Learner Name:

Learner Guide

Earthmoving Course

RIIMPO316E Conduct Self-propelled Compactor Operations

Learner Guide

National Courses PTY LTD

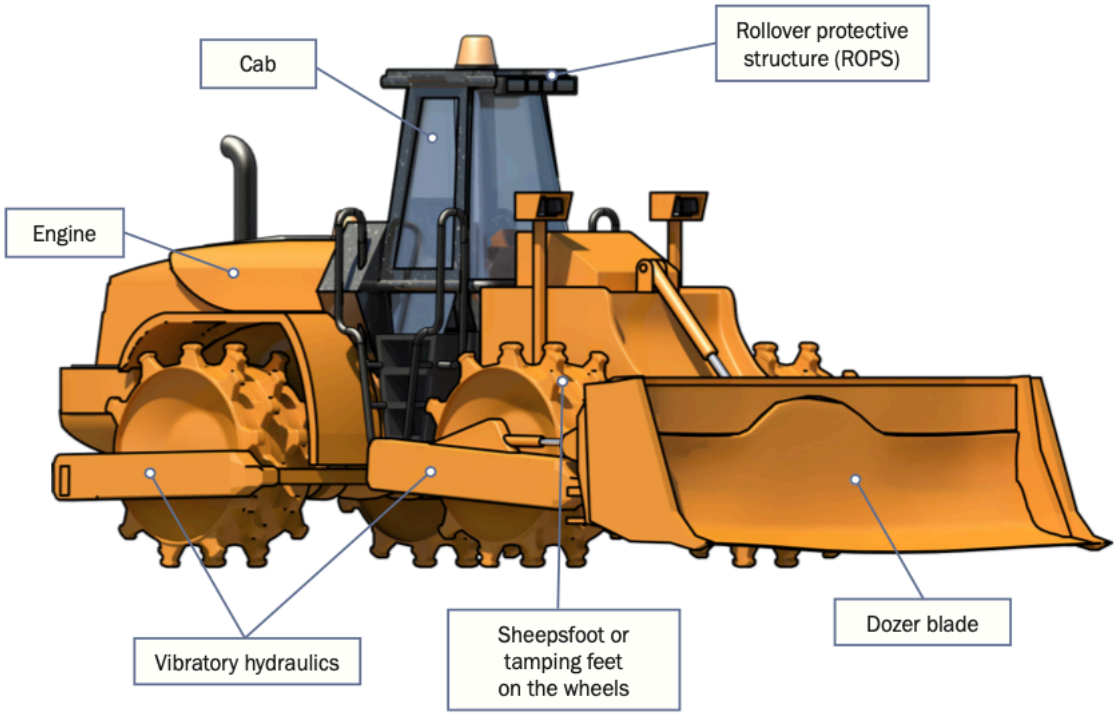
1.1 Introduction to Self-propelled Compactor

A self-propelled compactor is a self-propelled, tamping foot drum, wheeled machine, used to compact a variety of types of construction materials. It can operate at relatively high speeds and may have a dozer blade mounted on the front-end of the machine allowing for dozing, filling and compacting versatility. The tamping feet on the wheels of the machine may vary in size, shape and depth.

What Industries Do You Use A Self-propelled Compactor In?

- Civil construction

1.1.1 An Example of A Self-propelled Compactor

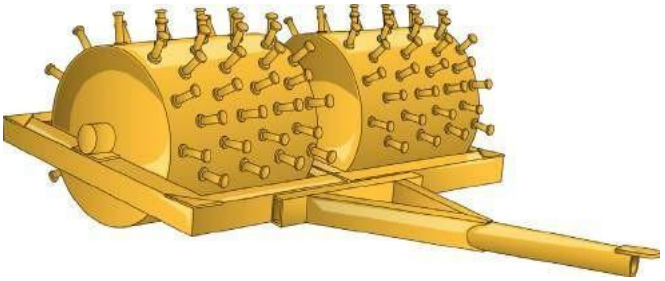


1.1.2 Self-propelled Compactors

Four wheel (steel drum) articulated self-propelled compactor with dozer blade

1.1.3 Towed Compactors

Single sheepsfoot drum compactor



1.1.4 Who Has Duty of Care?

You have a duty of care. So does anyone who has something to do with the worksite.

Duty of care applies to:

Employers/persons conducting a business or undertaking (PCBU). This includes managers, manufacturers/suppliers, importers, designers, inspectors, etc.	Workers. This includes employees, contractors and sub-contractors, employees of labour hire companies, outworkers, volunteers, etc.
	

1.1.5 Worker's Duty of Care

As a worker you must take care of your own health and safety – and the health and safety of others at the workplace. You must not put your own or other people's health and safety at risk.

Never work where you believe a hazard is a serious risk to your health and safety. You must also:

- do your best to follow reasonable health and safety instructions from your boss (PCBU)
- follow workplace health and safety policies and procedures
- do not work where you believe a hazard would be a serious risk to your health and safety.

1.1.6 PCBU/Employer's duty of care

The PCBU must:

- Provide a safe workplace
- Train workers and make sure they know what to do on the job
- Try to get rid of risks, or find ways to minimise risks
- Tell workers about any hazards or risks. Workers must know what to do in an emergency.
- Have a workplace safety plan. For example, workers should be trained in the use of fire fighting equipment and first aid equipment.

Penalties

If you are a PCBU/employer or a worker, the government can fine you or even imprison you for

1.2 The Basics of Road Construction

1.2.1 The Basics of Road Construction

A surveyor will stake out the site according to the site plan. The stakes mark where the road will go and any drains or pits, which will help to drain water away from the road area.

An excavator or dozer removes the trees, shrubs and other plants and levels the area. Some trees may be protected with padding or fencing.

Sometimes contractors may use a borrow pit (also called a sand box). A borrow pit is an area where soil, sand or gravel (material) is dug out to be used in another area. Sometimes the borrow pit will become the drains, or water catchment areas at the end of the work.

The excavator or dozer may use material from the borrow pit to build up low areas in the road. They may also build up diversion blocks. Diversion blocks divert water away from the road and into drains.

As the operator shapes the ground, they will usually create drainage at the sides of the road area. They will also make sure there is enough fall (scope) on the road so that water drains away from the road.

Drains are installed to help take water away from the worksite.

The grader grades the road to produce a much smoother surface.

A roller or compactor then compacts the road. This breaks up lumps and smooths the surface out.

A site supervisor or roller operator tests the compaction. Sometimes they will use a deflectometer or penetrometer. Some rollers/compactors can test the compaction as they drive.

Many layers of the ground material are built up. This is called the subgrade. Each layer is compacted and tested.

Trucks then deliver subbase. Haul trucks or tip trucks sometimes tip the subbase, and front end loaders spread it.

A water truck may spray water on the subbase to help the soil bond. This makes the particles stick together and make it compact better.

Several layers of subbase are laid. The subbase is compacted and tested.

Once the subbase is at the right thickness and is compacted properly, trucks deliver the course road base. The road base is built up in many layers. Water trucks may wet down the road base if it helps the roller/compactor compact the base.

When the road base is thick enough, and is compacted properly, the road is finished.

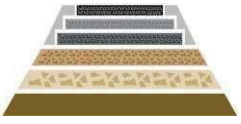
If asphalt is being laid, more layers will go on top of the road base. There will be an asphalt base course, then a binder course, and finally, a surface course.

Finally the planting, erosion control and drainage work is completed.

1.2.2 Principles of Soil Technology for Civil Works

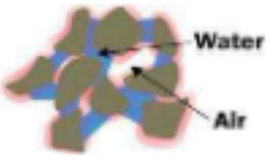
One of the most important jobs you will do, as a machine operator, is to help lay foundations. Foundations are the base for roads, railway lines, swimming pools and buildings. If you do not have a solid foundation, you cannot build something solid on top of it.

When soil is firmly compacted it has an increased density, this provides a stronger foundation to build on.

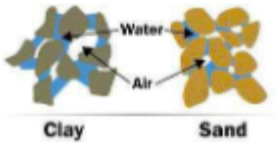


In civil construction, moisture content means how much water is in a soil, rock, aggregate or road base. Moisture is very important in earthmoving. Moisture affects the weight of soils. It makes soils swell, and it also affects the handling properties of the soil. Handling properties means how easy or hard it is to work with that soil.

The amount of water in soil affects its viscosity. Viscosity is how thick the soil is. For example dry loose soil has a low viscosityand is easy to work with. Wet muddy soil has a higher viscosity and can be more difficult to work with.



All soils usually contain moisture. How much moisture the soil has depends on many things. The weather, drainage, and the soil's ability to hold water all affect the moisture in a soil. Retention properties mean how much water a soil can hold. Different soils can hold different amounts of water. Sometimes you can treat a soil to change its moisture content. To do this you mix a chemical with the soil.



Different types of soils can cause problems with foundations. Wet, boggy soil can cause foundations to sink. That is why it is important to make sure water can run or drain from the site. It is also important that the foundation is built up to the right level. You can sometimes treat wet boggy soil with lime. Lime helps dry out the soil, and helps it 'clump' together.

Clay soils can also cause problems under foundations. This is because clay attracts water. When this happens, the clay expands and swells. Later, when it is hot and sunny, the water dries up and the clay cracks.

Over time, this swelling (expanding) and cracking (while shrinking) can warp your foundations. This can cause cracks and potholes in roads, cracked walls or ceilings in buildings, or swimming pools to crack and leak.

You can treat clay soils with chemicals that stop clay from attracting water. Once you treat the clay, you can compact it. This makes a much better foundation that won't swell and crack as much.

Before you use any chemicals, you must make sure they are safe. Check the safety data sheet (SDS) to find out how to safely use, store and handle the chemical. Check the site's environmental management plan. If you are not sure about using a chemical, talk to your site supervisor.

1.2.3 Earthmoving Site Hazards

Checking for underground services

You should always check where services are **before** you start work.

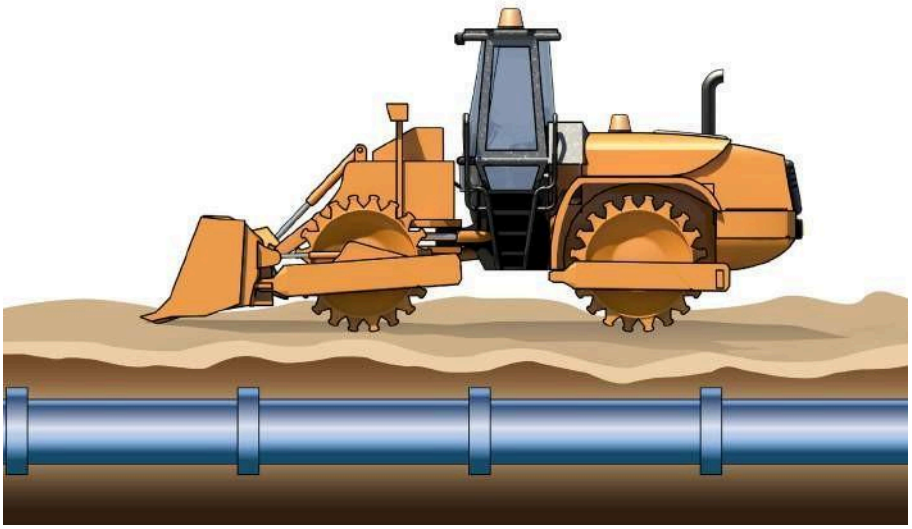
You may phone '**Dial before you dig on 1100**'. You may look at the site plan or talk to your supervisor. You may need to look at the location of pits and meters to get an idea of where the services run. You may need to check with the local council or service company. You may even need to get underground detection equipment.

If you hit a service line, contact the provider immediately. You may need to organise to get the service disconnected while a qualified person fixes the problem.

You can sometimes tell there are services below by the types of ground. Some services are surrounded by a different type of soil, rock or sand. You may notice that the soil is looser, or does not match the soil around where you are digging. There may be a line of tape alerting you to the services.

If you suspect there are services underground, stop working.

Check the ground. You may need to excavate the area by hand, or dig in another area.



1.2.4 Operating Techniques

Building a stockpile

A stockpile is a pile of material (soil, sand, rock, etc) that you use for earthmoving work. You must choose a good location for your stockpile. If you choose the wrong location, your stockpile could get washed away or become dirty (mixed with other materials).

If you can, choose an area of well drained, firm level ground. 	You should set up drainage so that rainwater does not cause the stockpile to wash away or slide. 

Make sure the stockpile is close to the area you are working. You don't want to drive too far to work with the stockpile. 	Make sure you have clear access to the stockpile. 
Clear the area of any rubbish or debris, so it doesn't get mixed in the stockpile. 	When you fill out a stockpile, start by filling the area closest to the back of the stockpile area. 
Don't work too close to the edge of the stockpile as it could give way. 	Keep filling out the stockpile one row at a time or by dozing material to the correct position on the stockpile. 

Taking from a stockpile

When you take from a stockpile, try and work neatly. 	Take from the top, working down in layers. 	**Do not undercut the stockpile. It might collapse on you.** 

You may need to maintain the stockpile by neatening it up.

To do this, you push material up that has been spread out.
Keep the loading area clean and level.

2.1 Plan and Prepare Self-propelled Compactor Operations

2.1.1 Work Health & Safety Legislative Requirements

'Laws to keep your workplace safe'

WHS/OHS requirements are outlined in Acts, Regulations, Codes of Practice and Australian Standards.

WHS/OHS Acts

'WHS/OHS Acts' are laws that explain how to improve health and safety in the workplace.

For example: Model National WHS Act, June 2011. WHS has the same meaning as OHS in this document.

Regulations

'Regulations' explain specific parts of the Act.

For example: Part 4.3 – Confined spaces, Part 4.4 – Falls.

Codes of Practice/Compliance Codes

'Codes of Practice' are practical guidelines on how to comply with (meet the rules of) legislation.

For example: HAZARDOUS MANUAL TASKS Code of Practice, 23rd December 2011.

Australian Standards

'Australian Standards' are work guidelines that set the minimum accepted performance or quality for a specific hazard, process or product.

For example: AS 2550 – Cranes, hoists and winches – safe use set.

What do codes of practice explain?

Codes of practice are practical guidelines on how to comply or follow the rules in legislation/laws.

For example:

A traffic management code of practice will tell you all the rules a traffic controller must follow. For example, a traffic controller must have a zero percent blood/ alcohol concentration/ reading while performing traffic control duties.

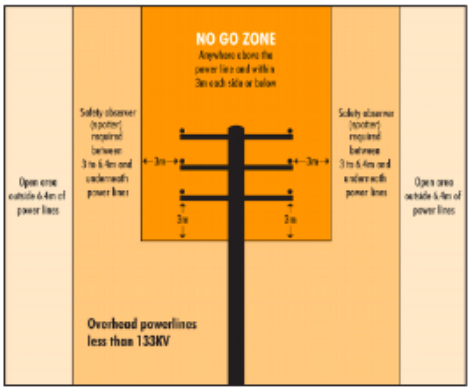
What do Australian Standards explain?

Australian Standards are work guidelines that set the minimum accepted performance or quality for a specific hazard process or product.

For example:

A2250.1-2011 - Powerline distances

This standard tell you the distances you can safely work near powerlines on poles and towers.



What are quality requirements?

The quality requirements tell you the standards you must meet when doing earthmoving work. They tell you what you need to do and how to do it to satisfy the customer. You may need to follow codes of practice, regulations, national standards etc.

Slab Foundation Preparation.
Quality & Specification check list.

√	Job stage	Checked by
	Correct area pegged out	
	Vegetation removed	
	Top soil removed and stockpiled	
	Slab size pegged out in correct location	
	Slab size pegged out to correct size	
	Level markers in place	
	Site leveled to pegs	
	Crushed rock is correct size as per specification	
	Slab area boxed to correct height off floor	
	Crush rock is the correct height as specified	
	Boxing pegs at correct spacing and depth	
	Crushed rock is level to specification	
	Crushed rock covers the specified area	
	Crushed rock compaction meets specifications	
	Compacted crushed rock base is at the specified height	
	Slab preparation meets specification and ready for concrete contractor	
	Contractor notified ____/____/____ @ _____AM / PM	

What are examples of documentation you should read before doing earthmoving work?

- WHS/OHS Act
- Regulations
- Codes of practice
- Australian Standards (AS 2958 Earthmoving machinery)
- Manufacturer's specifications
- Operator's manual for your machine
- Site requirements and procedures
- Company policies and procedures for Employment and workplace relations, Equal opportunity and disability.

Why should you check the operator's manual before using earthmoving equipment?

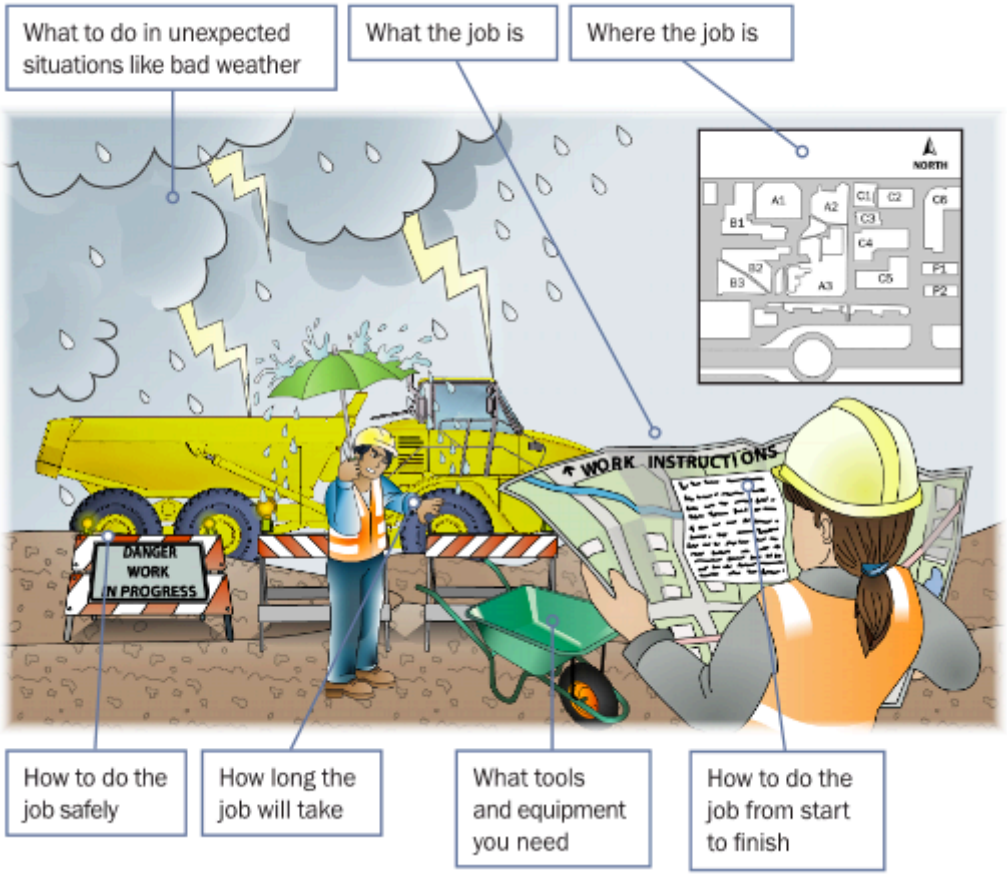
The operator's manual tells you how to operate your machine. The manual also tells you about maintenance (how to keep your machine working well).

2.1.2 Where to Find WHS Information

You can check these websites for more information about workplace health and safety. The National WHS Act started in some states/territories on January 1, 2012.

What do the job's work instructions explain?

Work instructions explain:



What kinds of information do you need before starting work?

- Plans – Drawings and sketches outlining what you need to do
- Specifications – rules and details about the job
- Operational details – how you will do the job
- Quality requirements of the job – the standards you are expected to meet.

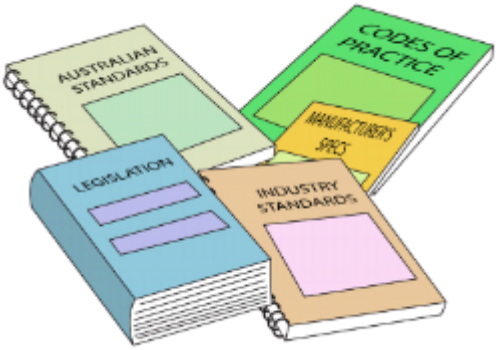
When planning your job, why do you need to know what other people are doing on site?

- To make sure you will not get in the way of other jobs being done
- To make sure you know what others are doing near where you must work.

What are the National Work Health (WHS) and Occupational Health and Safety (OHS) Acts about?

The Acts explain how to keep your workplace safe and healthy. They explain what you need to do to meet your duty of care.
For example:
You must make sure you do earthmoving work in a way that won't put yourself or others at risk. You must use earthmoving equipment according to instructions.

Note:
Check your state/territory requirements as Acts may vary.



You have a high risk work licence. Under WHS/OHS laws, what are your responsibilities while working?

You must work in a way that is safe. You must not risk the health and safety of yourself or others.

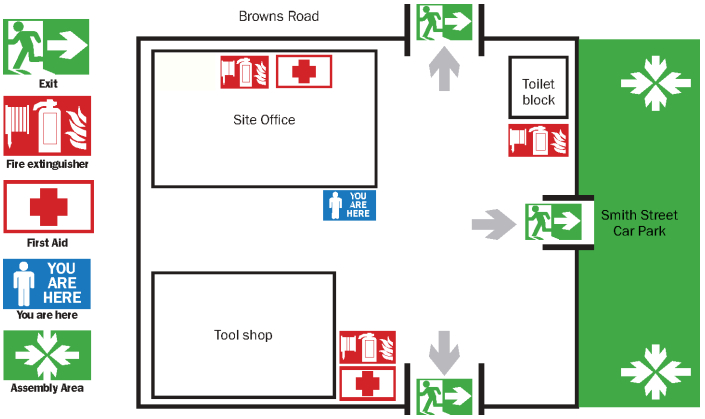
2.1.3 Worksite Requirements

Examples of documents your employer should provide include:

- Safety plan for the site
- Emergency procedures, for example a site evacuation plan
- Environmental management plan for the job.

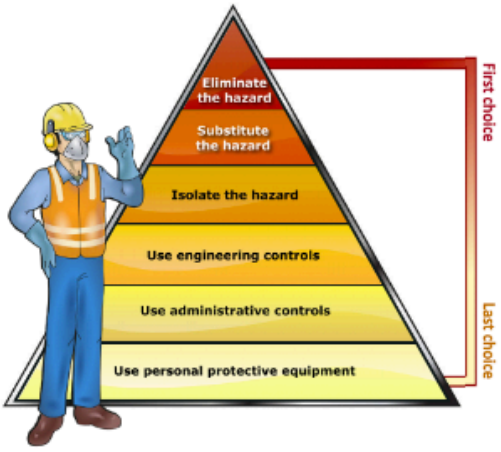
2.1.4 Emergency Evacuation Plan

Many worksites have an emergency evacuation plan which is displayed on the notice board.
You should make sure you know how to interpret this plan. For example, start by looking for a 'You are here' sticker on the plan drawing. Note how nearby areas are shown on the plan. Then work out where the emergency exit is – on the plan and in real life.



The hierarchy of hazard control is a list of controls you can use to lower the danger from a hazard on the worksite. What are the six (6) levels in the hierarchy of hazard control from the first choice to the last choice?

1. **Elimination:** If possible, remove (take away) the hazard.
2. **Substitution:** Use a safer method if you can't remove the hazard.
3. **Isolation:** Stop access to the hazardous (dangerous) area.



4. **Engineering Control Measures:** Change the tools, equipment or environment to make it safer.
5. **Administrative Practices:** Reduce the time the worker is exposed to the hazards by using training, job rotation, the timing of jobs, etc.
6. **Personal Protective Equipment (PPE):** Use PPE as your **last line** of defence.

Memory aid: **E**very **S**aturday **I** **E**at **A** **P**ie

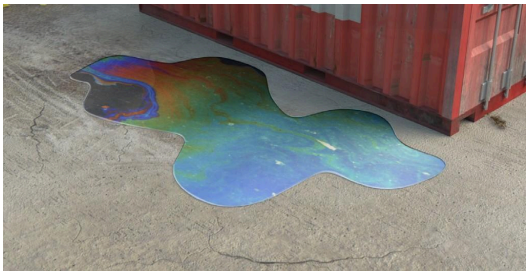
2.1.5 How to Remember the Hierarchy of Hazard Control

You can use the following acronym (an abbreviation formed from the initial components in a phrase) to help you remember the steps in the hierarchy of hazard control.

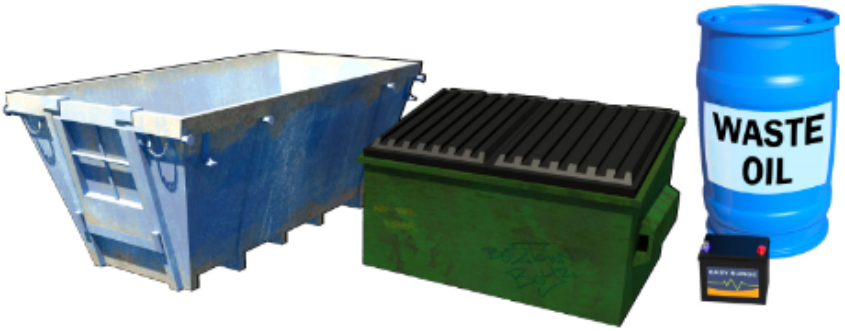
2.1.6 Environmental Management Plan (EMP)

The Environmental management plan (EMP) tells you important things about the environment at the worksite. It explains how the work you are doing could damage the environment. The possibility that you will cause this damage is called the environmental risk.

The EMP tells you what you must do so you do not damage the environment. It tells you how to work in a way that reduces damage to the environment.



The EMP also tells you how the worksite meets all environmental protection laws and what to do with waste.



2.1.7 Earthmoving Hazards and Risks

The most common hazards and risks with earthmoving work are:

Falls from plant or machinery 	Traffic and other mobile plant 	Overhead or underground power 
Underground gas lines 	Water and sewage piping 	Rollovers 
Noise 	Dust 	Manual handling 
Contaminated soil 	Falling into trenches or excavations 	UV rays (radiation) from working in the sun 

2.1.8 Decibel Levels of Common Sounds

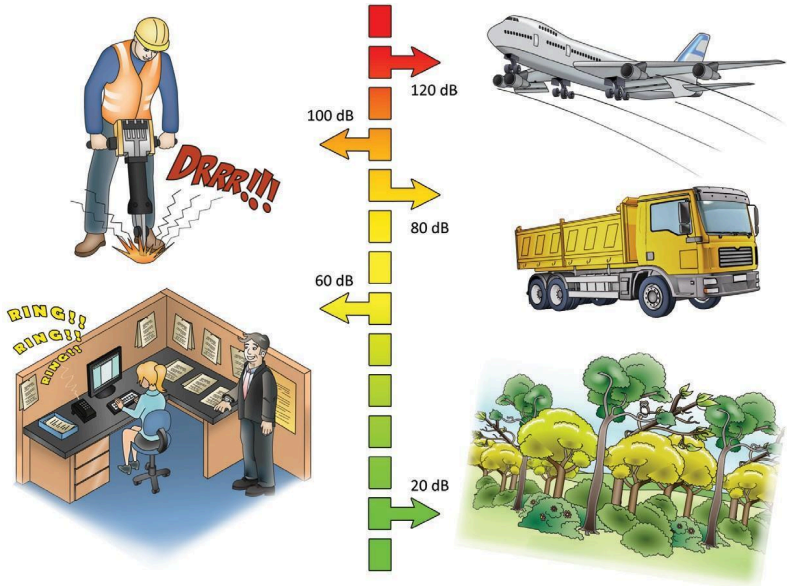
You must wear hearing protection when operating heavy equipment. This is important because 8 hours of noise at 85 db (decibels), or noise levels of 140 db even briefly can permanently damage your hearing.

Hearing loss is:

- Slow
- Painless
- irreversible.

Here are some examples of levels of noise in different environments.

- A forest has about 20 db of noise
- In an office there might be around 60 db
- Standing outside a truck generates about 80 db
- A jackhammer generates around 100 db
- A jet taking off generates about 120 db



2.1.9 Chemicals and Solvents

Chemicals should always have a label, so that you can easily tell what you are working with. They should be stored in a safe place where nobody may accidentally come in contact with them.

Always check the safety data sheet (SDS) before handling any chemicals.

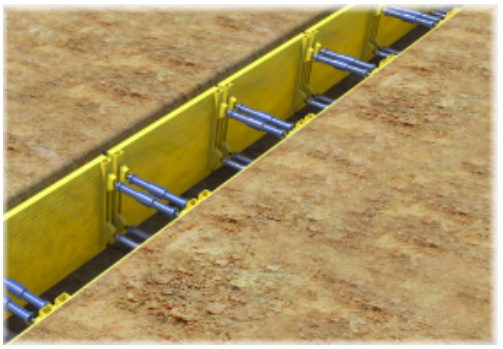
An employer must provide an SDS to a person using chemicals in the workplace. They must make sure the person using the chemical knows how to read and understand the SDS.

If you are not sure about a chemical, put the chemicals in a safe, isolated area and talk to your supervisor.

2.1.10 Safety around Trenches

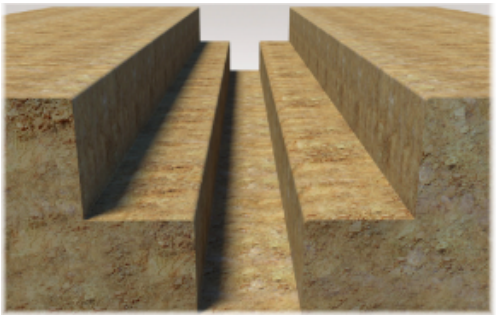
There is a risk that a person could fall into an open trench or excavation on a worksite. People working in trenches are at risk of being crushed or trapped if the trench caves in. You must try to reduce this risk. Isolation is a good way to reduce the risk. You could put up para-webbing, barriers or temporary fencing. You may put trench shields with guard rails.

2.1.10.1 Trench Shields and Shoring



If a trench is 1.5 metres deep or more you must use trench shields or shoring. You should use trench shields that have approved lifting points. The shields weight must be permanently marked on the shield. If the shield does not have its weight marked, it must be rigged by a licenced dogger or rigger. The shoring must meet Australian Standard 4744: Steel shoring and trench lining equipment. It must also come with an instruction manual. You should secure a ladder for workers to get in and out of the trench.

2.1.10.2 Benching



Benching is where you cut levels in the soil to reduce the fall risk. For example, instead of having a single 2 metre trench, this area is excavated in two (2) levels. The first level is a 1 metre drop and is 3 metres wide. The second level is 1 metre × 1 metre.

2.1.10.3 Battering

Battering is where the edges of a trench are 'tapered' back on a gentle slope. Battering means that instead of a straight drop off, you have a more gentle slope. In this example, the drop off has been 'battered' back so the fall hazard is reduced. Benching and battering reduce both the fall risk and the risk of collapse.

2.1.11 Confined Space

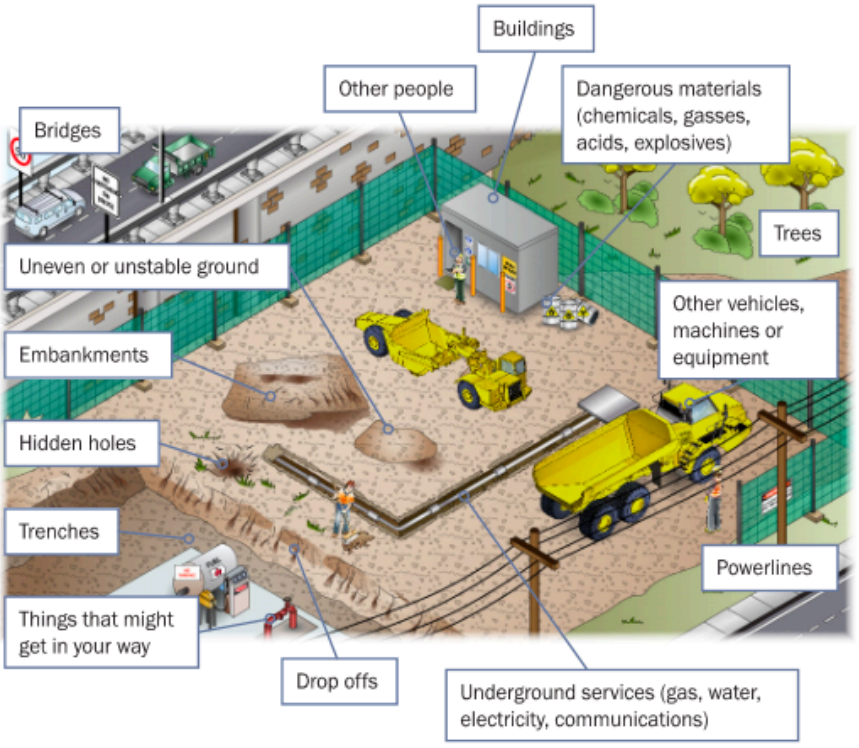
A confined space is an enclosed or partially enclosed area. It is an area that was not designed for people to go into. It may have no natural or mechanical ventilation. There are also hazards (such as a gas or flammable substance) that makes it dangerous.

Gases in the atmosphere such as LPG, which are heavier than air, may enter spaces like trenches, underground tanks or pits displacing oxygen.

When you drive a petrol, gas, or diesel machine into a space like this you create a hazard. The exhaust gasses can fill the space. Dangerous gases like carbon monoxide can build up in the area. You can't smell all the dangerous gasses or fumes. You might breathe in a dangerous gas and not even know it. The gas could make you unconscious or even kill you.

You must be trained to work in a confined space, you must also have a permit. The permit makes sure you have thought about all hazards and controls, including a rescue plan, and that you have a team there to help you in case something goes wrong. You must get your permit approved by a supervisor.
If you are going to work a machine in a confined space, you might need a catalytic converter installed. A catalytic converter takes out harmful gasses (like hydrocarbons, carbon monoxide and nitrogen oxides) and turns them into harmless gasses (like carbon dioxide, water and oxygen).

What are some hazards you must look for before starting work?



2.1.11.1 Example of an Environmental Management Plan

Company Details:	EGA Earthworks – 19 Chandler Road, Boronia. Vic. 3155.		
Work description:	Soil removal		
Date	12/12/2015	**Contact**	Dick Osborne – 0455 555 555

Environmental concerns for the site	Risk Level	Risk likelihood	Protection measures
Excessive noise generation associated with the construction and operation of support infrastructure. Public nuisance /complaints.	Minor	Possible	Work on site to be carried out between 7:00am and 6:00pm.
Vegetation loss leading to increased runoff during wet periods.	Moderate	Almost certain	Use cut off drains to direct water away from area being worked on. Put silt cloth barrier on high side of trench. Put straw bales in trench to filter water.
Mud on surrounding roads near entry and exit points.	Moderate	Possible	Use rumble grids and wash wheels of vehicles leaving site.
Dust generation due to removal of top soil.	Moderate	Likely	Use water carts to keep soil moist.
Combustion products from exhaust pipes. Air emissions.	Moderate	Likely	Check that catalytic converters fitted to machinery.
Damage to remaining trees on site.	Moderate	Possible	Use temporary fencing and/or safety mesh to isolate trees from surrounding work.

Approved by:	TJ Crossbow	**Signed:**	TJ Crossbow

2.1.11.2 Working with an Environmental Management Plan

When preparing an Environmental management plan (EMP) there are three things you must decide:

1. How serious is the environmental risk?
2. How likely is it to happen?
3. How can you control the risk?

How can you control the environmental risk?
Here are some examples of environmental risks and the controls that could be used. They can be written into an environmental management plan.

Example 1

Risk : Soil and clay spread on residential streets.

Cause : Not cleaning wheels of vehicles leaving the worksite.

Control : Wash wheels or use rumble grids or put gravel at exit points.

Example 2

Risk : Noise.

Cause : Engine noise from heavy machinery.

Control : Work on site to be carried out between 7 am and 6 pm.

Example 3

Risk : Loss of topsoil.

Cause : Driving across a paddock or over vegetation.

Control : Go around the paddock even if it increases the time the job takes.

2.1.12 Disposing of Environmentally Sensitive Fluid

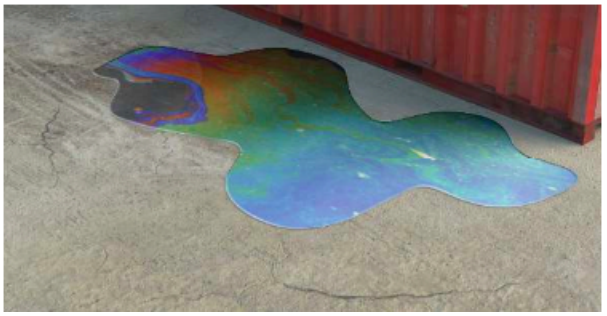
There are times when you will need to dispose of environmentally sensitive fluids. You may have to deal with oil spills or chemical spills.

There are disposal companies who remove used oil, oily water and emulsions, waste grease, filters, rags, brake fluids and coolants.

Oil is a good example of an environmentally sensitive substance that needs to be disposed of properly.

The damage oil and chemicals can do

If oil ends up in landfill, it will slowly leach into surrounding land and underground water. Storm water and sewage, polluted by oil, can cause long term damage to coastal and marine habitats and ecosystems, seabirds, mammals, fisheries and people.



How serious is the environmental risk?

You can use the following table to rate how serious the environmental risks are.

Level	Rating	Examples of impact on the environment
1	**Catastrophic**	**Death, injury or illness to humans or animals. Destruction of a heritage site. Toxic release into waterway and groundwater.**
2	**Major**	**Release leading to measurable change to storm water quality. Soil contamination over a wide area. Damage to a heritage site.**
3	**Moderate**	**Short term minor change to ecosystems. On site release that is contained with little contamination. Localised, short-term change in storm water quality.**

4	**Minor**	**On-site release immediately contained. Isolated complaints from the community.**
5	**Insignificant**	**Impact on the environment is too small to measure.**

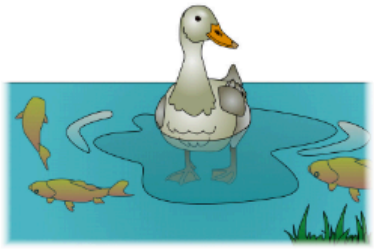
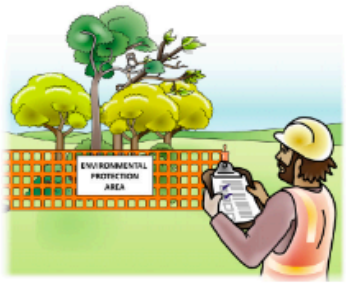
How likely is the environmental risk?

You can use the following table to rate how likely it is that an environmental incident may happen.

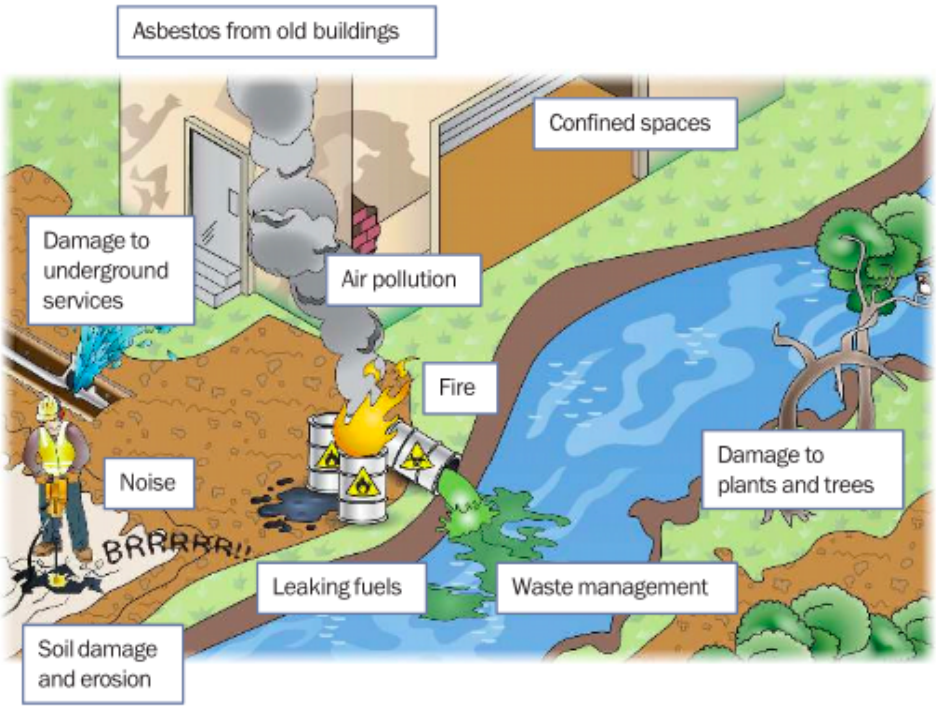
Level	Rating	Examples of impact on the environment
A	**Almost certain**	**Environmental concerns that you expect will happen.**
B	**Likely**	**Environmental problem that has happened in the past and is likely to happen again.**
C	**Possible**	**Environmental concern that has sometimes been a concern and may happen.**
D	**Unlikely**	**Environmental concern that has sometimes been a concern but is not expected to happen.**
E	**Rare**	**Environmental issues that are very unlikely to happen.**

What does the environmental management plan (EMP) tell you?

The EMP tells you:

Possible risks to the environment on the worksite 	How to work in a way that reduces damage to the environment 
How the worksite meets all environmental protection laws 	Who is responsible for each part of the environmental management plan (EMP) 

What environmental challenges should you be careful of when working?

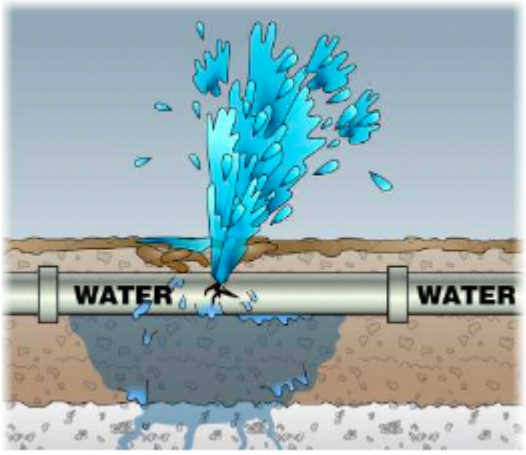


What could happen if you damage an underground gas line?

You could cause a gas leak, and maybe an explosion.

What could happen if you damage an underground water pipe?

You could cause a water leak, and the water could be polluted.
Surrounding soil can be eroded causing a cavity which could collapse either immediately or in the future.



Why should you check the noise laws for your state/territory before starting work?

Because there are rules about how early or late you can work.

What is the danger if you damage an underground electrical cable?

There is a risk of an electric shock.

Who do you talk to if you damage an underground cable, gas line or other service?

You must tell your supervisor. Your supervisor will tell the relevant authority.

Are you allowed to carry a passenger on the self-propelled compactor?

No, never. They could fall and be crushed by the self-propelled compactor.

How do you safely get in and out of the self-propelled compactor's cabin?

Always use 3 points of contact facing the machine. For example, use two hands and one foot or two feet and one hand.

2.1.13 Job Safety and Environment Analysis (JSEA) or Safe Work Method Statement (SWMS)

These forms help you plan for the work you will do. It is very important you fill these out before you start work. They help you work out the tools, equipment and PPE you need to do the job safely. All workplaces should have these types of forms.

Example:

Job safety and environment analysis (JSEA)/Safe work method statement (SWMS) 123456

1. ACTIVITY/TASK INFORMATION AND LOCATION	
Location/Project:	123 Belmaine Highway, Roseville
Activity or Task Description:	Load spoil from excavation right hand turn lane
Competency/Qualification needed to do work safely:	All operators have current tickets

2. HAZARD IDENTIFICATION

Location/Area Hazards		Rate	Work/Task Hazards		Rate	Work/Task Hazards		Rate
Area			**Visibility and hearing**			**Plant/machinery**		
Entry or exit is difficult			Poor lighting			Plant or Machinery	X	8
Engulfment/entrapment			Poor visibility			Tools/equipment		
Work at heights			Bright lights/UV			Traffic	X	8
Confined space			High noise levels	X	7	Pedestrians		
Remote location			Communication difficulties			Railway		
Rescue could be difficult			**Services**			Pneumatics		
Temperature extremes			Multiple electrical feeds			Process lines		
Hazardous/Toxic substances (attach MSDS)			Electrical hazards - LV			Suspended loads		
			Electrical hazards - HV			**Slips/trips/falls**		
Gasses/oxygen/chemicals			Overhead power	X	8	Slips/trip hazard		
Poisonous gas/es			UG services (gas, power, water)			Fall hazard		
Explosive/flamable gas			**Hazardous/toxic substances**			**Other**		
Oxygen levels (high or low)			Pressurised fluids			Sharp materials		
Inhalable dusts/fibres			Gas cylinders			Confined space		
Hazardous/toxic substances (attach MSDS)			Flammable materials			Work at heights		
			Toxic materials			Welding/Grinding		
Exposure			Acids/solvents			Manual handling		
Heat/Cold			Other chemicals			Using ladders		
Sunlight/ Radiation	X	4	Inhalable dusts/fibres			Using EWPs		

3. PPE		4. ACCESS/EQUIPMENT/ISOLATION		5. ENVIRONMENTAL		
Hands, feet and body		**Access equipment**		**Environmental Hazards**	✓x	**Rate**
Gloves: (type)	X	Scaffold		Air pollution (dust, fumes)	X	5
Safety boots	X	Ladders		Noise (plant and equipment)	X	5
Long sleeves/pants	X	EWP		Spills to drains/waterways		
High visibility vest/clothing	X			Spills to ground	X	5
Head and face				Soil erosion		
Safety glasses/sun glasses	X	**Static plant/equipment:**		Hazard to flora/fauna		
Full face shield				Other:		
Hearing protection	X					
Hard hat	X	**Mobile plant/equipment:**				
Dust gas mask		Excavators, Loaders, Trucks, Machine	X			
Breathing apparatus			X			
Welding face shield		**Safety/emergency equipment:**				
Fall protection and access						
Safety harness						
Fall protection equipment						
Fall arrest equipment		**Isolation and warnings**				
Other:		Barricades	X			
		Group isolation				
		Personal locks or lock out tags				
		Warning signs	X			
		Area lighting				
		Other:				
		Traffic controllers	X			

Risk Rating Table: Use the following table to rate the risk.

- 1-2 = Low
- 3-4 = Medium
- 5-6 = High
- 7-8 = Extreme

Likelihood: (How likely is it to occur)	Consequences: Catastrophic	Major	Moderate	Minor
Almost Certain	8	7	6	5
Likely	7	6	5	4
Possible	6	5	4	3
Unlikely	5	4	3	2
Rare	4	3	2	1

6. PERMITS (Attach and record number)

Hot work		Excavation	N/A	Hazardous work	
~~Access to work area~~		High voltage		Confined space	

Job safety and environment analysis (JSEA)/Safe work method statement (SWMS) 123456

7. JOB STEPS, HAZARDS AND CONTROLS

Step (No.)	Job Step (Describe each step)	Hazard/Environmental Issue	Risk Rating (Before control)	Control	Risk Rating (after control)
1	Set up traffic control	Traffic in busy intersection	8	Barriers and flag person supplied by ABC Traffic.	1
		Noise of traffic and plant	7	Hearing protection must be worn at all times.	1
		Sunlight	4	Long sleeve pants, tops, hard hats with visor and sunglasses.	1
2	Unload excavator from float	Excavator sliding on ramps	5	Pedestrian exclusion zones 1.5 x excav. height. Operator wear seat belt.	3
3	Excavate turn lane	Powerlines overhead	8	Power will be isolated. This must be confirmed before starting.	1
4	Load tip truck	Location of tip truck and drivers while loading.	8	Traffic controllers will direct drivers where to safely park. Drivers must remain in truck while being loaded.	1
5	Load excavator on float				
		Dust and noise	5	Noise restrictions limit work to between 9am-5pm. Water truck available to reduce dust if needed.	2
		Spills to ground	5	Pre-op checks on excavator before work. Spills kit on site if needed.	2

8. CONSULTATION AND WORKER OFF

By putting my signature below I confirm that I have attended a briefing and understand and will comply with all environmental and safety issues, as described in this JSEA/SWMS. I have reviewed and will comply with all necessary paperwork including permits, SDS, isolation plants etc.

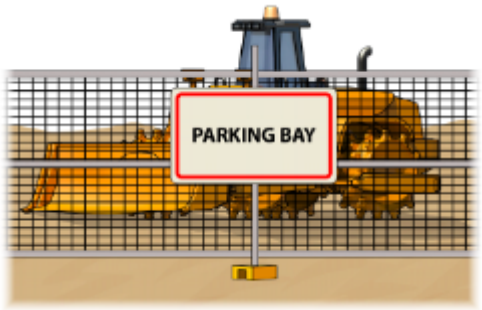
Name	Signature	Date	Name	Signature	Date
Dick Osborne	Dick Osborne	2/4			
Paul Williams	Paul Williams	2/4			
Jason Tennant	Jason Tennant	2/4			
Amanda Jones	Amanda Jones	2/4			

9. FINAL APPROVAL/SIGN OFF

	Name	Signature	Date
Approved by:	Mark Alabaster	Mark Alabaster	2/4/
Approved by:	Duncan Morton	Duncan Morton	2/4/
Customer/Client	N/A		

What does the safety plan tell you?

The safety plan tells you how the worksite intends to meet all the safety rules. It tells you:

<table>
<tr><td colspan="2">What personal protective equipment (PPE) to wear
  </td></tr>
<tr><td>How to use tools, plant and equipment safely
  </td><td>Emergency procedures and exits
  </td></tr>
<tr><td>How to park safely and where to park
  </td><td>How to control hazards and risks
  </td></tr>
</table>

When do you wear respiration gear such as a mask?

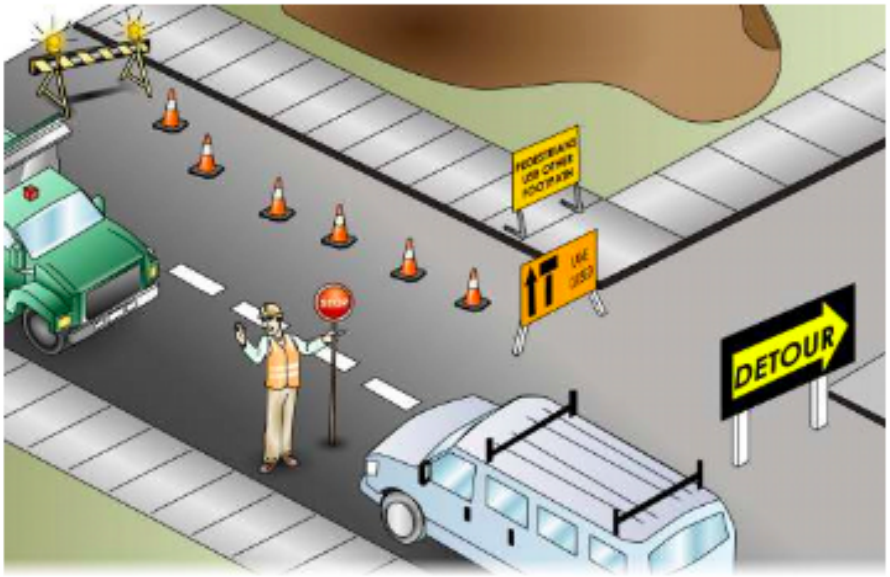
When the area is dusty or polluted.

When do you wear hearing protection?

You must wear hearing protection when there is a danger to your hearing from the work site or the equipment you are operating.

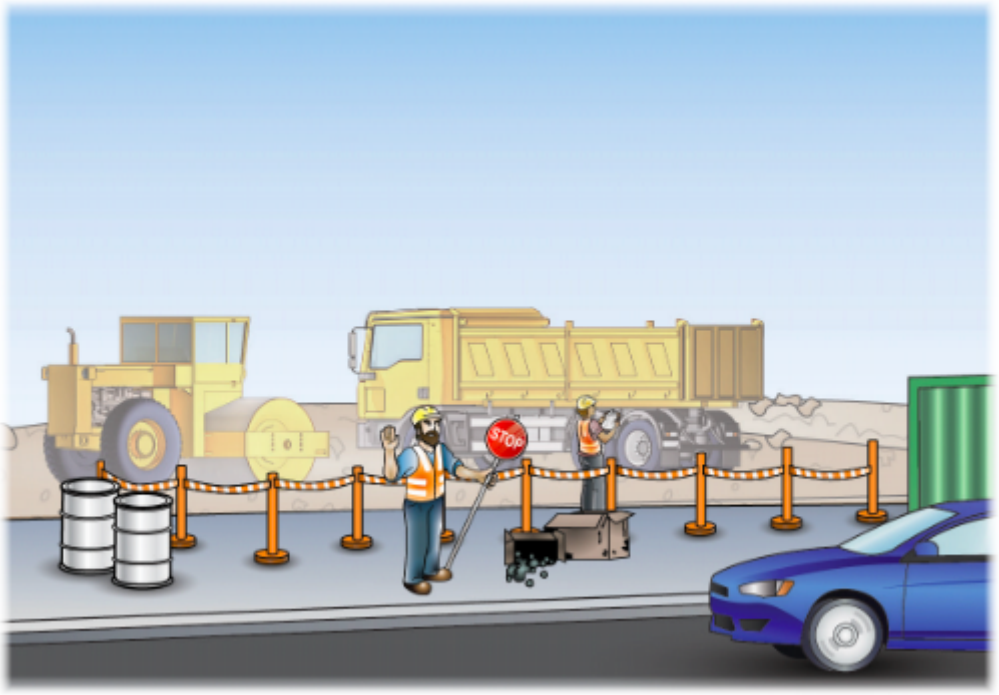
What is the aim of a traffic control plan?

The aim of a traffic control plan is to maintain a safe flow of traffic around the work area.



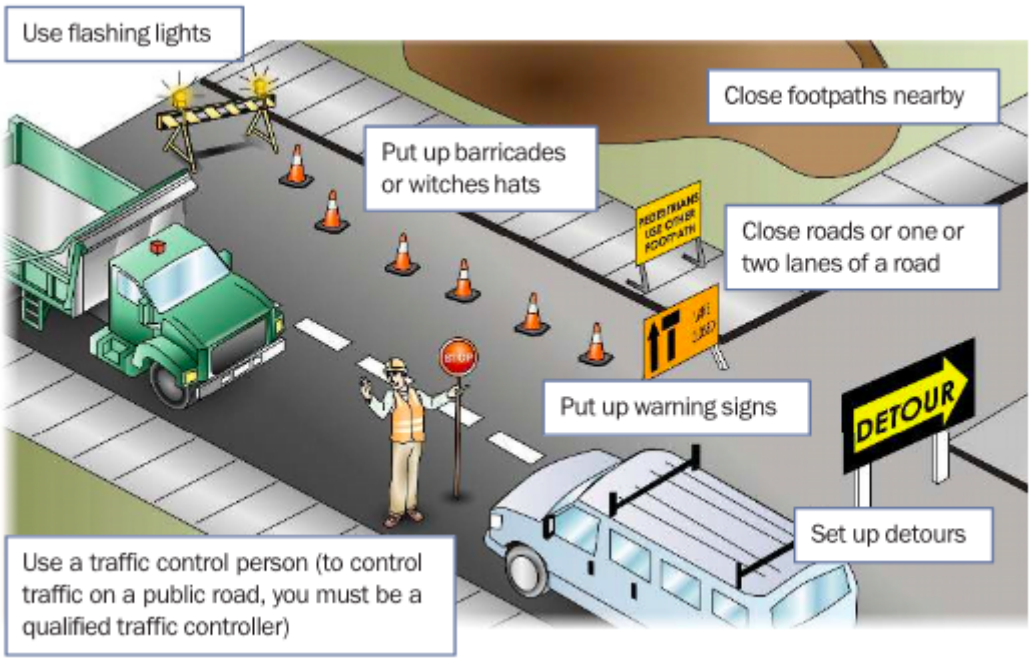
What does the traffic management plan (TMP) tell you?

It tells you how to control vehicles in and around the worksite. It helps keep the site safe for you and others. You may require a traffic control licence in your state or territory.



What can you do to control traffic in and around a worksite?

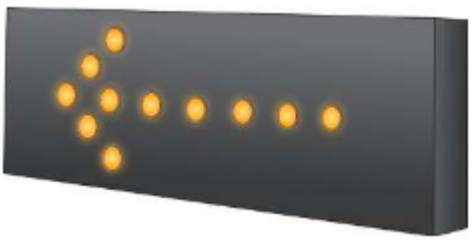
You can:



Where do you put up warning signs?

Near underground services 	Near dangerous places 
In places you need to control traffic 	On the site fencing 

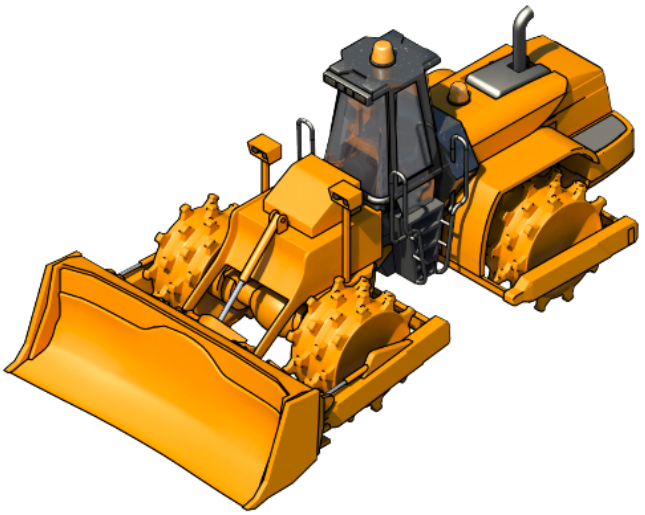
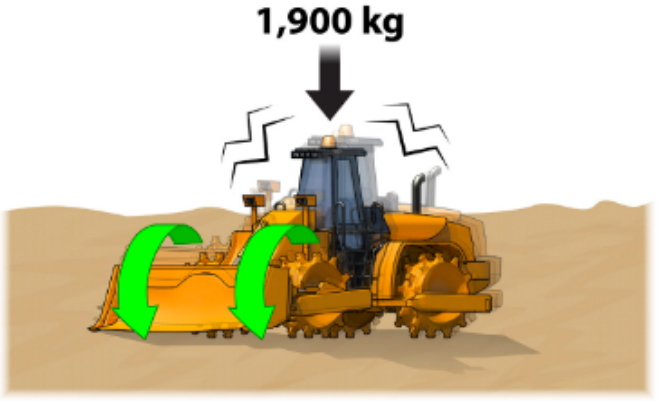
What signs may be used in a traffic control plan?

Speed limit signs 	Warning signs 
Arrow boards 	Portable traffic signals 

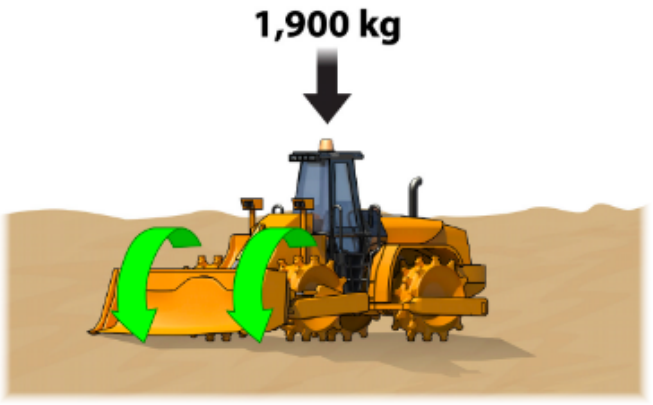
What equipment may be used in a traffic control plan?

Stop/slow bats 	High visibility vests 	Radios 
Barricades 	Cones 	Bollards 

What kinds of self-propelled compactors are there?

Sheepsfoot or padded self-propelled compactor	
Vibrating self-propelled compactor	

Static/smooth self-propelled compactor



2.1.14 Tools and Equipment

Here are some typical tools and equipment you might need. Remember, if your workplace has a policy about what PPE you need to use, you must use it.

Personal protective equipment (PPE)

- Steel cap boots
- High visibility safety vest
- Hearing protection
- Hard hat
- Goggles/glasses
- Gloves
- Dust mask

Hand tools

- Shovel and levels
- Socket sets
- Screwdrivers or wrenches
- Wire brush
- Spanners

Maintenance equipment

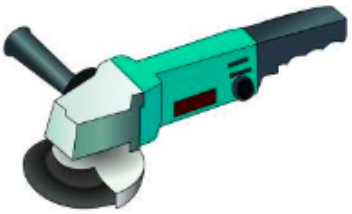
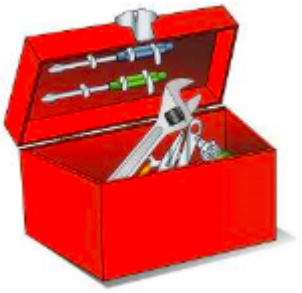
- Grease gun
- Tyre pressure gauge

Lifting equipment

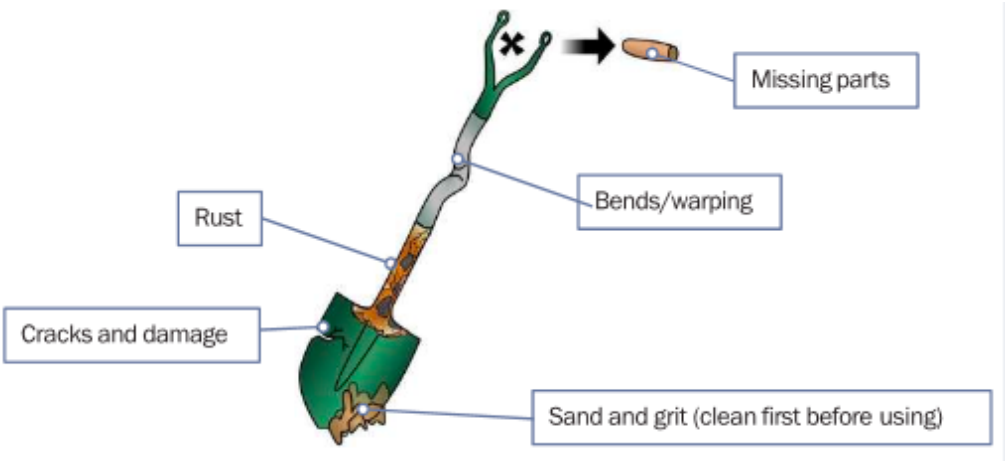
- Slings
- Chains
- Shackles

What kinds of tools and equipment might you use when doing earthmoving work?

Jack, chocks and stands. 	Crowbars 
Hand tools such as spanners, ratchets, wrenches, screwdrivers and hammers. 	Socket set 
Laser level 	Wire brush 
Welder 	Punch 

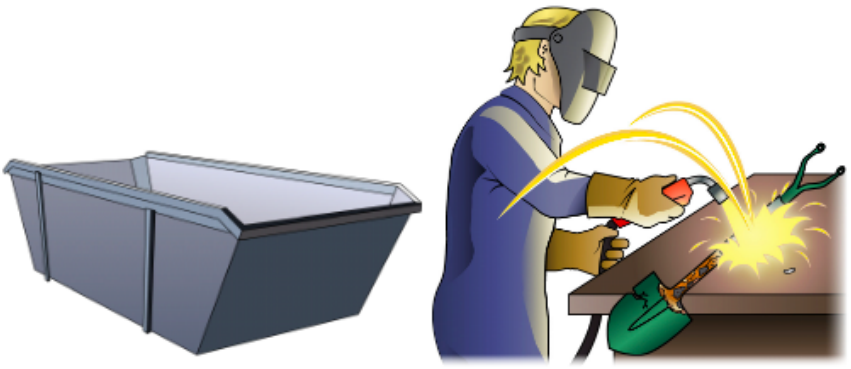
Grinder 	Oxy set 
Portable lighting 	Grease gun 
	Other hand tools that come with the grader 

What kinds of faults do you check hand tools for?



What do you do with faulty hand tools?

If you can, arrange to have them repaired. If that is not possible, tag them as faulty, or put them in the rubbish.



2.1.15 First Aid and Emergencies

Employers should make sure there are trained first aiders and first aid kits available.
The employer should make sure:

- The first aid kits are checked, maintained and kept in a clean dry place.
- There are clear signs indicating the location of first aid kits.
- They have recorded and displayed the numbers and location for emergency services (or local doctors or hospitals).

2.1.15.1 Reporting Incidents

As a PCBU, employer or self-employed person you must report serious incidents to the SafeWork authority in your state. You must give a written report within 48 hours if any of the following happen on a site you are controlling:

A death	An injury that requires medical treatment	Exposure to a substance that requires treatment	Other injuries or health issues caused from a workplace incident.
			

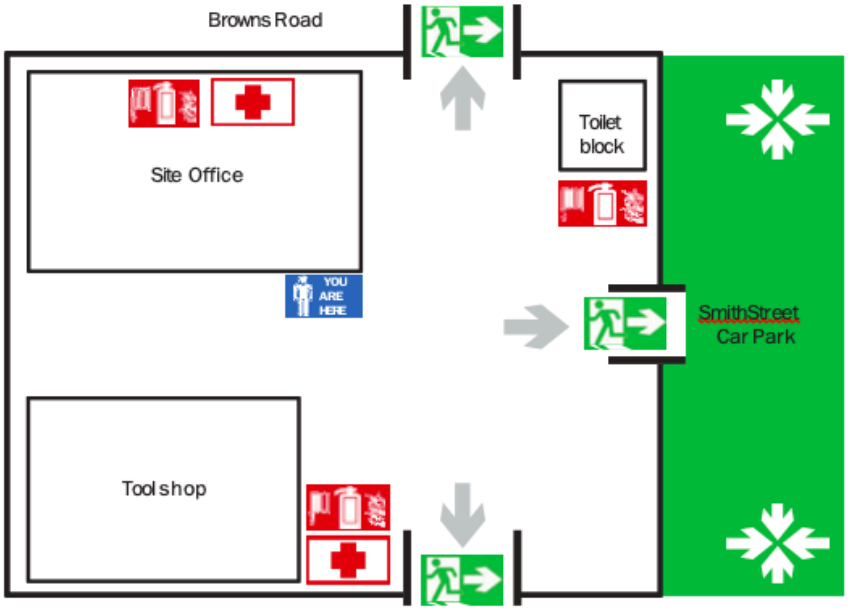
The authorities may send an inspector to come and examine the site. You must leave the site as it is, unless you need to; protect people, help an injured worker, make the site safe, or stop other incidents happening. The inspector will tell you when you can continue working normally.

2.1.16 Safety Plan

The safety plan may tell you things like:

- How to use tools and equipment safely
- How hazards and risks need to be controlled
- Emergency procedures
- Emergency exits and assembly areas
- What PPE to wear
- Safe areas to park machinery
- Site evacuation.

2.1.16.1 Site Evacuation Plan (Example)



2.1.17 Communication

You need to be able to communicate with other workers when you're working on a job. Here are some important communication methods.

Written instructions – You might have written work instructions for some jobs. The instructions will tell you what to do and how to do it.

Schedules/rosters – You might have to follow a schedule telling you where and when to start work.

Verbal instructions – Your supervisor or a workmate might tell you how to do a particular task at the worksite.

Fault reporting – If you find a problem with the telehandler, its attachments or any other equipment, you must tell your supervisor or the owner of the equipment.

You may also have to tag out the equipment, if it's not safe to use.

Remember to document (write down) the problem in th

Then lock the telehandler and take the key.

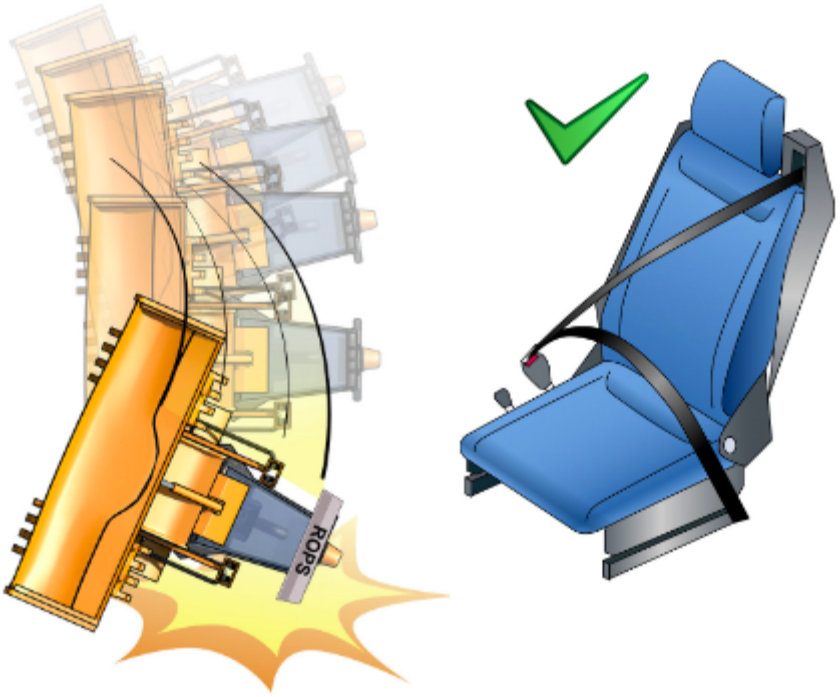
Hand signals – Learn the standard hand signals for your worksite.

What equipment should be on site to deal with an emergency?

Telephone 	Fire extinguishers 
First aid kit 	Incident reporting forms 

Which safety devices protect you if the self-propelled compactor tips over?

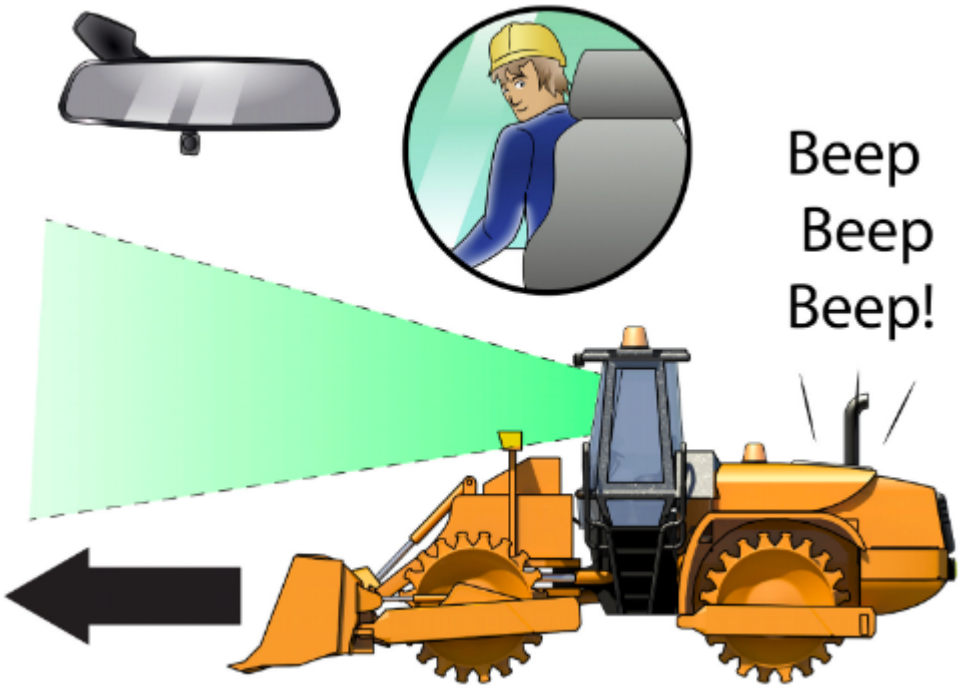
The rollover protective structure (ROPS) and the seat belt.
Always wear the seat belt when using a self-propelled compactor!



2.2 Operate Self-propelled Compactor

What do you do before moving a self-propelled compactor which has been stationary?

1. Sound the horn once.
2. Check the way is clear and there is no one near the self-propelled compactor.
3. Make sure the reversing alarm has started before you move in reverse.

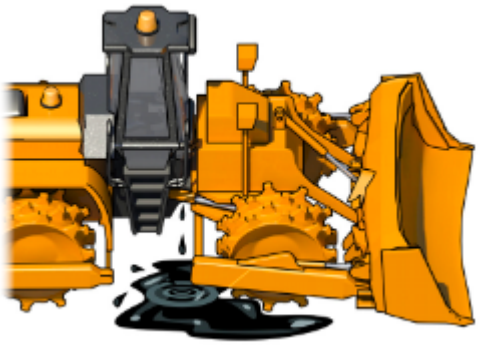


What is the first check you do on the machine?

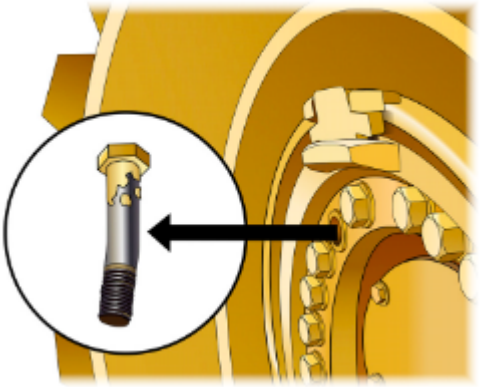
Walk around it and check for obvious problems you can easily see.

What pre-operational checks do you do before using the self-propelled compactor?

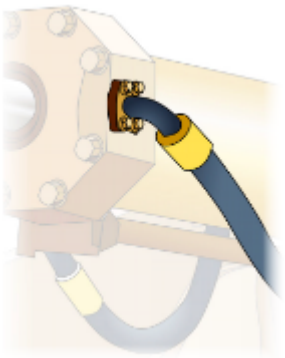
Look for leaks under the machine



Check drum condition and nuts



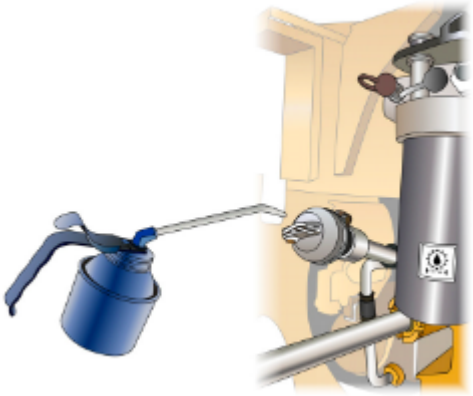
Check hydraulic systems (including attachments)



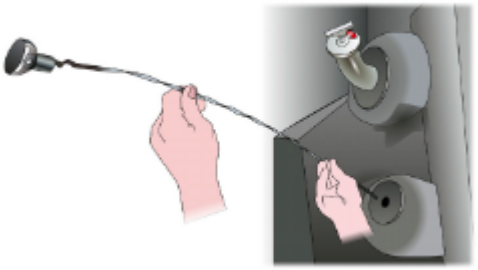
Check the fuel gauge to make sure the self-propelled compactor has enough fuel

Check power steering fluid

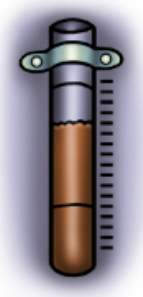
Check transmission oil



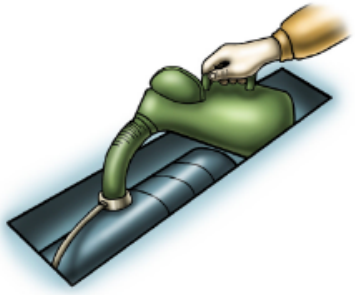
Check engine oil



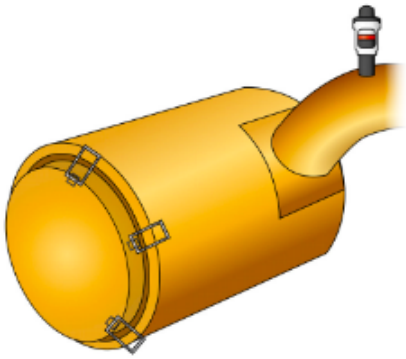
Check hydraulic fluid (brakes and clutch)



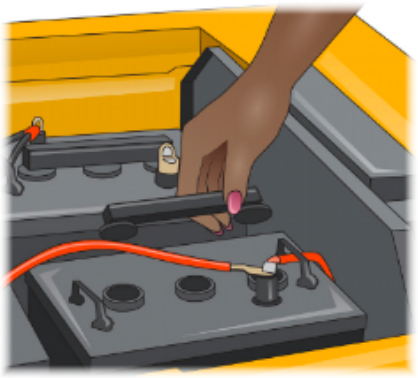
Check engine coolant



Check air filter



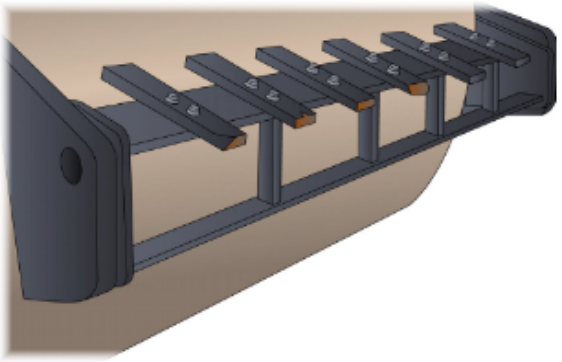
Check battery water level



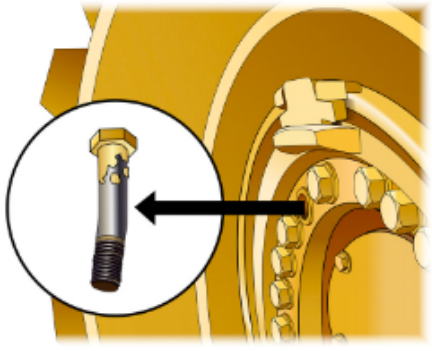
Drain condensation from the air tank (if fitted).

What structural checks do you do? For example, safety features and mechanical parts.
What checks do you do to the self-propelled compactor's moving parts and safety features?

Check the condition of attachments



Check for broken or damaged parts



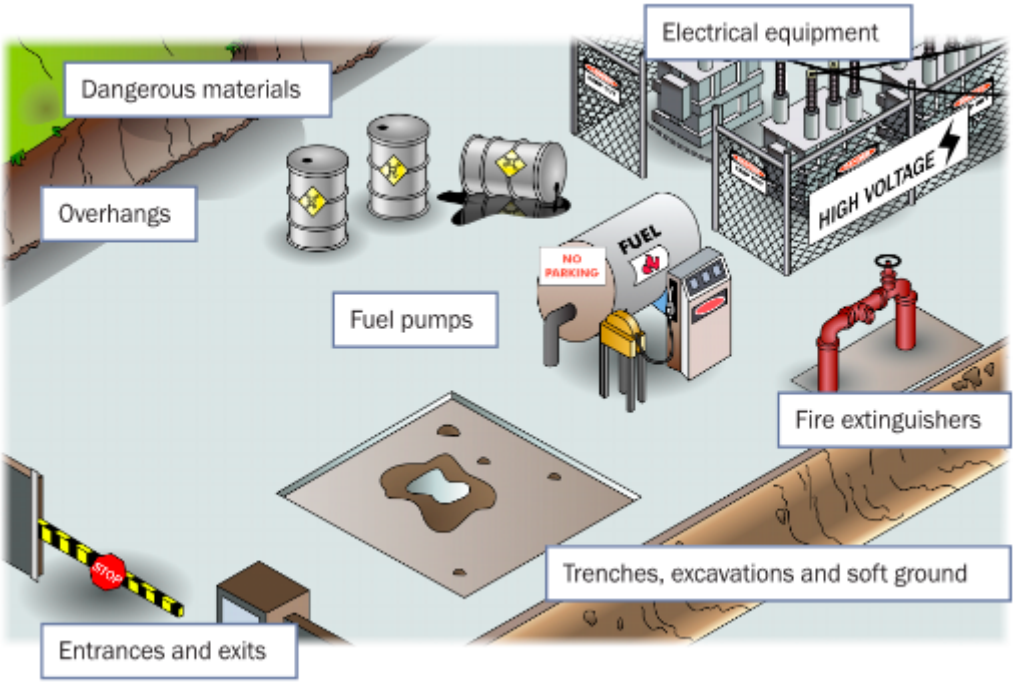
Check damage to the roll over protective structure (ROPS).

You take out the oil dipstick and the oil looks milky. What does this mean?

There may be water leaking into the engine oil. There may be water in the sump or the engine may need repairs. Check with your supervisor.
The engine should not be operated.

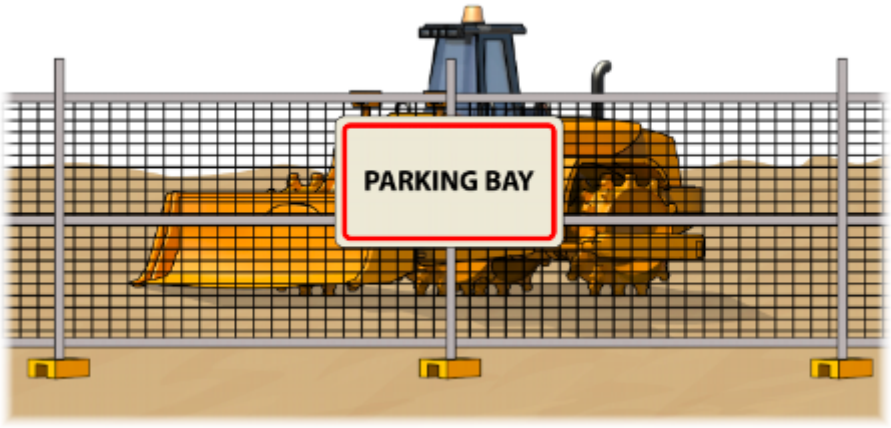
Where would you not park the self-propelled compactor?

Always park in a safe place on firm, level ground.
Do not park near:



What is the best kind of surface to park the self-propelled compactor on?

A firm level surface.

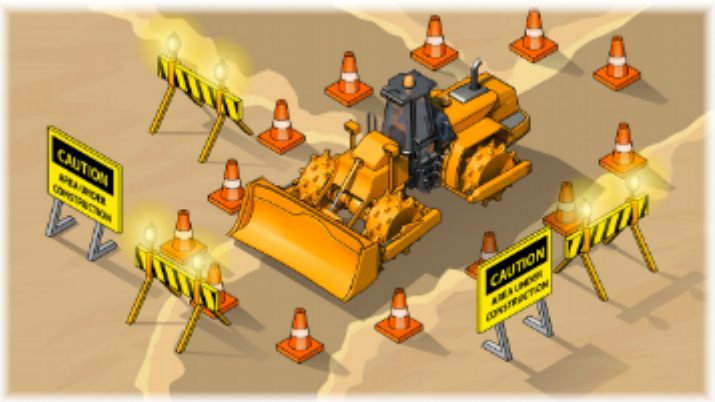


If you have to park the self-propelled compactor on a slope, which way do you park it?

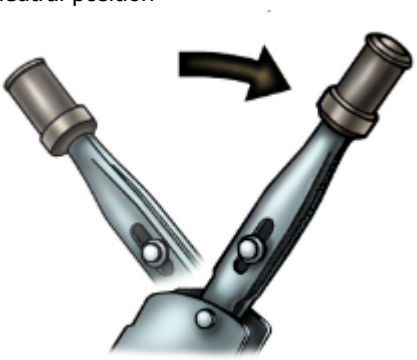
Park across the slope so it won't roll away.

If you need to park the self-propelled compactor near an access way (for example, a footpath) what do you need to do?

Set up a barricade, lights and warning signs.



How do you shut down the self-propelled compactor?

Make sure the park brake is on and the control levers are in neutral position 	Turn off the ignition and remove the key 

What must you do if you find any fault with the self-propelled compactor?

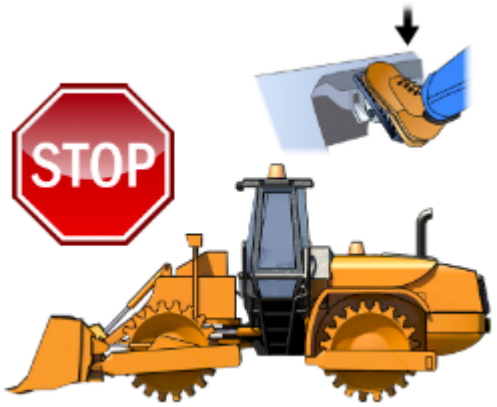
1. Tag out the equipment and DO NOT USE IT.

2. Record the problem in the logbook.

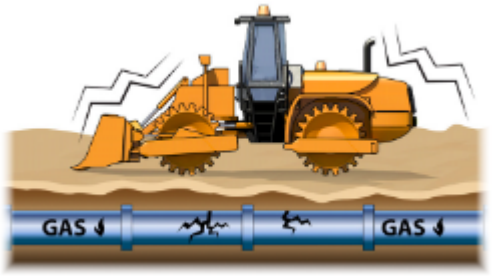
3. Report the problem to a supervisor.

What kinds of tests should you do before using the self-propelled compactor?

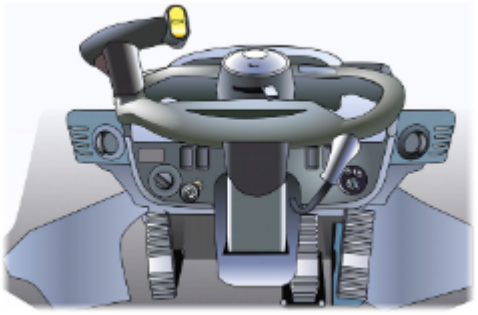
Test the brakes



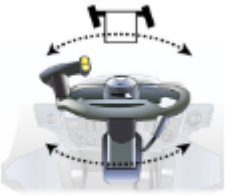
Test the self-propelled compactor's functions. For example, the vibrator. (Do this away from under ground services).



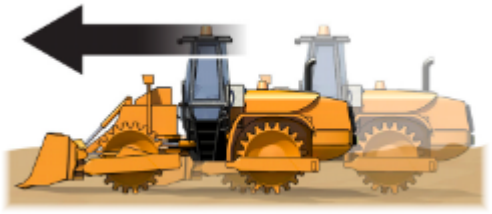
Test the controls in a safe place



Test the steering in a safe place



Drive the self-propelled compactor a short distance to make sure it's okay

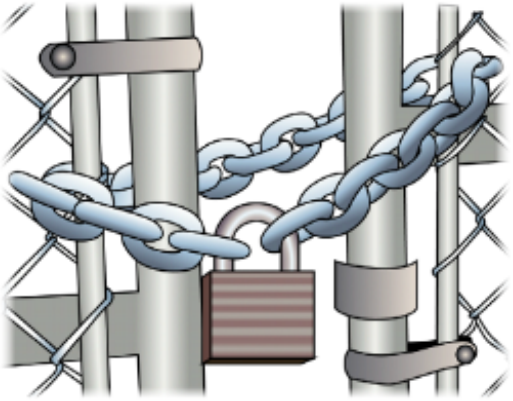


Why should you remove the keys from the self-propelled compactor when leaving it parked?

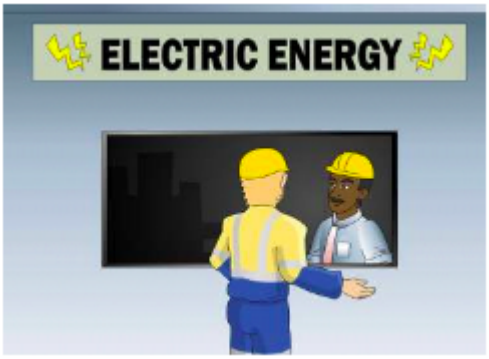
To stop unauthorised people using the machine.

How do you secure the site to stop unauthorised people getting in and damaging the self-propelled compactor?

Set up fences and barricades. If possible, lock the site.



Who can you ask about underground services on the worksite?

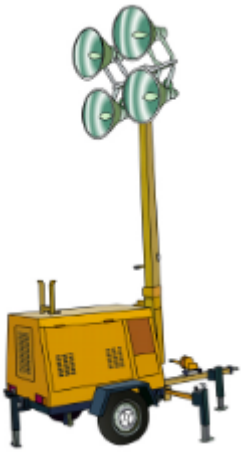
Ask your site supervisor 	Call 'Dial Before You Dig' on 1100 as a guide to services location only. Ask a specialist consultant to check the site. 
Ask the local supply authority (for example, the electricity, gas or water company). 	Check the council maps for the site 

Some of the standard hand signals are shown here. What do both these signals mean?

Stop	
Motion	Hand signal
	

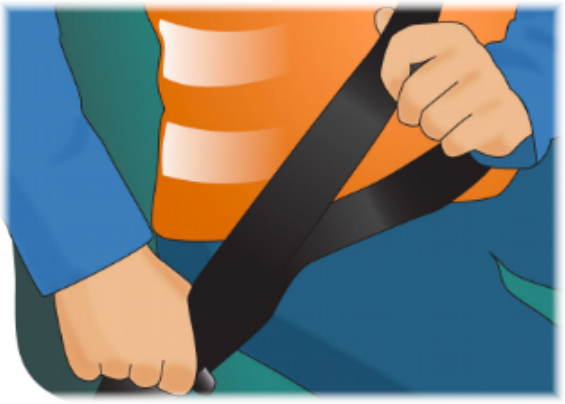
Travel and traverse	
Motion	Hand signal
Indicate the direction you want the machine to go	

What is the danger of working when it is dark or difficult to see?

It's harder to see hazards. In the dark it is harder to tell distances. 	Provide lighting if needed 

What safety device keeps you in the seat?

The seat belts.



Which way should you travel when driving on sloping ground?

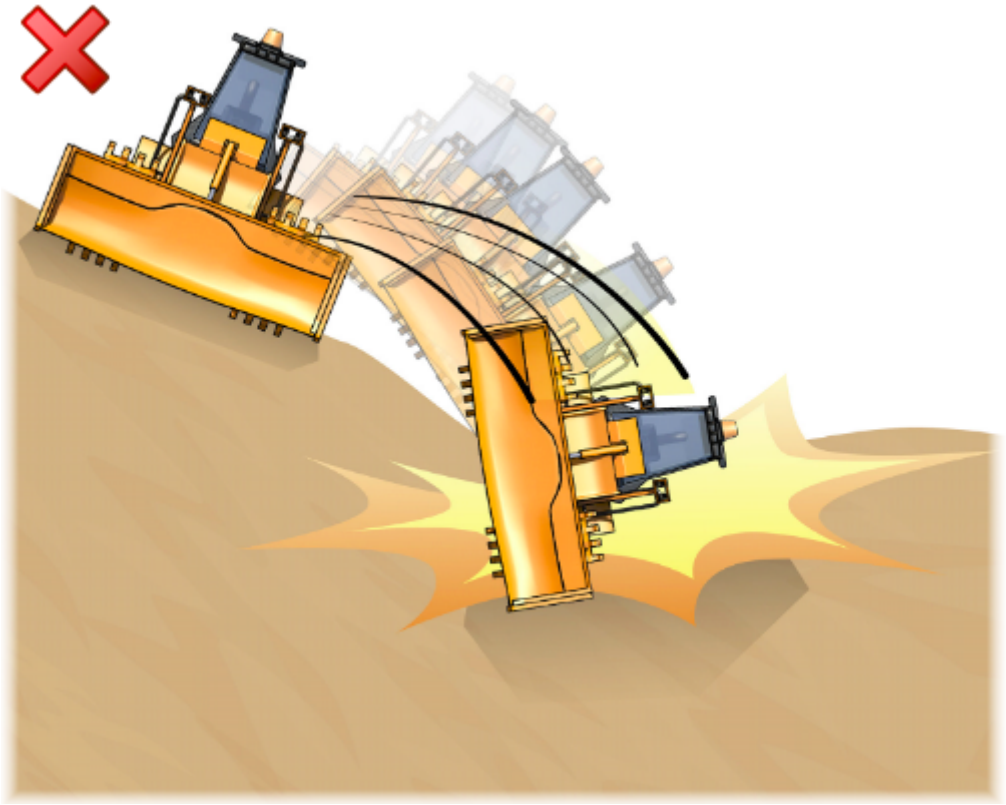
Go straight up or down the hill, not at an angle.

You're operating the self-propelled compactor and a hydraulic hose starts to squirt fluid. What do you do?

1. Stop working. 	2. Remove the key 
3. Tag out the machine. 	4. Report to your supervisor. Have the hose replaced. 

What is the danger of driving a self-propelled compactor sideways along a slope or hill?

The self-propelled compactor might tip over.

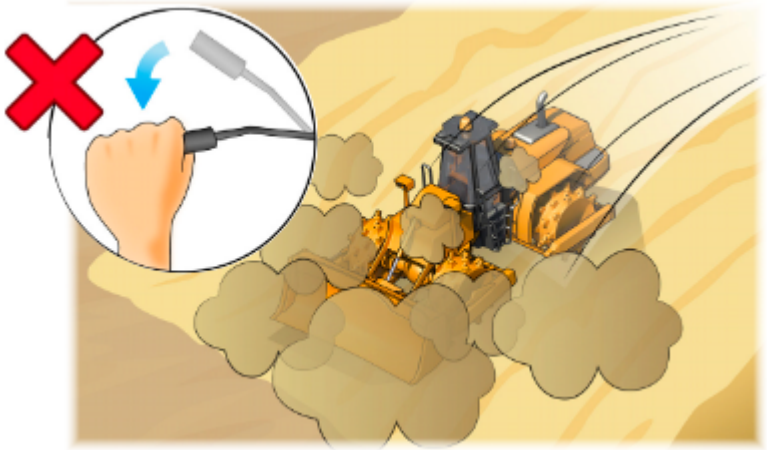


You need to travel over a rocky or bumpy surface. What speed do you drive at?

Drive slowly to keep the self-propelled compactor stable.

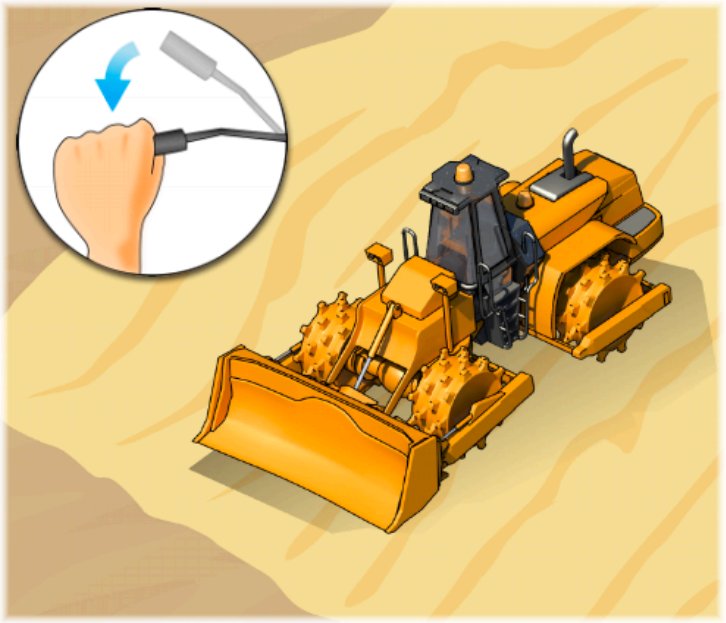
What is the risk of changing gear while you're driving the self-propelled compactor up a slope?

If you miss the gear the brakes may not be able to hold the self-propelled compactor. You may lose control.



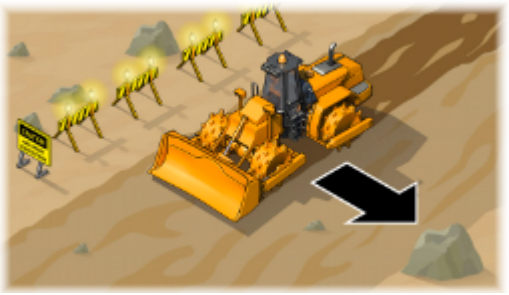
Which gear do you use when travelling down a steep slope?

Use the lowest gear you can.



How do you compact a surface using a self-propelled compactor?

- Start from the outer or lower edge and move towards the centre of the surface you want to compact

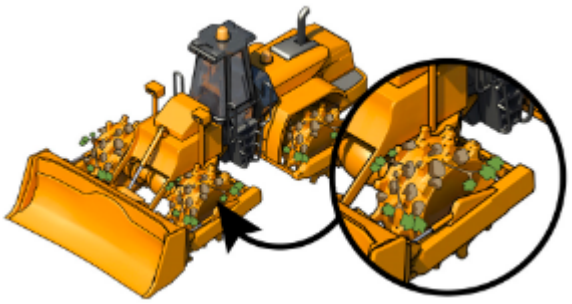


- Do a forward and reverse pass and overlap on each pass

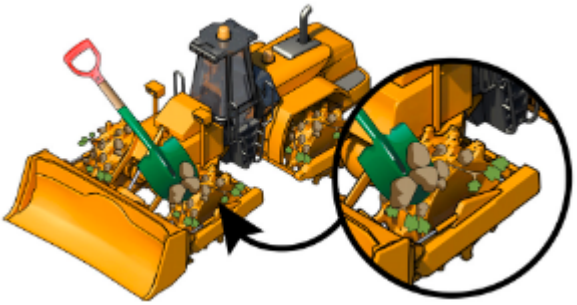
- Turn the self-propelled compactor around
- Turn the vibrator off
- Go back in the opposite direction
- When the self-propelled compactor starts to walk out, the surface is properly compacted.

When using the compactor, contaminants will build up. What should you do to identify and remove the contaminants?

1. Check the compactor. Identify the contaminants.

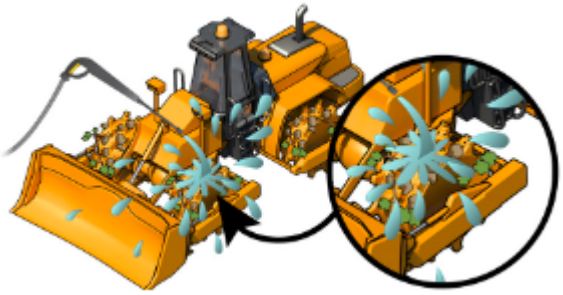


2. Use hand tools to remove the main contaminants.



3. Use high pressure water to remove the remaining contaminants.

Make sure the work is done in an isolated area to prevent contamination of the worksite.

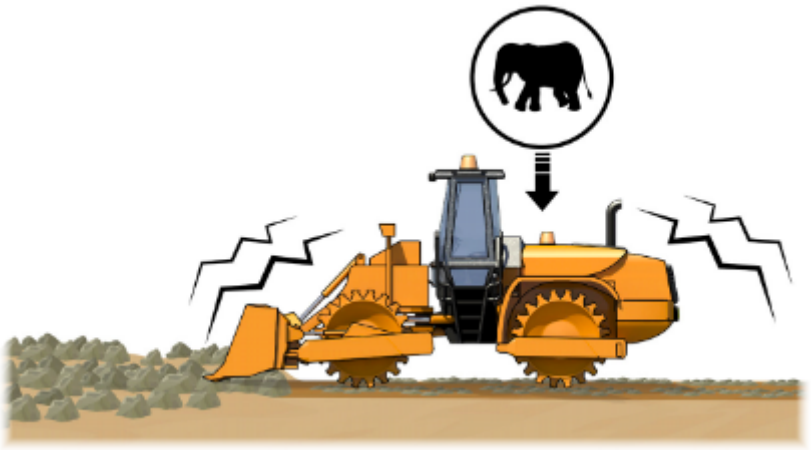


How does a vibrating self-propelled compactor work?

A vibrating compactor shakes up materials and takes away air and water. Vibration makes the materials hit each other and break up, compacting the material and filling in gaps.

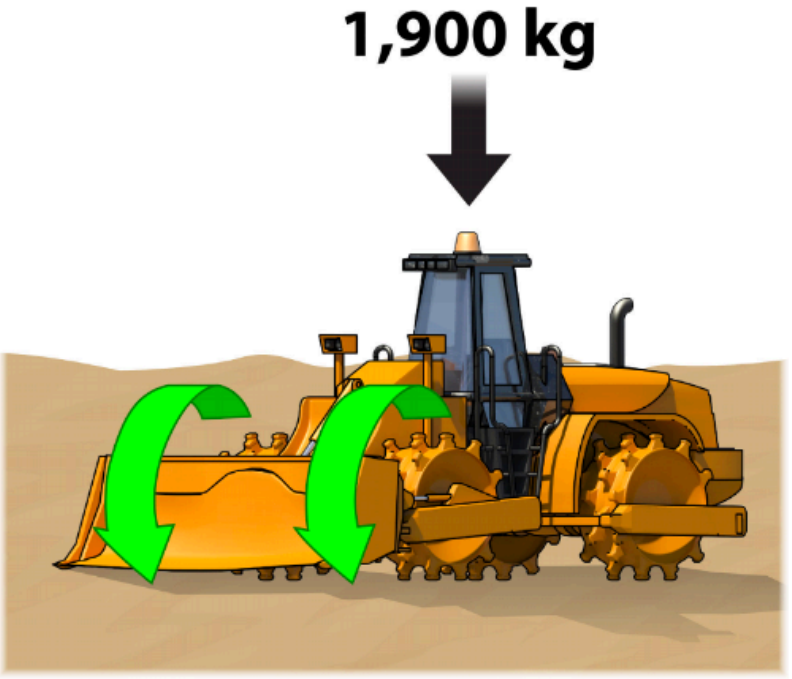
How does a vibrating self-propelled compactor compact soil and material?

The vibrating self-propelled compactor uses its weight and the vibrations of the self-propelled compactor drum to increase the compaction of the material.



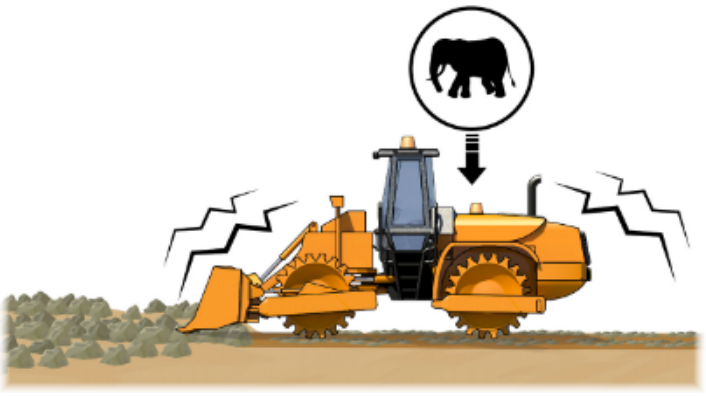
How does a static self-propelled compactor compact soil and material?

The static self-propelled compactor uses its weight and the rolling action of the drums.



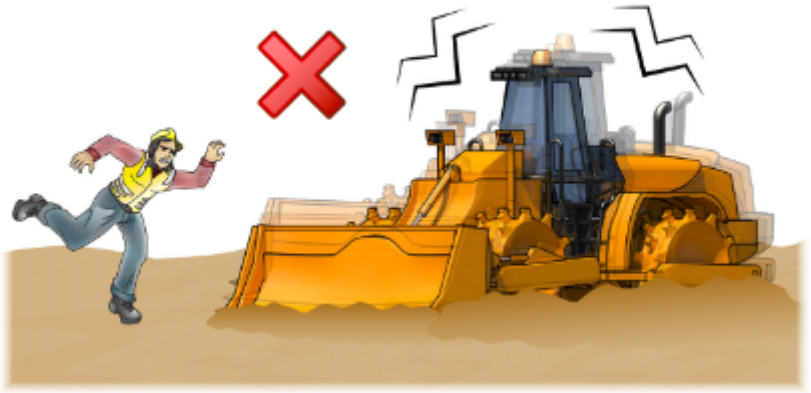
What advantage does the vibrating self-propelled compactor have?

The vibrating self-propelled compactor uses a vibrator so it can compact to a deeper level.



You have finished using a vibrating self-propelled compactor and leave it vibrating on soil. What will happen?

The self-propelled compactor's vibration will sink it into the soil. Don't leave the vibrator on while you aren't using it.



Can you leave the self-propelled compactor running when you are not in it?

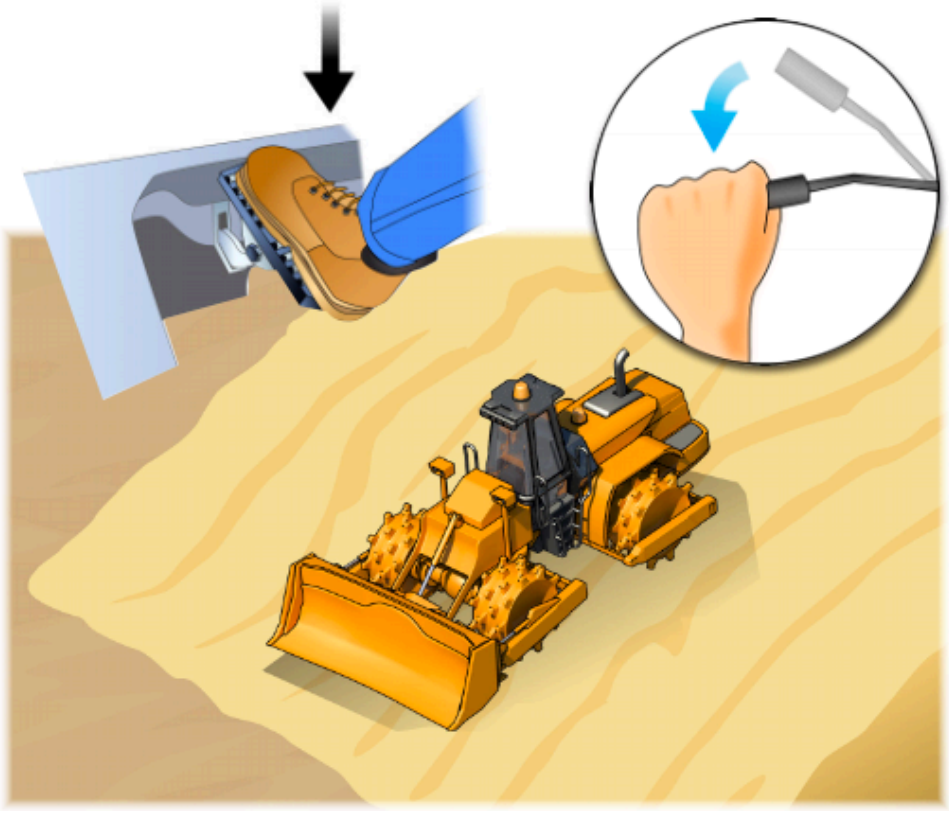
No. It could roll away and injure someone.

Is it safe to coast the self-propelled compactor downhill?

No. Always keep the self-propelled compactor in gear when going downhill or you may lose control of the compactor.

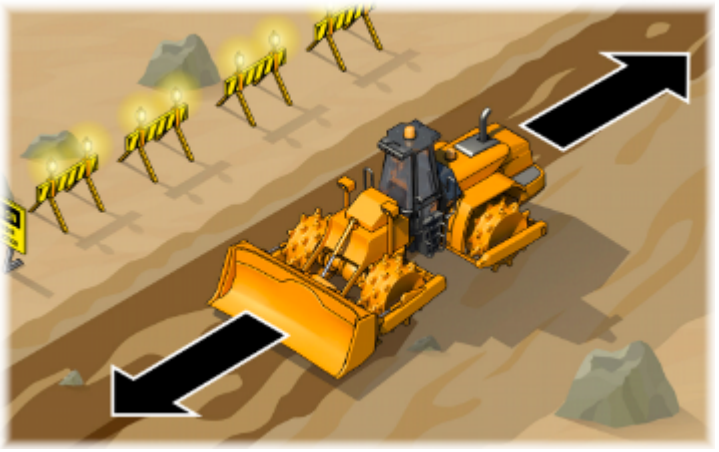
What do you do before you go down a steep slope?

Slow down by using the service brake and select a low gear.



When compacting, why do you overlap each roll?

Overlap each roll so you do not have any uncompacted surface when you have finished.



You are trying to drive up a hill but the self-propelled compactor won't climb in the gear you chose. What should you do?

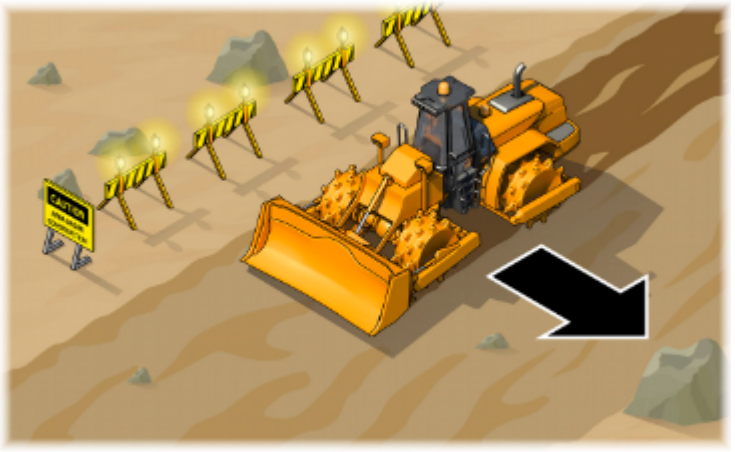
Reverse back down the hill. Try a lower gear and start again.

You need to compact the soil on a slope. Which way do you roll?

Straight up and down the slope. Do not roll across it or at any angle. You may tip the self-propelled compactor over.

When you use a self-propelled compactor on a road, where do you start compacting first?

On the kerb side, then move in towards the middle of the road.



2.2.1 Costing A Job

Arranging times for other contractors, the time taken to do a job and the costs of fuel are some things you may need to know or do as a self-propelled compactor operator.

You have to cost a job. Using the following information:

Calculate the cost of fuel needed to complete the job

- Your self-propelled compactor drum has a working width of 2.46 metres
- The overlap specified in the work instruction is 0.5 metres
- It will take nine (9) passes to compact the road to the specification
- The self-propelled compactor uses 12.2 litres of diesel per hour at $1.59 per litre
- The road you have to roll is 11.08 metres wide
- The road you have to roll is 162 metres long
- Your travel speed is 2.5 km/h

1. What is the effective width of the self-propelled compactor?

Effective width of the drum

= 2.46 m – 0.5 m

= 1.96 metres

2. How many passes will you need to make to cover the road once?

(Round up to the next whole number.)

$$\frac{\text{Road width}}{\text{Effective width}}$$

$$\frac{11.08}{1.96}$$

= 5.6 passes rounded up

= 6 passes

3. How long will it take you to make one complete pass over the road?

(Round the answer up to the next whole minute.)

(a) Convert kilometres per hour to metres per hour.

(1000 metres = 1 kilometre)

2.5 kms × 1000 = 2500 m/hr

3. (b) Convert metres per hour to metres per minute.

(Round the answer up to the next whole minute.)

(1 hour = 60 minutes)

$$\frac{2500}{60}$$

= 41.66 m/hr

3. (c) Round the answer up to the next whole minute.

41.66 rounded up = 42 metres/minute

$$\frac{\text{Length of road}}{\text{Metres/minute}}$$

$$\frac{162}{42}$$

= 3.85 minutes rounded up

= 4 minutes/pass

4. How long will it take to make 1 pass over the whole road?

Passes × Minutes/pass

6 × 4 = 24 minutes to cover the road once

5. How long will it take to complete the road compaction to specifications?

Time to cover the road once × Passes to compact to specification

24 × 9 = 216 minutes

or 3.6 hours (3 hours 36 minutes)

6. What is the fuel cost for the job?

Fuel /hour × Total hours × $/litre

12.2 × 3.6 × $1.59 = $69.84

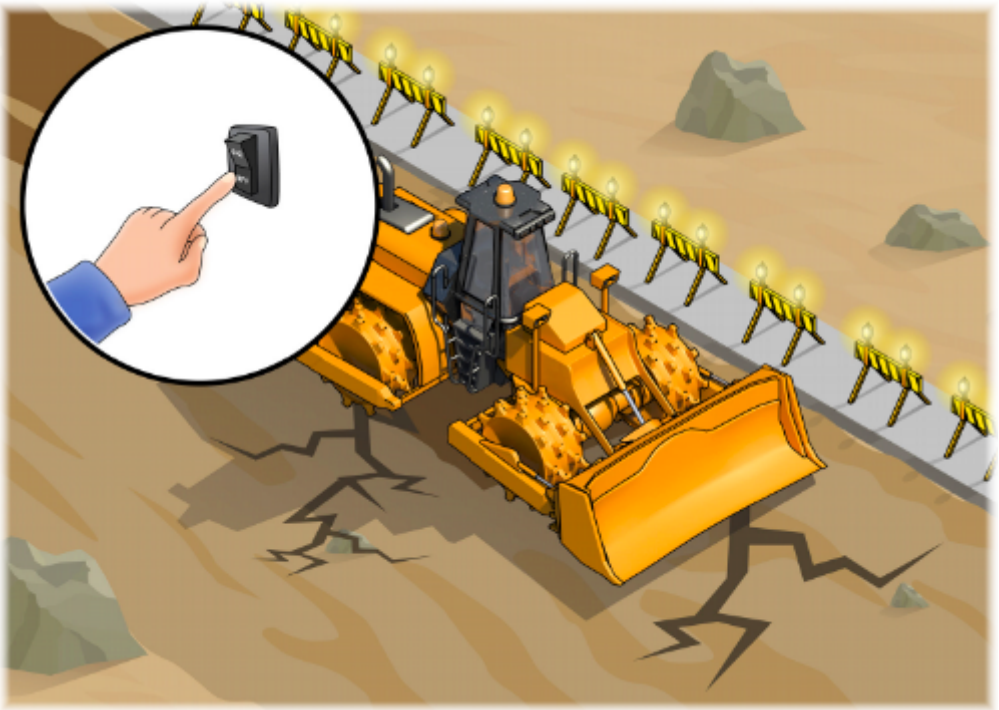
2.2.2 Monitoring Systems and Alarms

Monitoring systems and alarms help you to know that your compactor is operating safely. The following are examples of symbols that alert you to:

Engine overheating Symbol on gauge 	**Low engine oil** Symbol on gauge 
Blocked air filter Symbol on gauge. A blocked air filter can lower engine performance. 	**Note:** **A warning light and an alarm may come on depending on how serious the fault is. Always check the operator's manual for information.**

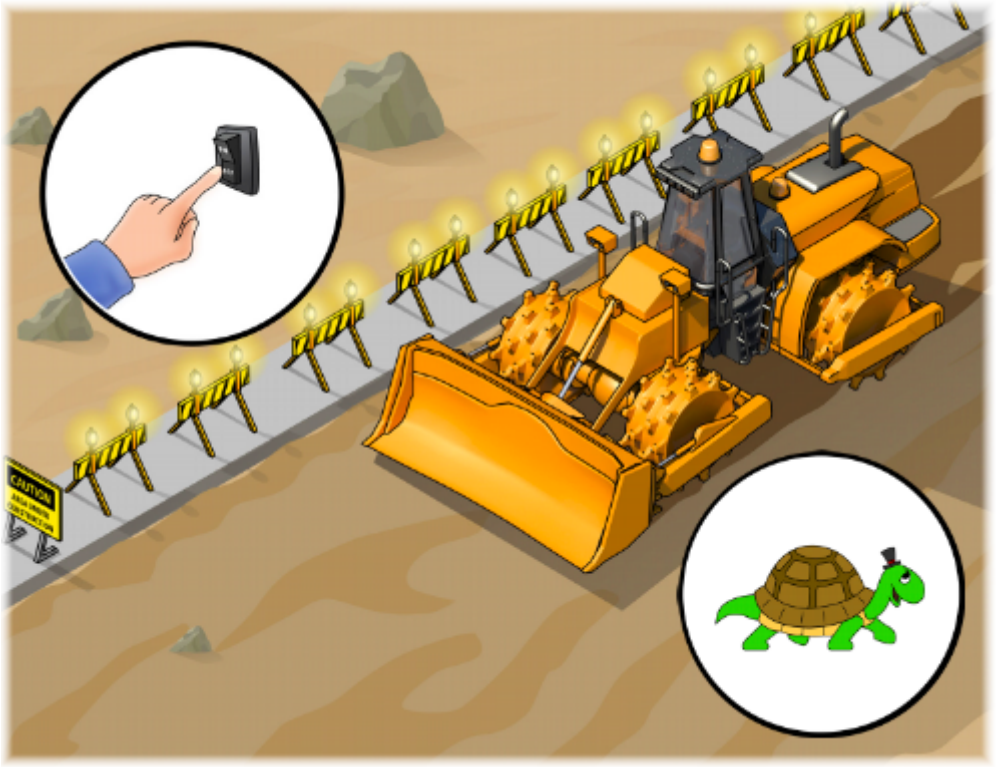
You are using a vibrating self-propelled compactor. The surface you are rolling has cracks. How do you fix the cracks?

Compact the surface again with the vibrator turned off. You might need to get the surface watered.



You will use a vibrating self-propelled compactor. How do you do the first run on the uncompacted soil next to the kerb?

Go slowly and don't use the vibrator.



2.2.3 Risk of Using A Self-propelled Compactor Near Infrastructure

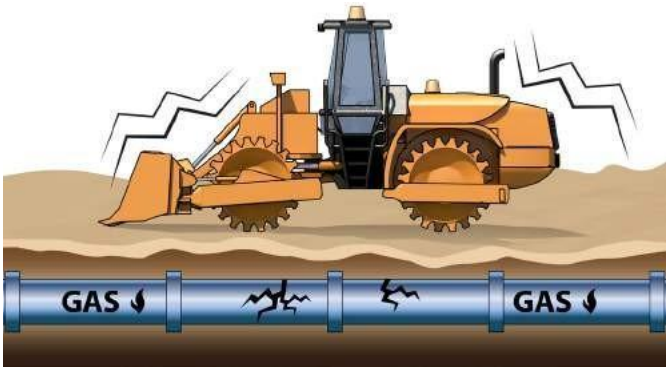
A self-propelled compactor passing over, beside or near underground infrastructure can cause damage. This damage may not be immediately visible and not cause a problem until sometime after the job is complete.

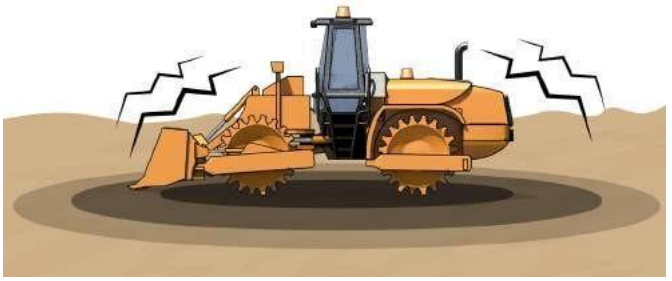
An example is the cracking of a water pipe. It will start to leak and the water erodes away the soil supporting a road or foot. This can cause a cave in.

The vibrating effect of a self-propelled compactor greatly increases the tremor in the soil surrounding the self-propelled compactor drum.

The ground tremor can cause damage to the underground services such as water and gas pipes. It can cause trenches to collapse.

Ask the site engineer about the distance you should keep your self-propelled compactor away from services when using the vibrating system.





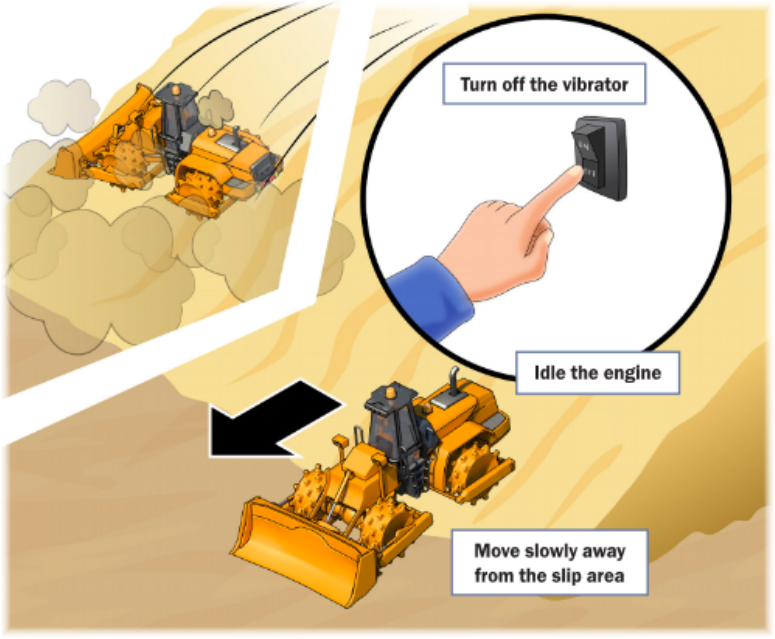
Place markers such as pegs, cones or barriers at a safe distance from the underground services. This will help remind you of the services.

You are compacting soil. What will happen if the soil is very wet?

The water will come to the surface and the soil won't compact properly. Soil may build up on the self-propelled compactor drum or wheels.

You are using a vibrating self-propelled compactor near a bank. The bank starts to slip or break away. What do you do?

Turn off the vibrator immediately. Idle the engine and then try to move slowly away from slip area. If you can't get out, ask for help.



You will work in a hazardous area for example, a confined space. What type of permit might you need to get?

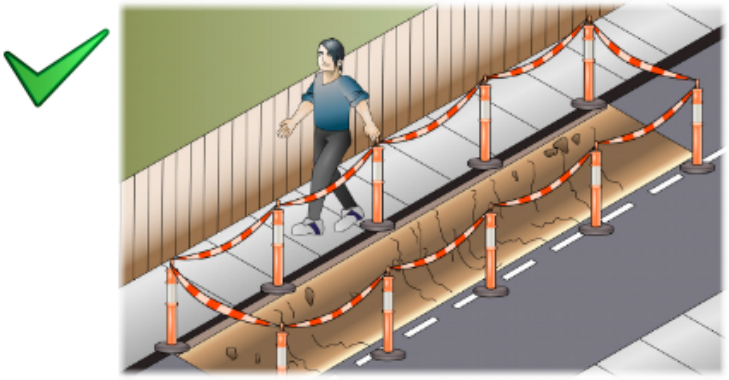
You may need to get a hazardous work permit.

What is the danger of using the self-propelled compactor near a trench or excavation?

The self-propelled compactor might tip over and fall into the trench, or the edge of the trench might cave in.

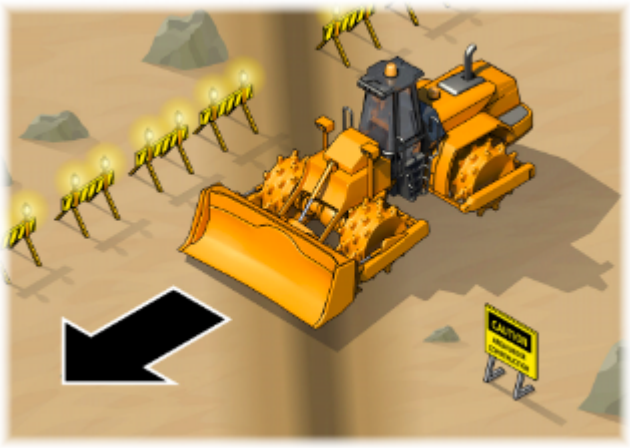
There is a trench near a pedestrian footpath. How can you stop people falling into the trench?

Put up barricades, guard rails or fencing. Use signs to warn people of the danger.



How do you safely cross a ditch?

Drive at an angle towards the ditch. Cross the ditch slowly. Avoid having the self-propelled compactor drum in the ditch as you may not be able to get it out.

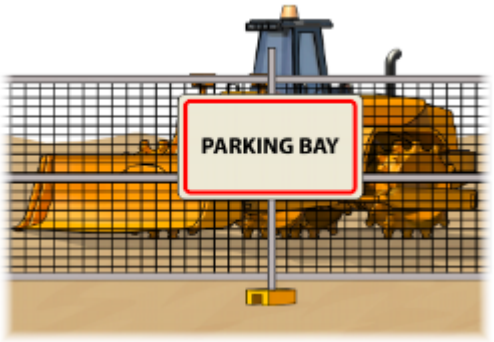


You are using a vibrating self-propelled compactor. What do you do before stopping?

Turn off the vibrator so it doesn't vibrate in the one spot.

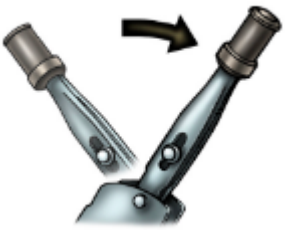
What steps do you take when shutting down the self-propelled compactor at the end of the day?

1. Park the self-propelled compactor on flat ground in a place it won't cause a hazard.



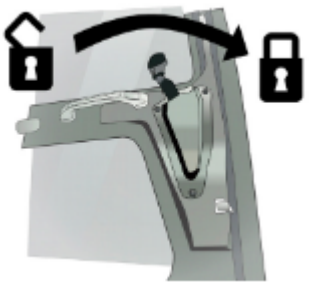
2. Idle the engine before you turn it off. Stop the engine.

3. Pull up the parking brake.



4. Remove the keys.

5. Lock the cabin.



When do you inspect the self-propelled compactor for damage or faults?

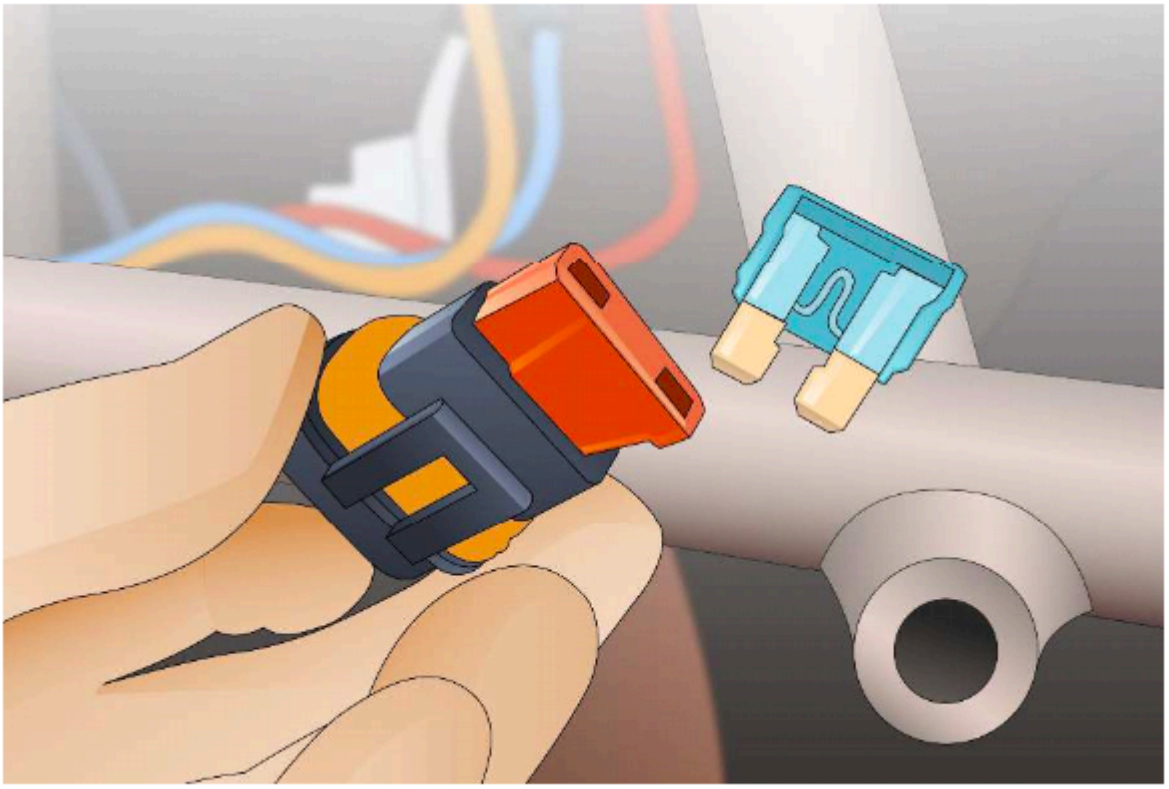
Always test and inspect the self-propelled compactor before and after you use it. You do this to make sure it's safe to use. Inspect the self-propelled compactor at the end of the day.

What do you do if you find a fault with the self-propelled compactor? For example, you might see a bulge in a hydraulic hose.

1. Stop using the machine 	2. Tag out the machine 
3. Record the fault in the logbook or daily inspection checklist. 	4. Record the fault in the logbook or daily inspection checklist. 

2.2.4 Defective Parts

If you notice a defective part, for example, a fuse is blown or not working, you should arrange to have it replaced immediately. You must check the rules for your site and your state or territory. In some states only licenced mechanics are allowed to do any repairs.

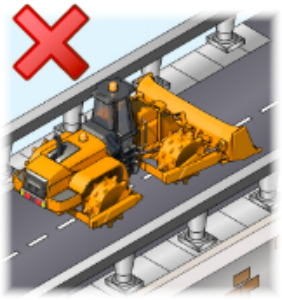


2.3 Relocate the Self-propelled Compactor

You are going to move the self-propelled compactor between worksites. You will be loading the self-propelled compactor on a public road and will need to control the flow of traffic. Do you need to be qualified to do this?

Yes, you must be a qualified traffic controller.
For example:
RIIWHS302D – Implement traffic management plan
This unit covers the competency required to implement a traffic management plan in the civil construction industry. It includes planning and preparing, setting out, monitoring and closing down the traffic guidance scheme and cleaning up.

What are some things you should remember when driving the self-propelled compactor on work sites?

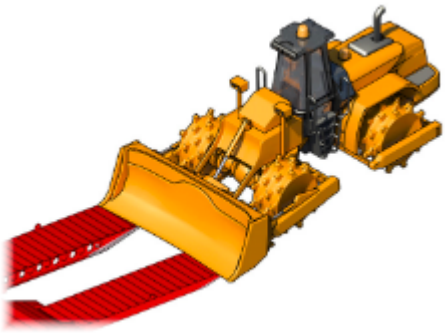
<table>
<tr>
<td>Ask someone to help you if the area is busy
  </td>
<td>Travel at low speed
  </td>
</tr>
<tr>
<td>Do not drive on surfaces the self-propelled compactor may damage
  </td>
<td>Don’t get off the machine while it’s moving
  </td>
<td>Always follow all rules and laws
 
</td>
</tr>
</table>

How do you load the self-propelled compactor on to the float or low loader?

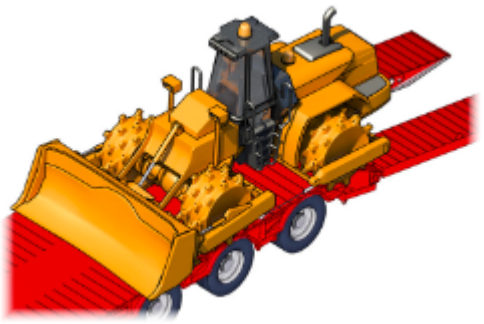
Ask someone to help you

Check that the float is clean and ready

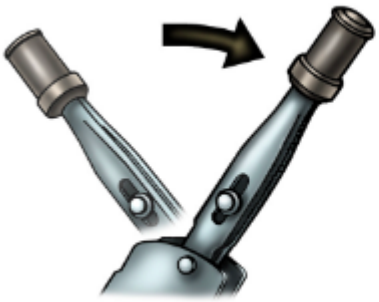
Drive the self-propelled compactor towards the ramp at the right speed and angle.
Do not change direction on the ramp.



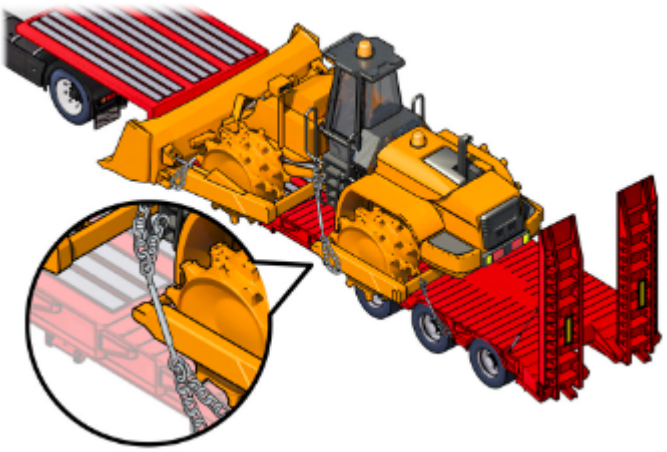
Park the self-propelled compactor on the vehicle



Secure the self-propelled compactor with the handbrake and remove the keys.



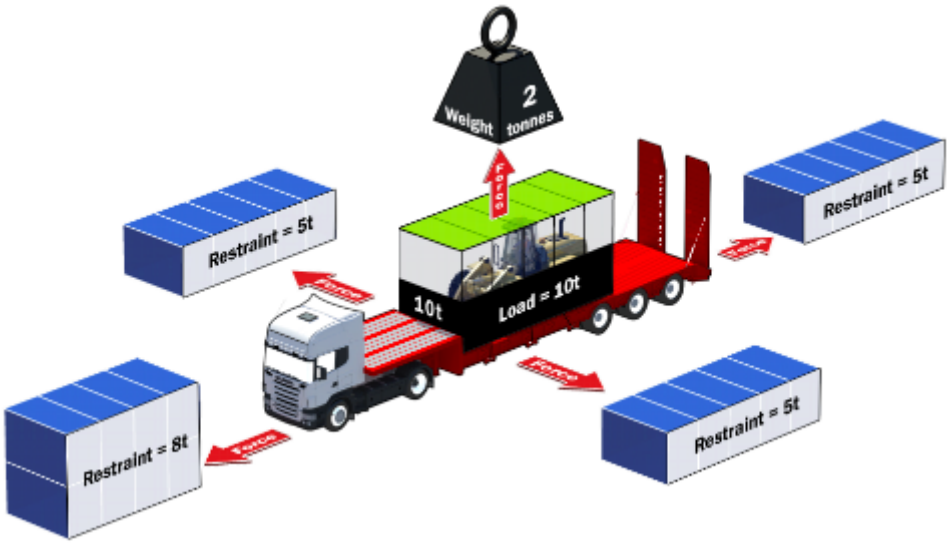
Tie down the self-propelled compactor using lashings, chains or straps to secure it to the vehicle.
Make sure you check the condition of the tie downs.



Are there regulations about securing a load on a truck or trailer?

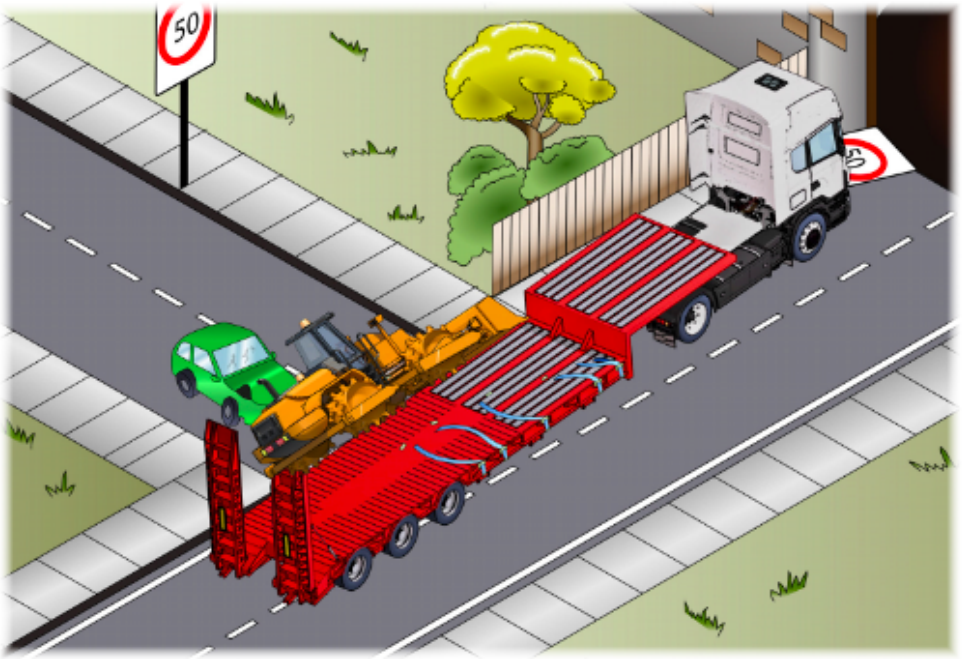
Yes, the load restraints must be able to hold the load from moving as shown in the table.

Direction	Restrain needed
Forward	80% of load weight
Rearward	50% of load weight
Sideways	50% of load weight
Bounce or upwards	20% of load weight



What is the danger of not securing the self-propelled compactor properly on the float?

The self-propelled compactor will move around on the float and could fall off on to the road. You could cause injury or death.



2.4 Conduct Housekeeping Activities

2.4.1 Clean Up

Recycling Items

Many environmentally sensitive items can be recycled. Items such as batteries, oil and gas cylinders can sometimes be recycled and reused.
Some oils can be taken to a recycling centre. With oil, bring your materials to the recycling centre in a clean, plastic container with a lid. The original container is a good container to return the oil in.

Pressure clean

You may need to pressure clean the wheels, tyres, or attachments.

After you've finished the job, what should you do?

Tell people who live in the area that the work is finished

Clean the job site	Throw away any rubbish and recycle what you can
	

What instructions do you follow when cleaning up?

The environmental management plan and site procedures.

What is the danger with leaving earth and rocks around the work site?

Someone might trip on a rock and be injured. Rocks left on the road can damage cars.

What do you have to clean on the self-propelled compactor?

Clean the windows and cabin	Clean the attachment
	

What do you do with other equipment and tools you've used?

Clean tools and equipment, and put them back in their place.

Where do you record the work done when repairing and maintaining service equipment?

Enter all repairs and maintainance on equipment in the site specific record book or system.

Where do you record the materials, parts and lubricants used when servicing machines and equipment?

In the site specific record books or record keeping systems.