ALEP

Aboriginal Landcare Education Program

12

Install, Maintain and Repair Fencing

Learning Guide

Greening Australia

CONTENTS

Student name:.....

Student number:.....

INTRODUCTION

Welcome to *Install, Maintain and Repair Fencing*. You might need to be able to build or repair a fence when carrying out bush regeneration work, doing feral animal control work or for other land management activities. This could be when you are working for your council, doing ranger work or when managing your own country. Training should be completed on the job out in the field over an extended period of time.

This learning guide covers fences that are commonly seen in conservation and land management situations. The focus is on rural fencing rather than fences in urban situations.

ALEP
Aboriginal Landcare Education Program

EQUIPMENT REQUIRED

To complete this training you will need the following:

1. Appropriate Personal Protective Equipment (PPE).
2. Safety gear including first aid kit and water.
3. A sketch pad, pencils, calculator and ruler for planning.
4. Fencing materials.
5. Fencing tools and equipment.

ASSIGNMENTS

There are three assignments you will need to complete.

Some of these assignments may go towards your final assessment.

Section	Assignment	Competent (C) Not yet competent (NYC)	Date Achieved
Getting Prepared	Assignment 1. Project Risk Assessment		
Building a Fence	Assignment 2. Build a Fence		
Maintaining and Repairing Fences	Assignment 3. Inspect and Repair a Fence		
Finishing Up			

1 GETTING PREPARED

1A. FENCING INFORMATION

Information about fencing can be found at your local hardware store or fencing supplier or through manufacturers' websites. See References on page 25 for more information.

Most local councils have fencing guidelines and you should make yourself familiar with these before you build your fence. Restrictions are often made on the height and type of fence you can build and you may need a permit. The Northern Territory Lands group has information about NT requirements including a fact sheet about fencing.

www.nt.gov.au/lands/building

1B. FENCING SAFELY

There are many hazards associated with fencing. It is important that you are aware of some of the potential dangers so that you can avoid getting injured.

PERSONAL SAFETY

1. Fencing requires strength and stamina and staying fit and healthy is very important. Make sure you have plenty of sleep and a good feed before starting fencing.
2. Wear good Personal Protective Equipment (PPE).
3. Strong long trousers, long sleeved shirt, thick gloves and sturdy boots will protect you from scratches and cuts from wire and splinters from wood posts.

4. A hat and sunscreen will help protect you from the sun. Proper safety glasses will prevent eye injuries from wire. Earmuffs will be necessary when working with noisy machinery or power tools.
5. Fencing materials can be very heavy – always lift heavy objects correctly to avoid injuring your back (see Resource 1).

SAFETY IN THE FIELD

1. Inform your trainer about where you are going and when you expect to return. Ideally you should not go out into the field with less than three people.
2. Always carry a first aid kit, maps and plenty of water for drinking. Make sure someone in your group has first aid training.

3. Make sure your vehicle is properly maintained. Check all safety equipment such as radio and mobile or satellite phone before you leave to see if they are working properly.
4. Before you set off check the weather, road and fire reports for your local area.

TRANSPORTING FENCING GEAR SAFELY

Fencing materials are often heavy and awkward to carry around. You will probably need to carry them around in a vehicle such as a trayback ute.

1. Work out what materials, tools and equipment you need, make a list and tick them off as they are loaded into the ute.
2. Make sure all tools and equipment are securely tied down.
3. Include fuel and oil for the ute and any motorised equipment such as chainsaws and post hole diggers.
4. Drop materials off along the fence line to avoid double handling.
5. Use a suitable vehicle and drive very carefully when on uneven surfaces.

SAFETY AT THE FENCING SITE

1. Avoid cuts and eye injuries from high tension and old rusty wire (high tension wire is very 'springy' when cut and may cause nasty injuries) - control both sides of a wire before cutting it and avoid overstraining wire.
2. Keep the site tidy to avoid people tripping over and hurting themselves.
3. Be careful to avoid snake and spider bites when working in long grass and around stored fencing materials.
4. Avoid poisoning and skin irritations from posts treated with chemicals (such as copper chrome arsenate or creosote) – wear good PPE and wear a dust mask when cutting.
5. Prevent electrocution when working near powerlines or underground cables – check for underground services first.
6. Mark holes that have been dug so people don't fall in them or trip over.
7. Avoid injury to children and livestock. They all need to be kept away from the work site.
8. Have a method of communicating with workers at the other end of the fence (e.g. walkie talkies).

SAFE USE OF TOOLS AND EQUIPMENT

1. Keep safe distances away from other workers around tools and equipment.
2. Learn how to maintain and use hand tools correctly to avoid injury – always use the right tool for the job.
3. Extreme caution should be taken with motorised machinery such as post hole diggers and chainsaws. Only properly trained people should use motorised machinery and correct PPE must be worn.

NOTE

Learn handy tips and techniques from experienced workers.

Before you begin, use this checklist to confirm you have followed good safety procedures and have all the right resources.

SAFETY CHECKLIST ACTIVITY		✓
Long trousers, shirt and boots		
Hat and gloves		
Sunscreen, insect repellant and sunglasses		
Safety glasses		
Ear muffs		
Safety vests		
Water		
First aid kit		
Notified others and have phone/2 way radio		
Checked weather, road and fire reports		
Permits (if required) and maps		

REMEMBER

Most fencing injuries are the result of rushing the job and taking short cuts. Don't try and save time by taking short cuts. Work slowly and methodically, especially around machinery.

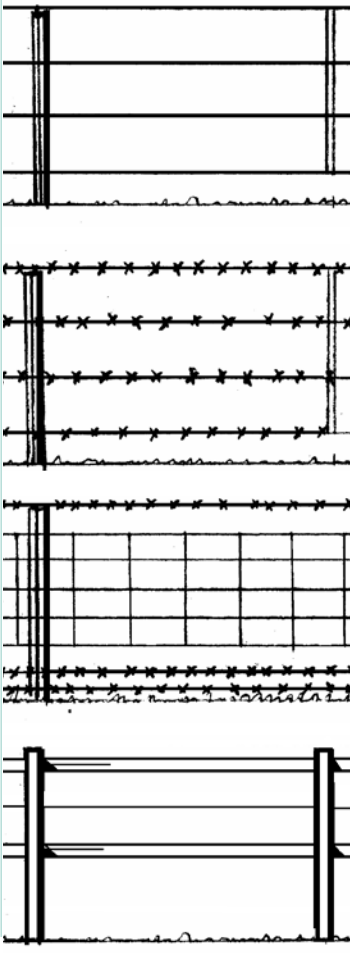
1C. WHY FENCE?

Fences are used to control the movement of animals, people and vehicles:

- **Boundaries:** A fence can indicate a property boundary. Boundary fences should always be constructed along a legal surveyed line. The cost of erecting and maintaining a boundary fence is usually shared between the property owners.
- **Livestock control:** Landholders have a responsibility to contain livestock so they do not stray onto neighbouring properties or wander onto roadways. Fences help manage livestock and prevent crops being eaten or trampled by livestock. They are also useful in restricting the movement of feral animals.
- **Land management:** Fences are very important for conservation and land management work. They are used to protect native vegetation from feral animals and livestock, and to stop people driving their cars all over the place. Fences can restrict animal and people access to fragile river habitats, rehabilitated areas and other important habitats.
- **Preventing access:** Fences can be used to prevent access by people to certain areas such as the whole property, buildings, paddocks or machinery and equipment. These may be for security or safety reasons.

1D. TYPES OF FENCE

There are many types of fencing for many different purposes. It is important to carefully select the right fence for the job. Some fence types used in land management work include:



- **Plain wire fence:** These fences are common in rural areas and are cheap, especially if you can use local timber for posts. The number of wire strands and height depend on the reason for the fence. The steel droppers are normally suspended in the air, not driven into the ground – sometimes these fences are called 'suspension fences'.
- **Barbed wire fence:** Barbed wire can help in containing animals such as cattle. Sometimes barbed wire is used as well as plain wire in a fence. There is a higher risk of animals getting injured in barbed wire fences.
- **Woven wire fence:** Some animals such as pigs and dogs will not be contained by barbed wire alone. Hinged joint and ringlock are types of woven wire with large openings. They are often used in combination with barbed wire.
- **Post and rail:** Combinations of wooden posts and rails with wire strands makes this an effective fence for stock, especially horses. When using local timber this form of fence becomes cost effective.

1E. PLANNING

NOTE

Before you start make sure you have the permission of the person who owns the land. For some projects you will need written permission and/or permits.

PLANNING

Fences are expensive and time consuming to build and look after. You should carefully plan the type of fence for your project. Before any fencing job starts you will need to work out the quantity of materials required to do the job.

A strong fence will depend upon setting the fence posts at the right distance and depth. You will need to get advice on what type of fence you need – ask your trainer or your fencing shop for help. You will need to know:

- What the fence is for.
- The length of the fence (measure it on the ground or use a map).
- What type of end assemblies, strainer posts, posts or pickets, droppers and gates will be best (see 2B, 2D and 2E).
- What type of wire will be best (see 2C).
- How close together the strainer posts, posts or pickets and droppers are to be placed.

It's a good idea to draw up a map on paper to work all this out.

FENCING FOR WILDLIFE

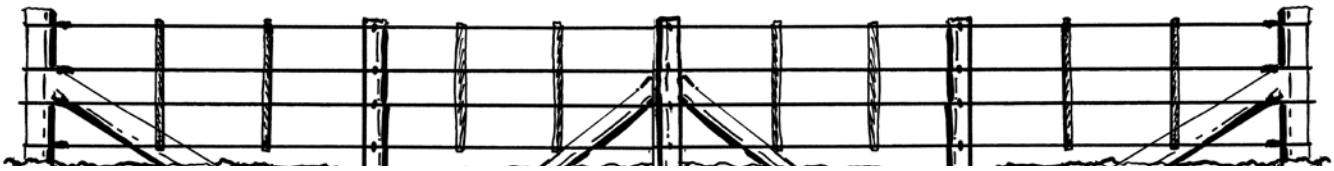
Fencing can have negative impacts on wildlife if not properly designed. Fences can stop animals moving through the landscape. Most animals will try to get under or through a fence so the bottom section of a fence is the most important. Well designed fences will help allow the movement of wildlife safely.

Do

- Consider the movement of wildlife species in your area and how they might be affected by fencing.
- Seek advice from the local wildlife experts.
- Use plain wire wherever possible instead of barbed wire.
- Make sure you have wire spacings that avoid killing wildlife.

Don't

- Create hazards or barriers for wildlife.



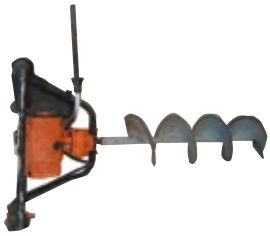
ACTIVITY

With your trainer and your group draw up a map of your fence in this box.

1F. TOOLS AND EQUIPMENT

Using the correct tools is important when fencing. Tick off the items you will need for building your fence. Make sure all your equipment is in good working condition. Always check for faulty or unsafe tools and put them aside for repair or replacement.

ACTIVITY

		✓
Wheelbarrow		
Measuring tape		
Marking paint and flagging tape		
Chainsaw		
Drill and bits		
Post hole auger		

		✓
Post hole shovel		
Crowbar		
Steel post driver		
Hammer		
Spirit level		
Fencing pliers		

Wire reel		
Strainer		
Strain gauge		
Wire joining tool		
Netting clip pliers		
Bolt cutters		

1G. MATERIALS

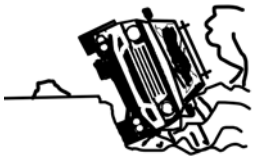
Now work out a materials list using your plan from 1E. Write the amount of materials in the empty boxes on this checklist. Always add in some extra materials to allow for tying off and mistakes.

ACTIVITY		Amount
Strainer assemblies		
Connectors		
Posts		
Pickets		
Plain wire		
Barbed wire		

		Amount
Wire joiners		
Tie wire		
Droppers		
Woven wire		
Netting clips		
Gate		
Gate fittings		

PROJECT RISK ASSESSMENT

- Stop and think before starting work.
- What needs to be done so you can work safely?
- Complete the **What to do about it?** column – we have written one thing in each box – try and think of some others.
- Fill in all of the last row by adding a new hazard.

HAZARD **and what can happen = the risk**	**What to do about it?**
TRIP HAZARDS Risk of: Injury from falling over 	• Keep tools and materials neat and tidy • • •
WORKING WITH WIRE Risk of: Cuts and eye injuries 	• Wear safety glasses • • •
LIFTING THINGS Risk of: Injured back 	• Use a wheelbarrow to move things • • •
SUN EXPOSURE Risk of: Heat exhaustion, deyhydration and sunburn 	• Wear protective clothing • • •
ROAD TRAVEL Risk of: Injury in vehicle accident 	• Make sure tools and supplies are tied down • • •
	• • • •

2 BUILDING A FENCE

2A. MARKING OUT THE FENCE

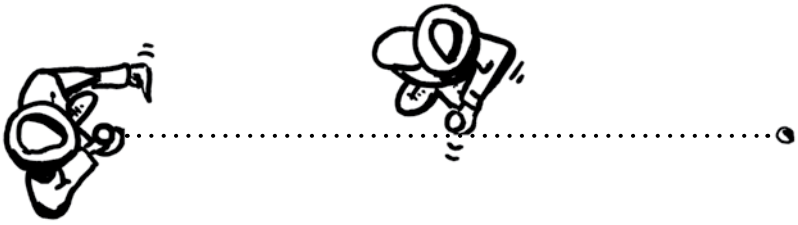
CLEAR THE FENCE LINE

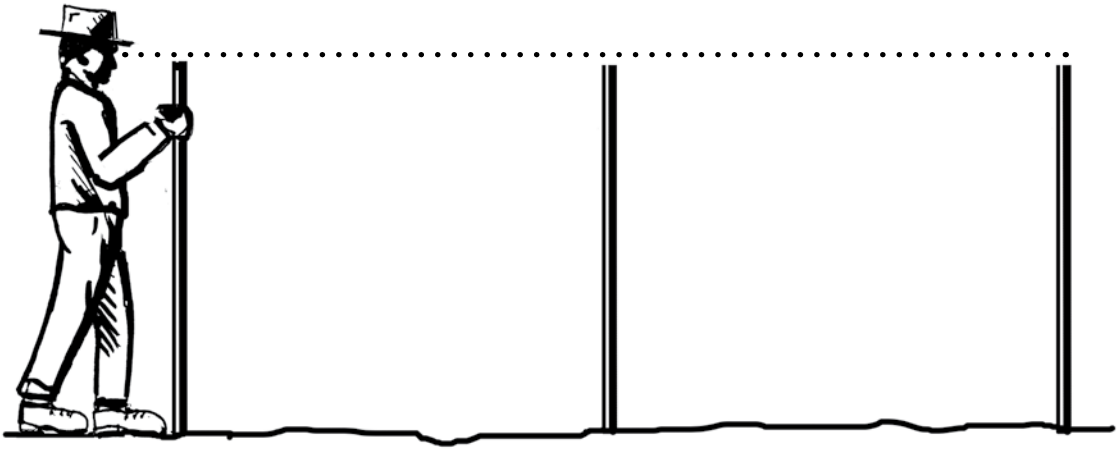
- Clear any obstacles in the way such as shrubs, bushes or large rocks (use a grader or bulldozer in thick scrub).
- A fire break of at least 2 metres each side of the fence should be cleared (make sure you have permission to clear).
- Do not use existing trees for fence posts.

SIGHTING A STRAIGHT LINE

You can use a length of string to get a straight line for short fence sections, but for long sections you will need to sight a straight line (use marking pickets to mark the place for post holes, actual pickets can go straight in).

- Put a picket at each end of the fence line – one person stays at the beginning and the other works in the middle.
- The first person looks down the line at the beginning and end picket, the second person moves the new picket back and forth until it is on the line between the two. Keep going until all the marking pickets are in line.





DIAL BEFORE YOU DIG

Before digging fencing holes make sure there are no services underground. For instance telephone, power and water lines are often located underground. Talk to your council or ESO (Essential Services Officer) to check.

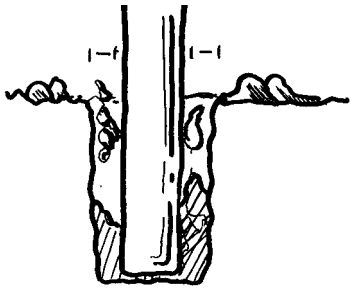
Phone: 1100 Fax: 1300 652 077

POST HOLES

- Use marking paint or marking pickets to mark where all the posts will go.
- Fence post holes can be dug with: a crowbar and post hole shovel, or with an auger, or a motorised post hole digger.
- Make sure that the hole dug is not too large as it may allow the post to pull sideways and fall over. The hole should be just slightly wider than the post.
- The higher the fence the deeper the post needs to go into the ground.
- After digging the hole and placing in the post, backfill the hole with earth and pack the earth down firmly with a crowbar.
- Mound any excess dirt around the post to allow for sinkage. Try not to leave a well or depression around the post as water will collect and rot the timber or rust the steel.
- The post should be checked with a level during the process to ensure that it is straight.

NOTE

Any posts used for fencing must be put right in the middle of the hole so that the soil can be rammed around the post evenly.



ACTIVITY

Be careful when digging holes with a spade or shovel as wrongly twisting and turning with a load of soil can easily damage your back. With your trainer practice the correct lifting and turning technique when using a long handled shovel.

2B. STRAINER ASSEMBLIES AND LINE POSTS

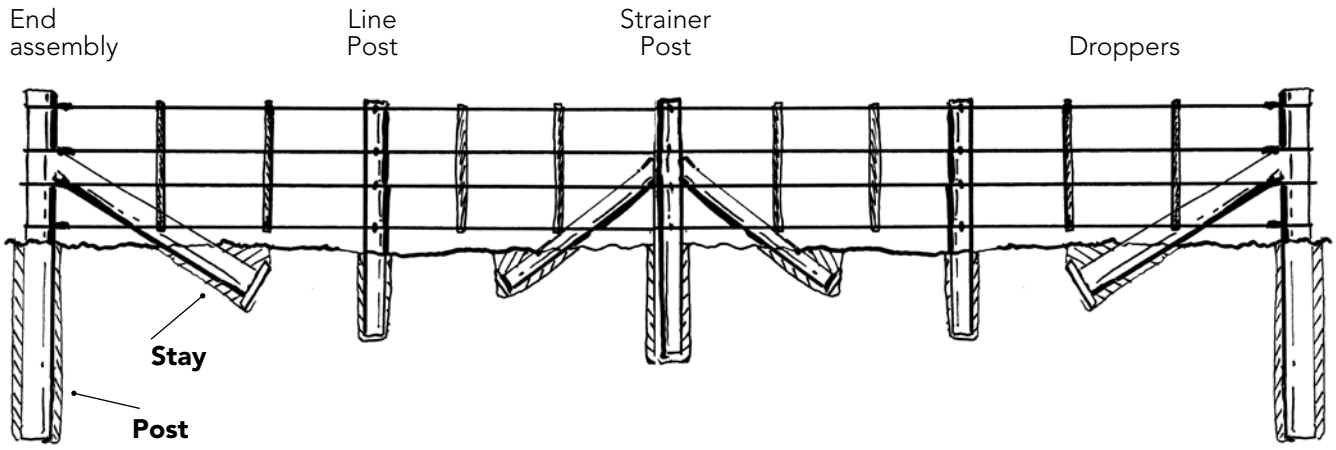
End assemblies, strainer posts and line posts can be made from steel or wood.

- **Wood:** The disadvantage of using wood is that it can get burnt in a bushfire, it can rot, and termites can eat it. The advantage is that if you can use local wood it makes it cheaper. Wood can be treated to make it last longer.
- **Steel:** The disadvantage of using steel is that it can rust and corrode. However in the Top End the risks of fire, rotting and termites make steel a good option. The risk of them corroding is higher in coastal areas and in acid or salty soils. Galvanised steel will last longer but it is more expensive.

STRAINER ASSEMBLIES

End assemblies and strainer posts are very important – they hold the fence up and provide a point for the wire to be strained against. They are made from posts and stays.

- The **post** takes the strain of the wires – they should be buried 1 metre into the ground.
- The **stay** makes sure the fence does not pull the post over.
- You can buy them ready made from steel with fittings provided, or you can make them yourself from wood.



LINE POSTS OR PICKETS

Line posts provide additional support for the wires in a fence. They keep the wires at the required height and evenly spaced. The size and number of posts will be determined by the type of fence required.

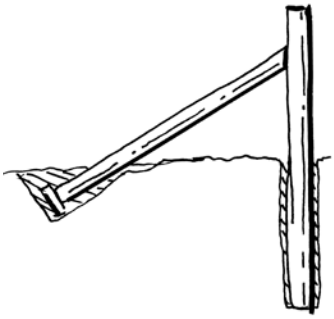
Steel pickets (star pickets) do the same job. They are normally driven straight into the ground with a post driver which means you don't have to dig a hole. You can get hand held drivers or motorised ones that run off a tractor. Make sure the pickets are all facing the same way so the side with the holes is on the same side – this will make it easy to attach the wire.

End assemblies

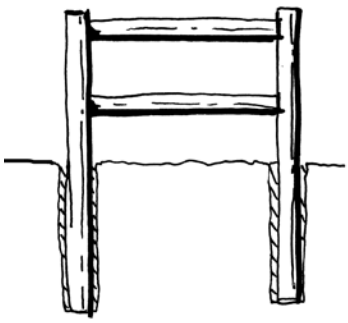
End assemblies are the most important part of a fence. They are needed at each end of the fence line, at gateways, at corners, whenever the fence changes direction, at the top of hills and the bottom of gullies. At corners there must be an end assembly for each fence line – so one end assembly may have two or more stays facing in different directions, for two or more fence lines.

Two types of end assemblies are shown here.

Angle assembly



Box assembly



Strainer posts

Strainer posts should be included in long fences over flat ground. Here is an example of a strainer post.

2C. WIRE, STRAINING AND KNOTS

WIRE TYPES

High tensile wire can be stretched further without breaking or losing its shape but it is more difficult to handle and knot than soft wire. You need to get advice about the best wire for your fence. Make sure you find out the recommended load for your wire so you don't overstrain it.

RUNNING OUT WIRE

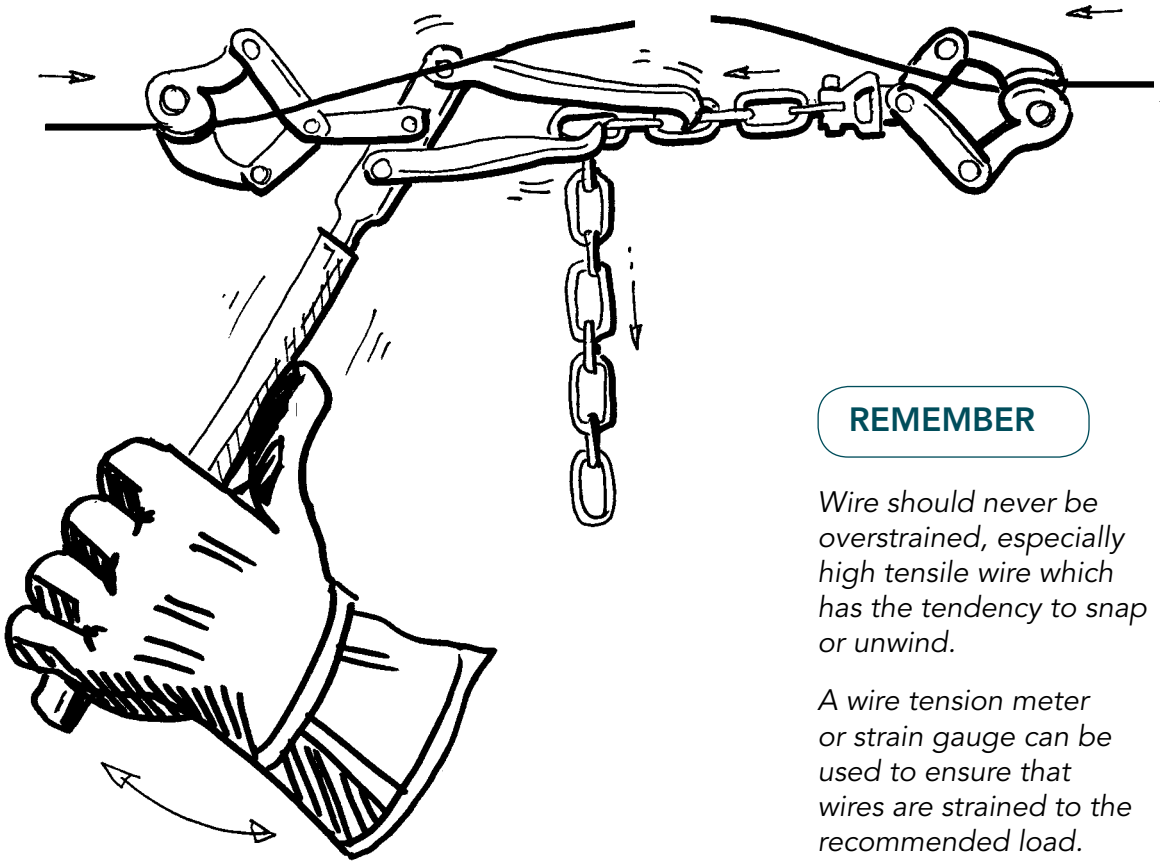
When the end assemblies have been constructed and the strainer posts and line posts installed in the ground, the wires can be run out along the fence line.

It's often quicker to run all the wires out at the same time. A wire reel or spinner can make it much easier.

STRAINING

Wire straining can look complicated at first, you will need to practice using the strainer with your trainer.

- The wire is wrapped around the strainer post at one end of the line and securely knotted using pliers.
- Then the wire strainer is attached to the opposite strainer post and the wire is strained, then tied off.



REMEMBER

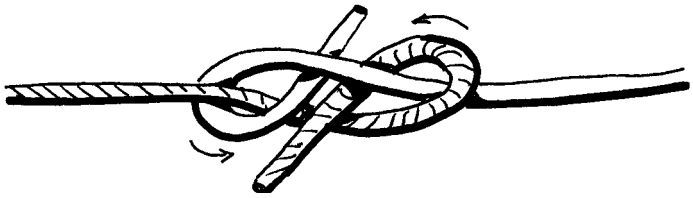
Wire should never be overstrained, especially high tensile wire which has the tendency to snap or unwind.

A wire tension meter or strain gauge can be used to ensure that wires are strained to the recommended load.

KNOTS

There are a number of knots used to join wire. Some common knots are:

- **Figure eight:** Used to join plain wires of the same gauge.



- **Double loop:** For joining barbed wire and making quick repairs.

Wire joiners can be used instead of knots. The wires are fed from opposite ends through the wire joiner and clamped with a special tool.

ATTACH WIRE TO LINE POSTS

Attach the wire to line posts using tie wire.

- If using pickets put the tie wire through a hole in the picket.
- Twist the tie wire end around the wire a number of times.

Sometimes the main wire is threaded through the holes in the pickets before straining, but this can wear the wire and also make repairs difficult.

2D. DROPPERS, WOVEN WIRE AND NETTING

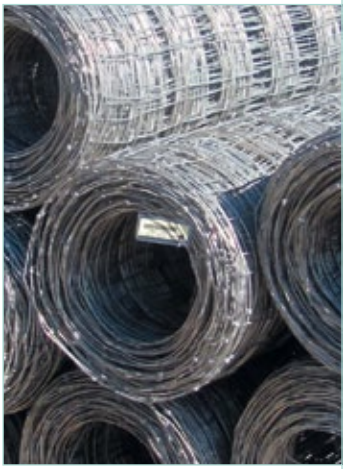
DROPPERS

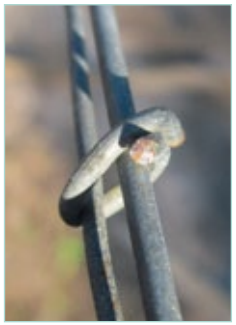
Fence droppers are suspended on the fence wire to help support and space the wire. They can be used in place of posts to keep fencing costs down.

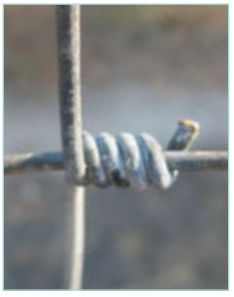
- Place steel droppers at the correct intervals and attach the wire.
- Fence dropper clips are used to attach fence droppers to the fence wire - they are usually provided with the fence droppers.

WOVEN WIRE AND NETTING

Woven wire (such as hinged joint or ringlock) or other types of netting should be attached to the wire or posts using wire or netting clips and netting clip pliers. In some situations the woven wire or netting may need to be strained as well.







2E. GATES

A fence is useless without a gate. It is important that gates are installed correctly. Nobody likes gates that are hard to open and close!

- Gates let livestock, vehicles, machinery and people to move in and out of paddocks, leaving the paddock secure once the gate is closed.
- Gates are usually placed in the corners of paddocks.
- Ideally, a gate should open both ways, although the terrain does not always make this possible.

TYPE AND SIZE OF GATE

The type of gate depends on what it is to be used for.

- Factory-made steel gates of varying widths are very common.
- Gates can also be made yourself from steel or timber.
- Wire gates are cheap and easy to make and are good if the gate is not used a lot - they are sometimes called cocky or bush gates.

The size of the gate used depends on what the gate is to be used for.

- A gate for people only needs to be small.
- For vehicles, the gate needs to be about 3 metres wide.
- For large machinery, two or more gates may be needed.

FITTING THE GATE

- Make sure that you measure everything and dig the holes in the right place so that the gate works properly.
- A gate should swing smoothly on its strainer post and not drag or scrape along the ground.
- Before fitting the gate it should be positioned on blocks evenly between the posts.
- Temporary wire hinges can be used to hold the gate in place.

ASSIGNMENT 2 A2

BUILD A FENCE

With your group build a fence. Draw all the steps here.

MAINTAINING AND REPAIRING FENCES

3

3A. MAINTENANCE

It is important to maintain your fence by checking it regularly. Fences can be damaged by:

- Fire.
- Floods.
- Termites.
- Wood rot.
- Corrosion.
- Falling trees and branches.
- Livestock and other animals.
- People.
- Vehicles, machinery and implements.

Once the damage has been noticed you should arrange to repair the fence as soon as possible.

3B. REPAIRING FENCES

- The most common fencing repair is rejoining broken wires. You will need to use your strainer.
- Wooden posts that are rotten or burnt can be supported with a steel post. The steel post is driven in beside the old existing post and wired to it. Alternatively, the failed posts can be pulled out of the line and replaced with new ones.
- A strainer post may have tipped over due to the failure of its stay. If it is still sound, the strainer can be re-stayed and the wires restrained.
- Where termite attack is severe the posts should be replaced with treated timber, steel or concrete posts.
- Steel posts and wire are susceptible to corrosion, especially in coastal districts and in highly acid, alkaline or saline soils. Wire can be galvanised to provide protection and steel posts can be galvanised or dipped in a tar compound.
- After a major flood, kilometres of fence lines may need to be repaired or replaced.

3C. DISMANTLING FENCES

Sometimes fences are no longer needed and need to be dismantled. Also, sometimes damage to a fence is so severe that it needs to be replaced, the damaged fence needs to be dismantled first.

- As the fence is being dismantled, any materials that can be reused or recycled should be salvaged for future work.
- You should use a steel post remover to remove steel posts - never try to wriggle the posts out of the ground as they will bend in the process and you will not be able to re-use them again.
- If fence posts are removed do not leave the holes unfilled as they could injure workers and animals, and small native animals could fall in and get trapped.

4 FINISHING UP

NOTE

You should never take any tools and equipment to a new work site with any dirt or soil on them from the previous work site. Doing this could spread soil-borne diseases to non-contaminated sites.

4A. CLEANING UP

The final task is to clear up the site.

- Make sure any rubbish is cleaned up and removed.
- Before you leave have a look around and check that you have picked up all your tools.
- Wire off-cuts and staples should be carefully picked up as they pose a hazard to people, livestock and machinery.
- Any piles of soil should be moved and spread appropriately.
- All unused fencing materials should be brought back to your workshop.

4B. DISPOSAL OF WASTE MATERIAL

When fencing lots of material that is left over can be kept to use again:

- Wire should be neatly rolled up. Even small bits of wire can be kept for doing repairs.
- Posts, pickets and droppers that are in good condition should be neatly stored to be used on the next fencing project.
- Hinges, gates and other fittings can be stored for future needs.
- Old posts can be used to stack other materials off the ground.
- Old wooden posts make good firewood but you should never burn treated posts as the fumes and ashes are poisonous.

Anything that can not be used again should be disposed of in an environmentally safe manner such as at an authorised landfill.

4C. TOOL MAINTENANCE

To make the next job easy and to prevent injury it is very important to keep tools in good condition. Follow the steps below:

- Wash all tools of mud and dirt and oil any metal parts to prevent rusting. Steel wool and a light oil will remove any surface rust.
- Keep tools sharp and in good working order. Bevel the back edge of a spade off with a bench grinder or a coarse sharpening stone.
- Replace any broken handles. Never use bush sticks as handles as they often break causing injury.
- Sand and oil all wooden handles to avoid getting nasty splinters. Use 50% mineral turpentine and 50% raw linseed oil on wood.

Any damaged or faulty tools or equipment should be reported to the trainer.

4D. RECORD KEEPING

Check with your trainer to see what records about the fence are needed. You may need to record where the fence is on a property map, or list the materials used in the fence.

ASSIGNMENT 3 A3

INSPECT AND REPAIR A FENCE

With your group inspect a damaged fence. Fill in this table and then carry through with the repairs.

TYPE OF DAMAGE	REPAIRS NEEDED

RESOURCE: BASICS OF GOOD LIFTING

Correct handling of materials is important to ensure a safe working environment. Improper lifting techniques can lead to back pain and learning the right way to lift will help you avoid this.

1. Plan ahead

- Size up the object and test to see if it is possible to lift by yourself
- Clear a path and make sure there are no obstacles in your way
- Practice the lifting motion before you lift the object

2. Lifting the object

- Place your feet shoulder width apart with your feet close to the object
- Keep the object close to your body
- Bend your knees and tighten your stomach muscles
- Get a firm hold on the object and stand up slowly keeping your back straight
- Let your legs do the lifting work
- Take short steps and do not twist

3. Putting the object down

- Keep the object close to your body
- Bend your knees and keep your back straight
- Let your legs do the work
- Wait until it is firmly in place before letting go

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6. Maintain Properties and Structures
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