NORTHERN POWERGRID®

Underground cable safety

Contents

CAREFUL AROUND Cables

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Welcome

We have created this document to keep you and your colleagues safe whilst working near underground cables.

Please read it and share to anyone who needs to know this information.

It is important that you regularly keep yourself up to date with health and safety practices and know the dangers of working near live utility cables.

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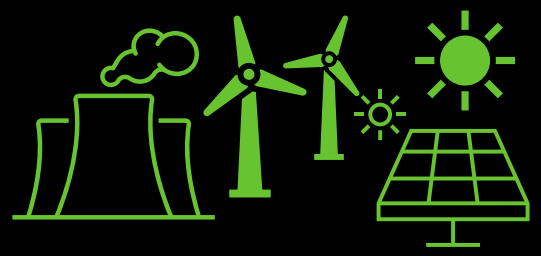
Who is Northern Powergrid and what do we do?

We manage the electricity network that **powers everyday life** for more than **8 million people** across **3.9 million** homes and businesses in the North East, Yorkshire and northern Lincolnshire.

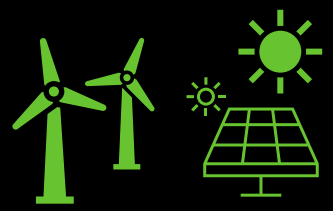
We take electricity from National Grid's transmission network (which connects the larger power stations) and from smaller generators, such as wind farms, that are directly connected to our network.

Our network consists of more than **63,000 substations**. This also includes **17,312 miles** of overhead powerlines and **43,037 miles** of underground cables spanning **9,650 square miles**.

Where we fit in the electricity industry



Utility scale generation



Locally distributed generation

Domestic batteries

Domestic generation

Electric vehicles

Smart meters

Power transmission

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Large substations

Primary substations

Distribution substations

Residential customers

Industrial and commercial customers

Smarter powergrid

Introduction

This presentation aims to help anyone who excavates or breaks ground to stay safe around our network.

Over the past 10 years in the UK, there have been over 1,000 recorded injuries because of contact with underground electricity cables. Many of these incidents have been on construction or demolition sites, with the rest on public highways, footpaths, domestic premises and gardens.

Damage can result from excavation or breaking ground and can cause an explosion, leading to severe burns or even death.

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Dangers of electricity

- When underground cables are damaged, people can be killed and injured by electric shock, electrical arcs, and flames, causing severe burns to hands, face and body - even if arc rated clothing is worn.
- This can happen when a cable is damaged, cut through by a sharp object such as the point of a tool; or crushed by a heavy object or powerful machine. Cables that have been previously damaged but left unreported and unrepaired can also cause incidents. In addition, interruption to supplies can have life-threatening consequences.
- Northern Powergrid has ‘NSP/002 – Policy for the Installation of Distribution Power Cables’ available in the public domain. This document provides guidance and sets out company policy on the procedures that are to be followed when installing distribution power cables. The document covers the excavation of trenches, trench preparation, installation of ducts, installation of safety features and warning signs, laying and pulling in of cables, back-filling of trenches, re-making of ground and recording of cable positions.
- Work which is undertaken on the public highway should be done so in accordance with the ‘New Roads and Street Work Act 1991’ (NRSWA) and ‘The Traffic Management Act 2004 Regulations’ and Codes of Practice.

Energy Networks Association (ENA) video

Think before you dig: electricity

Watch video –
click image to play

This video shows the dangers of drilling into live electricity cables.

Think before you dig: gas

Watch video – click image to play

This video shows a man driving a fence post into a live gas main.

He narrowly escapes with his life.

Think before you dig: gas (continued)

The incident happened in Derby in 2022

Rather than shy away from the incident, the operative wanted to spread the safe dig message, helping keep other people safe on site. It is a brave and honourable approach.

He said:

"***For a few seconds I simply thought my time was up, and I was more than incredibly lucky to walk away with not so much as a scratch on me.***

"After I recovered from the initial shock, my only thought was 'I don't want anyone else going through this'.

"I want to make sure that anyone out there thinking of putting a hole in the ground, no matter if it is knocking in a fence post, planting a tree, or taking on a major construction project, then they should always search 'safe dig plans' before they start work."

What you need to know

- Before starting any excavation works you must always check for underground cables.
- Underground distribution power cables carry voltages up to 132,000 volts and can be located near to the surface.
- Distribution power cables are defined as those cables used directly for the transfer of electricity from the 132,000 volts system through to the low voltage (LV) service at customers' premises.

You must always:

- treat all cables as live
- carry out a risk assessment in accordance with HSE Guidance Note HSG 47 ‘Avoiding Danger from Undergrounds Services’
- obtain cable records by visiting www.northernpowergrid.com and use our FREE check before you dig service
- use a cable avoidance tool (CAT) to detect any cables in the vicinity
- ensure mechanical excavator and power access tools are **not** used within 0.5 metres of a suspected cable route or a cable which has been located using a CAT
- take care when using power tools to break through paved surfaces where gas and electricity cables are
- look for likely signs i.e. street furniture, as service cables may not be shown on plans
- ensure all workers have Northern Powergrid’s 105 free-phone number saved in their phones
- mark the cable positions using a waterproof medium.

If a cable has been struck:

- Make sure everyone stays clear.
- Don’t assume that the cable is dead.
- Always seek medical advice if you suspect someone has received an electrical shock, however minor, dial 999 immediately. Use What3Words to provide your exact location. This is particularly important when working in rural or isolated areas.
- When it is safe to do so, call Northern Powergrid on free-phone 105 to report the incident.

Health and Safety Executive (HSE)
HSG 47 Avoiding Danger from Underground Services

This document explains the three basic elements of a safe system of work during excavation:

- Planning the work
- Locating and identifying buried services
- Safe excavation

HSG47 provides guidance on how to manage the risks of digging near underground cables.

HSG47 applies to all sites ‘where work involves penetrating the ground at or below surface level’.

A key qualifying statement reads: ‘Buried services are widespread, and it should be assumed they are present unless it has been shown otherwise’.

Health and Safety Executive (HSE)
HSG 47 Avoiding Danger from Underground Services

"The position of any services in or near the proposed work area should be pinpointed as accurately as possible using a detecting device in conjunction with up-to-date service plans and other information which provides a guide to the possible location of services and help interpret the signal.

"Excavation work should follow safe digging practices. Once a detecting device has been used to determine position and route, excavation may proceed, with trial holes dug as necessary, to confirm the position of any detected services. A cable is positively located only when it has been safely exposed.

"Cable depths are not generally indicated on our records and can vary considerably even when shown.

"Great caution must be exercised at all times when using mechanical plant. Careful trial digging should always be carried out on the whole route of the planned excavation to ascertain no cables exist."

Safe digging practices

- After the use of a cable locator, trial holes should be carefully dug, using either electrically insulated hand tools or safe excavation equipment (vacuum excavators, air lances, etc) to confirm the position of buried services. The use of hand-held power tools and mechanical excavators too close to underground services are the main cause of accidents.
- Digging should be carried out alongside the service, rather than directly above it; final exposure of the service should be by horizontal digging.
- Once underground services have been uncovered, it is essential to identify them correctly.
- Water pipes, electricity cables and telecommunication cables may be black plastic. Any black plastic service uncovered should be assumed to be an electricity cable until proved otherwise.
- Similarly, cast iron and steel water pipes may look like gas pipes; all such pipes should be treated as gas pipes until positively identified.
- All services should also be assumed to be live unless written confirmation of isolation or disconnection is received from the utility or owner.

Starting excavation work

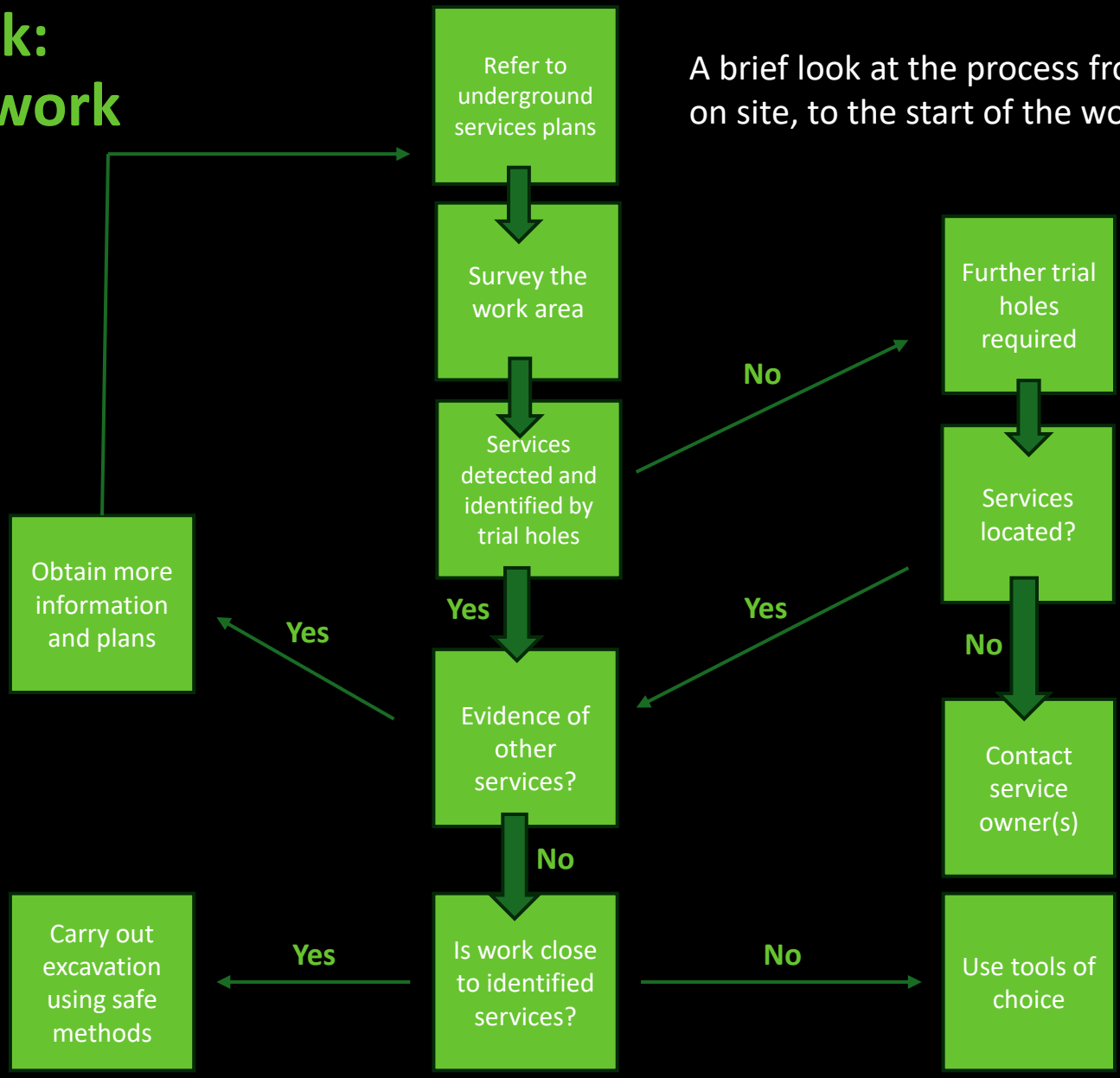
The next phase of the process, once all services have been marked and identified, is to commence excavation works**.**

Most service strikes occur whilst excavation works are underway and can often be attributed to one or more root causes.

1. Failure to sufficiently investigate and identify services at the planning stage or via trial holes.
2. Discovery of an uncharted and/or undetected service which has either been masked by another service or is hard to trace.
3. Poor communication of the risks present either via a suitable workforce briefing or clear permit to break ground.
4. Divergence from the safe system of work following ‘dynamic’ workface risk assessment out with due process
5. Complacent/Risk tolerant behaviour around services; leading to a failure to maintain risk controls akin to a high-risk service.
6. Eagerness to progress the works; a mindset that all services have been found and works can proceed at an increased pace.

Planning the work: a safe system of work

A brief look at the process from referring to plans on site, to the start of the work near services.



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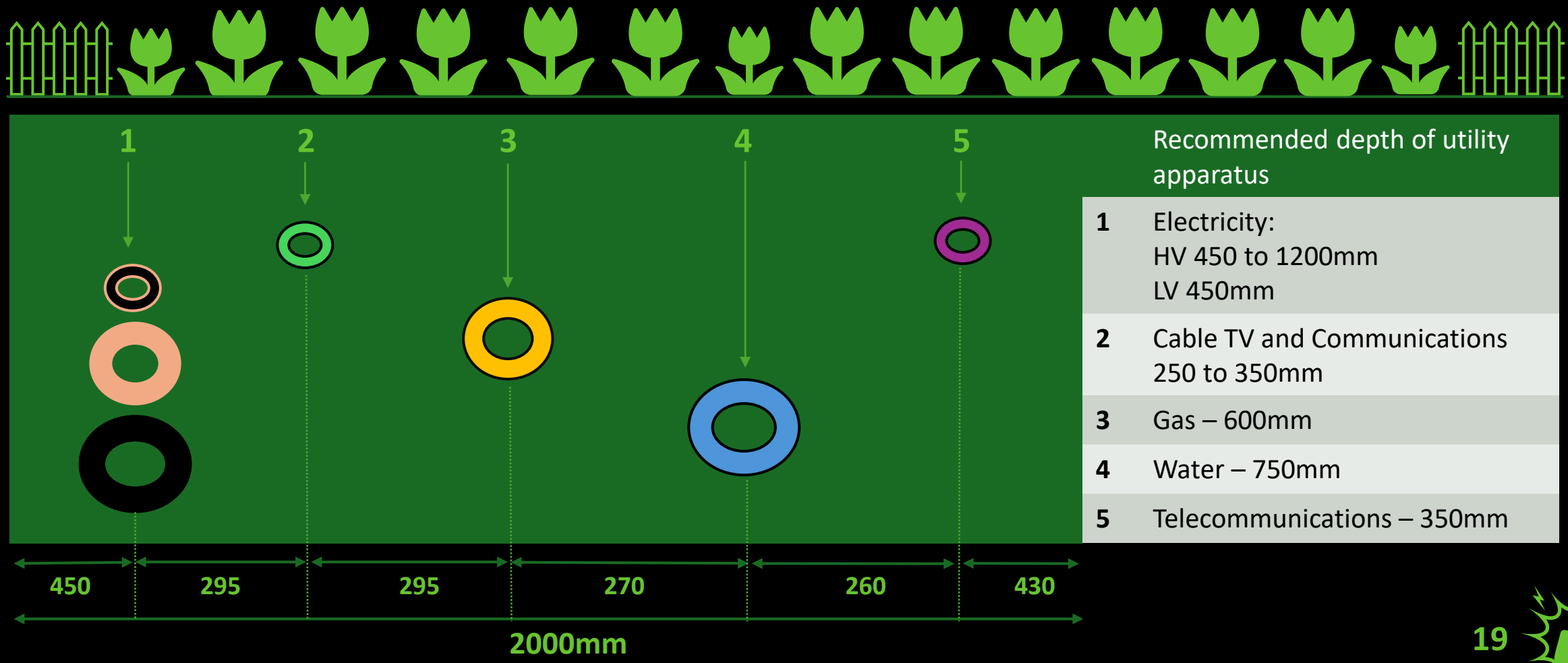
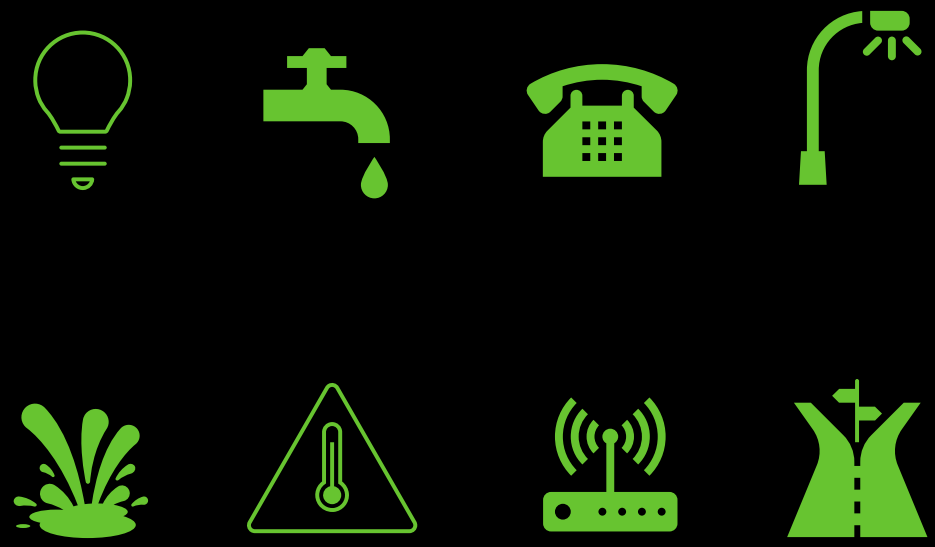
Recommended depth of utility apparatus



	Recommended depth of utility apparatus
1	Electricity: HV 450 to 1200mm LV 450mm
2	Cable TV and Communications 250 to 350mm
3	Gas – 600mm
4	Water – 750mm
5	Telecommunications – 350mm

UK Utility Companies' National Colour Coding for buried services.



Utility	Duct	Pipe or Cable	Marker or Tape
Gas	Yellow	Yellow	Yellow with Black Legend
Electricity	Black	Black or Red for some HV	Yellow with Black Legend
Water	Blue	Blue	Blue
Water (Special)		Blue with Brown Stripes	Blue / None
Sewerage		Black	None
Telecommunications	White or Grey	Light Grey or Black	Yellow with Blue Legend
Communications	Grey or Green		White with Blue Legend or Green and Yellow
Communications (Motorway) England and Wales	Purple	Grey or Black	Yellow with Black Legend
Communications (Motorway) Scotland	Black or Grey	Black	Yellow with Black Legend
Street Lighting England and Wales	Orange	Black	Yellow with Black Legend
Street Lighting Scotland	Purple	Purple	Yellow with Black Legend

Further information

Health and Safety Executive

www.HSE.gov.uk and search:

- Managing risks and risk assessments at work
- HSE document guidance notes HSG47 (Third Edition) ‘Avoiding danger from underground services’. It can be downloaded free of charge from this website.

Energy Networks Association

- www.energynetworks.org and search ‘Think before you dig’

Northern Powergrid

- www.northernpowergrid.com/safety
- Email: safety.information@northernpowergrid.com
- Call 105

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