Underground Services Standard

(SHEMS-STD-GR-059)

Unitas
Stoke-on-Trent Ltd.

Contents

1 Introduction 4
2 Scope 4
2.1 Definitions 4
3 Process 5
5
4 Unitas Requirements 6
4.1 Dangers from underground services 6
4.2 Planning 6
4.2.1 Hierarchy of risk management control 6
4.2.2 Information at tender stage 6
4.3 Design and pre-construction 7
5 Construction and Transient Works 7
5.1 Responsibilities and competencies 7
5.1.1 Supervisors-Construction 7
5.1.2 Supervisor-Transient 7
5.1.3 Lead Ganger-Transient 8
5.1.4 Service Coordinator 8
5.1.5 Service Locator 8
5.1.6 Excavation team 9
5.1.7 Utility mapping companies 9
5.2 Service provider's information 9
5.2.1 Service provider drawings 9
5.2.2 Master services records 10
5.2.3 Responsive Maintenance 10
6 Excavation 10
6.1 Identification of underground services 10
6.2 Permit to dig 11
6.2.1 Construction 11
6.2.2 Transient Workers 12
6.3 Restriction and exclusion zones 12
6.3.1 Restriction zone 12
6.3.2 Exclusion zone 13
6.4 Positive identification and trial hole excavation 13
6.5 Safe digging 14
6.6 Exposed services 15
6.7 Backfilling underground services 15
7 Tool, equipment and PPE 15

8 Removal of services 15
9 Emergencies 16
Appendix 1: Guidance to Permit to Work 17
Appendix 2 – PAS 128: 2014 Specification for underground utility detection, verification and location 18

1 Introduction

The purpose of this procedure is to provide a process that ensures that work in proximity to underground services is planned and carried out safely, including identification of services, assessment, control, supervision, monitoring and review.

2 Scope

The scope of the SHEMS covers all persons, workplaces and operations in Unitas.

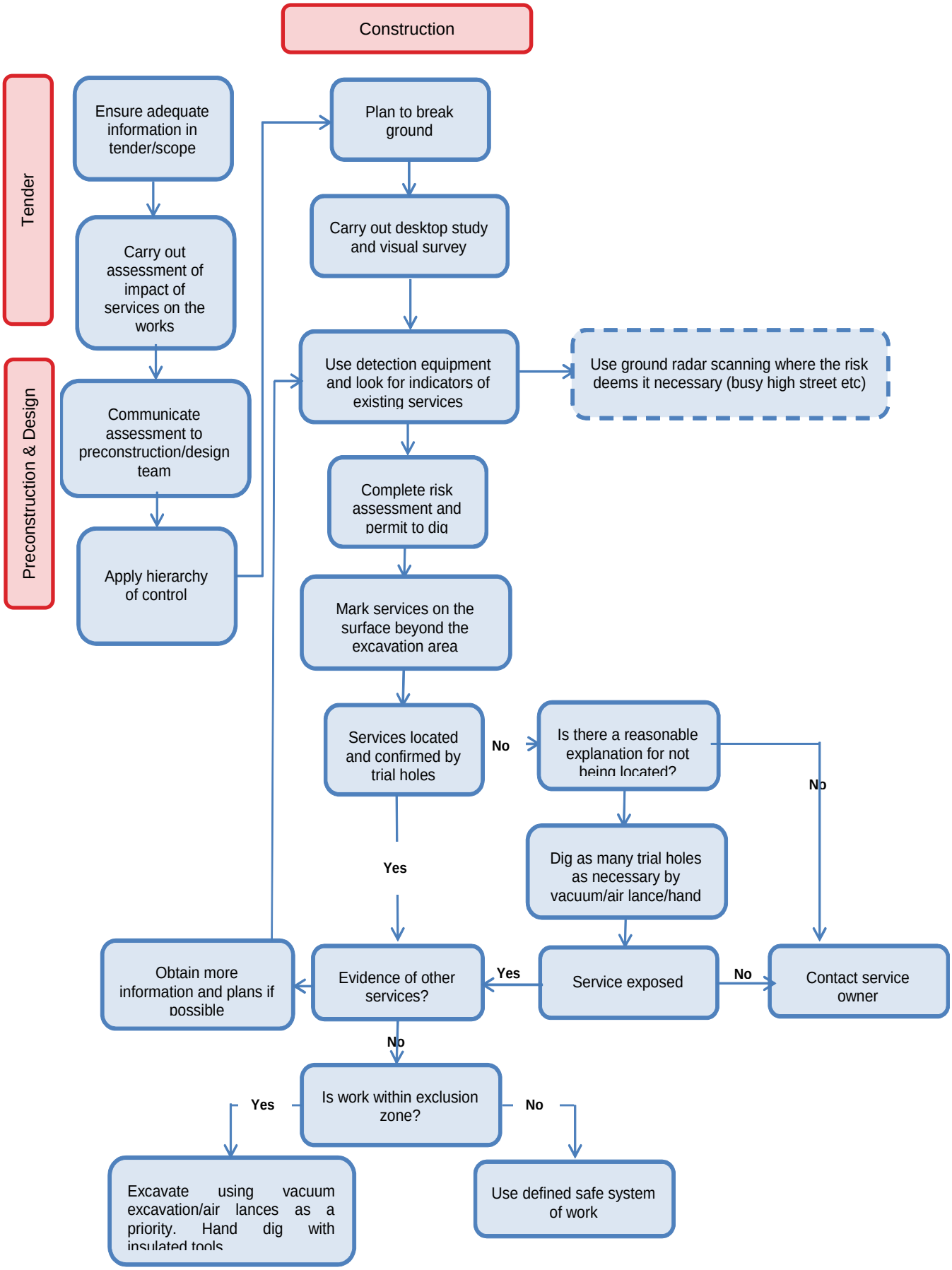
Exceptions will be documented through a SHEMS Appendix B process (SHEMS-FOR-GR-999), jointly authorised by the Director Responsible for coordinating SHE.

Unitas SHEMS Manual (SHEMS-STD-GR-003) provides guidance and signposting for the compliance, implementation, monitoring, audit and review of our systems, demonstrating continual improvement.

2.1 Definitions

Underground Service	Means all underground pipes, cables and equipment associated with the electricity, gas, water (including piped sewage) signalling and telecommunications industries. It also includes other pipelines which transport a range of petrochemical and other fluids. They may emerge into the open or above ground for short sections.
Service Owner	The operator in control of the underground utility (e.g. Owners, Distribution Network Operators etc.) as identified on utility plans
Detection equipment	Cable Avoidance Tool (CAT), Signal Generator (Genny), ground penetrating Radar (GPR) etc.
Competent Person	In the context of this document, a person who has acquired through training, qualification and experience, the knowledge and skills to carry out the identified role.
Responsive Maintenance	Work which is carried out in response to a request from a client/service provider to maintain or repair a service, which is not part of a scheduled work activity. This could include emergency work
Mechanical Excavation	The use of any machine excavator, pneumatic, hydraulic or mechanical breaker, piling and drilling rig, hand-held or machine mounted powered breaker, etc.
Mechanical Excavation Service Wheel	Identifies proximity of mechanical equipment to underground services.
Restriction zone	The horizontal distance of 1.0m from either side of the outside dimensions of any buried service and extends to the surface in which additional controls must be applied.
Exclusion zone	The horizontal distance of 0.5m (minimum) from either side of the outside dimensions of any buried service and extends to the surface within which mechanical excavation is not permitted.

3 Process


Construction
Tender
Preconstruction & Design
Ensure adequate information in tender/scope
Carry out assessment of impact of services on the works
Communicate assessment to preconstruction/design team
Apply hierarchy of control
Plan to break ground
Carry out desktop study and visual survey
Use detection equipment and look for indicators of existing services
Use ground radar scanning where the risk deems it necessary (busy high street etc)
Complete risk assessment and permit to dig
Mark services on the surface beyond the excavation area
Services located and confirmed by trial holes
No
Is there a reasonable explanation for not being located?
No
Dig as many trial holes as necessary by vacuum/air lance/hand
Yes
Obtain more information and plans if possible
Evidence of other services?
Yes
Service exposed
No
Contact service owner
No
Is work within exclusion zone?
Yes
No
Excavate using vacuum excavation/air lances as a priority. Hand dig with insulated tools
Use defined safe system of work

4 Unitas Requirements

4.1 Dangers from underground services

Work on or around underground services is recognised as a hazardous activity. As well as the risk of death or serious injury other risks associated with the activity include; loss of service to businesses and public, delays to the project, reputational harm and significant financial costs.

Common causes of accidents and incidents due to service damage fall into five broad categories; Inadequate planning; quality of information received and prepared; training and competency at all levels; inadequate safe systems of work and non-compliance with procedures.

4.2 Planning

4.2.1 Hierarchy of risk management control

All work activities that may be impacted by underground services must be planned in accordance with the following hierarchy of control

HIERARCHY OF RISK CONTROL FOR AVOIDING DANGER FROM UNDERGROUND SERVICES	
Eliminate	▪ Redesign the planned route of the excavation to avoid the known services ▪ Divert the planned route of the new services to avoid existing ▪ Isolate existing services during the planned activities ▪ Use non-ground penetrating designs for columns, fencing
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. ▪ Supervision and monitoring
Control	▪ Employ Utility Mapping experts to identify services ▪ Maintain safe distances from existing services ▪ Use insulated tools
PPE	▪ Wear flame retardant PPE
Discipline	▪ Discipline - Mentor, retrain, understand why standards and controls are not followed

4.2.2 Information at tender stage

An individual within the tender/bid team should ensure the following information is requested early and recorded (SHE Considerations SHEMS-FOR-GR-084) in the tender stage if not already made available:

- Up to date service plans for the area of activity (Ideally 1:2500 scale, not less than three months old).
- Results of any surveys and trial holes carried out within the area of activity.
- The relevant asset owner contact details.
- Special requirements and restrictions, for example, minimum exclusion distances from operational services, imposed by asset owners.
- The requirements/restrictions/timescales for isolations or diversions.
- As early as possible a detailed assessment should be made of the routes of existing and proposed services. The assessment should identify their impact on the planned work and detail where risks can be avoided or mitigated using the hierarchy of control.
- All information collected and project risk assessments (SHEMS-FOR-GR-085) carried out at tender stage should be communicated to the construction team prior to work commencing on site.

Where Unitas is the Client, the above information should be included as applicable in any tender documentation.

4.3 Design and pre-construction

Design and preconstruction planning should identify the presence of underground services, identify measures to avoid associated risks, or if that is not possible, to reduce or control risks. The assessment will review the planned works in line with the hierarchy of control and also establish existing and planned routes of underground services, the coordination of utility contractors and temporary support requirements.

Where there are underground services in proximity to construction works, contact the designer and discuss possible options for redesign that will eliminate the requirement to excavate within or near the exclusion zone area.

Where redesign has not been granted, contact the Service Provider and request isolation or re-routing of the service.

Where isolation is carried out written confirmation should be requested from the Service Provider. Where isolation is not carried out (and even where isolation has been confirmed) all underground services should be treated as live.

Where up to date utility plans for the area of activity have not been provided utility plans must be obtained from the asset owner. Utility plans should be requested to be in colour, no less than three months old and in a condition that enables them to be accurately interpreted by end users. Unclear or out of date drawings must not be used.

5 Construction and Transient Works

5.1 Responsibilities and competencies

All persons engaged in activities covered by this procedure must be competent and adequately trained for the task being undertaken. All persons must hold the relevant CSCS, CPCS NRSWA and EUSR qualifications as applicable to the task. Specific training regarding underground services must be evidenced to suit the requirements detailed below.

5.1.1 Supervisors-Construction

An authorised supervisor must be present at all times when excavation is taking place. This can be an individual overseeing a number of excavations concurrently. The minimum qualification for all persons supervising excavation work on Unitas sites is the CITB SSSTS or a UKCG recognised equivalent. In addition, the supervisor must be trained and competent regarding:

- The risks associated with underground services and typical causes of service damage.
- Unitas standards and minimum standards related to underground services and HSG 47.
- Understanding utility plans, service identification techniques and safe digging practices.
- The action in the event of an emergency

The supervisor must ensure that:

- The conditions of any permit to break ground/excavate are followed.
- Safe digging techniques are applied.
- The ground is scanned for services as work proceeds.
- Exposed services are supported and protected as necessary.
- Work is stopped if circumstances change.

5.1.2 Supervisor-Transient

The role of a transient Supervisor is to oversee several gangs at any one time as they respond to both reactive and planned works. The minimum qualification for all persons supervising gangers completing excavation work on Unitas sites is the CITB SSSTS or a UKCG recognised equivalent.

In addition, the supervisor must be trained and competent regarding:

- The risks associated with underground services and typical causes of service damage
- Unitas standards and minimum standards related to underground services and HSG 47
- Understanding utility plans, service identification techniques and safe digging practices
- The action in the event of an emergency

The supervisor must ensure that their gangs work safely and follow Unitas and HSE 47 requirements including:

- Safe digging techniques are applied
- The ground is scanned for services as work proceeds
- Exposed services are supported and protected as necessary
- Work is stopped if circumstances change

5.1.3 Lead Ganger-Transient

The responsibility for issuing a Permit to Dig on transient works is delegated to the Lead Ganger. The Lead Ganger (issuer) will issue the Permit to Dig to a member of his team (acceptor). The Lead ganger must be present at all times when excavation is taking place and is able to be part of the active team. The lead ganger must be trained and competent regarding:

- The risks associated with underground services and typical causes of service damage
- Unitas minimum standards, gang pack requirements related to underground services and HSG 47
- Understanding utility plans, service identification techniques and safe digging practices
- The action in the event of an emergency

The lead ganger must ensure that:

- The conditions of any permit to break ground/excavate are followed.
- Safe digging techniques are applied.
- The ground is scanned for services as work proceeds.
- Exposed services are supported and protected as necessary.
- Work is stopped if circumstances change

5.1.4 Service Coordinator

A Service Coordinator shall be appointed in writing (Appointment of Service Co-ordinator SHEMS-FOR-GR-012) for each construction site or Services contract/depot to implement and oversee the processes for avoiding danger from underground services.

The competence of the Service Coordinator will be based upon training and experience of working with underground services; knowledge of service provider systems and procedures; understanding underground service drawings; understanding Unitas procedures; knowledge of underground service location techniques; understanding the dangers associated with underground services including knowledge of the consequence of cable strikes.

5.1.5 Service Locator

Only suitably trained and competent personnel shall be engaged to carry out underground service location/surveys using the specified detection equipment. The training must include:

- Understanding of Unitas procedures and full knowledge of the permit to dig system.
- Use of avoidance equipment,
- Interpretation of utility drawings, line search documents and permit to dig.
- Methods of marking located underground services
- Knowledge and understanding of HSG (47)
- Safe digging techniques
- Identify the dangers and hazards associated with underground services

5.1.6 Excavation team

Only suitably trained and competent personnel shall be engaged to undertake excavation work in the proximity of underground services. Relevant information and instruction must be produced and communicated to all persons involved prior to any work starting. Those tasked with excavating around underground services must be competent, adequately trained and briefed for the task. As a minimum, training should include:

- Use of avoidance equipment,
- Interpret utility drawings, line search documents and permit to dig to identify underground services
- Knowledge and understanding of HSG (47)
- Safe digging techniques
- Identify the dangers and hazards associated with underground services

5.1.7 Utility mapping companies

Utility Mapping companies must be members of The Survey Association and registered to ISO 9001 which includes underground service surveying as part of their registered scope – has this been procured?

British Standards Institution PAS 128, “Specification for underground service detection, verification and location” should be used to define the scope and specification when contracting a utility mapping company to carry out survey service work. See Appendix 2: PAS 128: 2104 Specification for underground utility detection, verification and location.

Existing service drawings should be provided to the mapping organisation in advance. Unitas should have a representative on site when scanning is taking place, The location of known future excavations should also be communicated to the mapping company as they will reduce the dimension between sweeps to provide better data in that area. Ideally they need to mark services on the ground and provide an electronic drawing showing locations.

5.2 Service provider’s information

Planning is essential to find alternative routes, or if this is not possible, make arrangements for the service to be made dead. Service providers are likely to wish to attend site for a request to make dead. Service providers should respond to any reasonable request as soon as possible.

Where a service has been made dead all parties involved must liaise until the work is finished before the service is re-energised utilising a permit-to-work.

Work with live services should only be conducted where it would be unreasonable to make the service dead. A safe working method should then be adopted, with advice as necessary, from the service provider.

5.2.1 Service provider drawings

At contract commencement, site management must determine if there are any underground services. During the tender handover the tender team should make specific reference to information obtained at tender stage. The Service Provider (statutory authority or service owner) must be contacted and up to date, legible drawings obtained, showing the location of all underground services. They must be understandable, readable, no more than 3 months old, to a suitable scale and where possible in colour or appropriately

marked as to what the service is. An alternative source is www.**linesearch**beforeudig.co.uk

In addition to obtaining the drawings from the service providers, a "line search before you dig" search should be carried to determine if any other services are in the area that have not been identified by other means.

5.2.2 Master services records

A detailed schedule of all charted underground services should be produced, updated where appropriate and maintained on file throughout the duration of the project. On fixed sites, a master services plan should be prepared. This must be updated and maintained throughout the project and displayed in a prominent position. The master services plan should include:

- The type and level of ground penetrating radar survey completed
- The presence of known underground services including known position of isolation valves and stop taps
- Known depths of any existing services plus any safe distances to be maintained.
- Trial-hole results
- The location of any open permits.

It is the responsibility of the Service Coordinator to ensure that the master services drawing is updated with as built information as the work proceeds.

5.2.3 Responsive Maintenance

In the event of emergency repair works being required, Unitas shall ensure that facilities are in place to provide personnel with up to date service drawings prior to any excavation works being carried out. A safe system of work is documented for each contract that reflects the local process for providing service drawings. Where it is not possible for those undertaking the excavation work to obtain information the work should be carried out as though there are buried services in the area.

6 Excavation

6.1 Identification of underground services

Detailed surveys of the work area must be carried out prior to work commencing. The intention of this survey is to identify the position, depth and number of underground services present. When using external utility mapping companies the scope of survey and expectations must be defined. The correct level of survey to suit the project conditions and level of risk that exists should be requested and specified in line with PAS 128, "Specification for underground service detection, verification and location".

Where work activities involve penetrating the ground at or below surface level, the Service Coordinator must ensure that up to date records have been obtained of the services in the area. Service Providers should be contacted to verify the presence of underground services and to provide appropriate plans. The use of a "one call" service may be considered to obtain comprehensive information on services within the project footprint.

Obtain assistance from underground service owners where required to identify and mark the exact location of their utilities. Some service owners may provide assistance in locating their services in some areas. Where the Service Provider does not provide this service, then the Service Coordinator must arrange for a trained competent person to scan the work area to positively identify the location of the underground services. The use of underground utility survey companies may be considered to provide a comprehensive survey.

The scanning equipment must be appropriate to the type and complexity of the underground services and those using the equipment must be trained in the specific equipment being used. The standard equipment for Unitas is specified as eCat4+ for locating, and the RD7000 for locating/surveying.

Local knowledge of a particular site or area of land (for example, from the landowner, nearby houses etc.) may be needed to assist in establishing the existence of any underground utility that might not otherwise be

documented.

Arrangements must also be made for competent individuals to visually scan the work area and surrounding areas for visual signs of the presence of uncharted services (nearby dwellings, street lighting cables, highway lighting, illuminated signs and traffic control systems, inspection chamber covers, drainage access points and rodding eyes, roadside cabinets (as used by BT and other telecommunications providers) and roadside (verge) marker posts (these usually indicate the approximate distance from the post to a service).

Once underground services have been identified, the ground surface above the service must be highlighted with markers, tape, or waterproof paint. The colour used to mark the service should be identified and be specific to the marking of underground services. This will avoid confusion with other markings.

The marking of services should not be restricted to areas where excavating is planned as underground services can be damaged by plant and vehicle movements or vibration from piling or demolition.

Utility companies use a colour-coding scheme to identify apparatus and warning markers. However it is important to remember that the apparatus may have been buried prior to 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

6.2 Permit to dig

6.2.1 Construction

Where work activities involve penetrating the ground at or below surface level the Supervisor shall control the Permit to Dig process and ensure through liaison with site management, service coordinator (as

appropriate), competent individuals are appointed to carry out service location and completion of the permit to dig.

The “Permit to Dig” (SHEMS-FOR-GR-059) cannot be authorised and accepted by the same person. The Supervisor/Service Coordinator is responsible for ensuring the permit system is correctly applied. On fixed projects, the Supervisor/Service Coordinator shall authorise the Permits to Dig. See guidance notes Appendix 1 ‘How to complete Permit to Dig (Construction)

All within the working gang must be briefed on the requirements of the permit. The “Permit to Dig” is to be issued to personnel involved in the works, (together with a specific sketch/drawing depicting the location of the services, service valve housings/covers), specifying the precautions to be taken and the safe methods to be adopted within the timescale defined in the permit.

Where underground services are identified (noted on services plans, from physical surface evidence or by detection equipment) within or near the work area, these must be ‘positively’ confirmed by trial holes prior to any works commencing.

Once all known underground services have been ‘positively’ confirmed, works may then continue under the controls identified in the permit.

6.2.2 Transient Workers

Where work activities involve penetrating the ground at or below surface level the Service Coordinator will provide guidance on drawings, scales and cable avoidance practice. Due to the volume of works carried out within the transient work-stream the role of the service coordinator will be to ensure all drawings services are maintained up to date and to provide guidance and assistance to the supervisors and dig teams. The service coordinator will review all of the named individuals (include gang leaders) who are permitted to issue permit to dig forms on a regular basis.

The responsibility for issuing a Permit to Dig on transient works is delegated to the Lead ganger. The Lead Ganger (issuer) will issue the Permit to Dig to a member of his team (acceptor). The Lead ganger must be present at all times when excavation is taking place and is able to be part of the active team

The “Permit to Dig” (SHEMS-FOR-GR-059) cannot be authorised and accepted by the same person. The Service Coordinator is responsible for ensuring the permit system is correctly applied.

The acceptor must be a competent and trained in excavation and underground services. Both the acceptor and other operatives/s must endorse the permit. Both the issuer and acceptor must ensure compliance with the permit and challenge non-conformances.

All within the working gang must be briefed on the requirements of the permit. The “Permit to Dig” is to be issued to personnel involved in the works, (together with a specific sketch/drawing depicting the location of the services, service valve housings/covers), specifying the precautions to be taken and the safe methods to be adopted within the timescale defined in the permit.

Where underground services are identified (noted on services plans, from physical surface evidence or by detection equipment) within or near the work area, these must be ‘positively’ confirmed by trial holes prior to any works commencing.

Once all known underground services have been ‘positively’ confirmed, works may then continue under the controls identified in the permit.

6.3 Restriction and exclusion zones

6.3.1 Restriction zone

When working near underground services a minimum 1.0m restriction zone shall apply. (3.0m for gas > 2 bar). Within the restricted zone:

- The hierarchy of risk set out in sub paragraph 4.2.1 must be followed.
- Preference shall be given to vacuum excavation over other digging methods.
- Trial holes must be excavated to positively locate underground services within this zone.

6.3.2 Exclusion zone

For underground services the exclusion zone is defined as the horizontal distance from either side of the outside dimensions of any buried service and extends to the surface.

The minimum exclusion zone is 0.5m.

The higher risk the service presents, the wider the exclusion zone should be. Within the exclusion zone mechanical excavation is not permitted. (Refer to the Mechanical Excavation Service Wheel for more details on exclusion zones).

For medium/intermediate/high pressure gas mains do not mechanically excavate within 3 metres of the main Intermediate gas mains – If you need to excavate within 3m contact the service provider on 0800 688 588 prior to commencing work.

High & Very High Pressure – Formal consent is always required prior to excavating and a formal agreed safe system of work established.

The service provider must be contacted prior to carrying out any construction activity within 30m of high pressure steel pipelines containing petroleum products. This distance increases to 400m where the use of explosives is planned.

These are the minimum requirements. Check with the local regional provider or asset owner as additional or stricter requirements may be in place.

6.4 Positive identification and trial hole excavation

In order to establish that any work requiring penetration of the ground is within or outside of- the exclusion zone, all underground services within the Restriction Zone must be positively confirmed to establish the exact locations and depths under the control of the Permit to Dig.

Once the underground service has been located, trial holes must be carefully excavated, using vacuum excavation, air lances and if required hand dug using insulated tools.
Trial holes must be carried out to identify the location of underground services prior to any mechanical excavation.

The Service Provider should be contacted to request isolation of the service. Do not assume that this will not be granted. Where isolation is carried out written confirmation should be requested from the Service Provider. Where isolation is not carried out (and even where isolation has been confirmed) all services should be treated as live.

All personnel involved in the activity must be briefed in the presence of the services, the dangers associated with the services and the controls to be applied whilst excavating, or exposing the services.

The number of trial holes must be sufficient for the scope of the works particularly where services such as plastic pipes will not be detected by conventional service locators. Excavating the trial holes should commence approximately 0.5 metres to the side of the line of the service.

Where there is a road, pavement, or other hard surface, a jackhammer may be used to break through the surface. Great care must be taken to avoid over penetration and power tools must never be used over the indicated line of the service, nor within 0.5 metres of the service. Once the hard surface has been broken, the use of power tools must cease and hand digging, using a spade or shovel should commence. Insulated tools must be used when the work involves hand digging around electrical services. The hand dig should be vertical to the side of the service until the anticipated depth is reached then across until the service is

exposed

If the services are buried in concrete, work must not commence until a detailed system of work (including isolation where possible) has been agreed with the Service Provider.

All operatives involved in trial hole excavations must be provided with and wear full cover flame retardant coveralls conforming to EN ISO 11612 (in a high viz. spec.) to minimise the risk of a burn should uncharted services be encountered or charted services be accidently damaged. All outer clothing must be flame retardant.

All operatives involved in trial hole excavations must be provided with and use electrically insulated tools to minimise the risk of electrocution should uncharted services be encountered or charted services be accidently damaged.

Regular monitoring must be undertaken by the relevant supervisor to ensure that the work is being carried out in accordance with the permit controls.

Once a service is exposed, it must be physically identified by a Competent Person, and if necessary the Service Provider should be contacted to identify their service. When a service will remain exposed, it must be identified (marker) and adequately protected, from physical damage. Services across a trench must be adequately supported; the Service Provider should be contacted to confirm the degree of support.

6.5 Safe digging

Excavation methods such as vacuum excavation and the use of water or air pressure jet systems to loosen and dig into soil must be considered and where practicable, implemented. Appropriate safety margins (as specified by the relevant Service Provider) for each type of service must be implemented and recorded on the Permit to Dig. No mechanical excavation can take place within the exclusion zone.

Where the line and level of the service cannot be confirmed with confidence for its full length, mechanical excavation is not permitted and further trial holes under the control of the “Permit to Dig” must be carried out.

In situations where excavations are to be carried out and it has not been possible to isolate or adequately protect an underground service, and where there is the potential for an operative, whilst hand digging, to strike an electric cable or gas pipe, then the operative must;

- wear full cover flame retardant coveralls conforming to EN ISO 11612 in a high viz. specification to minimise the risk of a burn should the service be damaged;
- use electrically fully insulated tools provided; .
- not use forks as these are prohibited;
- priority must be given to air lances and vacuum excavation.

Frequent and repeated use should be made of scanning equipment, as service locations and its associated equipment (such as a junction box, branch, or siphon valve) are likely to become more accurate as ground cover is removed. A close watch must also be kept to identify and report any signs of soil variances or warning marker tapes during the course of the work.

If the services are buried in concrete, work must not commence until a detailed system of work, including isolation, has been agreed with the Service Provider.

Regular monitoring must be undertaken by the relevant supervisor to ensure that the work is being carried out in accordance with the permit to dig controls.

When a service will remain exposed, it must be identified (marker) and adequately protected, from physical damage, consideration for the need of secure fencing/barriers if to be left open unattended/overnight. As site closes down for the day, consider and ensure the risk of excavation banks collapsing from wheeled vehicles in close proximity is prohibited/prevented. Services across a trench must be adequately supported; the Service Provider should be contacted to confirm the degree of support required.

6.6 Exposed services

All exposed services must be protected from damage. The necessary equipment to support or cover cables, ducting or clay pipes within an excavation must be provided.

If HV electrical cables are exposed consider covering them with fire retardant mats or blankets to prevent injury to workers within the excavation in the event of unexpected failure of the cable.

6.7 Backfilling underground services

Backfilling must be effectively planned and executed to ensure that services are not damaged during the backfill process, or at a later date, due to improper backfilling technique. Where the backfill requirements are not clearly identified in the specification, the Service Provider should be contacted to discuss and agree the backfill material and technique. Where applicable, a Supervisor and Operatives trained and certificated under The New Roads and Street Works Act should be appointed to conduct the work.

7 Tool, equipment and PPE

All hand excavation gangs should be equipped with insulated tools and an air lances to assist in disturbing the ground without damaging cables and pipes.

The detection equipment must be either eCAT4+ for service locating or RD 7000+ for initial survey/mapping work. It must have the data logging, strike alert and dynamic overload protection features enabled.

The detection equipment must be provided as a minimum with:

- A compatible transmitter
- A Genny Clamp
- Live plug connector
- A direct connection lead, an earth extension lead, an earth stake and a high-strength neodymium magnet

Full cover flame retardant coveralls to EN ISO 11612 must be worn where excavations are to be carried out and it has not been possible to isolate or adequately protect an underground service, and where there is the potential for an operative, whilst hand digging, to strike an electric cable or gas pipe. Outer garments must be flame retardant. The flame retardant properties must not degrade when washed (Protal or similar).

8 Removal of services

Where the scope of the works involves the removal of existing services, then in addition to compliance with the foregoing conditions, the undernoted must also be implemented. Under no circumstances should anyone attempt to break or sever any service until this procedure is fully implemented.

The Service Coordinator must be appointed to manage the activity and to ensure that all of the information used is verified as being correct.

The Service Provider must be contacted and a site meeting convened at which a record must be made to confirm the under noted:

- The extent of the service to be removed.
- The timescale of the activity.
- The means of verifying isolation e.g. spiking cables.
- The method of removal.

The Service Provider must be requested to conduct the removal of the service. If this is agreed then it must be recorded by the Service Provider and a copy retained by the Unitas Project manager/supervisor.

If the Service Provider will not remove the service then the following requirements must be applied:

- The location of the service must be confirmed.
- The Service Provider must be requested to isolate the service and confirm isolation by completing the relevant section on the Service Provider's Service Removal Permit or similar.
- The timescale of the work must be recorded.
- The method of removing the service must be recorded.
- The Competent Person completing the Service provider's Service Removal Permit or similar must confirm that all controls have been applied before commencing the removal of the service.
- The person responsible for the work must receive a copy of the Service Provider's Service Removal Permit.
- The Service Provider will be requested to witness the removal of the service.

Once the aforementioned conditions have been met, the service may be removed. Once the service has been removed the Competent Person will confirm this on the Service Provider's Service Removal Permit, which will be maintained on file, together with the appropriate Permit to Dig.

9 Emergencies

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

Specific actions must be identified 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.

First aid arrangements must be considered and made readily available where appropriate.

All personnel must be instructed and be aware of the action to be taken in the event of any emergency including any degree of damage to a service.

Appendix 1: Guidance to Permit to Work

Excavations require special precautions to be taken before and during this potentially hazardous operation. The Permit to Locate and Permit to Dig should be prepared by a Unitas responsible person who is familiar with the work procedures, the hazards involved and the precautions to be taken. The Permits should be used as an integral part of the safe system of work.

Part 1 Permit to Locate

Complete Part 1 detailing;

- Work location
- Unitas / Contractor Personnel
- Cable avoidance tool to be used, together with the name and proof of training of the operator
- The attached drawings relating to the ground
- Specific information relating to the task
- Reference to the Risk Assessment & Method Statement

Confirmation of Part 1 briefing;

The Unitas responsible person preparing the permit must issue it to the trade supervisor and ensure it is signed by;

- Trade Supervisor
- Machine operator (if applicable)
- CAT operator / Banksman

Part 2 Permit to Dig

Safe Digging Process

This section should be completed by the Unitas responsible person, following evidence that the Part 1 Permit requirements have been completed satisfactorily. The Part 2 Permit must only be completed following a review of the on-site conditions by the Unitas responsible person;

- Select chosen digging method for the excavation works.
- Complete the excavation assessment to ensure adequate equipment is on site prior to continuation.

Confirmation of Part 2 Permit briefing

This section must be signed by the Unitas responsible person preparing the Permit to Dig confirming that, having implemented all necessary precautions, the work can proceed.
This permit must be signed by;

- Trade Supervisor
- Machine operator (if applicable)
- CAT operator / Banksman

Completion of the works (Permit closure)

This part is to be completed by the supervisor, stating the date and time when the work has been completed or suspended and left in a safe condition, to include a check to ensure that any residual holes or excavations are guarded and signed where appropriate. This should then be countersigned by the Unitas responsible person and filed for record purposes.

This Permit is to be closed each day. Should works be incomplete, the area is to be fenced off using 2m Heras fencing double clipped to prevent unauthorised access. Part 2 of this permit is to be reissued the next day following a review of site conditions.

NOTE: The original Permit to Locate and Permit to Dig should be held by the Unitas responsible person and a copy carried by the supervisor and the operative undertaking the work. The supervisor must acquaint all relevant persons under his control of the Permits and instruct them accordingly.

Appendix 2 – PAS 128: 2014* Specification for underground utility detection, verification and location

PAS 128: 2014 – Publically Available Specification for underground utility detection, verification & location