

Site investigations

Site investigations are to be undertaken within the RPA's of retained trees to determine the size, depth and location of any roots that may be present for the purpose of informing foundation design.

All excavation within the RPA's are to be initially undertaken to a minimum depth of 800mm deep for any excavation or to the full depth of the proposed foundations, hard surfacing or underground services. The soil is to be loosened with the use of a fork or pick and then cleared with the aid of an air-spade and air-vac using a specialist arboricultural contractor. If an air-spade is not used and all excavations are to be undertaken using hand tools (forks, shovel, trowel, brush), soil will be loosened with the aid of a fork or trowel and the spoil removed from with the aid of a shovel. Where an air spade or specialist arboricultural contractor is not employed, all excavations are to be undertaken under direct arboricultural supervision. All roots are to be retained in situ and the project arboret will visit the site to record and photograph the depth, location, and size of any roots present, during this visit the project arboret may be able to cut specific roots with the use of a hand saw or secateurs. The edge of the excavation closest to the retained trees and all uncovered roots will be covered over with a minimum of two layers of damp hessian to prevent drying out, and where necessary be shrouded to prevent soil collapse or contamination. If appropriate soil beneath the depth of 800mm may be sheet piled with any deeper excavations being undertaken by a machine with an appropriate bucket under direct arboricultural supervision. If a decision is made for a machine to be used it must work from outside of the RPA or have appropriate ground protection in place to move and work upon.

Upon the completion of the site investigations all trial excavations are to be back filled with the original material or inert fill. It may be suitable to insert a root barrier in locations where the proposed roots are not present or are beginning to enter to prevent root activity within areas deemed to be root free.

Foundations within RPAs

The use of traditional strip foundations can result in excessive root loss and as such should be avoided.

Designs for foundations that would minimize the adverse impact upon trees should include particular attention to the existing levels, proposed finished levels and cross sectional details. Site specific and specialist advice should be sought from the project engineers and arboriculturalist.

Root damage can be minimised by using:

- Piling with site investigation used to be determined their optimal location whilst avoiding damage to roots important for the stability of the tree, by means of hand tools or compressed air soil displacement, to a minimum depth of 600mm;
- Beams, laid at or above ground level, and covered as necessary to avoid tree roots identified by site investigation.

Where a slab for minor structures (e.g. shed base) is to be formed within the RPA, it should bear on the existing ground level, and should not exceed an area greater than 20% of the existing available ground.

Slabs for larger structures (e.g. dwellings) should be constructed with a ventilated air space between the underside of the slab and the existing soil surface (to enable gas exchange and venting through the soil surface). In such cases, a specialist irrigation system should be employed (e.g. roof run-off redirected under the slab). The design of the foundation should take into account of the effect on the load bearing properties of the underlying soil from the redirected roof run-off. Approval in principle for a foundation that relies on tapered retention and roof run-off under the slab should be sought from building control authority prior to this approach being relied upon.

Where piling is to be installed near to trees, the smallest practical pile diameter should be used, as this reduces the possibility of striking major tree roots, and reduce the size of the rig required to sink the piles. If a piling mat is required, this should conform to the parameters for ground boarding. Use of the smallest practical piling rig is also important where piling within the branch spread is proposed, as this can reduce the need for access facilitation piling. The pile type should be selected bearing in mind the need to protect the soil and adjacent roots from the potentially toxic effects of uncured concrete, (e.g. shrouded bored piles or screw piles).

The information is compiled with British Standard BS5837:2012 in relation to design methodology and BS5837:2012 (Recommendations, annexes) to BS5837:2012 (Requirements for foundations within the RPA).

'No Dig' Surfacing

Trees can be affected by construction within the RPAs either through the direct damage caused by the removal of roots, compaction of the rooting environment or secondary damage such as poisoning through leaks and spills (oil, fuels, etc.) or through de-icing (road salt, etc.).

Proposed hard surfacing within the RPAs of retained trees is to be designed so that it can be situated above the existing soil level and to minimise any adverse impact upon the tree RPA's, as the use of traditional foundations can result in excessive root loss through direct removal of roots during excavation and by compaction of the soil beneath the excavation, as such this 'traditional' type of foundation would be avoided.

When designing hard surfacing that is to be situated within RPAs, the design team need to pay particular attention to the proposed usage (pedestrian, domestic traffic, delivery vans, Emergency vehicles, HGVs, etc.), the existing and proposed levels of hard surfacing and finished floor levels, existing types and details, proximity to tree trunks and surface rooting, contamination capture, SUDs, etc.

Possible sub-bases (foundations systems) for hard surfacing situated within the RPAs of retained trees could include:

- A proprietary system such as a multi-dimensional confinement system (Calfweb® TDF or similar);
- Engineered solution such as a road deck, bridge, etc.

An engineered solution is likely require a level of excavation for site specific investigations to locate roots to aid in foundation design so that a suitable foundation can be designed to avoid roots and for the installation the structure.

NB: The use of a multi-dimensional confinement systems and or an engineered solution will affect the finished level of the hard surfacing by raising the levels and needs to be taken into consideration when designing foundations and setting the finished floor levels of adjacent buildings.

Utility apparatus

Underground utility apparatus

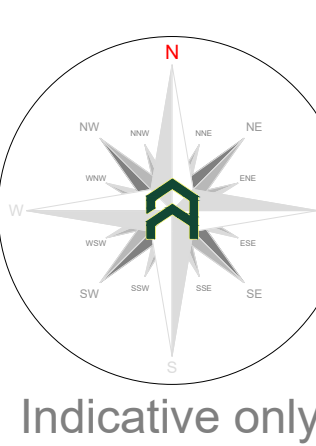
Mechanical trenching for the installation of underground apparatus and drainage serves any roots present and can change the local hydrology in a way that adversely affects the health of the tree. For this reason, particular care should be taken in the root and methods of installation of all underground apparatus. Wherever possible, apparatus should be routed outside of RPAs. Where this is not possible, it is preferable to keep apparatus together in common ducts, all inspection chambers should be sited outside of the RPAs.

Where underground apparatus is to pass within the RPAs, detailed plans showing the proposed route should be drawn up in conjunction with the project arboriculturalist. In such cases trenchless insertion methods should be used with entry and retrieval pits being located outside of the RPAs. If this option is not feasible and providing roots can be retained, and protected excavations should be undertaken using hand held tools (air-spade, forks, shovels) or a combination of trenchless and manual excavation (broken berms).

Any design and installation should be undertaken in accordance with the National Joint Utilities Guidelines (NJUG).

Above-ground utility apparatus

Above-ground apparatus (including CCTV cameras and lighting) should be sited to avoid the need for detrimental tree pruning, as such the current and future crown size of the tree should be assessed. Tree branches can be pruned back with care to provide space, though it is not appropriate for negative and significant tree work to be an initial design solution unless this is a suitable management outcome for the tree. Any pruning should be undertaken in accordance with BS3998:2010.



Arboricultural Impact Summary		
Impacts		Nos. of trees
Trees to be removed		0
Drainage (Hedges to be removed (Partial removal of groups)		2 (1)
Trees with proposed incisions into RPA's		2
Drainage (Hedges with proposed incisions into RPA's)		1
Trees that will require pruning		0
Drainage (Hedges that will require pruning)		0
Trees to be transplanted		0
Drainage (Hedges to be transplanted)		0

Arboricultural Impacts			
No.	Species	Proposed structure	Incursion
G4	Lawnend Cypress	Dwelling & hard surfacing	RPA's Canopy
G5	Various	Dwelling & hard surfacing	RPA's Canopy
5	Cherry Laurel	Dwelling & hard surfacing	

Tree Work Schedule			
No.	Species	Works	Category
G3	Cypresses up	Full to ground level, grind out stumps	U
G4	Lawnend Cypress	Crown reduction & lift	C
G4-1	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-2	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-3	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-4	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-5	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-6	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-7	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-8	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-9	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-10	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-11	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-12	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-13	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-14	Lawnend Cypress	Crown lift W canopy to 3.5m above OL	C
G4-15	Lawnend Cypress	Crown reduce W canopy to 0.3m from trunk up to 7m above OL	C
G4-16	Lawnend Cypress	Crown reduce W canopy to 0.3m from trunk up to 7m above OL	C
G4-17	Lawnend Cypress	Crown reduce W canopy to 0.3m from trunk up to 7m above OL	C
G4-18	Lawnend Cypress	Crown reduce W canopy to 0.3m from trunk up to 7m above OL	C
G4-19	Lawnend Cypress	Crown reduce W canopy to 0.3m from trunk up to 7m above OL	C
G4-20	Lawnend Cypress	Crown reduce W canopy to 0.3m from trunk up to 7m above OL	C
H2	Various	Full to ground level, grind out stumps	C
G5	Apple	Full to ground level, grind out stumps	C
H2	Various	Partial removal: Full to ground level, grind out stumps	C
5	Cherry Laurel	Crown reduce 50% canopy site boundary	C

All tree work is to be undertaken in accordance with British Standard BS 3998:2010 Tree work - Recommendations.

All existing trees to be removed and the site is to be left as found. Care is to be taken of the ground around retained trees to make sure that it does not become compacted as a result of the ongoing operations. No equipment or vehicles such as timber lorries, tractors, excavators or cranes shall be parked or driven beneath the canopy of any retained trees, to prevent subsequent compaction and root death.

No. of individual trees to be removed				
U	A	B	C	D
0	0	0	0	0

No. of groups / hedges to be removed				
U	A	B	C	D
1 (0)	1 (0)	0 (0)	1 (1)	
1 (1) Partial removal of a group				

Arboricultural Method Statement

All tree work is to be undertaken in accordance with British Standard BS 3998:2010 Tree work - Recommendations.

Please refer to ArborTech Consulting Ltd. Tree Schedule, Arboricultural Method Statement and Tree Protection Plan for full details of all surveyed trees and how all aspects of the development may be implemented without detriment to retained trees.

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