ARBORICULTURAL IMPACT ASSESSMENT

KENT COUNTY COUNCIL

WALDERSLADE ROUND WOOD SITE
WALDERSLADE WOODS
WALDERSLADE,
BOXLEY,
KENT

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EXECUTIVE SUMMARY

S.1 This report is in connection with a planning application for the construction of 12 new residential units with associated access road, parking and gardens within a clearing in the Round Wood area of Walderslade Woods.

S.2 A total of 28 individual trees, 5 groups and 1 hedge are the subject of this report which has been written in accordance with British Standard, BS 5837:2012 'Trees in relation to demolition, design and construction – Recommendations'.

S.3 7 B grade trees and sections of 5 B grade groups, 5 C grade trees, and 1 C grade group will be removed to facilitate the development. In addition 3 U grade trees will be removed for reasons of sound arboricultural management.

S.4 The installation of new hard surfacing is required within the RPAs of 2 B grade trees, 1 B grade group and 1 C grade tree. Providing the correct methodology is used the impact on these trees will be minimised.

1. INTRODUCTION

1.1. **Brief:** Lloyd Bore have been instructed by Kent County Council to carry out a survey of significant trees on a section of land at Walderslade Woods adjacent to Wildfell Close, Boxley, Kent in accordance with the principles of British Standard BS 5837:2012, *'Trees in relation to design, demolition and construction – Recommendations'* (The BS) and to prepare the following information to accompany a planning application:

- details of significant trees including an assessment of condition using BS 5837 categorisation.
- a plan showing tree survey information, categorisation and root protection areas.
- an assessment of the impact of the proposal on trees and any wider impact that it has on local amenity and any impact trees may have on the proposed development.
- guidance for an arboricultural method statement dealing with the protection and management of the trees to be retained.
- a schedule of tree works to facilitate construction.

1.2. **The Proposal:** This report accompanies a planning application for the construction of 12 new residential units with associated access road, parking and gardens within a clearing in the Round Wood area of Walderslade Woods.

1.3. **Site description:** The proposed site is found to the west of Wildfell Close in Boxley. It is an area of clearing within the Round Wood area of Walderslade Woods which currently consists of grass and scrub bounded by trees on all sides. The area is currently used by the public and is subject to littering with debris found within the clearing area. The surrounding woodland is a mature semi-natural woodland, growing on uneven topography, with ground levels falling away from the clearing area. The ground levels then rise to meet the roads to the east and south.

1.4. **Scope of this report:** This report covers trees on and adjacent to the site. It is concerned with the impact the development may have on nearby trees and the effect retained trees may have on the development. Its purpose is to allow the local planning authority (LPA) to assess the tree information as part of the planning submission.

1.5. **Summary of the general impact of development on trees:** Development can adversely impact upon trees in a number of different ways, if arboricultural issues are not considered at an early stage of the development process. Considered and careful planning will prevent valuable trees being lost to development, damaged during the demolition and construction phases, or lost following completion of development from pressures to prune or remove.

1.6. Damage to the branches or trunk may be quite obvious, but it is damage caused to the below ground portion of the tree which is less obvious and may have the most devastating long term effect on the future health and safe retention of a tree. Tree roots can be asphyxiated and die if the rooting environment becomes compacted or soil structure damaged or contaminated. This can easily occur, particularly on clay soils, even with the passage of light vehicles or pedestrians. It is important, therefore, that the root protection area (RPA)[1] is left undisturbed. Where this is unavoidable the disturbance can be minimised by following a strict working methodology and through innovative engineering design. Building lines should be at least 2m outside the RPA to allow the movement of materials, the erection of scaffolding around the new structure and the installation of new services.

1.7. Trees are long lived organisms, which take time to mature, and if their protection is considered at an early stage, they can complement and increase the value of a development. Construction and demolition activities, including removal of existing hard surfaces, changes of land levels and services routes, must be considered at the design stage to achieve an appropriate relationship between existing trees and new structures.

1.8. **Legislation:** From information on Maidstone Borough Council's website it is understood that all of the trees on or adjacent to the site, are the subject of a tree preservation order (TPO). However the site is not located within a conservation area (CA). The tree protection status is correct at the time of report production but can be subject to change. It is therefore the responsibility of any persons undertaking operations to the trees which are the subject of this report and in accordance with our recommendations, to undertake their own statutory checks.

1.9. The Occupiers Liability Act (1957 and 1984) places a duty of care upon tree owners to ensure that no reasonably foreseeable harm takes place due to tree defects. Therefore this report recommends works for safety reasons as well as work required to facilitate the proposal.

1.10. Common law allows pruning back to the property boundary line, the overhanging branches and roots as long as this does not contravene any statutory protection. However if the work is not carried out in accordance with best practice and the tree(s) becomes unbalanced and/or diseased as a result of the work, the owner may take civil action. Whilst common law does not require the tree owner to be consulted, it is courteous to inform him/her of the proposed works.

[1] Root protection area (RPA) - A layout design tool indicating the minimum area surrounding the tree that contains sufficient rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. Assessed according to the recommendations set out in clause 4.6 of BS 5837. It is calculated by multiplying the radius squared by 3.142. Clause 4.6.2 of BS 5837 states that the RPA may be changed in shape, taking into account local site factors, species tolerance, condition and root morphology.

1.11. **Ecological constraints:** The Wildlife and Countryside Act 1981, as amended, The Conservation of Habitats and Species Regulations 2010 and the Countryside and Rights of Way Act 2000, provide statutory protection to species of flora and fauna including birds, bats and other species that are associated with trees. These could impose significant constraints on the use and timing of access to the site. It is the responsibility of the main contractor and tree surgery contractor to ensure that no protected species are harmed whilst carrying out site clearance or tree surgery works. Unless competent to do so, the advice of an ecologist must be sought. An Ecological Appraisal by Lloyd Bore referenced 3478_RP_001 accompanies this planning application.

2. SITE VISIT AND OBSERVATIONS

2.1. **Site visit:** A site visit was undertaken on 5th October 2015. The weather was rain with heavy cloud.

Methodology: The trees are inspected from ground level only. Whilst every effort is made to ensure that the comments relating to the trees surveyed are accurate it must be noted that no climbing of trees, internal inspections or excavations of the root areas have been undertaken. All trees with a trunk diameter of 75mm or above are surveyed. All dimensions are accurately measured on-site unless otherwise indicated.

2.2. Hedges and shrub masses are identified where appropriate. Information collected is in accordance with recommendations in subsection 4.4.2.5 of BS 5837 and includes species, height, diameter, branch spread, crown clearance, age class, physiological condition, structural condition and remaining contribution. Each tree is then allocated one of four categories (U, A, B or C) to reflect its suitability as a material constraint on development. Surveyed trees are identified with a prefix 'T' and a unique number on Tree Survey Plan 3478_DR_001-A which also includes a tree survey schedule. Groups of trees are identified with the prefix 'G' and hedges with the prefix 'H'. The tree canopies and their spread are shown with green shapes and Root Protection Areas (RPAs) are indicated by a solid blue line. The label attached to each tree shows the individual tree number and the grading of the tree.

2.3. **Tree survey plan:** Tree Survey Plan 3478_DR_001-A is based on a topographical survey supplied by the client. Some trees not included on the topographical survey have also been included in the tree survey. Where this has occurred trees have been plotted by eye whilst on site. No liability for the accuracy of the plotting is accepted and distances should be checked on site. The Tree Survey Plan can only be used for dealing with the tree issues in relation to design. This can be found at Appendix 3. Below ground constraints are represented by the RPA (shown as a solid blue line). Above ground constraints consist of the existing crown spreads of the trees and are represented by the solid outlines.

2.4. **Soil type:** An assessment of soils on-site was carried out by a desktop analysis using the National Soil Resources Institute website which identified the soils as likely to be shallow lime-rich soils over chalk or limestone. This is a guide only and detailed on-site soil analysis should be undertaken by the project engineer to inform the foundation design.

2.5. **The subject trees:** A total of 28 individual trees, 5 groups and 1 hedge are the subject of this report which has been written in accordance with BS 5837. 12 individual trees and 5 groups have been categorised as 'B' grade trees of moderate quality and value. 13 individual trees, 5 groups and 1 hedge have been categorised as 'C' grade trees of low quality and value. In addition, 3 trees have been classified as 'U' grade trees which should be removed for reasons of sound arboricultural management. No trees have been categorised as 'A' grade trees of high quality and value. The categories are explained in Appendix 1.

2.6. **Species and age distribution**: The most common species on the site is sweet chestnut which forms the majority of the woodland structure. Also on the site is goat willow, silver birch, common oak, beech, field maple, hornbeam, hazel, crack willow, hawthorn and elder. The majority of the trees are classed as early-mature trees followed by mature and semi-mature as the most frequent age groups. There are no young or over mature trees on the site.

2.7. **Comments on specific trees**: The woodland as a whole which surrounds the clearing offers important screening and habitat value to the site. It is protected by a TPO and therefore should be retained where possible. Due to the topography the majority of trees are found below the level of the grass clearing.

3. ARBORICULTURAL IMPACT ASSESSMENT

3.1. **Summary of the impact of the development upon trees:** 7 B grade trees and sections of 5 B grade groups, 5 C grade trees, and 1 C grade group will be removed to facilitate the development. In addition 3 U grade trees will be removed for reasons of sound arboricultural management.

3.2. The installation of new hard surfacing is required within the RPAs of 2 B grade trees, 1 B grade group and 1 C grade tree. Providing the correct methodology is used the impact on these trees will be minimised.

3.3. **Root protection areas**: The root protection areas shown on the tree survey plan show the theoretical root protection areas based on the ideal circular rooting area. The British standard allows for the shape of the RPA of retained trees to be altered under certain circumstances (see below), but not reduce its area whilst still providing adequate protection for the root system:

a. 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.

b. 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).

c. The soil type and structure.

d. Topography and drainage.

e. 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.

3.4. **Tree protection plan**: The survey plan is an aid to design and should not be used on-site, following planning consent. The tree protection plan which shows trees to be retained, trees to be removed and tree protection measures should be used for this purpose. This can be found at Appendix 4 as drawing number 3478_DR_002-A.

3.5. **Trees to be removed**: Trees to be removed are identified on the tree protection plan (TPP) as red dashed circles with red centres. To facilitate the construction the following trees require removal: T1, T2, T3, T4, T13, T14, T15, T16, T17, T18 and G1. Due to the topography of the site, T5 and T6 will also require removal due to the increase of soil volume required within their RPAs in order to level the proposed access road. As both of these trees have been historically coppiced, it is recommended that these trees be re coppiced - not completely removed. This will therefore allow regrowth from the coppice stool, retaining the trees under a management scheme rather that removing them. It will also illuminate the weak structural implications that are associated with lapsed coppice which is the condition the trees are currently in.

3.6. Sections of the following groups will also require removal: G2, G3, G4, G5 and G6. The section removal of these groups should be done on site by the client and arboricultural consultant to determine the appropriate trees within the group which need removing. In addition, T19, T24 and T27 should be removed for sound arboricultural value as they are 'U' grade.

3.7. **Trees to be pruned**: In order to offer suitable vehicular clearance, T12 will require pruning. To facilitate the construction of the footpath on the western boundary, G4 will require pruning. All tree

surgery works required to facilitate the development or for obvious safety or arboricultural reasons can be found in Appendix 5.

3.8. **Incursions into the root protection area**: The construction of a section of hard surfacing in the form of car parking spaces is required within the RPAs of T11 and T12. Where this occurs the hard-surfacing should be constructed using minimal dig construction methods, which only allows the turf layer to be removed. A cellular confinement system is then laid before the hard surfacing is applied. This avoids direct impact to roots from excavation and indirect damage to the roots caused by soil compaction.

3.9. A new footpath is anticipated to exit the site at the western boundary. The exact location of this footpath should be marked out on site between the client, the architect and the arboricultural consultant to provide a route which is the most sympathetic to the trees, though it is likely that this will run through the RPAs of T20 and trees in G4. The footpath should be constructed using 'minimal dig, construction methods such as cellular webbing.

3.10. Roots of retained, removed and newly planted trees have the potential to cause damage to structures, foundations and services. This should be taken into consideration by the project engineer when designing these elements.

3.11. The RPA of T23 will fall within the 2m clearance for scaffolding. The scaffolding within this area should therefore be erected on suitable ground protection boards to spread the weight and avoid soil compaction. During the construction phase it may be necessary for machinery and materials to pass through the RPA of retained trees. Should such incursions be necessary they must either be restricted to existing roadways and entrances designed to bear the weight of vehicles, or specialist ground protection methods used such as those detailed in section 5 of this report.

3.12. Precautions must be taken during facilitating works (including tree works) to avoid compaction or contamination of the soil which may be detrimental to the long term health and retention of the tree.

3.13. **Protection of retained trees**: An arboricultural method statement that can be referred to in a planning condition can be used to ensure that trees are successfully retained on a development. To be effective, it must specify working procedures and methods of protection in a realistic and workable way for on-site personnel, and must be adhered to throughout the duration of the scheme.

3.14. The details for each section of the method statement should form a key part of the site induction process for any person undertaking works near retained trees, to ensure that each individual knows their responsibility with regard to tree protection issues.

3.15. Guidance for an arboricultural method statement for this site can be found in Section 5 of this report. The location of protective measures, usually a combination of barriers and ground protection, can be found on the tree protection plan.

3.16. The layout of the tree protection measures should also take into account the layout of the site compound, parking, vehicular movements, movements and storage of materials and lifting operations.

3.17. **Impact on amenity**: Although a moderate amount of trees will be removed to facilitate the scheme they are within the existing woodland structure. This will mean that the surrounding trees will envelop their loss and still provide screening to the site. The open area of the site is currently used by fly-tippers, with debris littered around the general area. The proposal would therefore act to make use of an area which unfortunately has led to anti-social behaviour. The managed proposed residential area would therefore stop the misuse of the current site and lead to a positive impact on amenity. To further support this improvement, it is anticipated that replanting will take place in an attempt to enhance the woodland area.

4. GUIDANCE FOR AN ARBORICULTURAL METHOD STATEMENT

4.1. An arboricultural method statement is intended to detail the protective measure to be put in place around the root protection area of all retained trees and to specify the working methodology where site operations may have an effect on the trees, including the requirement for arboricultural supervision if deemed appropriate. Once final plans, site compound locations and service runs have been finalised (usually post planning) a site specific arboricultural method statement should be prepared. This can also take into account any specific planning conditions stipulated by the local planning authority or protect areas for new planting.

4.2. **Tree protection plan (TPP)**: The TPP (Appendix 4) is based on the information, measurements and layouts provided by the client and details the protection measures needed to protect the retained trees through the duration of the scheme. Its use should be limited to dealing with tree related issues only and measurements shown should be checked on site. The tree protection measures consist of tree protection barriers and/or ground protection measures which define the construction exclusion zone (CEZ). The CEZ is an area based on the theoretical RPA which is to be protected during the scheme and whose shape may change if known to be influenced by on-site factors.

4.3. **Tree protection barriers**: The approximate location of the tree protection barriers is shown on the TPP, however their precise location should be agreed upon by the arboricultural consultant, the building contractors and the local tree officer at a pre-commencement meeting. Guidance for the design of the protective measures is shown in Appendix 6. Where protective fencing does not entirely protect the crowns of retained trees care must be taken to protect them from the movement of plant, materials or high vehicles or from the use of cranes or piling rigs. When such movements occur near to the crowns of retained trees a banksman should be used to ensure that no damage occurs. Any damage should be reported to the project arboriculturist.

4.4. **Ground protection**: In areas where it is not possible or appropriate to install protective barriers, ground protection measures must be used within the CEZ. Where it has been agreed during the planning process that vehicles, pedestrians or materials require movement through the CEZ the retained trees should be protected through a combination of barriers and ground protection measures which together protects the entire CEZ. As above, the precise location of the ground protection measures should be agreed at a pre-commencement meeting before any works begin on site. Where scaffolding is to be sited within the CEZ, this will be erected on scaffolding boards on a layer of sharp sand. Builders sand must not be used due to the high salt content, which may cause burning of the tree roots. Further guidance for ground protection can be found in Appendix 6.

4.5. **Works within the CEZ**: Only works agreed with the local planning authority and addressed in the arboricultural method statement may be carried out within the CEZ of retained trees.

4.6. **Removal of hard surfaces**: Where the CEZ of any retained retained tree is covered with hard surfacing, the removal of this surfacing has the potential to cause significant damage to the structure of soils and to tree roots directly. All hard surfacing requiring removal within the CEZ will be broken up with a hand help pneumatic drill or a hydraulic breaker mounted on a mini digger located outside the CEZ unless operating on suitable ground protection methods or on the existing surface if it is suitably load bearing, such as a road or car park. Debris should then be removed by hand or the mini digger may be used to pull the debris away from the trees rolling back onto the surfacing yet to be removed. No soil or hard core may be removed from beneath the surfacing and topsoil or sharp sand must immediately be used to cover the soil surface to prevent tree roots from drying out.

4.7. Once the removal of the surfacing is completed the full protective measures of ground protection and protective fencing must be installed up to the edges of the CEZ.

4.8. **Installation of new surfacing**: Where existing non permeable hard surfaces are to be repaired or renewed only the tarmac surface may be removed using hand held machinery and the sub base must be left intact. Where new hard surfacing is to be installed within the CEZ the excavations and disturbance to the tree roots must be kept to a minimum to avoid long term health issues for the tree. To avoid damage to tree roots from compaction or mechanical damage, a no dig construction method such as a cellular confinement system should be used. This spreads the surface pressure beneath the surface and helps prevent compaction of the soil. This no dig system should be topped with a porous surface to permit gaseous and water diffusion between the surface and the soil beneath. When non-permeable materials are present above roots, the gas cannot diffuse out and is trapped in the soil around the roots. When concentrated, carbon dioxide is detrimental to the development and function of tree roots and consequently the whole tree. It is also essential that the tree roots are able to maintain an adequate supply of water and oxygen from the soil around it, which non-porous materials hinder. The use of bitumen along with the use of other non-permeable materials within the CEZ is therefore prohibited.

4.9. **Installation of new services**: It is often difficult to establish the exact routes of service runs until contractors are appointed and construction is in progress, however at the planning stage all efforts should be made to ensure that any new services run outside the CEZ of any retained tree. Where it is unavoidable for new services to be routed around the CEZ or existing services require upgrading, conventional trenching techniques are not acceptable. Ideally no dig methods such as directional drilling should be used, however if this is not possible the methodology used must comply with NJUG Volume 4: Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees. This stipulates that hand digging must be used with roots worked around carefully and roots only cut as a last resort. No roots on excess of 25mm should be cut without referring to the project arboriculturist and roots less than 25mm should be pruned with a sharp saw or secateurs to leave a clean small wound. The cut end should then be wrapped in clean hessian sacking which should be removed before back filling. Ideally any excavations should be undertaken only under arboricultural supervision.

4.10. **Site hoardings**: Where site hoarding runs through the CEZ of a retained tree, it must be carefully positioned to avoid contact with the trunk or branches of the tree and allow room for movement in winds. Post holes should be dug using hand tools and the hole lined with impermeable plastic sheeting to prevent alkaline burn of roots in the soil. Site hoardings may form part of the tree protection barriers, if positioned in accordance with the TPP.

4.11. **Site storage, washing points and contamination**: During construction there should be no materials stored or dumped within the protective fencing and no vehicles or plant may be parked within the CEZ to avoid soil compaction. Where compaction has occurred, advice should be sought from an arboriculturist and a structural engineer on decompaction methods. Fuel storage areas should be outside the CEZ and no fueling or discharge of potential contaminants should occur within 10m of a retained tree or where there is a risk or surface run off into the CEZ.

4.12. **Site compound**: Site cabins and temporary buildings may be located within the CEZ with the consent of the project arboriculturist and the Local Planning Authority. These must be placed on suitable ground protection measures and may form part of the protective barriers around the CEZ. Care must be taken to ensure there is no discharge of waste into the CEZ, or exhaust fumes or hot air into the canopy from generators or kitchen facilities to prevent damage to the retained trees.

4.13. **Landscape**: Landscape operations as part of the exterior works phase have the potential to cause significant damage to a tree protected through the building phase, if works within the CEZ are not carried out with care. In addition the removal of protective fencing to permit landscape works may inadvertently allow other contractors, vehicles or materials into the CEZ. Once the fencing is removed the outline of the CEZ should be marked with spray paint, road pins or another obvious means. All works must be carried out by hand and soil works kept to a minimum with the soil level not increased by more than 100mm to avoid suffocation of the roots or the ingress of pathogens into the trunk. Materials should be transported in wheel barrows running on boards within the CEZ and pedestrian movements minimised beyond the boards to reduce the risk of soil compaction.

5. CONCLUSIONS

5.1. Trees to be removed are identified on the tree protection plan (TPP) as red dashed circles with red centres. To facilitate the construction the following trees require removal: T1, T2, T3, T4, T13, T14, T15, T16, T17, T18, G1. In addition U grade trees T19, T24 and T27 should be removed for reasons of sound arboricultural management.

5.2. Due to the topography of the site, T5 and T6 will also require removal as it will be necessary to make up the ground levels by up to 1m within their RPAs in order to provide a suitably level access road near the entrance of the site. As both of these trees have been historically coppiced, it is recommended that these trees be re coppiced - not completely removed. This will therefore allow regrowth from the coppice stool, retaining the trees under a management scheme rather that removing them. It will also illuminate the weak structural implications that are associated with lapsed coppice which is the condition the trees are currently in.

5.3. Sections of G2, G3, G4, G5 and G6 require removal, although the exact tree within the groups should be identified at an on-site meeting between the client and arboricultural consultant when the exact layout can be pegged out.

5.4. In order to offer suitable vehicular clearance, T12 will require pruning. To facilitate the construction of the footpath on the western boundary, G4 will require pruning.

5.5. The construction of a section of hard surfacing in the form of car parking spaces is required within the RPAs of T11 and T12. Where this occurs the hard-surfacing should be constructed using minimal dig construction methods, which only allows the turf layer to be removed. A cellular confinement system is then laid before the hard surfacing is applied. This avoids direct impact to roots from excavation and indirect damage to the roots caused by soil compaction.

5.6. A new footpath is anticipated to exit the site at the western boundary. The exact location of this footpath should be marked out on site between the client, the architect and the arboricultural consultant to provide a route which is the most sympathetic to the trees, though is thought to run through the RPAs of T20 and trees in G4. The footpath should be constructed using 'minimal dig, construction methods such as cellular webbing.

5.7. The RPA of T23 will fall within the 2m clearance for scaffolding. The scaffolding within this area should therefore be erected on suitable ground protection boards to spread the weight and avoid soil compaction

5.8. Providing the tree protection and working methods detailed in this report are followed the impact on the retained trees will be minimal.

6. RECOMMENDATIONS

6.1. The routes of any proposed services must be assessed by the arboriculturist and a detailed arboricultural method statement written where the services run through the CEZ of any retained tree.

6.2. The proposed foundation design must take into account any tree to be retained, trees that have been removed and new trees to be planted.

6.3. A copy of this report and the detailed method statement must be kept on site and must be referenced as part of the site induction of any persons working near to, or within the CEZ of the retained trees.

6.4. The working methodology outlined in this report and detailed in the arboricultural method statement must be observed by all site personnel and supervised at key stages by the project arboricultural consultant. Short supervision reports should be written after each inspection in a format suitable for submission to the local planning authority if required.

6.5. Where archaeological or contaminated land reports and hard and soft landscape design plans are prepared for the site, these should be cross referenced with this arboricultural impact assessment to ensure there are no conflicts in land treatments, recommendations or retention plans.

7. APPENDIX 1 - TREE SURVEY KEY

The schedule tree survey lists the trees and groups included in the survey and details the following:

- Species;
- Height (m);
- Trunk diameter generally at 1.5 m above ground level (mm);
- Branch spread (m);
- Height of crown clearance and height and compass direction of first significant branch(m);
- Age class (newly planted, Y , SM , M , over-mature, veteran);
- Physiological condition (good, fair, poor, dead);
- Structural condition (as determined from the ground);
- Estimated years remaining (<10, 10-20, 20-40, >40);
- Category grading (U or A to C).

Species: Species of tree with both common and botanical names.

Ht: Height in metres.

Ult ht: Ultimate height likely to be achieved for this tree in this location.

Dia: Diameter of stem in millimetres at 1.5m above ground level for single-stemmed trees or in accordance with Annex C of BS 5837 for multi-stemmed trees or trees with low forks or irregular stems.

NSEW: Crown spread at the four cardinal points. Ø = average crown radius.

Cr ht 1: Height of first significant branch above ground level and direction of growth.

Cr ht 2: Height of canopy above ground level.

Cond: Physiological and structural condition. G = good; F = fair; P = poor; D = dead.

Life exp: Estimated remaining contribution in years.

Age Class:

NP = Newly planted.

Y = Young - an establishing tree that could be easily transplanted.

SM = Semi-mature - an established tree still to reach its ultimate height and spread and with considerable growth potential.

EM = Early mature - a tree reaching its ultimate height and whose growth is slowing, however it will still increase considerably in stem diameter and crown spread.

M = Mature - a tree with limited potential for further significant increase in size although likely to have a considerable safe useful life expectancy.

OM = Over mature - a senescent or moribund tree with a limited useful life expectancy.

The report includes the following categories as indicated in BS 5837:2012.

To be assessed in respect of arboricultural, landscape and/or cultural (incl. conservation), values.

Category A: Those of high quality and value, those in such a condition as to be able to make a substantial contribution (a minimum of 40 years is suggested).

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).

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.

Category U: Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years.

Criteria (subcategories):

1. mainly arboricultural value.
2. mainly landscape value.
3. mainly cultural value.

8. APPENDIX 2 - TREE SURVEY SHEETS

Tree Ref No.	Common Name	Botanical Name	Height (m)	No. of Stems	Stem dia. (mm)	Root Protection Radius (m)	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Crown Clearance (m)	Age class	Condition	Comments	Est. Rem. Contr. (Yrs)	BS : 5837 Grade
T1	Sweet Chestnut	Castanea sativa	12	2	300,350	5.53	3	3	3	3	1	EM	Fair	twin stem, growing on side of bank, edge of woodland closest to road, deadwood	20+	B2
T2	Goat Willow	Salix caprea	10	1	300	3.6	4	1	2	4	0	EM	Fair	historically leaning, supressed tree, on edge of woodland leaning into site, deadwood, veg, growing on top of bank	10+	C1
T3	Silver Birch	Betula pendula	10	1	200	2.4	1	1	1	1	2	EM	Fair	growing at woodland edge closest to road, on top of bank, suppressed	10+	C2
T4	Sweet Chestnut	Castanea sativa	12	1	300	3.6	3	3	3	3	1	EM	Fair	growing on side of bank, edge of woodland closest to road, deadwood, upright suppressed habit	20+	B2
T5	Sweet Chestnut	Castanea sativa	18	10	250,250,250,250,200,100,100,100,150,200	7.42	4	4	4	4	0	M	Fair	multi stem, growing on side of bank, edge of woodland closest to road, deadwood, upright suppressed habit	20+	B2
T6	Sweet Chestnut	Castanea sativa	18	5	300,300,350,250,250	7.85	2	2	2	2	0	M	Fair	multi stem, growing on side of bank, edge of woodland closest to road, deadwood, upright suppressed habit	20+	B2
T7	Sweet Chestnut	Castanea sativa	15	4	150,300,150,150	4.76	3	3	3	6	0	M	Fair	multi stem, growing at bottom of bank, veg deadwood, upright suppressed habit	20+	B2
T8	Sweet Chestnut	Castanea sativa	13	2	250,100	3.23	2	2	2	2	2	M	Fair	multi stem, growing at bottom of bank, veg deadwood, upright suppressed habit	10+	C1
T9	Sweet Chestnut	Castanea sativa	9	1	200	2.4	1	0.5	1	3	2	M	Fair	veg deadwood, upright suppressed habit, leaning into site, on top of bank	10+	C1
T10	Goat Willow	Salix caprea	5	1	250	3	2	0.5	2	4	0	EM	Fair	historically leaning, supressed tree, on edge of woodland leaning into site, deadwood, veg, growing on top of bank	10+	C1
T11	Sweet Chestnut	Castanea sativa	17	4	150,150,250,300	5.33	4	4	4	6	0	M	Fair	multi stem, growing at bottom of bank, veg, deadwood, upright suppressed habit	20+	B2
T12	Common Oak	Quercus robur	7	2	120,200	2.8	2.5	1	2	5	1	EM	Fair	twin stem, on bottom of bank, suppressed habit	10+	C1
T13	Sweet Chestnut	Castanea sativa	18	2	350,350	5.94	4	4	4	6	0	M	Fair	multi stem, growing at bottom of bank, veg deadwood, upright suppressed habit	20+	B2

Tree Ref No.	Common Name	Botanical Name	Height (m)	No. of Stems	Stem dia. (mm)	Root Protection Radius (m)	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Crown Clearance (m)	Age class	Condition	Comments	Est. Rem. Contr. (Yrs)	BS : 5837 Grade
T14	Beech	Fagus sylvatica	10	6	150,100,90,75,100,150	3.37	2	2	2	6	0	EM	Fair	included multi stem tree, suppressed, deadwood, pruned	10+	C1
T15	Sweet Chestnut	Castanea sativa	20	13	250,300,300,100,250,250,150,100,200,250,250,250,250	10.04	4	4	4	7	0	M	Fair	multi stem, growing at bottom of bank, veg deadwood, upright suppressed habit	20+	B1
T16	Sweet Chestnut	Castanea sativa	18	7	200,200,350,350,90,150,400	8.62	6	4	4	7	0	M	Fair	multi stem, growing at bottom of bank, veg deadwood, upright suppressed habit	20+	B2
T17	Beech	Fagus sylvatica	10	4	100,150,80,100	2.65	3.5	2	2	4	0	EM	Fair	included multi stem tree, suppressed, deadwood, inclusions	10+	C1
T18	Beech	Fagus sylvatica	10	1	250	3	4	2	2	4	0	EM	Fair	suppressed, deadwood, inclusions	10+	C1
T19	Sweet Chestnut	Castanea sativa	7	2	300,300	5.09	10	4	1	4	0	M	Poor	fallen tree, still alive, cannot access	<10	U
T20	Goat Willow	Salix caprea	16	2	450,250	6.18	4	6	2	4	0	M	Fair	cannot access due to veg and ground conditions, uneven habit, deadwood, growing in dipped area, multi stem	20+	B2
T21	Goat Willow	Salix caprea	10	1	300	3.6	4	2	2	6	0	EM	Fair	cannot access, survey from distance, towards edge of woodland towards site, veg	10+	C1
T22	Goat Willow	Salix caprea	10	1	200	2.4	3	2	2	5	0	EM	Fair	next to site entrance, suppressed, broken branches, deadwood	10+	C1
T23	Silver Birch	Betula pendula	6	1	150	1.8	1	1	1	3	1	EM	Fair	growing on bank, suppressed, leaning, historic mechanical wounding, deadwood	10+	C2
T24	Unknown	Unknown	6	1	200	2.4	1	1	2	2	2	EM	Dead	dead tree by site entrance	<10	U
T25	Sweet Chestnut	Castanea sativa	18	7	250,250,300,300,150,200,200	7.66	5	5	5	5	0	M	Fair	multi stem, growing in valley area below site ground levels, deadwood, upright suppressed habit	20+	B2

Tree Ref No.	Common Name	Botanical Name	Height (m)	No. of Stems	Stem dia. (mm)	Root Protection Radius (m)	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Crown Clearance (m)	Age class	Condition	Comments	Est. Rem. Contr. (Yrs)	BS : 5837 Grade
T26	Sweet Chestnut	Castanea sativa	18	5	250,250,150,200,200	5.72	5	5	5	5	0	M	Fair	multi stem, growing in valley area below site ground levels, deadwood, upright suppressed habit	20+	B2
T27	Goat Willow	Salix caprea	5	1	300	3.6	2	1	2	8	0	EM	Fair	fallen tree, covered in ivy	10+	U
T28	Goat Willow	Salix caprea	10	1	250	3	4	2	1	5	0	EM	Fair	suppressed tree growing on edge of woodland on site side, ivy, veg, uneven habit, growing on top of bank	10+	C2
G1	Group	Betula pendula (Silver Birch)	8	4	100	2.4	1	1	1	1	0	EM	Fair	understorey group, suppressed	10+	C2
G2	Group	Salix caprea (Goat Willow),Quercus robur (Common Oak),Acer campestre (Field Maple),Fagus sylvatica (Beech)	15	1	300	3.6	5	5	5	5	0	SM-EM	Fair	woodland group, not picked up clearly on topo with difficult access and banking	20+	B2
G3	Group	Betula pendula (Silver Birch),Carpinus betulus (Hornbeam),Acer campestre (Field Maple),Salix caprea (Goat Willow)	17	1	200	2.4	4	4	4	4	0	SM-EM	Fair	predominantly upright birch with mixed understorey, woodland group, not picked up clearly on topo with difficult access and banking	20+	B2
G4	Group	Carpinus betulus (Hornbeam),Acer campestre (Field Maple),Salix caprea (Goat Willow),Corylus avellana (Hazel),Castanea sativa (Sweet Chestnut)	17	1	200	2.4	4	4	4	4	0	SM-EM	Fair	predominantly more mature goat willow, woodland group, not picked up clearly on topo with difficult access and banking	20+	B2
G5	Group	Carpinus betulus (Hornbeam),Acer campestre (Field Maple),Salix caprea (Goat Willow),Corylus avellana (Hazel),Castanea sativa (Sweet Chestnut),Salix fragilis (Crack Willow)	17	1	150	1.8	4	4	4	4	0	SM-EM	Fair	not picked up at all on topo, predominantly goat willow, smaller and younger woodland group on edge of site, ground levels undulating away from site, majority of trees below level of site	20+	B2

Tree Ref No.	Common Name	Botanical Name	Height (m)	No. of Stems	Stem dia. (mm)	Root Protection Radius (m)	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Crown Clearance (m)	Age class	Condition	Comments	Est. Rem. Contr. (Yrs)	BS : 5837 Grade
G6	Group	Castanea sativa (Sweet Chestnut),Fagus sylvatica (Beech),Sambucus nigra (Elder),Salix caprea (Goat Willow),Crataegus monogyna (Hawthorn),Quercus robur (Common Oak),Betula pendula (Silver Birch)	20	1	300	3.6	5	5	5	5	0	SM-EM	Fair	woodland group with some individuals picked up on topo, on undulating levels, multi stems, inclusions, deadwood, some dead stems	20+	B2

9. APPENDIX 3 - TREE SURVEY PLAN

Please see attached plan - 3478_DR_001-A

10. APPENDIX 4 – TREE PROTECTION PLAN

Please see attached plan - 3478_DR_002-A

11. APPENDIX 5 – TREE SURGERY SCHEDULE

Tree Ref. No.	Common Name	Proposed works	Reason
T1	Sweet Chestnut	Fell tree and grind out stump	To facilitate access road
T2	Goat Willow	Fell tree and grind out stump	To facilitate access road
T3	Silver Birch	Fell tree and grind out stump	To facilitate access road
T4	Sweet Chestnut	Fell tree and grind out stump	To facilitate access road
T5	Sweet Chestnut	Fell tree to ground level and retain as coppice	To facilitate access road
T6	Sweet Chestnut	Fell tree to ground level and retain as coppice	To facilitate access road
T7	Sweet Chestnut	No works required.	-
T8	Sweet Chestnut	No works required.	-
T9	Sweet Chestnut	No works required.	-
T10	Goat Willow	No works required.	-
T11	Sweet Chestnut	No works required.	-
T12	Common Oak	Prune back to edge of parking area	To provide structural clearance
T13	Sweet Chestnut	Fell tree and grind out stump	To facilitate development
T14	Beech	Fell tree and grind out stump	To facilitate development
T15	Sweet Chestnut	Fell tree and grind out stump	To facilitate development
T16	Sweet Chestnut	Fell tree and grind out stump	To facilitate development
T17	Beech	Fell tree and grind out stump	To facilitate development
T18	Beech	Fell tree and grind out stump	To facilitate development
T19	Sweet Chestnut	Fell tree and grind out stump	To facilitate development
T20	Goat Willow	No works required.	-

Tree Ref. No.	Common Name	Proposed works	Reason
T21	Goat Willow	No works required.	-
T22	Goat Willow	No works required.	-
T23	Silver Birch	No works required.	-
T24	Unknown	Fell tree and grind out stump	For reasons of sound arboricultural management
T25	Sweet Chestnut	Fell tree and grind out stump	For reasons of sound arboricultural management
T26	Sweet Chestnut	No works required.	-
T27	Goat Willow	No works required.	-
T28	Goat Willow	No works required.	-
G1	Group	No works required.	-
G2	Group	Fell section of group and grind out stumps	To facilitate development
G3	Group	Fell section of group and grind out stumps	To facilitate development
G4	Group	Fell section of group and grind out stumps Prune back trees around new footpath	To facilitate development To provide appropriate pedestrian clearance
G5	Group	Fell section of group and grind out stumps	To facilitate development
G6	Group	Fell section of group and grind out stumps	To facilitate development

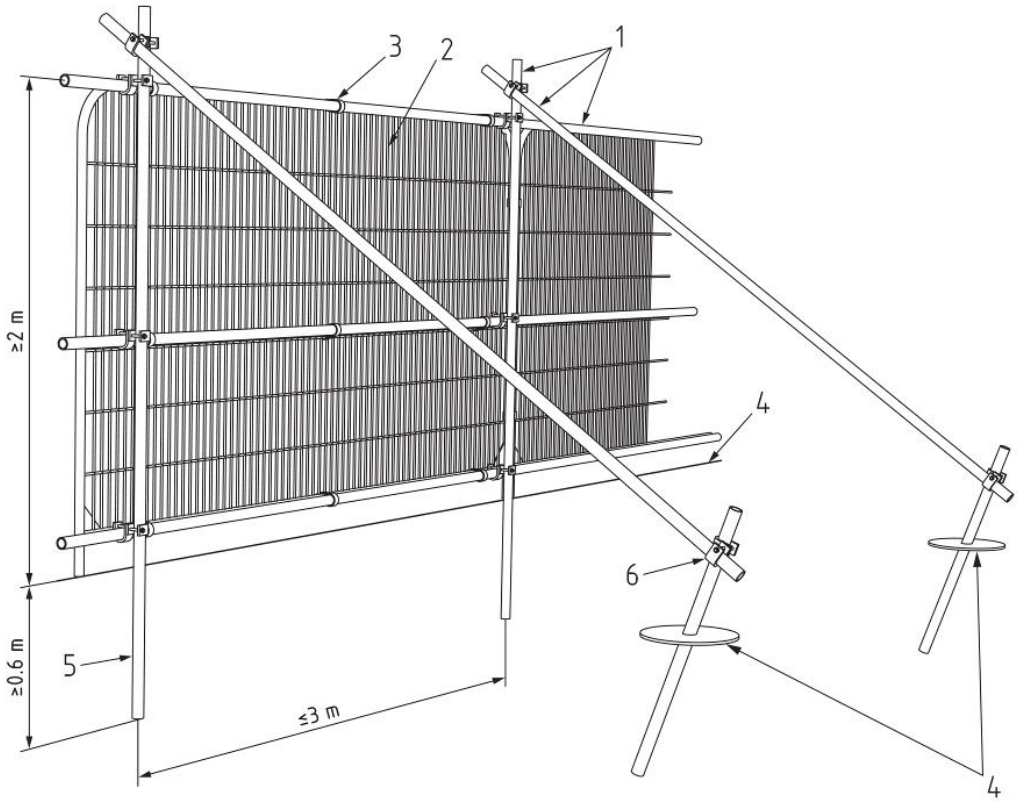
12. APPENDIX 6 TREE PROTECTION SPECIFICATION

DESIGN OF WELDED MESH, HERAS TYPE TREE PROTECTION BARRIERS

12.1. Barriers should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place. The default specification should be in accordance with 6.2.2.2 of BS 5837, as set out below.

12.2. **Specifications**: Barrier shall be a minimum 2 m high. It shall consist of a vertical and horizontal scaffold framework, well braced to resist impacts, as illustrated below. The vertical tubes should be spaced at a minimum interval of 3 m and driven securely into the ground. Onto this framework, welded mesh panels should be securely fixed. See Figure 2 below.

Figure 2 **Default specification for protective barrier**



Key

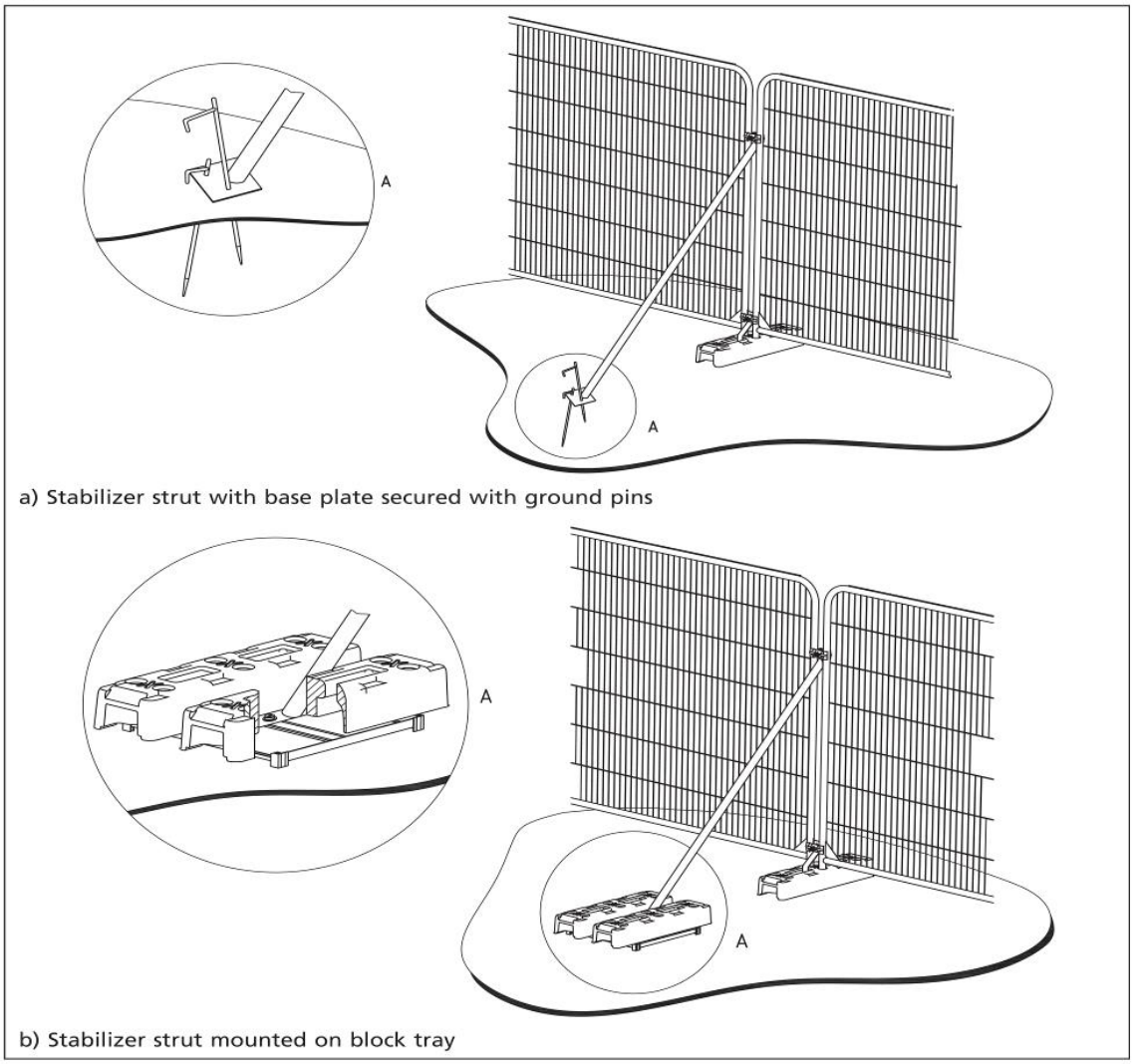
1 Standard scaffold poles
2 Heavy gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross-members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

12.3. Where site circumstances and associated risk of damaging incursions into the CEZ do not necessitate the default level of protection, an alternative specification may be used if agreed with the local authority. An example would be 'Heras' type welded mesh panels on rubber or concrete feet. The panels should be joined together using a minimum of two anti-tamper couplers, installed so that they can only be removed from inside the fence. The panels should be supported on the inner side by stabiliser struts. See Figure 3 below. All-weather notices should be attached to the barrier with words such as **'CONSTRUCTION EXCLUSION ZONE - NO ACCESS.**

12.4. **Location**: Fencing shall be positioned on the perimeter of the Root Protection Area to define the Construction Exclusion Zone or as specified in the Tree Protection Plan.

Shown on the Tree Protection Plan by a dashed black line

Figure 3 **Examples of above-ground stabilizing systems**



GROUND PROTECTION

12.5. In areas where it is not possible to erect protective fencing, ground protection must be used to protect the CEZ of trees. Where it has been agreed during the design stage, and as shown on the tree protection plan, that vehicular or pedestrian access for the construction operation may take place within the CEZ, the possible effects of construction activity should be addressed by a combination of barriers and ground protection. The position of the barrier may be within the CEZ at the edge of the agreed working zone but the soil structure beyond the barrier to the edge of the CEZ should be protected with ground protection. This must be installed before any site activity takes place to protect soil structure and tree roots.

12.6. For pedestrian movements or the erection of scaffolding within the CEZ the installation of ground protection in the form of a single thickness of scaffold boards on top of a compressible layer of sharp sand or woodchip laid onto a geotextile, may be acceptable.

12.7. For wheeled or tracked construction traffic movements within the CEZ, the ground protection should be designed by an engineer to accommodate the likely loading and may involve the use of proprietary systems of metal, polymer or wooden panels or reinforced concrete slabs, examples of which follow. Cellular confinement no-dig systems can also be used.

Fig 1. Cellular confinement system

Fig 2. Ground-Guard board protection system.