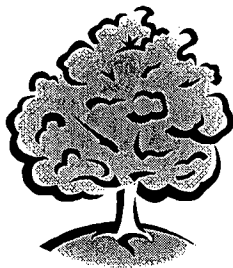


B. BS5837 Tree Survey



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Tree Care Consultant

ARBORICULTURAL REPORT IN RELATION TO DEVELOPMENT PROPOSALS

LOCATION: Mill Road, Arundel, West Sussex.	REF: PJE/01/08
CLIENT: Angmering Park Estate	DATE: 24 th October 2008
REPORT BY: Phillip J. Ellis MI Hort Cert Tech Arb	INSPECTION DATE: 3 rd October 2008
SURVEYED BY: Phillip J. Ellis MI Hort Cert Tech Arb	PAGE No: 1 of 23

INSTRUCTIONS:

Issued by: David Pennel 29th September 2008

Terms of Reference: To inspect the significant trees in accordance with British Standard 5837:2005 'Trees in relation to construction' and assess their suitability for retention in relation to the development of the site. To provide guidance on measures that should be taken to ensure the protection of retained trees and successful integration of the proposed development.

Documents Supplied:

Existing site plan showing the existing site and superimposed image of the proposed site layout and positions of trees.

Summary:

Proposal is to demolish existing wooden hall and replace with a museum of brick construction. There are 10 trees on and adjacent to the proposed construction all mature with no young trees. Six trees were classified as category B, one tree classified as category C and three trees as category R. The removal of one category C tree and three category R trees would not have any significant impact on the landscape. Tree protection measures are prescribed that will safeguard the long term well being of retained trees.

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Please note that abbreviations introduced in [square brackets] are used throughout this report



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TREE SURVEY

1.0 Scope of Survey

- 1.1 The survey is concerned with the arboricultural aspects of the site only.
- 1.2 The survey was carried out on the 3rd October 2008 by P. J. Ellis.
- 1.3 The planning status of the trees on site was not investigated, however it is understood that the trees are within a Conservation Area and require application to the local planning department to carry out any works to the trees giving six weeks notice.
- 1.4 This survey relates to a proposed development for the construction of a museum on the site of an existing timber building best described as a village hall. For the purposes of this report, these areas will be referred to as 'the site'.
- 1.5 This survey is restricted to trees within the site or those outside the site that may be affected by its re-development. No other trees were inspected.
- 1.6 The survey was carried out following guidelines detailed in British Standard 5837:2005 'Trees in relation to construction - Recommendations' [BS5837]
- 1.7 The trees were inspected on the basis of the Visual Tree Assessment method expounded by Mattheck and Breloer (The Body Language of Trees, DoE booklet Research for Amenity Trees No. 4, 1994).
- 1.8 Any observations made with regard to the condition of built structures are from a lay person's view.

2.0 Survey Method

- 2.1 The survey was conducted from ground level with the aid of binoculars.
- 2.2 No tissue samples were taken nor was any internal investigation of the subject trees undertaken.
- 2.3 No soil samples were taken.
- 2.4 The height of each tree was estimated using a clinometer.
- 2.5 The trunk diameters [SD] of single stemmed trees were measured in millimetres at 1.5m above ground level. Multi-stemmed trees were measured immediately above the root flare.
- 2.6 The crown radii were measured using a laser device and are given for each main compass point: north, east, south and west.

- 2.7 The positions of trees are taken from the provided site plan and are shown plotted on an amended version of that plan at Appendix A – Plan 1.

3.0 The Site

- 3.1 The site is located in the town of Arundel, West Sussex in Mill Road alongside the River Arun next to the public car park. There is an existing wooden building currently used for minor exhibitions and meetings.
- 3.2 The access to the site is via Mill Road into a public car park. In front of the site is a public footpath that will always require public access.
- 3.3 The level site is bordered by the river Arun on the south side, the Old Priory building to the west, Mill Road to the north and a public car park to the east.
- 3.4 Soil depth is not indicated but there is no reason to suppose that it would be inadequate for normal tree root development from observations of mature trees growing in the immediate vicinity. From the British Geological survey the soil is described as silty and sandy soils with gravels.

4.0 Existing Trees

- 4.1 Only trees of significant stature were surveyed and trees with a stem diameter (SD) of less than 75mm have in general been excluded.
- 4.2 Each tree has been assessed in terms of its Arboricultural, landscape, cultural and conservation values in accordance with BS 5837:2005 'Trees in relation to construction' and placed within one of the following categories:

Category R: Trees in such condition that any existing value will be lost within 10 years and which should, in the current context, be removed for reasons of sound Arboricultural contribution (a minimum of 40 years is suggested).

Category A: Trees of high quality and value: in such a condition as to make a significant contribution (a minimum of 40 years is suggested)

Category B: Trees of moderate quality and value: those in such a condition as to make a significant contribution (a minimum of 20 years is suggested).

Category C: Trees of low quality and value which might remain for a minimum of 10 years or young trees with stems less than 150mm diameter.

- 4.3 Whilst the assessment of a trees condition is a subjective process, Table 1 of British Standard 5837: 2005 (see appendix 1a) gives clear guidance on the appropriate criteria for categorizing trees and in, particular, the factors that would assist the Arboriculturalist in determining the suitability of a tree for retention.

Category R criteria from BS 5837:2005 - Table 1:

- *Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable 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 the health and/or safety of other trees nearby (e.g. Dutch elm disease), or very low quality trees suppressing adjacent trees of better quality.*

- 4.4 BS 5837 makes a clear differentiation between trees on development sites and trees in other situations where retention of lower quality trees may be acceptable or possible for the short term:

4.3.4 In the categories, A, B, C, which together deal with trees that should be a material consideration in the development process, the subcategories are intended to reflect arboricultural, landscape and cultural values respectively. Category R trees are those that would be lost in the short term for reasons connected with their physiological or structural condition. For this reason, they should not be a consideration in the planning process.

4.3.7 When assigning trees to any of the categories, the presence of any serious disease or tree-related hazards should be taken into account. If disease is fatal and/or irremediable or likely to require sanitation for the protection of other trees, the trees concerned may need to be categorized as R, even if they otherwise have considerable value. If mechanical defects present an unacceptable risk to people and property, the extent to which the defects are remediable, including the effect that this might have on the tree's remaining value, should indicate whether the tree should still be assigned to the category that it would otherwise merit.

- 4.5 6 trees were identified within the site. 4 additional trees growing in the verge of Mill road in front of the development have also been included because their canopy overhangs the site and their stems and root system could potentially be affected by construction activity. There are no young trees growing on the site.
- 4.6 3 trees were graded as category R and should be removed in the interests of good arboricultural practice.
- 4.7 There were no trees graded as category A.
- 4.8 Six trees were graded as category B. Generally these trees do not have high individual merit however they have some landscape significance and can be expected to thrive for 20 years or more.

- 4.9 One tree was graded as category C. These trees are of low quality or have low individual landscape value but may have some screening value.
- 4.10 The surveyed trees are listed in Appendix A which includes a key and explanatory notes. A tree survey plan based on the existing site plan provided is included as Plan SMW/PE/ANM/002 within Appendix A.

THE DEVELOPMENT

5.0 Development Appraisal

- 5.1 The proposed development will include the demolition of one existing wooden building and the construction of a Heritage Centre of brick construction.
- 5.2 The removal of existing surfacing will be required prior to the construction of new roads and parking bays.
- 5.2 It will be necessary to identify an appropriate location within the site for the positioning of site huts and for the storage of construction materials during the construction period. This has been established on the east side of the site on the edge of the existing car park.
- 5.3 Access to the site for construction traffic will be routed through the access road to the public car park.
- 5.4 No specific information has been provided regarding the positioning of any new underground services.

6.0 Arboricultural Implications Assessment

- 6.1 The primary criterion in arboricultural terms is the retention of as many appropriate trees as is practicable. Quite apart from the requirement to retain some of the existing character, the presence of trees is generally accepted as being beneficial to the environment. The following is an assessment of the effects of the proposed development on existing trees and the future landscape. Full details of recommended works are provided within the schedule of trees at Appendix A. Supervision of this work will be required at the time of work by an arboricultural consultant.

Recommended tree removals for reasons of sound arboricultural management

- 6.2 The removal of three category R trees is recommended as a matter of good arboricultural practice and would be advisable irrespective of these development proposals. The removal of one C category tree is essential to facilitate the construction of the new building as it will be too close and will damage the structure.

Tree pruning required to facilitate development

- 6.3 Some tree pruning works may be required at the construction phase to provide clearance between the proposed buildings and the tree canopy of T8 to allow adequate access for construction activity. The pruning requirements are included in the schedule of trees at Appendix A.
- 6.4 The specified pruning works are relatively minor in nature and will have little, if any effect on the outward appearance of the site but will assist in the future well being of the retained trees.

Tree losses to facilitate the development

- 6.5 The construction of the museum will involve the removal of one tree T9 on the south side of the existing building facing the river. Without its removal it will not be possible to go ahead with the construction.

Encroachment of the Root Protection Area

- 6.6 There will be a potential of encroachment upon the RPA of T8, a Horse Chestnut where the roots are considered to exist under the existing wooden structure. I understand that the foundations for the new building will be pile and beam limiting potential damage to roots from foundations. However care will be required during the excavation of the piles and the exact position of roots will need to be identified prior to excavation to select suitable points to excavate for the piles. The equipment being used will need to be of such a size that it will not damage the crown of this tree and some branches may require removal. Excavating by hand is recommended when ever possible over the RPA of T8. The surface area will also require protection to avoid compaction of the existing soil. Supervision of this work will require the assistance and advice of a Arboriculturist to ensure damage is limited
- 6.7 The removal of the existing hard surfaces within RPAs could cause damage to any roots under the existing surface and as a precaution it will be essential to apply robust and effective protection measures to ensure that roots are adequately safeguarded.
- 6.8 Whilst most of the vehicular traffic connected with this development will be restricted to the existing public car park, it will be necessary for pedestrians to pass within the root protection areas. To avoid significant damage to roots it will be necessary for the soil surface in these areas to be protected from disturbance, compaction or contamination by toxic materials throughout the period of construction.

Potential for Damage to Tree Trunks

- 6.9 Due to the proximity of the proposed building to the remaining trees there is a risk of direct physical damage to the trunk of the trees during the construction process and its related activity. There should be no construction activity in this area or storage of materials.

Landscaping

- 6.10 These proposals allow the retention of all the most significant trees on the site and the effect on the landscape will not be significant. There is some limited scope for planting trees to replace the category R trees that are to be removed for arboricultural reasons and to facilitate the construction. The new trees will introduce much needed age diversity that will ensure long term tree cover at the site.

Underground services

- 6.11 Whilst no specific information has been provided regarding services it is anticipated that installation of new underground services can be achieved without passing through, or close to, the root protection areas of retained trees.

Future Pressures/ Shading

- 6.13 The existing trees to the inevitably cause some shading to the new building. There will be uninterrupted daylight from the east and south. Shading will occur from the north and west side as the sun moves during the day and the separation between tree canopies and the building will allow significant amounts of daylight through to habitable rooms.
- 6.14 In addition, the recommended pruning specified in the schedule of trees at Appendix A, will further increase light levels to the buildings.
- 6.15 I consider that the relationship between the development and retained trees to be tenable and similar to that being enjoyed by many similar developments in the area. I do not foresee any significant post development pressures for the removal or inappropriate pruning of retained trees
- 6.16 Due to the presence of trees on site and off site it would be prudent to design the rainwater collection system to allow easy maintenance such as meshed grill caps or easily cleanable traps to down pipes for leaf collection. It is important that these be checked during leaf fall and after to prevent flooding into the buildings.

7.0 TREE PROTECTION MEASURES

Root Protection Area

- 7.1 BS5837 provides guidance within paragraph 5.2 for the calculation of root protection areas [RPAs] of those trees to be retained. The RPA is the recommended area in square metres that should be left undisturbed around each tree to ensure that excessive damage to its roots or rooting environment is avoided.
- 7.2 In the case of open grown trees with an even, radial root distribution it would normal for the boundaries of the RPA to be equidistant from the trunk of the tree. However, BS5837 acknowledges that the disposition of tree roots can be significantly affected by a number of factors and that the actual position of the

RPA will be influenced by specific tree and site factors. These factors are to be assessed by the arboriculturist and appropriate adjustments to the siting of the RPA made.

- 7.3 The RPA for the retained tree is shown at Appendix B - Plan SMW/PE/ANM/001 as red dashed circles. No offsetting or adjustment for site features is shown.

Tree Protection Barriers

- 7.4 BS5837 requires that the RPA of all retained trees are protected from the effects of development by the installation of protective barriers.
- 7.5 It should be noted however, that the position of these barriers may also be influenced by the presence of any tree canopies that extend beyond the RPA and that could be damaged by construction works or where it is desirable to protect areas for future tree planting.
- 7.6 The protective barriers demarcate the 'Construction Exclusion Zone' [CEZ] and should be installed prior to the commencement of any construction works, including clearance or demolition. They should be maintained for the duration of the works. All weather notices should be erected on the barriers with words such as 'Construction exclusion zone – Keep out'. Protective barriers should be in accordance with Figure 2 of BS5837 (or similar accepted), a copy is included as Appendix C.
- 7.7 The position of protective barriers and the boundary of the CEZ are shown as a dashed blue line in Plan 2 at Appendix B.
- 7.8 The area within the CEZ is to be regarded as sacrosanct and protective fences and barriers should not be taken down without the written approval of the Local Planning Authority, or where present, the supervising Arboricultural Consultant.

Ground Protection

- 7.9 Where it is necessary, for the construction operation, to permit vehicular or pedestrian access within the RPA, for example to erect scaffolding, retained trees should be further protected by a combination of barriers and ground protection in accordance with Figure 3 in BS 5837. A copy is included at Appendix D.
- 7.10 Ground protection should be of sufficient strength and rigidity to prevent disturbance or compaction to the soil underneath (e.g. Ground-Guards supplied by *GreenTek* – 0113 267 6000 www.groundprotection.co.uk).
- 7.11 Contamination of the soil by any substances should be prevented by the use of geotextile fabric.
- 7.12 The position of ground protection is shown as a pale blue block on Plan 2 at Appendix B.

- 7.13 Where existing hard surfaces can be retained intact within root protection areas it is possible for these surfaces to be retained for the duration of the construction works and used as ground protection. It is essential, however, that the surface does not break up and permit damage to be caused to roots underneath, or that any toxic substances are permitted to pass to the soil beneath.
- 7.14 If the existing surface is to be retained for use as ground protection it should only be removed as part of the post-construction landscaping of the site.
- 7.15 Where any existing hard surface within the RPA is to be removed entirely for landscaping purposes it should be carried out in accordance with the method statement at Appendix E. General stripping of the hard surface and underlying soil must be avoided. Once the hard surface is removed the area must be protected from construction damage by appropriate barriers as described in paragraphs 7.4 to 7.8.

Protection of Tree Stems and Root Buttresses

- 7.16 Where the stems of trees are close to the area of construction activity they may require additional protection to prevent direct physical damage from machinery and vehicles.
- 7.17 This protection should take the form of a robust vertical barrier constructed from strong timber or scaffolding. It should be securely fixed in a position that allows a minimum gap of 300mm between the barrier and the stem and buttresses of the tree. The barrier should be at least 2m high and should afford protection from any direction from which the risk of injury may arise.
- 7.18 Where the risk of damage to tree stems is from high sided vehicles, it may be necessary to provide protection to a height equal to that of the vehicles that will be employed in the delivery of construction materials.
- 7.19 It is normal for there to be a concentration of larger roots in close proximity to the tree trunk, therefore great care should be exercised with the installation of any supports for protective barriers that penetrate the soil. During the erection of protective barriers it may be necessary for the position of any supports to be adjusted to avoid damage to significant roots.

Cranes and Excavators

- 7.20 Particular care and planning is necessary to accommodate the operational arcs of excavation, unloading and lifting machinery, including their loads, especially large building components such as beams and roof trusses. Operations like these have the potential to cause incidental damage to trees and logistical planning is essential to avoid conflicts.
- 7.21 Therefore, any transit or traverse of plant and materials in close proximity to trees should be conducted under the supervision of a banksman to ensure that adequate clearance from trees is maintained at all times.

General Tree Protection Measures

- 7.22 Do not raise or lower soil levels or strip topsoil around trees - even temporarily.
- 7.23 Avoid disturbing the natural water table level.
- 7.24 Do not light fires near trees.
- 7.25 Do not attach notice boards, telephone cables or other services to any part of a tree.
- 7.26 No construction materials should be stored within root protection areas. Toxins such as diesel, petrol or cement should be suitably stored to prevent such substances leaching into the soil.
- 7.27 In addition to protecting existing trees, BS 5837 recommends that areas of the site in which new or replacement tree planting is proposed should also be protected from the effects of construction. There is ample space within those areas already identified as 'construction exclusion zones' for post development tree planting and landscaping and it is not necessary to specifically protect additional areas for this purpose.

ARBORICULTURAL METHOD STATEMENT

8.0 Preliminary Works

- 8.1 Prior to the commencement of any other works the tree removal and pruning specified in Appendix A should be carried out by an appropriately qualified tree contractor.
- 8.2 Tree protection barriers, ground protection and additional protection for the stems of T7, and T8 as detailed in section 7, in conjunction with Plan 2 of Appendix B, should be installed prior to the commencement of any site clearance or construction works.
- 8.3 The removal and replacement of existing hard surfaces within root protection areas [RPA] presents a potential risk of damage to roots that may be found growing immediately below existing base levels. Trial holes should be dug to determine the depth of existing hard surfaces and the position of roots. Particular care needs to be taken over the RPA of T2, T3, T4 and T8 the Horse chestnut as its roots will be under the new structure in part. Any works must be carried out with due care and kept to a minimum, hand excavation is recommended. This area is shaded yellow on the drawing and is great care is required so as not to damage roots in that area. Ground shall not be compacted and further advice can be found in appendix E of this report.
- 8.4 The demolition of any existing structures, site clearance and removal of existing hard surfaces within RPAs should be carried out in accordance with the method statement at Appendix E. General stripping of the hard surface and underlying soil must be avoided. Once hard surfaces are removed the area must be protected from construction damage by appropriate barriers and/or ground protection as described in paragraphs 7.4 to 7.13 of this report.

- 8.5 The excavation of holes for piling shall be carried out with great care. Firstly identifying the location of any roots greater than 25mm in diameter by hand excavation. Location of holes to be adjusted to eliminate damage to roots. Arboricultural Supervision required at this stage to advice on reducing damage to roots.
- 8.6 The position of any site huts, materials storage and any on site car parking for contractors should be clearly identified. The preferred location, from an arboricultural perspective, of site huts and materials storage is on the east side of the site on the edge of the public car park, shown in Plan 2, Appendix B.
- 8.7 Tree protection measures shall remain in place until completion of the development and may only otherwise be removed to facilitate any post development landscaping.

9.0 Installation of Access

- 9.1 The removal of the existing surfaces within RPAs should be carried out in accordance with the method statement at Appendix E. Any excavations below the existing base course should be avoided. Where an existing hard surface is to be replaced by new surface existing base levels should be left undisturbed other than for the minor levelling of irregularities.
- 9.2 It is essential that new surfaces within RPAs are constructed on top of any existing soil levels using permeable materials; this process is commonly referred to as a 'no dig' construction. The principles of this type of construction are explained in the Arboricultural Information and Advisory Service's publication APN1 'Driveways Close to Trees' (1996). The construction should incorporate recent improvements in low invasive access design and the use of a three-dimensional cellular confinement system. A method statement that follows the principles of APN1 and cellular confinement systems is included at Appendix F. Further, specific guidance can be provided if and when required.

10.0 Underground Services

- 10.1 We have seen no information regarding the installation of underground services and it is assumed that installation of services can be achieved with out trespassing within RPAs of retained trees.
- 10.2 Should the installation of underground services within a RPA be unavoidable, it is essential that it is carried out in accordance with National Joint Utilities Group Volume 4: Issue 1:08/10/2007 'Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees' [formally NJUG10] and under the supervision of the Arboriculturist.

11.0 Arboricultural Supervision

- 11.1 The installation of tree protection measures should be supervised by an appropriately experienced Arboriculturist who should be appointed to monitor the observance of those measures for the duration of the development.

- 11.2 The Arboriculturist should directly supervise any works that have to be undertaken within RPAs. These include the removal of any hard surfacing, the installation of any underground services and the construction of any new footpaths or hard surfaces.
- 11.3 The Arboriculturist should make regular site inspections and keep a written log of the results of those inspections. Any contraventions of the tree protection measures or other incident that may prejudice the well being of retained trees shall be brought to the attention of the site manager in the form of a written report. Copies of the inspection log and any contravention reports will be available at the site for inspection by the Local Planning Authority at all times.
- 11.4 The Arboriculturist should be informed immediately of any accidental damage made to trees and make written recommendations to rectify damage.

CONCLUSION

- 12.1 These development proposals have been assessed in accordance with British Standard 5837: 2005 'Trees in relation to construction'
- 12.2 Tree removals are required to facilitate the development. A very limited amount of crown pruning will however be required to ensure adequate clearance of the proposed buildings and to allow machinery and scaffolding to be used on the site.
- 12.3 All the retained trees will be protected from the effects of development by means of appropriate protective barriers and ground protection throughout the duration of the works.
- 12.4 The observance of the Arboricultural Method Statement, together with any additional guidance from the Arboriculturist will ensure the successful integration of these proposals with the retained trees.
- 12.5 No irresistible post-development pressures are anticipated that would oblige the Local Planning Authority to give consent to inappropriate tree works in the future.
- 12.6 In consideration of the information provided and my own site observations I am satisfied that the proposals for this site are arboriculturally sound and that the long term well being of retained trees will be safeguarded in a sustainable manner.

RECOMMENDATIONS

- 13.1 The seven category R trees, T1, T6 & T10 within category R as defined by British Standard 5837: 2005 and should be removed for arboricultural reasons. One category tree C T9 should be removed to facilitate the development.
- 13.2 Pruning works as specified in the schedule of trees should be carried out both in the interests of sound arboricultural management and, where required, to avoid damage to trees during construction.

- 13.3 The tree protection measures detailed in this report should be implemented and supervised by an appropriately experienced Arboriculturalist.
- 13.4 Appropriate post development landscaping proposals should be implemented to ensure sustained, effective tree cover on the site.

The statements in this Report do not take account of the effects of extremes of climate, vandalism or accident, whether physical, chemical or fire. Phillip Ellis cannot therefore accept any liability in connection with these factors, nor where prescribed work is not carried out in a correct and professional manner in accordance with current good practice. The authority of this Report ceases at any stated time limit within it, or if none stated after two years from the date of the survey or when any site conditions change, or pruning or other works unspecified in the Report are carried out to, or affecting, the subject tree(s), whichever is the sooner

Appendix A – Schedule of trees

Tree reference number	Species	Height m	Stem diameter mm	Branch spread m	Height of crown clearance m	Age Class	Physiological condition	Structural condition	Preliminary management recommendations/ comments	Estimated remaining contribution years	Cat. grading
T1	Lime	12	1000	N 4.5 S 4.3 W 4.5 E 5	1.5	M	Poor	Fair	Regrown stump, Multistem (10). Remove, tree has no long term benefit.	<10	R
T2	Lime	19	670	N 5.5 E 4.7 S 4.3 W 5.8	3	M	Fair	Fair	Highway tree in grass verge	<40	B1
T3	Lime	18	620	N 6.4 E 4.7 S 6.2 W 6.2	3	M	Fair	Fair	Highway tree in grass verge	<40	B2
T4	Lime	19	620	N 6.5 E 4.8 S 4.7 W 5.1	3	M	Fair	Fair	Highway tree in grass verge	<40	B2
T5	Lime	22	700	N 6 E 6 S 4.6 W 5.2	3	M	Fair	Fair	Highway tree in grass verge. Minor deadwood	<40	B2
T6	Lime	21	560	N 4.1 E 5.4 S 2.8 W 4.2	1.5	M	Poor	Poor	Exposed bark from buttress 3.2 m long occluding. Remove for arboricultural reasons.	<10	R
T7	Lime	21	510	N 3.7 E 1.4 S 4.8 W 4.2	1.5	M	Poor	Poor	Weak fork and thin crown	<10	B2

Tree reference number	Species	Height m	Stem diameter mm	Branch spread m	Height of crown clearance m	Age Class	Physiological condition	Structural condition	Preliminary management recommendations/ comments	Estimated remaining contribution years	Category grading
T8	Horse Chestnut	21	1180	N 7.2 E 6 S 5.5 W 5.6	2	M	Fair	G	Infested with leaf miner that could cause decline, minor deadwood. Root place lifting stone paving. Lift crown as required to clear building and equipment used in the construction.	<40	B2
T9	Sycamore	15	530	N 4 E 6 S 5.5 W 5.6	2.5	M	Fair	Fair	Self sown tree against existing building damaging roof. Dead ivy in crown. Remove tree to allow construction.	<20	C2
T10	Hawthorn	6.5	900 Multistem (3)	N 1.5 E 4.5 S 2.5 W 3.2	1.5	M	P	Poor	Crown covered in ivy difficult to access stem. Remove for arboricultural reasons	<10	R

Appendix A - Key

1. **Tree No:** Relates to individual tree numbers on a plan or, where used, tags on trees or groups of trees. The prefix indicates whether the tree or trees are an individual, a group, a woodland or a hedge (T, G, W or H)
2. **Species:** The name given is the 'common name'. Where Latin names are given they are shown in *italics*
3. **SD:** Trunk diameter at 1.5 metres ('breast height') above ground level, given in millimetres. In the case of multi-stemmed trees (ms) the stem diameter is taken just above the root flare
4. **H (Height)** The height measured in metres with the aid of a clinometer
5. **R (Crown radius)** The average crown spread taken from the centre of the trunk to the tips of the live lateral branches given in metres. May be given as separate measurements following the compass points N-E-S-W.
6. **Age:**
 - Y Young
 - MA Middle aged - 1/3 to 2/3 life expectancy
 - M Mature - over 2/3 life expectancy
 - OM Over-mature - fully mature, past peak condition and beginning to decline
 - V Veteran - trees of interest biologically, aesthetically or culturally because of significant age.
7. **PC:** Physiological Condition – An assessment of the health and vigour of the tree compared with what would normally be expected of the species:
 - G Good
 - F Fair
 - P Poor
 - D Dead
8. **Comments:** Comments have been made in relation to the following:
 - Health or condition
 - Structural defects/safety
 - Aesthetics
 - Future potential
 - Relationship to other trees or features
 - Extent of ivy growth, if present
 - Any other relevant details
9. **Recommendations:** Preliminary management recommendations in relation to the proposed development are made where appropriate. These may include remedial tree works that are deemed necessary to improve the quality of the tree or for safety reasons. Recommended tree works will be required to be in accord with British Standard 3998:1989 Tree Work [BS3998].
10. **Life Expectancy:** an estimate of the future life expectancy of the tree(s) in the present setting given normal circumstances, given in years (< = less than > = greater than).
11. **BS5837 Category:** A qualitative assessment of the tree based on criteria detailed in BS5837:2005 Table 1.
 - R: Trees for removal
 - A: Those of high quality and value
 - B: Those of moderate quality and value
 - C: Those of low quality and value

Please note that trees are living organisms and their condition is subject to change over time. Assessments are based on their condition on the day of inspection and cannot cover unforeseen circumstances.

Table 1 — Cascade chart for tree quality assessment

TREES FOR REMOVAL				
Category and definition	Criteria			Identification on plan
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	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable 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 the 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).			DARK RED
TREES TO BE CONSIDERED FOR RETENTION				
Category and definition	Criteria — Subcategories			Identification on plan
	1 Mainly arboricultural values	2 Mainly landscape values	3 Mainly cultural values, including conservation	
Category A Those of high quality and value: in such a condition as to be able to make a substantial contribution (a minimum of 40 years is suggested)	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 or 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)	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)	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 numbers, 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	MID BLUE
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 150 mm	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	GREY
	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 150 mm should be considered for relocation.			

Appendix B – Root Protection Areas (RPA) of Retained Trees

No	Species	SD	RPA (m ²)	RPA Radius (m)
T1	Lime	1000	452	12
T2	Lime	670	203	8
T3	lime	620	174	7
T4	Lime	620	174	7
T5	Lime	700	222	8
T7	Lime	510	1187	6
T8	Horse chestnut	1180	630	14

Notes:

Root Protection Area radii are rounded to the nearest 0.5m

Stem diameters (SD) are measured at 1.5 metres ('breast height') above ground level, given in millimetres. In the case of multi-stemmed trees (ms) the stem diameter is taken just above the root flare in accordance with BS 5837: 2005.

Appendix C Protective Barriers [BS 5837:2005 Figure 2]

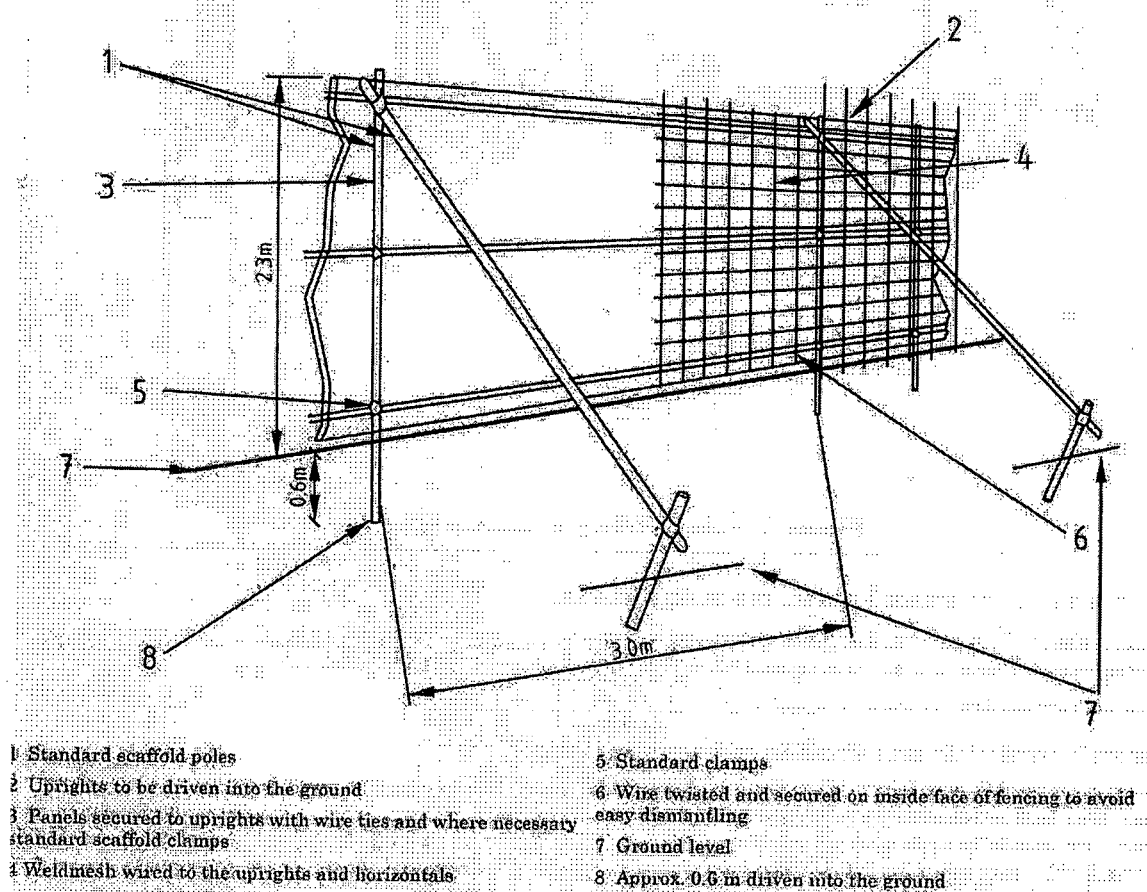


Figure 2 — Protective barrier

Appendix D

Scaffolding within a Root Protection Area [Figure 3, BS 5837: 2005]

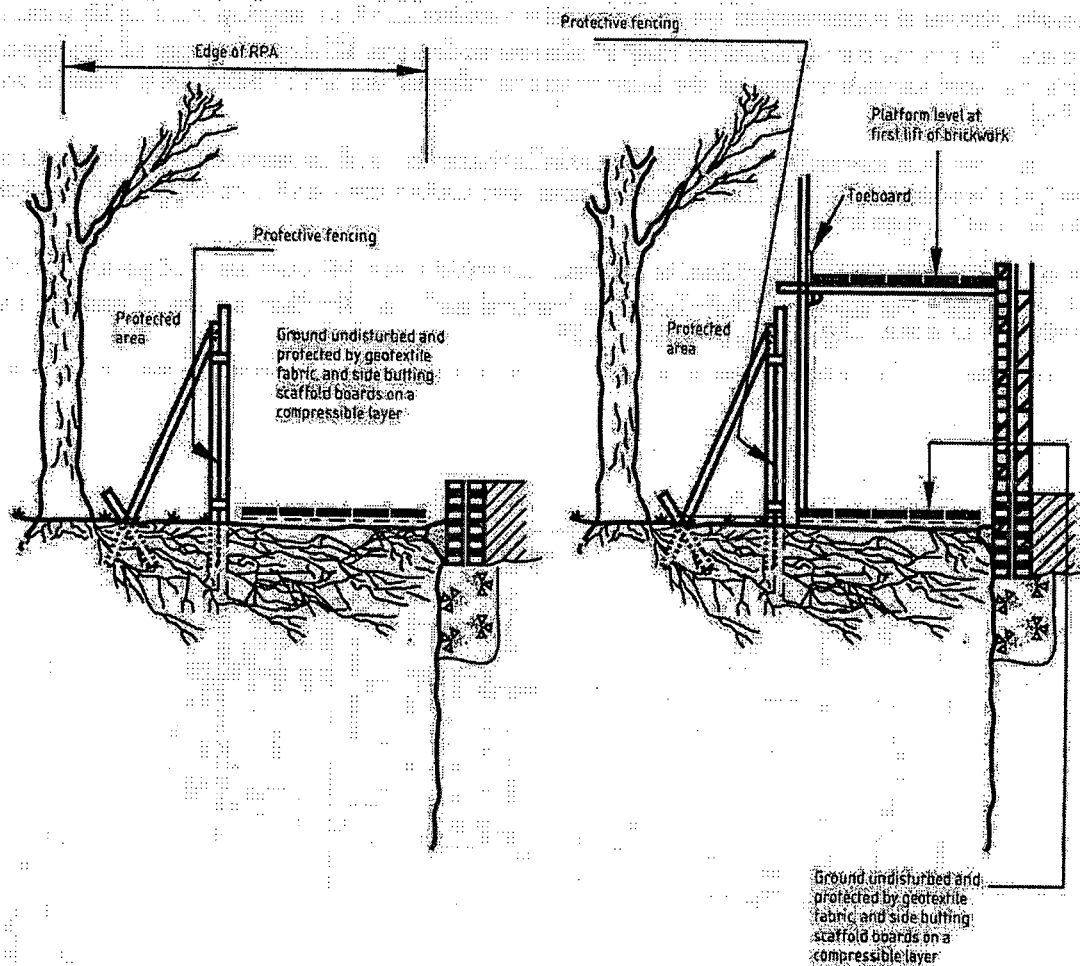


Figure 3 — Scaffolding within the RPA

Appendix E

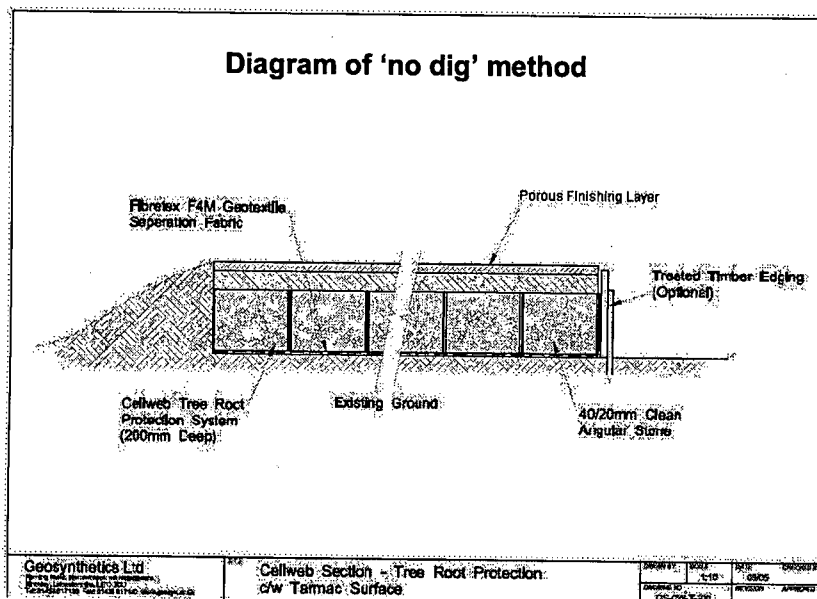
Method Statement for the removal of hard surfacing and buildings near trees

[RPA refers to the Root Protective Area as specified in the Report, derived from paragraph 5.2.2 of British Standard 5837:2005 'Trees in relation to construction – Recommendations']

1. The uptake of the existing surface and buildings should be carried out from outside the RPA whenever possible and from within the footprint of the existing surfacing or building where this is within the RPA of a tree.
2. The excavation of the material must not extend into the soil underneath. In practical terms the bucket of the excavator must be used so that the cutting edge is horizontal so that any disturbance of the underlying soil is kept to an absolute minimum. The cutting edge of the bucket should be flat and without 'teeth' to further reduce the risk of root damage. Where the surfacing is very thin and/or roots are very near the surface, the digging should be done manually.
3. The rubble must not be stockpiled within the RPA of the tree and must be exported without crossing the RPA.
4. Due care and planning must be taken to ensure that the operational arcs of excavators do not damage the crowns of retained trees.
5. Where new surfacing is to be installed, if the depth of the old surface is insufficient, the wearing surface may need to be higher than existing in order to accommodate the appropriate thickness. There may be a requirement for a geo-textile membrane to be laid on the soil surface, but this is an engineering matter dependent upon soil type. The separation is beneficial for root development.
6. Where the old surface is taken up and not replaced, the infill should be of good quality topsoil laid without compaction.

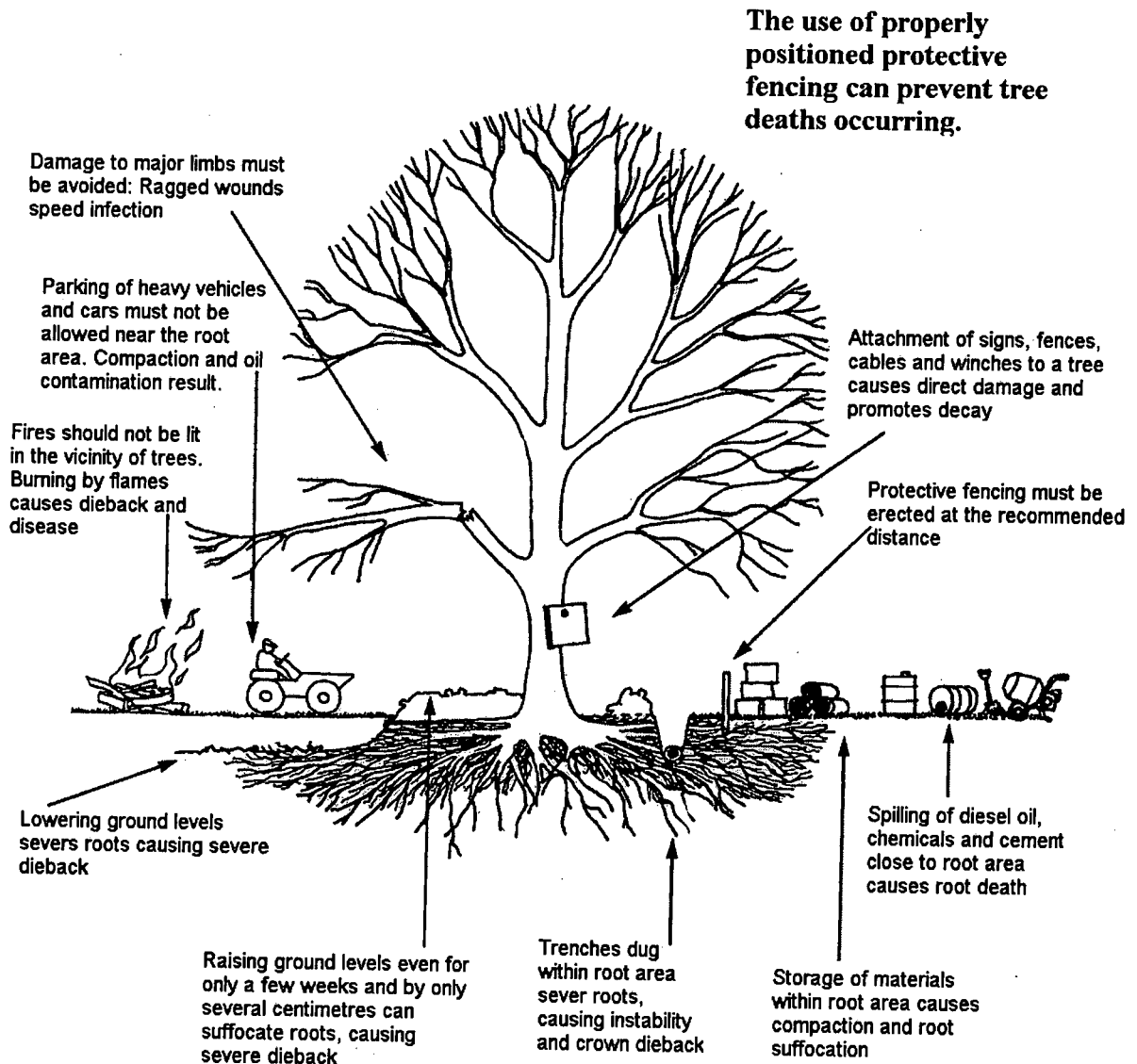
Appendix F**Installation of driveways close to trees using the 'No Dig' method and a cellular confinement system**

1. Remove surface vegetation using a systemic herbicide and gather dead organic material. Care must be taken to select (by reading the product label) a herbicide that will not affect the roots of retained trees and vegetation. This must be carried out by an appropriately trained operative.
2. Remove major protrusions such as rocks and stumps (stumps should be ground out to minimise ground disturbance).
3. Any exposed roots should be covered with good quality top soil immediately to prevent them drying out. Any damaged roots should be cut cleanly with a hand saw or secateurs.
4. Fill significant hollows with sharp sand.
5. Install the non woven 'Geotextile' directly on top of the finished soil grade level to provide protection to and separation from the soil level.
6. Lay the three dimensional 'Geogrid' directly onto the soil over the whole of the driveway or parking area.
7. Install kerbs or edgings directly on top of the existing soil grade level. For light structures a treated peg and edging board may be acceptable. For more substantial construction railway sleepers, drilled kerbstones or gabians should be used and held in place with track or road pins.
8. Cover the geogrid with a minimum of 100mm of aggregate (DoT Type1). This should be placed near one end and spread along the geogrid so that machinery only moves on the laid sub-base. The aggregate should not be tipped straight onto the geogrid.
9. Compact the sub-base to ensure binding with the geogrid and to minimise future rutting of the surface.
10. Install temporary surface if necessary
11. Install final surface which should be permeable and gas porous. Where brick paviors are used these should be laid on a dry bed and should not be pointed/grouted.



Appendix G

Common causes of Tree Death



Please use copies of this as an on-site poster for personnel



ARBORICULTURAL METHOD STATEMENT

8.0 Preliminary Works

- 8.1 Prior to the commencement of any other works the tree removal and pruning specified in Appendix A should be carried out by an appropriately qualified tree contractor.
- 8.2 Tree protection barriers, ground protection and additional protection for the stems of T7, and T8 as detailed in section 7, in conjunction with Plan 2 of Appendix B, should be installed prior to the commencement of any site clearance or construction works.
- 8.3 The removal and replacement of existing hard surfaces within root protection areas [RPA] presents a potential risk of damage to roots that may be found growing immediately below existing base levels. Trial holes should be dug to determine the depth of existing hard surfaces and the position of roots. Particular care needs to be taken over the RPA of T2, T3, T4 and T8 the Horse chestnut as its roots will be under the new structure in part. Any works must be carried out with due care and kept to a minimum, hand excavation is recommended. This area is shaded yellow on the drawing and is great care is required so as not to damage roots in that area. Ground shall not be compacted and further advice can be found in appendix E of this report.
- 8.4 The demolition of any existing structures, site clearance and removal of existing hard surfaces within RPAs should be carried out in accordance with the method statement at Appendix E. General stripping of the hard surface and underlying soil must be avoided. Once hard surfaces are removed the area must be protected from construction damage by appropriate barriers and/or ground protection as described in paragraphs 7.4 to 7.13 of this report.
- 8.5 The excavation of holes for piling shall be carried out with great care. Firstly identifying the location of any roots greater than 25mm in diameter by hand excavation. Location of holes to be adjusted to eliminate damage to roots. Arboricultural Supervision required at this stage to advice on reducing damage to roots.
- 8.6 The position of any site huts, materials storage and any on site car parking for contractors should be clearly identified. The preferred location, from an arboricultural perspective, of site huts and materials storage is on the east side of the site on the edge of the public car park, shown in Plan 2, Appendix B.
- 8.7 Tree protection measures shall remain in place until completion of the development and may only otherwise be removed to facilitate any post development landscaping.

9.0 Installation of Access

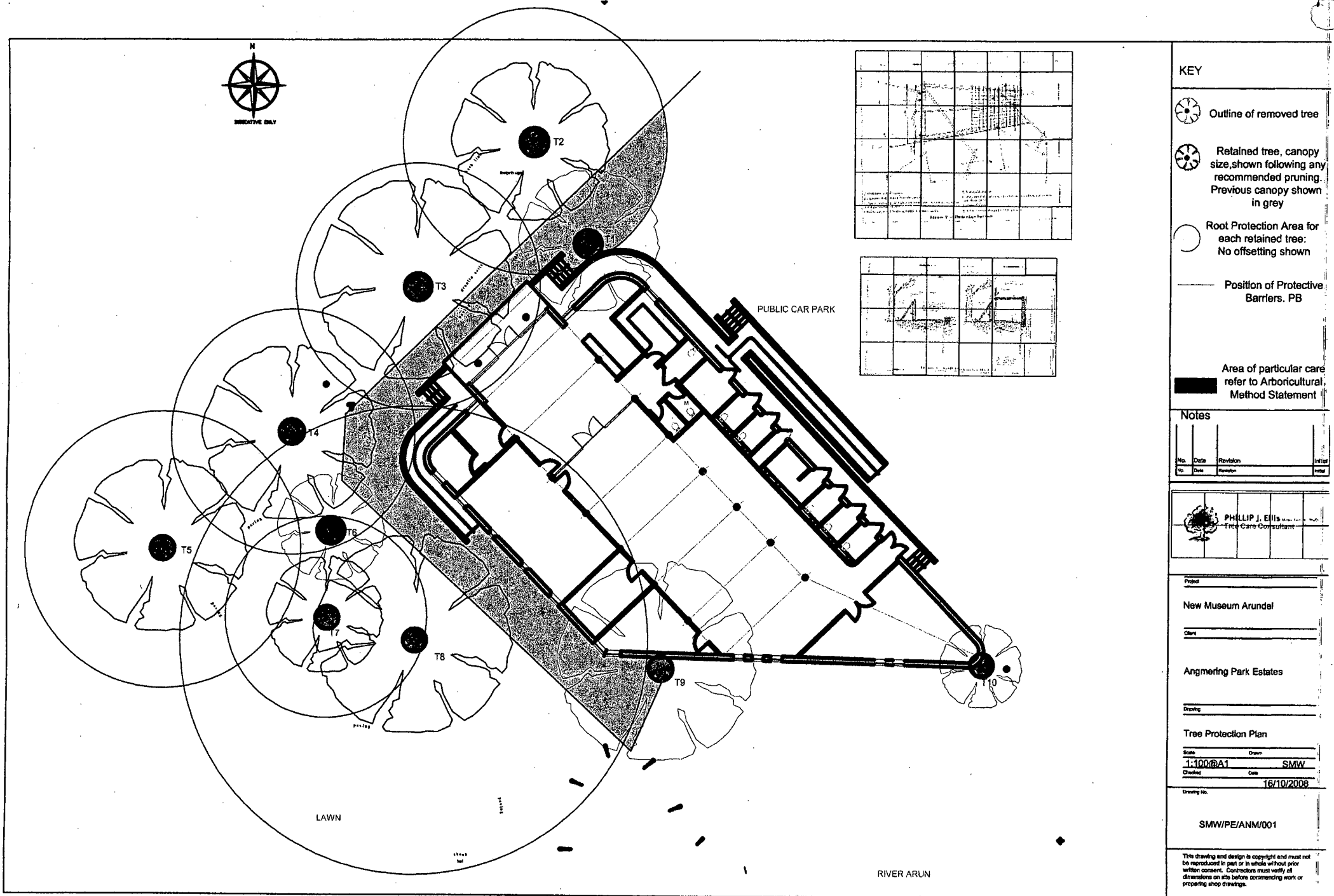
- 9.1 The removal of the existing surfaces within RPAs should be carried out in accordance with the method statement at Appendix E. Any excavations below the existing base course should be avoided. Where an existing hard surface is to be replaced by new surface existing base levels should be left undisturbed other than for the minor levelling of irregularities.
- 9.2 It is essential that new surfaces within RPAs are constructed on top of any existing soil levels using permeable materials; this process is commonly referred to as a 'no dig' construction. The principles of this type of construction are explained in the Arboricultural Information and Advisory Service's publication APN1 'Driveways Close to Trees' (1996). The construction should incorporate recent improvements in low invasive access design and the use of a three-dimensional cellular confinement system. A method statement that follows the principles of APN1 and cellular confinement systems is included at Appendix F. Further, specific guidance can be provided if and when required.

10.0 Underground Services

- 10.1 We have seen no information regarding the installation of underground services and it is assumed that installation of services can be achieved with out trespassing within RPAs of retained trees.
- 10.2 Should the installation of underground services within a RPA be unavoidable, it is essential that it is carried out in accordance with National Joint Utilities Group Volume 4: Issue 1:08/10/2007 'Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees' [formally NJUG10] and under the supervision of the Arboriculturist.

11.0 Arboricultural Supervision

- 11.1 The installation of tree protection measures should be supervised by an appropriately experienced Arboriculturist who should be appointed to monitor the observance of those measures for the duration of the development.
- 11.2 The Arboriculturist should directly supervise any works that have to be undertaken within RPAs. These include the removal of any hard surfacing, the installation of any underground services and the construction of any new footpaths or hard surfaces.
- 11.3 The Arboriculturist should make regular site inspections and keep a written log of the results of those inspections. Any contraventions of the tree protection measures or other incident that may prejudice the well being of retained trees shall be brought to the attention of the site manager in the form of a written report. Copies of the inspection log and any contravention reports will be available at the site for inspection by the Local Planning Authority at all times.
- 11.4 The Arboriculturist should be informed immediately of any accidental damage made to trees and make written recommendations to rectify damage.



KEY

- Outline of removed tree
- Retained tree, canopy size, shown following any recommended pruning. Previous canopy shown in grey
- Root Protection Area for each retained tree. No offsetting shown
- Position of Protective Barriers, PB

Area of particular care refer to Arboricultural Method Statement

Notes

No.	Date	Drawn	Initial
1	16/10/2008	SMW	

Project
New Museum Atundel

Client
Angmering Park Estates

Drawing
Tree Protection Plan

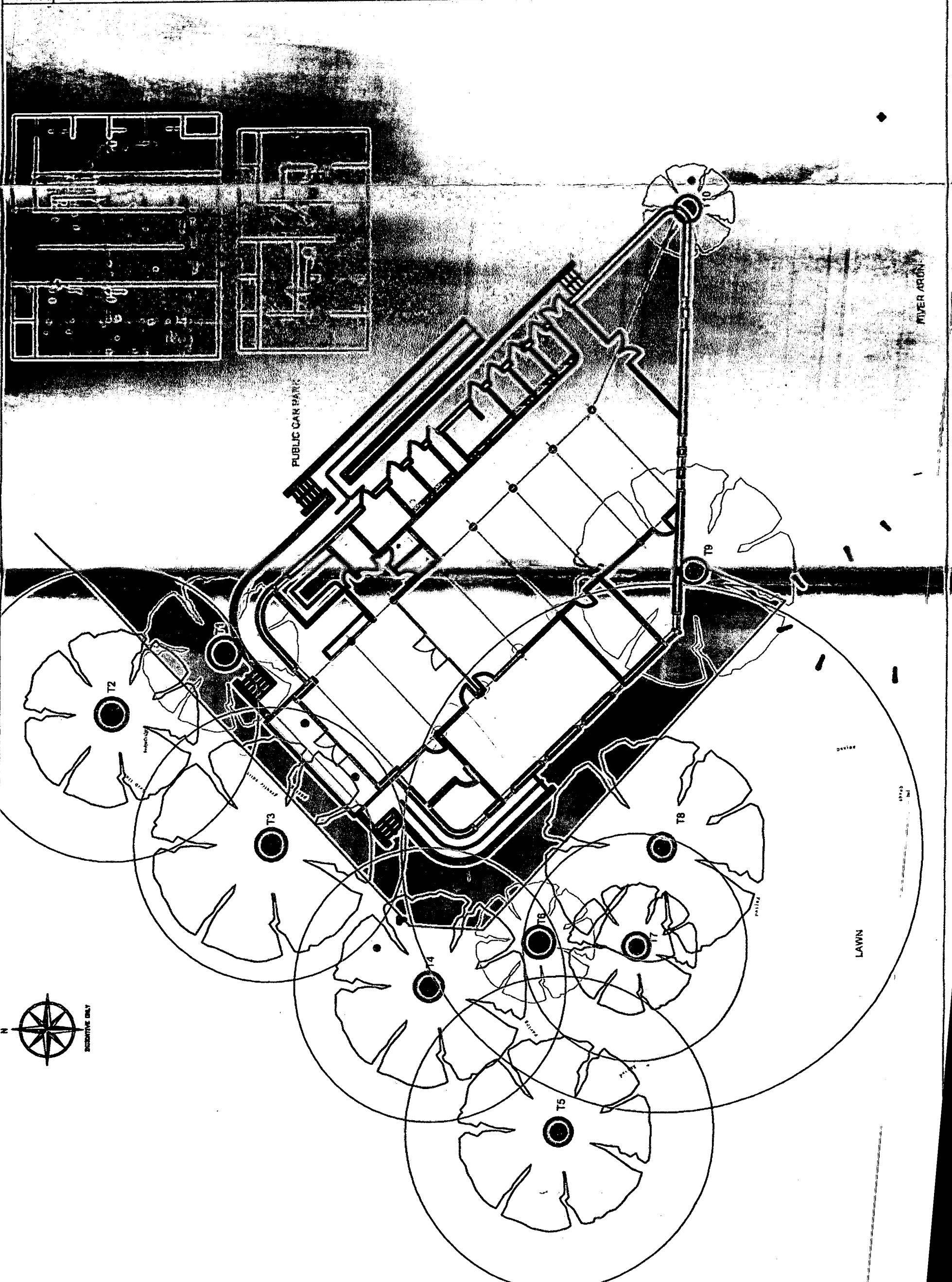
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Drawn
SMW

Check'd
16/10/2008

Drawing No.
SMW/PE/ANM/001

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MYER ARON