Street Works UK: Publications Volume 4 – Guidelines for the planning, installation, and maintenance of Utility apparatus in proximity to Trees

Issue 3: 2026

Who are Street Works UK?

Street Works UK is the trade association representing utilities and their contractors on all street works issues. Our membership comprises around 70 companies across all five utilities: water, wastewater, gas, electricity and telecoms/broadband. Our members include leading utility companies like Cadent Gas, United Utilities, National Grid, Virgin Media O2 and Openreach, with strong representation also within the devolved nations. On average the annual collective capital investment by our members in the UK is £14 billion.

Summary:

- Trees provide essential environmental and amenity benefits to society. As complex living organisms, trees are vulnerable to damage or destruction from infrastructure works.
- Many trees are legally protected by a Tree Preservation Order (TPO), by being located within a Conservation Area (CA), or both.
- Legal protection applies equally to both the above-ground parts (trunk, crown, branches) and the below-ground parts (root system) of a tree.
- Destroying a protected tree can result in a fine of up to £20,000 in a Magistrates' Court. In more serious cases referred to the Crown Court, fines may be unlimited.
- Statutory Undertakers are responsible for maintaining and upgrading overhead and underground infrastructure, which may bring them into close proximity with trees.
- They have a legal duty to take all reasonable steps to avoid damaging or killing trees — regardless of whether the trees are protected by a TPO or located in a CA.
- At a minimum, "reasonable steps" include notifying the Local Authority Arboriculturist (LAA) of intended works and adhering to the procedures and best practices outlined in this document. Some Local Authorities may also require an Arboricultural Method Statement (AMS) for approval before work begins.

- While certain exemptions exist for Statutory Undertakers under TPO and CA regulations, these are limited. Undertakers may still be prosecuted if their actions result in tree damage or destruction.

- Even if a tree is not legally protected, the tree owner (often the Local Authority) may pursue criminal damage charges against those responsible for harmful works.

- To minimise legal and environmental risks, it is essential to follow the guidance in this document.

Contents:

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Background

The statutory right of undertakers (i.e. those undertaking the installation of key utilities, or utilities companies) to carry out works within the public highway to provide and maintain their apparatus dates from the mid-19th century. There are no statutory obligations governing the position or depth at which apparatus should be laid within the highway. The following guidelines should therefore be adhered to wherever practicable.

The New Roads and Street Works Act 1991, as amended by the Transport Act 2000, the Traffic Management Act 2004, the Transport (Scotland) Act 2005 together with the Street Works (Northern Ireland) Order 1995, sets out the legislative requirements to be adopted during the installation, repair and maintenance of apparatus in roads and streets.

Scope

(i) Trees (including shrubs and hedges) play an essential role in the environmental and visual amenity of both rural and urban landscapes. They are a significant component of biodiversity and form part of nature-based solutions to combat the effects of climate change. They may take decades to grow but can be destroyed in minutes. Wherever they are growing, whether in public footpaths, private gardens or rural verges they require space for the adequate development of their root systems and to allow the branches to develop an attractive and natural shape.

(ii) Modern society expects a multiplicity of apparatus (electricity, gas, water, sewage, telecommunications and cable television) each of which requires an extensive distribution network, both above and below ground. These networks also need space, and they are frequently under tight constraints regarding their alignment and how they are positioned.

(iii) The space available for both trees and apparatus is often very restricted, and they are frequently forced to share the available space, both above and below ground. Where they are in close proximity, there is the potential for either the tree or the apparatus to be subject to damage. To successfully co-exist precautions must be taken to minimise the risk of damage to both trees and apparatus based on the technical guidance obtained from this document and where appropriate, further advice from local authority arboriculturists.

(iv) Legislative mechanisms for ensuring that existing trees (including shrubs and hedges) are safeguarded already exist (see sub-section 7 – 'Legislation'). References to legislation relate to the whole of the United Kingdom (UK) but variations between countries may occur. They seek to provide constructive advice on how to minimise damage to trees by undertakers (utilities) and to utility apparatus by trees and will be helpful to utility companies, contractors, arboriculturists, highway engineers, developers and planners. The guidelines have been prepared in collaboration between representatives of the utilities, the Arboricultural and urban forestry professions. As with all guidelines, their interpretation and application should be always complemented by common sense. However, expert guidance on specific instances should be sought from the appropriate utility, local authority or arboriculturist. The emphasis throughout this document is on the need for local liaison, communication and collaboration.

(v) While all trees possess some amenity value, those that possess significant amenity value may very well be subject to Tree Preservation Orders (TPOs). Trees protected by a TPO must not be wilfully damaged or destroyed and cannot be cut down, uprooted or pruned without the consent of the local planning authority. In addition, any tree that is growing within a Conservation Area will be subject to similar restrictions.

(vi) These guidelines are applicable to all apparatus (underground and overhead) and to trees in any location (public or private, rural or urban). They should be considered when new apparatus is planned to be constructed adjacent to existing trees, when new trees are to be planted adjacent to existing apparatus and where apparatus is to be maintained or repaired and trees are to be managed (e.g. pruning, removal or replacement).

(vii) Site surveys should be undertaken appropriate to the scale of the planned works. These surveys will identify the presence of trees which could impact on works. Advice should then be sought from a Local Authority Arboriculturist (LAA). However, on major projects, a consultant arboriculturist should be employed to liase with the Local Authority Arboriculturist (LAA). Site surveys should be carried out according to the recommendations within BS 5837.

(viii) The principles set out in these guidelines also have relevance in respect of work carried out to highways near trees (e.g. kerbing, footway reinstatement).

1. HOW TREES ARE DAMAGED

Trees are complex living organisms, which are susceptible to damage from a wide range of physical agents or activities. Trees do not heal. Damage caused to a tree will remain for the rest of its life. Even minor damage may have long-lasting consequences that can be difficult or expensive to manage or may otherwise lead to the loss of the tree.

1.1 The Root System

Contrary to widespread belief, the root system of a tree is not a mirror image of the branches, nor is there usually a 'tap root'. Most of the root system of any tree is in the surface 600mm of soil, extending radially in any direction for distances frequently exceeding the tree's height. Excavation or other works within this area are liable to physically damage the roots.

Damage can also be caused by compaction of the soil (parked vehicles, plant, equipment and material). Compaction damages the soil structure, leading to less available oxygen for tree roots; it also inhibits the growth of mycorrhiza fungi, which are essential to tree roots' health.

The base of a trunk typically flares out in buttresses extending into the main lateral structural roots. These rapidly subdivide into the mass of smaller roots which serve to anchor the tree into the soil and transport water and nutrients. These roots may extend to well beyond the branch spread of the tree. A mass of fine roots, less than 1 mm in diameter, develop off all parts of this root system. These fine roots also absorb the water and nutrients, which are essential for the growth of the tree.

The main structural roots (close to the trunk) develop as the tree grows in response to the need for physical stability. Beyond these major roots, growth is influenced by the availability of water,

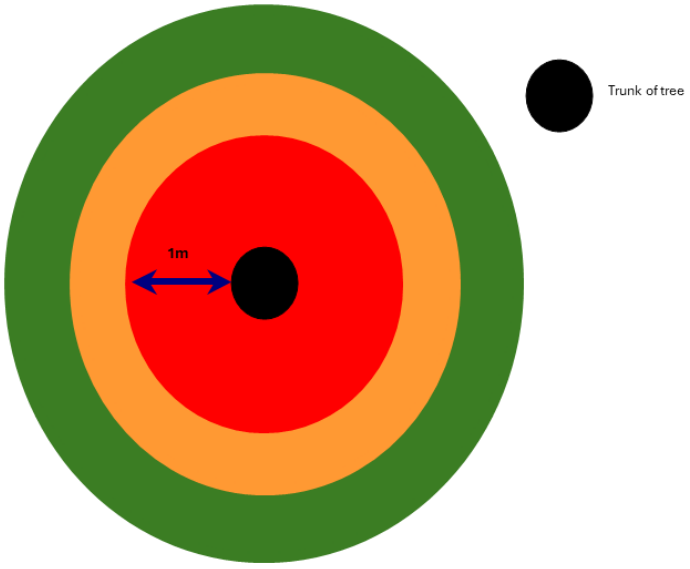
air and nutrients in the soil. Disturbance of soil can improve conditions for root growth. Apparatus is often cooler than the surrounding soil encouraging moisture within the soil to condense on its surface stimulating root growth close to the apparatus. For all these reasons root growth is often most prolific within the backfilled trench and in the soil around the apparatus.

There are certain areas around trees, illustrated in Figure 1 – 'Tree Protection Zone', where excavation either must not be undertaken or only undertaken under strict conditions in order to avoid or minimise any damage to a tree's root system.

For the purposes of this guideline document, they are called zones.

- the Prohibited Zone (1m from the trunk)
- the Precautionary Zone (4 x the tree circumference)
- the Permitted Zone (outside of the Precautionary Zone)

Figure 1 – Tree Protection Zone



PROHIBITED ZONE – 1m from trunk. Excavations of any kind must not be undertaken within this zone unless full consultation with the local authority Arboriculturist is undertaken. Materials, plant and spoil must not be stored within this zone.

PRECAUTIONARY ZONE – 4 x tree circumference . Where excavations must be undertaken within this zone the use of mechanical excavation plant (other then Vacuum Excavation) should be prohibited. Precautions should be undertaken to protect any exposed roots. Materials, plant and spoil should not be stored within this zone. Seek Local Authority Arboriculturist (LAA) or independent professional.

PERMITTED ZONE – outside of the precautionary zone. Excavation works may be undertaken within this zone; however, caution must be applied and the use of mechanical plant limited. Any exposed roots should be protected.

1.2 Below Ground

1.2.1 Root systems can be harmed by:

- the severance of a root, for example by trenching will destroy all parts of the root beyond that point. Even roots less than 10mm in diameter may be serving the fine roots over a wide area. The larger the root severed, the greater the impact on the tree's health and stability.

Examples of typical root damage caused by excavation works.

- damage to the bark on the root. The bark protects the root from decay and is also essential for further root growth. It is loosely attached and easily damaged. If damage to the bark extends around the whole circumference the root beyond that point will be killed.

- damage to surface roots. Care must be taken when using mechanical plant. Materials and vehicles must never be stored within the Prohibited Zone and should not be stored within the Precautionary Zone unless there is ground protection.

- compaction of the soil. Incidental compaction may occur from storage of materials and/or the passing of heavy equipment over the roots. This can restrict or even prevent the movement of water and gases (i.e. oxygen and carbon dioxide) through the soil and thereby asphyxiate the roots. The roots must have oxygen for survival, growth and effective functioning. Materials and vehicles must not be stored within the Prohibited Zone, and they should not be stored within the Precautionary Zone unless there is ground protection.

Non-Compliant site management within the Prohibited Zone and Precautionary Zone

alterations in soil level. Lowering soil levels can physically damage tree roots growing near the surface. Raising soil levels can reduce water and essential gases reaching the roots. It can also cause compaction damage.

- the application of herbicide - frequently used to clear weed growth on operational land (e.g. substations). The wide-ranging root system of a tree may extend into the operational land and absorb herbicides, which have been applied to the ground. Herbicide absorbed in one part of the root system can kill the whole tree.

  NOTE: The selection and application of herbicides must be undertaken by a competent person in accordance with Control of Substances Hazardous to Health (COSHH) regulations.

- spillage of oils or other materials (e.g. diesel oil, cement, resins). Spillage can permeate into the soil and damage root systems (see Sub-Section 4.3 – 'Chemical Damage to Trees').

1.2.2 If roots are damaged:

- close to the trunk - The anchorage and stability of the tree may be adversely affected rendering the tree immediately hazardous.

- anywhere along their length - The distal portion including the fine roots they serve, will be destroyed. Damage to fine roots by severance of a main root, or by compaction or alteration of ground levels, will prevent fine roots from absorbing the water and nutrients which are essential for the wellbeing, growth and anchorage of the tree.

- by successive excavations - Multi-utility excavations close to a tree can cumulatively damage a root system.

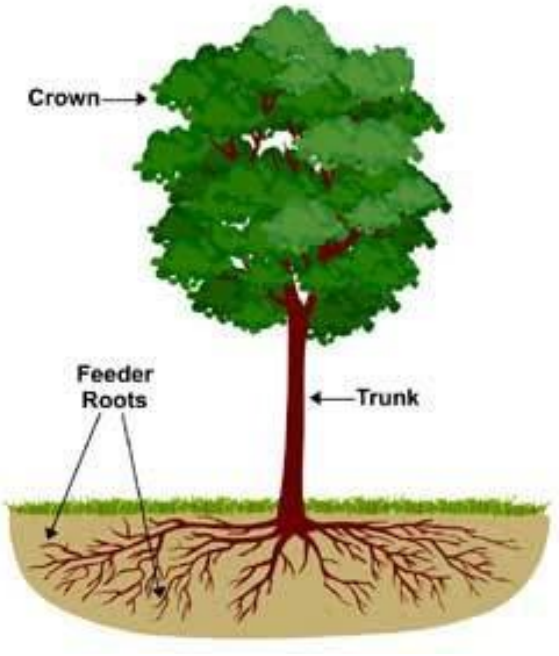


Figure 2 - Typical Tree Structure

1.2.3 Symptoms

Trees with damage may not show any immediate symptoms. Such symptoms may range from minor branch dieback to deterioration and ultimate death and collapse of the tree dependent on the severity of damage and the ability of the roots to regenerate.

If a root of 25mm diameter or over is severed, as a precautionary measure, a Local Authority Arboriculturist (LAA) / arboriculture expert` should be contacted immediately.

1.3 Above Ground

Trees have a single or multi-stemmed trunk supporting a framework of branches and twigs. These structures are protected by a layer of bark, the purpose of which is to protect the functional tissues immediately beneath. The purpose of these functional tissues is to transport nutrients throughout the tree. Therefore, if the bark is damaged, then the functional tissues will also likely be damaged, which will compromise the health and integrity of the tree.

Trees can be damaged by:

- Fire and scorching.
- Direct impact by plant or machinery
- Inappropriate or sub-standard pruning
- Abrasion by overhead apparatus
- Chemicals and fuel oils
- Storage of materials within the Prohibited and Precautionary Zones
- Poor location of plant equipment

1.3.1 Abrasion

The tree may be damaged by abrasion with overhead apparatus. Initially this only removes the outer bark. If the abrasion continues it can expose the underlying wood which may Increase the likelihood of infection and affect the health of the tree.

If trees are growing in proximity to overhead apparatus, it should be possible to prevent the development of problems by timely pruning and tree management. This requires expert knowledge of the growth pattern of the many varied species of tree, consideration of the effects of the pruning on the appearance of the tree and application of the correct pruning techniques. All pruning should be in accordance with BS 3998. All operatives should be qualified and competent.

For all works other than emergency or urgent works, notification and consultation with all interested parties is necessary before work commences (see Section 5 – 'How to Avoid Damage to Apparatus by Trees').

1.3.2 Permissions / Notifications

Any work to trees adjacent to an area of operations that extends beyond what is necessary for operational requirements may require either written permission from the local planning authority (in respect to Tree Preservation Orders) or six weeks' notification to the local planning authority (in respect to trees in Conservation Areas). *See also Section 6 – 'Sites with Designated Status'*.

2. HOW APPARATUS IS DAMAGED

The positioning and type of underground apparatus are detailed in SWUK publication **Volume 1: Street Works UK Guidelines on the Positioning and Colour Coding of Underground Utilities' Apparatus**

Construction methods and utility service materials are subject to change, and any cluster of utility services is likely to consist of a variety of historic and modern materials constructed to various specifications. In general utility apparatus includes the following:

- Pipes
- Cables
- Ducts
- Chambers
- Poles/Towers/Masts/Satellite dishes
- Above ground installations

2.1 Below Ground

Underground apparatus (especially those less than 600mm deep) may be affected by tree roots. The risk will depend on the ability of the apparatus, particularly any joints, to resist or tolerate distortion.

2.1.1 Direct damage

Direct damage is caused by the annual increase in root thickness and length resulting in eventual contact with apparatus. However, it is usually either the root or the adjacent soil that will distort rather than the apparatus itself. The potential for damage depends on the amount of root growth and is greatest in the main structural roots within 3 metres of the tree. Roots may grow around an apparatus to form a sheath, but this will rarely exert sufficient pressure to cause any damage. Surface wrappings inadequately attached to an apparatus, if non-toxic, may be colonised by roots and eventually lifted off.

2.1.2 Indirect damage

Indirect damage is restricted to shrinkable soils, mainly clays but also peat and some silts. Such soils shrink as they dry with the potential to distort any apparatus supported by the soil. Vegetation growing within the same area of soil may increase the drying effect.

The degree of the shrink ability of the soil will affect the amount of movement caused by drying and thus the potential for damage to occur. In situations where apparatus passes from a shrinkable soil into a rigid structure there is the possibility of extreme distortion taking place. Regular seasonal movement can also cause damage even in the absence of roots, particularly with short, segmented pipes (*See Sub-Section 3.1.4 – 'Shrinkable Soils'*).

2.1.3 Root incursion

Intact apparatus will not generally be penetrated by roots. However, roots can exploit existing defects such as:

- Cracks in foul or surface water drains.
- Defective pipe joints.
- Inadequate or degraded pointing of inspection chambers.

Where internal conditions are moist and aerated and therefore most conducive to root growth, root proliferation may occur and ultimately block the apparatus. If root thickening occurs where it passes into apparatus, root related enlargement of a defect may occur. This becomes less likely with increased distance from the trunk.

2.1.4 Trees and Wind Movement

The potential for damage to apparatus close to a tree may increase due to movement of the lower trunk and a structural root as the tree sways in intense winds. Such movement may result in direct pressure being applied to the apparatus. Furthermore, if a tree is uprooted, any apparatus passing across or through the disturbed root plate may also be displaced. Such events are unlikely and are restricted to situations where apparatus is in close proximity to the trunk of the tree, but the potential may be increased if other supporting structural roots are severed. Encasing apparatus in lean mix or coarse concrete can exacerbate this problem as fine roots may penetrate the material providing a greater 'hold' on the apparatus unless an appropriate root barrier material is used to separate the apparatus from the root system.

2.1.5 Mechanical Removal of Trees and Stumps

The mechanical removal of tree stumps by grinding or grubbing may disturb or damage apparatus passing across or through the root plate of the tree. Using a mechanical digger to uproot a tree scheduled for removal is highly likely to damage apparatus within and close to the Prohibited or Precautionary Zones as the roots will apply pressure to the apparatus as they are uprooted.

2.2 Above Ground

If overhead apparatus encounter trees they may be damaged from the outset as a result of:

- Abrasion when the tree and / or apparatus move in the wind bringing them into contact. The resultant abrasion can damage wires affecting their efficiency, strength and causing interference or loss of supply.
- The collapse of a branch or a whole tree which could bring down overhead lines.

3. PLANNING OF WORKS

Where trees are identified within the planned area of works (Any zone) it is essential that you communicate with Local Authority Arboriculturist (LAA) or the land owner where site specific liaison, collaboration and agreement between the asset owner and other interested parties is essential if damage to trees is to be avoided.

The use of an Arboricultural Method Statement (AMS) would be beneficial for the communication with tree owner whether it is the Local Authority or a Landowner.

The inherently variable nature of trees, and the generally low incidence of damage to underground apparatus, makes it neither practical nor justifiable to impose absolute limits on the proximity of trees to apparatus.

With respect to overhead apparatus there are minimum established clearances which must be maintained. Details of these clearances can be obtained from the utility network operator.

Before new trees are planted the advice of a Local Authority Arboriculturist (LAA) or arboriculturist should be obtained.

3.1 Special Considerations when Planning the Installation of Underground Apparatus

3.1.1 New / Renewal of Apparatus - New Trees

In considering the location of new or renewed apparatus in conjunction with a new tree planting scheme early consultation is essential between the relevant professional organisations e.g. local authorities, utility companies, developers and landowners.

3.1.2 New / Renewal of Apparatus - Existing Trees

It is important to remember that trees provide numerous benefits, not only to their owners, but to the wider community. One of these benefits is amenity value. There are a few established and accepted systems that allow for the amenity of a tree to be valued and therefore assigned a monetary value. This is why it is important that that a suitably qualified arboriculturist (usually although not necessarily the Local Authority Arboriculturist) is involved at the planning stage to determine amenity value.

Therefore, when planning the installation or renewal of apparatus, the position of existing trees should be considered as one of the primary factors which could affect the siting, depth, method of installation and future maintenance of that apparatus. Consultation with the relevant interested parties will identify any conflict and consideration should be given to apparatus diversion or felling and re-planting.

This decision should be influenced by the amenity value of the tree and the extent of the additional diversionary works.

3.1.3 Existing Apparatus - New Trees

Early consultation with utilities should take place before any tree work, including planting, is undertaken to ascertain the position of existing apparatus. Records of underground apparatus should be obtained from utilities and used in conjunction with onsite apparatus detection techniques. The guidance contained within Health and Safety Executive guidance note HSG47 – 'Avoiding Danger from Underground Services' should be followed when excavating. In addition, when planning new tree planting, there should be liaison with the utilities, local authority and landowner so that the risks trees may pose to utility apparatus in the future are minimised.

3.1.4 Shrinkable Soils

Apparatus laid in clay or peat should be constructed to tolerate movements of the subsoil caused by root activity. Special precautions for differential movement should be incorporated where apparatus joins rigid structures founded at a different depth to the apparatus (e.g. pipe connections to chambers). See subsection 2.1.2 'Indirect Damage'.

3.2 Precautions when Repairing Existing Apparatus

Where apparatus requires repair the location of the excavation is often defined by the location of the fault. The nature of the work usually requires open excavation. Excavation within the Prohibited and Precautionary Zones should be in accordance with sub-section 4.1 'Below Ground' except for emergency or urgent works.

Where emergency or urgent works may have caused damage to roots with a diameter in excess of 25mm, interested parties should be informed immediately. They may choose to consult a Local Authority Arboriculturist (LAA) or arboriculturist regarding whether remedial treatment to the tree is necessary.

If roots have grown into a drain or duct and proliferated to cause a blockage, the removal of the root mass from within the drain or duct will only provide temporary relief. If the root, which originally penetrated the drain, is still present it will regenerate and recreate the same problem. Roots of other plants may have a similar effect. Permanent relief can only be obtained by the proper repair of the original defect e.g. by replacement or refurbishment.

Utility apparatus may be refurbished using prefabricated, slip lined or cured-in-place lining systems or pipes. Prefabricated and slip lined systems and pipes are generally resistant to root growth/intrusion but cured-in-place linings may deform and ultimately collapse from the incursion of root growth. Following pre-survey (e.g. CCTV), it is essential that any roots are removed from the bore of the apparatus as far as practicable prior to lining, using proprietary root removal systems (e.g. high-pressure water, flails, or rotating blade cutters).

3.3 Special Considerations when Planning the Installation of Above Ground Apparatus

The aerial parts of a tree are constantly growing larger and are prone to bend and flex in windy conditions. As a result, parts of a tree may come close to or into contact with above ground apparatus.

3.3.1 Electricity

The overhead apparatus belonging to the electricity supply industry is subject to minimum clearances from adjacent trees and other structures. This is to ensure the safety of the public and protect against flashover and loss of supply. Local conditions may require an increase in the clearances specified in current electricity industry standards.

Part IV of The Electricity Supply Regulations covers the construction of power lines above ground. Schedule 4(9) of the Electricity Act 1989 enables electricity companies to require the felling or lopping of trees which obstruct or interfere with the working of their lines or constitute an unacceptable source of danger.

In addition to the above, reference should be made to the Energy Networks Association (ENA) document Engineering Recommendation G55 - Safe Tree Working in Proximity to Overhead Electric Lines (see section 8).

3.3.2 Communications

Communication operators run their systems under the Telecommunications Act 1984 (as amended by the Communications Act 2003) in accordance with The Telecommunications Code (Schedule 3A). Paragraph 5 of the Telecommunications Code enables operators to require the lopping of trees which overhang the street and obstruct or interfere with the working of their lines.

4. HOW TO AVOID DAMAGE TO TREES

This section gives general guidance on methods of work to minimise damage to trees. The local authority (or for privately owned trees, the owner, or their agent), should be consulted at an early stage prior to the commencement of any works. This will reduce the potential for future conflict between trees and apparatus. The Local Authority may require an Arboricultural Method Statement (AMS) to be provided prior to the commencement of any works. A standard suggested format is in Appendix A. The AMS will define the process to be followed to ensure that the risk of damage to trees is minimised.

See *TABLE 1 – S*ummary details regarding causes and types of damage to trees and the implications of the damage and the necessary precautions to be taken to avoid damage.

Table 1 - Preventation of Damge to trees

Type of Damage	Causes of Damage	Implications for the Tree	Precautions
Root severance	Mechanical excavation Hand excavation not carried out to specification	The tree may fall over Death of the root beyond the point of damage Potential risk of infection of the tree The larger the root the greater the impact on the tree	• Hand excavate (or vacuum excavation) only within the Precautionary Zone. • Work carefully around roots. • Do not cut roots over 25mm in diameter without referring to the Local Authority Arboriculturist (LAA). • For roots less than 25mm in diameter use a sharp tool and make a clean cut leaving as small a wound as possible.
Root bark damage	Mechanical excavation Topsoil surface removal Hand excavation not carried out to specification	The tree may fall over. If the damage circles the root, it will cause the death of the root beyond that point. Potential risk of infection of the tree The larger the root the greater the impact on the tree.	• Do not use mechanical machinery (unless vacuum excavation) to strip the topsoil within the Precautionary Zone. • Hand excavate (or vacuum excavation) only within the Precautionary Zone. • Work carefully around roots. Do not cut roots over 25mm in diameter without referring to the Local Authority Arboriculturist (LAA). • For roots less than 25mm use a sharp tool and make a clean cut leaving as small a wound as possible.
Soil compaction & Water saturation	Vehicle & Plant movement and material storage within the precautionary area.	Restricts or prevents passage of gaseous diffusion through soil, the roots are asphyxiated and killed affecting the whole tree.	• Prevent all vehicle movement, plant use or material storage within the Precautionary Zone, or ensure suitable ground protection measures are installed prior to any activity
Alterations in soil level causing compaction or exposure of roots	Top-soil scouring, excavation or banking up.	Lowering levels strips out the mass of roots over a wide area. Raising soil levels asphyxiates roots and has the same effect as soil compaction.	• Avoid altering or disturbing soil levels within the Precautionary Zone.
Poisoning of the tree via root, bark, leaves and shoots absorption	Use of herbicides.	Death of the whole tree Death of individual branches Damage to leaves and shoots.	• The selection and application of herbicides must be undertaken by a competent person in accordance with COSHH regulations.
Contamination of soil:- Bark bruising, bark removal, damage to the wood, damage to buttress roots, Abrasion to trunk	Spillage of oils or other materials that are toxic to the tree Impact by vehicle or plant Physical attachment of signs or hoardings to the trunk Storage of materials at base of tree Rubbing by winch or pulling cables	Toxic and asphyxiation effects of chemicals, oils, building materials (cement, plaster, additives etc.) on the root system can kill the tree. Wounding with the potential for infection ultimately resulting in death of all or part of the tree. Structural failure of the tree	• Never store oils, chemicals or building materials within the Precautionary Zone • Surround the trunk with protective free-standing barrier. • Exclude vehicles, plant or material storage from the Precautionary Zone. • Ensure sufficient clearance of cables or ropes.
Physical damage to the tree :- Bark brusing or damage Damage to wood Split or broken branches Damage to buttress roots Serious damage to trunk	Impact by vehicle or plant Physical attachment of signs or hoardings to the trunk Rubbing by overhead cables, overhead cables Leaning of materials against the tree	Structural failure of the branch. Wounding or loss of a branch with the potential for infection ultimately resulting in death of all or part of the branch or tree. Infection of tree system including roots	• Exclude vehicles, plant or material storage from the Precautionary Zone. • Ensure sufficient clearance of cables or ropes. • All pruning should be carried out in accordance with BS3998 (*prune affected branches to give appropriate clearance from cables)* • Surround the trunk with protective free-standing barrier.
Inappropriate pruning	Inappropriate siting of overhead apparatus i.e poor planning Use of non experts in pruning	Adverse affects the health of the tree i.e potential infections	• Effective planning and liaison with Local Authority Arboriculturist (LAA) / arboriculturist, taking into consideration the future growth potential and management.

4.1 Below Ground

Wherever trees are present, precautions should be taken to minimise damage to their root systems. As the shape of the root system is unpredictable, there should be control and supervision of any works, particularly if this involves excavating in the upper 600mm of soil where the majority of roots develop.

4.1.1 Fine Roots

Fine roots are vulnerable to desiccation once they are exposed to the air. Larger roots have a bark layer which provides some protection against desiccation and temperature change. The greatest risk to these roots occurs when there are rapid fluctuations in air temperature around them e.g. frost and extreme heat conditions. It is therefore important to protect exposed roots where a trench is to be left open overnight where there is a risk of frost.

- In winter, before leaving the site at the end of the day, the exposed roots should be wrapped with dry sacking. This sacking must be removed before the trench is backfilled.
- In summer, before leaving the site at the end of the day, the exposed roots should be wrapped with damp sacking. This sacking must be removed before the trench is backfilled.

4.1.2 Precautions

The precautions referred to in this section are applicable to any excavations or other works occurring within the Prohibited or Precautionary Zones as illustrated in Figure 1 – 'Tree Protection Zone'.

4.1.3 Realignment

Whenever possible apparatus should always be diverted or re-aligned outside the Prohibited or Precautionary Zones.

Under no circumstances can machinery be used to excavate open trenches within the Prohibited Zone.

The appropriate method of working within the Precautionary Zone should be determined in consultation with a qualified and competent Arboriculturist (either the Local Authority Arboriculturist (LAA) or, for privately owned trees an Arboricultural consultant) and may depend on the following circumstances:

- The scope of the works (e.g. one-off repair or part of an extensive operation).
- Degree of urgency (e.g. for restoration of supplies).
- Knowledge of location of other apparatus.
- Soil conditions.
- Age, condition, amenity value and life expectancy of the tree.

Where works are required for the laying or maintenance of any apparatus within the Prohibited or Precautionary Zones there are various techniques available to minimise damage.

Acceptable operational techniques available:

a) Trenchless

Wherever possible trenchless techniques should be used. The launch and reception pits should be located outside the Prohibited or Precautionary Zones. In order to avoid damage to roots by percussive boring techniques it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the equipment with materials other than water (e.g. oil, bentonite, etc.) must not be used when working within the Prohibited Zone. Lubricating materials other than water may be used within the Precautionary Zone following consultation and by agreement.

b) Broken Trench - Hand-dug

This technique combines hand dug trench sections with trenchless techniques if excavation is unavoidable. Excavation should be limited to where there is clear access around and below the roots. The trench is excavated by hand with precautions taken as for continuous trenching as in (c) below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases the open sections should be kept as short as possible and outside of the Prohibited Zone.

c) Continuous Trench - Hand-dug

The use of this method must be considered only as a last resort if works are to be undertaken by agreement within the Prohibited Zone. The objective being to retain as many undamaged roots as possible.

d) Vacuum Excavation

Vacuum excavation is considered one of the safest methods of digging around live utilities. It allows for the removal of earth from around existing pipes and cables without damaging the underground utilities. This method is particularly useful in environmentally sensitive zones where ground disturbance must be minimised, for example around tree roots.

All roots should be retained and protected where practicable,

All roots greater than 25mm diameter must be preserved and worked around.

These roots must not be severed without first consulting the owner of the tree or the Local Authority Arboriculturist (LAA) / arboriculturist. If after consultation severance is unavoidable, roots must be cut back using a sharp tool to leave the smallest wound.

4.1.5 Backfilling

- Any reinstatement of street works in the United Kingdom must comply with the relevant national legislation. In England this relates to the requirements of the code of practice – 'Specification for the Reinstatement of Openings in Highways' approved under the New Roads and Street Works Act 1991. Without prejudice to the requirements relating to the specification of materials and the standards of workmanship, backfilling should

be carefully carried out to avoid direct damage to roots and excessive compaction of the soil around them.

- The backfill should, where possible, include the placement of an inert granular material mixed with topsoil or sharp sand (not builder's sand) around the roots. This should allow the soil to be compacted for resurfacing without damage to the roots securing a local aerated zone enabling the root to survive and grow in the longer term.

- Backfilling outside the constructed highway limits should be carried out using the excavated soil. This should not be compacted but lightly "tamped" and usually left slightly proud of the surrounding surface to allow natural settlement. Other materials should not be incorporated into the backfill. No spoil mounds should be left in the Precautionary Zone, and no spoil should be left against the trunk.

4.1.6 Additional Precautions near Trees

- At the planning stage a consideration should be given to the need to provide protective fencing, barriers and truck protection along with floorboards.

- Movement of plant should be avoided but may be the only option, on agreement with Local Authority Arboriculturist (LAA) / Arboricultural advice, to avoid closing access routes, footpaths etc within the Prohibited Zone. This should also be avoided within the Precautionary Zone, except on existing hard surfaces, in order to prevent unnecessary compaction of the soil. This is particularly important on soils with a high proportion of clay. Spoil or material must not be stored within the Prohibited Zone and should be avoided within the Precautionary Zone.

- Where it is absolutely necessary to use mechanical plant within the Precautionary Zone care should be taken to avoid impact damage to the trunk and branches. A tree must not be used as an end-stop for paving slabs or other materials nor for security chaining of mechanical plant. If the trunk or branches of a tree are damaged in any way advice should be sought from the Local Authority Arboriculturist (LAA) / Arboriculturist.

4.2 Above Ground

4.2.1 Damage by Pruning

Trees (including shrubs and hedges) can be damaged by inappropriate or excessive pruning. Reference should be made to the Energy Networks Association (ENA) document Engineering Recommendations 136 Vegetation Management near Electricity Equipment – Principles of Good Practice" (see Section 8 – 'Other Useful Publications'), British Standard 3998 document or appropriate company specific documentation for guidance on pruning,

4.2.2 Damage by Plant Exhaust

Avoiding damaging Trees / Shrubs / Hedges by ensuring that safety protocols are being followed when placing the plant. Maintain a safe buffer zone between exhaust sources and trees, even a few meters can significantly reduce exposure to harmful gases and particulates.

4.3 Chemical Damage to Trees

Trees can be damaged by chemicals such as diesel, oil, cement, hydraulic fluid, sewage effluent, salt, bleach and surfactants. No chemicals should not be stored in the prohibited zone and the precautionary zone.

The risk can be identified when planning any works in accordance with this document.

If Herbicides are to be applied, they shall be applied by a competent person only at the rate and in the manner recommended by the manufacturer.

5. HOW TO AVOID DAMAGE TO APPARATUS BY TREES

5.1 Consultation with Utilities

The potential for future conflict between trees and above-ground apparatus can be reduced by appropriate planning. Early consultation with utilities should therefore take place before any tree work including planting is undertaken to ascertain the position of existing apparatus. Records of underground apparatus should be obtained from utilities and used in conjunction with onsite apparatus detection techniques. Specific care must be taken when removing the stumps of existing trees. In addition, when planning new tree planting there should be liaison with the utilities, local authority and landowner so that the risks trees may pose in the future are minimised.

5.2 Precautions during new tree planting

Every possible precaution should be taken to ensure that the existing apparatus is not damaged during excavation works. Health and Safety Executive guidance note:

HSG47 – 'Avoiding Danger from Underground Services' and any specific guidance issued by the apparatus owner should be followed at all stages of the work.

BS 8545 Trees: from nursery to independence in the landscape - British Standard is good practice to assist people involved in planning, designing, resourcing, producing, planting and managing new trees in the landscape. It describes a process for planting young trees that will result in them achieving 'independence in the landscape'. This means that they are healthy and have every chance of survival.

5.2.1 Below Ground

Before any excavation work begins, trial holes should be undertaken to validate the results of any detection surveys undertaken to confirm the actual position and depth of the apparatus.

5.2.2 Above Ground

Consideration should be given to the presence of satellite dishes and masts on commercial properties, poles and drop wires, as future tree growth may cause operational problems.

Reference should also be made to Energy Networks Association (ENA) document '*Engineering Technical Report 136 Vegetation Management near Electricity Equipment – Principles of Good Practice' (see section 8 – 'Other Useful Publications')* or appropriate company specific documentation.

NOTE: In all cases where definitive clearances are required, contact must be made with the appropriate electricity or communication company who will determine the clearance to be adopted.

See also sub-section 3.3 – *'Special Considerations when Planning the Installation of Above Ground Apparatus'.*

6. SITES WITH DESIGNATED STATUS/STAKEHOLDERS

Certain sites, groups of trees, and individual trees may be specifically designated and will require consultation and / or permission from the relevant authority prior to undertaking any works. This list isn't exhaustive and provides examples of where to look when planning the work:

- Sites of Special Scientific Interest (SSSI)
- English Heritage Sites

- English Nature / Natural England
- National Trust Land
- Nature Reserves
- Conservation Areas
- NatureScot
- National Landscape (Areas of Outstanding Natural Beauty)
- Natural Resources Wales
- Historic Environment Scotland
- Northern Ireland Environment and Heritage Service
- Cadw (Welsh Historic Monuments)
- Tree Preservation Orders
- Important Hedgerows

6.1 Tree Preservation Orders and Trees in Conservation Areas

The law on Tree Preservation Orders (TPOs) is in Part VIII of the Town and Country Planning Act 1990 as amended and in the Town and Country Planning (Tree Preservation) (England) Regulations 2012 which came into force on 6 April 2012.

Trees in a Conservation Area that are not protected by a TPO are protected by the provisions in Section 211 of the Town and Country Planning Act 1990

Section 198 of the Town and Country Planning Act 1990 (the Act) gives local planning authorities powers to make trees and woodlands the subject of tree preservation orders (TPOs) in the interests of amenity. Trees protected by a TPO or these within a Conservation Area may not be wilfully damaged or destroyed and cannot be cut down, uprooted, topped or lopped without the local planning authority's consent.

Additionally, in England and Wales, under section 211 of the Act, anyone proposing to cut down, uproot, top, lop etc. a tree in a conservation area is required to give the local planning authority six weeks' notice before doing so. This gives the authority an opportunity of making a TPO in respect of the tree.

Certain statutory obligations imposed by Acts of Parliament may allow for the limited felling, and/or pruning of trees protected by a TPO in order to supply and maintain service although this does not preclude the requirement to consult with the owner. However, Statutory Undertakers are reminded to check with the Local Planning Authority as to whether these exceptions apply in their specific case. Statutory Undertakers should also be aware that even if a tree is not protected by a TPO or is not within a Conservation Area that damage caused to such a tree could result in prosecution for criminal damage.

7. LEGISLATION

7.1 Primary Legislation

National Parks and Access to the Countryside Act 1949*

Health and Safety at Work Act 1974

Highways Act 1980**

Telecommunications Act 1984

Gas Act 1986

Electricity Act 1989

Town and Country Planning Act 1990 (Section 198 HIGHWAYS ACT 1980

Tree Preservation Orders

Town and Country Planning (Tree Preservation) (England) Regulations 2012

Environment Act 2021

Water Industry Act 1991

The New Roads and Street Works Act 1991 (NRSWA)

The Streets Works (Northern Ireland) Order 1995

Communications Act 2003

Traffic Management Act 2004

Transport (Scotland) Act 2005

The Streets Works (Northern Ireland) (Amendment) Order 2007

Forestry Act 1967

* Under the National Parks and Access to the Countryside Act 1949 local authorities are given a general power to plant trees.

** Under the Highways Act 1980 highway authorities may plant trees in the highway, or license others to do so. They need to ensure that trees do not overhang or cause a danger to roads or footpaths and are given powers to prevent this from happening.

The above list is not exhaustive, please be aware there can be differences in the different countries, please ensure you check before using this guidance.

7.2 Secondary Legislation

Each Act of parliament in 7.1 will have various associated regulations that should be referred to.

8. OTHER USEFUL PUBLICATIONS

This is not an exhaustive list of available publications and is only valid at the time of issue.

BS 3998 Recommendations for Tree Work

- Provides recommendations for tree surgery and other tree work.

BS 5837 Trees in Relation to Design, Demolition Construction

- Gives advice on the integration of new development amongst trees.

Codes of Practice approved under the New Roads and Street Works Act 1991

- Co-ordination of Street Works and Works for Road Purposes and Related Matters
- Specification for the Reinstatement of Openings in Highways
- Safety at Street Works and Road Works
- Measures Necessary where Apparatus is Affected by Major Works (Diversionary Works)
- Code of practice for street works inspections.

Energy Networks Association publications:

- Engineering Technical Report 136 'Vegetation Management Near Electricity Equipment – Principles of Good Practice'
- Engineering Recommendation G55 – 'Safe Tree Working in Proximity to Overhead Electric Lines'
- ENA-TS 40-80 – ENA Technical Standard for Overhead Line Clearances
- Engineering Recommendation G70 – Vegetation Control near Overhead Lines
- ETR 132 – Improving Network Performance (under abnormal weather conditions by the use of a risk-based approach to vegetation management near electric overhead lines)
- MNT/004 – UK Distribution Policy for the Inspection and Maintenance of Overhead Lines

Forest Industry Safety Accord

- FISA 804 Electricity at work: Forestry

Manual for Streets (supersedes Design Bulletin 32 and Places, Streets and Movement)

- The Department for Transport and the Department for Communities and Local Government (DCLG), with support from the Commission for Architecture and the Built Environment (CABE), commissioned WSP

- TRL , Llewellyn Davies Yeang and Phil Jones Associates to develop a Manual for Streets to give guidance to a range of practitioners on effective street design.

National House Building Council (NHBC) Standards Chapter 4.2. Building near trees

- Gives information on the design of new foundations in proximity to trees on shrinkable clay soils.

9. OTHER REFERENCES

9.1 Arboricultural

Arboricultural advice may be sought from the:

- Arboricultural Association
- Arboriculture and Forestry Advisory Group (AFAG)
- Forest Industry Safety Accord (FISA)
- Institute of Chartered Foresters
- Local Authority Arboricultural (LAA)

9.2. Herbicides

Information on herbicides and their application may be obtained from the:

- British Agrochemicals Association
- Health & Safety Executive (HSE)

9.3 Utilities

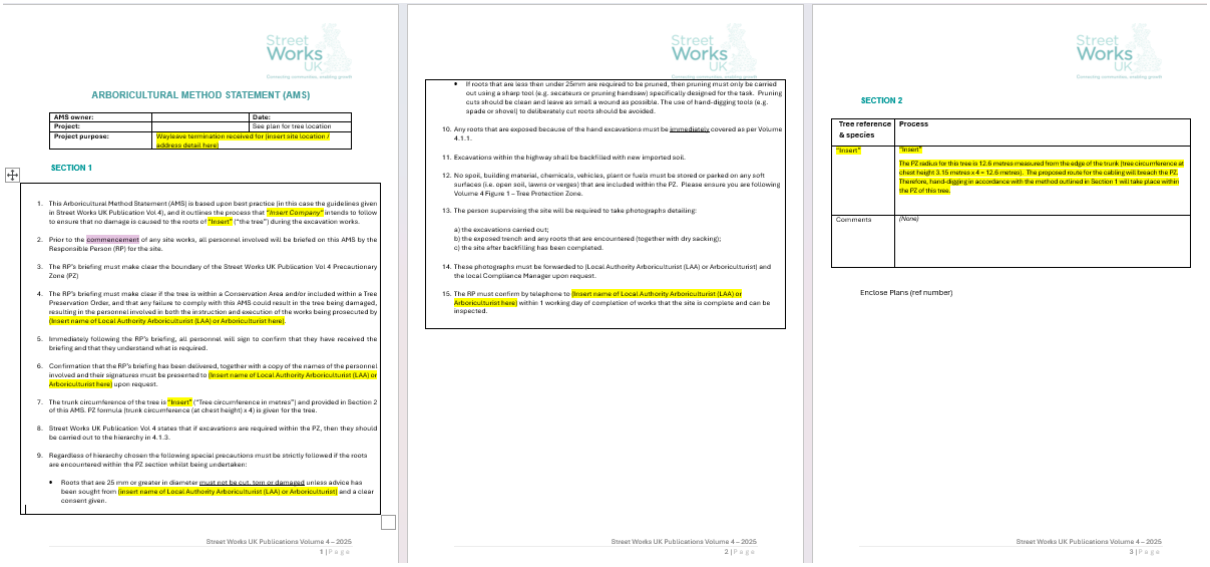
Utility advice may be sought from the local utility contact or Street Works UK.

GLOSSARY

Apparatus	Equipment such as valves, stopcocks, chambers, cabinets, transformer chambers etc and includes any structure for the lodging of apparatus.
Arboriculturist	A professional who cultivates and manages trees, hedgerows and shrubs and provides information and advice on specific tree related issues.
Carriageway	A way constituting or comprised in a highway, being a way (other than a cycle track) over which the public have a right of way for the passage of vehicles.
Cycle track	A way constituting or comprised in a highway over which the public have a right of way on pedal cycles with or without a right of way on foot.
Desiccation	The state of extreme dryness, the drying out of roots.
Distal	Situated farthest from the centre.
Drop wires	Overhead wire from telegraph pole to customer premises.
Duct / ducting	Structure (usually cylindrical) used to convey and protect apparatus.
Footpath	A highway over which the public have a right of way on foot only, not being a footway.
Footway	A way comprised in a highway which also comprises a carriageway, being a way over which the public have a right of way on foot only.
Herbicide	A chemical that destroys plants.
SWUK	Street Works UK
Pipe	Longitudinal structure (usually cylindrical) used to convey water, gas or oil.
Root plate	Formed just below the soil surface when shallow lateral growing roots predominate.
Service strip	A strip of designated land alongside a carriageway or footway used to convey services.
Local Authority Arboriculturist (LAA)	A professionally qualified Arboriculturist employed by the Local Authority to manage trees owned by the LA (e.g. Parks, Highways etc.) and to oversee management of Tree Preservation Orders
Utility	An undertaker by statute that has a legal right to provide customer services (e.g. communications, electricity, gas, water)
Verge	A strip of land which may form part of the public highway alongside a carriageway or footway, which may contain services.

APPENDIX A

ARBORICULTURAL METHOD STATEMENT (AMS)



ARBORICULTURAL METHOD STATEMENT (AMS)

APS owner:		**Date:**
Project:		See plan for tree location
Project purpose:	Wayleave termination received for [insert site location / address detail here]	

SECTION 1

1. This Arboricultural Method Statement (AMS) is based upon best practice (in this case the guidelines given in Street Works UK Publication Vol 4), and it outlines the process that "Insert Company" intends to follow to ensure that no damage is caused to the roots of "Insert" ("the tree") during the excavation works.
2. Prior to the commencement of any site works, all personnel involved will be briefed on this AMS by the Responsible Person (RP) for the site.
3. The RP's briefing must make clear the boundary of the Street Works UK Publication Vol 4 Precautionary Zone (PZ)
4. The RP's briefing must make clear if the tree is within a Conservation Area and/or included within a Tree Preservation Order, and that any failure to comply with this AMS could result in the tree being damaged, resulting in the personnel involved in both the instruction and execution of the works being prosecuted by [Insert name of Local Authority Arboriculturist (LAA) or Arboriculturist here].
5. Immediately following the RP's briefing, all personnel will sign to confirm that they have received the briefing and that they understand what is required.
6. Confirmation that the RP's briefing has been delivered, together with a copy of the names of the personnel involved and their signatures must be presented to [Insert name of Local Authority Arboriculturist (LAA) or Arboriculturist here] upon request.
7. The trunk circumference of the tree is "Insert" ("Tree circumference in metres") and provided in Section 2 of this AMS. PZ formula (trunk circumference (at chest height) x 4) is given for the tree.
8. Street Works UK Publication Vol. 4 states that if excavations are required within the PZ, then they should be carried out to the hierarchy in 4.1.3.
9. Regardless of hierarchy chosen the following special precautions must be strictly followed if the roots are encountered within the PZ section whilst being undertaken:
   - Roots that are 25 mm or greater in diameter must not be cut, torn or damaged unless advice has been sought from [insert name of Local Authority Arboriculturist (LAA) or Arboriculturist] and a clear consent given.

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- If roots that are less than under 25mm are required to be pruned, then pruning must only be carried out using a sharp tool (e.g. secateurs or pruning handsaw) specifically designed for the task. Pruning cuts should be clean and leave as small a wound as possible. The use of hand-digging tools (e.g. spade or shovel) to deliberately cut roots should be avoided.

10. Any roots that are exposed because of the hand excavations must be immediately covered as per Volume 4.1.1.
11. Excavations within the highway shall be backfilled with new imported soil.
12. No spoil, building material, chemicals, vehicles, plant or fuels must be stored or parked on any soft surfaces (i.e. open soil, lawns or verges) that are included within the PZ. Please ensure you are following Volume 4 Figure 1 – Tree Protection Zone.
13. The person supervising the site will be required to take photographs detailing:

    a) the excavations carried out;
    b) the exposed trench and any roots that are encountered (together with dry sacking);
    c) the site after backfilling has been completed.

14. These photographs must be forwarded to (Local Authority Arboriculturist (LAA) or Arboriculturist) and the local Compliance Manager upon request.
15. The RP must confirm by telephone to [insert name of Local Authority Arboriculturist (LAA) or Arboriculturist here] within 1 working day of completion of works that the site is complete and can be inspected.

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SECTION 2

Tree reference & species	Process
"Insert"	"Insert" The PZ radius for this tree is 12.6 metres measured from the edge of the trunk (tree circumference at chest height 3.15 metres x 4 = 12.6 metres). The proposed route for the cabling will breach the PZ. Therefore, hand-digging in accordance with the method outlined in Section 1 will take place within the PZ of this tree.
Comments	(None)

Enclose Plans (ref number)

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APPENDIX B

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