Zero incidents
Zero harm
Zero compromise
Keeping you healthy and safe, every day at work.

ESSENTIAL STANDARD no.27

Utility Management

Thames Water

KEY MESSAGES

Our first priority is the safety of employees working on any asset and to ensure that our works don't put members of the public or other stakeholders at risk.

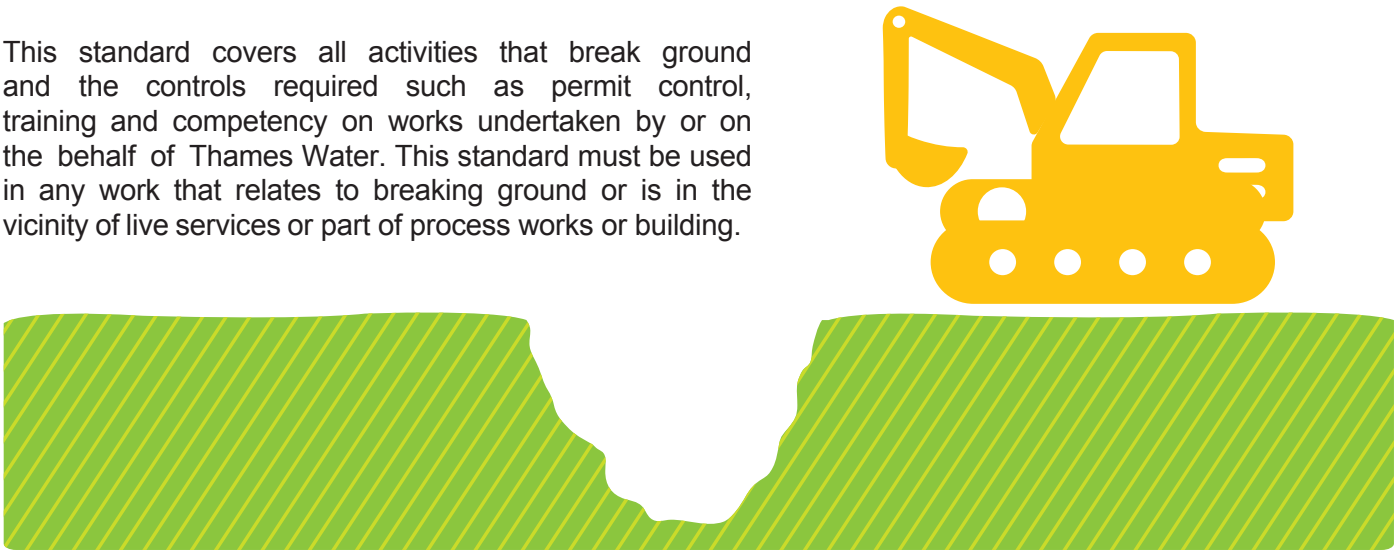
This Essential Standard serves as a commitment from all those working for and on behalf of Thames Water that breaking ground will be carried out in a controlled manner to prevent damage to apparatus and to protect the workforce and third parties.

- Employee and public safety is a priority – all works must be carried out in accordance with HSG47.
- Design works to avoid breaking ground and plan to avoid any utility strike, and have a responsible, authorised person in charge of all undertakings where we break ground.
- Ensure the necessary plans, service drawings, tools, equipment and materials are available on site to carry out the work safely.
- Always ensure the correct method is used at all times to minimise the risk of service strikes.
- Anyone undertaking excavation work must be trained, competent and understand the risks and control measures.
- In line with HSG47 there is a legal requirement to isolate known live services prior to breaking ground
- The following mandatory steps must be taken for any known live electricity service encased in concrete prior to breaking ground or on the discovery of a cable encased in concrete: Stop Work- Discuss with your line manager- Contact the Asset Owner (electricity provider) to request isolation and retain a record of the request.

1. Introduction

Breaking ground or excavations is a high-risk activity that kills or seriously injures people every year, either from striking services or structural collapses. All breaking ground and excavation work (shallow, deep, etc.) must be properly planned, managed, supervised and carried out to prevent incidents.

This standard covers all activities that break ground and the controls required such as permit control, training and competency on works undertaken by or on the behalf of Thames Water. This standard must be used in any work that relates to breaking ground or is in the vicinity of live services or part of process works or building.



For the purpose of this standard, breaking ground is defined as any activity where the ground surface is disturbed. This includes the installation of road pins, earth rods, bore holing and driving fixed elements into the ground. Limit breaking ground where possible and if directional drilling or moling activities need to be carried out, then adopt the principles set out in this standard and document detailed controls in the contract specific safe system of work.

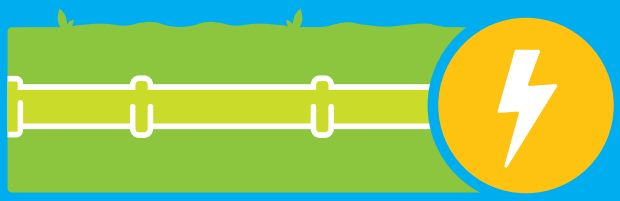
Refer to ES 1 Excavations.

2. Before You Break Ground – Planning and Risk Assessment

Before you perform any excavation activity or break ground, it is important to plan for the following:

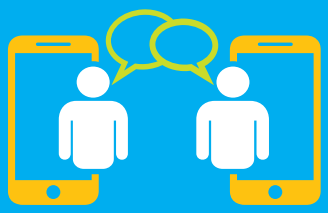
- Design and plan work to limit breaking ground and/ or working around live services where possible.

- Avoid contact with underground services.



- Clearly scope works and ensure clarity of known areas of service interaction.
- Define requirement for management of work near underground services.
- Define/establish communication channels including Designers and Supply Chain
- Define change/ follow change management process
- Understand responsibilities for coordination and management of underground services information.

- Establish clear communication with Asset Owners for contact, help and advice, including local knowledge.



- Ensure minimum acceptable standards for service information provision, including drawings that are legible, to scale, colour and that cross sections are shown where appropriate and where possible dated within the last 3 months.
- Do a line search before you break ground: www.linesearchbeforeudig.co.uk
- Allow sufficient time and resources for positive service location and recording of services where appropriate.
- Obtain all relevant and available underground services information.
- Provide safe working areas to keep highway users and members of the public away from excavations and machinery.
- Protect operational staff from plant and vehicles.
- Prevent trench collapse and support apparatus.
- Understand ground condition and requirement for protection of exposed services.
- Keep excavated ground and other materials away from the excavation.
- Have visible and secure edge protection as necessary to prevent people falling from height.

- Appropriate access and egress to/from the excavation.

3. Avoiding Underground Services

A written permit to dig/break ground must be in place before any works are carried out. There must be a responsible, authorised trained person in attendance at all times during the works. *(Refer to ES 1 Excavations for an "example of a permit to dig/break ground").*

Decision making

The hierarchy of risk control requires us to avoid and, where possible, to eliminate the need to dig completely. The below table offers some guidance on how to take a risk-based approach and should be considered at all stages of the works, i.e. planning,enabling design, construction, etc.

PAS 128 provides a robust methodology for delivering utility surveys in the UK. It focuses on levels of accuracy – referred to as Survey Category Types and the principles contained within the guidance should be referenced when designing, planning or undertaking any construction work.

HIERARCHY OF RISK CONTROL FOR AVOIDING DANGER FROM UNDERGROUND SERVICES	
Eliminate	• Redesign the planned route of the excavation to avoid the known services and identify risks. eg obstructions,stability, etc. • Isolate existing services during the planned activities – record isolation requests. • Use non-ground penetrating designs for columns, fencing, etc.
Reduce	• Use improved technology such as vacuum excavation and air lances/soil picks. • Use Directional Drilling/moling systems. • Physically protect exposed services from damage. • Use of hand excavation techniques.
Inform	• S.S.W including permit to break ground, trial holes. • Make sure that the responsible person supervising the excavation work has service plans and knows how to use them. • Ensure that all persons involved are briefed and fully understand the scope of works and hazards associated with the activity. Pre construction meetings must include Designers • Everyone carrying out the work should be familiar with safe digging practices and emergency procedures. • Look around for obvious signs of underground services, e.g. covers or patching of the road surface, signage, etc.
Control	• Employ Utility Mapping experts to identify services. • Use locating devices to trace any services with data logging capability (CAT4E or equivalent standard). Mark the ground accordingly – if a shown service cannot be found, stop and escalate. • Continue to scan – every 150mm. • Maintain safe distances from existing services. • Use insulated tools BS8020 – forks/picks are prohibited.
PPE	• Wear flame/ARC retardant PPE.
Discipline	• Use locating devices to trace any services with data logging capability (CAT4E or equivalent standard). Mark the ground accordingly – if a shown service cannot be found, stop and escalate.

4. Permit Process

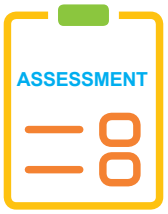
A Permit to Dig/Break Ground must be issued before starting any activity that breaks the surface of the ground (including all excavations, piling, drilling of boreholes and the insertion of rods or stakes into the ground) on Thames Waste Water sites or undertakings where there is the possibility of underground services.

Ensure the necessary plans, service drawings, equipment and materials are available on site to carry out the work safely – no works are permitted without the necessary information.

The authorised Permit Holder is responsible for and must supervise the work; all digging work is to stop if the permit holder leaves the worksite/excavation. If, for any reason, the work deviates from the original plan then:

1. STOP work

2. Escalate to the appropriate supervisor/manager



3. Carry out a Point of Work Assessment

4. Record any necessary changes or reissue the permit as appropriate

If necessary, request drawings directly from the relevant utility, rather than working from substandard drawings. Identify and locate all services before starting any works as drawings may not be 100% accurate.

In all cases, perform an assessment of the potential presence of underground services where excavation is required. Information on the location of underground services must be obtained during the risk assessment phase using the following sources:

- Pre-construction information from the client, designer or landowner.
- Utility drawings.
- Historical information.
- Physical evidence on the ground or overhead, including a visual assessment of buildings, cabinets, street furniture and other structures in the area that are likely to require a service supply of some kind.
- Past experiences of the workforce/local residents.
- Avoid the removal of thrust restraints to pressurised pipe lines,consult with the relevant utility complany.

When working on any Thames Water assets (excluding R&M,Developer Services) a TWOSA will be required,along with a permit to work and a permit to dig when breaking ground.

Electricity Mains

In line with HSG47 there is a legal requirement to isolate known live services prior to breaking ground.
The following mandatory steps must be taken for any known live electricity service encased in concrete prior to breaking ground or on the discovery of a cable encased in concrete the following steps must be undertaken:

- **Stop Work.**
- **Discuss with your line manager.**
- **Contact the Asset Owner (electricity provider) to request isolation.**
- **Retain a record of the request and action to be taken.**

Contact electricity companies as early as possible to allow them to isolate supplies. Plan project schedules to allow sufficient time for this to happen. If an HV cable cannot be isolated, agree on an alternative safe way of doing the work with the asset owner.

All high voltage cable routes MUST BE HAND DUG where practicable. Only use such power tools 500mm or more away from the indicated line of a service buried in or below a hard surface.

If not possible to hand dig, perform a full risk assessment that details additional controls/precautions and add them to the permit to work/safe system of work. *Record and file all requests for and confirmation of isolations.*

Gas Mains

Damage to gas pipes can cause toxic and explosive atmospheres. Various materials are used for gas pipes such as cast iron, steel and plastic. Modern plastic pipes are bright yellow. Cast iron gas pipes look similar to cast iron water pipes and therefore any cast iron pipe must be treated as a gas pipe unless evidence is available stating otherwise.

If heavy plant has to cross a gas pipe, keep the crossing points to a minimum and clearly mark them. Where necessary use sleepers, steel plates or a reinforced concrete slab where the service crosses unmade ground to protect assets from failure due to excessive additional load/ground movement.

Consult the gas company if welding or hot work is proposed adjacent to gas pipes or surface plant. Provide suitable and sufficient protection to prevent damage to plastic or coated pipes from heat sources.

Water Mains

Refer to *Essential Standard 26* for any excavation works on or around live mains.

5. Communication

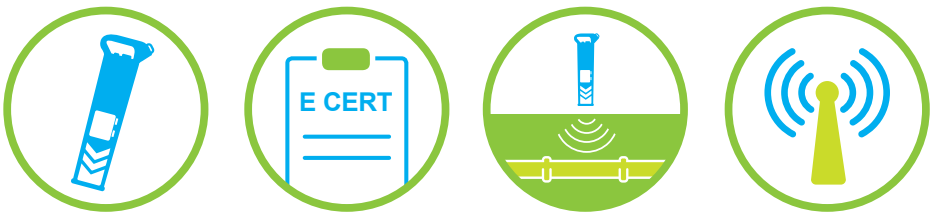
The responsible person in charge of the excavation must brief the permit detail to the work gang who are to complete the works and check that everyone understands. This must include the necessary control measures to be complied with, the associated Risk Assessment and method statements. Record the communication.

Before starting work, the responsible person must ensure that all control measures are in place, and that the precautions detailed in the permit have been taken.

6. Scanning Devices/Techniques

The **minimum** standard scanning tool shall comprise:

- CAT4E (or equivalent) with the minimum of
- Avoidance Mode (A)
- Genny Signal Locate (G)
- Power Signal Locate (P)
- Radio Signal Locate (R)
- Small Ø Locate Frequency
- eCert
- Dynamic Overload Protection
- Depth Estimation
- Genny (Signal Generator)
- Signal Clamp
- Live Cable Connection



You can use ground probing radar as support, but not as a replacement, if deemed necessary by a specific risk assessment for high risk areas such as where a high density of services are known or expected.

The nominated person must ensure all equipment is maintained and calibrated in line with manufacturer's instructions.

Re-scan the area at suitable intervals (150mm layers) when excavating.

7. Identification of Underground Services

Utility companies use a colour-coding scheme to identify apparatus and warning markers. However, it's important to remember that the apparatus may have been buried before the introduction of the universal colour scheme, therefore it is not always safe to assume, or expect, that the apparatus is compliant with the scheme. The current underground service colour-coding scheme is detailed below.

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	
Sewerage		Black	
Telecommunications	White or Grey	Light Grey or Black	Yellow with Blue Legend
Communications	Grey or Green		White with Blue Legend or Green and Yellow
Street Lighting Scotland	Purple	Purple	Yellow with Black Legend
Street Lighting England & Wales	Orange	Black	Yellow with Black Legend
Communications (Motorway) Scotland	Black or Grey	Black	Yellow with Black Legend
Communications (Motorway) England & Wales	Purple	Grey or Black	Yellow with Black Legend

8. Marking Up Underground Services

Note and mark the line of any identified underground services with waterproof crayon, chalk or paint on paved surfaces (using biodegradable paint or erasing residual markings as far as possible after excavation), or with **wooden pegs** in grassed or unsurfaced areas. Metal road pins are not permitted.

9. Trial Holes

After identifying the approximate location of underground services using all the available information, the authorised person must ensure trial holes are carefully dug by hand to establish the exact location and depth of the underground services throughout the proposed excavation area. Consider taking photos of the area before, after and during trial holing. A Trial Hole Record Sheet should be available to record the findings of trial hole activities.

Where trial holes are required to expose a service, the service should be positively identified. This means the service should be exposed so that:

- It is visible to establish the type, colour and material is consistent with the service expected;
- Its full circumference is visible to confirm the size is consistent with the service expected; and
- Adequate checks are made to ensure no new services have been laid adjacent to a redundant one e.g. by inducing a signal into the service.

It should not be assumed that underground services follow a straight line or are at a consistent depth between trial holes.

10. Training and Competence

A competent person must supervise all works around underground apparatus. Give people working in excavations clear instructions on how to work safely.

Thames Water requires the responsible person/ supervisor to have an appropriate level of competence (training and experience) to supervise any breaking ground activity - SSSTS/SMSTS (for visiting supervision), or IOSH Managing Safely and where undertaking any street works NRASWA training appropriate to their level.

In addition, all persons breaking ground will require:

- Familiarity specific training for service avoidance tools issue, e.g. CAT4E, Radiodetection, EZiCAT and knowledge of HSG47.
- Successful completion of a 1-day Thames Water approved Utilities Management Training (or approved and verified equivalent) and Cognisco (or equivalent) service avoidance assessment.

11. Monitoring and Supervision

Before starting work on a TW contract for the first time, an approved competent supervisor must be present to ensure that persons under their control understand the requirements of any relevant safe systems of work i.e. method statements and risk assessments, and that they have the appropriate plans, records, equipment and materials to carry out the work safely.

The lead person/operator and team must continually monitor the site for changing conditions throughout the duration of the work. Record all monitoring. Suspend work and perform or review a point of work risk assessment for any significant changes before continuing. Record changes on the permit, or reissue the permit as necessary. Install any additional safety controls before recommencing work. Check and record findings from data logging records regularly to ensure compliance regarding the accurate/regular use of service avoidance equipment.

12. Emergencies

Make emergency arrangements to deal with any contingency relating to the work. Identify emergency contacts (including telephone numbers) who must make contact with the Service Provider and the Emergency Services (where appropriate) in the event of a damaged service or other emergency.

Identify specific actions to deal with the danger relating to the type of service e.g. gas leaks would involve evacuating the immediate vicinity, prohibiting smoking, naked flames, or ignition sources, contacting the Service Provider, contacting the Police and Fire Service, advising local occupants and generally assisting as directed by the Service Provider or Emergency Services.

Consider first aid arrangements where appropriate. Instruct all personnel to be aware of the actions needed in the event of any emergency including any degree of damage to a service.

13. Incident/Near Miss Reporting and Investigation

Report all underground apparatus strikes through Safeguard. Perform a full investigation on any strike on electrical services and conduct an MD led call within 24hrs. Perform an executive incident review for all significant incidents with the potential for loss or injury. Following a service strike the team must undergo a drug and alcohol test at the very fist opportunity following the incident