks – self-propelled, single-drum vibrating rollers or non-vibrating compaction machinery. – Pile drivers and other noisier equipment not to be used (e.g., double-drum vibration roller and impacting tools and implements such as rock-breakers).	
> 200 m	• Any equipment other than pile drivers may be used.	

You are encouraged to further minimise overall impact by deferring starting hours.

Victorian Planning Provisions

See Planning Schemes Online on the Department of Environment, Land, Water and Planning website.

4.3.1. Scheduling works

Scheduling noisy activities when people nearby are least affected can reduce noise impact.

Schedule noisy activities at times that minimise potential harm

Controls to help you achieve this objective

- Schedule activities to minimise noise impacts. Aspects to consider include:
  - undertaking work during normal working hours
  - avoiding work when there are special events
  - scheduling work when neighbours/residents are not present
  - scheduling noisy works together to reduce the overall duration of exposure
  - scheduling noisy activities around times of high background noise to provide masking or to reduce the amount that noise from your activities intrudes above the background
  - scheduling noisy activities for less sensitive times, for example, delay a rock-breaking task to the later morning or afternoon
  - avoiding work that coincides with sensitive ecological processes, for example, during critical breeding season of species that rely on mating calls.

- Organise deliveries and access, with consideration given to:
  - combining loads to reduce noise and congestion in surrounding streets
  - optimising the number of vehicle trips to and from your site
  - maintaining vehicles in good condition
  - promoting good driving behaviour, to prevent sudden acceleration and unjustified use of engine brakes
  - consulting and informing potentially noise-affected residences regarding designated access routes to your site. Ensure drivers are aware and use nominated vehicle routes
  - providing onsite parking for staff and onsite truck waiting areas away from nearby people. Install bunding or walls to minimise noise for truck waiting areas
  - scheduling deliveries to nominated hours only.

4.3.2. Community information and consultation

Early engagement and consultation with community, from planning and throughout your project's development and construction, is key to minimising the impacts of noise. Early engagement also gives the community an opportunity to better prepare to cope with or avoid noise from your activities (e.g., they may like to plan time away from home).

The community is more likely to understand and accept noise generated by your activities if you provide information in an open and transparent manner and demonstrate how their views and opinions have been considered.

Consult and inform residents and other people who may be affected by noise

Controls to help you achieve this objective

- In the early stages of planning, identify and assess those potentially impacted by noise, then document and maintain the information for the duration of your project or activities.
- Engage community to keep them informed, for example community meetings with community and workers.
- Notify community before and during construction, communicating information such as:

  – dates and times (start and finish) when noise will be generated
  – why the noise is necessary
  – type of noise
  – measures to minimise noise volume, for example, installation of noise barriers
  – measures to minimise disturbance, for example, works scheduled to cease on certain days to provide residents with a break from the noise and discuss expected noise after implementation of management measures
  – contact details for information (the contact person should have a level of knowledge and responsibility that will enable them to provide a real-time response to queries and complaints)
  – what is happening now and what is happening next.

  Also consider:

  – using media such as a project-related website, letter box drops, meetings, individual contacts and notify in languages other than English where appropriate
  – following an agreed time period to contact community/residents regarding planned work outside normal working hours
  – offering alternative accommodation for affected residents when unavoidably noisy works will occur at night.

- Install and maintain a site information board at the front of your site with contact details, hours of operations, after hours emergency contact details, and regular information updates. Locate the board so it's visible from the outside boundary.
- Maintain a process for managing complaints.

People may be more likely to tolerate noise when you engage with them early and let them know:

- why the noise will be generated (e.g., construction of an essential infrastructure)
- the time of day they can expect the noise to take place
- the duration of noisy construction work (e.g., three weeks).

4.3.3. Noise source

Controlling noise at the source is one of the most effective methods of minimising noise impacts from your activities. Reducing noise at the source also improves conditions for workers.

Minimise noise generated by activities onsite

Controls to help you achieve this objective

- Undertake preparatory work offsite where there is low potential for impacting people (e.g., formwork, cutting or prefabrication of materials offsite prior to transporting to the construction site)
- Connect to the electricity grid as early as possible to avoid the use of diesel generators.
- Restrict areas where mobile plant can operate so that it is away from people who could be affected by noise.
- Locate site vehicle access and waiting areas away from people who could be affected by noise.
- Plan vehicle movements to avoid manoeuvres and idling at location nearest to nearby people.
- Use quieter equipment or methods. This may require considering:
  - buying or leasing quieter equipment
  - avoiding metal-to-metal and metal-to-stone contact
  - installing mufflers
  - reducing throttle and turning off equipment when not in use
  - placing things down rather than throwing
  - educating drivers to use driving practices that minimise noise.
- Use low-noise saw blades.
- Use electrical equipment rather than equipment driven by a diesel generator.
- Use low-noise emitting generators.
- Use effective alternatives to 'beeper' alarms (e.g., broadband alarms, proximity sensors).
- Avoid using reversing alarms by designing site layout to avoid reversing (e.g., drive-through for parking and deliveries).
- Maintain equipment by:
  - inspecting regularly and maintaining equipment to ensure good working order
  - checking machines with enclosures, including doors and door seals and that the door closes properly against seals
  - maintaining air lines on pneumatic equipment so they do not leak.
- Maintain vehicles by:
  - considering good working conditions of mufflers
  - securing loose parts that may rattle.
- Limit noise caused by people onsite. This may include procedures to:
  - avoid yelling and shouting onsite (note: if people onsite need to shout to hear each other over the site ambient noise, it is possible the noise level may be putting their hearing at risk)
  - minimising the use and volume of any electrical amplified sound-reproducing equipment, for example radios, stereos, televisions or public address systems.
- Plan transport and haulage routes to minimise the number of trucks/vehicles. Where there are large numbers of truck movements, consider truck route and truck waiting protocols (e.g., engines on/off and restart requirements).
- Implement substitute methods taking into consideration:

- alternatives to rock-breaking work methods, such as hydraulic splitters for rock and concrete, hydraulic jaw crushers, chemical rock and concrete splitting, and controlled blasting such as penetrating cone fractures. The suitability of alternative methods should be considered on a case by case basis, including what potential risks they involve.
- alternatives to diesel and petrol engines and pneumatic units, such as hydraulic or electrical generator located away from nearby people.

4.3.4. Vibration and regeneration noise source

Vibration and regenerated noise sources from your activities may include stationary plant, for example jackhammers, portable plant, mobile plant (such as earthmoving and ground impacting equipment), pile-drivers, tunnelling machines and activities, and blasting.

Controlling vibration at the source is the most effective approach to minimise vibration impacts from your activities and support the wellbeing of workers and nearby people.

Limit vibration and regenerated noise by onsite activities

Controls to help you achieve this objective

- Use alternative lower-impact equipment or methods (e.g., substitute impact piling with bored piling, grip jacking or the use of hammer cushion when driving steel piles that minimise the vibration).
- Use non-explosive demolition agents and/or chemical agents to facilitate concrete/rock breaking activities to reduce the noise generated.
- Substitute demolition methods not involving impact where feasible (e.g., use hydraulic rock splitters rather than rock breakers).
- Schedule the use of vibration-causing equipment such as jackhammers, demolition, earthmoving and ground-impacting operations at the least sensitive time of day.
- Routing, operating or locating high vibration sources as far away from people who could be affected by noise.
- Sequencing operations so that vibration-causing activities do not occur simultaneously.
- Isolate equipment causing vibration on resilient mounts.
- Isolate activities from adjoining structures.
- Maintain equipment in accordance with manufacturer's specifications.

4.3.5. Noise reduction between noise source and receiver

Blocking the path between the noise source and people who could be affected can reduce the potential noise impact.

Limit the level of noise reaching nearby people offsite

Controls to help you achieve this objective

- Plan to have as much distance as possible between plant, equipment or other noisy activities and people who could be affected by noise.
- Maximise shielding taking into consideration:
  - topography of the site (e.g., use of earth mounds as barriers)
  - existing structures, temporary buildings and material stockpiles

- early construction of permanent walls so they can be used as early as possible as noise barriers
- avoiding placing noise-producing equipment in locations where reflected noise will increase noise exposure or reduce the effectiveness of mitigation measures.

- Prioritise construction of structures such as buildings and walls that can contribute to shielding noise from the construction site.
- Obstruct the transmission path of sound (e.g., using acoustical walls or barrier, flexible noise barriers such as noise curtain or blankets, acoustic sheds or enclosures. See Figure 4.2 and Figure 4.3.
- Protect noise sensitive receivers (e.g., increasing window sound insulation by retrofitting acoustic glazing or suitable double glazing).

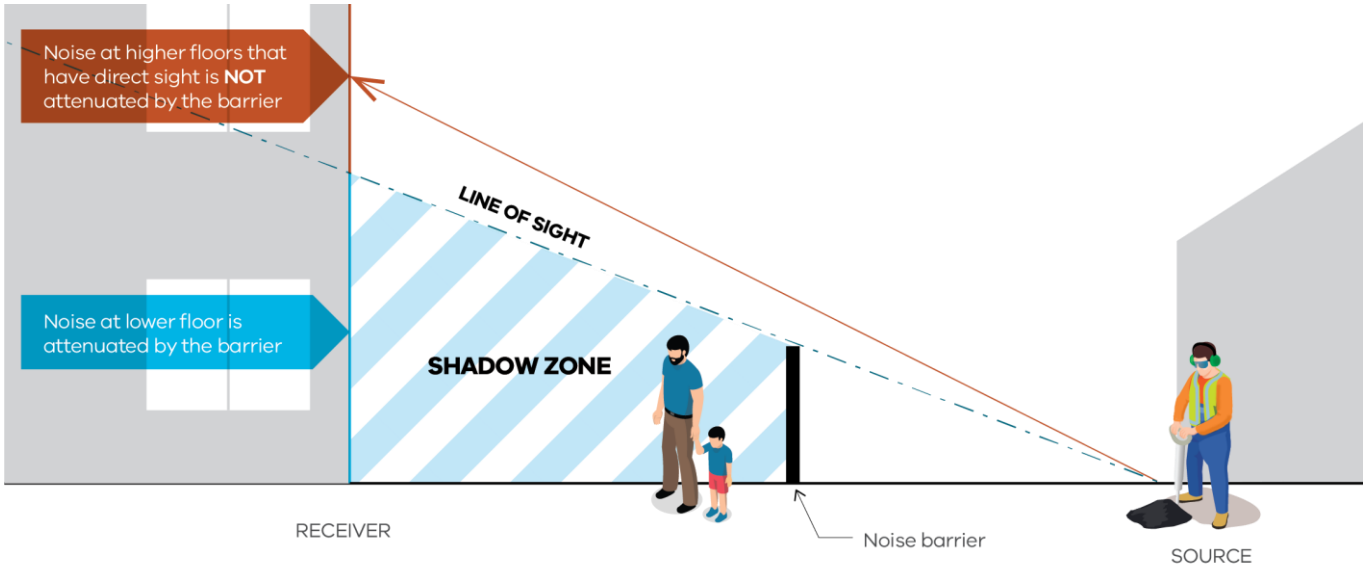


Figure 4.2. Line of sight and shadow zone created by a noise barrier.

Figure 4.3. Temporary noise barrier (photo courtesy of John Holland).

4.4. Managing noise and vibration outside normal working hours

Where relevant, works outside normal working hours (Sunday, public holidays, evening and night-time) should be done in accordance with local laws or with an approval.

Projects should aim to constrain works to normal working hours. Where necessary, works or activities outside normal working hours may occur for:

- **Low-noise impact works** – these are inherently quiet or unobtrusive, for example, manual painting, internal fitouts, and cabling. Low-noise works do not have intrusive characteristics such as impulsive noise or tonal movement alarms. The relevant authority must be contacted, and any necessary approvals sought.
- **Managed-impact works –** works where the noise emissions are managed through actions specified in a noise and vibration management plan (may be part of a broader environmental management plan), to minimise impacts on sensitive receivers. Managed-impact works do not have intrusive characteristics such as impulsive noise or tonal movement alarms.
  You must contact the relevant authority and seek any necessary approvals. A noise and vibration management plan may need to be prepared or reviewed by a suitably qualified acoustic consultant or practitioner (see Work with an environmental consultant, EPA website).
- **Unavoidable works** – are **works** which pose an unacceptable risk to life or property or a major traffic hazard and can be justified. Includes an activity which has commenced but cannot be stopped. You will need to demonstrate that planned unavoidable works cannot be reasonably moved to normal work hours. This requires additional consideration of potential noise and vibration generating activities and controls to minimise noise and vibration. These can be recorded within the noise and vibration management plan (may be part of a broader environmental management plan).
  You must contact the relevant authority and seek any necessary approvals for unavoidable works. You should notify affected sensitive receivers of the intended work, its duration and times of occurrence. A noise and vibration management plan may need to be prepared or reviewed by a suitably qualified acoustic consultant or practitioner to address unavoidable works (see Work with an environmental consultant, EPA website).

Examples of unavoidable works may include:

- the delivery of oversized plant or structures that police or other authorities determine require special arrangements to transport along public roads
- emergency work to avoid the loss of life or damage to property, or to prevent environmental harm
- maintenance and repair of public infrastructure where disruption to essential services and/or considerations of worker safety do not allow work within standard hours
- tunnelling works including mined excavation elements and the activities that are required to support tunnelling works (i.e. spoil treatment facilities)
- rail occupations or works that would cause a major traffic hazard
- works where a proponent demonstrates and justifies a need to operate outside normal working hours such as work that once started cannot practically be stopped until completed such as concrete pouring or construction of diaphragm walls.

A site decision-making process may help you determine and justify works as unavoidable for your site.

Where work is not justified as 'low-noise impact works', 'managed-impact works' or 'unavoidable works', your activities should follow the normal working hours schedule in

Table 4.1.

For any works outside normal works hours, it is essential you engage with the affected community before beginning works to explain the benefits and drawbacks of different scheduling, planning and remediation options.

Planned unavoidable night work may require approval by the relevant authority. There may be requirements in:

- Environment Performance Requirements (EPR) from Environment Effects Statements (EES).
- Land use planning or local laws. Local laws may be different and may require out of hours permits.

It is your responsibility to determine which approval you require, if any.

Where there is justified out of hours work, which includes low-noise impact works or managed impacts works, your activities are required to follow the outside normal working hours schedule (see Table 4.3).

Table 4.3. Outside normal working hours schedule and noise requirements.

Weekend/evening work hours	Night period
Noise level from non-residential construction at any residential premises not to exceed background noise by: • 10 dB(A) or more for up to 18 months after project commencement • 5 dB(A) or more after 18 months during the hours of: • 6 pm – 10 pm Monday to Friday • 1 pm – 10 pm Saturdays • 7 am – 10 pm Sundays and public holidays.	Noise inaudible (see definition below) within a habitable room of any residential premises during the hours of: • 10 pm – 7 am Monday to Friday • 10 pm – 7 am* Saturday, Sunday and public holidays *or 9 am based on the normal working hours Saturday schedule, see **Table 4.1**

The construction noise should be assessed as an L_{Aeq} and compared to the background noise at the time of impact. If the noise presents tonal or impulsive character, apply the following adjustments to the measured L_{Aeq}:

- +2 dB for a tone just detectable by the observer and +5 dB for a tonal component prominently audible; and
- +2 dB for an impulsiveness just detectable by the observer and +5 dB if it is readily detectable.

The L_{Aeq} should be determined over a sufficiently long time to represent the noise and will be measured for not less than five minutes. Do not include extraneous noise that could affect the level of the noise being assessed.

The background noise should be measured as an L_{A90} over a sufficiently long time (not less than five minutes) to represent the background at the time of impact.

See Australian Standard Guide to noise and vibration control on construction, demolition and maintenance sites, AS 2436-2010 for further information on noise and vibration control, including methods for measurement of noise and vibration (Section 5 of the standard).

Residential construction must not be audible between 8 pm to 7 am (Monday to Friday), 8 pm to 9 am on Saturdays, Sundays and public holidays or 7 am based on the normal working hours Saturday schedule (see Table 4.1). Any works during these times that are audible in a residence are not allowed.

What is inaudibility?

Inaudibility is the quality of not being perceptible by ear (i.e., cannot be heard) and cannot be measured in decibels (dB). The requirement for inaudibility relates primarily to adequate scheduling of works.

Adequate scheduling would mean, for example, undertaking noisy activities at less sensitive hours, and inherently quiet activities that would be inaudible to people, in the night period.

Inaudibility *is not* meant to be a measurable criterion in dB. It does not only relate to the intensity of the noise, but also to its frequency spectrum, its character and it varies with time.

To predict construction noise, a reference level set at the background noise level (L_{A90} representative of the background at the time of impact) +0 dB could be used as a suitable reference level to assess the risk of audible noise occurring. Where this approach is used, apply adjustments to consider the potential character of the noise that increases its impacts (e.g., tonality, impulsiveness).

You should not use this approach for compliance purposes, but only to inform risk assessment regarding the scheduling of works.

4.4.1. Scheduling works outside normal working hours

Weekend and evening periods are important for community rest and recreation. They provide respite when noisy work has been conducted throughout the week. You should not usually schedule work during these times.

Apply similar controls to scheduling works for normal working hours (see

Table 4.1) and the additional controls below for works outside normal working hours.

Minimise noise from any weekend, evening or night-time activities onsite

Controls to help you achieve this objective

- Plan *quieter* unavoidable work activities outside normal working hours.
- Schedule noisy unavoidable work when it is less likely to affect residents' sleep and for shorter periods, wherever possible.
- Schedule respite periods if unavoidable work is near residents. Consult with residents who may be most affected about restricting the number of nights per week and/or per calendar month when you undertake works.
- Stockpile material from unavoidable work activities that occur outside normal hours in, for example, an acoustic enclosure. Also restrict load-out to occur during normal working hours.
- Train all workers regarding unavoidable work activities that occur outside normal working hours.

4.4.2. Community information and consultation outside normal working hours

You should effectively manage noise impacts and consult with affected community before you begin work outside of normal working hours. Follow the same engagement process for normal working hours plus the additional controls identified below for outside normal working hours activities.

Consult and inform residents and other people who may be affected by outside normal working hours noise

Controls to help you achieve this objective

- Manage expectations of the community by explaining:
  - what will happen, with as much detail as possible
  - why unavoidable works are required outside normal working hours
  - the timing and nature of works that may affect them and details of any changes to construction work schedules
  - the criteria for qualification for offsite mitigation such as respite offers, acoustic treatment or alternative accommodation.
- Notify residents early so they can make plans to cope with the noise.

4.5. Reducing noise impact offsite

You might still find that people are impacted by noise generated from your activities, even after you have implemented controls onsite to prevent this from happening. In this case, you will need to consider putting offsite mitigation controls in place.

Limit noise impact offsite

Controls to help you achieve this objective

- Provide respite offers that reflect the level of impact, for example, movie tickets.

- Offer alternative accommodation where there is sustained noise impact (such as ongoing sleep disturbance over many nights) or where residents may have underlying health conditions that could be adversely impacted.
- Relocate affected residents if noise levels cannot be reduced sufficiently for the agreed period of construction activity.

Unreasonable noise

See *Unreasonable noise guidelines* for further information on how to recognise potentially unreasonable noise. It also contains general information on how the duties under the Environment Protection framework relating to noise may be complied with.

Chapter 5. Erosion, sediment and dust

This chapter discusses controls to minimise:

- **soil erosion**
- **the generation and transport of sediment**
- **the generation and transport of dust.**

Civil construction, building and demolition activities and projects often involve land disturbance, including removing vegetation and reshaping topography resulting in soil erosion. Soil erosion produces sediment and dust, which can pose risks to human health and the environment if not properly managed.

Additional to your **general environmental duty** (ss.25–27), the EP Act includes these duties relevant to erosion, sediment and dust:

- duty to respond to harm (s.31)
- duty to notify of an incident (ss.32–33).

5.1. Background

5.1.1. Sediment and dust generated by erosion

Soil erosion is a natural process. Wind, rain and flowing water mobilises soil particles and transports them to a new location. Erosion caused by water can generate sediment, while erosion caused by wind can generate sediment and dust.

Human activities can exacerbate erosion, particularly if it is not managed appropriately.

See Erosion and sediment advice for businesses (EPA website).

5.1.2. Erosion, sediment and dust generation

Large amounts of sediment and dust can be generated from construction, building and demolition activities. When not managed appropriately, the generation of sediment and dust can impact the health and wellbeing of sensitive environments and receptors.

Activities that may lead to erosion and the generation of sediment and dust include:

- removal of vegetation onsite
- excavation, handling and stockpiling of soil
- movement of plant and equipment across exposed soil
- driving trucks and light vehicles on unsealed roads
- discharge of excess water
- uncovered stockpiles of soil and/or construction and demolition materials.
- Potential impacts of sediment and dust

The generation and transport of sediment and dust should be prevented, where possible, for the following reasons:

- Sediment washed into the stormwater system may enter waterways, reducing water quality and impacting aquatic plants and animals.
- Sediment and dust may contain contaminants (e.g., metal and pesticides), pathogens and pests that can impact aquatic and terrestrial ecosystems.
- If sediment migrates onto roads and footpaths it can increase the risk of vehicle accidents and pedestrian trips and slips.
- Dust may cause respiratory issues or eye irritation and infection in humans and animals, as well as nuisance and loss of amenity.
- Dust may also contain soil-bound contaminants, pathogens and pests that can impact sensitive receivers.
- Dust reduces visibility onsite and nearby, which may lead to other hazards.
- Dust may enter waterways resulting in sedimentation of waterways affecting the waterway health.
- Hazardous dusts (e.g., asbestos and crystalline silica) have the potential to cause or exacerbate a range of serious respiratory diseases such as asthma, asbestosis, chronic obstructive pulmonary disease and cancers of the respiratory system (e.g., mesothelioma and lung cancer).
- Termite management chemicals transported to wetlands and waterways can impact aquatic ecosystems.

5.2. Planning your project

You should consider the management of sediment and dust as part of your planning before you begin construction, building and demolition activities. It may be necessary to consider a sequence of multiple controls to manage sediment and dust. In most instances, the controls you implement to manage erosion and sediment will also likely help reduce dust impacts. Selected controls should be fit for purpose, installed correctly and maintained.

Prepare an erosion and sediment management plan, dust management plan or environmental management plan that addresses erosion, sediment and dust for your specific site before your activities begin. This helps you identify appropriate controls to take in managing the impacts (see Chapter 3 Managing your environmental risk and 0: Appendix 2 – Environmental management plan – structure outline).

If you choose to use a plan, it should be prepared by a suitably qualified person and be reviewed and updated to reflect the changes at your site.

See *Site planning and management* (EPA publication 1884) for more information on undertaking site planning and management to eliminate or reduce the risk of harm to human health and the environment posed by your site activities.

See Work with an environmental consultant (EPA website) for general information about how to engage a consultant.

5.2.1. Factors to consider

The following factors may help you understand erosion, sediment and dust generation and should be considered when planning:

- the scale and nature of your activities
- topography of land and sloped areas with higher erosion potential
- structural stability of soil (some soil types are structurally unstable and more prone to erosion, and can collapse in water and lead to sedimentation of waterways)
- sediment suspension in water (coarse sediment such as sand readily settles in water and is easy to remove, whereas fine sediment such as clay generally remains suspended in water, making it more difficult to remove)
- existing vegetation cover and the ability of vegetation to protect against soil erosion and sediment transport
- rainfall that may increase erosion and sediment transport
- wind that may increase erosion and sediment and dust transport
- the sources and characteristics of dust and sediment from your site activities
- high vehicle traffic and entry/exit points
- presence of sodic and dispersive soils can pose exacerbated erosion and sedimentation risks.

To understand the consequence of your activities it is important to identify and understand the nearby sensitive receivers.

See Bureau of Meteorology for information on rainfall intensity frequency duration, rainfall data and weather forecasts (short and long term). These can be helpful when scheduling your works.

5.2.2. Working within or adjacent to waterways

Works within or adjacent to a waterway or floodplain are challenging. There is the potential to create significant impacts to aquatic/riparian flora and fauna if not managed effectively. Consider all possible options to avoid works within, or adjacent to, a natural waterway or floodplain at the design stage.

Approvals and permits may be required by the relevant authority prior to undertaking works that:

- are in, or adjacent to, a waterway or floodplain
- result in disturbance or removal of riparian and aquatic vegetation
- include construction of permanent instream barriers
- require temporary instream barriers
- require instream sediment control measures.

For more information on how you can manage construction, building and demolition works within or near waterways, see Chapter 5 Erosion, sediment and dust 0Guidance Sheet 1: Working within or adjacent to waterways.

5.3. Managing erosion, sediment and dust

5.3.1. Minimising soil erosion

It is important to minimise soil erosion during construction activities, as soil erosion produces sediment and dust. When you consider controls for erosion, it is essential you understand the way water flows across your site and the types of soil and vegetation present onsite.

Limit soil erosion from disturbed or unstable soil

Controls to help you achieve this objective

- Minimise clearance of vegetation and retain existing vegetation wherever possible, particularly along drainage lines and waterways, steep slopes and areas with unstable soils.
- Schedule ground disturbance activities, for example vegetation clearance and earthworks to periods of lower rainfall intensity and lower than average rainfall.
- Plan sites to minimise disturbance of sodic and dispersive soils where possible.
- Manage earthworks to minimise volume and duration of stockpiled material, ensure stockpiles are located away from receptors such as waterways and drains, control transport of sediments by including bunding downslope of stockpiles.
- Erect temporary fencing around vegetation to be retained prior to works commencing.
- Stabilise exposed soil where applicable with the appropriate structural materials and media for your project or activities (e.g., stabilisation matting, rock armour, vegetation or chemical amendment such as gypsum for sodic soils), with additional reinforcement to stabilise the base of a slope or embankment.
- Manage vehicle movement to designated roads and access areas.
- Irrigate vegetation and grass, including retained vegetation and revegetated areas, particularly during drier months.
- Reinstate vegetation as soon as works in an area have finished (staged reinstatement). Maintain erosion controls until vegetation is considered to be established.
- Conduct post-installation maintenance of established controls and assess control effectiveness at regular intervals during the time the established controls are in place.

Figure 5.1. Slope stabilisation controls (photo courtesy of Regional Roads Victoria).

5.3.2. Managing sediment

Stormwater has the potential to enter waterways, potentially impacting the health of sensitive receptors and aquatic ecosystems.

Diverting stormwater away from exposed soil onsite helps to minimise erosion and reduce sediment and other pollutants reaching stormwater drains and waterways.

This section outlines controls to:

- manage the flow of stormwater onsite
- minimise sediment in stormwater flowing offsite.

Prevent sediment entering stormwater drains and waterways

Controls to help you achieve this objective

- Divert clean stormwater around the site, where possible.
- Avoid works during times of the year when aquatic animals are likely to be under pressure, particularly during migration or spawning.
- Install sediment fences around stockpiles to contain coarse soil and sediment (see Chapter 5 Erosion, sediment and dust 0Guidance Sheet 2: Managing stockpiles).
- Minimise access by vehicles and people near waterways, restricting access to essential works only
- Manage truck and vehicle movements to limit the generation of sediment (see Chapter 5: Erosion, sediment and dust 0Guidance Sheet 3: Managing truck and other vehicle movement).

- Direct the flow of turbid stormwater within a constructed lined channel or sediment basin where applicable to reduce the velocity of run-off water and encourage settling of coarse solids.
- Install primary, secondary and tertiary treatment control measures based on the site-specific hazards and level of risk in your project or activities. Confirm that your controls are designed and installed to adequately capture sediment loads from your activities. A sequence of controls, commonly referred to as a 'treatment train', may be needed if pollutants such as nutrients and fine sediment are encountered.

  - **Primary treatment controls** include physical screening of sediment in grassed swales, sediment basins, portable sedimentation tank and litter traps.
  - **Secondary treatment controls** consist of fine particle sedimentation and filtration in swales, infiltration trenches, filter bags, and porous paving.
  - **Tertiary treatment controls** include removal of nutrients and dissolved heavy metals in wetlands and bio-retention systems.

Figure 5.2. Portable sedimentation tank (photo courtesy of McConnell Dowell).

- Reduce the amount of sediment entering the stormwater pits and kerb inlets using screens, filter traps and silt socks (see Figure 5.2).
- Contain and remove concrete slurry from run-off in a suitable area and prevent it from entering stormwater networks and waterways.
- Monitor surface water quality regularly upstream and downstream from the works area to confirm effectiveness of established controls and where additional controls may be required.
- Treat and remove sediment from dewatering activities prior to discharge. Consider using primary, secondary and tertiary treatment controls for treatment.
- Conduct post-installation maintenance of established controls and assess control effectiveness at regular intervals while the established controls are in place.

- Remove accumulated sediment from your controls as required and manage in accordance with Chapter 6 Contaminated land and groundwater (note that surface run-off resulting in contamination of waterways is also discussed in this chapter).

See International Erosion Control Association – Australasia for information and resources on erosion and sediment control, and their influences on air, land and water quality.

The Best Practice Erosion and Sediment Control document provides comprehensive erosion, sediment and dust management practices.

Figure 5.3. Silt sock in use to prevent sediment entering drain inlets (photo courtesy of McConnell Dowell).

Figure 5.4. Installed sediment basin (photo courtesy of McConnell Dowell).

5.3.3. Managing dust

A significant issue for civil construction, building and demolition activities is dust management. Consider how dust can be generated by understanding likely sources and characteristics. You should understand the proximity of sensitive receivers that may be impacted by dust.

Dust from your activities can result from exposed soil, uncovered stockpiles, vehicle movement and demolition activity. It can be particularly problematic during the drier summer months because high temperatures, strong winds and dry soil cause dust to become airborne.

Dust can impact human and animal respiratory and cardiovascular health and ecosystem health. It can contain soil-bound contaminants that may impact sensitive receivers. In addition, dust can cause nuisance and amenity issues. You should minimise dust as much as possible where nearby sensitive receivers are present.

Minimise the generation and transport of dust

Controls to help you achieve this objective

- Install sealed ground surfaces or use stabilised materials in high traffic areas.
- Schedule dust generating activities by avoiding adverse weather conditions, such as during hot and dry periods, high winds, and days with poor air quality.
- Manage stockpiles in a way that minimises dust generation (see Chapter 5 Erosion, sediment and dust 0Guidance Sheet 2: Managing stockpiles).
- Manage truck and vehicle movements to limit dust generation (see Chapter 5: Erosion, sediment and dust 0Guidance Sheet 3: Managing truck and other vehicle movement).
- Minimise dust generation at sources by considering appropriate physical and engineering controls for the situation and work activities.
- Suppress dust during concrete cutting and construction and demolition activities.
- Install shade cloth as a wind break to slow down winds and minimise wind carried dust.
- Suppress dust from construction activities such as rock breaking and drilling where appropriate with on-tool dust extraction and enclosure of activities.
- Temporarily stop works if dust is visibly discharging or emitting nuisance airborne particles beyond site boundaries. Resume works only when effective controls can be implemented, or weather conditions and air quality improve.
- Monitor air quality for dust (PM_{10}, particles with a diameter of 10 micrometres or smaller) with use of ambient dust monitoring equipment located onsite and offsite in the surrounding community to assist with identifying the effectiveness of implemented dust controls.
- Conduct post-installation maintenance of established controls (including dust monitoring equipment) and assess control effectiveness at regular intervals.

Figure 5.5. Dust suppression using water spray during demolition works (photo courtesy of Kane Constructions).

Hazardous dust

See WorkSafe Victoria for more detail on hazardous dust, including:

- Safe concrete cutting and drilling
- Compliance code: Demolition
- Asbestos safety basics
- Crystalline silica: Safety basics

Chapter 6. Contaminated land and groundwater

This chapter outlines general information and controls to manage:

- **the identification and presence of existing contaminated land and groundwater**
- **potentially contaminated stormwater**
- **potentially contaminated groundwater during dewatering.**

Civil construction, building and demolition projects or activities often encounter contaminated land and groundwater. This can occur at any point during a project. Contaminated land and groundwater can cause harm to human health and the environment if not properly managed.

Understanding contaminated land and groundwater issues is complex and may require the services of a suitably qualified person. You will need to decide who is suitably qualified to do this.

See Work with an environmental consultant (EPA website) for general information about how to engage a consultant.

Additional to your **general environmental duty** (ss.25–27), the EP Act has duties relevant to contaminated land and groundwater:

- duty to manage contaminated land, including groundwater (s.39)
- duty to notify the EPA of contaminated land, including groundwater (s.40).

The controls in this chapter will support your duty to manage. This duty means you must minimise the risk of harm to human health and the environment from the contamination so far as reasonably practicable.

Information about how to identify and assess contaminated land will support your duty to notify. This duty means you must notify EPA as soon as possible if the land you manage has become contaminated with certain wastes or chemical substances.

See Manage contaminated land (EPA website) for more information about your duties.

Contaminated Land

See *Guide to the duty to manage contaminated land* (EPA publication 1977.1) for more information on identifying, assessing and managing risks from contamination.

See *Guide to the duty to notify of contaminated land* (EPA publication 2008.2) for more information on notifying EPA of contaminated land.

6.1. Background

6.1.1. Causes of contaminated land and groundwater

Land and groundwater can become contaminated by sources such as waste and chemical substances. These can cause a change in the land's characteristics and pose a risk to human health and the environment.

Contamination is typically present as a result of past or current industrial, agricultural or commercial activities that involve the handling, storage and/or movement of liquids, chemicals and/or wastes.

Sometimes contamination can spread from the site where the contaminating activity occurred and impact adjacent properties. This typically occurs via:

- contaminated soil blowing off a site as dust
- contaminated surface water run-off
- infiltration of surface contaminants to groundwater
- contaminated groundwater flowing offsite.

6.1.2. When does contaminated land and groundwater pose a risk of harm?

A conceptual site model (CSM) is a useful tool that can help you evaluate harm to human health and the environment. A CSM is a visual representation showing:

- **source** of contamination
- **pathways** through which it could spread
- **receptors** it could impact. Receptors include humans and the environment (e.g., animals, vegetation and waterways).

A source, pathway and receptor must be present for contamination to cause harm.

Figure 6.1. Conceptual site model.

The CSM above illustrates six potential pathways that can expose people to contamination, demonstrated as 'exposure points':

- **Exposure point 1: Direct contact** – e.g., a site worker is in direct contact via skin (dermal) with contaminated soil.
- **Exposure point 2: Inhalation** – e.g., site workers or a member of the public might inhale vapours or contaminated dust. Inhalation exposure can also be from vapours that have migrated indoors (vapour intrusion).
- **Exposure point 3: Ingestion** – e.g., some of the chemical may percolate down through the soil, dissolve into groundwater and flow offsite. Contaminated groundwater may be extracted from a bore used for drinking water and ingested by a member of the public or animals. Soil can also be ingested by children and by others when unwashed vegetables are eaten. Vegetables can also absorb contaminants through the soil.

6.2. Planning your project

6.2.1. Identifying potential land and groundwater contamination

Identifying potential land and groundwater contamination before starting your activities is important to ensure contamination is appropriately managed during works. This will reduce impacts on human health and the environment.

Knowing the current and past activities of your site and of nearby properties can provide an indication of potential contamination and related infrastructure that exists onsite. You can identify these activities via a desktop study, for example, by:

- searching relevant databases, websites and other sources of information about a site
- requesting information from relevant authorities.

- Landata provides historical aerial photos
- The planning department of the relevant council
- VicPlan for planning information
- Dial Before You Dig referral service
- Victorian Landfill Register
- EPA Victoria's Public Register
- Victoria Unearthed – brings together site information from sources including:
- Sands and McDougall business directories, also available from the State Library of Victoria
- EPA Priority Sites Register
- EPA groundwater quality restricted use zone
- EPA licensed sites
- Environmental audits
- Environmental Audit Overlay

The desktop study can inform a preliminary site investigation. This aims to identify potential contamination based on existing infrastructure and visual and olfactory signs of contamination being present (see Table 6.1). It can be completed as part of your planning activities. The desktop study and preliminary site investigation are commonly referred to as a Phase 1 assessment.

Depending on the actual or potential contamination identified, a detailed site investigation, commonly referred to as a Phase 2 assessment, may be required. This involves undertaking sampling for laboratory analysis to identify the nature and extent of contamination. This should be undertaken by a suitably qualified person (see Work with an environmental consultant, EPA website).

Table 6.1. Indicators of potential contamination (note: this is not an exhaustive list).

Indicators of potential contamination	
Infrastructure indicative of potentially contaminating activities	Aboveground storage tanks
	Evidence underground storage tanks might be onsite: fuel bowsers or tank dip/fill/vent points
	Old drums / chemical storage
	Triple interceptor traps
	Vehicle hoists
	Electrical transformers
	Livestock dips
	Dilapidated buildings which contain asbestos
	Treated pine, which may contain arsenic
	Pit lids
Visual/olfactory signs of potential contamination	Areas of scalded/bare earth
	Soil that appears different to naturally occurring soil (evidence of imported fill)
	Staining or unusual colour on soil
	Unusual colours, oil or a 'sheen' on surface water, including areas of pooling
	Odours (e.g., resembling petrol, solvents, decomposing rubbish or 'rotten egg')
	Piles of soil and partially excavated areas
	Ash and cinders, rubbish or demolition rubble in soil
	Fragments of suspected asbestos-containing materials such as fibre cement sheeting
	Dead or stressed vegetation

The purpose of assessing potentially contaminated land and groundwater is to determine:

- if an environmental audit is required based on the potential for land or groundwater to be contaminated and the proposed use, taking past land uses into consideration
- if land or groundwater is contaminated and the extent of the contamination
- if the land or groundwater is contaminated, can the contamination be managed, or is remediation required to make it suitable for the current or future land use?

See *Potentially contaminated land – A guide for business* (EPA publication 2010) for more information on identifying and managing risks from contamination.

Contaminated land and groundwater should be assessed in accordance with guidance produced by the National Environment Protection Council. Your proposal may require specific forms of assessment when obtaining approval under the *Planning and Environment Act 1987*. Planning Practice Note 30 – Potentially Contaminated Land (DELWP 2021) provides further advice on the recommended approach to assessing potentially contaminated land for land use planning proposals.

Schedule B2 of the National Environment Protection (Assessment of Site Contamination) Measure 1999 (amended 2013) details the recommended staged approach to assessing contaminated land.

6.2.2. Managing commonly encountered issues - asbestos and acid sulfate soils

Information is provided in Table 6.2 for two commonly encountered contaminants: asbestos in soil and acid sulfate soils. Other commonly occurring contaminants are listed in section 8.3.

Table 6.2. Ways of managing asbestos and acid sulfate soils.

Asbestos in soil	Acid sulfate soils
Asbestos was historically used in numerous products, including fibre cement pipes, fibre cement sheeting, vinyl tiles, brake linings and pipe lagging. Asbestos is often encountered on the soil surface or within fill during civil construction, building and demolition projects. Asbestos poses a risk of harm to human health if asbestos fibres are inhaled into the lungs.	Acid sulfate soils are naturally occurring. When acid sulfate soils are disturbed and exposed to air and water, sulfuric acid is produced. Sulfuric acid corrodes steel and concrete structures and, if it is washed into waterways, negatively impacts aquatic plants and animals.
Managing asbestos in soil If asbestos is suspected or identified in soils onsite, seek advice from a suitably qualified person. For advice on this, see Work with an environmental consultant (EPA website).	**Managing acid sulfate soils** Undertake a desktop assessment of the likelihood of encountering acid sulfate soils, in accordance with Acid sulfate soil and rock (EPA publication 655). If the desktop assessment indicates the likely presence of acid sulfate soils, seek advice from a certified professional soil scientist or a suitably qualified person. Manage acid sulfate soils in accordance with advice from the soil scientist or consultant.
See Waste 0Guidance Sheet 7: Hazardous waste for disposal of soil containing asbestos.	See Waste 0Guidance Sheet 7: Hazardous waste for disposal of acid sulfate soils.

6.2.3. Considerations if dewatering groundwater

Dewatering contaminated groundwater can pose risks to human health and the environment. As a result of dewatering, contaminated groundwater that is present on a site has the potential to spread. It can also draw contaminated groundwater from surrounding areas onto the site.

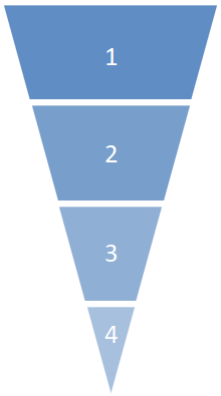
If groundwater dewatering is proposed, use the resources in the box below to conduct a desktop risk assessment of the potential for groundwater contamination onsite and nearby properties. If you suspect groundwater is contaminated, seek advice from a suitably qualified person to ensure these risks are understood and properly managed.

- Refer to About groundwater (EPA website) for further information on groundwater contamination.
- Refer to Environmental audit system (EPA website) for further information on environmental audits and preliminary risk screen assessments.
- Refer to Victoria Unearthed for further information on contamination in Victoria and historical business listings.

6.2.4. Remediation of contaminated land and groundwater

If you need to remediate contaminated land and groundwater, your remediation strategy should reflect the order of preference below. This is also consistent with the waste hierarchy (see section 8.2.1).

Most preferred



Least preferred

1. Ongoing management requirements must be appropriate if onsite management of contaminated land and groundwater is proposed. They should be within the context of current and future land use and done in accordance with an appropriate EPA permission.
2. Contaminated land and groundwater should be remediated and reused onsite rather than reused offsite.
3. Contaminated land and groundwater should be remediated so it is suitable for reuse offsite, without the need for ongoing management.
4. Sending contaminated soil to landfill is the least preferred option.

You can save significant costs if you don't have to engage someone to transport and deposit your waste at a place lawfully able to accept it, and can instead remediate contaminated land and groundwater to reuse onsite.

See Chapter 8 Waste for more information about managing waste onsite.

Remediation technologies

Several soil remediation technologies are available in Victoria. See:

- *Industrial waste resource guidelines – soil remediation technologies in Victoria* (EPA publication IWRG 622)
- *Thermal treatment technologies* (EPA publication 1402)

6.2.5. Removal of contaminated materials

Contaminated materials, including soil and groundwater, need to be taken to a place that is lawfully able to receive it.

6.2.6. Environmental Audit Overlay

The Environmental Audit Overlay (EAO) is a planning tool under the Victorian Planning Provisions that councils and other planning authorities apply. The presence of an EAO means a determination has already been made that land is potentially contaminated, and that a process under the environmental

audit system will be required before the land is used or developed for a sensitive use such as a secondary school or children's playground.

By applying the overlay, the planning authority allows the rezoning of land to occur, with a process under the environmental audit system deferred to occur at a later date. It may restrict some buildings and works from occurring until the requirements of the EAO have been met.

6.2.7. Environmental audits

Under Victoria's environment protection laws, the environmental audit system includes:

1. Preliminary risk screen assessments (PRSA).
2. Environmental audits.

The purpose of the PRSA is to assess the likelihood of the presence of contaminated land and determine whether an environmental audit is required. PRS and environmental audits must be completed by EPA-appointed environmental auditors.

Environmental auditing and auditors

EPA's website has further information about:

- Environmental auditing
- Environmental auditors

6.3. Managing contaminated soil

Contaminated soil may pose a risk to human health or the environment if it:

- becomes airborne as dust
- creates contaminated run-off which could seep into groundwater or is washed into waterways as sediment
- creates offensive odours
- is mixed with uncontaminated soil that is intended for other uses.

Excavate and handle contaminated soils to prevent harm to human health and the environment

Controls to help you achieve this objective

- Avoid exposing or excavating contaminated soil until it is necessary to do so. Stockpile contaminated soil separately to clean soil.
- Implement the controls in Chapter 5 Erosion, sediment and dust 0Guidance Sheet 2: Managing stockpiles when stockpiling contaminated soil to prevent:
  - contaminants from vapourising
  - stockpile erosion from wind and water
  - generation of dust and sediment
  - contaminated run-off.

- Erect temporary fencing and signage around contaminated soil to prevent site workers from unnecessary contact with contaminated soil.
- Consider using odour covers such as tarps for soils generating offensive odours (see odour guidance, EPA website).
- Arrange for analysis of contaminated soil to identify contaminants of potential concern in accordance with EPA Industrial Waste Resource Guidelines (see below). Analysis will determine to what extent soil is contaminated and inform decisions about management, treatment or reuse onsite. A suitably qualified person can advise on identification, sampling and analysis of contaminants of potential concern.
- Seek advice from a suitably qualified person on the most suitable way to manage contaminated soil (e.g., containment, treatment or disposal). The consultant may prepare a soil management plan to include in the environmental management plan (see Chapter 3 Managing your environmental risk and 0: Appendix 2 – Environmental management plan – structure outline).
- Manage contaminated soil in accordance with the consultant's advice and the waste hierarchy.
- See section 8.6 for information on removing contaminated soil offsite.

See EPA Industrial Waste Resource Guidelines:

- *Soil sampling* (EPA publication IWRG 702)
- Guide to classifying industrial waste (EPA publication 1968.1)

6.4. Managing potentially contaminated stormwater

Stormwater that encounters contaminated soil may become contaminated and pose risks to human health and the environment, particularly waterways.

Limit the generation and disposal of contaminated stormwater to prevent harm to human health and the environment

Controls to help you achieve this objective

- Avoid generating contaminated stormwater by diverting stormwater away from areas of exposed contaminated soil. Implement the controls in section 5.3.2.
- Capture potentially contaminated stormwater in a sediment basin or portable sedimentation tank and prevent it from leaving site.
- Erect temporary fencing and signage around areas where potentially contaminated stormwater is stored to prevent site workers from unnecessary contact with water.
- Implement odour control measures, such as use of tarps and containers, for contaminated stormwater that generates offensive odours (see odour guidance, EPA website).
- Arrange for potentially contaminated stormwater to be analysed for the chemicals or substances known to contaminate the site. Analysis will determine to what extent stormwater is contaminated and inform decisions about management, treatment or reuse onsite.
- Seek advice from a suitably qualified person on the most suitable way to manage contaminated stormwater.
- Manage contaminated stormwater in accordance with the consultant's advice and the waste hierarchy (see Chapter 8 Waste).

See EPA Industrial Waste Resource Guidelines for further detail on *Sampling and analysis of waters, wastewaters, soils and wastes* (EPA publication IWRG 701).

6.5. Managing contaminated groundwater during dewatering

If not managed appropriately, dewatering contaminated groundwater, as part of dewatering activities, poses potential risks of harm to human health and the environment. This is described in section **Error! Reference source not found.**.

Manage pumping of contaminated groundwater to prevent harm to human health and the environment

Controls to help you achieve this objective

- Avoid extracting contaminated groundwater wherever possible.
- If volatile and combustible chemicals are present in groundwater, monitor air quality during dewatering to ensure a safe atmosphere is maintained.
- Use suitable storage vessels when dewatering.
- Erect temporary fencing and signage around the dewatering pumps and the water storage vessel to prevent site workers from unnecessary contact with contaminated water.
- Arrange for groundwater to be analysed. An analysis will determine to what extent groundwater is contaminated and inform decisions about management, treatment or reuse onsite.
- Seek advice from a suitably qualified person on the most suitable way to manage contaminated groundwater.
- Manage contaminated groundwater in accordance with the consultant's advice and the waste hierarchy (see section 8.2.1).

See section 5.3.2 on managing dewatering activities onsite to help prevent sediment from entering waterways.

6.6. Managing unexpected contamination or contamination 'hot spots'

You can sometimes still discover unexpected contamination during civil construction, building and demolition activities after an environmental assessment has been conducted.

Unexpected contamination can originate from, for example:

- buried drums or underground storage tanks
- buried rubbish
- ash and cinders
- fragments of asbestos-containing material in soil.

Manage unexpected contamination to prevent harm to human health and the environment

Controls to help you achieve this objective

Develop a procedure to implement onsite should you encounter unexpected contamination. Your procedure should cover the following:

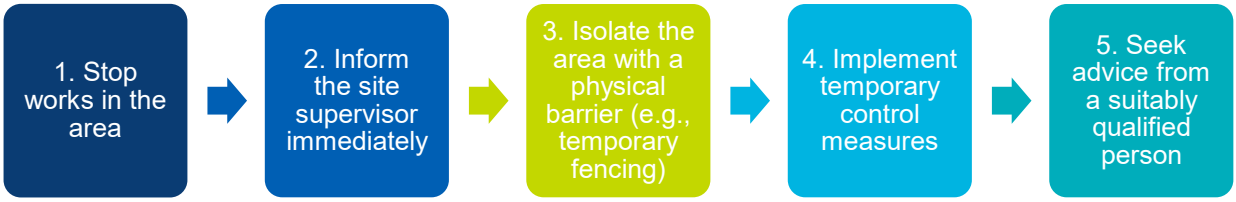


Figure 6.2. Steps to include in your procedure for unexpected contamination.

6.7. Collection and removal of contaminated material

Contaminated material, including soil and water, needs to be taken to a place that is lawfully able to receive it. See section 8.6 for information on waste collection and removal.

Chapter 7. Chemicals

This chapter outlines controls to minimise the risks associated with chemical storage and handling, spill response and cleanup, and storage and handling of volatile liquids.

Chemicals are often used in civil construction, building and demolition activities and projects. It is the responsibility of site managers to ensure that chemicals used onsite are stored and handled appropriately to reduce the risks of spills and leaks and potential impacts to human health and the environment.

Additional to your **general environmental duty** (ss.25–27), the EP Act has duties relevant to your storage and handling of chemicals:

- duty to respond to harm (s.31)
- duty to notify of an incident (ss.32–33).

7.1. Background

Civil construction, building and demolition sites commonly use chemicals, such as

- curing compounds
- sealers
- paints
- paint thinners
- fuel
- flocculant
- coagulants
- waterproofing chemicals
- water repellents
- adhesives
- primers
- cleaning agents
- hot tar
- pesticides including termite control chemicals.

Poor chemical management can impact human health and the environment in many ways, including:

- contamination of land, ground and surface waters
- loss of plant and animal life
- emission of odour and toxic vapours
- direct exposure to hazardous chemicals, resulting in skin irritation, respiratory distress, injury and illness.
- excessive nutrients in waterbodies (the addition of some chemicals can cause eutrophication)
- combustion and fire risk.

Use of pesticides in termite management

See Guidance sheet 4: Termite pesticide for more information on identifying, assessing and managing risks from termite pesticides.

7.2. Planning your project

It is important to plan for onsite chemical management as part of your project planning before starting your activities. Chemical management includes storage, handling, waste removal and spills response.

When planning your activities or project, you should consider:

- the types, characteristics and volumes of chemicals you require
- how chemicals will be managed, including storage and spill response procedures
- collection and removal options for chemical waste (see Chapter 8 Waste).

Identifying and assessing the risks associated with onsite chemical storage and handling will help you determine the appropriate management controls for chemicals onsite (see Chapter 3 Managing your environmental risk).

See *Site planning and management* (EPA publication 1884) for more information on undertaking site planning and management to eliminate or reduce the risk of harm to human health and the environment posed by your site activities.

See Work with an environmental consultant (EPA website) for general information about how to engage a consultant.

7.3. Chemical storage and handling

Inappropriate chemical storage and handling could result in spills and leaks, potentially contaminating air, land and waterways, and causing harm to human health and the environment.

Prevent spills and leaks of chemicals from onsite storage and handling practices

Controls to help you achieve this objective

Follow good management practices by:

- storing chemicals in a dedicated, well-ventilated storage area (see Figure 7.1)
- clearly labelling all containers
- implementing systems to ensure incompatible materials are not stored or handled together, as identified by Safety Data Sheets (SDS) (formerly referred to as Material Safety Data Sheets or MSDS)
- maintaining an inventory that lists all chemicals stored onsite, the quantities and their locations
- not storing chemicals in empty food and drink containers
- ensuring lids are secured on containers
- monitoring and maintaining primary containment systems (e.g., storage containers, tanks and pipes).

When selecting a storage site:

- avoid locations:
  - next to stormwater inlets, drainage lines, waterways, and sensitive receivers such as vegetation and animal habitat
  - without secondary containment systems (e.g., bunding)
  - with potential for direct water pollution or land contamination (e.g., in or on structures that are built over water such as boat sheds, jetties, pontoons)
  - on bare ground or unsealed surfaces.

- choose locations:
  - at least 10 m away from sensitive receivers (e.g., waterways, vegetation or animal habitats)
  - with sealed surfaces
  - with suitably designed and maintained secondary containment and covered roofing to exclude rainwater contact.
  - Check if there are additional requirements for storing and handling specific chemicals.

Figure 7.1. Incorrect chemical storage onsite.

Handle and dispose of chemicals appropriately by:

- using the appropriate personal protective equipment (PPE) for worker safety
- keeping current SDS of the chemicals in a location accessible to all staff and emergency services and informing workers of their availability and location
- purchasing smaller quantities and safer chemicals (e.g., granular products instead of dusty powders, water-based products, more dilute chemicals)
- minimising spills and splashes by using safe pouring or decanting techniques e.g., fitting drip collectors to containers with taps, and decanting over a collection tray
- for mobile bowsers onsite, ensuring that the bowsers have a valve or a tap that either closes off automatically or is lockable to prevent leaks
- disposing of any unused chemicals in an appropriate manner (contact your local council, local landfill, chemical waste disposal company or EPA Victoria for specific advice).

Implement secondary containment to contain leaks or spills from the primary container, or if transfer mechanisms fail.

Secondary containment can include:

- bunds – raised impermeable barriers forming the perimeter of secondary containment areas (e.g., walls, speed humps, guttering, curbing, flexible rubber barriers constructed with robust, impermeable, UV and chemical resistant material or lined with such material)
- encasement – storage containers with built-in (integral) secondary containment (e.g., encasing plastic pipes that carry liquid within a larger pipe which drains to a collection sump, placing drums inside larger, sealed plastic drums during transport by forklift)
- grading of sealed surface areas to form a contained area, either as part of a building or an external structure.

Establish and maintain a designated refuelling/maintenance area, and consider:

- establishing plant storage and refuelling areas in a location where they will not need to be relocated during the construction activities
- locating plant storage and refuelling areas at least 10 m away from drains, waterways and other sensitive receivers, in an area where there is minimal risk of collision with vehicles or equipment
- minimising the quantities of oil and fuel onsite
- using and storing fuel storage containers and equipment (e.g., buckets, funnels, smaller containers) within secondary containment – a bunded area on an impervious surface (see Figure 7.2)
- regularly maintaining the pipes, valves and shut-off mechanisms used in the refuelling area
- locking fuel storage tanks when not in use to prevent unauthorised access and to reduce the risk of vandalism.
- keeping a spill kit within 10 m of the plant storage and refuelling areas (see section 7.4).

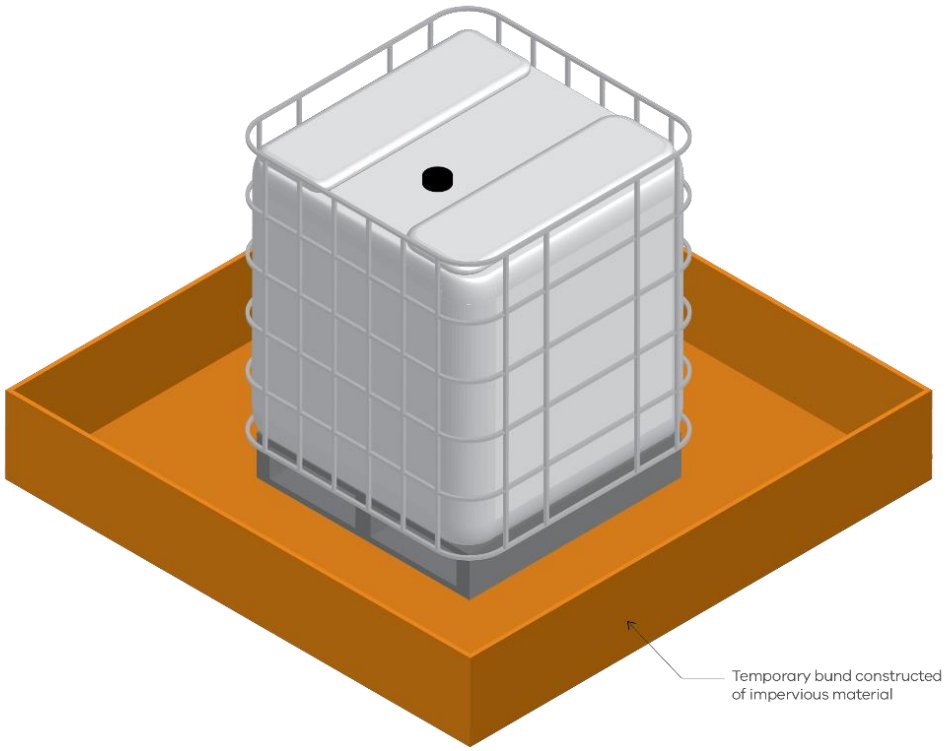


Figure 7.2. Bunded area with an impervious surface.

Secondary containment

See *Liquid storage and handling guidelines* (EPA publication 1698) and *Solid storage and handling guidelines* (EPA publication 1730) for more information.

This guidance includes design considerations such as calculating the volume required for a secondary containment area and material selection.

7.4. Spill response and cleanup

Appropriate spill response ensures that all spills are contained and do not spread around the site or beyond the site boundary, impacting the surrounding environment. Spill response includes containment, cleanup and disposal.

Promptly clean up and limit the spread of spills and leaks to prevent pollution

Controls to help you achieve this objective

- Ensure employees are trained in the use of spill response equipment.
- Clean up spills as soon as they occur.
- Maintain the following spill response equipment:
  - spill kits containing absorbent material appropriate to the type of chemical(s) being used onsite (see Figure 7.3)
  - an appropriate number of recovery drums/containers compatible with the chemicals which may be put in them
  - neutralisers for any acids/bases
  - equipment to block stormwater inlets
  - drains, booms
  - portable pumps, retention tanks
  - fire extinguishers
  - drain seals to cover drains in event of a spill occurring
  - safety equipment for the workers involved in cleanup activities.

Figure 7.3. Example of a spill kit contents.

- Maintain the following spill response infrastructure:
  - site containment systems e.g., absorbent socks
  - retention pits
  - rollover bund where chemicals are stored or handled, including the refuelling area.
- Locate spill response equipment and infrastructure in an accessible location.
- Locate spills kits within 10 m of the chemical storage area.
- Ensure the spill kit selected for the site is designed to treat the types of chemicals that are stored on that site.

Figure 7.4. Containment and cleanup of a spill.

Figure 7.5. Drain seal (left) and rollover bund (right).

Appropriately dispose of absorbent material and other materials (e.g., soil) that become contaminated through a spill or cleanup activity.

See Chapter 8 Waste for information on collection and removal of waste, including contaminated spill response material.

7.5. Storage and handling of volatile liquids

Paint, adhesives and fuel are examples of volatile liquids that cause odour and can pollute the air. You should know which of the chemicals you store, use or produce, could volatilise during normal operating or weather conditions.

Some of these chemicals may generate an odour which will help you detect a leak through vaporisation, while others may be odourless.

Prevent vaporisation of chemicals to minimise odours and air pollution

Controls to help you achieve this objective

- Eliminate the use of volatile organic compounds from your process or substitute with a less volatile alternative.
- Install vapour recovery equipment or other measures for minimising losses of volatile components to the surrounding air, such as the installation of after burners or carbon filters.
- Regularly maintain your ventilation and exhaust systems.
- Ensure solvents are collected by a licensed hazardous waste disposal contractor.
- Seal chemical containers and keep them in a well-ventilated storage area, away from direct sunlight and hot areas.
- Carry out any spray-painting activities using hazardous chemicals in well maintained spray booths, except when it is not possible (e.g., painting a building). Where a spray booth is not possible, use fans and natural fresh air, and a local exhaust ventilation system to capture solvent vapours.

- Keep an inventory of volatile liquids and refer to the SDS to ensure they are stored and handled appropriately.

Relevant Australian Standards

See Standards Australia and the Globally Harmonised System (GHS) for further chemical management guidance.

Standards are regularly reviewed by Standard Australia technical committees.

Chapter 8. Waste

This chapter discusses controls relating to:

- **minimising waste using the waste hierarchy**
- **managing different types of waste**
- **storing waste materials onsite**
- **waste collection, transport and disposal**
- **maintaining waste records**
- **reducing illegal dumping.**

Civil construction, building and demolition activities generate waste. If not managed appropriately, this waste may harm human health and the environment through contamination of soil, air, groundwater and surface waters.

Additional to your general environmental duty (ss.25–27), the EP Act has duties relating to:

- depositing, receiving and transporting waste
- investigating alternatives to waste disposal
- managing specific types of waste
- responding to harm (s.31)
- notification of an incident (ss.32–33)
- notification of contaminated land (s.40).

See Waste duties (EPA website) for more information.

What is waste?

Waste is unwanted or surplus material including any solid, liquid or gas, irrespective of its potential use or value.

See Part 2 of the EP Act for the full definition of waste.

See *Guide to classifying industrial waste* (EPA publication 1968.1) and *Waste classification assessment protocol* (EPA publication 1827.2) for more information on classifying waste.

Refer to the following for more information on different waste categories:

- Industrial waste
- Priority waste
- Reportable priority waste

You may also want engage an accredited consigner to help you with meeting your waste duties such as correctly classifying your waste and sending it to a lawful place.

8.1. Background

Waste generated from or encountered during civil construction, building and demolition activities can include:

- excavated material such as rock and soil
- waste asphalt, bricks, concrete, plasterboard, timber, vegetation
- asbestos, acid sulfate soils and contaminated soil
- litter
- chemical waste
- washdown and other contaminated waters.

When not managed appropriately, waste can:

- cause pollution to water, land and air
- adversely impact ecological systems
- pose a human health risk
- be visually unappealing.

8.2. Planning your project

You should consider the management and disposal of waste before you begin activities. As part of your planning, consider:

- the types, characteristics and volumes of waste you may generate
- how wastes may be managed, including storage onsite
- waste removal options, waste contractors (including waste transporters and receivers) and accredited waste consigners.

Preparing a waste management plan or environmental management plan that addresses waste management before your activities begin can help you identify appropriate controls to eliminate or reduce the risks of harm from waste, particularly if your site activities are complex (see Chapter 3 Managing your environmental risk and 0: Appendix 2 – Environmental management plan – structure outline).

The plan should be prepared by a suitably qualified person and be reviewed and updated to reflect any changes at your site.

See *Site planning and management* (EPA publication 1884) for more information on undertaking site planning and management to eliminate or reduce the risk of harm to human health and the environment posed by your site activities.

See Work with an environmental consultant (EPA website) for general information about how to engage a consultant.

Help to manage your waste

An accredited consigner is an approved professional appointed by EPA who has knowledge on how to lawfully manage specific types of waste and can help you manage your waste.

See Work with an environmental consultant (EPA website) for general information about how to engage a consultant to manage your waste.

8.2.1. Waste hierarchy

When planning, you should use the waste hierarchy to support your waste management decisions. The waste hierarchy (Figure 8.1) outlines an order of preference for managing waste, with avoidance being the most preferred option and disposal the least.

Figure 8.1. Waste hierarchy.

A waste minimisation assessment can identify opportunities for you to avoid, reuse and recycle waste. It can ultimately result in less waste being disposed and this can minimise costs to your project.

Incorporating the waste hierarchy into your site environmental management plan can help you stay on track with your efforts to minimise waste (see Chapter 3 Managing your environmental risk and 0: Appendix 2 – Environmental management plan – structure outline).

8.3. Waste types and management

Table 8.1 looks at common waste types generated from civil construction, building and demolition. You can then refer to the corresponding guidance sheet listed in the column on the right for information about controls you can put in place to manage your impact and reduce the risk from that waste type.

Prevent waste from polluting the environment

Table 8.1. Common waste types generated during civil construction, building and demolition activities.

Waste type:	Description:	For controls see:
Litter	Includes a variety of solid and putrescible wastes such as building material, general rubbish, packaging material, prunings and discarded food are often caused by lack of awareness of staff and unavailability of suitable bins.	Waste 0Guidance Sheet **5: Litter**
Surplus excavated material	Excavated material becomes surplus when it cannot be used by the project because of its physical, chemical or biochemical characteristics and location, and more material being available than is required.	Waste 0
Contaminated soil	Soil that is contaminated with chemicals, such as heavy metals and hydrocarbons, which includes pre-existing contamination at a site.	Chapter 6 Contaminated land and groundwater
Hazardous wastes	Wastes that have a known risk to human health and the environment, including asbestos, polychlorinated biphenyls, lead, and acid sulfate soils.	Waste 0
Masonry and other solid materials	Consists of building rubble, concrete, bricks, timber, plastic, glass, metals, bitumen, trees, and e-waste.	Waste 0
Drilling mud	The liquid or sludge residue generated during drilling or non-destructive hydro-excavation of soil or earth.	Waste 0
Historic buried waste	Unknown waste, including closed landfill or illegal dumping grounds, uncovered during excavation works on construction sites. It can contain masonry and other solid material waste, hazardous waste and putrescible waste.	Waste 0
Sewage	Sewage generated onsite from workers.	Waste 0
Wastewater	Water that has been 'used' or is 'surplus' water (i.e. cannot be used by the project).	Waste 0

8.4. Storing waste material onsite

You might need to temporarily store waste until you can send it offsite to a place that is lawfully able to receive it (e.g., a waste and resource recovery facility or landfill, for disposal) or until you can determine a location onsite for its reuse, treatment or containment.

Implementing the following general controls will assist you with storing waste on your site.

Controls to help you store waste material onsite

- Identify opportunities for reducing and reusing waste, following the waste hierarchy (see Figure 8.1).
- Identify appropriate locations for storing wastes onsite, depending on the type of waste (see the guidance sheets listed in Table 8.1 for further information on managing specific types of waste).
- Store incompatible wastes separately e.g., chlorine and benzene. Some wastes have the potential to react with another and create a fire risk.
- Store wastes in both primary and secondary containment areas, where possible, particularly hazardous wastes. See Chapter 7 Chemicals for information on primary and secondary containment.
- Prevent any liquid wastes (including dry wastes that become wet) leaching from skip bins or other waste storage containers – ensure there are no holes or damage. Consider using an impervious liner to prevent leaking.
- Implement controls in section 5.3.2 when managing surface run-off after rain events and section 0 for managing potentially contaminated stormwater.
- Implement the controls in Chapter 5: Erosion, sediment and dust 0Guidance Sheet 2: Managing stockpiles, when stockpiling waste materials.
- Where waste is generating offensive odours, identify and implement appropriate odour controls such as odour covers e.g., tarps over stockpiles to reduce odours emissions, or store waste in a container, where possible.
- Clearly label waste storage areas and containers to ensure accurate sorting and ease of collection by a particular service provider (for recycling, recovery or disposal).
- Determine the length of time the waste will be stored in that location, and whether the storage locations are appropriate for that length of time.
- Use tarps or lidded bins so waste cannot be blown or washed away.
- Place lids or covers on waste containers.
- Lock bins to prevent illegal use by unauthorised people.
- Ensure staff are trained in the management of waste onsite.

For containment and storage of specific types of waste commonly generated by civil construction, building and demolition activities, see the Waste guidance sheets referenced in Table 8.1.

8.5. Stockpiling

Stockpiling wastes may be appropriate depending on the type and characteristics of the waste (e.g., solidity, chemical composition and contamination levels), site location and weather conditions it may be exposed to. Stockpiles may be used to store waste temporarily for collection and transport to a site that is lawfully able to receive it.

See Chapter 5 Erosion, sediment and dust 0Guidance Sheet 2: Managing stockpiles, and guidance sheets referenced in Table 8.1 for information on stockpiling wastes and contaminated soils.

8.6. Waste collection and removal

Some wastes, particularly contaminated wastes, need to be collected and transported by an authorised contractor, such as one holding a relevant EPA permission, to help ensure it is taken to a site that is lawfully able to receive it.

Any person (including a waste generator, producer, transporter or receiver) who dumps or allows for waste to be taken to a place that cannot lawfully accept it faces heavy penalties if prosecuted. You may be required to pay cleanup costs as well as the cost of taking that waste to a lawful place.

Contact your local council or regional waste management group to find a site that is lawfully able to receive your industrial waste, such as a landfill, transfer station or recycling facility.

Implementing the following general controls may assist you to manage collection and removal of your waste.

Controls to help you manage collection and removal of waste

- Operate vehicles transporting waste material onsite in a manner to prevent loss of materials during loading, transport and unloading activities.
- For waste that cannot be reused or cannot be stored onsite, engage a waste transporter to collect this waste and transport it to a site that is lawfully able to receive it.
- For certain types of liquid and solid wastes classified as reportable priority waste, engage an authorised transporter to take the waste to a site that is lawfully able to receive it and use EPA's electronic Waste Tracker tool to inform EPA each time your waste changes hands.
- Record all your onsite and offsite waste (see section 8.7).
- Transport odorous waste in covered vehicles.
- Waste receipt dockets from a lawful place can demonstrate that waste from your site is going to the right place – ask the waste transporter for this.

8.7. Maintaining waste records

Recording and maintaining information about your waste and how it is managed can help you to demonstrate your waste management practices.

EPA may ask you at any time to supply information about your wastes. There are penalties if you supply false or misleading information.

It is recommended you keep a record of:

- location (include source location, and storage locations), type and quantity of wastes
- date and quantity of waste transported and received
- registration number of the waste transporter's vehicle
- waste receipt dockets from the lawful place to which waste was taken to
- waste assessment and categorisation reports, including sampling methodologies and plan, and laboratory analysis reports, for potentially harmful materials such as contaminated soil
- written procedures and plans for managing waste, including handling and storage procedures, and incident response plans

- development applications, including waste management plans or environmental management plans addressing waste
- site assessments including contaminated site assessments, and environmental and geotechnical studies.

Under the *Environment Protection Act 2017*, anyone who handles reportable priority waste must let EPA know every time it changes hands. Producers, accredited consigners, transporters, drivers and receivers of reportable priority waste must use Waste Tracker to complete transactions. Waste Tracker enables EPA to better monitor the movement of waste.

Leaving waste on private or public land that is not lawfully able to accept it is **illegal.** Illegal dumping is a crime.

As a waste generator, you are legally responsible for ensuring waste is taken to a facility that can lawfully receive it. Waste receipt dockets from an approved waste disposal facility are your only guarantee that waste from your site is going to the right place.

You cannot rely on the word of others. If a quote for managing waste is cheaper than expected, find out why. The waste transporter, sub-contractor or waste facility manager may be avoiding costs by illegally dumping the waste – and enforcement action may be taken against you.

Call EPA on 1300 372 842 (1300 EPA VIC) or your local council to report suspected illegal dumping.

See Report illegal waste disposal (EPA website) for more information.

Guidance sheets: Erosion, sediment and dust

These guidance sheets provide further detail on controls discussed in Chapter 5 Erosion, sediment and dust.

Contents

The controls in these guidance sheets are *examples or options only*.

You can implement other controls not covered in these sheets, so long as you can demonstrate you have eliminated or reduced the risk of harm to human health and the environment so far as reasonably practicable.

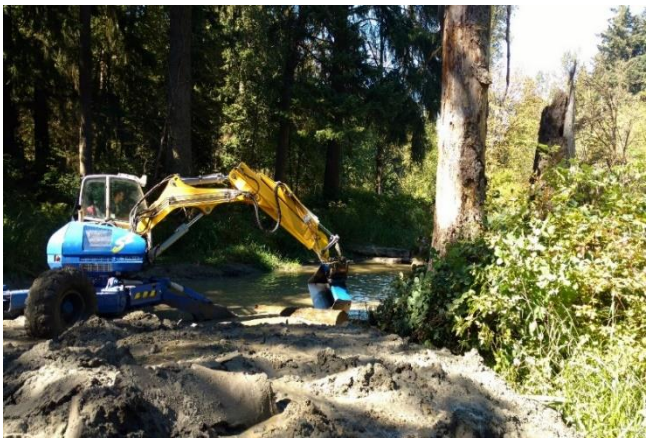
You may also need to seek additional or more tailored advice if your activities are not covered or are not adequately addressed in these guidance sheets.

The actions you take and the controls you decide to implement must comply with your general environmental duty (ss.25–27) and other duties under the EP Act.

See Chapter 2 Understanding your duties for more information.

Guidance Sheet 1: Working within or adjacent to waterways

Works within or near waterways arise when an activity changes the existing condition of a waterway or riparian area.



Works within a waterway can consist of:

- constructing a waterway crossing such as a bridge or culvert
- removing debris or material that is restricting waterway flow
- planting vegetation on embankments
- removing invasive vegetation
- rehabilitating wetlands.

Ensure you have obtained the appropriate permits from the relevant authority before conducting any works within a waterway.

Step one: identify hazards

Common hazards associated with works within a waterway include:

- increased erosion and sediment release into waterways and riparian areas
- increased waterway flow
- uncontrolled release of chemicals, hydrocarbons and waste by vehicles and construction equipment.

Step two: assess risks

To help assess the risk of generating environmental impacts from works within or adjacent to waterways, you can:

- consider the size, scale, and location of the proposed works
- understand the physical properties and soil characteristics of the waterway and riparian zone in the area of works
- assess the seasonal variations in waterway flow
- identify the impacts of construction techniques and methods for works within or near a waterway. Due to the size and scale of larger construction vehicles, unwanted erosion and sediment can be generated if construction equipment and vehicles are not managed appropriately
- understand the loading impacts of excavators, plant equipment and vehicles on soils and embankments
- identify entry and exit points and the limitations of access for construction works
- consider the chemical properties of lubricating oils used by excavators and plant equipment
- consider potential impacts to nearby sensitive receivers including aquatic ecosystems and riparian habitat.

Step three: implement controls

Consider implementing the following controls, appropriate for your activities, to limit the impacts to waterways and riparian areas at your site:

- Follow and comply with all permit and approval requirements obtained for your works.
- Minimise the duration of works within a waterway or floodplain.
- Schedule works to occur during drier months of the year and lowest flow of the waterway.
- Avoid works during times of the year when aquatic animals are likely to be under pressure, particularly during migration or spawning.
- Stabilise waterways to minimise erosion using non-invasive grass, vegetation, stabilisation matting or rock armour.
- Design and construct rock filter dams, modular sediment barriers, or silt curtains (see Figure 1) to assist in the reduction of sediment entering the waterway downstream.
- Minimise access by vehicles and people to the waterway, restricting access to essential works only and prevent access to unstable areas.
- Reduce the movement of sediment by encouraging deposition in specific areas of the waterways considering the size of the waterways using one or a combination of:
  - working on one bank
  - creating new channels/channel works
  - discharge pipes into creeks.
- Remove excavated material and debris from the project site or place it in a stable area above the high-water level of the waterway, or as far as possible from the waterway.
- Use bio-degradable lubricants and oils on excavators and plant equipment that work within or adjacent to waterways.
- Prevent livestock from accessing the waterway. If livestock are prevented from accessing a waterway, provide an alternative water supply.
- Monitor surface water quality regularly upstream and downstream from the works area. If monitoring shows a change in water quality, stop the works. Confirm if works are the cause of these changes, assess for any adverse impacts on aquatic ecosystem and modify work practices.
- Develop contingency measures for works within a waterway or floodplain. Your contingency measures should consider the consequences to the environment allowing for recurrence intervals of potential floods, and address:
  - methods to prevent water entering excavations
  - controls to be implemented when a storm event is forecast
  - measures to ensure that waterways and floodplains retain sufficient flood detention capacity to moderate peak water flows
  - a flood warning system
  - clean up procedures, including disposal of excess water
  - notification of relevant authorities if unplanned incidents occur that could pose a risk to the environment (see section 3.1.3).

- Plan reinstatement measures that may include:
  - proposed changes to the waterway including temporary short-term bypass pumping or temporary diversion channels
  - impacts to existing vegetation
  - erosion and sediment controls
  - proposed methods for reinstatement of the waterway bed and banks
  - a revegetation plan, including proposed species and locations, methods for weed control and ongoing maintenance until native species have established.

Figure 1. Engineered silt curtain installed to prevent migration of sediment for construction works within a waterway.

Step four: check controls

Monitoring controls you put in place can help you to ensure they operate effectively and as planned – and improved if they do not.

For the management of works within or adjacent to waterways, this could include:

- regularly monitoring the strength and effectiveness of waterway stability measures (non-invasive grass, vegetation, stabilisation matting or rock armour) and reinforcing the installed stability measures as required
- regularly monitoring the strength and effectiveness of rock filter dams, modular sediment barriers, and floating silt curtains and performing maintenance to the associated controls and reinforcing the infrastructure as required
- monitoring the variations in waterway flow throughout the project
- monitoring the operation and effectiveness of bypass pumping and diversion channels.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheet 2: Managing stockpiles

Sediment and dust can be generated from unmanaged stockpiles.

Stockpiles in civil construction, building and demolition activities can include:

- excavated soils
- structural soils and backfill material
- demolition and waste materials stockpiles.

Photo courtesy of Kane Constructions.

Step one: identify hazards

Uncontrolled release of dust and sediment into the environment from stockpiling soil, construction, building and demolition materials.

Step two: assess risks

To help assess the risk of sediment and dust transport from stockpiling, you can:

- identify key stockpiling areas on your site
- understand how sediment and dust on site can be transported offsite and into the environment
- consider nearby sensitive receivers.

Step three: implement controls

The controls below may assist you to manage your stockpiles to prevent potential adverse impacts to the environment.

- Design and designate an area for stockpiles before site works commence. Locate stockpiles away from residential areas, other sensitive receivers and in a location where they are protected from prevailing wind.
- Shape stockpiles, taking into consideration width to height ratio, nature of stockpiled material, location, access and available area for the stockpile.

- Limit stockpile heights based on stability, manageability, dust and amenity impacts. More gentle slopes may be required for unstable soils.
- Divert stormwater away from stockpiles using a catch drain or earthbank.
- Cover small stockpiles with tarpaulins or stabilisation matting (see Figure 2). Anchor covers to prevent them from blowing away.
- Contour stockpiles within floodplains to minimise erosion during high rainfall events.
- Minimise period of stockpile inactivity. For stockpiles to be left inactive for longer periods, establish vegetation or grass. Subsoil stockpiles may require an outer layer of topsoil to assist grass establishment.
- Surround stockpiles with sediment control fences to minimise run-off of material. Remove sediment when it is halfway up the sediment control fence, return the material to the stockpile and consider implementing additional controls for effective management.
- Use machinery to contour or scarify the surface of stockpiles to assist in the reduction of run-off velocity and erosion.
- Suppress dust from small stockpiles using water or chemical dust suppressants, applying using a water truck or hand-held hose.

Figure 2. Covered stockpile (photo courtesy of McConnell Dowell).

Step four: check controls

Monitor controls you put in place to ensure they operate effectively and as planned – and improved if they do not.

For the management of stockpiles, this could include:

- Measuring and monitoring the size and geometry of the stockpiles. Adjust the height and dimensions of stockpiles as required to attain the desired stability and to control dust and amenity impacts.
- Monitoring of stormwater catchment diversion controls. Ensure catch drains and earthbanks are adequately diverting stormwater.
- Removing accumulated stockpile material adjacent to sediment control fences and reinforce fences as required.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheet 3: Managing truck and other vehicle movement

On civil construction, building and demolition sites, vehicles regularly travel on unsealed surfaces and roads containing soil and mud, resulting in the generation and transport of sediment and dust.

Trucks and trailers that haul soil and other materials without a cover can lose materials in transport and generate sediment and dust.

Step one: identify hazards

Uncontrolled release of dust and sediment into the environment from vehicle movement.

Step two: assess risks

To help assess the risk of sediment and dust generation from truck and vehicle movements, you can:

- identify the planned movement and traffic routes of vehicles on your site and develop a traffic management plan
- identify entry and exit points, and high traffic areas on your site
- understand how sediment and dust onsite can be transported offsite and into the environment
- consider nearby sensitive receivers.

Step three: implement controls

Consider implementing the following controls to limit the sediment and dust generation at your site:

Manage site access

- Minimise site access to limit the impact from vehicles to roads.
- Stabilise site entry and exit points with a sealed road, aggregate or road base.

- Divert surface water run-off away from site access points so sediment is not washed or tracked offsite.

Manage road use

- Minimise the number of access roads used by vehicles.
- Seal roads with asphalt or a spray seal, or stabilise with aggregate, gravel or road base. Aggregate or gravel may need to be replaced periodically.
- Locate unsealed roads to avoid erodible areas of the site, such as sloping terrain or unstable soils.
- If roads are not stabilised or sealed, minimise dust using water or chemical dust suppressants.
- Provide sealed or stabilised car parks for site workers to park their vehicles.
- Restrict vehicles to defined roads and site entry and exit points. Fence the site to prevent vehicles bypassing designated site access points.
- Limit vehicle speeds onsite to minimise the generation of dust. Ensure roads are signposted and site workers are aware of designated speed limits.

Machinery hygiene

- Avoid and minimise mud, soil and dust entering on site from incoming trucks and vehicles.
- Identify and assess invasive plants that may be present and the feasibility of controlling the spread.
- Avoid driving in areas that may contain invasive plants and maintain clean machinery on site.

Manage dirt and mud on access roads/routes

- Cover trucks transporting loose materials with fitted canopies. Ensure all loads are covered before trucks leave site.
- Remove soil from the rim of trucks before they leave site. Place scraped material in a location where it won't be washed offsite. This control may only be suitable on projects with a small number of vehicles leaving site.
- Install rumble grids at site exit points to shake soil off trucks, taking care not to position them in or over a drainage line. Ensure the road between rumble grids and the site exit is stabilised and with adequate distance and wheel rotations (recommended minimum three-wheel rotation).
- Submerge rumble grids in water so tyres are washed as the truck crosses the rumble grid. Prefabricated rumble grid/wheel baths are available for purchase or hire. Drain and replace the water in the wheel bath periodically. Water from wheel baths should be treated as 'waste' and managed in accordance with the waste hierarchy (see section 8.2.1).
- Minimise use of a wheel wash or hand-held hose to wash vehicle tyres due to the large volume of wastewater generated. If a wheel wash or hand-held hose is used, treat the water as 'waste' and manage in accordance with the waste hierarchy, preferably capturing and treating the water (see section 8.2.1).
- Clean sediment off roads as soon as possible. This can be undertaken using a broom and shovel, water or street sweeper. Treat the water as 'waste' and manage in accordance with the waste hierarchy, preferably capturing and treating the water (see section 8.2.1).

Step four: check controls

Controls you put in place to prevent or mitigate risks must be monitored to ensure they operate effectively and as planned – and improved if they do not.

For the management of truck and vehicle movement, this could include:

- monitoring of site entry and exit points and performing maintenance as required
- monitoring the driver compliance of speed limits and the canopy use on trailers
- monitoring of the condition and effectiveness of rumble grids and periodically removing built-up sediment and soil from under the rumble grids.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheet 4: Termite pesticide

Typically, a pesticide for termite management is installed during building construction which can then be released in dust, soil, runoff, and waste if not properly managed.

Commonly used pesticides for termite management are bifenthrin, cypermethrin, permethrin, imidacloprid, fipronil, and chlorfluazuron.

Step one: identify hazards

Pesticide emissions to the environment through dust and soil.

Once released to the environment, the pesticides used in termite management can be dispersed on fine dust particles impacting wetlands and waterways.

Step two: assess risks

The risk of pesticide emissions to the environment through dust and soil varies based on the type of treatment used:

- crushed rock are physical termite barriers and are low risk as they do not use pesticides
- termite membranes are long lasting and have a moderate risk if the membrane or surrounding soil is exposed to weather
- chemical soil treatments and irrigated perimeter treatments need to be replenished every few years and have a high risk of pesticide emissions from dust and soil if not properly managed
- inground stations have variable risk based on pesticide used, replacement time and other treatments such as barriers that may be required.

Step three: implement controls

Implementing the following controls may assist you with managing termite pesticides:

- Inform builders and new property owners of the type of termite management system installed and its maintenance requirements.
- If possible, use non-chemical termite management systems.
- For termite membranes, dispose of pesticide containing waste material and reduce the membrane exposure to weather (especially rain and wind) by covering the membranes as soon as possible.
- For chemical soil treatments, avoid disturbance of soils that have newly applied chemicals. This can be from activities such as landscaping around houses and concrete paving. It is recommended to apply the chemical treatment after concreting and/or landscaping is complete.
- For chemical soil treatments, understand the potential environmental impacts of disturbing treated soil and try to avoid the movement and dispersal of this soil.
- Try to establish gardens and lawns around the property as soon as possible to reduce chemically contaminated dust dispersal.
- Manage dust generation on the premises (see section 5.3.3 managing dust).
- Termite controls for new buildings:

  - **Crushed rock:** crushed rock and a plastic strip shielding is installed to areas most prone to termite attack and force termite activity out into the open where it is visually detectable.
  - **Termite membranes:** Pesticide impregnated polyethylene sheeting is installed around structures to prevent termite infestation.
  - **Chemical soil treatment:** A liquid pesticide is applied to the soil around the building.
  - **Irrigated perimeter treatments:** An irrigation system is installed around the perimeter of the building prior to laying the slab that slowly delivers pesticide to the surrounding soil.
  - **Inground stations:** Pesticide impregnated stations of preferential termite food sources are installed where they are likely to be found searching for food.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of termite pesticides, this could include:

- checking that termite membranes have not been uncovered and/or damaged
- if installed, ensuring that irrigated perimeter treatments are primed after landscaping and pathing has been completed
- checking that dust management controls are adequate and still in good working order
- ensuring that sediment controls are operational and maintained.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheets: Waste

These guidance sheets provide further detail on controls discussed in Chapter 8 Waste.

Contents

The controls in these guidance sheets are *examples or options only*.

You can implement other controls not covered in these sheets, so long as you can demonstrate you have eliminated or reduced the risk of harm to human health and the environment so far as reasonably practicable.

You may also need to seek additional or more tailored advice if your activities are not covered or are not adequately addressed in these guidance sheets.

The actions you take and the controls you decide to implement must comply with your general environmental duty (ss.25–27) and other duties under the EP Act.

See Chapter 2 Understanding your duties for more information.

Guidance Sheet 5: Litter

Litter onsite can generally comprise of:

- building material which is small enough in size or weight to be blown away in windy conditions or washed away during a storm and deposited into waterways
- general rubbish thrown away by construction workers.

Litter commonly includes solid wastes and putrescible wastes and is often caused by staff and the unavailability of suitable bins on the construction site.

Some litter can be particularly hazardous and is considered 'dangerous litter', such as glass, cigarette butts, and greasy rags.

Step one: identify hazards

Uncontrolled release of litter into the environment.

Step two: assess risk

To help assess the risk of litter entering the environment, you can:

- Identify the potential sources of litter on your site.
- Understand how litter generated onsite can travel offsite and into the environment.
- Consider nearby neighbours, drains and local waterways.

Litter can block stormwater drains, impact the environment by contaminating local waterways and eventually the coast, and can create an amenity issue.

Step three: implement controls

Implementing the following controls may assist you with managing your litter onsite:

- Ensure materials are not left where they can be blown or washed away.
- Provide covered litter or skip bins:
  - Small bins are suitable for small rubbish like paper, food wrapping and drink containers that may be blown off site.
  - Skips with a closable lid are suitable for larger items like cardboard boxes, plastic wrapping and polystyrene (see Figure1).
  - Ensure bin lids are closed and locked at the end of each day and during adverse weather conditions.

Figure 2. Example of a recycling skip bin.

- Provide small litter bins for construction workers and staff at locations where they consume food or beverages.
- Provide separate recycling bins for recyclable litter.
- Arrange for an authorised contractor to collect skip bins to prevent overflow and transport to a site that is lawfully able to receive it.
- Collect scattered litter on the site daily, or whenever litter is observed on the site.
- Install temporary fencing around the site to help prevent litter from being carried offsite.
- Store waffle pods (used in some concrete pouring activities) in 'scrap bags', i.e. which are large transparent bags, and secure to the site fencing or other structure as appropriate. Arrange for collection of the waffle pods by an authorised contractor for it to be taken to a lawful place where it can be recycled.
- Notify staff of importance of litter avoidance via onsite induction or other training activities (see section 3.1.3).

Note: council bins may not be used on some building sites. You should check this with your local council.

Step four: check controls

Controls you put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of litter, this could include:

- inspecting litter bins during daily site walks
- emptying the litter bin regularly and not allowing bins to overflow
- checking for litter generally.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheet 6: Surplus excavated material

Excavated material becomes surplus if:

- the physical, chemical or biochemical characteristics of the material prevents it from being used by the project
- there is more material available than required for the project
- it is located too far from where it is required to make its use practical.

Note surplus excavated materials are considered a waste unless reclassified as clean fill (see Step three) or determined suitable to be used onsite.

We look at surplus water from dewatering activities in Chapter 5 Erosion, sediment and dust and Chapter 6 Contaminated land and groundwater.

Step one: identify hazards

Uncontrolled release of surplus excavated material into the environment.

Step two: assess risk

To help assess the risk of surplus excavated material entering the environment, you can:

- identify the potential sources and locations of excavated material on your site – this can be undertaken through an assessment of soil, including determining the site history and soil sampling.
- understand how surplus excavated material generated onsite can leave the site and impact the environment
- consider nearby neighbours, drains and local waterways.

Excavated material has the potential to block stormwater drains and reduce water quality, which can harm human health and the environment.

Step three: implement controls

Implementing the following controls may assist you with managing your surplus excavated material on your site:

Remove construction and demolition waste such as concrete, bricks, pipe and organic matter from or near excavated material, to maximise clean fill material classification so it may be used onsite as fill. See *Waste classification assessment protocol* (EPA publication 1827).

- Stockpile surplus excavated material separately to any clean fill (see section 0).
- Where excavated material has been identified as having naturally elevated levels of metals or other contaminants, seek approval from EPA before using it as fill material. Use excavated material onsite for site filling / levelling as appropriate and authorised.

Step four: check controls

Controls you put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of surplus excavated material, this could include reviewing the effectiveness of how surplus excavated material is stored onsite.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheet 7: Hazardous waste

Hazardous wastes have a known risk to human health and the environment. Some hazardous wastes resulting from civil construction, building and demolition activities include asbestos, polychlorinated biphenyls (PCBs), lead, and acid sulfate soils (ASS).

Per-and poly-fluoroalkyl substances (PFAS) are an environmental contaminant of concern which may pose a risk to human health and the environment.

Asbestos

Asbestos is a group of naturally occurring fibrous silicate minerals that were commonly used in the production of insulation and construction materials such as cement sheeting and piping due to its thermal and chemical stability.

It was also used in the manufacture of vinyl floor tiles, electrical components, brake linings, disc pads, paints and sealants, and a variety of other materials, for a wide variety of industrial, manufacturing, building and construction applications. When disturbed, the materials may release asbestos fibres which if breathed in can cause a range of health problems including asbestosis, lung cancer and mesothelioma.

A ban on use of certain types of asbestos in Victoria was introduced in 1992, with a total ban introduced in 2003. Buildings constructed or refurbished in Australia prior to these bans may contain asbestos materials.

For more information, see WorkSafe Victoria's *Asbestos: A handbook for workplaces*.

PCBs (Polychlorinated biphenyls)

PCBs are a stable group of chemical substances that do not degrade easily and are resistant to temperature changes, acids and alkalis.

PCBs may be encountered in old electrical equipment including transformers, capacitators, fluorescent light fittings, concrete caulking compounds, and a range of other products that take advantage of its chemical stability. Due to the serious health concerns associated with PCBs and their persistence in the environment, the importation and manufacture of PCBs in Australia has been banned since the 1960s.

PCB exposure can lead to human health affects including cancer, liver damage, neurological and immunological changes.

Lead

Lead is likely to be present in older structures, occurring in paint, old water pipes and other plumbing fittings, sheet lead, solders, lead flashing, lead light windows and glass. One of the major sources of lead in the environment are lead-based paints which are commonly used on window frames, doors, skirting boards, kitchen and bathroom cupboards, exterior walls, gutters and fascia and metal surfaces. Lead-based paint in good condition is usually not a problem, except in places where painted surfaces are subject to friction or impact such as windows and doors.

Exposure to lead through inhalation or consumption can result in harm to the brain and nervous system, particularly with unborn babies and young children, with symptoms including fatigue and poor coordination, depending on the type of exposure.

ASS (Acid sulfate soils)

ASS are naturally occurring and contain elevated levels of metal sulphide minerals. They typically occur in coastal areas, and inland waterways, wetlands and drainage channels which are waterlogged and have saline and anaerobic properties, as well as in mine spoil. When exposed to air, acid and heavy metals such as arsenic and aluminium can be mobilised and leach into the environment, contaminating groundwater and surface waters, posing a risk of harm to human health and the environment, and engineering works. However, ASS can be generally considered safe and harmless when not disturbed.

PFAS (Per-and poly-fluoroalkyl substances)

PFAS are a group of chemicals manufactured since the mid-20th century that have historically been used in firefighting foams and other industrial and consumer products including mist suppressants, non-stick cookware and food packaging. There are many types of PFAS, including perfluorooctane sulfonate (PFOS), perfluorooctanoic acid (PFOA) and perfluorohexane sulfonate (PFHxS). PFAS can build up in food chains and may pose a risk to human health and the environment.

PFAS residues may be present in construction materials and therefore wastewater generated through construction and demolition also has the potential to contain PFAS. In addition, PFAS residues can be present in soil, sediments, groundwater and landfill leachate due to historical industrial activities.

While scientific research continues to be undertaken, EPA, consistent with federal guidelines from the Environmental Health Standing Committee (enHealth), takes a precautionary approach and advises people to reduce their exposure to PFAS. EPA's *Interim position statement on PFAS* (EPA publication 1669) reflects the most up-to-date information from the 2019 enHealth Guidance Statement and is supported by additional assessments by EPA.

Duty holders should familiarise themselves with their overarching obligations under the EP Act and supporting regulations, along with EPA Position Statements as issued from time to time. More information can be found at www.epa.vic.gov.au/for-community/environmental-information/pfas/pfas-and-epas-role.

Step one: identify hazards

Entry of hazardous wastes into the environment.

Step two: assess risk

To help assess the risk of hazardous wastes entering the environment, you can:

- Identify the potential sources of hazardous waste on your site.
  - For asbestos, prior to demolition works, review any asbestos registers and consider the location, quantity and condition of asbestos present and identify a suitable method for demolition.
  - For buildings suspected of containing PCBs or lead-based paints, sampling may be required prior to demolition.
  - If ASS is present, undertake risk identification and assessment in accordance with the *Victorian Best Practice Guidelines for Assessing and Managing Coastal Acid Sulfate Soils* (DSE 2010), available at https://www.marineandcoasts.vic.gov.au/__data/assets/pdf_file/0016/31237/CASS-BPMG-2010.pdf.
  - If PFAS is present, undertake risk identification and assessment in accordance with the PFAS National Environmental Management Plan.
- Understand how hazardous waste generated onsite can travel offsite and into the environment via waterways, soil, groundwater or the air.
- Consider nearby neighbours, drains and local waterways that may be impacted if hazardous wastes were to enter the environment.

Step three: implement controls

Implementing the following controls may assist you with managing your hazardous wastes onsite:

Asbestos

- Take all reasonable steps to minimise the risks of handling, transporting and disposing of materials containing asbestos.
- Ensure those handling, transporting and disposing of materials containing asbestos are authorised to do so.
- For guidance relating to managing asbestos during demolition work, see WorkSafe Victoria.
- Notify WorkSafe Victoria before any asbestos removal work is carried out, as they may issue licenses which place restrictions on removal of specific types of asbestos-containing material or asbestos-contaminated dust.
- Ensure your asbestos waste is taken to a site that is lawfully able to receive it. This is not only the asbestos removalist's responsibility – it is also your responsibility (see section 8.6).

PCBs

- Equipment or parts containing PCBs must be placed into a sealed container which is then stored in a marked secondary sealable metal container (e.g., steel drum) containing absorbent (e.g., diatomaceous earth) until it can be taken to a site that is lawfully able to receive it.

Lead

- Minimise the generation of lead dust and fumes, including by cleaning work areas before and after demolition activities.

- Do not sand or burn off lead-based paint.
- For guidance relating to lead management prior to and during demolition, refer to WorkSafe Victoria.

Acid sulfate soils

- Prepare an ASS management plan for the site, including measures to:
  - avoid and minimise disturbance
  - prevent oxidation
  - neutralise acidity
  - dispose offsite.
- Restrict where possible the disturbance and excavation of ASS.
- Where excavation is required, ensure that treatment pads consisting of a clay liner and bund are present to manage the excavated soil.
- Add bagged lime, at appropriate levels, to excavated material onsite prior to backfilling.
- Collect acidic surface water using drains or shallow basins and treat before discharging.
- If removing and disposing of ASS offsite, either:
  - prepare an EMP addressing ASS, to be submitted to EPA Victoria for approval
  - dispose of at a lawful place that already has an EPA-approved EMP for managing ASS.

See Acid sulfate soil and rock (EPA publication 655) for further information on management of ASS.

PFAS

- Isolate PFAS-contaminated materials from the surrounding environment by providing appropriate barrier systems such as a primary (upper) and secondary (lower) composite liner, a primary leachate collection system and a secondary leachate detection and collection system
- For management of contaminated water, see 0Guidance Sheet 12: Wastewater.
- Refer to the PFAS National Environmental Management Plan (NEMP), applicable Position Statements issued by EPA and regulatory obligations under the EP Act 2017.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive them.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of hazardous waste, this could include:

- inspecting hazardous waste containers to ensure they are sealed and free of cracks or leaks
- undertaking offsite monitoring to ensure hazardous wastes are not entering the environment - this may involve monitoring water quality upstream and downstream of the project site for chemicals which are present in the onsite hazardous waste.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheet 8: Masonry and other solid material wastes

Masonry and other solid material wastes found on civil construction, building and demolition sites consists of:

- building rubble
- concrete
- asphalt
- bricks
- timber
- plastic
- glass
- metals
- bitumen
- trees
- shredded tyres
- e-waste (EPA website).

Step one: identify hazards

Entry of masonry and other solid material waste into the environment.

Step two: assess risk

Masonry and other solid material wastes have the potential to block stormwater drains and contaminate land and local waterways.

To help assess the risk of masonry and other solid material wastes entering the environment, you can:

- identify the potential sources of masonry and other solid material wastes on your site
- understand how masonry and other solid material wastes generated onsite can be transported offsite and into the environment
- consider nearby neighbours, drains and local waterways.

Step three: implement controls

Implementing the following controls may assist you with managing masonry and other solid material waste generated from your activities:

- Store solid waste in a designated stockpile area or waste bin (sorted by type of solid waste) until a sufficient quantity has accumulated for removal.
- Have the waste taken to a site lawfully able to take that waste, which may include waste and resource recovery facilities and landfills.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive them.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of masonry and other solid waste material wastes, this could include:

- regularly inspecting rubble and other solid waste material stockpiles to ensure they are of appropriate dimensions, and that they are secured with tarps, fencing or other appropriate methods to prevent loose material from falling
- inspecting rubble and other solid material waste bins during daily site walks for any overflow or incorrect sorting
- inspecting the site to identify any masonry and other solid material waste that have not been placed in the correct storage location.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheet 9: Drilling mud

Drilling mud is the liquid or sludge residue generated during drilling through soil or earth. It may comprise of a mixture of:

- naturally occurring rock and soil including sand, silt, gravel and clay
- naturally occurring organic matter including tree roots, grass and shrubs
- water and drilling fluid (which primarily consists of water and may also contain non-synthetic additives such as bentonite).

Drilling mud may also contain contaminants from within the soil and groundwater being excavated / drilled or as a result of the drilling process.

Step one: identify hazards

Entry of drilling mud into the environment.

Step two: assess risk

To help assess the risk of drilling mud entering the environment, you can:

- Identify where drilling mud is being generated and stored on your site.
- Understand how drilling mud generated onsite can move offsite and into the environment.
- Consider nearby neighbours, drains and local waterways.

Drilling mud has the potential to pollute land and, in particular, waterways. This can harm human health and the environment.

Step three: implement controls

Implementing the following controls may assist you with managing drilling mud generated from your activities:

- Ensure that additives or contaminants (for example, oil lubricants) are not introduced during the drilling or excavation operation.
- If use of oil-based additives cannot be avoided, use biodegradable oils where possible.
- Contain the drilling mud temporarily in pits or sumps onsite, or in clearly labelled drums.
- Have the drilling mud taken to a site that is lawfully able to receive it or remediate onsite depending on level of contamination (see Chapter 6 Contaminated land and groundwater).
- Consider any viable reuse options of the mud dependent on its level of contamination e.g., fill material, composting, road construction.
- Dewater the drilling mud naturally or allow to air-dry, or direct to a dewatering facility.
- If the drilling mud can remain safely onsite (see Chapter 6 Contaminated land and groundwater), you should develop and implement an ongoing management plan for the drilling mud. This can be incorporated into the site environmental management plan.
- Transport the drilling mud in a vehicle that is safe, secure and leak-free, with no contaminated residue in the tanker / tanker trailer.
- See section 8.7 on keeping drilling mud management records.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive it.

Classification of drilling mud

For information on classification of drilling mud, see *Waste classification assessment protocol* (EPA publication 1827). This will help you ensure it is properly managed and goes to a place that is lawfully able to receive it.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of drilling mud, this could include:

- inspecting drilling mud storage areas and containers to ensure there are no leaks or run-off
- regularly reviewing the management plan for drilling mud, to ensure controls are updated based on their effectiveness.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheet 10: Historic buried waste

Historic buried wastes may become uncovered during excavation works on construction sites.

These wastes are often associated with closed landfills or illegal dumping grounds and can contain:

- Masonry and other solid material waste – consists of building rubble, concrete, asphalt, bricks, timber, plastic, glass, metals, bitumen, trees, shredded tyres and e-waste (see 0Guidance Sheet 8: Masonry and other solid material wastes)
- Hazardous wastes – consists of asbestos, polychlorinated biphenyls (PCBs), lead, and acid sulfate soils (ASS) and any other material waste that has a known risk to human health and the environment (see 0Guidance Sheet 7: Hazardous waste)
- Putrescible wastes – those that can be decomposed by bacterial action. They usually consist of discarded food, domestic garbage, animal carcasses, grass and garden clippings and prunings.

The presence of historic buried waste may indicate existing land and groundwater contamination. See Chapter 6 Contaminated land and groundwater for guidance on managing contamination.

Step one: identify hazards

Presence of buried wastes.

Step two: assess risk

To help assess the risk associated with buried wastes, you can:

- Identify historic activities which may have involved the burying of waste on the site.
- Locate potential areas where waste may be buried.
- Identify the content of any identified historic buried waste sites.
- Understand how historic buried waste may have decomposed resulting in release of contaminants into the environment.
- Understand the pathways of pollution to the environment from buried waste, considering nearby neighbours, drains, conduits and local waterways.
- Define extent of the historic buried waste materials via methods including ground penetrating radar, test pitting and implementation of a comprehensive sampling program.

- Investigate if the cap over the historic buried waste is appropriate to protect current and future site users and to minimise impacts to the environment.
- Identify the nature of material, odour levels, presence of methane, groundwater quality, groundwater levels and leachate quality to determine the correct management method (see Chapter 6 Contaminated land and groundwater).
- Identify whether the historic buried waste and any associated impacted material is to remain onsite or if it is to be excavated and removed. Engage a suitably qualified person to manage the process (see Work with an environmental consultant, EPA website).
- If the waste is required to be removed from the site, it must be taken to a place that is lawfully able to receive it.
- Ensure the area does not pose an immediate threat e.g., strong odours, sharp objects, or drums of unknown chemicals. Where an immediate threat is encountered, access to the area should be restricted and the threat removed by a suitably qualified person.
- Develop and implement an ongoing management plan to maintain and manage the site to ensure that risks to site users and the environment are minimised into the future.

Buried wastes create a risk of harm to human health and the environment by causing pollution of air (gases), land, groundwater and surface waters, and present an explosion risk.

Contact EPA. If historic buried waste associated with a landfill is identified, contact EPA immediately – an in-depth assessment process may need to be followed.

Step three: implement controls

Implementing the following controls, in addition to those listed in Chapter 6 Contaminated land and groundwater, will assist you with managing buried waste discovered during your activities:

- Where historic buried waste has only been partly excavated, look to seal any uncovered waste - you may need approval from your local council to do this. Materials used to seal this waste may include geosynthetic liners and vegetative layers.
- If an existing cap over historic buried waste is found to be inadequate, undertake further capping works if the waste is to remain onsite.
- Control odours during excavation by minimising the working surface area and immediately covering with a clean fill (see 0Guidance Sheet 6: Surplus excavated material). Use of a deodoriser may also be required to minimise emissions of malodorous gases to the atmosphere.
- Use sealed containers for the storage of small volumes of historic wastes and during transport to limit odour emissions.
- Limit leachate generation by minimising infiltration of ingress of water into the old landfill through installation of cut-off drains, banks or bunds around the excavation area.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive them.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of historic buried waste, this could include:

- monitoring upgradient and downgradient groundwater and surface water quality levels from any identified buried waste, including monitoring for leachate
- air quality monitoring for methane and sulphur gases of uncovered buried waste.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheet 11: Sewage

Sewage is a type of wastewater typically composed of excrement, detergents and toilet paper.

Improper management can lead to contamination of the surrounding environment, disease and illness, and odour issues.

Step one: identify hazards

Human exposure to sewage and its entry into the environment.

Step two: assess risk

Sewage can create nuisance odour and contamination of the surrounding environment. Due to its biological nature, it can cause viral, bacterial and parasitic diseases in humans and animals.

To help assess the risk of sewage entering the environment, you can:

- Identify the potential sources of sewage on your site, which includes identifying the location of underground sewage pipes.
- Understand the pathways for sewage flow from the site and into the environment.
- Consider nearby neighbours, drains, conduits and local waterways.

Step three: implement controls

Implementing the following controls may assist you with managing sewage discovered during your activities:

- Mark the location of underground sewage pipes onsite.
- Provide temporary toilets throughout the construction and demolition period, that are clearly signposted with appropriately sized waste and water tanks where there is no connection to sewer. Regularly service the facilities.
- Regularly inspect toilets and excavations for visual signs of sewage spills.
- Use an authorised contractor to collect the sewage waste.
- Where civil construction, building and demolition are expected to occur for a significant length of time, consider engaging an authorised contractor to connect the toilet facilities to the sewerage network.
- Assess the location of buried sewage pipes and mark out services on ground surface to prevent damaging them.

Use an accredited consigner. This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive them.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of sewage waste, this could include:

- monitoring upstream and downstream surface water and groundwater
- reviewing the sampling and analysis program and update depending on effectiveness.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Guidance Sheet 12: Wastewater

Wastewater is water that has been 'used', is contaminated (including contaminated stormwater), or is 'surplus' (i.e. unwanted or excessive), water resulting from dewatering activities.

Civil construction, building and demolition activities generating wastewater include:

- site dewatering
- vehicle and equipment washdown
- brick tile works
- concrete pour works
- high pressure washing of concrete slabs
- painting and plastering
- air conditioner installations
- sewage generation (see 0Guidance Sheet 11: Sewage).

Step one: identify hazards

Site dewatering

Dewatering is the permanent or temporary removal of ponded stormwater or infiltrated groundwater, usually for the purpose of excavation and construction activities.

Vehicle and equipment wash-down

Vehicles, machinery, tools and other equipment may require frequent or occasional washing on a construction site, with the washdown water potentially containing chemicals and / or sediments.

Other activities resulting in wastewater

Common construction and demolition activities with the potential to generate wastewater, include brick tile works, concrete pour works, high pressure washing of concrete slabs, painting and plastering, and air conditioner installations.

Step two: assess risk

To help assess the risk of wastewater entering the environment, you can:

- identify the potential sources of wastewater on your site
- understand how wastewater on your site can move offsite and into the environment
- consider nearby neighbours, drains and local waterways.

Site dewatering

Pumping out groundwater from an excavation or dewatering bore could cause groundwater drawdown, affecting nearby ecosystems, and draw contaminated water from other properties onto the site.

Discharge of potentially contaminated dewatering water to stormwater and reinjection into a groundwater aquifer could pollute surface water and groundwaters, posing a risk of harm to the environment and human health.

Vehicle and equipment wash-down

Washdown water can pollute waterways via the stormwater system if not managed appropriately.

Other activities resulting in wastewater

Wastewater from brick tile works, concrete pour works, high pressure washing of concrete slabs, painting and plastering, and air conditioner installations have the potential to enter the surrounding environment and pollute waterways.

Step three: implement controls

Site dewatering

The controls below may assist you to manage water resulting from dewatering activities to prevent potential adverse impacts to the environment. Consider engaging a suitably qualified person to manage this process (see Work with an environmental consultant, EPA website).

- Test the water resulting from dewatering activities for contaminants (see Chapter 6 Contaminated land and groundwater).
- Identify if the water can be reused onsite for activities such as dust suppression, vehicle and machinery wash down, earthworks compaction and revegetation.
- Treat contaminated water onsite where appropriate e.g., via flocculation or coagulation. Oils and grease may be removed from the surface of water by use of floating booms, pads and socks.
- Ensure any reuse of water does not cause ponding or run-off of water.
- For discharge to sewer, contact your local water authority to investigate whether the water meets the requirements for discharge to sewer by identifying the trade waste acceptance criteria and apply for a trade waste agreement.
- If discharge to a sewer is not viable and onsite treatment not appropriate, dispose of the water to a site that is lawfully able to receive it.
- Monitor upstream and downstream water quality during any discharge of treated water to a waterway (directly or via a stormwater drain) to check if discharge is affecting water quality of the waterway.

Cleaning of vehicle, equipment and roads

The controls below may assist you to manage your cleaning activities to prevent potential adverse impacts to the environment:

- Carry out washing of vehicles and equipment in a designated area, designed to allow collection of the washdown water.
- Cover the designated washdown area, where appropriate.

- Locate the washdown area away from drainage lines, stormwater inlets, waterways, areas of significant flora and fauna and other sensitive areas identified onsite.
- Contain wash out barrels in the designated washdown area for washing of tools and smaller equipment.
- Install sediment control structures e.g., fences or basins to collect sediments, downslope to prevent entry of sediment into drains and waterways (see Chapter 5 Erosion, sediment and dust).
- Appropriately bund the washdown area to contain all washdown water (see Chapter 7 Chemicals).
- Discharge the washdown water to the sewer with approval from the relevant water authority.
- Return concrete mixing and delivery trucks to the batching plant for washout, where possible. However, should this not be possible, designate an area onsite for washing out of concrete trucks, which:
  - is located near the site exit to encourage drivers to use it
  - signed for easy identification
  - is lined with an impervious liner (plastic or geotextile), allowing the water to evaporate, for concrete residue to then be disposed of as solid waste (in a skip bin or collected and transported to a site that is lawfully able to receive it) or used as a road base.

- Clean equipment off before washing to minimise use of water. Brush dirt and mud off equipment before you wash it.
- Avoid using solvents for cleaning vehicles and use phosphate-free soaps and biodegradable soaps.
- For tools used for water-based paints, use one container to wash the brush and another to rinse. The container used to wash the brush can be left to stand overnight to allow solids to settle – the contents can then be poured out and solids put in a bin.
- For tools used for oil-based paints, do not put on the ground and clean using a solvent bath. Contact a waste contractor to ensure it is taken to a lawful place.
- Where hazardous chemicals (see Chapter 7 Chemicals) are suspected to occur in the washdown water, ensure collection (e.g., via a sump with no outlet) and arrange for an authorised contractor to collect the washdown water and dispose of at a site that is lawfully able to receive it.
- For road cleaning:
  - Minimise use of roads by vehicles to reduce:
    - fuel and other chemical leaks from vehicles onsite
    - dust and sedimentation
    - frequency of vehicle washing.
  - Restrict access on and offsite during wet conditions.
  - Pave entry and exit roads with gravel and top dress these paths periodically.
  - Sweep roads at least once a day.
  - Install rumble grids (see Figure 2) and wheel washes at entry and exit points and remove sediment from the wheel wash as required. Consider placing rumble grids under water via excavation of a shallow pit, to facilitate removal of sediment.

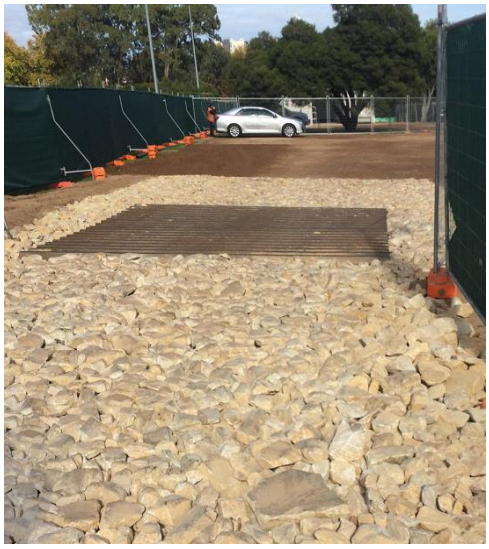


Figure 2. Rumble grid (photo courtesy of McConnell Dowell).

- Designate a paved parking area.
- Where the site is not large enough to install rumble grids and wheel washes, sweep the road daily.
- Install road sediment controls such as litter traps lined with filter cloth in all side-entry pits.
- Cover all loads of waste, including soil, being taken offsite to a site lawfully able to accept that waste.

Other activities resulting in wastewater

- Brick tile works
  - Mix mortars in areas that will not drain into the stormwater system.
  - Prevent wastewater from brick-cutting activities from entering the stormwater system.
  - Recycle or discharge surplus wastewater from brick-cutting activities to a contained area for evaporation.

- Concrete pour works
  - Carry out concrete mixing in a contained area to prevent residues and wastes from entering the stormwater system.
  - Install temporary bunds down slope gutters where the use of concrete pumps from public roadways is required.
  - Seal concrete once cured to prevent run-off water from becoming alkaline.
  - See above under 'Cleaning of vehicle, equipment and roads' for washdown controls.

- High pressure washing of concrete slabs
  - Prevent wash water containing concrete residue from entering the stormwater system.
  - Appropriately bund the washdown area to contain all washdown water.
  - Discharge the contained washdown water to the sewer with approval from the relevant water authority or
  - Allow the washdown water to evaporate and dispose of the concrete residue as solid waste at a lawful place.

- Painting and plastering
  - Keep unused paint in a tin or other sealed container.
  - Dispose of unwanted paint to a site that is lawfully able to receive it.
  - See above under 'Cleaning of vehicle, equipment and roads' for cleaning controls to clean up painting equipment.
  - Filter solvent used to clean oil-based paints, for reuse, or have it taken to a site that is lawfully able to receive it.
  - Allow plastering residues to dry within a designated contained area on the site. Then put solid waste into a skip bin or dispose of at a site that is lawfully able to receive it.
  - Consider using solid plastering wastes such as calcium sulfate as a clay modifier for landscaping works.

- Air conditioner installations
  - Ensure that air conditioners are installed to manufacturers specifications.
  - Direct saline wastewater from the air conditioner dump valve systems and cooling towers to a sewer, rainwater tank (non-drinking), or garden.
  - Install cooling towers so that wastewater from the tower does not enter the stormwater system.

Use an accredited consigner**.** This is a professional approved by the EPA with knowledge on how to properly manage specific types of waste and ensure they are sent to a place that is lawfully able to receive them.

Step four: check controls

Controls that are put in place to prevent or mitigate risks must be monitored to ensure they work as planned – and improved if they do not.

For the management of wastewater, this could include:

- monitoring upstream and downstream water quality, if discharging into waterways.
- inspecting bunds during daily site walks to ensure they are installed correctly.

Managing risk

See Chapter 3 Managing your environmental risk, *Assessing and controlling risk: a guide for business* (EPA publication 1695) and four short videos for more information about managing risk, including monitoring and measuring the effectiveness of controls.

For all EPA Victoria industry guidance, see www.epa.vic.gov.au/for-business

Glossary

Term	Definition
Contaminated land	Land and groundwater where waste or a chemical substance is present on or under the surface of the land at a concentration above safe levels that creates a risk of harm to human health or the environment.
Dewater	To drain, permanently or temporarily, groundwater or water flowing over land, for agriculture, construction or mining.
Dust suppressant	A chemical applied to disturbed soils to suppress dust.
Eutrophication	The excessive growth of aquatic plant species and algae which reduces the amount of oxygen that is dissolved in water negatively impacting other organisms (fish, birds, humans).
Flocculant	A substance which is added to promote the clumping and settling of suspended particles.
Floodplain	An area of land adjacent to a creek, river, estuary, lake, dam or artificial channel that is prone to flooding.
Habitable room	A room other than a kitchen, storage area, bathroom, laundry, toilet or pantry.
Land zoned for residential purposes	• residential zones in Victorian Planning Provisions (VPP) • another zone to facilitate development with residential component (e.g., a Comprehensive Development Zone for residential development) • land identified in local planning policy framework or incorporated document as for residential development
Lawful place	A lawful place is somewhere lawfully authorised to receive industrial waste. If you generate, transport or receive waste, you must make sure it ends up at a lawful place. See Understanding lawful place (EPA website)
Onsite	An area of land in which project activities occur, around which a complete boundary can occur i.e., continuity is not broken with presence of land controlled or managed by another person or for another purpose unrelated to the project.
Portable sedimentation tank	A prefabricated tank containing one or more compartments that is used to capture and retain sediment.

Primary containment	Infrastructure that is the primary container for the storage and use of a material.
Project site	Can include multiple geographic areas managed or controlled by a person for a specific project, which aren't necessarily joined at any one point (i.e. are separated by land being managed or controlled by someone else).
Receptor/receiver	These words have the same meaning and are used interchangeably throughout this guide. Receptors/receivers are something of value which can be harmed by hazards, including humans and the environment (e.g., animals, vegetation and waterways).
Regenerated noise	Noise heard within a building that is generated by vibration transmitted through the ground into the structure form construction works.
Riparian	Land that runs along rivers, creeks, estuaries, lakes and wetlands. Riparian land can vary in width from a narrow strip to a wide corridor.
Secondary containment	Infrastructure that can contain materials that have leaked or discharged, as a result of failure, from primary containment infrastructure (e.g., bunds).
Sedimentation	Deposits of sediment into low lying areas like natural waterways and artificial drainage systems, from wind and water erosion.
Sensitive receivers	Sensitive areas or species from a human or environmental context which include, but are not limited to, the following: • social surroundings (houses, hospitals, schools, playgrounds, public amenities) • waterways, streams, source of drinking water for people or livestock • parks and recreational areas • area of public interest and cultural significance • land or water with identified flora, fauna, vegetation, ecosystem or environmental value.
Stormwater	Surface run-off from rain and storm events.
Subsoil	The layer of earth or soil immediately under the surface soil.
Suitably qualified person	Identifying and understanding hazards and appropriate controls to eliminate or reduce risk can be complex. You will need to determine who is most suitably qualified to do this. EPA does not endorse any individuals, businesses, certifications, accreditation schemes or professional associations.

	See Work with an environmental consultant (EPA website) for general information about how to engage a consultant.
Topsoil	The surface or top layer of the soil.
Treatment train	A sequence of treatment controls designed to manage potential impacts to the environment.
Turbid water	Water with suspended particles, making it opaque or muddy.
Waterway	A river, creek, lake, canal, stormwater drain or other body of water.

Further reading and references

This list of references includes many of the sources EPA drew from to develop this guide.

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Appendix 1 – Risk register – completed example

The colours in this register example correspond with the four steps of the risk management process covered in Chapter 3 Managing your environmental risk. You should identify and add further controls if you need to address remaining or 'residual' risk.

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 completed
Litter	Bins overflowing. Bins with no lids. Site staff disposing of general rubbish directly onto ground.	Litter entering nearby waterways, polluting the water, and causing harm to human health (from the decline in water quality and spread of disease) and wildlife (incl. causing choking).	Litter is easily dispersed to waterways via wind and rain, due to its generally light nature.	• Arranging collection of litter bins in a timely matter to prevent overflow. • Ensure all litter bins have lids which are closed at all times. • Education of staff regarding the importance of correctly disposing general waste.	Less contamination of waterways as a result of litter entry, and less harm to human health and wildlife.	Dispersal of litter into the environment is significantly reduced.	Site inspection to identify: • no overflowing general waste bins • emptying of general waste bins at schedule dates. • Presence of any litter on site.	Litter still being observed on site even though bins not overflowing: Remind site staff during toolbox meetings to close lids on bins after use.	dd/mm/yy	dd/mm/yy

Appendix 2 – Environmental management plan – structure outline

Project name:

Project address:

In this Appendix we outline some elements you can consider including in your own environmental management plan (EMP).

Depending on the type of works and the conditions of your site, you may need to adjust these or include additional information in your EMP to help you manage your risks.

Note: Victorian councils and other regulatory bodies may have specific requirements regarding the content of your EMP. This is an *outline only* and is not intended to indicate the content and level of detail that may be required in your own EMP.

The paperclip indicates where it may be useful to attach additional information at the end of your EMP.

The *italicised content* helps explain the various elements of an EMP.

Prepared by:

Company name:

Company address:

See AS/NZS ISO 14001:2016 Environmental management systems – Requirements with guidance for use (Australian Standards)

Declaration of accuracy

Some regulatory authorities may require the submission of an EMP prior to project approval or commencement of works. A declaration of accuracy indicating the submitted information is not false or misleading may be required.

You can insert the relevant declaration of accuracy here – see relevant regulatory authority for wording to be used.

Signed:

Full name:

Organisation:

Date:

Document control

Providing a record of version of your EMP can help ensure staff are referring to the most recent version.

Version	Date	Description	Authorised by
V1	*18 September 2019*	*Draft for comment*	*Project manager*
V2	*25 October 2019*	*Updated the review period*	*Project director*
V3			

Location of document

Keeping a copy of your EMP onsite in an easily accessible location can encourage site staff to refer to it when required. Depending on the size of the project, you may want to consider keeping copies at various location(s).

You can list the site locations of the document here.

Contents

Key contacts

Providing the key contacts and responsibilities at the beginning of the EMP can be a quick way to direct readers to the appropriate person.

Key contacts

Company		
Company responsible for implementing the EMP	Company name Business address Contact number	
Person responsible for implementing and updating the EMP	Name Email Contact number After-hours contact number	
Project Manager	Name Email Contact number After-hours contact number	
Scope of works		
	Describe method and equipment used	*Company responsible*
Demolition		
Excavation		
Construction		
EMP updates	*Review date:*	*Reason:*

Permits or approvals required

Additional approvals may be required prior to works commencing. You should make the appropriate enquiries to ensure all approvals and permits are obtained prior to commencing site works. In some instances, your local council may identify these authorities for you. The approval and permit applications can be attached to your EMP and provided to the relevant authority.

Including a table such as the example provided below may assist you with identifying whether you need to apply for a particular permit or approval.

Will the project:	No	Yes	
Be within a conservation area identified in the 'Biodiversity Conservation Strategy for Melbourne's Growth Corridors'?	☐	☐	*You can attach the DELWP approval for projects on land within a conservation area*
Require removal of native vegetation?	☐	☐	*You can attach the application and permit to remove native vegetation*
Change a place or object on the Victorian Heritage Register?	☐	☐	*You can attach the Heritage Victoria Application and Permit*
	☐	☐	

Conditions of approval

Depending on the regulatory authority, you may be required to address conditions for approval of your project. You may want to include a table which lists approval conditions and the relevant sections of the EMP in which they are addressed.

Item	Condition reference	Condition requirement	Relevant section in EMP	Description of how addressed
1	*14(d)*	*The EMP must address disposal of contaminated soil from X location*	*3.2 Management measures*	*Provides information on how contaminated soil will be sampled, collected, transported and disposed of.*
2				
3				

Legislative requirements

In absence of conditions of approval, you can list any environmental legislation relevant to your project, including any specific legislative requirements, to assist with preparation of relevant environmental management measures and ensure you are compliant with the law.

Name of legislation	Regulatory authority	Requirement	Where addressed in this EMP
Environment Protection Act 2017	*Environment Protection Authority*	*Duty to manage contamination*	*Section XX*
Environment Protection and Biodiversity Conservation Act 1999	*Department of Environment, Land, Water and Planning*	*Protection of Growling Grass Frog (Litoria raniformis) habitat*	*Section XX*

Key reference documents

Preparing EMPs in accordance with the following can ensure consistency and with company practices and ensure obligations are met:

- *Company policies and / or environmental management systems to ensure consistency in company practices*
- **Current legislation** *to ensure legislative obligations are met.*
- **Up-to-date guidance** *that outlines good environmental practice and control measures.*

You can attach copies of the business EMS or environmental policies to your EMP.

Project overview

Providing a brief description of the project will provide further context.

Environmental setting

A description of the surrounding environment, including the condition and any features of significance (for example threatened species, environmentally sensitive areas, and areas of historic significance). To assist you identify sensitivities, provide local and regional context.

Site location

Describe the location of the site, including the address, and insert a map showing the local and regional area, with any sensitive receptors (e.g., schools, residential buildings, and boundary of the site) indicated.

Site description

A description of the site, including historical land use, geological features, hydrology, and surrounding land uses, can assist with identifying sensitive receptors and designing the appropriate controls to manage your environmental risks.

Description of activities

A description of activities to be undertaken as part of your civil construction, building or demolition activities, can assist with identifying the environmental risks of the projects, and implementing the required controls. You can also include the hours of works here.

Phase of works	Method	Company responsible	Expected commencement/ completion dates
Demolish site structures	*You can describe how works will be undertaken, including what plant and equipment will be used.*		

Impact footprint

A description of the area that will be directly impacted by the works, and adjacent areas, will assist with planning for minimisation of risks.

Site plan

The site plan would show the extent of the works, either as a map or photograph, showing the boundary of the site, location of infrastructure, and other relevant features. Multiple site plans may be required depending on the extent of the works.

Timing

Providing a project timeline, showing the total duration of works and time of year they will occur, may assist you with keeping on track to complete works as scheduled.

Summary of site information

You can provide a summary of the site information based on the information collated in the previous section.

Site address	Address
Site location	*(e.g., 250 kilometres (km) northwest of nearest capital city).* *The site location is shown on Figure X.*
Local government authority	*Name of LGA.*
Surrounding land uses and sensitive receptors	*Describe land uses and potential receptors, (e.g., residential properties, schools, hospitals, parks, conservation areas, rivers, lakes).* *North: (describe land uses and receptors).* *South: (describe land uses and receptors).* *East: (describe land uses and receptors).* *West: (describe land uses and receptors).*

	Surrounding land uses and potential receptors are shown on Figure X.
Site area (ha)	*Area in square metres (m^2) or hectares (Ha).* *The site layout during works is included as Figure XX.*
Historical land uses on site	*Describe historical land uses on site, if known, starting from most recent.*
Site geology	*Describe geology, e.g., the presence of fill, acid sulfate soils or potential acid sulfate soils, underlying natural soil, rock type/s).*
Site hydrology and surface water features	*Describe hydrology, if known.* *Describe surface water features present on site or adjacent to site, including stormwater drains).* *Site surface water features are shown on Figure XX.*
Hours of works	*(e.g., 7 am to 6 pm, Monday to Friday).* *7 am to 1 pm, Saturday.*
Expected project commencement and completion dates	*Commencement date:* *Completion date:*

Objectives of this EMP

Listing the objectives of your EMP can assist you with identifying what content you require in your EMP to appropriately manage your environmental risks.

Roles and responsibilities

Defining the roles and responsibilities of staff (including contractors and subcontractors) involved in environmental management of the project, can help to ensure environmental management is being undertaken by the most appropriate person. Any changes to roles and responsibilities would also be documented.

Victoria's environment protection laws mean that anyone engaging in an activity that poses risk of harm to human health and the environment, from pollution or waste, must eliminate or reduce that risk so far as reasonably practicable.

The general environmental duty (ss.25–27) applies to all Victorians.

Position	Name	Environmental responsibilities	Person reporting to	Contact details
Principal contractor (company name)				
Project manager				*Email address* *Landline* *Mobile*
Person responsible for implementing EMP				
Project health, safety and environment officer				
Stakeholder liaison officer				
Subcontractor 1 (company name)				
Project manager				
Team member 1				
Subcontractor 2 (company name)				
Project manager				
Team member 1				

Reporting

You may be required to report implementation of this EMP to external parties, which include providing environmental management records to the regulator. You can describe reporting requirements in this section.

Staff training

Appropriate staff training will ensure that roles and responsibilities, procedures and processes are clear to all site personnel, including contractors, subcontractors and visitors.

In this section, you can describe the modes of training you will be implementing to ensure the relevant aspects of the EMP are communicated to all relevant staff, and list the key points of environmental value you would like to communicate during training e.g., natural values of particular significance, and the role of the EMP.

Modes of training may include:

- *site induction*
- *tool-box meetings each day, prior to commencement of works*
- *induction meetings with sub-contractors.*

Maintaining a record of a training register or record of attendance can be useful in ensuring all staff are provided the necessary training to manage the risks of their activities.

Name of person	Business	Date of training	Name of trainer	Description of training content

You can attach training and induction registers to your EMP.

Emergency contacts and procedures

Listing key emergency contacts and emergency response procedures associated with the project's environmental risks can help to ensure that emergencies are managed appropriately to prevent and mitigate pollution events.

Emergency contacts

Organisation / person	Contact no	Alternative contact no.
Company responsible for implementing your EMP		
Person responsible for implementing and updating your EMP		
Project manager		
Site 24-hour emergency contact person (1)		
Site 24-hour emergency contact person (2)		
First aid officer		
Project HSE officer		
Person responsible for implementing EMP		
Fire brigade/Police/ Ambulance)		
EPA Victoria		
Wildlife rescue		

Emergency response procedures

Item	Description
How to notify of an emergency	*Describe procedure.*
Emergency alarm sound	*Describe sound.*
What to do if the emergency alarm is activated	*Briefly describe what site workers should do if the emergency alarm is activated (e.g., stop work, walk to emergency muster point).*
Emergency muster point	*Describe location of emergency muster point.*
Frequency of drills	*State the frequency of emergency drills.*
CB radio channel	*List the relevant radio channel.*
Hazardous materials	*List names, quantities and locations of hazardous materials.*
Locations of mitigating controls	• *EMP document* • *locations of Safety Data Sheets* • *locations of spill kits* • *locations of fire extinguishers* • *locations of first aid kits*
Responding to a chemical spill	*Refer to the spill response procedure, stating its location onsite.*
Insert additional rows as relevant	

You can attach any relevant emergency response procedures to your EMP.

Identifying risks

Identifying the environmental risks of your activities can assist with identifying appropriate controls for inclusion in the EMP. See Chapter 3 Managing your environmental risk *and Assessing and controlling risk: a guide from business* (EPA publication 1695)*, for further information on how this can be undertaken.*

Environmental management measures / controls

Describing the environmental measures / controls you will implement to manage the risks of your activities, with timelines, controls and performance targets can assist you with implementing the appropriate controls, once you have identified your risks. You may also want to include maps and diagrams to assist you with implementation of controls.

Management measures also include corrective actions and non-compliance reporting.

You can also present each environmental aspect / impact relevant to your project e.g., dust, noise, sediment and erosion control, waste, as a separate table to list your environmental controls and measures.

Noise

Objective	*Minimise noise impacts on nearest sensitive receivers* *Undertake works in accordance with the relevant legislation*		
		Responsibility	**Timing**
Control(s)	• *Turn off vehicles and machinery when not in use* • *Use silencers on vehicles, where possible* • *Do not schedule noisy works during the early morning and in the evenings*	Site Environment Manager	Ongoing
Performance indicator(s)	*No complaints received from nearest sensitive receivers.*		
Monitoring	*Daily site inspections.*		
Reporting	*Incidents are to be reported immediately to XXX*		
Corrective action(s)	*Located noisy activities behind noise barriers.*		

Environmental monitoring checklist - noise

Daily	*Weekly*		*Monthly*		*Other*
Checklist completed by:	*Signed:*		*Date:*		
Environmental control / issue	*Type of monitoring (e.g., site inspection)*	*Observations*	*Action required (and by when)*	*Person responsible*	*Date actioned*

Incident reports

You may want to include a register of any incidents occurring on site, which can assist you with review and update of the EMP (see next section) to ensure that risks are being controlled as appropriate.

Date and time	Description of incident	Action required	Person responsible for actioning	Action by	Date actioned

Audit and review

The following will help ensure the controls you implement are appropriate to eliminate or reduce the risks of your project:

- *including a schedule and triggers for auditing and reviewing the implementation and effectiveness of your EMP (set this against your objectives and any regulatory conditions)*
- *having a procedure for evaluating and updating your EMP.*

Events that may trigger a review and update include:

- *completion of one phase of works*
- *change to scope of works*
- *occurrence of an environmental incident or near miss occurs, prompting a review of the controls*
- *monitoring results indicate a control is inadequate*
- *an improvement to the controls is identified through onsite experience, a change in industry best-practice or legislation*
- *there is a change of subcontractors or key personnel.*

Complaints procedure

Recording complaints made from stakeholders, including members of the community, within a register can assist with managing them appropriately. You may also wish to prepare a complaints procedure for the reporting of complaints and responding to complaints.

Date	Name	Contact details	Comment or complaint	Action taken	Date action

You can attach a copy of the complaints register to your EMP.

Resubmitting revised EMPs

Depending on the regulatory authority, you may need to resubmit any revised EMPs for approval, specifying what changes were made.

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