

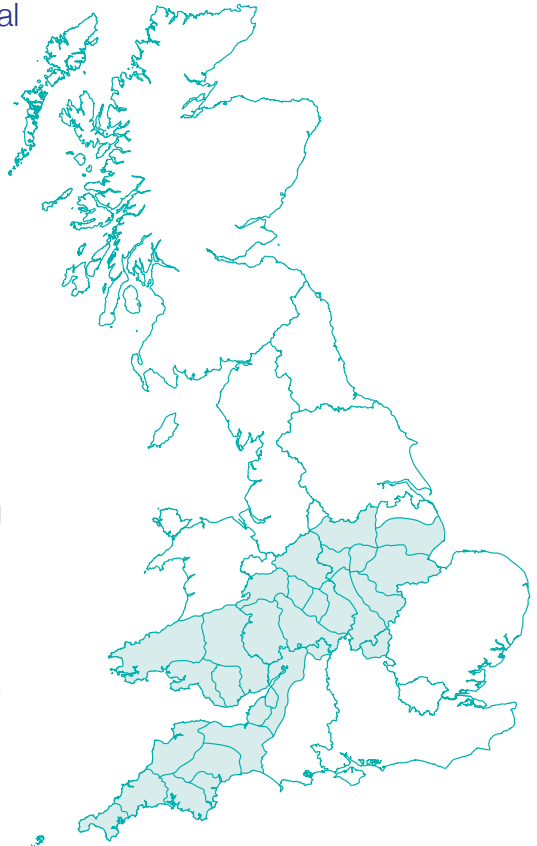
Avoidance of danger from electricity overhead lines and underground cables

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.

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 amount of heat, light and noise that are the result of an electrical flashover.

In the Midlands, South West and South Wales, National Grid Electricity Distribution (NGED) 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 became 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.



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.

Companies and organisations can request plans through LSBUD (Linesearch BeforeUdig) **lsbud.co.uk** – this site provides the same high quality plans and service that the NGED Webmap system has provided in the past, with the significant added benefit of searching over 40 other asset owners from a single query, including underground and overhead electricity networks, gas, high pressure fuel, water and fibre optic networks.

(Please note: not all asset owners are represented by LSBUD, and enquiries should also be made independently to all other relevant organisations).

This service allows you to request plans online and receive an information pack back via email within minutes.

Domestic/private customers should request plans using the phone number, email or postal address shown at the bottom of this section.

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

Email:

nged.mapresponse@nationalgrid.co.uk

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

An online mapping service is available at: **nationalgrid.co.uk/our-network/check-before-you-dig-location-of-our-cables-and-equipment**

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 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 an insulated 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 with 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

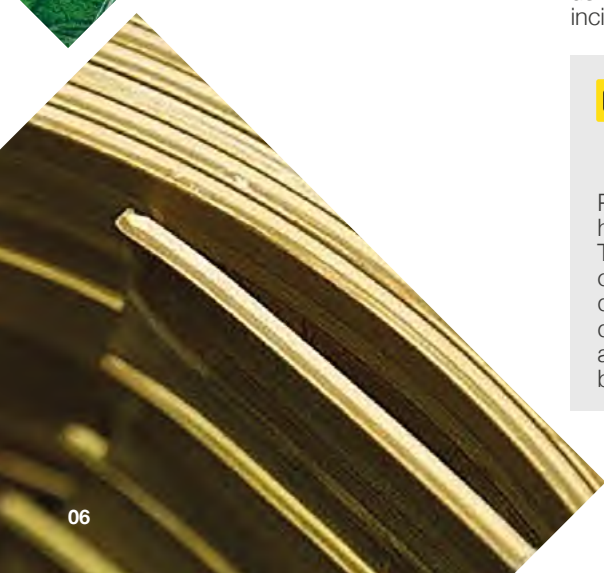
You must immediately clear the area of personnel because the cable could still be live, or become live again.

If a machine is still in contact with the cable, instruct the driver to jump clear 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.

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.

Incident locations can be hard to describe. Using the free What3Words app will enable us to quickly and easily identify where the incident has taken place across our network.



CALL 105

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 large repair bill.

Working in the vicinity of overhead lines

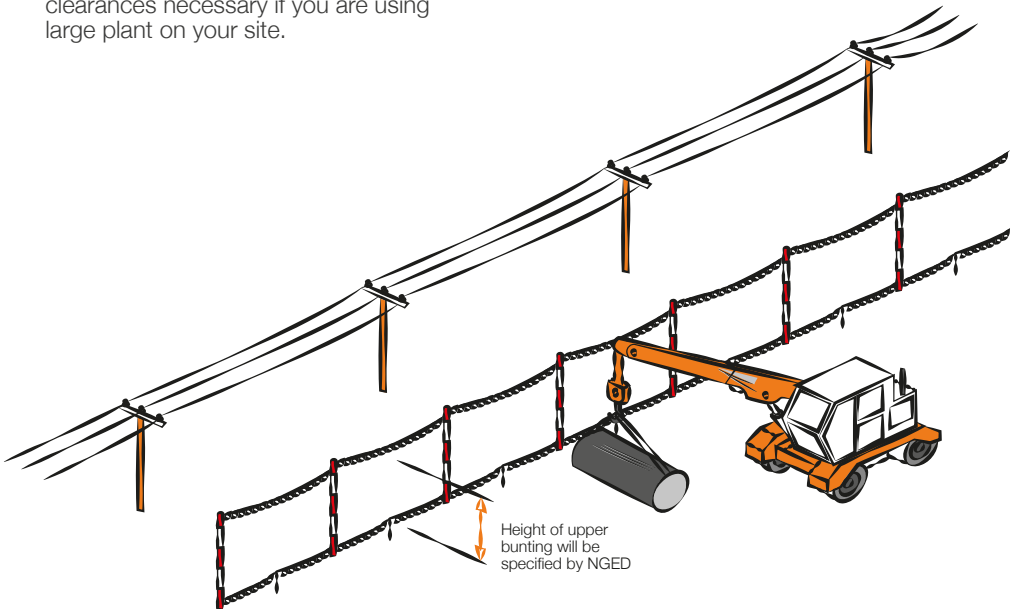
Under no circumstances should you attempt to work on, or interfere with any of our overhead line equipment or service wires.

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.

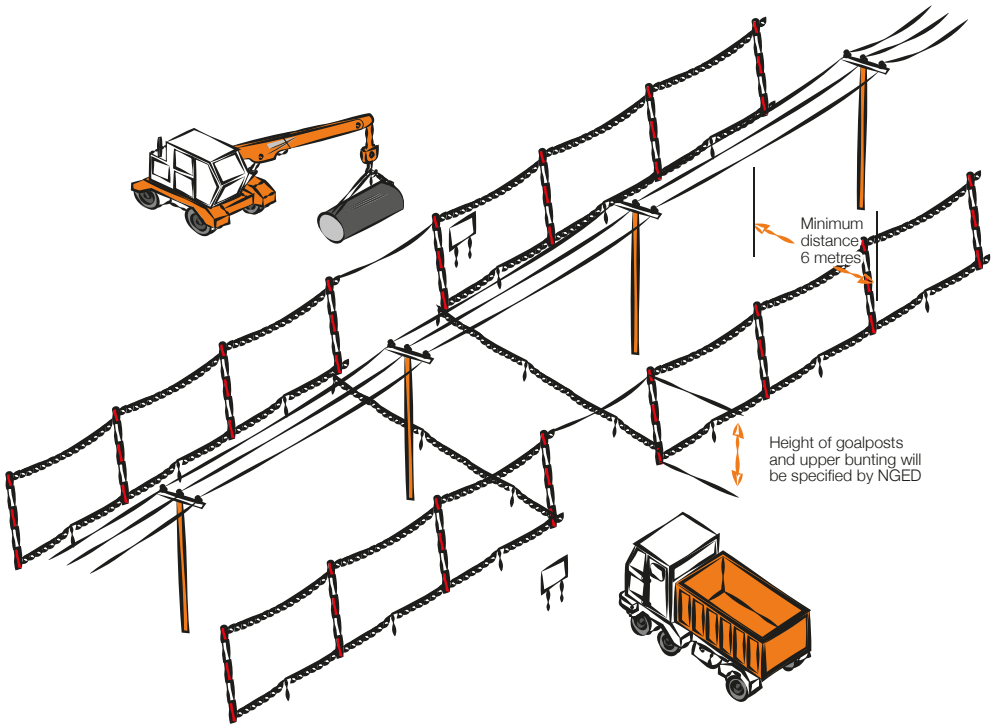
- Always assume that our overhead lines are live unless we have informed you otherwise in writing.
- We will be able to advise you about the type and voltage of the overhead lines in question and provide you with information about the clearances that you must adhere to during your work. Please ring our regional general enquiries number for further advice.
- 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.
- 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.
- 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.

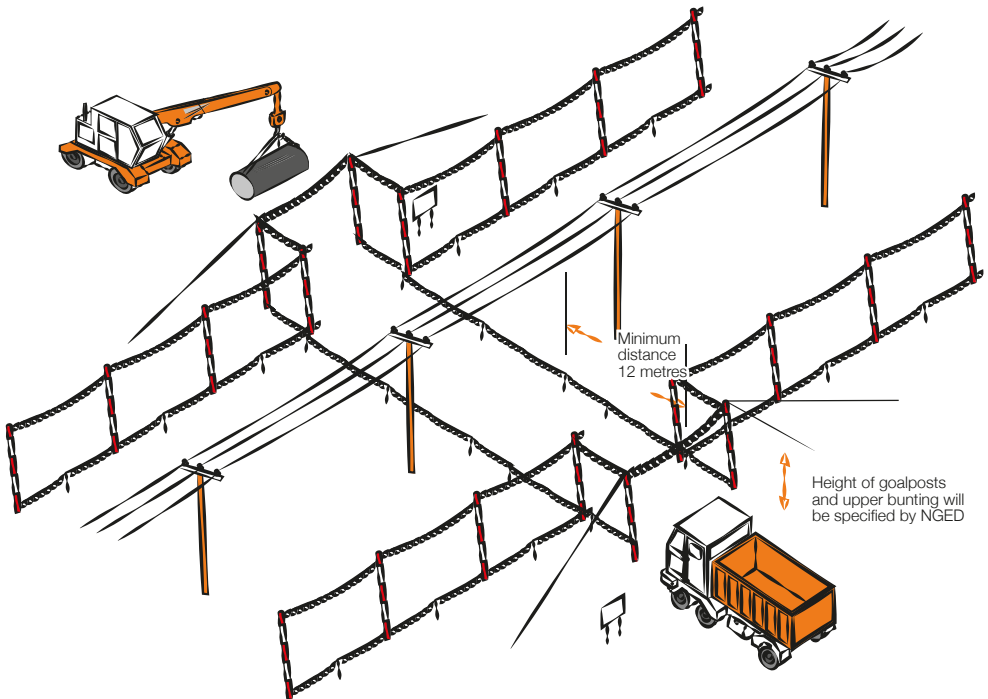
- If it is decided that work can go ahead in the vicinity of our overhead lines but there is a risk of you infringing the safety clearances from the overhead lines, you have a responsibility to erect safety barriers to segregate your works from the area around the overhead lines. The detailed requirements 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.
- 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.
- 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.
- 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 jumping with both 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.

CALL 105



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 and 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 general enquiry number:

Our general enquiry number is:

0800 096 3080

National Grid Electricity Distribution plc
Avonbank
Feeder Road
Bristol BS2 0TB
United Kingdom

nationalgrid.co.uk

Finally

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

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Look out, look up!

National Grid Electricity Distribution's
guide to the safe use of mechanical
plant in the vicinity of electricity
overhead lines



nationalgrid.co.uk

CALL 105



The safe use of mechanical plant in the vicinity of electricity overhead lines

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 Hiabs, 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.

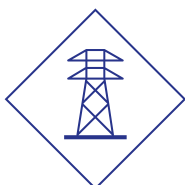
1 Before starting work

Overhead lines have the advantage that they can easily be seen, so before you set up your vehicle or plant always:

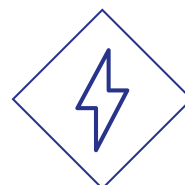
Stop and look up!



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.



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.



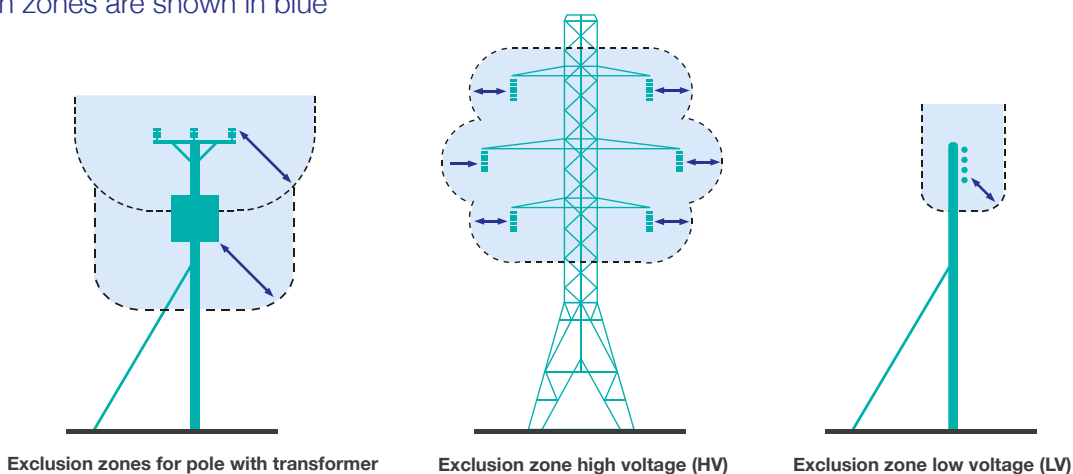
It is not normally practical for electricity companies to shroud high voltage conductors and even when low voltage conductors are shrouded, the shrouding is not designed to protect against contact by mechanical plant – again, always assume the lines are live.

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.

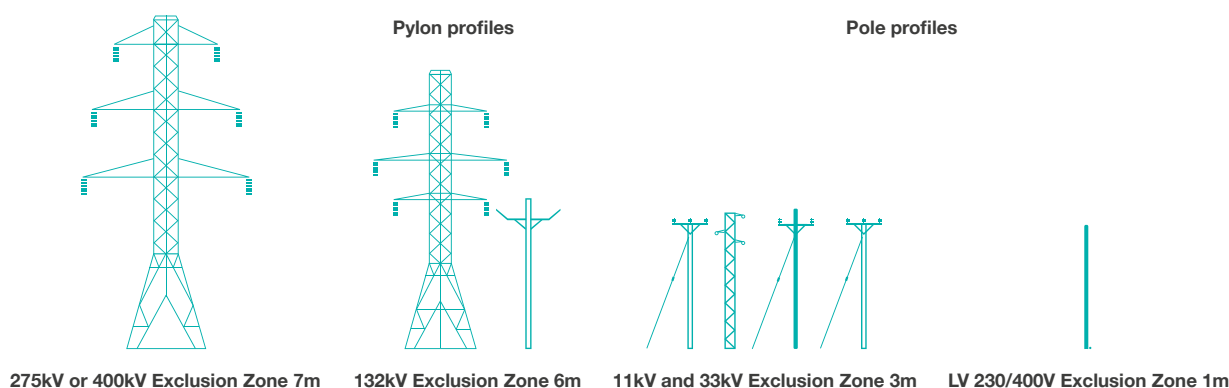
The higher the voltage, the further you must stay away from the line and any other equipment that may be fitted to the pole or pylon. This distance is called the **exclusion zone**. Examples of this are shown highlighted in the diagram below.

Exclusion zones are shown in blue



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 opposite.

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.

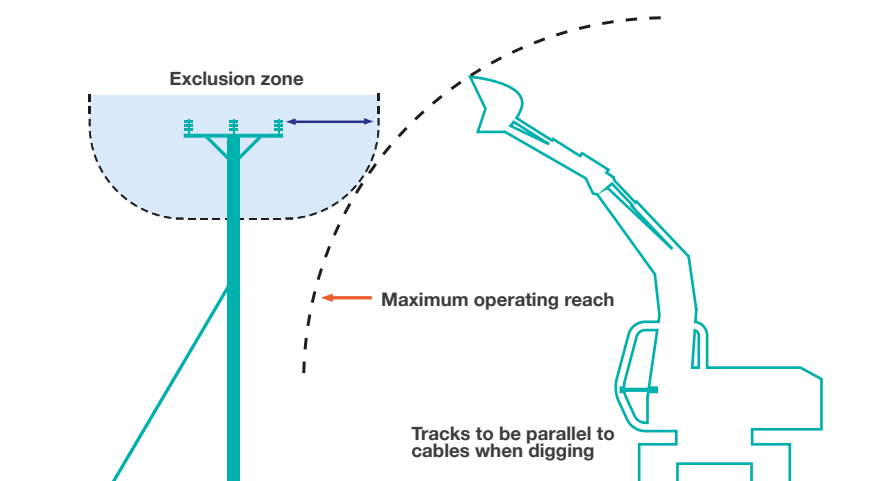
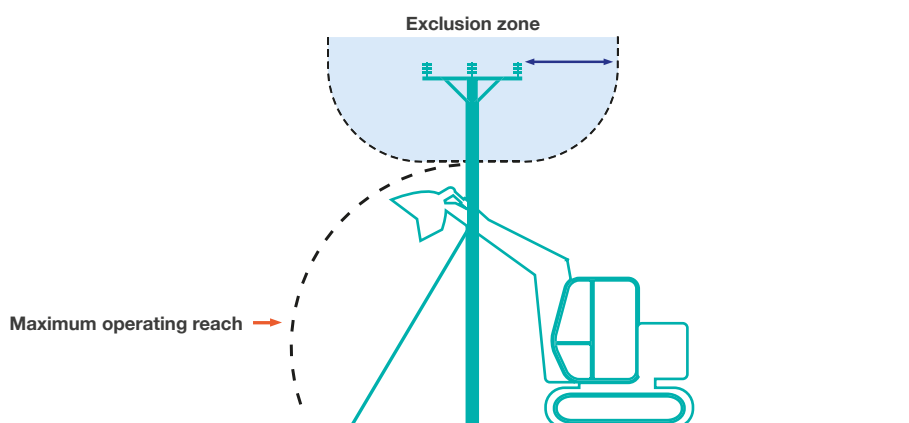
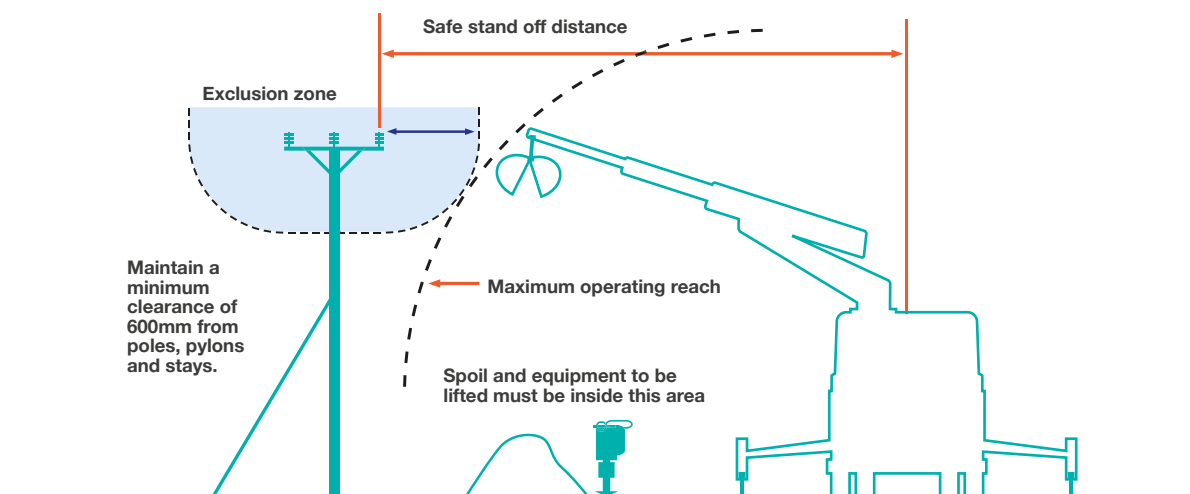
These restraints may be electrical or hydraulic systems fitted to the plant, or mechanical devices such as chains.

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 National Grid Electricity Distribution 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 National Grid Electricity Distribution 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!

CALL 105



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 National Grid Electricity Distribution 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!**

nationalgrid

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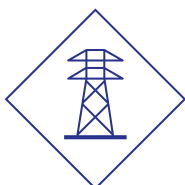
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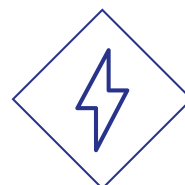
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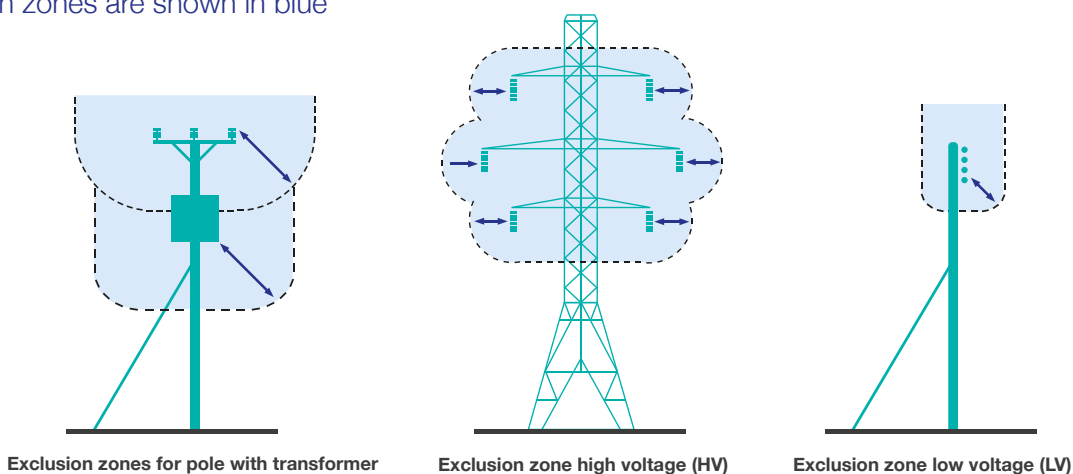
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2 Exclusion zones

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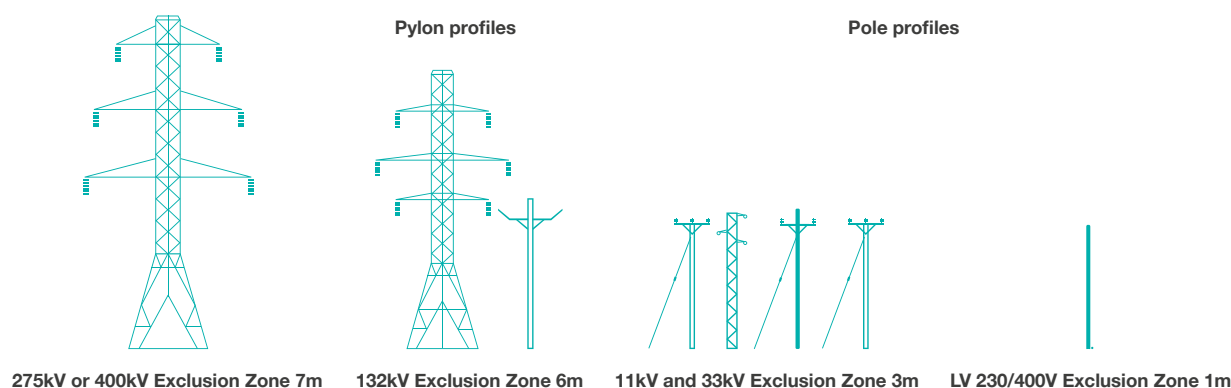
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Please note that these are absolute minimum distances that should under no circumstances be infringed. If you do – it could prove fatal. As well as staying away from the lines or equipment, you should also stay at least

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 opposite.

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.

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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.

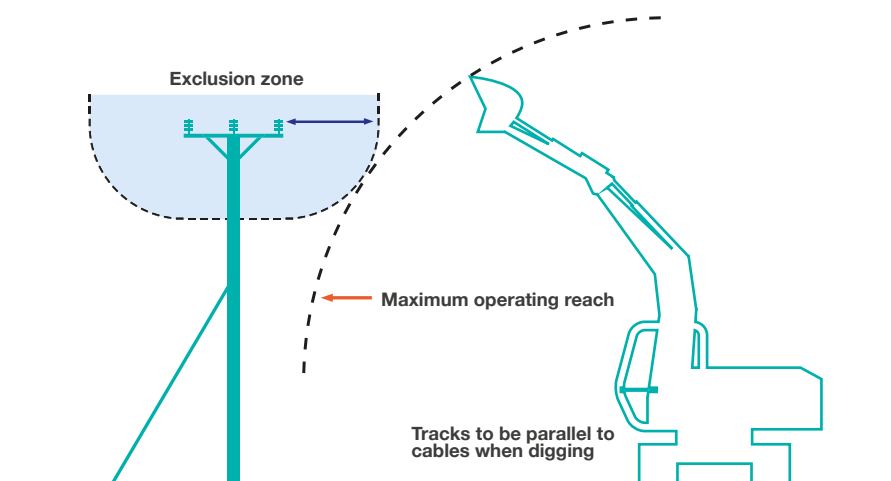
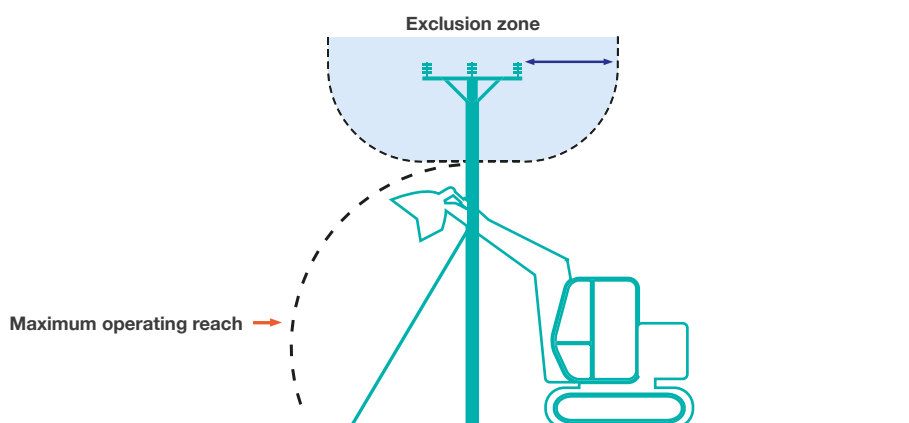
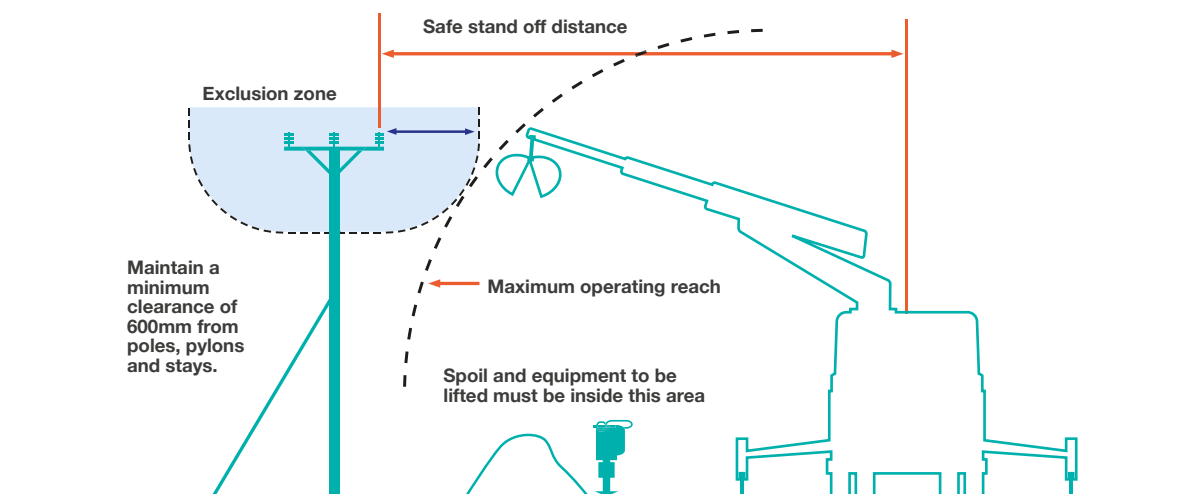
These restraints may be electrical or hydraulic systems fitted to the plant, or mechanical devices such as chains.

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 National Grid Electricity Distribution 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 National Grid Electricity Distribution 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!

CALL 105



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 National Grid Electricity Distribution 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!**



nationalgrid

Avoidance of danger from electricity overhead lines and underground cables

National Grid Electricity
Distribution's information
to manage safety whilst
working in the vicinity
of our equipment.

nationalgrid.co.uk

CALL 105



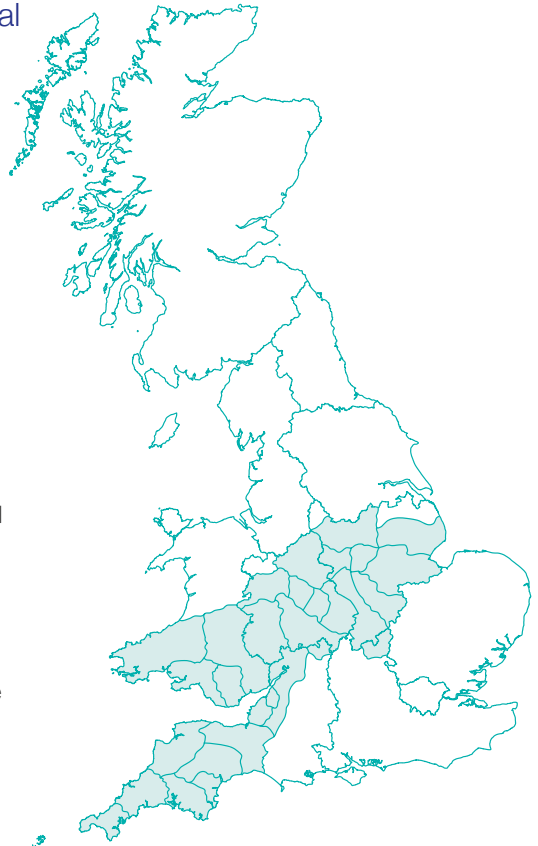
Avoidance of danger from electricity overhead lines and underground cables

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.

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 amount of heat, light and noise that are the result of an electrical flashover.

In the Midlands, South West and South Wales, National Grid Electricity Distribution (NGED) 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 became 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.



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.

Companies and organisations can request plans through LSBUD (Linesearch BeforeUdig) **lsbud.co.uk** – this site provides the same high quality plans and service that the NGED Webmap system has provided in the past, with the significant added benefit of searching over 40 other asset owners from a single query, including underground and overhead electricity networks, gas, high pressure fuel, water and fibre optic networks.

(Please note: not all asset owners are represented by LSBUD, and enquiries should also be made independently to all other relevant organisations).

This service allows you to request plans online and receive an information pack back via email within minutes.

Domestic/private customers should request plans using the phone number, email or postal address shown at the bottom of this section.

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

Email:

nged.mapresponse@nationalgrid.co.uk

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

An online mapping service is available at: **nationalgrid.co.uk/our-network/check-before-you-dig-location-of-our-cables-and-equipment**

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 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 an insulated 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 with 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

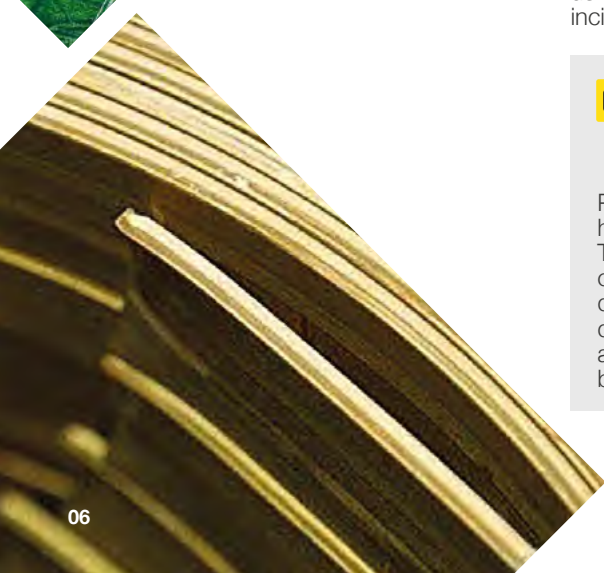
You must immediately clear the area of personnel because the cable could still be live, or become live again.

If a machine is still in contact with the cable, instruct the driver to jump clear 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.

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.

Incident locations can be hard to describe. Using the free What3Words app will enable us to quickly and easily identify where the incident has taken place across our network.



CALL 105

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 large repair bill.

Working in the vicinity of overhead lines

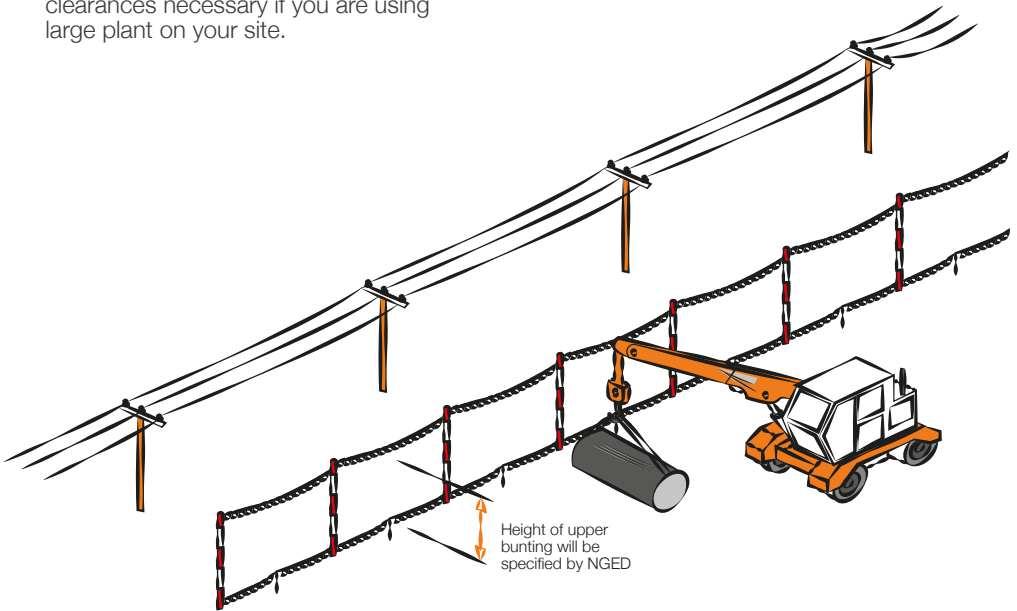
Under no circumstances should you attempt to work on, or interfere with any of our overhead line equipment or service wires.

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.

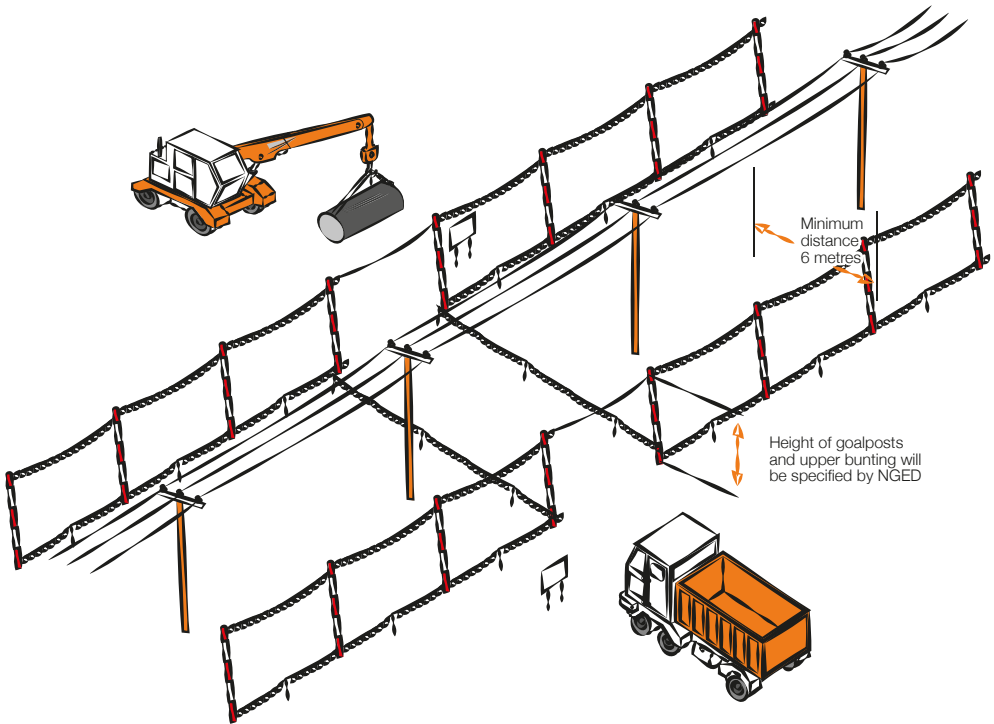
- Always assume that our overhead lines are live unless we have informed you otherwise in writing.
- We will be able to advise you about the type and voltage of the overhead lines in question and provide you with information about the clearances that you must adhere to during your work. Please ring our regional general enquiries number for further advice.
- 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.
- 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.
- 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.

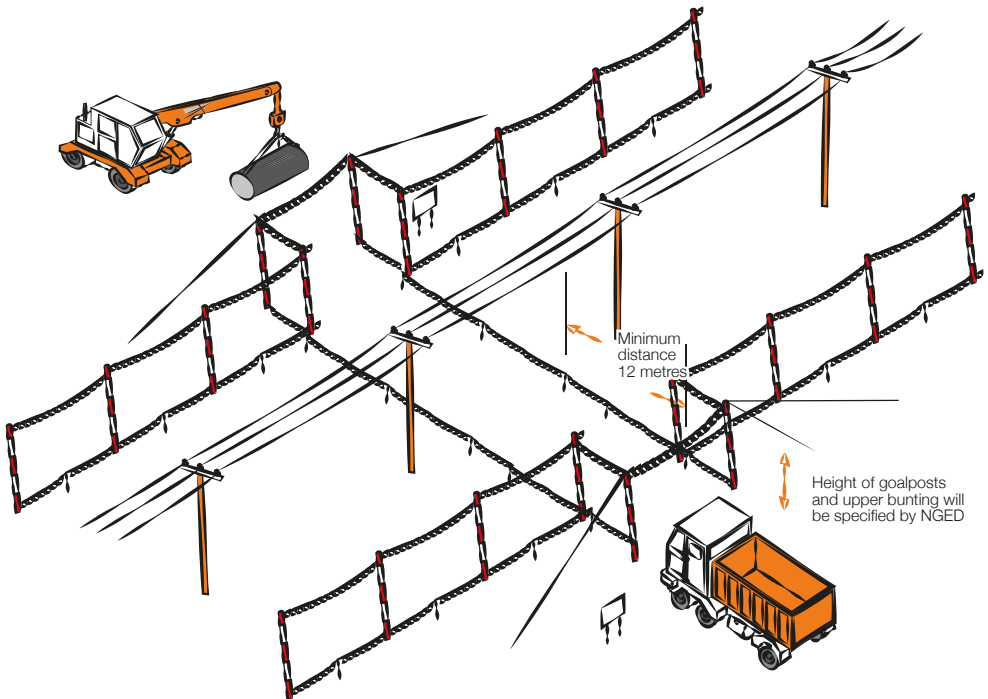
- If it is decided that work can go ahead in the vicinity of our overhead lines but there is a risk of you infringing the safety clearances from the overhead lines, you have a responsibility to erect safety barriers to segregate your works from the area around the overhead lines. The detailed requirements 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.
- 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.
- 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.
- 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 jumping with both 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.

CALL 105



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 and 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 general enquiry number:

Our general enquiry number is:

0800 096 3080

National Grid Electricity Distribution plc
Avonbank
Feeder Road
Bristol BS2 0TB
United Kingdom

nationalgrid.co.uk

Finally

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

THIRD PARTY SEARCHES

Enquirer

Name	Mr Duncan Phillips	Phone	01516325142
Company	Cornerstone Projects	Mobile	Not Supplied
Address	91 Market Street Hoylake MSY CH47 5AA		
Email	searches@cornerstoneprojects.co.uk		

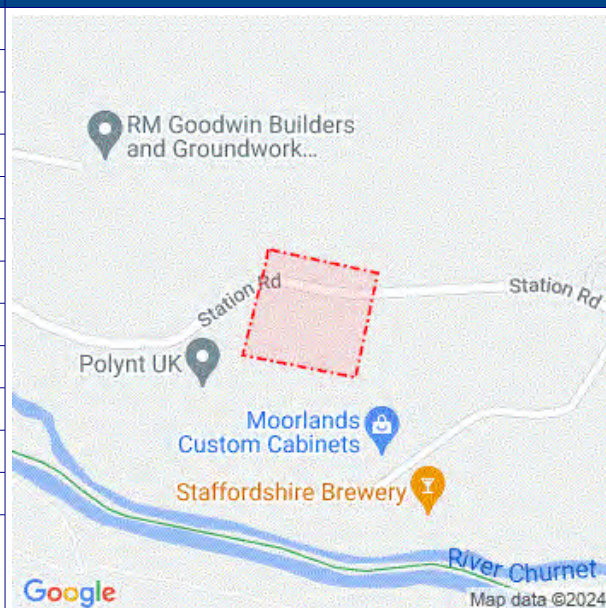
Enquiry Details

Enquiry type	Initial Enquiry
Work category	Development Projects
Work type	Commercial/industrial
Work type buffer*	75 metres
Start date	19/07/2024
End date	19/07/2024
Scheme/Reference	42337
Search location	XY= 397746, 352572
Confirmed location	397748 352579
Site size	8552 metres square
Site Contact Name	Not Supplied
Site Phone No.	Not Supplied

Description of Works

* The WORK TYPE BUFFER is a distance added to your search area based on the Work type you have chosen.

Site Map



Please note that the above map only displays the location of the proposed work site and will not display any of the Members' pipes and cables. It is imperative that this area accurately reflects the proposed work site.

Affected LSBUD members

(LSBUD Members who have assets registered on LSBUD within the vicinity of your search area.)

Do not proceed until all Members listed below have confirmed that your works can continue.

Asset Owner	Phone/Email	Emergency Only	Status
Cadent Gas	0800688588	0800111999	Await response
National Grid Electricity Distribution	08000963080	08006783105	Await response
Neos Networks	03453053337	03453053337	Await response

Status explanation

Await Response means that the asset owner will contact you. This is typically by sending the plan response but they may ask for further information before being able to do so, particularly if any payments or authorisations are required.

Email Additional Info means that the asset owner needs further information about your works to assess your enquiry before providing a response. Please provide any details you have available including plans, method statements etc. if available.

Important notices

It is very important that you correctly understand what the service does and the procedures in order for you to work safely. Please refer to the LSBUD Support Page (www.lsbud.co.uk/lineasearchbeforeudig-support) for further guidance.

This information includes how to provide additional information to the LSBUD Members who request it to provide a response to your enquiry.

Validity and search criteria. The results of this enquiry are based on the confirmed information you entered and are valid only as at the date and time of the enquiry. It is your responsibility to ensure that the Enquiry Details are correct, and LineasearchbeforeUdig (LSBUD) accepts no responsibility for any errors or omissions in the Enquiry Details or any consequences thereof. LSBUD Members update their asset information on a regular basis so you are advised to consider this when undertaking any works. It is your responsibility to choose the period of time after which you need to resubmit any enquiry but the maximum time (after which your enquiry will no longer be dealt with by the LSBUD Helpdesk and LSBUD Members) is 28 days. If any details of the enquiry change, particularly including, but not limited to, the location of the work, then a further enquiry must be made.

Terms and Conditions. Please note that this enquiry is subject always to our standard terms and conditions available at www.lsbud.co.uk ("Terms of Use") and the disclaimer at the end of this document. Please note that in the event of any conflict or ambiguity between the terms of this Enquiry Confirmation and the Terms of Use, the Terms of Use shall take precedence.

List of not affected LSBUD members (LSBUD Members who do not have assets registered on the LSBUD service within the vicinity of your search area.)

Angus Energy	AWE Pipeline	B & D Energy Limited
Balfour Beatty Investments Limited	BOC Limited (A Member of the Linde Group)	Box Broadband
BP Exploration Operating Company Limited	BPA	Cambridge Water
Cambridgeshire County Council Climate Change and Energy Services	CATS Pipeline c/o Wood Group PSN	Cemex
Centrica Storage Ltd	CNG Services Ltd	Concept Solutions People Ltd
ConocoPhillips (UK) Teesside Operator Ltd	D.S.Smith	Diamond Transmission Corporation
DIO (MOD Live Pipelines)	Drax Power Limited	E.ON UK CHP Limited
EDF Energy Renewables Ltd	EET Fuels	EirGrid
Eleclink Limited	Electricity North West Limited	Energy Assets Networks
ENI & Himor c/o Penspen Ltd	EnQuest NNS Limited	EP Langage Limited
ESB CCGT Power station (Carrington Gas Pipeline)	ESP Utilities Group	Esso Petroleum Company Limited
euNetworks Fiber UK Ltd	EXA Infrastructure	Exolum Pipeline System
Fulcrum Electricity Assets Limited	Fulcrum Pipelines Limited	Gamma
Gas Networks Ireland (UK)	Gateshead Energy Company	Gigaclear Ltd
Harbour Energy	Heathrow Airport LTD	Humbly Grove Energy
IGas Energy	INEOS FPS Pipelines	INEOS Manufacturing (Scotland and TSEP)
INOVYN ChlorVinyls Limited	INOVYN Enterprises Limited	Intergen (Coryton Energy or Spalding Energy)
Jurassic Fibre Ltd	Kensa Utilities	Last Mile
Mainline Pipelines Limited	Manchester Jetline Limited	Manx Cable Company
Marchwood Power Ltd (Gas Pipeline)	Melbourn Solar Limited	MUA Group Limited
National Gas Transmission	National Grid Electricity Transmission	National Grid Ventures
Northern Gas Networks Limited	Northumbrian Water Group	NPower CHP Pipelines
NTT Global Data Centers EMEA UK Ltd	NYnet Ltd	Ogi
Oikos Storage Limited	Ørsted	Palm Paper Ltd
Perenco UK Limited (Purbeck Southampton Pipeline)	Petroineos	Phillips 66
Portsmouth Water	Premier Transmission Ltd (SNIP)	Redundant Pipelines - LPDA
RWE - Great Yarmouth Pipeline (Bacton to Great Yarmouth Power Station)	RWEnpower (Little Barford and South Haven)	SABIC UK Petrochemicals
SAS Utility Services Ltd	Scottish and Southern Electricity Networks	Scottish Power Generation
Seabank Power Ltd	SES Water	SGN
Shell	Shell NOP	South Staffs Water
SP Energy Networks	Spring Fibre Limited	Squire Energy Networks
SSE Generation Ltd	SSE Transmission	SSE Utility Solutions Limited

Storengy	Tata Communications (c/o JSM Construction Ltd)	TfL – London Underground HV Cables (Road Side Cables)
toob Limited	Total Colnbrook Pipelines	Total Finaline Pipelines
Transmission Capital	Trojan Energy Limited	UK Power Networks
Uniper UK Ltd	University of Cambridge Granta Backbone Network	Vattenfall
Veolia ES SELCHP Limited	Veolia ES Sheffield Ltd	Voneus Limited
VPI Power Limited	Wales and West Utilities	Welsh Power
West of Duddon Sands Transmission Ltd	West Sussex OpenNetwork (Cooperative National Infrastructure)	Westminster City Council
Zayo Group UK Ltd c/o JSM Group Ltd		

Non-LSBUD members (Asset owners not registered on LSBUD)

(The following Non-LSBUD Members may have assets in your search area. It is YOUR RESPONSIBILITY to contact them before proceeding.

Please be aware this list is not exhaustive and it is your responsibility to identify and contact all asset owners within your search area.)

Asset Owner	Preferred contact method	Phone	Status
Arelion UK Ltd	check-network@arelion.com		Not Notified
BT	https://www.swns.bt.com/pls/mbe/welcome.home	08000232023	Not Notified
CityFibre	asset.team@cityfibre.com	033 3150 7282	Not Notified
Colt	plantenquiries@catelecomuk.com	01227768427	Not Notified
Equans	nrsua.uk@equans.com	0800 130 3600	Not Notified
GTC	https://pe.gtc-uk.co.uk/PlantEnqMembership	01359240363	Not Notified
Lumen Technologies	plantenquiries@ocugroup.com	02087314613	Not Notified
Mobile Broadband Network Limited	mbnl.plant.enquiries@turntown.com	01212 621 100	Not Notified
Severn Trent Water	www.stwater.co.uk/building-and-developing/estimators-and-maps/request-a-water-sewer-map	03456016616	Not Notified
Sky UK Limited	nrsua@sky.uk	02070323234	Not Notified
Sota	sota.plantenquiries@ocugroup.com		Not Notified
Utility assets Ltd	assetrecords@utilityassets.co.uk		Not Notified
Verizon Business	osp-team@uk.verizonbusiness.com	01293611736	Not Notified
Virgin Media	http://www.digdat.co.uk	08708883116	Not Notified
Vodafone	osm.enquiries@atkinsglobal.com	01454662881	Not Notified

Disclaimer

Please refer to LSBUD's Terms of Use for full terms of use available at www.lsbud.co.uk

The results of this Enquiry are personal to the Enquirer and shall not be shared with or relied upon by any other party. The asset information on which the Enquiry results are based has been provided by LSBUD Members, therefore LSBUD will provide no guarantee that such information is accurate or reliable nor does it monitor such asset information for accuracy and reliability going forward. There may also be asset owners which do not participate in the enquiry service operated by LSBUD, including but not exclusively those set out above. Therefore, LSBUD cannot make any representation or give any guarantee or warranty as to the completeness of the information contained in the enquiry results or accept any responsibility for the accuracy of the mapping images used. LSBUD and its employees, agents and consultants accept no liability (save that nothing in this Enquiry Confirmation excludes or limits our liability for death or personal injury arising from our negligence, or our fraud or fraudulent misrepresentation, or any other liability that cannot be excluded or limited by English law) arising in respect thereof or in any other way for errors or omissions including responsibility to any person by reason of negligence.

QUALITY CHECK

Checked and issued by:	<i>J Jackson</i>
Name:	Jacob Jackson
Date:	18/07/24
Plans are valid until:	16/10/24
Unless noted otherwise plans are valid for three months from date of issue - please note the date shown above is approximate. After the above date please contact us to arrange a refreshed utility search pack at www.cornerstoneprojects.co.uk Please refer to www.cornerstoneprojects.co.uk/terms.html for full Terms and Conditions.	

Cornerstone Projects Ltd is a UK wide desktop underground utility search expert:

- Market leading pricing and response times
 - Comprehensive utility database
 - 20 Years plus experience
 - Over 94,000 completed searches
 - Over 7,000 registered businesses
- Searches to PAS 128 survey level D
 - ISO9001 certified company

Want an easier way to interpret your utility search results?

Searching through your utility results can be time consuming and complex. Here at Cornerstone, we have the ability to produce one consolidated drawing which will allow you to view all your results on a single plan. Moreover, as the utilities are drawn in separate layers, you will also be able to turn different layers on and off to allow you to focus on individual utilities.



We can produce your consolidated drawing in .dwg (CAD) format from £60.00 + VAT.

We can also convert this into a Smart .PDF starting from £35.00 + VAT.

Call us on 0151 632 5142 or email enquiries@cornerstoneprojects.co.uk for a quote for this site. Please provide your site name/reference.

Planning work near overhead lines? We can now help obtain the overhead heights (GS6 guidance) from the utility provider from as little as £23.50 per crossing. Find out more [here](#)

Need help with administering road opening licences, capacity checks or gaining quotes from the utility companies for connecting or diverting services?

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Capacity check – We will complete an application to determine whether a utility has sufficient capacity for your proposed development and if not, what budget costs would be required to reinforce the network – our fee is from as little as £150.00+VAT per utility plus disbursements.

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APPENDIX E: HUMAN HEALTH GENERIC HUMAN HEATH RISK ASSESSMENT (GQRA)

Human Health GQRA

Selection of HHACs

To assess the potential significance of the long-term risks to human health posed by substances identified in shallow site soils, a human health GQRA has been undertaken to compare soil data with relevant reference human health assessment criteria (HHACs). If representative concentrations are considered to be significantly above the relevant HHACs, then this would normally trigger further appropriate actions, such as additional investigation, further consideration or risk assessment and/or remediation/mitigation.

Relevant soil HHACs can be selected from the following UK resources/references:

- 2015 LQM/CIEH: 'suitable for use levels' (S4UL); latest revision August 2015
- Current EA/DEFRA 'soil guideline values' (SGV)
- 2009 EIC GACs; published by CL:AIRE
- DEFRA funded 'Research Project Phase-1' C4SLs; most recently revised in December 2014
- SAGTA funded 'Phase-2 Technical Report' C4SLs; most recently published by CL:AIRE in 2021
- *References provided below.*

The SGVs, GACs, S4UL, C4SLs have been calculated within the broad contaminated land exposure assessment (CLEA) methodology framework, with amendments to the CLEA approach adopted within the S4UL and C4SL methodologies. These reference based HHACs are typically used within a tiered risk assessment as an initial means to evaluate the likely significance of long term human health risk posed by substances of concern concentrations identified in site soils. The HHACs are provided for a number of standard land use scenarios and the commercial/industrial use scenario has been adopted for the redeveloped site use as the best available standard fit.

The available GACs (which include SGVs & S4ULs) are scientifically based screening criteria derived using the Agency CLEA computer model in accordance with the CLEA framework. Should soil concentrations be at or below a GAC relevant to the land use, then the long term health risks should be considered minimal/tolerable. The 2015 S4ULs have been adopted in preference to SGVs as the S4ULs reflect appropriate recent changes to toxicological profiles and exposure conceptual model amendments.

The C4SLs for the Part 2A contaminated land regime have also been published for a number of soil contaminants and land uses and these provide additional soil screening criteria that may be used appropriately within the town and country planning regime. The published C4SLs (and range of provisional C4SLs detailed in the C4SL document appendices) provide criteria that should lie within Category 4, but would be expected to be generally closer to the Category 3/4 boundary than 'low/minimal risk' GACs, i.e. the C4SL describe a 'low' level of risk and are intended to provide a 'higher simple test' for deciding whether land is suitable for use under the planning regime and definitely not Contaminated Land under Part 2A.

Where available, the 2015 S4ULs have generally been adopted in preference to the published C4SL (with C4SL shown for information) as the S4ULs reflect a lower ('minimal/tolerable' versus 'low') level of risk compared to the C4SL. For lead, the C4SL has been adopted given the absence of a current published UK reference GAC.

The adopted HHAC are presented in Table 1 for a 1% SOM (soil organic matter) in line with the majority of the analysis results for total organic carbon (TOC) and are reported to two/three significant figures. The HHACs selected from the C4SLs are for a 6% SOM soil (the official published values). All of the analytical

results have been included in the initial data screening with no consideration of sampling depth, location or lithology.

For TPH, the lowest HHAC for representative fractions has been selected for comparison. For PAHs, Public Health England (Ref: 2017) generally recommends the use of a coal tar benzo-a-pyrene (BaP) surrogate marker approach for assessing carcinogenic/genotoxic risks posed by 8 of the 16 PAHs in soils and this approach has been adopted using the available C4SL BaP coal tar criteria. The eight genotoxic PAHs are: benzo-a-anthracene, BaP, benzo-b-fluoranthene, benzo-ghi-perylene, benzo-k-fluoranthene, chrysene, dibenzo-ah-anthracene, fluoranthene, fluorene and indeno-123-cd-pyrene (8-PAHs).

The asbestos 'GAC' (minimal risk level) been taken as 'not-identified' or <0.001% where quantified (providing there are no visible fragments of potential asbestos containing materials). The selected phenol HHAC considers potential acute risk exposures. Total Sulphate, pH and TOC are not of concern for chronic human health and do not require HHACs.

For cyanide species, easily liberatable (free) cyanide is the primary cyanide species of concern. Where both easily liberatable (free) and total cyanide results are available, only easily liberatable (free) cyanide results would normally be compared against the HHAC. Where only total cyanide results are available, using the cyanide HHAC is considered very conservative as it is based on acute risks posed easily liberatable (free) cyanide. The cyanide HHAC is based on a precautionary approach for acute risk using the EA/DEFRA Tox-5 free (easily liberatable) toxicological data and CLEA receptor weight. The acute risk HHAC assumes intake of a 3 g soil bolus containing the equivalent of the Tox 5 TDSI (TDI less MDI by kg body weight). The acute risk HHAC is then given by $TDSI \times body\ weight / (soil\ intake\ (kg/day))$.

It is important that the HHACs are used carefully when comparing with site data and that their use appropriately takes into account the adopted sampling strategy. The HHACs are typically compared to average or representative source/averaging-area concentrations, rather than maximum or isolated elevated/peak levels. Where a HHAC represents a very low concentration (e.g. near to or less than method detection limit), due consideration should be given to adopting the method detection limit or other practical/pragmatic target as the HHAC. Background levels in the area may also need to taken into account when using the HHAC.

The references for the adopted HHACs are presented below. A comparison of the site analytical data with the adopted HHAC is presented in Table 1.

Table 1: Comparison of Soils Data with Adopted HHACs in mg/kg

Substance	No. Analysed	HHAC Commercial/Industrial	Source	Data Comparison with HHAC
Arsenic	6	S4UL/C4SL 640	S4UL & C4SL	All <HHAC
Cadmium	6	S4UL 11; C4SL 410	S4UL & C4SL	All <HHAC
Chromium	6	8,600	S4UL	All <HHAC
Copper	6	68,000	S4UL	All <HHAC
Lead	6	C4SL 2,300	C4SL	All <HHAC
Inorganic Mercury	6	1,100	S4UL	All <HHAC
Nickel	6	980	S4UL	All <HHAC
Selenium	6	12,000	S4UL	All <HHAC
Vanadium	6	9,000	S4UL	All <HHAC
Zinc	6	730,000	S4UL	All <HHAC
Asbestos	6	Not Identified or <0.001%	See Text	One sample > HHAC
Naphthalene	6	190	S4UL	All <HHAC
Acenaphthylene	6	83,000	S4UL	All <HHAC
Acenaphthene	6	84,000	S4UL	All <HHAC
Fluorene	6	63,000	S4UL	All <HHAC
Phenanthrene	6	2,200	S4UL	All <HHAC
Anthracene	6	520,000	S4UL	All <HHAC
Fluoranthene	6	23,000	S4UL	All <HHAC
Pyrene	6	54,000	S4UL	All <HHAC
Benzo(a)anthracene	6	Via BaP 77	C4SL	All <HHAC
Chrysene	6			
Benzo(b)fluoranthene	6			
Benzo(k)fluoranthene	6			
Benzo(a)pyrene	6			
Indeno(1,2,3-cd)pyrene	6			
Dibenz(a,h)anthracene	6			
Benzo(ghi)perylene	6			
Total Phenols	6			
TPH (C6 - C8)	6	7,800 (aliphatic TPH C5 - C7)	S4UL*	All <HHAC
TPH (C8 - C10)	6	2,000 (aliphatic TPH C8 - C10)	S4UL*	All <HHAC
TPH (C10 - C12)	6	9,700 (aliphatic TPH C10 - 12)	S4UL*	1 sample > HHAC
TPH (C12 - C16)	6	36,000 (aromatic TPH C12 - C16)	S4UL*	All <HHAC
TPH (C16 - C21)	6	28,000 (aromatic TPH C16 - C21)	S4UL*	All <HHAC
TPH (C21 - C35)	6	28,000 (aromatic TPH C21 - 35)	S4UL*	All <HHAC

* Analysis results have been compared against the aliphatic OR aromatic HHAC, whichever is lower; DL = Detection Limit

Data Comparison with HHACs

Table 1 presents a comparison of the analytical data against the adopted HHACs. The screening shows that all of the levels of the potential contaminants identified in site soils are at concentrations lower than or equal to the adopted HHAC except in the case of asbestos.