ARTHUR ARBON
Tree Advisory Services Ltd.

Tree survey schedule for development sites, including Root Protection Area (RPA) requirements

British Standard 5837:2005 Trees in relation to construction - Recommendations

Trees in Tree Preservation (Manor Road, Bottesford) Order 1989

Site:	10 Manor Road, Bottesford, Scunthorpe, North Lincolnshire
Client:	Mr A McPheat, 11 Leefair Gardens, Scunthorpe, N Lincolnshire, DN17 2RG
Date of survey:	16 September 2008

Notes on British Standard 5837: 2005 *Trees in relation to construction – Recommendations*

The revised British Standard was considered at a seminar on 26 January 2006, organised by the Midlands Branch of the Arboricultural Association to provide guidance on the implications of the updated document. The meeting was addressed by the chairman and members of the committee that carried out the revision.

Emphasis was placed on the scope of the BS, in that it gives recommendations and guidance on the principles to be applied to achieve a satisfactory juxtaposition of trees, including shrubs, hedges and hedgerows, with structures. It follows, in sequence, the stages of planning and implementing the provisions that are essential to allow development to be integrated with trees.

Item 3.2, Implementation, says that the BS provides guidance for a balanced approach on deciding which trees are appropriate for retention, on the effect of trees on design considerations and on the means of protecting these trees during development.

It was pointed out by the speakers that in Item 4.2.1, Tree Survey, that this should be undertaken by an arboriculturalist.....**independently of and prior to** any specific design for development taking place. By following the procedures set out in the BS information will be provided to a client that should be used in a design layout.

The BS requires trees to be categorised A, B, C and R, as shown in the document's Cascade Chart for tree quality assessment. All speakers were of the opinion that by following the classification procedure the better trees, rated A and B, would be retained, a number of poorer quality category C trees would be lost, and trees rated as R would be removed prior to development taking place. It was expressed that overall fewer trees would be retained than in the past (Item 6.1, General, refers), and emphasis was given to the need for new planting.

The Cascade Chart states that C category trees will usually not be retained where they would impose a significant constraint on development.

One main requirement is the need to provide trees with Root Protection Areas (RPAs). This does not, however, suggest the minimum distance that construction can be positioned adjacent to trees. Trees do not have to be in the centre of the root protection area, providing a sensible arboricultural assessment is made of the position of the tree in relation to available space.

For an individual open grown tree it may be acceptable to offset the RPA distance by up to 20% in one direction only. Item 5.2.4a of the BS refers.

Protection of the soil for planting areas is required.

Further reference to the British Standard may be necessary, particularly at the design stage.

1. General description of site and surroundings

An older bungalow stands back from Manor Road on a long, narrow piece of land.

On the eastern side of the property are a number of trees in the Tree Preservation Order. Some are in the garden of the subject property and others are in neighbouring gardens of newer bungalows.

Since the TPO was made in 1989 not all the trees remain.

2. Brief

a. To provide an arboricultural report on the condition of the trees on the proposed development site and, where appropriate, to give information on the protection of trees that are considered suitable for retention. The information provided to the client, or his design team, should be incorporated into the preparation of a layout plan prior to its submission for planning consent.

b. To provide information where trees on adjoining land could be affected by the proposed development

c. To provide information from the British Standard regarding the Root Protection Areas (RPA) for the trees and for calculated areas for the construction exclusion zones intended to prevent unnecessary root severance and damage whilst building works are in progress.

d. To provide a site drawing showing the RPAs

e. To provide advice for appropriate management and make recommendations for work required on the trees to alleviate the possible risk of their causing injury/damage to people and/or property.

In making assessments of risk and in recommending work a presumption has been made towards safety, as this is required by both British and European Union law.

f. To provide recommendations for suitable planting and ground protection in such areas. (Fuller information can be provided when the layout has been determined.)

g. To provide preliminary information on the construction of an access, using a cellular confinement system laid at ground level (no-dig driveway method), taking into account the information in BS 5837 and "Driveways Close to Trees" published the Arboricultural Advisory and Information Service in 1996, in their copyright series "Trees in focus".

h. As the trees are the subject of a Tree Preservation Order, (attached document General Procedures and Guidance for Implementing Tree Work refers), to give reasoning for the recommended work on the trees to enable it to be fully considered by North Lincolnshire District Council (NLDC).

3. Documents attached to report

a. Schedule (7 pages) stating relevant information and category grading for the trees.

b. General Procedures and Guidance Notes for Implementing Tree Work.

c. An A1 plan of the site provided by Mr David Etheridge, showing the positions of the trees. Mr Etheridge thought that locations of some of the trees needed to be more accurately plotted on the plan.

The positions of the additional trees I have shown on the plan have not been surveyed.

d. An A4 sheet of an extract from BS 5837 2005 – Figure 1, Flow diagram, summarising planning for trees on development sites.

e. An A4 sheet of an extract from BS 5837 2005 - Table 1: *Cascade chart for tree quality assessment*

f. An A4 sheet of BS 5837 Figure 2 - Protective Barrier.

g. A paper produced by Cooper Clarke Group Ltd – tree root protection using Geoweb Cellular Confinement

4. British Standard 5837 - Strategy Section 3

Ensure that an accurate survey showing the locations of the trees is prepared to enable appropriate positioning of any proposed development in relation to the trees.

Undertake recommendations for protection of trees and arboricultural work as shown in the schedule. Consent for arboricultural work from NLDC is necessary as most of the trees are in a TPO.

The BS provides guidance for a balanced approach on deciding which trees are appropriate for retention, on the effect of trees on design considerations, and on the means of protecting the trees during development. Pre-planning site discussions involving all parties are recommended.

Follow the procedure shown in Figure 1, Flow diagram, of the BS and incorporate the arboricultural recommendations into the planning application. In addition to providing RPAs for those trees to be retained, areas for planting/landscape works should be identified and protected against compaction.

Prior to the start of site work it is advised that an arboriculturalist should meet the site agent to ensure the correct erection of barriers and ground protection that is intended to form construction exclusion zone/s (Item 3.2.2).

Before work is begun on the site erect the Root Protection Area barriers as specified in the British Standard.

Ensure that all those involved in the development of the site are instructed on the need to maintain the protective fencing for the trees by keeping barriers in place at all times (3.2.4). An all-weather notice should be erected on the barrier stating *Construction exclusion zone – Do not move. Keep out.*

An arboriculturalist appointed by the developer can help monitor site activity, but it should be recognised that the Local Planning Authority has powers for enforcement (3.2.5).

Site surveys for bats and birds are required. Information is given in the General Procedures document.

Information is provided below on other considerations that require to be taken into account in determining strategy to protect trees.

5. British Standard 5837 - Surveys Section 4

Tree categorization method (Item 4.3)

Where I have had the opportunity to view the trees on the subject site, they have been categorized in accordance with the cascade chart at Table 1 of the BS. For trees on adjoining land provisional categories have been given.

6. British Standard 5837 - Tree constraints plan Section 5

Root Protection Area (Item 5.2)

The RPAs have been assessed and calculated in accordance with Table 2 of the BS with information being given in the schedule.

20% offset (Item 5.2.4 (a)

For individual open-grown trees only, it may be acceptable to offset the distance by up to 20% in one direction, provided the area can be compensated for in another direction.

Note 1 of 11.3.5 makes provision for excavations within the RPA to be carried out carefully by hand etc and for the protection of roots.

Above-ground constraints (Item 5.3.1)

Shade areas require to be taken into account in relation to windows of proposed dwellings during the main part of the day. Account should be taken of the ultimate size of the trees that are to be retained, and shade areas should be represented by a segment with a radius from the centre of the stem equal to the height of the tree drawn from due north-west to due east.

7. British Standard 5837 - Arboricultural implications assessment (AIA) and design issues Section 6

Tree constraints and design (Item 6.2)

Areas for future planting should be determined and protected from damage, eg soil compaction and impeded drainage. Information can be provided after the layout for the site has been prepared.

8. British Standard 5837 - Arboricultural method statements (AMS) and the tree protection plan (TPP) Section 7

7.2 Other points for the architect/designer to consider are:

a. site construction access;
b. the intensity and nature of the construction activity;
c. contractors' car parking;
d. phasing of construction works;
e. space needed for all foundation excavations and construction works;
f. the availability of special construction techniques;
g. the location and space needed for all service runs, including foul surface water drains, land drains, soak-aways, gas, oil, water, electricity, telephone, television or other communication cables;
h. all changes in ground level, including the location of retaining walls, steps, and making adequate allowances for foundations of such walls and backfillings;
i. space for cranes, plant, scaffolding and access during works;
j. space for site huts, temporary latrines and other temporary structures,;
k. the type and extent of landscape works that will be needed within protected areas and the effects these will have on the root system;
l. space for storing (either temporary or long term) materials, spoil and fuel and the mixing of cement and concrete;
m. the effects of slope on movement of potentially harmful liquid spillages.

9. British Standard 5837 - The construction exclusion zone: barriers and ground protection Section 9

General (9.1.1)

Once erected, barriers and ground protection should be regarded as sacrosanct and should not be removed or altered without prior recommendation by an arboriculturalist and approval of the Local Planning Authority.

Protective barriers – existing trees (Item 9.2)

Barriers should consist of standard scaffold poles with uprights driven into the ground in accordance with Figure 2 of the British Standard. Anchor blocks used with Heras-type fencing (that can be readily moved) are NOT acceptable.

Ground protection – new planting (Item 9.3)

Scaffolding within the ground protection area should also be in accordance with Figure 2 of the British Standard.

Additional precautions outside the exclusion zone (Item 9.4)

When planning site operations, particularly if plant with booms, jibs and counter-weights are employed, care should be taken to avoid damage to trees that are to remain.

Prior to the start of work consideration should be given to avoiding damage to roots and the structure of trees in neighbouring properties.

10. British Standard 5837 - Avoiding damage to structures by trees Section 10

Table 3 Minimum distance between young trees or new planting and structure to avoid direct damage to a structure from future tree growth

It is assumed that the soil will be assessed by a competent designer and adequate foundations provided to prevent the risk of tree/s causing damage to a new dwelling, eg subsidence on a shrinkable clay soil.

Mr Etheridge has in mind to plant a few trees between Manor Road and the existing bungalow. A selection could be made from silver birch (Betula pendula), cockspur thorn (Crataegus prunifolia) and mountain ash (Sorbus 'Embley').

11. British Standard 5837 - Demolition and construction in proximity to existing trees Section 11

Demolition (Item 11.2.1)

Where demolition is proposed on the site where trees are to be retained, access facilitation pruning (see also Clause 8 of the BS) should be undertaken to prevent injurious contact between demolition plant and the tree/s. Any pruning should be undertaken in accordance with a specification prepared by an arboriculturalist and approved by NLDC where trees are in the TPO.

Foundations within the RPA (Item 11.6)

The information provided in the attached schedule makes provision for all foundations to be clear of RPAs.

Underground and above ground services (Item 11.7)

Such work should NOT take place within the RPA.

It is essential that roots of existing trees are not damaged by incorrect positioning of underground services or that crowns are unnecessarily affected to accommodate above-ground structures. Normally they should be kept clear of RPAs.

To address this problem trench-less techniques are recommended.

Item 11.6 of the BS does, however, make provision for structures within RPAs that may be justified if this allows the retention of a good quality tree (Category A or B Table 1).

Types of hard surface and their suitability in proximity to trees (Item 11.9)

There appears to be no reason for hard surfaces to be constructed within the RPA, and they should be avoided.

12. British Standard 5837 - Design considerations for new planting Section 13

Provision should be made by a suitably qualified person for the landscaping of the site.

13. British Standard 5837 - Post-development management Section 15

A management maintenance plan is required for soft landscape works.

14. British Standard 3998 : 2005 *Recommendations for tree work*

This British Standard is relevant where tree work is to be carried out and should be specified in any order given.

15. No-dig driveways using a cellular confinement system - recommendations for construction

Mr Etheridge may wish to reposition the existing driveway with a curve. It should be kept clear of RPAs. If this is not possible a no-dig driveway can be considered.

The document "Driveways Close to Trees" published the Arboricultural Advisory and Information Service in 1996, in their series "Trees in focus" (subject to copyright) can be obtained from the AAIS at the Forestry Commission Research Centre, Alice Holt, Wrecclesham, Farnham, Surrey.

Essentially it states that for roots to be retained undamaged there must be no excavation, soil stripping or site grading within the protected zone. There must be no compaction above the roots, and they must not be severed. Oxygen must be able to diffuse into the soil beneath the engineered surface.

Considerations are:

a. driveways should be no more than 4m wide;

b construction should incorporate a geogrid and an aggregate sub-base, and should ideally be undertaken between May and October when the ground is driest and least prone to compaction, and in dry weather;

c. keep driveways a maximum distance away from the boles of trees;

d. keep all driveway structure above ground level and not to excavate into the soil ("no-dig");

e. build up the haunches of the drive with open textured material, eg sandy gravel or soil type other than clay, to allow moisture to get to the roots of the tree/s;

f. construct the driveway as shown in the "Trees in focus" document (sketch of construction Figure 5);

g. keep to a minimum the removal of branches above the no-dig drive;

h. provide protective fencing for trees, ie the Root Protection Area.

Regarding a geogrid, the enclosed leaflet "Tree Root Protection using Geoweb Cellular Confinement" produced by Cooper Clark Group Ltd, of Bloomfield Road, Farnworth, Bolton, Lancashire BL4 9LP, provides useful information.

The product is a cellular plastic load transfer mattress, laid on the surface, with the honeycomb spaces filled with stone to achieve a surface zone of a low cohesive soil under concentrated loads for tree root protection.

When the access is designed it is recommended that this, or a similar product, should be specified for use.

16. Extent of report

The inspection and report categorizing the trees has been undertaken in accordance with British Standard 5837, revised 2005, *Trees in relation to construction – Recommendations.* It shows their condition but does not consider structural problems to existing buildings.

17. Limitations of report

A check has not been made on the accuracy of the plan provided, nor on the position of any trees that are shown and are the subject of this report.

The report is NOT intended to be a tender, specification for works or, a conditions of contract document.

The inspection was carried out from the ground only as a Visual Tree Assessment (VTA). It was not a climbing inspection, nor was any arborsonic equipment used to determine the condition of the trees. This service can be provided on request.

Inspections carried out whilst trees are in leaf provide the opportunity to assess health and vigour from their foliage, but the opportunity to readily see their structure is restricted. After leaf fall the reverse applies.

Whilst ivy is a good native woody growth that provides quality habitat benefits, it nevertheless restricts the full inspection of trees. To enable an adequate assessment to be made it is necessary to remove ivy.

As necessary I shall be happy to re-inspect the trees.

Whilst every care has been taken in assessing the trees, in writing this report I am NOT able to say there is nil risk of their falling, branches falling from the crowns, or any other risks arising from the trees. Such happenings could occur from weather conditions or other situations that I am not able to predict.

Regular professional inspections of the trees on this site are advised at intervals of no more than three years. This report should be considered valid for the next three-year period, on the understanding that the recommended tree work and re-inspections are carried out.

As remedial/safety work recommended in this report proceeds, an assessment of any other tree work that may be revealed as being necessary should be carried out as part of the operation.

I have not undertaken an inspection for the presence nesting birds, bats or bat roosts in the trees.

18. Conclusion

The information provided in this report is intended as a design tool for the proposed development site and it is advised that it is taken into consideration before a layout is submitted to NLDC. Priority for tree retention is shown at the start of this document under Background notes on British Standard 5837: 2005 *Trees in relation to construction – Recommendations.*

Developers may wish to remove from the site trees that are included in this report and for which no recommendation has been made for their removal. Should this be the case consultation with NLDC is advised as the Council may be prepared to accept that not all the trees on the site need to be retained.

Where trees are close together, for practical purpose it may be better to erect protective fencing as a straight line to the dimensions of the tree with the largest RPA.

It is important that the barriers for both the Root Protection Areas and for ground protection are in place and remain undisturbed whilst construction is in progress.

The information provided to protect the ash tree should be incorporated into the development plan prior to its being submitted to NLDC.

Arthur Arbon Tree Advisory Services Ltd
18 September 2008

D104/BottesfordManorRoad01

TREE SURVEY SCHEDULE FOR DEVELOPMENT SITES, INCLUDING ROOT PROTECTION AREA (RPA) REQUIREMENTS

British Standard 5837:2005 Trees in relation to construction - Recommendations

Trees in Tree Preservation (Manor Road, Bottesford) Order 1989

Site: 10 Manor Road, Bottesford, Scunthorpe, North Lincolnshire
Client: Mr A McPheat, 11 Leefair Gardens, Scunthorpe, North Lincolnshire, DN17 2RG
Date of survey: 16 September 2008
Weather: Cloudy and mild

I reported previously on the trees at the above-named site in July 2005. It was prepared to British Standard 5837:1991 *Guide for trees in relation to construction* , and this present report updates the required information to the revised British Standard of 2005.

Tree 1, ash, Tree 2, lime, Tree 6, copper beech, are in the gardens of adjoining dwellings. The tall, close-boarded fence prevented a full inspection and measurements being taken. This also includes Tree A, copper beech, that was not recorded in my previous report.

Trees B, C, D and E are in/close to the western boundary adjacent to the existing bungalow. Ownership of the trees is not clear. Without entering the garden of the neighbouring property I made the best measurements and judgement possible of the trees.

Tree ref No	Species	Est ht (m)	Ht of crown clearance (m)	Stem diam (mm)	Branch spread (m)	Size for species	Age class	Physiological condition Health & Vigour	Other comments including pests/diseases & structural condition	Risk when recommended work carried out	Estimated remaining contribution Years	Category grading
A	Copper beech	12	5.0	Est 500	N 3 E 5 est S 5 W 2	Medium	Middle	Cannot assess Moderate	Risk now: cannot assess without full inspection. Needs full inspection.	Cannot assess	Minimum 20	Pro-visional B1

Recommended arboricultural work: owner to assess the condition of the tree and take appropriate action.

Tree probably well clear of any proposed development on subject site.

Required Root Protection Area (based on estimated stem diameter – see formula below): 113 sq m. RPA to be a square of 10.6m with protective fencing being 5.3m from centre of tree, or a circle enclosing 113 sq m.

Tree ref No	Species	Est ht (m)	Ht of crown clearance (m)	Stem diam (mm)	Branch spread (m)	Size for species	Age class	Physiological condition Health & Vigour	Other comments including pests/diseases & structural condition	Risk when recommended work carried out	Estimated remaining contribution Years	Category grading
TPO 1	Ash	18	9.0	Est 470	N 2 E 3 est S 2 W 4	Large	Mature	Cannot assess Cannot assess (loss of foliage)	Risk now: cannot assess without full inspection. Dense ivy on bole. Had lost foliage which is very early in the season and may be in decline. The tree requires re-inspection in 2009 when leaves should have appeared.	Cannot assess	Minimum 20 or lost within 10	Pro-visional B1 or R
Recommended arboricultural work: remove ivy and re-inspect. Owner to assess the condition of the tree and take appropriate action. **Required Root Protection Area** (based on estimated stem diameter): 100 sq m. RPA to be a square of 10.0m with protective fencing being 5.0m from centre of tree, or a circle enclosing 100 sq m.												
TPO 2	Lime	21	6.0	Est 480	N 6 E 5 est S 5 W 4	Large	Mature	Cannot assess Cannot assess (loss of foliage)	Risk now: cannot assess without full inspection. Had lost foliage which is very early in the season and may be in decline. Dead twigs in high crown. The tree requires re-inspection in 2009 when leaves should have appeared.	Cannot assess	Minimum 20 or lost within 10	Pro-visional B1 or R
Recommended arboricultural work: owner to assess the condition of the tree and take appropriate action. **Required Root Protection Area** (based on estimated stem diameter): 104 sq m. RPA to be a square of 10.2m with protective fencing being 5.1m from centre of tree, or a circle enclosing 104 sq m.												
TPO Tree 3 shown as copper beech on plan dated 30 June 2005 – not found												
TPO 4	Ash	24	2.0	560	N 5 E 9 est S 6 W 7	Large	Mature	Good Normal	Risk now: medium (dead wood and size of tree) 7.6m from existing bungalow. Minor amount of dead wood in crown. One dead branch in high crown.	Low/medium	Minimum 20	B1
Recommended arboricultural work: lift crown 2.5m above ground level and remove dead wood. **Required Root Protection Area**: 142 sq m. RPA to be a square of 11.9m with protective fencing being 6.0m from centre of tree, or a circle enclosing 142 sq m. As the existing bungalow is 7.6m from the tree, the 6.0m RPA distance can be attained.												

Tree ref No	Species	Est ht (m)	Ht of crown clearance (m)	Stem diam (mm)	Branch spread (m)	Size for species	Age class	Physiological condition Health & Vigour	Other comments including pests/diseases & structural condition	Risk when recommended work carried out	Estimated remaining contribution Years	Category grading
TPO Tree 5 – not found at my inspection of June 2005												
TPO 6	Copper beech	22	4.0	Est 600	N 5 E 5 est S 5 W 5	Medium /large	Mature	Cannot assess but appears good Normal	Risk now: cannot assess without full inspection. 4.0m from existing bungalow. Estimate 1.0m from neighbouring building. Large lower branches removed in the past where rot may have developed.	Cannot assess	Minimum 20	Pro-visional B1
Recommended arboricultural work: owner to assess the condition of the tree and take appropriate action. **Required Root Protection Area** (based on estimated stem diameter): 162 sq m. RPA to be a square of 12.7m with protective fencing being 6.4m from centre of tree, or a circle enclosing 162 sq m. Tree most unlikely to have any significant rooting system beneath the existing bungalow, and provided any new development is constructed on the footprint the well-being of the tree should not be affected.												
TPO Tree 7 – not found at my inspection of June 2005.												
TPO 8	Sycamore	18	1.8	530	N 4 E 5 est S 6.5 W 6	Medium /large	Mature	Good Normal	Risk now: low 18.5m from main part of existing bungalow and estimated 5.0m from neighbouring garage. Satisfactory	Low	Minimum 40	A1
Recommended arboricultural work: lift crown 2.5m above ground level. **Required Root Protection Area**: 127 sq m. RPA to be a square of 11.3m with protective fencing being 5.7m from centre of tree, or a circle enclosing 127 sq m.												

Tree ref No	Species	Est ht (m)	Ht of crown clearance (m)	Stem diam (mm)	Branch spread (m)	Size for species	Age class	Physiological condition Health & Vigour	Other comments including pests/diseases & structural condition	Risk when recommended work carried out	Estimated remaining contribution Years	Category grading
TPO 9	Sycamore	20	2.0	570	N 3 E 7 est S 5 W 5	Large	Mature	Fair (defect) Normal	Risk now: low Defect on north side of bole that extends from ground level to 1.3m above ground level by 250mm wide. Probably caused by careless garden fire. Serious rot has not yet developed.	Low	Minimum 10	C1
Recommended arboricultural work: lift crown 2.5m above ground level. Remove lower branch close to apex of garage on neighbouring property. Re-inspect within 3 years. **Required Root Protection Area** : 151 sq m. RPA to be a square of 12.3m with protective fencing being 6.2m from centre of tree, or a circle enclosing 151 sq m.												
TPO 10	Sycamore	22	2.5	610	N 6 E 8 est S 4 W 7	Large	Mature	Fair (defect) Normal	Risk now: low Defect on north side of bole that extends from 150mm to 800mm above ground level by 100mm wide. Probably caused by careless garden fire. Serious rot has not yet developed.	Low	Minimum 20	B1
Recommended arboricultural work: re-inspect within 3 years. **Required Root Protection Area**: 168 sq m. RPA to be a square of 13.0m with protective fencing being 6.5m from centre of tree, or a circle enclosing 168 sq m.												

A single line of fencing on the western side of TPO Trees 8, 9 and 10, enclosing the RPA on the south and north ends could be used.

Trees on western boundary of site

Tree ref No	Species	Est ht (m)	Ht of crown clearance (m)	Stem diam (mm)	Branch spread (m)	Size for species	Age class	Physiological condition Health & Vigour	Other comments including pests/diseases & structural condition	Risk when recommended work carried out	Estimated remaining contribution Years	Category grading
B	Sycamore	9	1.0	280 at root flare	N 2 E 3 S 3 W 2 est	Small	Young	Assume good Normal	Risk now: low 2.5m from western edge of existing concrete drive. Forks at ground level.	Low	Minimum 20	Pro-visional B1
Recommended arboricultural work: remove few minor branches growing over drive. **Required Root Protection Area:** 25 sq m. RPA to be a square of 5.0m with protective fencing being 2.5m from centre of tree, or a circle enclosing 25 sq m. Unlikely to have any significant roots beneath concrete drive.												
C	Sycamore	9	Ground level	Est 200	N 1.5 E 1.5 S 1.5 W 1.5	Small	Young	Assume good Normal	Risk now: low. 3.0m from western edge of existing concrete drive.	Low	Minimum 20	Pro-visional B1
Recommended arboricultural work: nil. **Required Root Protection Area** (based on estimated stem diameter): 18 sq m. RPA to be a square of 4.2m with protective fencing being 2.1m from centre of tree, or a circle enclosing 18 sq m. Unlikely to have any significant roots beneath concrete drive.												

Tree ref No	Species	Est ht (m)	Ht of crown clearance (m)	Stem diam (mm)	Branch spread (m)	Size for species	Age class	Physiological condition Health & Vigour	Other comments including pests/diseases & structural condition	Risk when recommended work carried out	Estimated remaining contribution Years	Category grading
D	Ash	12	2.5	230	N 4 E 3.5 S 2 W 2 est	Small/ medium	Young/ middle	Assume good Normal	Risk now: low 2.0m from western edge of existing concrete drive.	Low	Minimum 20	Pro-visional B1
Recommended arboricultural work: remove few minor branches growing over drive. **Required Root Protection Area:** 24 sq m. RPA to be a square of 4.9m with protective fencing being 2.5m from centre of tree, or a circle enclosing 24 sq m. Unlikely to have any significant roots beneath concrete drive.												
E	Ash	9	2.5	200 and 210	N 3 E 2 S 2 W 2	Small	Young/ middle	Assume good Normal	Risk now: low. 2.3m from western edge of existing concrete drive. Tree forks near ground level and cannot be measured accurately at the root flare. For this reason the RPA has been assessed on an estimated measurement of 300mm.	Low	Minimum 20	Pro-visional B1
Recommended arboricultural work: nil. **Required Root Protection Area:** 41 sq m. RPA to be a square of 6.4m with protective fencing being 3.2m from centre of tree, or a circle enclosing 41 sq m. Unlikely to have any significant roots beneath concrete drive.												

A single line of fencing on the eastern side of Trees B to E, enclosing the RPA on the south and north ends could be used.

British Standard states "C" category trees will usually not be retained where they would impose a significant constraint upon development.

Formula for calculation of Required Root Protection Area/s (RPA) in square metres and suggested minimum distance development to tree/s

Root Protection Area = $\frac{(\text{Stem diameter at 1.5m above ground level} \times 12)^2}{1{,}000} \times 3.142$.

Where trees fork below 1.5m above ground level, stem diameters are taken at root flare (ground level) with that measurement being multiplied by 10 and not 12.

It is advised that Root Protection Areas should normally be a square scaffold framework 2.3m high barrier, as shown in Figure 2 of the BS, with the tree in the centre. In some cases the tree could be in the centre of a circular Root Protection Area.

The protective fencing for the RPA barriers, as specified in the BS, should be in place to ensure root protection prior to the start of building activities and kept in place until completion of development. An all-weather notice/s should be erected on the barrier stating *Construction exclusion zone – Keep out*. These areas shall be out-of-bounds at all times. Any areas prescribed for tree planting should be fenced off in the same way.

RPAs and suggested minimum distances are rounded to the nearest decimal point. Distances from site features are taken from the centre of trees.

Alternative for RPA using 20% offset THIS CAN BE ASSESSED IF REQUIRED BY CLIENT.

Item 5.2.4a of the BS – on the assessment of an arboriculturalist, for an individual open grown tree of strong vigour it may be acceptable to offset the RPA distance by up to 20% in one direction only providing that the RPA is compensated for on open ground on its other sides.

British Standard 5837 categories

Age class	Young	Middle-aged	Mature	Over-Mature	Veteran	
Physiological condition	Good	Fair	Poor	Dead		
Category A	High quality, minimum 40 years				**Category B**	Moderate, minimum 20 years
Category C	Low, minimum 10 years, or young tree diam >150mm				**Category R**	Lost within 10 years
Size for species	Small	Medium	Large	Very Large		
Health & vigour:	Normal	Moderate	Low			
Risk at present	Low	Medium	High			

Arthur Arbon Tree Advisory Services Ltd
18 September 2008

DI04/BottesfordManorRoadSchedule