# Electricity and excavating

As a key part of the communities in which we operate, we are committed to ensuring the safety of all community members in any way we can. It's important to be aware of requirements when working near the electricity network, including underground electrical infrastructure.

## Legal requirements

NSW legislation requires people who are planning to do excavation work to obtain copies of underground electricity cable plans through Before you Dig Australia at **byda.com.au** and to make sure that the plans are no more than 30 days old when excavation commences.

The aim of the legislation is to ensure that when workers dig or drive items near underground electricity cables, ducting, and pipes, they will establish the exact location of the cables and thus avoid contacting or damaging them.

These items carry vital services such as electricity, water, gas, and communications, and establishing their location before digging will help ensure worker safety and prevent damage to the network which may cause disruption of essential services to local communities.

## Excavate safely and protect underground assets

Before You Dig Australia (BYDA) is the first step to excavating safely. You should use BYDA when you will be undertaking (but not restricted to) the following:

- Any excavation using machinery digging deeper than 150mm. This includes but is not restricted to back hoes, excavators, borers & demolition hammers (ploughing or ripping activities)
- Any excavation using hand tools deeper than 300mm which includes shovels, spades, and crow bars
- Any vertical or horizontal boring.

**NOTE:** The above examples are general and may not cover all situations in the regulations where a BYDA would be required e.g. driving metal posts in the ground.

Regardless of the size of your project you should lodge an enquiry with BYDA before commencing work. This applies to small tasks like backyard landscaping, driving items into the ground as well as heavy work such as directional boring or directional drilling. BYDA strive to respond to enquiries within two business days.

**BEFORE YOU DIG AUSTRALIA**

- Phone: 1100
- Web: **BYDA.com.au**
- Download the BYDA iPhone App

## Locations of electricity cables

When BYDA plans have been obtained, submit a **Request for Safety Advice** form with Essential Energy. Allow at least two weeks (10 working days) advance notice in your construction program for Essential Energy to assign field resources to carry out an onsite inspection to identify any underground pipes or cables in the vicinity of the planned excavation works. The initial site visit is free of charge; any required controls or further consultation may incur a fee.

In the event the excavation does not commence within 28 days of receipt of a plan, a new plan should be obtained. The excavator must retain the plans on site for the duration of the excavation works.

## Your responsibility

All individuals have a duty of care they must observe when working in the vicinity of underground cables, ducts, and pipes. Be aware of the requirement set out in the latest SafeWork NSW Codes of Practice *Work near Underground*

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*Assets Guideline* and *Work near Overhead and Underground Powerlines w*hich can be viewed at **safework.nsw.gov.au** or you can purchase a copy of the Code of Practice by contacting SafeWork NSW on **13 10 50**.

You should also be familiar with Essential Energy's operational procedures *Work near Essential Energy's underground asset' CEOP8041* and *Construction work near electricity network CEOP1116*, which can be found at **essentialenergy.com.au/construction**

**Note –** when excavating with high pressure water or compressed air to break up the ground, which is then removed by a powerful vacuum unit to expose critical utilities after they have been electronically located to confirm identity, size, number of services and depth, checks should be carried out to ensure the pressure is acceptable for all cables and other assets which may be found prior to commencing potholing by this method.

**Warning:** CONSAC cables shouldn't be potholed by this method and must be de-energised before any work carried out near them. It's recommended to only use air/vacuum equipment to pothole that operates at or less than 13,790Kpa (2000psi).

**Employers:** If you're an employer or employing someone to excavate, complete construction or drive items into the ground even at home you have a legal obligation to ensure their safety.

**Excavators:** It is the excavator's responsibility to visually expose the underground pipes and cables manually before any construction begins.

## No Go Zone for powered excavation

**Table 1:** Types of assets and limits of underground approach - Extract from SafeWork NSW's *Work near Underground Assets*

| ASSETS | CLEARANCES | NO GO ZONE FOR POWERED EXCAVATION | CONTROLS | TYPICAL DEPTHS |
|---|---|---|---|---|
| Low voltage electricity cables – voltages less than or equal to 1000V (1kV) | Close proximity with the use of hand tools | 300 mm | Must contact asset owner for specific conditions | 450 – 750 mm |
| Electricity conductors from 11,000V (11kV) up to 33,000V (33 kV) | Close proximity with the use of hand tools | 600 mm | Must contact asset owner for specific conditions | 900 mm |
| Underground sub-transmission cables 33,000V up to 132,000V (132 kV) | Must contact asset owner | Must contact asset owner | Must be carried out under the supervision of the asset owner | 900 mm |
| High Voltage Electricity cables – voltages from 1000V (1kV) up to (33 kV) | Close proximity with the use of hand tools | Must contact asset owner | Must contact asset owner for specific conditions | 600 – 1000 mm |
| Extra High Voltage Electricity Transmission cables – voltages above (132 kV) and 330,000V (330 kV) | Must contact asset owner | Must contact asset owner | Work must be carried out under the supervision of the asset owner | 800 – 1200 mm |

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## How to expose cables or pipes

Location plans provide an indication of the presence of underground assets only; they do not pinpoint the exact location. This is why manual exposure is required, which can be done by potholing.

Underground assets must first be exposed by potholing with non-conductive tools to identify their location.

Excavation with hand tools shall be carried out carefully up to, but not closer than, the minimum distances specified in

**Table 1.** Several potholes may need to be dug manually to determine and satisfy yourself of the exact locations of cables or pipes to avoid any mishaps.

Manual potholing needs to be undertaken with extreme care, common sense and while employing techniques least likely to damage cables. For example, orientate shovel blades and trowels parallel to the cable rather than digging across the cable. Look out for sand, plastic strips or specially marked bricks when excavating, which signal the presence of underground cables.

Only once all underground assets have been located, marked, and protected against damage can the excavation proceed with caution.

## No Go Zone for powered excavation

Directional boring is powered excavation and contact with the asset owner must be made before excavation takes place.

For directional boring across the line of an asset a minimum clearance of 300mm from the asset shall be maintained. When boring across the line of an underground asset, the location of the asset/s shall be positively proven by hand digging (potholing) or by another approved method and a safety observer appointed.

NOTE: Where the risk assessment identifies a potential risk of making contact with underground assets, safety observer/s would be required. The safety observer's responsibility is to ensure that approach distances from underground and overhead assets are maintained.

For boring under electricity cables, the only true way of knowing where the directional drill is, is to "see" it. It is necessary to excavate a slit trench at right angles to the approaching drill and 500mm deeper than the asset being protected and beside the cables to confirm the depth of the cables and ensure the drill is not within the minimum approach distance of the cable (specified in **Table 1**).

For directional boring parallel to the asset and at the level of the asset, a clearance of 500mm shall be maintained from the edge of the nearest asset and potholed at 10m intervals to ensure clearances are maintained with a safety observer appointed.

## The five Ps of safe excavation

- **Plan**: Plan your job. Use the BYDA service at least one day before your job is due to begin, and ensure you have the correct information required to carry out a safe project. Contact Essential Energy on 13 23 91 to identify any underground pipes and/or cables in the vicinity
- **Prepare**: Prepare by communicating with asset owners if you need assistance. Look for clues onsite. Engage a Certified Locator.
- **Pothole**: Potholing is physically sighting the asset by hand digging or hydro vacuum extraction. Only use air/vacuum equipment to pothole that operates at or less than 13,790Kpa (2000psi)
- **Protect**: Protecting and supporting the exposed infrastructure is the responsibility of the excavator. Always erect safety barriers in areas of risk and enforce exclusion zones.
- **Proceed**: Only proceed with your excavation work after planning, preparing, potholing (unless prohibited), and having protective measures in place.

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## Digging safely

You cannot be too careful when it comes to safe excavation. Avoiding underground ducting pipe and cable damage is as simple as having the right tools, the right skills, and the right information.

- Study the plans you receive from asset owners thoroughly
- Check to see if they relate to the area, you requested and make sure you understand them. If you are unclear about what the symbols mean or how to proceed, contact the relevant network owner
- Check the work area for other forms of electrical equipment, including streetlights, ground substations, phone boxes or traffic lights – all good indicators that underground cables will be present
- Remember underground cables can also be present even if overhead powerlines have been identified
- Never assume the depth or alignment of pipes and cables. Installed networks assets may not have been installed in a straight line
- Always observe any instructions stated on the plans provided by the asset owner
- Remember, plans and maps identifying the location of underground cables and depths can alter after road upgrades or developments and underground assets may be as little as a few millimetres below the surface
- Other service lines (for example gas mains (pipes) and communication cables) can also be present. Shared trenches are frequently used on underground runs to premises
- New electrical cables are sometimes laid using existing old conduits
- Various methods of protecting underground cables may be utilised (for example electrical bricks, conduits, concrete or flat PVC barriers) or may be direct buried or installed by under-boring methods which may have no visual disturbance of the ground
- Ensure overhead and electrical structures aren't undermined during excavation.

## Earth cables

Earth cables are an important part of all electrical installations and have two main purposes:

- To safeguard against the possibility of danger to life, and
- To maintain the good working order of the electrical network.

They can have potentially dangerous electrical current flowing through them. Usually, they have a green and yellow covering but could be a bare cable buried directly in the ground.

Even if the map provided does not show underground cables, earth cables may be present. These earth cables are usually associated with electrical equipment located on the pole such as transformers, switching equipment, permanent earthing points or Padmount / kiosk subs.

It's recommended that if any excavation is to take place within 10m of a power pole with a cable running down it into the ground, submit a **Request for Safety Advice** form with Essential Energy to identify where the earthing system is located. While an effort is made to install the earthing under the powerline and guy if installed, sometimes circumstances may require a variation to this, so do not assume where they are installed. The distance and configuration that the earthing cable is installed varies due to the soil conditions and system type (e.g. Single wire earth return (SWER).

## Excavating near electrical poles and network assets

Anyone intending to excavate around any electrical item risks serious injury or death as a result of contact with underground cables or the earthing system.

For excavation depths greater than 250mm near power poles and stays you must submit a **Request for Safety Advice** form with Essential Energy to arrange for a representative to attend the worksite two (2) weeks prior to work commencing.

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Unless otherwise agreed, underground assets and other obstructions around poles are to be kept a minimum distance of 300mm from the periphery of the pole, to allow inspections by the asset owner employees.

No excavation within 10 metres of a SWER transformer pole is to occur without the approval of the local electricity asset owner. It should be noted that the NSW Service and Installation Rules require a sketch of the underground service/consumers mains to be marked inside the switchboard.

**WARNING: SWER INSTALLATIONS**

- Contacting SWER earthing can be deadly
- Voltage is present on SWER transformer earthing systems either at 12.7kV or 19.1kV
- NO excavation is allowed within 10 metres of a SWER transformer pole.

The risks are higher for those earthing systems of the SWER constructions as the earthing is utilised as the return path.

Typically, any electrical item installed on a pole will have an earth wire running down the pole into the ground, which includes:

- Transformers in urban and rural situations, and
- Isolation, protection, and regulation items.

Transformers located on the ground (padmount and kiosk), besides having underground electrical cables, will have an earthing system installed around them.

## Damaged earthing

If an earth cable has been damaged, maintain a clearance of eight (8) metres and contact Essential Energy immediately on 13 20 80. DO NOT ATTEMPT to rejoin the cable – this will place you at risk.

## Operating near underground cables and earths

- Underground cables should never be moved or relocated unless under the express authority of the organisation or person responsible for the powerlines
- The excavator shall report all damage made to Essential Energy assets immediately. Damage includes gouges, dents, holes, and gas escapes
- Never undermine poles, cables, earthing cable, pad-mount, and kiosk substations.

## Make sure it can't go wrong

You should ensure that people at work, their equipment (tools and plant) or materials do not come within close proximity to underground powerlines unless:

- A written risk assessment has been completed and a safe system of work implemented, and
- The relevant safety precautions and worker training requirements, including SafeWork NSW Codes of Practice and Essential Energy's requirements, have been implemented and complied with.

If working within close proximity to underground cables is unavoidable and the risk assessment has been completed, the following should be considered to control the risks and ensure work safety:

- Have the power switched off by Essential Energy
- Consider all conductors as live unless it is positively known they have been de-energised
- Where appropriate, provide ground markings to identify location and warn workers of the presence of underground power and other assets.

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## Emergency situations

If contact with an underground powerline occurs or cables are exposed or damaged, remembering the following points could help save a life:

- If the situation is at all life threatening, immediately contact the Emergency Services on 000 (triple zero)
- Call Essential Energy's 24-hour supply interruptions line 13 20 80 to switch off the power if required or report damage or exposure cables/conduits
- If any other underground assets are damaged, you should contact the affected asset owners immediately
- Treat underground cables as alive, even if they appear to be dead
- Keep everyone at least eight metres away from the incident site, the person or any machinery contacting underground cable
- Don't panic or touch the person receiving the electric shock – this could place you at risk
- Untrained, unequipped persons should not attempt to rescue
- a person receiving an electric
- shock. All too often secondary deaths occur when others go to the aid of earlier victims
- Remain on/inside the machinery until the supply is disconnected
- If possible, break contact between the machinery and underground cable.

## More information

Safety first! Essential Energy's Public Safety team is available to facilitate Electrical Awareness sessions and discuss any questions relating to electrical safety. Before you dig or drive items into the ground:

- Contact **Before You Dig Australia** at byda.com.au
- DO NOT attempt to excavate within listed exclusion zones/no go zones
- Submit a **Request for Safety Advice** form to Essential Energy to locate cables and earthing at essentialenergy.com.au/web-forms/request-for-safety-advice
- Use the potholing method to locate any underground infrastructure
- Proceed only if you have satisfied yourself, it is safe

## For information on electrical safety and the Essential Energy network, contact:

| | |
|---|---|
| Essential Energy General Enquiries | 13 23 91 |
| Essential Energy Supply Interruptions | 13 20 80 |
| SafeWork NSW | 13 10 50 |
| Before You Dig Australia (**byda.com.au**) | 1100 |

**MORE INFORMATION**

- Submit a **Request for Safety Advice** enquiry at **essentialenergy.com.au/web-forms/request-for-safety-advice**
- Visit **essentialenergy.com.au/safety**.
- Email **public.safety@essentialenergy.com.au**
- Call **13 23 91** and speak with our Public Safety Team.