

Avoidance of Danger from Electricity Overhead Lines and Underground Cables

WESTERN POWER
DISTRIBUTION

Serving the Midlands, South West and Wales

Avoidance of Danger from Electricity Overhead Lines and Underground Cables

Introduction

In the UK on average, 20 people are killed and 400 people are injured as a result of coming into contact (or close proximity) with electricity overhead lines and underground cables.

Although electric shock is the first thing that people associate with coming into contact with our network, those who have witnessed the effects of damage to our system are shocked by the amounts of heat, light and noise that are the result of an electrical flashover.

In the Midlands, South West and South Wales, Western Power Distribution (WPD) have had to attend to incidents where people have accidentally made contact with one of our live electricity overhead lines or damaged an underground cable and become seriously injured.

A significant number of these accidents occurred whilst people were working in the vicinity of overhead and underground electrical apparatus and this booklet has been produced to provide general guidance on how you and your employees can avoid becoming one of these statistics.

Our Operational Area



PLANNING YOUR WORK.

It makes sense to consider your safety while in the vicinity of our equipment as early in your planning process as possible.

One of the first things you should do whenever you are planning your work is to check whether there is any of our equipment in the immediate vicinity. You should do this whether your work is taking place on public (e.g. highways and footpaths) or on private land.

For instance, take a good look around your site to see if there are any visible overhead lines. You should also bear in mind that we have a very extensive network of underground cables, and we are always happy to supply a plan from our Map Response Team who can be contacted via the following;

Tel: 0121 623 9780

Fax: 0121 623 9223

WPDMapResponse@westernpower.co.uk

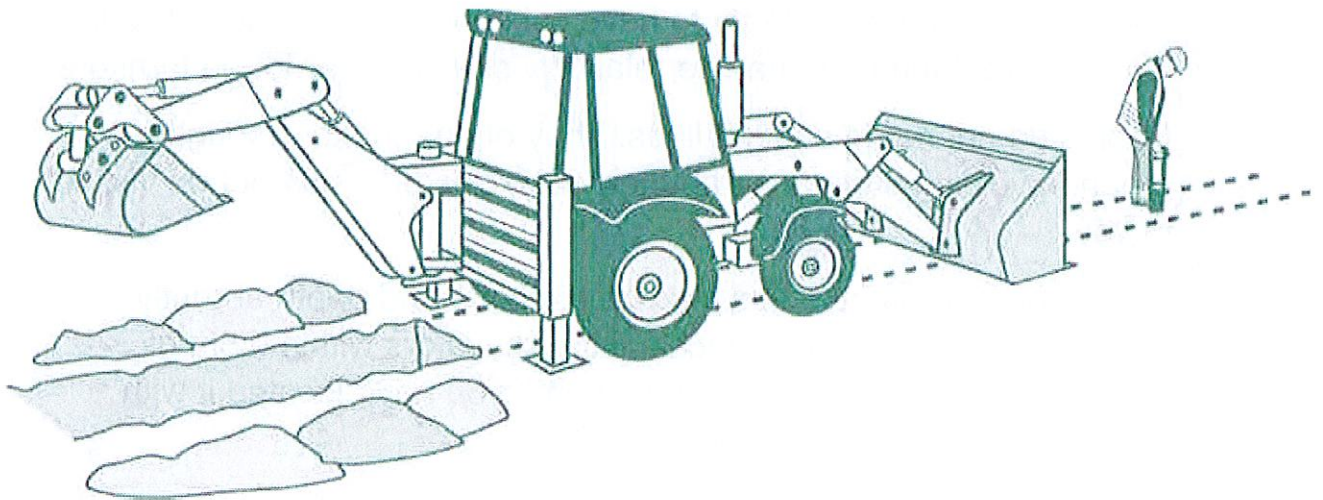
An online mapping service is available at
www.westernpower.co.uk/locationplans

It is always safer to assume that there are underground cables present in the ground until you have proven otherwise.

WORKING IN THE VICINITY OF UNDERGROUND CABLES

Having obtained copies of our network maps, it is important to recognise that in most cases there will be no surface indication of the presence of our underground cables. We therefore advise that you take the following actions:

- Make sure that you have up-to-date copies of our cable record plans ON SITE - not back in the office.
- Don't assume that these plans are to scale if they have been faxed or copied.
- Make sure that a competent person using a Cable Avoidance Tool (CAT) locates all of the cables shown on these plans.
- Mark the locations of cables on the ground surface with waterproof road paint or other permanent marker.
- Always assume that our cables are live unless we have informed you, in writing, otherwise.



- By hand, dig trial holes to locate the exact position of all cables. Always use a spade or shovel – never use a pick, fork or power tool – push the spade or shovel into the ground applying foot pressure.

- Look out for ducts, marker tape or tiles but do not rely on these. Even if a cable route was originally laid in a duct or with a marker tape, these may have been removed during other excavations at a later date along all or part of the cable route.
- Brief all people working in the vicinity of the presence and location of all underground cables.

UNDER NO CIRCUMSTANCES SHOULD YOU ATTEMPT TO WORK ON, OR INTERFERE WITH, ANY OF OUR UNDERGROUND CABLES.

The only people qualified to work on this equipment are our operatives; who have been specifically trained and are authorised in writing to do so.

Please also be aware that:

- Cable record plans are not guaranteed to be completely accurate. Kerb lines, roads and buildings may have been moved or altered since the cables were laid.
- Cables should ordinarily be at least 450mm deep but don't assume this to be the case where you are working – ground levels could have changed.
- Not all service cables are shown on record plans, so look for cables running down poles and bear in mind that all buildings, street lights and street furniture are likely to have cables running to them. Cables feeding street furniture may be relatively shallow near to the furniture.
- Cables do not run in straight lines. They often “snake” through the ground avoiding surface and buried obstacles that may not be visible to you.
- Cables are flexible and can change direction and depth abruptly – for this reason never use mechanical excavators within 0.5m of any underground electricity cable even if you have located it with trial holes.

- **No attempt should be made to break out concrete surrounding a cable. Please contact us immediately on our general enquiries number and we will discuss the options for safe working which may include making the cable dead or you moving your work site if possible. If we need to make the cable dead we may need to provide our customers with two weeks notice of the power interruption.**
- Our cables and joints are not designed to act as steps or to be left unsupported. If you remove support from any cable, you will need to support it using temporary hangers at not more than 0.5m intervals.
- When backfilling, please consolidate the ground under the cables, cover the cable with soil free of stones or with stone dust and replace any cable marker tiles, ducts and tape.

IF YOU DAMAGE AN UNDERGROUND CABLE

you must immediately clear the area of personnel, because the cable could still be live, or become live again.

If a machine is still in contact with the cable, instruct the driver to JUMP clear. Do not touch any part of the machine.

Please contact us on our emergency number immediately and tell us what has happened. Please be ready to provide us with a contact telephone number and an accurate location or set of directions – this will help us in getting our staff to site quickly to minimise any danger and lessen the disruption to your work.

Please report any damage to a cable, however superficial it might seem. The cable may not fail at the time of damage, but it could fail later, causing danger to our staff and other contractors, disruption to our customers' supplies, and also – if we trace the damage back to you – a very much larger repair bill.

WORKING IN THE VICINITY OF OVERHEAD LINES

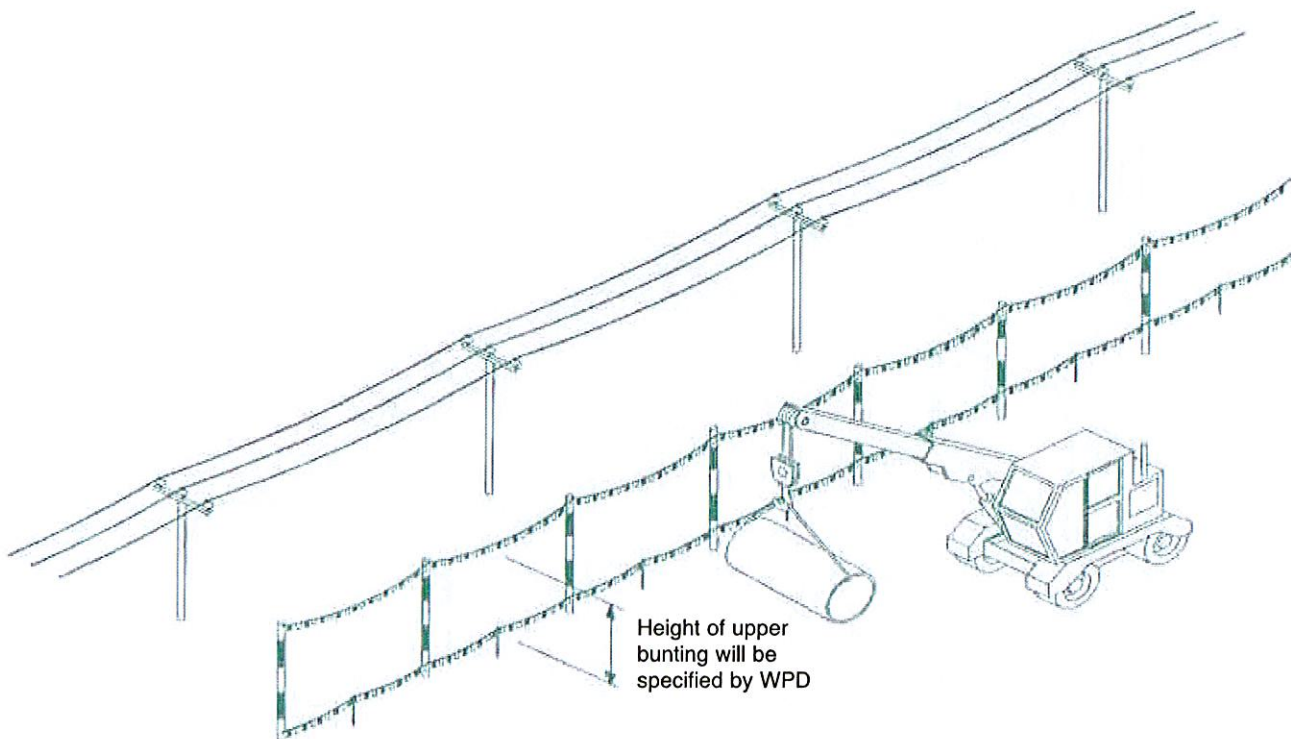
UNDER NO CIRCUMSTANCES SHOULD YOU ATTEMPT TO WORK ON, OR INTERFERE WITH ANY OF OUR OVERHEAD LINE EQUIPMENT OR SERVICE WIRES.

The only people qualified to work on this equipment are our operatives; who have been specifically trained and are authorised in writing to do so.

Overhead lines have the advantage that, unlike underground cables, they can easily be seen.

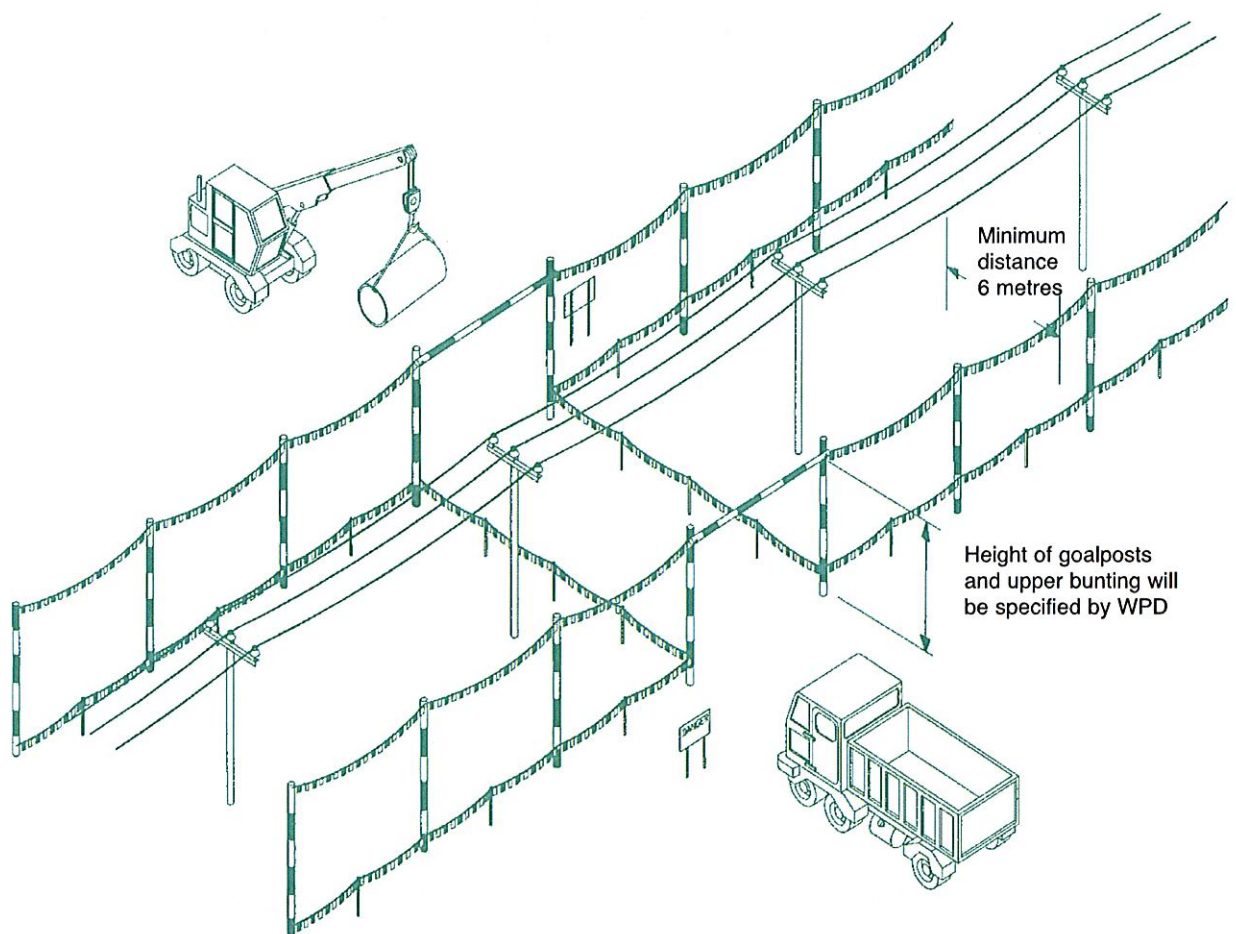
- Always assume that our overhead lines are live unless we have informed you otherwise in writing.
- We will be able to advise you about the type and voltage of the overhead lines in question and provide you with information about the clearances that you must adhere to during your work. Please ring our regional general enquiries number for further advice.
- If you are in any doubt about whether the overhead lines in question are power or telephone (this is a very common mistake) – please ask us.
- In some circumstances, we may be able to temporarily shroud low voltage overhead lines and services running to buildings if you need to work in the vicinity e.g. for scaffolding erection, fascia repairs and painting work on domestic properties. We don't normally charge for the shrouding of overhead lines, but please give us as much notice as possible.
- If you think that you will be working close to our overhead lines and they need shrouding – please don't start work until we have agreed what needs to be done and all safety precautions are in place.
- Please note that it is not technically possible to shroud high voltage lines, so if you cannot avoid working near to our high voltage lines, contact us and we will be happy to meet with you to discuss safe alternatives.

- If it is decided that work can go ahead in the vicinity of our overhead lines but there is a risk of you infringing the safety clearances from the overhead lines, you have a responsibility to erect safety barriers to segregate your works from the area around the overhead lines. The detailed requirements for these barriers are provided in the HSE document GS6 'Avoidance of Danger from Overhead Lines'. As a summary they should consist of:
 - Red and white coloured posts erected at 6m intervals, with coloured bunting stretched between their tops, supplemented by low level bunting erected at 1m above ground level, supported at 3m intervals on red and white coloured posts. This is shown below.



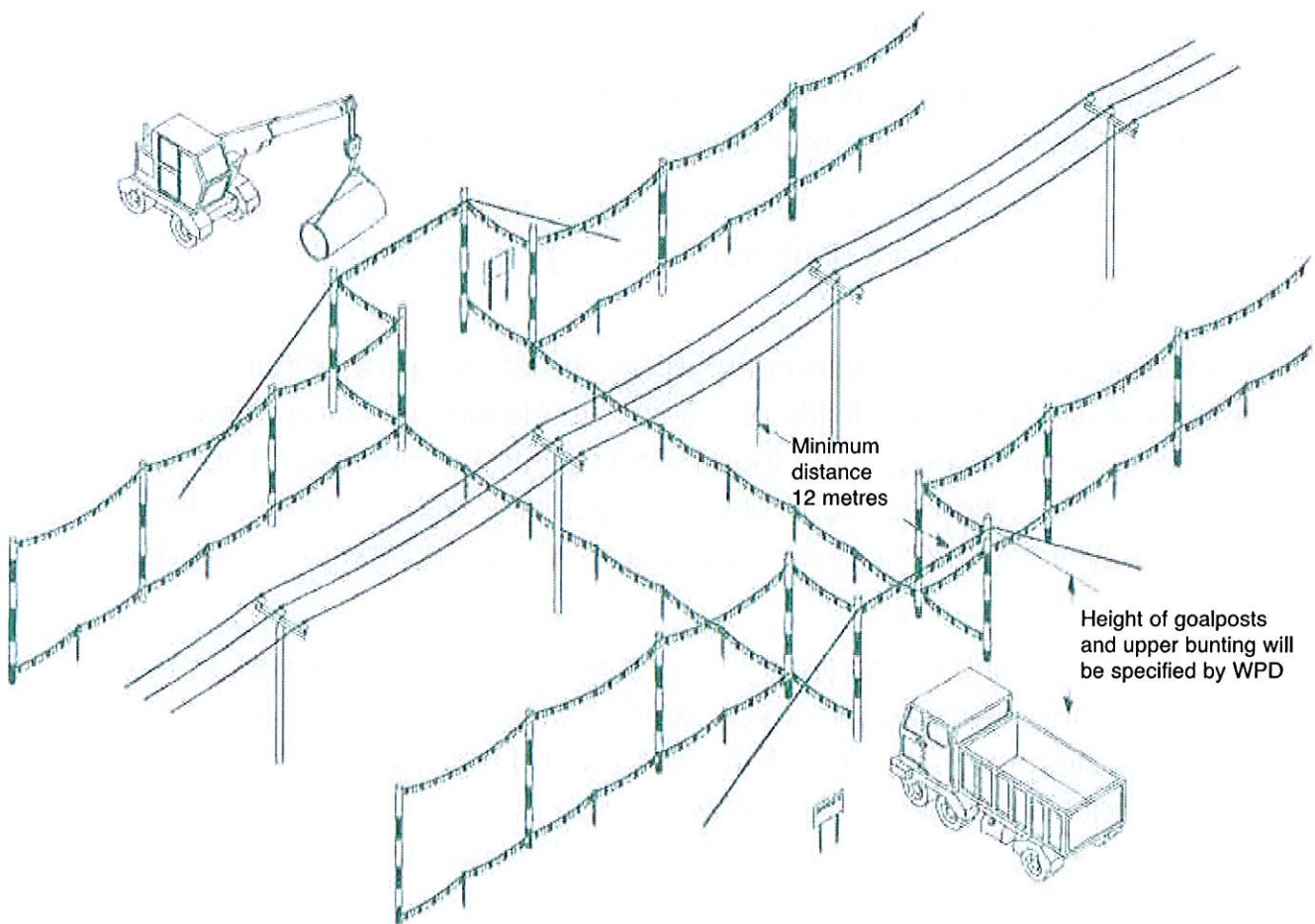
- We are able to advise you on the height of the barriers and any additional clearances necessary if you are using large plant on your site.
- Any bunting, ropes and lanyards used should be made from an insulating material.
- These barriers should be erected parallel to the overhead line at a minimum distance of 6m horizontally from the outermost conductor of the overhead line.

- The supports may be supported by rubble or concrete filled barrels or buried directly in the ground.
- Danger Notices should be fixed to all of your high level supports.
- The ground enclosed within these barriers is best regarded as “dead ground” in which all foot and vehicular traffic is forbidden, in all circumstances, for the duration of your work.
- Where it is necessary for foot and vehicular traffic to pass under the line, you will need to form a marked access way between the barriers as shown below.



- This access way should comprise of bunting erected 1m above ground, supplemented by high level “goal-posts” erected at either end.
- The goal post cross bars should be rigid, made of insulating material and positioned in a location and at a height specified by us.

- The access route should be as narrow as possible and should not normally exceed 10m in width.
- If it is necessary to make the access route wider than this, you may find it impractical to use rigid cross bars, so you may use a tensioned rope and bunting instead. If you use rope and bunting as a cross bar, you should move the entrance to the access route out to a minimum distance of 12m from the outermost conductor of the line. This is to allow for any stretching of the rope if pulled by your plant.



- If you decide to use steel wire rope to support the barrier, this must be effectively connected to earth at both ends.
- You should also install Danger Notices at all probable directions of approach and clearly display the cross bar height.
- If you are working at night, or in conditions of poor visibility, you should ensure the area is well lit and that the overhead lines are clearly visible.
- Whatever measures you take, you should ensure that everyone working in the vicinity of overhead lines is briefed about the risks and what safety measures are in place. Do not permit anyone to carry long objects, especially scaffold poles, ladders and irrigation pipes in the vicinity of overhead lines.
- You should ensure that all shrouding, barriers and signs are regularly inspected and maintained so that they remain effective.
- Overhead lines are not normally insulated and electricity at high voltages may jump, so a dangerous situation can arise just from a close approach.
- Cranes and excavators working near overhead lines are at increased risk because of the possibility of the jib/arm slewing or being raised into the overhead line, or the load swinging into the overhead line. You may therefore also need to fit plant and vehicles with restricting chains etc. to physically restrain their operation – we can advise on this if you wish.
- If you are planning to carry out tree cutting or arboriculture work in the vicinity of our overhead lines, you need to be aware that this is a complex, high risk activity and we recommend that you employ a competent tree surgeon, who complies with all of the requirements of Forestry industry Safety Accord (FISA) publication FISA 804 - Electricity at work: Forestry.

If contact is made with an overhead line

you must immediately clear the area and suspend all work within 50m of the damage because the line could still be live, or become live again.

The operator of a machine that is in contact with an overhead line should:

- **if the machine is still operable and the operator is still in the cab:**

provided that you do not risk breaking the overhead line or dragging it to the ground, immediately lower the raised parts of the machine USING ONLY THE CONTROLS IN THE CAB and/or drive the vehicle clear of the overhead line.

contact us immediately on our emergency number so that we can check the overhead lines.

instruct other people in the vicinity not to approach the vehicle.

- **if the machine is not operable, cannot be driven clear of the overhead line or there is a risk that doing so will break the line or drag it to the ground:**

stay in the cab.

contact your site manager or us immediately on our emergency number by radio or mobile phone or as soon as possible by any other method.

instruct everyone outside the vehicle not to approach it.

do not exit the cab until given confirmation BY WPD PERSONNEL that it is safe to do so.

- **if the machine is inoperable or cannot be driven free and there is risk of fire or other immediate hazard:**

JUMP clear of the vehicle, avoiding simultaneous contact with any part of the machine and the ground.

try to land with your feet as close together as possible.

where possible, continue to move away from the vehicle using “bunny hops” with your feet together until at least 15m from the vehicle.

instruct other people in the vicinity not to approach the vehicle.

contact us immediately on our emergency number.

do not return to the vehicle until given confirmation by WPD PERSONNEL that it is safe to do so.

Whatever the circumstances please contact us on our emergency number immediately and tell us what has happened. Please be ready to provide us with a contact telephone number and an accurate location or set of directions – this will help us in getting our staff to site quickly to minimise any danger and lessen any disruption to your work.

Please report any damage or contact no matter how minor they may seem to you at the time. The damage may not cause a serious problem at the time of damage, but it could fail later, causing danger to our staff and members of the public, disruption to our customers' supplies, and – if we trace the damage back to you – a large repair bill.

MORE INFORMATION

For your information, we are legally obliged to report all contact with our system to the Health & Safety Executive (HSE), and, if you are an employer, you may be obliged to report incidents involving your staff or contractors to the HSE. Even if no one is hurt, you could be prosecuted for failing to report such an incident.

More detailed general information on this subject is available in the following publications from the HSE:

HSG(47) – Avoiding Danger from Underground Services

GS6 – Avoidance of Danger from Overhead Lines

Along with Forestry Industry Safety Accord (FISA) publication FISA 804 – Electricity at Work: Forestry

If you require more site-specific information relating to our equipment at your location please contact us on our regional general enquiries numbers.

Our general enquiries numbers are;

Midlands 0845 724 0240

General Enquiries

South Wales 0845 601 3341

General Enquiries

South West 0845 601 2989

General Enquiries

FINALLY...

Please, always remember that electricity cables and overhead lines can be very dangerous – the general rule is **STAY AWAY** and stay safe.

NOTES



This booklet is issued by the Safety Team

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Western Power Distribution (West Midlands) plc. Registered in England and Wales No. 3600574

Western Power Distribution (South Wales) plc. Registered in England and Wales No. 2366985

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Our emergency number is:
0800 6783 105

Calling from a mobile?

East Midlands

0330 123 5009

West Midlands

0330 123 5008

South Wales

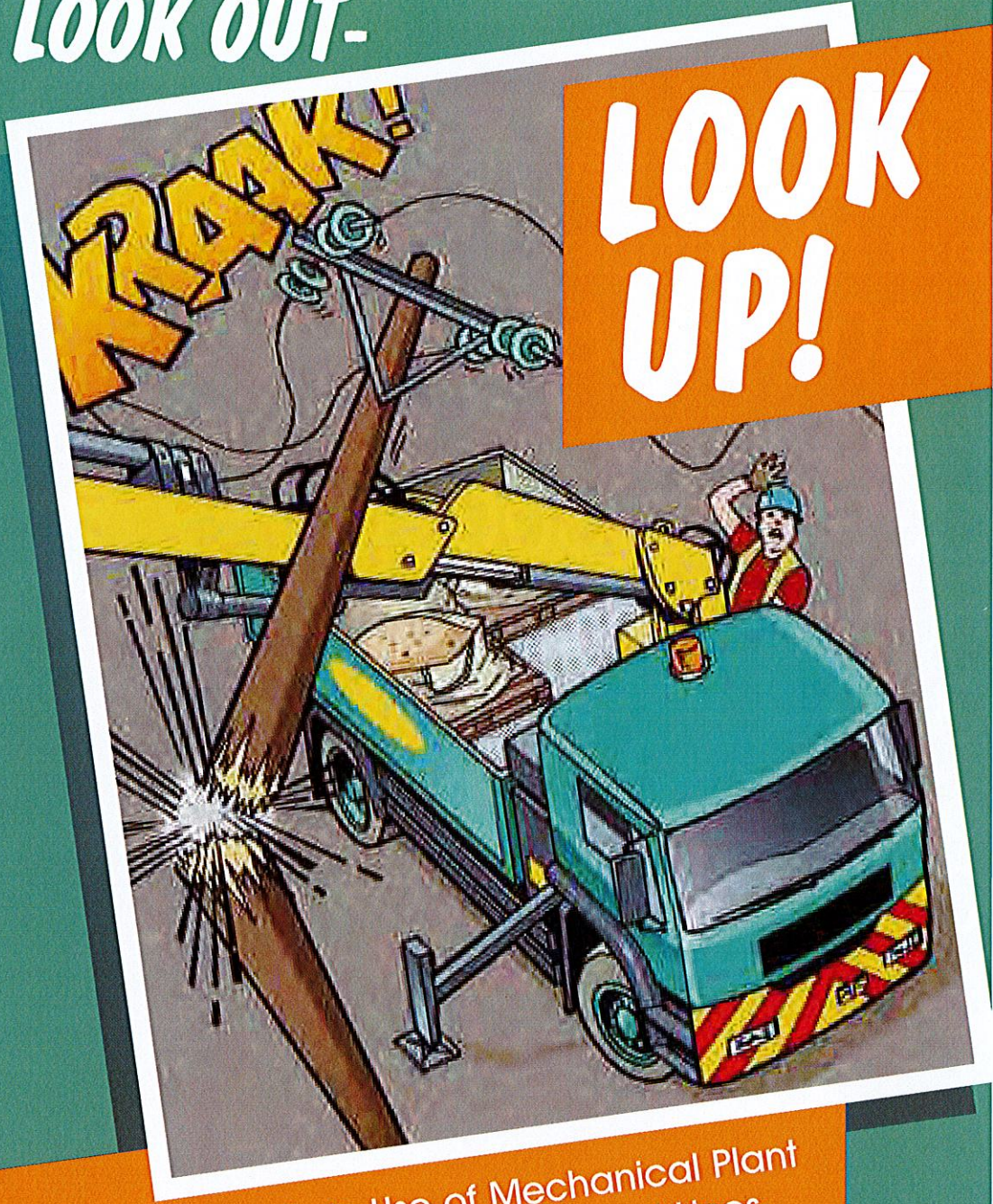
0330 123 5002

South West

0330 123 5001

LOOK OUT.

LOOK UP!



**A Guide to the Safe Use of Mechanical Plant
in the Vicinity of Electricity Overhead Lines**

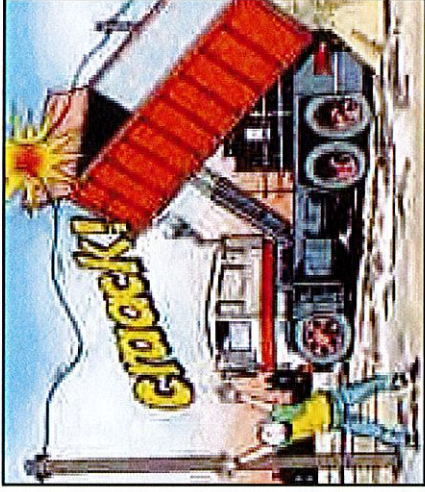
**WESTERN POWER
DISTRIBUTION**
Serving the Midlands, South West and Wales

The Safe Use of Mechanical Plant in the Vicinity of Electricity Overhead Lines

Introduction

Every year in the UK on average, two people are killed and many more are injured when mechanical plant and machinery comes into contact or close proximity to overhead electricity lines.

This booklet has been produced for anyone who uses mobile plant, (such as Hlabs, MEWPs, Tipper Lorries and Trailers, Grab Lorries, Concrete Conveyors and Excavators) for short duration work and provides general guidance on how to avoid becoming part of these statistics.

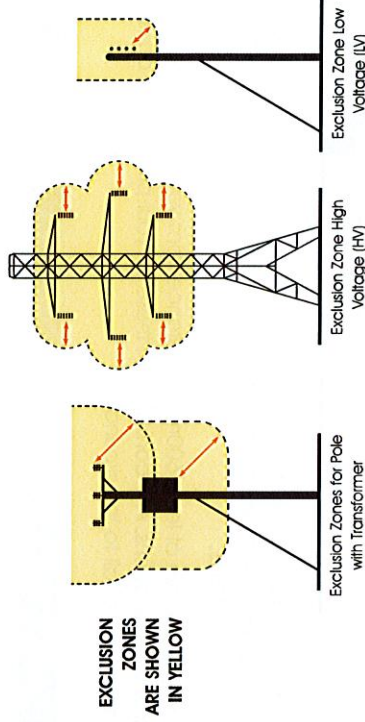


1 BEFORE STARTING WORK

- Overhead lines have the advantage that they can easily be seen, so before you set up your vehicle or plant always:
 - STOP AND LOOK UP!**
- If you are working at night, or in conditions of poor visibility, you should use spotlights or a torch to carefully check that there are no overhead lines within your vehicle's reach.
- Always assume that our lines are live unless we have informed you otherwise in writing.
- If you are in any doubt about whether the lines in question are power or telephone (this is a very common mistake) – always assume that they are power lines and are live.
- It is not normally practical for electricity companies to shroud high voltage conductors and even when low voltage conductors are shrouded, the shrouding is not designed to protect against contact by mechanical plant – again, always assume the lines are live.

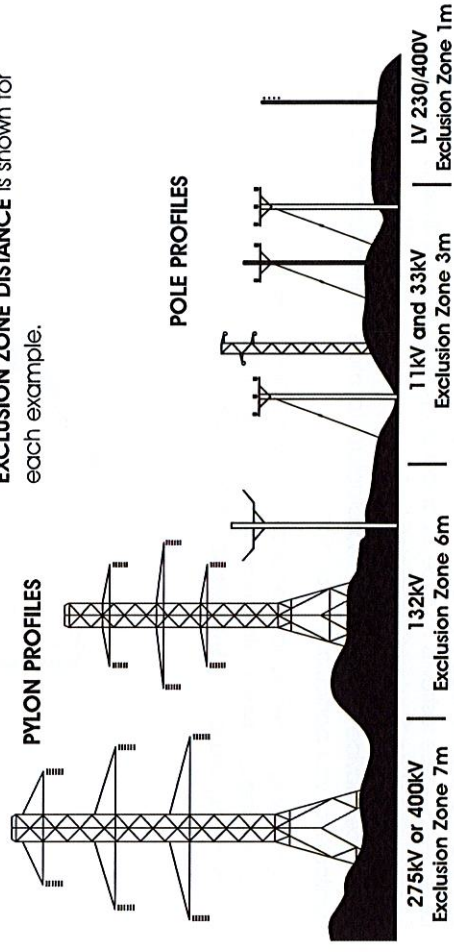
2 EXCLUSION ZONES

- Overhead power lines are not normally insulated and so any contact can result in serious or fatal injuries.
- Electricity at high voltages can also jump gaps with no warning whatsoever, so it is also dangerous to let your plant approach too close to a line.
- The distance that electricity can jump depends on the voltage of the line. The higher the voltage, the further you must stay away from the line and any other equipment that may be fitted to the pole or pylon. This distance is called the **EXCLUSION ZONE**. Examples of this are shown highlighted in the diagram below.



- You must not allow any part of your plant to enter the **EXCLUSION ZONE**.

- The diagram below shows typical types of overhead lines and provides a guide to help you assess the line voltage of lines on wooden poles or steel pylons. The minimum **EXCLUSION ZONE DISTANCE** is shown for each example.

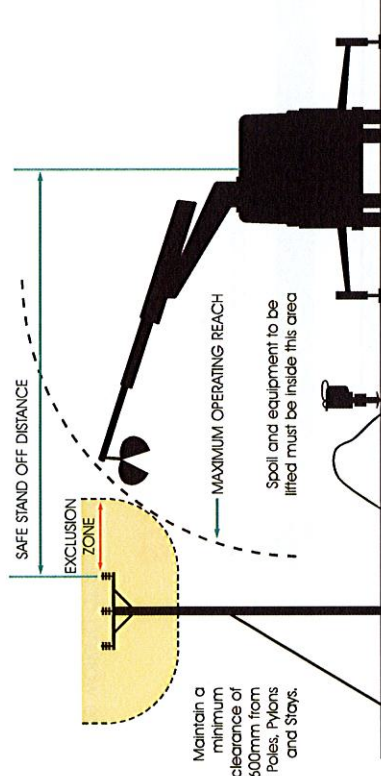


- Please note that these are absolute minimum distances that should under no circumstances be infringed. **If you do – it could prove fatal.**

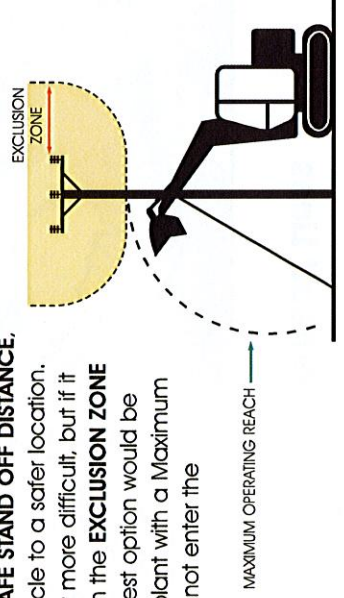
- As well as staying away from the lines or equipment, you should also stay at least 600mm away from any part of poles, pylons and stay wires.
- Please remember that is for guidance only, and if you are in any doubt, please call us for advice before setting up your plant or starting work.

3 STAND OFF DISTANCES

- If there are power lines in the vicinity of your work the best way to make sure you stay out of the **EXCLUSION ZONE** is to position your vehicle at a **SAFE STAND OFF DISTANCE** so that, even when fully extended, no part of it can accidentally reach inside the **EXCLUSION ZONE**.
- This **SAFE STAND OFF DISTANCE** can be calculated by adding the **EXCLUSION ZONE** distance for the appropriate voltage of the line to the Maximum Operating Reach of your vehicle. This is shown in the diagram below.



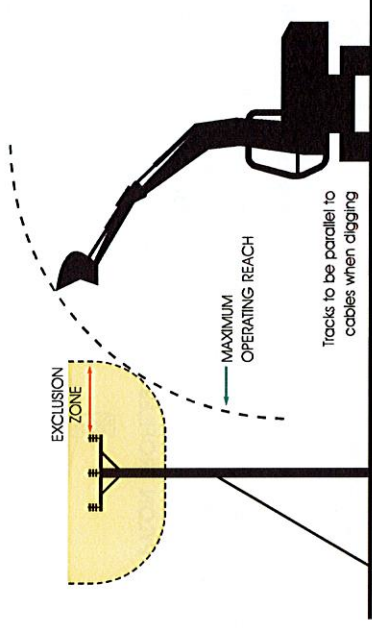
- If you position your vehicle outside of the **SAFE STAND OFF DISTANCE**, there is no risk of accidental contact with the lines and no danger of electricity jumping from the line to your vehicle.
- If you cannot achieve a **SAFE STAND OFF DISTANCE**, consider moving your vehicle to a safer location. It may make your job a bit more difficult, but if it means you stay away from the **EXCLUSION ZONE** - it will be safer. The next best option would be to consider using smaller plant with a Maximum Operating Reach that cannot enter the **EXCLUSION ZONE**.



- You may not be able to achieve either of these options, so, as a last resort, if you cannot avoid operating large items of plant in the vicinity of lines, you **MUST** make sure that the plant is fitted with restraints to ensure that the **EXCLUSION ZONE** cannot be entered. These restraints may be electrical or hydraulic systems fitted to the plant, or mechanical devices such as chains.

Please seek advice from the plant manufacturer for more information on choices available for your particular item of plant.

- If you are using a mechanical excavator to dig parallel to the line, it is good practice to position the excavator with the tracks or wheels parallel to the line, so as you move along the excavation the **SAFE STAND OFF DISTANCE** is easily maintained.



- Care must also be taken to avoid non-mechanical equipment, (e.g. scaffold poles, ladders and long loads such as lengths of steel or timber) from entering the **EXCLUSION ZONE**.
- Always maintain at least 600mm clearance from your plant to any of our poles, stay wires or pylons. Any contact with these by your plant could cause the line to break and fall to the ground.

4 EMERGENCY PROCEDURES

If contact is made with an overhead line, you must immediately clear the area and suspend all work within 50m of the damage because the line could still be live, or become live again.

The operator of a machine that is in contact with an overhead line should take the following steps:

- **If the machine is still operable:**
 - lower any raised parts that are controlled from the driving position and/or drive the vehicle clear of the line, as long as neither of these actions risk breaking the line or dragging it to the ground.

● **If the machine is not operable or cannot be driven clear of the line:**

- stay in the cab.
- contact your site manager or us immediately by radio or mobile phone or as soon as possible by any other method.
- instruct everyone outside the vehicle not to approach it.
- do not exit the cab until given confirmation BY WPD PERSONNEL that it is safe to do so.

● **If the machine is inoperable or cannot be driven free and there is risk of fire or other immediate hazard:**

- jump clear of the vehicle, avoiding simultaneous contact with any part of the machine and the ground.
- try to land with your feet as close together as possible.
- where possible, continue to move away from the vehicle using "bunny hops" with your feet together until at least 15m from the vehicle.
- instruct other people in the vicinity not to approach the vehicle.
- do not return to the vehicle until given confirmation BY WPD PERSONNEL that it is safe to do so.

Whatever the circumstances please contact us on our emergency number immediately and tell us what has happened.

Please be ready to provide us with a contact telephone number and an accurate location or set of directions – this will help us in getting our staff to site quickly to minimise any danger and to reduce any disruption to your work.

Our emergency number is:

105 or 0800 6783 105

Please report any damage or contact no matter how minor they may seem to you at the time. Whilst the damage may not cause a serious problem at the time of contact it could fail later, causing danger to our staff and members of the public, disruption to our customer's supplies, and – if we trace the damage back to you – a larger repair bill!

5 MORE INFORMATION

- Proximity Warning Systems (such as Wire Watcher – see wirewatcher.co.uk for information) may be fitted to your vehicle. Never turn these devices off or disable them in any way.
- Take note of any warnings these proximity warning systems may provide but do not use the presence of such devices as a reason not to follow the advice provided in this leaflet.
- For your information, we are legally obliged to report all contact with our system to the Department of Trade and Industry (DTI), and, if you are an employer, you may be obliged to report incidents involving your staff or contractors to the Health & Safety Executive (HSE). Even if no one is hurt, you could still find yourself being prosecuted for causing a dangerous occurrence.

6 FURTHER READING

For advice related to signing and guarding at longer term work sites please also refer to WPD booklet "Avoidance of Danger from Electricity Overhead Lines and Underground Cables" More detailed information is also published in the following documents available from the HSE.

GS6 – Avoidance of Danger from Overhead Lines.

HS(G) 47 – Avoiding Danger from Underground Services.

Along with Forestry Industry Safety Accord (FISA) publication **FISA 804 - Electricity at Work: Forestry.**

If you require more site-specific information relating to our equipment at your location please contact us on the relevant **GENERAL ENQUIRIES NUMBER:**

0800 096 3080

FINALLY.... Please, always remember that electricity overhead lines can be very dangerous – **the general rule is *STAY AWAY and STAY SAFE!***

For the Safe Use of Mechanical Plant in the Vicinity of Electricity Overhead Lines ALWAYS FOLLOW THESE SIMPLE RULES – THEY COULD SAVE YOUR LIFE!

- **Treat all overhead lines as live and dangerous**
- **Any contact may be fatal or cause very serious injuries**
- **Electricity can jump gaps**
- **Before you set up or use plant near to lines – STOP and LOOK UP**
- **Take special care and use lights in the dark or poor light conditions**
- **If there are lines in the vicinity of your work – stay well away**
- **Set up your plant with care to reduce the chance of contact**
- **If you are unsure or need advice**
 - please ask us before starting work

Our emergency number is: 105 or 0800 6783 105

You can also call 105 if you spot damage to electricity power lines, poles and substations which could put you or someone else in danger.

If there's a serious immediate risk, you should also call the emergency services.

This booklet is issued by the Safety Team: wpsafetyhelpline@westernpower.co.uk



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