

# Safe digging guide

 VolkerWessels UK



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## INTRODUCTION

All excavation activities have the potential to cause serious harm, injury or even death to those who come into contact with underground services. Some workers have suffered life changing injuries through bad practice, taking shortcuts or a lack of information.

Furthermore, the disruption to members of the public and residents affected by loss of services can have significant impacts, especially on those who work from home, or vulnerable people who need to have 24/7 communication lines.

This guide provides an insight into some of the essential control measures required to undertake safe digging and to avoid underground services, through safe working practices and awareness.

Note - The operations relating to excavations may require physical entry into confined spaces. Entry into confined spaces is not to be attempted by any operatives who are not suitably trained, nor without safety equipment. Attention is drawn to Confined Spaces H103 procedure and HSE's publication, Confined spaces – a brief guide to working safely (INDG258).

# WHAT DOCUMENTATION DO I NEED?

Before any digging starts, you must have all the appropriate documentation with you and understand its content. As a minimum, you must understand and work in accordance with the following documentation.

## Essentials

1. Works instruction (signed and approved by a supervisor).

2. Completed permit to break ground:

- H14-01 Permit to Break Ground (Trial Holes Only)
- H14-02 - Permit to Break Ground (Main Work Activities)
- H14-03 Permit to Break Ground (Transient or Reactive Works).

3. A completed RAMS - H02-02 Qualitative Risk Assessment and Method Statement or H02-03 Quantitative Risk Assessment and Method Statement.

4. Highway maintenance - on site risk assessment - HSE-75.

5. Utility drawings/stats/GPR plans recorded in a clear, usable format on working drawings, to be shared with those working on the site with colour and legend\* dated no more than three months from date of extraction. However, the service provider's specific requirement should always be checked, as these can be less than three months. For example, there is a 28 day requirement by some gas providers.

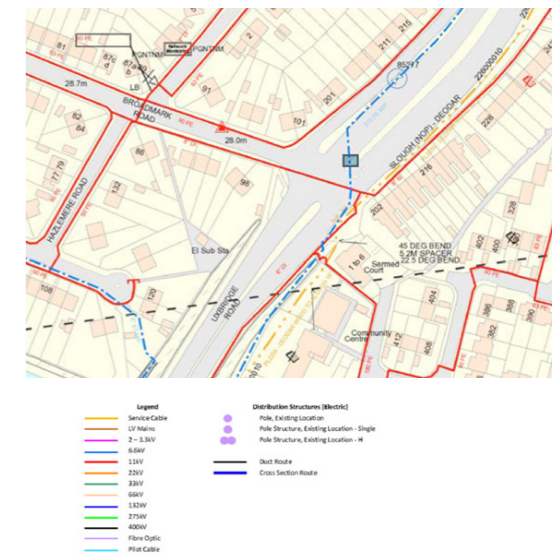
*\*drawings can be provided on digital formats providing that they are suitable for use.*

# NATIONAL GRID GAS PLC

This example plan shows those pipes owned by National Grid Gas plc in their role as a licensed Gas Transporter (GT).

Gas pipes owned by other GTs, or otherwise privately owned, may be present in this area. Information about such pipes should be obtained from the relevant owners. The information shown on this plan is given without warranty, so the accuracy cannot be guaranteed. Service pipes, valves, syphons, stub connections, etc, are not shown, but their presence should be anticipated. No liability is accepted by National Grid Gas plc or their agents or contractors for any error or omission. Safe digging practices, in accordance with HSG47, must be used to verify and establish the actual position of mains, pipes, services and other apparatus on site before any mechanical plant is used. It is your responsibility to ensure that this information is provided to all persons (either direct labour or contractors) working for you, on or near gas apparatus. The information included in this plan should not be referred to beyond a period of 28 days from the date of issue.

National Grid Gas plc example stats drawing

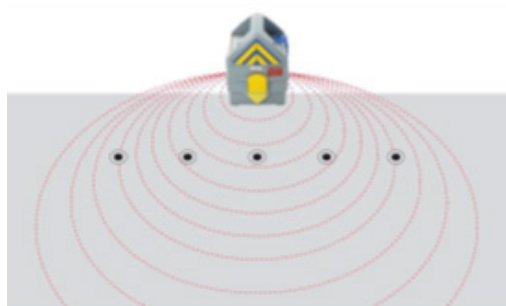






## THE BENEFITS OF USING A GENNY

Genny mode is prioritised over other modes and is the most reliable way to detect a pipe or cable. The CAT locates signal induced by a Genny.



There are various ways of applying the Genny signal, including:

- Induction mode
- Spiking into the ground
- Clamping directly onto a service. Wherever possible, connect the Genny to apparatus using either the crocodile clips or signal clamps (if available). Do not clamp onto HV cables, as this can damage the equipment.

### Avoidance

Avoidance mode speeds the process of pre-dig scanning, by searching for power, radio and Genny signals simultaneously.

### Power

Power mode detects signals originating from power transmission networks, based on magnetic field signals. These signals may be found on any pipe or cable, not just power cables.

- Some power cables do not radiate detectable power signals
- Power signals might not be found on power cables that are switched off – for example, a street light cable during daylight hours, pot ended cables or balanced cables, such as HV cables. These will require radio and Genny modes.

### Radio

Radio mode detects radio signals from distant radio transmitters as they travel along underground pipes and cables.

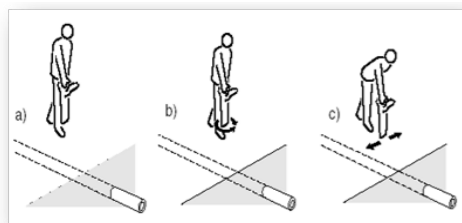
- Radio signals are not always present. Always use a Genny before excavating.

### Notes

- Remember that Genny and CAT tools will not detect plastic pipes or fibre optic cables
- Always carry a spare pair of batteries for your Genny and CAT.

# INSTRUCTIONS ON HOW TO USE A GENNY AND CAT

When scanning, it is essential to scan in the Genny mode first. This can be done using the induction mode, using the earth spike or direct connection.



## To begin:

- Scan the area as shown in the image in Genny mode, power mode and then repeat in radio mode
- Pinpoint the service for the exact position - reduce the CAT sensitivity
- After determining the position of the cable (rotate CAT **90 degrees** – signal will stop, showing direction of cable), move along in a side-to-side motion. Mark the services on the ground when found.

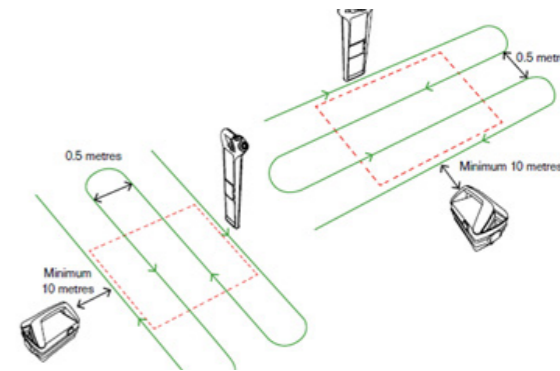
When scanning an area, always set the Genny no more than **10 metres** from the area to be scanned.

Begin by walking the perimeter of the proposed excavation site. Then walk the length of the excavation site, moving across the width in parallel sweeps around 0.5 metres apart. If using a Genny in induction mode, position the Genny as shown in the image so that the chevrons on the CAT are in line with the chevrons of the Genny.

Sweep across the width of the excavation site, moving up the length. If using a Genny in induction mode, position the Genny as shown in the image.

If a cable or pipe is located, first establish the direction of the cable or pipe, then trace it across the area to be excavated, marking as required.

Continue sweeping over the excavation site to identify any other services.



## MARKING UP OF SERVICES AND UTILITIES

Once you have a clear reading and understanding of where the services are located, mark up the line of each service, inside and outside of the area to be excavated. Ensure you use the correctly colour-coded line marker spray (as detailed).



Example

Line marker spray must be water soluble, semi-permanent or temporary for use on the highway.

You need to be able to identify services using the colour coded standard:

| Colour      | Service  |
|-------------|--|
| Red / black | Electricity - some high voltage cables   |
| Orange      | Street lighting in England and Wales and traffic control cables                              |
| Blue        | Water main   |
| Yellow      | Gas  |
| Purple      | Highways England standard for ducting (data cables) on motorways and all-purpose trunk roads |
| Grey        | Telecommunications   |
| Green       | Cable television and some telecommunications   |
| Brown       | Sewer/drainage   |
| Black       | Oil/fuel/sewage  |

Dependent on the location of works – e.g. in sensitive areas - the use of line marker spray may not be permitted. In this instance, chalk or crayons can be used to identify locations of underground apparatus. You must have permission from your supervisor to use these methods of marking.

This information must also be documented within the works information pack.

In wet conditions, consider the use of crayon rather than spray as it may be washed away.

### Notes:

- Where just one colour is used, it should have a stark contrast to the ground
- Where a range of colours are used to represent different utility types, then the colour code should be agreed beforehand with the client.

# SERVICES AND UTILITIES VISUAL INDICATORS AND MARKINGS

An essential task before any excavation is undertaken is to survey the surrounding area for signs of buried services and other structures that are present in the highway, which you may not be aware of. There are many signs which can give you an indication of what might be present in the ground.

Protecting underground apparatus:

*(this list is not exhaustive)*



Gas marker posts

Manholes/ducts/access covers/drainage rodding points



Street signs/bollard lights



Services duct markers (warning tape/tiles)



Sometimes metal studs are used in roads and pathways

Service entries into buildings



Evidence of service trenches/ scarring



Overhead services that go underground





Skylights/pavement lights (potential basements)



Stopcocks/fire hydrants/meter covers/toby box



Overhead services



Bridges/culverts/tunnels, etc



*Note - Talk to local authorities/residents for their services and utility knowledge.*

Coal chutes, hatches (potential basement) and vents



Gullies



Telecoms cabinets



## EXCAVATING IN THE VICINITY OF UNDERGROUND STRUCTURES

Many of the areas we operate in may be subject to the presence of underground structures; for example, basements to properties. This is due to the space constraints encountered in urban areas and, in many cases, the age of the property itself.

Like the avoidance techniques used for determining the presence of underground utilities, a visual survey must be undertaken to determine the presence of underground structures. The results of the visual survey must be recorded on the H02-02 Qualitative Risk Assessment and Method Statement or H02-03 Quantitative Risk Assessment and Method Statement for the works. Some of the visual markers found on footways, such as coal chutes and hatches, vents, skylights/pavement lights (potential basements), are shown on the previous page.

Operations must be planned and undertaken with a high focus to avoid unintended contact with underground structures. Where available, you will be supplied with information on the buildings (and any subterranean structures) by the client in the vicinity of your working area. If you require further clarification or information, contact your supervisor.

If you suspect that there may be undiscovered underground structures, contact your supervisor immediately and do not commence working until the location has been checked.

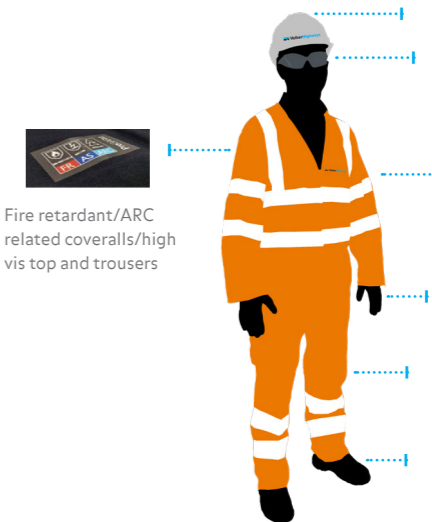
## WHAT PPE DO I NEED?

**PPE is workers' last line of defence from injury. Clothing has the potential to ignite from a flash spark or electrical discharge.**

When excavating, all clothing worn must be flame retardant to a minimum standard of EN ISO 14116:2015 (are Class 1 – IEC 61482-2:2018 and Fire Retardant EN ISO 11612 A1, B1 and C1). All other PPE must be worn in accordance with VolkerWessels UK and UK legislation.

If you have any queries relating to PPE, please contact a member of the HSEQS team.

**NOTE** - PPE is to be worn by all employees and visitors in all live sites, including stores/depot areas and when loading/unloading materials.



Fire retardant/ARC related coveralls/high vis top and trousers

– Toe and mid sole protection with lace up and ankle support.



# SAFE DIGGING

Safe digging can proceed once all ground surveying has been completed and all foreseeable measures have been taken to identify the location of underground apparatus, including the survey for 'visual indicators'. The safest means of excavation is by use of air lance or vacuum excavator. Where these options are not available, you must adhere to the following control measures.

## Protecting underground apparatus:

Use insulated hand tools with curved edges. Ease spades and shovels into the ground, applying gentle foot pressure. Do not throw or spike into the ground.

Make frequent and repeated use of the CAT and Genny during the excavation operation, rescanning every 100-150mm. Services location is likely to become more accurate as the cover is removed.

Once services are identified, no mechanical excavation is to be within 500mm of the marked area, as a minimum.

Always dig to the side of a known service, never directly over the top, to expose it.

Once services are exposed, protect them by clearly marking their position and making all on-site personnel aware of their presence.



Make sure those completing deliveries or materials collection are aware of the presence of exposed services. (A number of incidents relate to materials dropping or falling from buckets and grabs).

Do not move services unless you have permission from the service provider. Do not use services as handholds or footholds or as any other means of support, e.g. for climbing out of excavations. Support suspended apparatus using only approved methods.

Mechanical excavations must always be undertaken with caution, by breaking in layers. Breaking out using a pecker should be completed in a controlled manner and never be driven vertically into the ground to its full length. Once an opening has been made, breaking can continue from the face of the excavation at an angle.

If services or utilities need to be supported, this should only be done in consultation with the service provider. Do not attempt to support services without contacting the service provider.



#### Tips:

- Once exposed, services may need to be supported and should never be used as handholds or footholds for climbing in or out of excavations.
- All excavations, including those with exposed services, must be protected with boards steel plates, footway boards, T mats, etc, to protect workers, members of the public and exposed services.
- To minimise the risk of damage, you must only support exposed services with advice and permission from the service provider.
- Be aware - there may be joints in cables. These will need appropriate support and should be treated with additional care.
- Do not move exposed services, except with permission and in consultation with the service provider. All exposed apparatus must be protected and supported; the maximum span for an unsupported service is 1.2m. Colour coding flags or posts may be used to mark the ground where apparatus is identified.
- Ensure end caps are installed on newly laid ducts.
- Do not allow water to collect in the excavation and ensure you check the trench faces after rainfall. Where excavations are open for extended durations, pumps may be required to remove and/or prevent water ingress to the excavation trench.
- Provide protection of the apparatus against damage, e.g steel plates, sand over surface or supports for apparatus that span across excavations.
- Use suitable and sufficient signage, lighting and guarding at appropriate distances. Ensure that all personnel are aware of the services on site, by briefing operatives of their whereabouts and clearly marking their location.

## APPARATUS ENCASED IN CONCRETE

Services encased in concrete pose a significant risk when excavating; for example, in VolkerHighways, over 26% of all service strikes are as a result of services being encased in concrete. When you encounter any service encased in concrete - ALL WORK MUST STOP!

Please make contact with your supervisor for further guidance.

Apparatus encased in, or surrounded by concrete poses particular risks to operatives. With the combination of the unknown/known service inside the concrete and the excessive force required to remove the concrete casing, this could pose additional risks to those carrying out the works (even if only to create space for a component or working room).

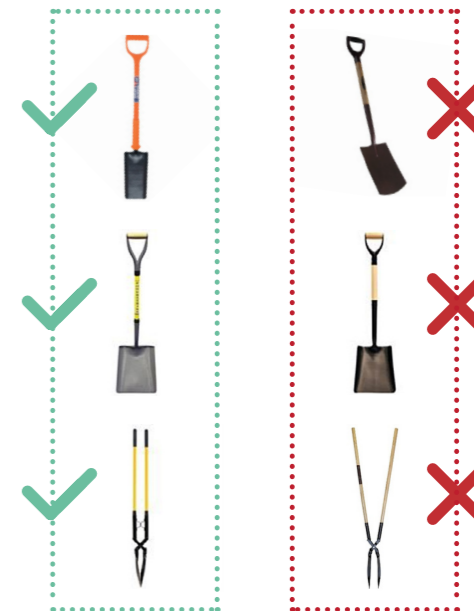
The concrete may be concealing faults, adversely loading the apparatus, weakening it, or preventing accurate identification of the services. The concrete may provide anchorage to pipelines and associated fittings, and the removal or complete exposure of the concrete should be avoided to minimise the risk of failure of the anchor.



If you are in any doubt, contact your supervisor.

## WHAT EQUIPMENT DO I NEED? NON-MECHANICAL

You will need all the relevant tools, plant and equipment to carry out the works in a safe and timely manner. All hand tools must be insulated, as a minimum standard. The use of non-insulated tools is prohibited. No picks are to be used on site.





# WHAT EQUIPMENT DO I NEED? MECHANICAL

When locating or avoiding services, following their mark up, it is essential that trial holes are completed to identify the exact location and depth of known services. These are often identified through the use of stats drawings provided by the service provider.

When excavating trial holes, non-mechanical means of excavation should be prioritised, because the majority of service damage is through mechanical means. This method can be very effective in congested excavations where mechanical excavation and use of hand tools is difficult. However, this is not always possible and should therefore be managed carefully.

Where mechanical excavation is used, ensure that the plant and machinery you are using is suitable for the task and that it has been inspected for defects. Inspections are to be undertaken daily and recorded on the Pre-use and Daily Plant Inspection (PUWER) H09-07 form. Forms are to be completed using a tablet, or on paper copies, submitted to your supervisor on a weekly basis. Any defects or issues must be reported and dealt with immediately.

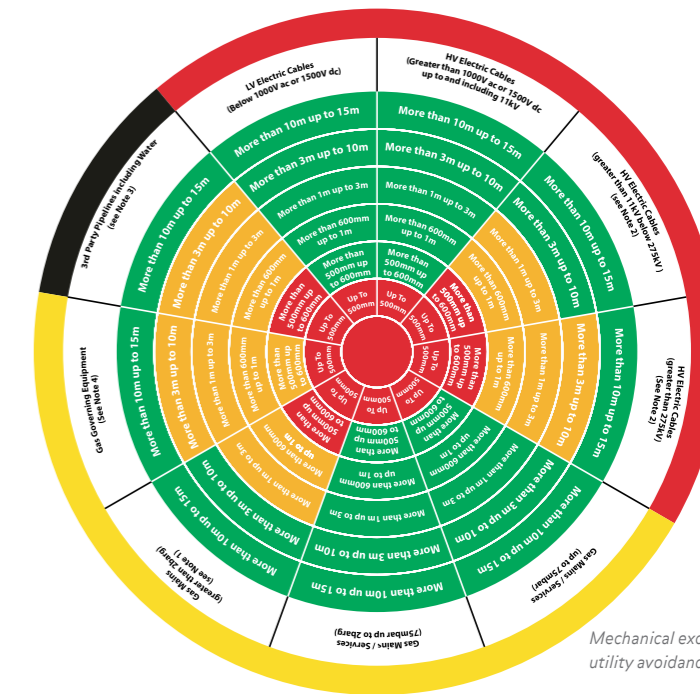
If mechanical excavation is required, the preference is to use vacuum excavation. Mechanical excavators and power tools can be used to break up hard surfaces, where the survey has proved that there are no services, or the services are deep enough so will not be damaged by such tools. Only toothless buckets should be used for mechanical excavations.

If an excavator is used, the operator should be supported by a banksman, to warn the driver of any services or other obstacles. The banksman should remain outside the excavator exclusion zone.

Breaking ground with the use of mechanical tools should only be carried out using an approved method; driving the full length of the chisel into the ground is not permitted. Breaking/excavation is to be undertaken in layers, ensuring you continually use the Genny and CAT as you proceed.

Gas pipes may have projections, such as valve housings, siphons and standpipes that are not shown on the plans. To allow for this, do not use mechanical excavators within 500mm of a gas pipe or any other service. The gas provider may advise greater safety distances, depending on the pipeline pressure.

For advice on the minimum distance in relation to working with excavators and different services, use the mechanical excavation utility avoidance wheel guide.



Mechanical excavation utility avoidance wheel

## EMERGENCY PROCEDURE

If you strike any underground apparatus or uncover a utility, which you suspect has been previously damaged, please report it immediately to your supervisor in accordance with the VolkerWessels UK reporting procedure Actions Following Safety or Environmental Incident H07-05 and in accordance with any client requirements. Do not attempt to move, adjust or interact with the service any further. Clear the area and do not approach the service until advised by the service provider that it is safe to do so. HV electric cables are likely to be re-energised as part of the fault testing process on some circuits and pose serious risk of secondary electrocution or flash over.

Ensure adequate security is applied to prevent entry or access to the excavation/trench and contact the emergency services if required. The relevant service provider must also be contacted immediately to inform them of the damage.

For location-specific emergency contact details, refer to your method statement, Construction Phase Health and Safety Plan (CPP) or contact your supervisor. Use of electronic geolocation mapping apps such as what3words can be used.

In the event of a service strike, follow the reporting actions below. Remember to follow any client requirements in relation to service strikes and any other incidents.

| Your Immediate Action    |                 |  |                                     |                           | Company Action within One Hour  |  |   |  |   |  | Investigation and Reporting                             |  |                          |
|--------------------------|-----------------|--|-------------------------------------|---------------------------|---|--|---|--|---|--|---|--|--------------------------|
| Attend to injured person | Make scene safe | Call emergency service(s) as appropriate | Report to Supervisor / Line Manager | Log incident on EcoOnline | Notify asset owner if applicable (e.g. utility company to arrange repair) | Supervisor / Manager notifies senior managers as appropriate | Supervisor / Manager notifies the H&S Manager | Supervisor / Manager contacts H&S Manager to arrange D&A screening | H&S Manager notifies HSEQS Lead, MD, CR Director and others as required | Inform the Client & other affected parties | Local investigation completed by site and sent to HSEQS | H&S Manager completes investigation, notify regulators (HSE or equivalent) | Notify insurance Company |
|                          |                 |  |                                     |                           |   |  |   |  |   |  |   |  |                          |
|                          |                 |  |                                     |                           |   |  |   |  |   | H07-08                                     | H07-08 and H07-02 / H07-03 (as appropriate)             | COM-12 C02-02-VF C28-02  |                          |

If you wish to discuss matters relating to safe excavation, please contact a member of your HSEQS team.

## EXTERNAL EMERGENCY CONTACTS

This list is only a snapshot of the main providers. You may need to contact other providers in your area where services are delivered by different providers. Information on these can be obtained during your stats check.

| Emergency contact                           | Number                                 | Website  |
|---|--|--|
| Emergency services: Police, ambulance, fire | 101 (police only)<br>999 (emergencies) | <a href="http://www.police.uk">www.police.uk</a>   |
| Environment Agency                          | 0800 807 060                           | <a href="http://www.gov.uk/government/environment-agency">www.gov.uk/government/environment-agency</a> |
| NHS   | 111                                    | <a href="http://www.nhs.uk">www.nhs.uk</a>   |
| National Grid                               | 0800 404 090                           | <a href="http://www.nationalgrid.com">www.nationalgrid.com</a>   |
| BT  | 0800023 2023                           | <a href="http://www.bt.com">www.bt.com</a>   |
| UKPN  | 0800 028 0247                          | <a href="http://www.ukpowernetworks.co.uk">www.ukpowernetworks.co.uk</a>                               |
| Southern Gas                                | 0800 111 999                           | <a href="http://www.sgn.co.uk">www.sgn.co.uk</a>   |
| Thames Water                                | 0800 714 614                           | <a href="http://www.thameswater.co.uk">www.thameswater.co.uk</a>                                       |
| Line Watch (PETROCHEM)                      | 01488 662750                           | <a href="http://www.linewatch.co.uk">www.linewatch.co.uk</a>   |
| Virgin Media                                | 0207 356 5000                          | <a href="http://www.virginmedia.com">www.virginmedia.com</a>   |

## OTHER RESOURCES



Other useful resources related to this guidance.



### Guidance and documentation

HSG47 - Avoiding danger from underground services

NRSWA 1991 – New Roads and Street Works Act 1991

NJUG Regulations – guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees

VolkerWessels UK policies

H14 - Safe Working Procedure for Working in the Vicinity of Underground and Overhead Services

Mechanical service utility avoidance wheel

## WHO ELSE CAN I ASK?



If you require any further information regarding this guidance, please contact your HSEQS team.



