

APPENDIX A Tree Retention Categories

- A.1 BS5837, the British Standards document for trees in relation to construction, gives guidelines for ensuring that trees on development sites are retained or removed according to their future potential to become an asset in harmony with the development or an object of resentment and a potential threat to public safety.
- A.2 The early assessment of a site can ensure that trees to be retained can be afforded adequate protection from the onset of construction right through to completion and long into the future.
- A.3 Planning conditions and the Town and Country Planning Act 1990 can be used following a survey to enforce the adequate protection for these trees in accordance with BS5387.
- A.4 Care should be exercised over misplaced tree preservation. Attempts to retain too many or unsuitable trees on a site are liable to result in excessive pressure on the trees during development work and subsequent demands for their removal. The end result is usually fewer and less suitable trees that would be the case if proper planting, selection and conservation had been applied from the outset.
- A.5 Particular caution is needed over retention of large old trees which become enclosed in the new development. Such trees may be less resilient and more likely to die as a result of the development, and even if they survive in the short term, they may die long before the new buildings are obsolete and in this situation the felling and disposal of trees can be very difficult and extremely costly.
- A.6 Although existing trees should be retained wherever reasonable, unless such trees are well suited for incorporating within the new development, it may be preferable to favour new planting. New plantings can then be selected which are ideal for the situation and landscape.
- A.7 The tree survey carried out has assessed and given particular attention to:
 - 7.1 the health, vigour and condition of each tree
 - 7.2 the structural defects in each tree and its life expectancy
 - 7.3 the size and form of each tree and its suitability within the context of the site development
 - 7.4 the location of each tree relative to existing site features, e.g. its value as a screen or as a skyline feature
- A.8 On the basis of this assessment, trees are divided into one of the following categories:

TREES TO BE CONSIDERED FOR RETENTION

Category A	Those of high quality and value: in such a condition as to be able to make a substantial contribution (a minimum of 40years is suggested).	
Criteria Subcategories		
1 Mainly arboricultural values	2 Mainly landscape values	3 Mainly cultural values, including conservation
Trees that are particularly good examples of their species, especially if rare or unusual, or essential components of groups, or of formal or semi-formal arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands which provide a definite screening or softening effect to the locality in relation to views into or out of the site, or those of particular visual importance (e.g. avenues of other arboricultural features assessed as groups)	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture).
To be indicated on plan: Light Green		

Category B	Those of moderate quality and value: those in such a condition as to make a significant contribution (a minimum of 20 years is suggested).	
Criteria Subcategories		
1 Mainly arboricultural values	2 Mainly landscape values	3 Mainly cultural values, including conservation
Trees that might be included in the high category but are downgraded because of impaired condition (e.g. presence of remediable defects including unsympathetic past management and minor storm damage).	Trees present in large number, usually as groups or woodlands, such that they form distinct landscape features, thereby attracting a higher collective rating than they might as individuals but which are not, individually, essential components of formal or semi-formal arboricultural features (e.g. trees of moderate quality within an avenue that includes better A category specimens), or trees situated mainly internally to the site, therefore individually having little visual impact on the wider locality.	Trees with clearly identifiable conservation or other cultural benefits.
To be indicated on plan: Mid Blue		

TREES TO BE CONSIDERED FOR RETENTION (continued)

Category C	Those of low quality and value: currently in adequate condition to remain until new planting could be established (a minimum of 10 years is suggested), or young trees with a stem diameter below 150mm.	
Criteria Subcategories		
1 Mainly arboricultural values	2 Mainly landscape values	3 Mainly cultural values, including conservation
Trees not qualifying in higher categories.	Trees present in groups or woodlands, but without this conferring on them significantly greater landscape value, and/or trees offering low or only temporary screening benefit.	Trees with very limited conservation or other cultural benefits.
Note: Whilst C category trees will usually not be retained where they would impose a significant constraint on development, young trees with a stem diameter of less than 150mm should be considered for relocation.		
To be indicated on plan: Grey		

TREES FOR REMOVAL

Category R	Those in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural management.
Criteria	
Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become inviable after removal of other R category trees (i.e. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning).	
Trees that are dead or are showing signs of significant, immediate and irreversible overall decline.	
Trees infected with pathogens of significance to health and/or safety of other trees nearby (e.g. Dutch Elm Disease), or very low quality trees suppressing adjacent trees of better quality.	
Note: Habitat reinstatement may be appropriate (e.g. R category tree used as a bat roost: installation of bat box in nearby tree).	
To be indicated on plan: Dark Red	

APPENDIX B Root Protection Areas (RPA's)

- B1 For the roots to be retained undamaged there must be no excavation, soil stripping or site grading within the protected zone. Or in other words, NO DIGGING. This means that construction will have to be above the existing ground level.
- B2 The trees to be retained on site must be afforded the maximum protection as specified in Table 2 BS 5837 2005.
- B3 In order to avoid damage to the roots or rooting environment of retained trees, the RPA should be plotted around each of the category A, B and C trees. This is a minimum area in square metres which should be left undisturbed around each retained tree.
- B4 The RPA should be calculated using Table 2 as an area equivalent to a circle with a radius 12 times the stem diameter for single stem trees and 10 times the basal diameter for trees with more than one stem arising below 1.5m above ground level.
- B5 The RPA for each tree as determined in Table 2 should be plotted on the TCP taking full account of the following factors, as assessed by an arboriculturalist, which may change its shape but not reduce its area whilst still providing adequate protection for the root system.
 - B5.1 The likely tolerance of the tree to root disturbance or damage, based on factors such as species, age and condition and presence of other trees. For individual open grown trees only, it may be acceptable to offset the distance by up to 20% in one direction.
 - B5.2 The morphology and disposition of the roots, when known to be influenced by past or existing site conditions (e.g. the presence of roads, structures and underground services).
 - B5.3 The soil type and structure.
 - B5.4 Topography and drainage.
 - B5.5 Where any significant part of a tree's crown overhangs the provisional position of tree protection barriers, these parts may sustain damage during the construction period. In such cases, it may be necessary to increase the extent of tree protection barriers to contain and thereby protect the spread of the crown. Protection may also be achieved by access facilitation pruning. The need for such measures, including the precise extent of pruning, should be assessed by an arboriculturalist.

- B6 The guidelines for type and dimensions of protective fencing are given in BS 5837 2005, and are as follows:
- B6.1 Barriers should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained tree(s). On all sites, special attention should be paid to ensuring that barriers remain rigid and complete.
 - B6.2 In most cases, barriers should consist of a scaffold framework in accordance with Fig 2 of BS5837, comprising of a vertical and horizontal framework, well braced to resist impacts, with vertical tubes spaced at a maximum interval of 3m. Onto this, weldmesh panels should be securely fixed with wire or scaffold clamps. Weldmesh panels on rubber or concrete feet are not resistant to impact and should not be used.
 - B6.3 It may be appropriate on some sites to use temporary site office buildings as components of the tree protection barriers.
- B7 Where it has been agreed during the design state, and shown on the tree protection plan, that vehicular or pedestrian access for the construction operation may take place within the root protection area (RPA), the possible effects of construction activity should be addressed by a combination of barriers and ground protection. The position of the barrier may be shown within the RPA at the edge of the agreed working zone but the soil structure beyond the barrier to the edge of the RPA should be protected with ground protection.
- B8 For pedestrian movements within the RPA, the installation of ground protection in the form of a single thickness of scaffold boards on top of a compressible layer laid onto a geotextile, or supported by scaffold, may be acceptable.
- B9 For wheeled or tracked construction traffic movements within the RPA, the ground protection should be designed by an engineer to accommodate the likely loading and may involve the use of proprietary systems or reinforced concrete slabs.

PROTECTIVE FENCING

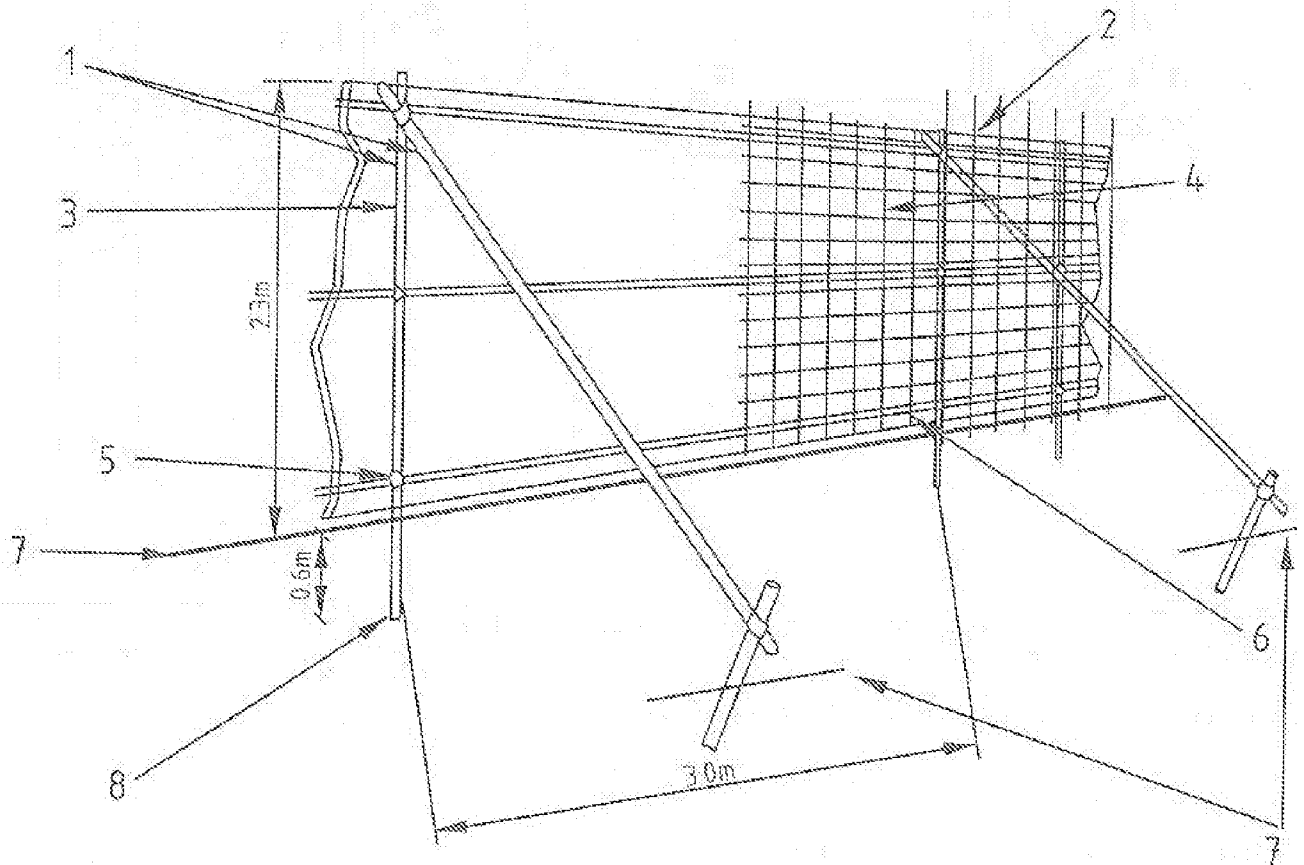


Figure 2 – Protective Barrier

- | | | | |
|---|--|---|--|
| 1 | Standard scaffold poles | 5 | Standard clamps |
| 2 | Uprights to be driven into the ground | 6 | Wire twisted and secured on inside face of fencing to avoid easy dismantling |
| 3 | Panels secured to uprights with wire ties and where necessary standard scaffold clamps | 7 | Ground level |
| 4 | Weldmesh wired to the uprights and horizontals | 8 | Approx 0.6m driven into the ground |

APPENDIX C

How tree roots can be damaged during construction

- C1 Construction close to trees can be enormously damaging and detrimental to the tree's health, often leading to their death and eventual removal. Most trees that have been growing undisturbed on a site for many years will have developed an extensive root system with the roots growing where the soil conditions are most favourable. There will be a balance between the development of the crown (which demands water) and the roots (which supply it). Any sudden alteration in the soil conditions within the tree's rooting area (a circle of radius equal to the tree's height) will therefore upset this balance.
- C2 Root systems can be damaged by:
- Repeated passage of machinery, which will squeeze the soil, closing up the pores causing compaction, especially in the upper levels, and so reducing the amount of oxygen available to roots and preventing them from growing through the soil. Surviving roots may then not be able to grow through the compacted soil. It is essential therefore that all but the immediate area of the development is protected from construction operations by fencing as recommended in BS5837.
 - Placing soil or other materials over the roots of a tree, which will impede air movement into and out of the soil and consequently reduce the availability of oxygen to the roots.
 - The severance of a root, for example by trenching, which 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.
 - 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.
 - Alterations in soil level. Lowering the level will strip out the mass of roots near the surface. Raising the levels will have the same effect as soil compaction.
 - Incorrect application of herbicide. There is frequently a need for operational land to be kept clear of weed growth for safety and as a fire precaution and herbicides provide an efficient method of killing both herbaceous and woody weeds. There are several types of herbicide with different modes of action and persistence, the most attractive of which tend to be those that can be applied to the ground, usually as a granule and which remain active in the soil for long periods. The wide-ranging root system of a tree may extend into the operational land from adjoining properties, and may absorb some types of herbicides which have been applied to the ground. Material absorbed in one part of the root system can kill the whole tree.
 - Spillage of oils or other harmful materials, which can leach into the soil can also damage the root system. For instance, oil spilled into the soil is broken down by soil bacteria which deplete the oxygen and so asphyxiate the roots. Other materials may also have a direct toxic effect on roots.

APPENDIX D

How to avoid damage to trees during construction

The precautionary area of a tree can be defined as either the extent of the crown spread (the drip line), or half the tree's height on either side of the tree. For excavation within the precautionary area, the key points to remember are:

- D1 Do not excavate with machinery. Use trenchless techniques where possible. Otherwise dig only by hand. All excavations within the area below the crown must be carried out by hand, digging carefully around roots, retaining as many as possible.
- D2 Do not sever any tree roots in excess of 25mm, unless the council's Tree Officer agrees beforehand.
- D3 Where small tree roots are to be cut, this should be done cleanly, as with the pruning of branches, using secateurs or a handsaw. Make a clean cut and leave as small a wound as possible.
- D4 Roots exposed during construction should be kept moist and protected from frost and from drying out. If trenches are to be left open overnight, cover the roots with dry sacking. Remember to remove the sacking before backfilling.
- D5 Backfill the trench with an inert granular material and top soil mix. Compact the backfill with care around the retained roots. On non-highway sites backfill only with excavated soil.
- D6 Don't store spoiled or building material, including chemicals and fuels within the tree's crown and make sure you do not contaminate tree roots and surrounding soils.
- D7 Do not lower or raise soil levels close to the tree.
- D8 Do not allow the passage of vehicles across the unprotected soil surface, especially when the soil is wet, as this will cause breakage of surface roots, soil compaction and consequently reduced soil aeration.
- D9 Construction materials must be permeable to allow gaseous exchange between the root system and the atmosphere, and be constructed in line with current guidelines to avoid soil compaction.
- D10 Where car parking or roadways are to be constructed close to trees, it is essential that construction follows guidelines available in APN12 Arboricultural Practice Note issued by the Arboricultural Advisory and Information Service.