Overhead and Underground Services

Contents

1. Introduction

The purpose of these overhead and underground services standards is to highlight the health and safety requirements that must be implemented when overhead and underground services are found on or close to site.

Overhead services are power and telecomm cables that are suspended in the air on wooden poles or metal pylons.

Underground services are gas, electric, water sewers, telecommunication, fibre, oil, fuel and other pipes. These are buried in the ground under paths and roads. Services are normally laid in a single trench on top of each other with water being the deepest, then gas being at the top.

Damaging pipes is inherently dangerous, can be costly and also damages our reputation with the local community if they are left without power, phone lines or the internet.

2. The dangers of striking an underground service

Gas

Damage to gas pipes and connections can cause leaks that may lead to fire or explosion which could result in serious injury or even death.

Electricity

Striking an electric cable can cause an explosion or electrocution which could result in serious injury or even death. Other services such as gas pipes may also be at risk from an electrical explosion.

Water
Damage to water pipes could jet from a high pressure waterman to injure the body or cause fragmentation from stones or other objects being ejected from the ground. Leaks from underground water pipes can affect other services and can damage the support of nearby structures. Damage to mains pipes can result in flooding, leading to subsequent risks from drowning or the rapid collapse of support to the sides of an excavation. Water can also can enter gas pipes if they are also damaged.

Oil
Damage to oil pipes could cause a major environmental incident and involve extensive clean-up work.

3. Safe system of work when digging

A safe system of work (SSOW) must be put in place and followed. The SSOW can be broken down into three components or phases:

3.1 Planning the work

During the planning phase we must establish where known underground service are located and whether the planned work has potential to disturb these services and take these steps:

- Obtain service drawings from utilities companies and other organisations such as the Technical Department with relevant information about the site.
- Survey the site to identify the services and other underground structures. Record the location of any services.
- Review/assess the planned work to avoid disturbing services where possible.
- Allow sufficient time and provide sufficient resource to do the work safely.
- Emergency work still requires planning and assessment of the risks arising from the work. A precautionary approach must be taken when breaking ground.

Not all services are marked on plans, extreme caution must be taken at all times when digging or breaking ground.

3.2 Detecting, identifying and marking underground services

Locate the services identified at the planning stage survey as being in the work area.

Make sure those involved in detecting and identifying services are competent in the proper use of survey tools and detecting devices as well as reading/ interpreting plans.

Once detected, identify and mark the services using spray paint on the ground. Also confirm their status i.e. whether electricity cables are live, whether gas pipes are pressurised and then record their location and status on a plan.

3.3 Safe excavation

Decide which method of excavating near underground services will be used.

A Permit to Dig must be completed and all involved in the digging of the excavation must be fully briefed.

Dig trial holes, machines can be used to break the surface but then insulated hand tools, air lance or vacuum excavators should be used. 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 certain 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.

Only hand digging should be done within 500mm of a service.

Refer to HSMS form 041 – Permit to Dig

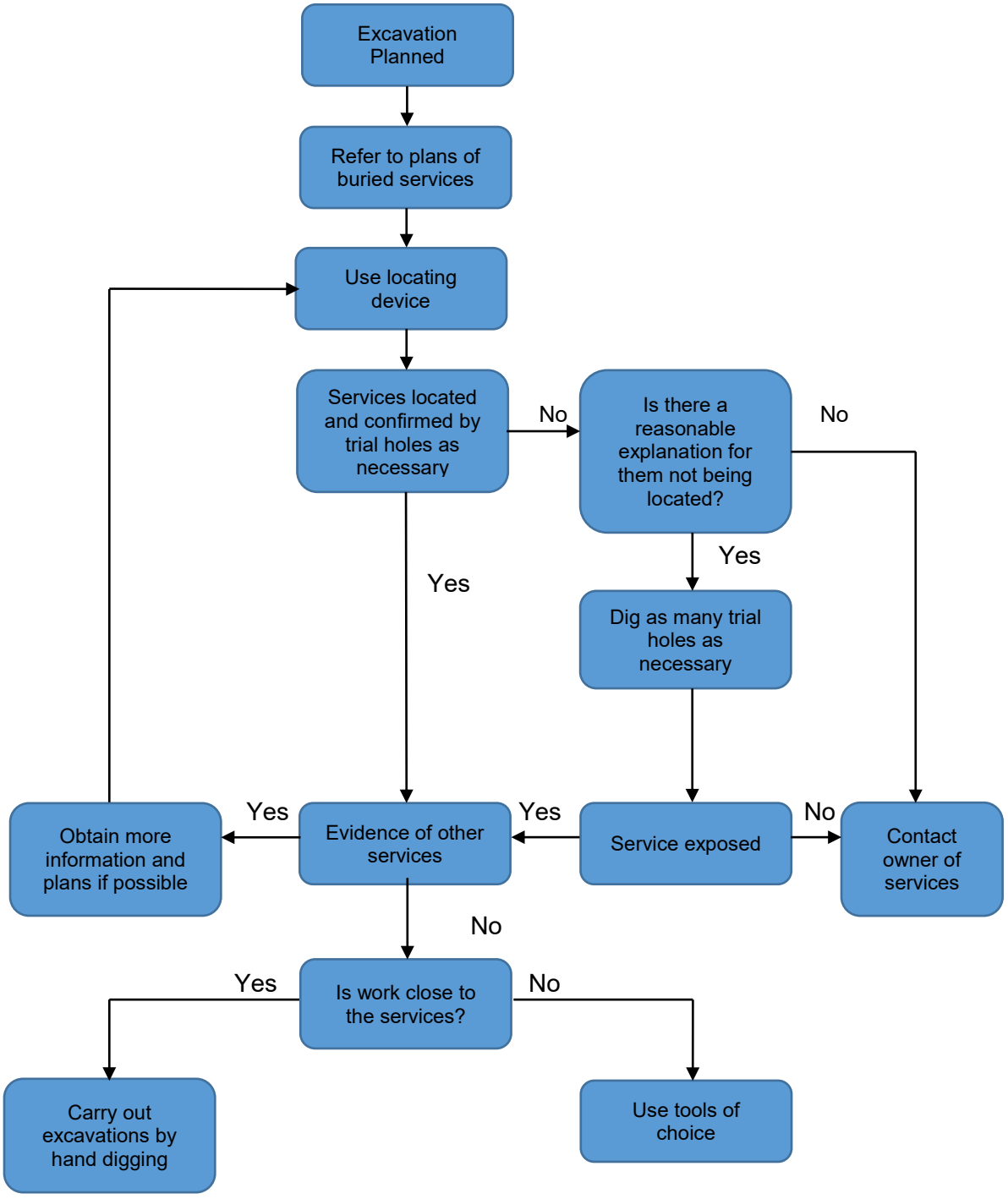
3.4 The Breaking Ground 'Do's and Don'ts'

- Do stop work if an unknown or unexpected service is found and immediately inform your supervisor.
- Do assume that all services are 'live' unless it's been proved without doubt that they're isolated.
- Do ask the service coordinator to re-establish any markings that are removed as work proceeds
- Do always respect service exclusion zones and don't operate mechanical plant within them.
- Do ask the supervisor or services coordinator if you are unsure about anything.
- Do continue to scan for services at regular intervals as the excavation proceeds.
- Don't attempt to remove any hard material that surrounds a service, e.g. concrete.
- Don't use services as a ladder/rope as means of getting into or out of an excavation.
- Don't work outside the limits of the work area shown on the permit to break ground.
- Don't use sharp hand tools when working near to underground services (e.g. pick axes) use insulated hand tools.

Also refer to:

HSMS Standards – Working at Height (refer to Excavations section)

4. Excavations flow chart to avoid hitting buried services



5. Striking an underground service

When an underground service is damaged the owner must be informed immediately, operatives and members of the public are to be kept away from the service until it has been made safe.

Any damage to a gas pipe no matter how minor must be immediately reported by telephoning the National Gas Emergency number 0800 111 999.

The following immediate actions must also be carried out:

- Remove all operatives from the immediate vicinity of the leak
- Keep members of the public away from the area.
- Remove all sources of ignition and prohibit any smoking near by

The gas distributer may also need to report the incident to the Health and Safety Executive, which could lead to an investigation.

In the event of any service strike the contractor responsible must carry out a full investigation and supply the report to the relevant operating business and Group HS&E Advisor.

The Group HS&E Advisor must also complete an internal report for recording and monitoring purposes.

Refer to HSMS form 071 – Service Strike Report

6. Overhead cables and services

Overhead services are more obvious than buried ones, usually in the form of an overhead power lines. However, a person can still be seriously injured if they come into contact with these services as a result of fire, explosion or electric shock. Electricity can also arc from the cable onto equipment that is in close proximity to the cable.

The person in control of the premises where the work is being undertaken must report the incident as a dangerous occurrence if any plant or equipment unintentionally coming into:

- Contact with uninsulated overhead power line in which the voltage exceeds 200 volts; or
- Close proximity with such an electric line, such that it causes an electrical discharge.

Contact with overhead cable and services could involve:

- Machinery; e.g. cranes, lorry-loader cranes, telehandlers, piling rigs, and tipping trailers.
- Equipment; e.g. scaffold tubes and ladders.
- Work activities; e.g. loading, unloading, lifting, spraying, and stacking.

If there are have overhead services on site, this must be communicated to all site operatives during induction and through regular Toolbox Talks.

6.1 Preventing contact

Any work within 10 meters of an overhead cable or service must have a site specific risk assessment completed. During the planning stage any overhead cables and services that are on site will need a GS6 survey carried out, this is done on request from the cable owners, usually the electricity company. The constraints from this survey must be checked at this early stage to ensure that the build can be carried out safely.

An engineer from the electricity company will visit site and carry out measurements of the cable height. They will then issue a copy of the survey, this will include safety exclusion zones horizontally and vertically that **MUST NEVER** be encroached.

6.2 Risk Assessment

If work has to be done close to an overhead cable or service, firstly the owner should be consulted and asked if the line can be diverted away from the working area or temporary switched off while the work is carried out.

If this is not practical or be easily achieved then a risk assessment must be carried out by a competent person and as part of the risk assessment process the following must be considered:

- The voltage and height above ground of the wires. Their height should be measured by a suitably trained person using non-contact measuring devices.
- The nature of the work and whether it will be carried out close to or underneath the overhead line, including whether access is needed underneath the wires.
- The size and reach of any machinery or equipment to be used near the overhead line.
- The safe clearance distance needed between the wires and the machinery or equipment and any structures being erected. If in any doubt, the overhead line's owner will be able to advise on safe clearance distances.
- Machines must be fitted with restrictors to prevent accidental encroachment from Excavators and Telehandlers.
- The site conditions, e.g. undulating terrain may affect stability of plant etc.
- The competence, supervision and training of people working at the site.
- When the site is in the planning stage the scaffold that is required to build the plot must be considered and must not encroach into the safety zone.
- Space for cranes when lifting on the roof must be taken into account.
- Future maintenance for the building must be considered; i.e. how are roofs to be repaired safely in the future.
- Material must not be stacked under overhead lines.

6.3 Working near an overhead cables or services

Most overhead cable strikes are from complacency, operatives forget about the cables and the dangers of working too closely. To help prevent this and to stop persons violating the exclusion zone the cables must be fenced off with a physical barrier, 6m either site of the power line.

6.4 Passing underneath overhead cables or services

If equipment or machinery capable of breaching the safety clearance distance has to pass underneath the overhead line, a crossing point will need to be created through the barriers. In this situation:

- Keep the number of passageways to a minimum.
- Define the route of the passageway using fences.
- Erect goalposts at each end to act as gateways using a rigid, non-conducting material, e.g. timber or plastic pipe. Visually highlight the goalposts, for example, by red and white stripes.
- If the passageway is too wide to be spanned by a rigid non-conducting goalpost a tensioned steel wire, earthed at each end, or plastic ropes with bunting attached may be used. These should be positioned further away from the overhead line to prevent them being stretched and the safety clearances being reduced by plant moving towards the line.
- Ensure the surface of the passageway is levelled, formed-up and well maintained to prevent undue tilting or bouncing of the equipment.
- Put warning notices at either side of the passageway, on or near the goalposts and on approaches to the crossing. This gives the crossbar clearance height and instructs drivers to lower jibs, booms, tipper bodies etc. and to keep below this height while crossing.
- Illuminate the notices and crossbar at night, or in poor weather conditions, to make sure they are visible.
- Make sure that the barriers and goalposts are maintained.

6.5 Working underneath overhead cables and services

Where possible work should be avoided underneath overhead cables and services, when this this is not possible the following precautions must be taken:

- The control measures on the GS6 survey are followed, without exception.
- Plant machines must be chosen to ensure that the cabs of the machine will not enter the exclusion zone.
- Machines such as excavators, cranes and telehandlers must be fitted with physical height restrictors.
- Operatives must never stand on the top of machines.
- All operatives must read and sign the risk assessment.
- If scaffold is to be erected, then only short tubes should be used. Tubes of the potential length to enter the exclusion zone must be prohibited.
- Ladder use must be strictly controlled.
- Scaffolds may need to be earthed (refer to NASC guidance *SG5:18 Earthing of scaffold structures).*

6.6 Emergency procedures

If someone or something comes into contact with an overhead cable or service, it is important that everyone involved knows what action to take to reduce the risk of anyone sustaining an electric shock or burn injuries. Key points are:

- Never touch the overhead line's wires.
- Assume that the wires are live, even if they are not arcing or sparking, or if they otherwise appear to be dead.
- Remember that, even if lines are dead, they may be switched back on either automatically after a few seconds or remotely after a few minutes or even hours.
- The line owner must be made aware that their line has been damaged.
- Call the emergency services, give them the location of the line and any casualties (using WHAT 3 WORDs), tell them what has happened and that electricity wires are involved and ask them to contact the line's owner.
- If a person is in contact with, or close to, a damaged wire, they must move away as quickly as possible and stay away until the line's owner advises that the situation has been made safe.
- If a vehicle has touched a wire, any occupants in the vehicle must either stay in the vehicle or, if needed jump out of it as far as they can. Nobody should touch the vehicle until it has been confirmed by the emergency services that it is safe to do so.
- Be aware that if a live wire is touching the ground the area around it may be live. Everyone must keep a safe distance away from the wire or anything else it may be touching and keep others away.
- Once safe to do so, provide written details of the incident to the line's owner and that if may have been damaged.

7. Monitoring

It is imperative that the site management team closely monitor anyone working close to overhead cables and services. Ensuring that operatives are fully briefed and signed the risk assessment. Contractors must ensure that they have non-working supervisors in place when their operatives are working under or near overhead cables and services.

The Group HS&E department will monitor compliance with these standards and inspect working arrangements and documentation during routine HS&E inspections.

8. Further reading

HSMS guidance – Preventing Service Strikes

HSE - Avoiding danger from overhead power lines

HSE - Avoiding danger from underground services

9. Toolbox Talks

Energy Networks TBT - Look Out Look Up

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