

BS 5837 Arboricultural Report

Impact Assessment & Method Statement



at
26 Netherhall Gardens
London
NW3 5TL

Dated
11th October 2022



Branching out through England and Wales

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1. Introduction

1.1. Instruction

1.1.1. We are instructed by TG Studio to:

- Undertake a Tree Survey to BS 5837 at 26 Netherhall Gardens and assess all trees potentially within influencing distance of proposed development within the site.
- Plot the trees on a Tree Constraints Plan and record the data in a Tree Data Schedule.
- Provide an overview of the site and any management recommendations.
- Determine if any trees are growing within a conservation area or are protected by a tree preservation order.
- Assess the potential impact of the development proposals and provide guidance as to appropriate mitigation measures.
- Produce an Arboricultural Impact Assessment for submission to the local authority.
- Produce a Tree Protection Plan and Arboricultural Method Statement specifying how the retained trees will be protected from accidental damage by demolition or construction activity.

1.2. Purpose of this Report

- 1.2.1. This report is produced according to the guidance and recommendations within *BS 5837: 2012 - Trees in Relation to Design, Demolition and Construction*. It is tailored to accompany a planning application. It assesses the impact of all proposed construction works on the tree population. Tree removal, canopy pruning, and the impact upon roots from various groundworks are all considered in detail. Best practice mitigation is specified wherever appropriate.
- 1.2.2. Consideration is also given to the impact of the changed juxtaposition between trees and buildings and how that may influence future tree management.
- 1.2.3. The accompanying Arboricultural Method Statement specifies how the trees shall be protected from accidental damage by demolition and construction activities. It is designed to be enforceable and may be conditioned upon the granting of planning permission.
- 1.2.4. This document should not be used to inform management decisions relating to liability or risk management. Such decisions should be based on a more detailed inspection of the trees than was carried out for this report.

1.3. References

- 1.3.1. We have liaised with our client and studied topographical surveys and projected ground levels to attain an adequate understanding of the project to enable us to carry out an accurate assessment of the proposals and to specify suitable tree protection measures.

1.4. Survey Details

- 1.4.1. A visual ground-level assessment of all trees was undertaken on the 20th of September 2022 by Ivan Button. No climbed inspections or specialist decay detection were undertaken. Details of how the survey was undertaken can be found in Appendix 1.
- 1.4.2. The tree locations shown on the accompanying drawings are based on a measured drawing of the site supplied to Crown Tree Consultancy. This drawing had the tree positions already plotted. Where applicable, additional trees have been plotted by us according to measurements taken on site.

1.5. Author

- 1.5.1. This report was compiled by Joe Taylor - FdSc (Arboriculture), M. Arbor A. Details of the author's experience that qualify him to produce such a report are detailed in Appendix 4.

2. Site Overview



2.1. Brief Site Description

- 2.1.1. Number 26 Netherhall Gardens is a detached residential property with gardens to the front and rear.
- 2.1.2. Ground levels slope upwards from the front of the property to the house and into the rear garden. Steps lead up to the house and into the rear garden.
- 2.1.3. Five trees grow within the front garden, including a Retention Category B lime (T4) and four Retention Category C and U trees (T11 – T14).
- 2.1.4. Six trees grow within the rear garden, including a Retention Category B oak (T1) and five Retention Category C trees (T6 – G9).
- 2.1.5. Nearby street trees (T3 and T5) and one tree in an adjacent garden (T2) were also included in our survey. The roots of these trees may extend into the site
- 2.1.6. The Tree Constraints Plan and Tree Data Schedule (see Appendix 6) should be referred to for descriptions and locations of all trees.

2.2. Coordinates

- 2.2.1. The site coordinates are 51°33'1.51"N 0°10'44.06"W, and the altitude is approximately 75m above sea level¹.

2.3. Survey Extent

- 2.3.1. The area indicated below² shows the extent of the survey. Our survey included all trees within the curtilage of the property and those adjacent to it.



¹ To access satellite imagery and street views of the site these co-ordinates may be entered into: <http://maps.google.co.uk/>

² Image taken from Google Earth and may not be current

3. Vegetation Overview (independent of proposals)

This section summarises all the recommendations within the Tree Data Schedule regardless of whether trees are to be retained, felled or pruned to facilitate the proposed development. It does not specify works that may be required to facilitate the development proposals.

3.1. Preliminary Management Recommendations

- 3.1.1. The following recommendations are made in order to maintain the trees in an acceptable condition:
- 3.1.2. A low retaining garden wall to the front of the property has become significantly displaced (see Photograph 5). To facilitate repairs to the wall, T12 requires removal due to its proximity. Its removal is of a lower priority.
- 3.1.3. T2 could not be fully inspected due to the presence of dense ivy. It is recommended that the ivy is removed and the tree reinspected.
- 3.1.4. All other trees were deemed to be in satisfactory condition.

3.2. Work Priority and Future Inspections

- 3.2.1. The table below suggests a schedule for completing the works recommended in the Tree Data Schedule based on the perceived risk:

Work Priority	Definition	Tree Number
Urgent	As soon as possible	None
Very High	Within 1 Month	None
High	Within 3 Months	None
Moderate	Within 1 year	T2
Low	Within 3 years	T12

- 3.2.2. The table below suggests a schedule of future inspections based on the condition and location of each tree:

Inspection Frequency (years)	Tree Number
0.5	None
1	None
1.5	T1, T2, T3, T4 and T5
3	T6, T7, T8, T9, T10, T11, T13, T14 and T15

- 3.2.3. The trees should be inspected sooner if there is a noticeable decline in their condition or following extreme weather events.

3.3. Species Present – Additional Information

- 3.3.1. The table below contains general information about the tree *species* (rather than the actual tree *specimens*) included in the survey. Its purpose is to assist readers who are unfamiliar with the characteristics of the various species.

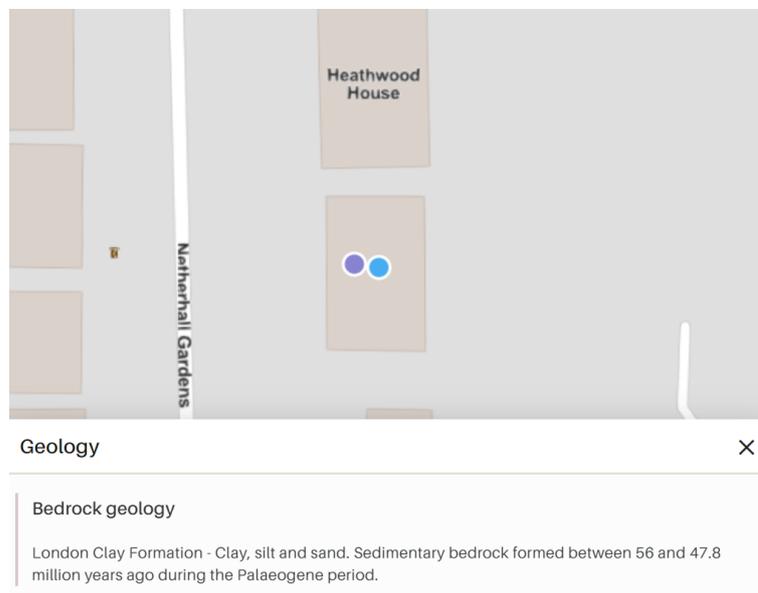
Species	Typical Height at Maturity (m)	Typical Canopy Spread at Maturity (m)	General Notes
Ash	25	18	Large deciduous tree with a straight bole and a high open domed crown. Native to Britain and commonly found in woodlands and adjacent roadsides. Not suitable for small gardens. Easily identified by its oppositely arranged pinnate leaves and black buds. Branches are relatively brittle resulting in a fairly high incidence of small branch failure in windy conditions. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Fraxinus+excelsior for more info.
Cherry	8	10	Many cultivars available, bred for their abundance of spring flowers, edible cherries or ornamental bark (e.g. Tibetan Cherry). Usually white or pink flowering, often in very early spring. Usually with a single bole to around 2.5m and multi-stemmed thereafter. Most varieties have excellent autumn colour.
Goat Willow	10	8	Also called Pussy Willow or Great/Common Sallow. Native and abundant in Britain except on the lightest soils. One of the first pioneer species to colonise an abandoned site due to its light far-blown seeds. Traditionally coppiced and used for basket making. rarely planted as an ornamental due to its untidy habit. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Salix+caprea for more info.
Holly	16	12	Evergreen tree native across Western Europe. Many cultivars available, often with variegated leaves. Females produce bright red berries. Good wildlife value. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Ilex+aquifolium for more info.
Holly Oak	25	20	Also called Holm Oak or Evergreen Oak. So named because of its evergreen vaguely holly-like leaves. Originating in the Mediterranean region. Mulched leaves are said to repel slugs and grubs. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Quercus+ilex+ballota for more info.
Japanese Maple	10	10	Attractive ornamental and often dainty tree native to China, Korea and Japan. Often multistemmed low down with a shrubby habit. Several cultivars available, all with attractive leaves, especially 'Dissectum'. All cultivars have attractive autumn colour. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Acer+palmatum for more info.
Leyland Cypress	40	8	Vigorous evergreen tree, cultivated hybrid between Nootka Cypress and Monterey Cypress. Widely planted and widely hated. Excellent hedging species unless it is undermanaged in which case it forms a giant, dense wall of foliage. Very hardy. Tolerates most conditions. Size may be managed by regular trimming. Golden forms available. (The details of the specific cultivar surveyed are not listed here.) Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Cupressocyparis+leylandii for more info.
Lime	25	12	Very common street tree. Several species exist; the one most often found in woods is 'common lime' which produces a mass of suckers at the stem base, making it very cheap to propagate. Limes have non-symmetrical heart shaped leaves which are much loved by aphids (hence the sticky honeydew on cars parked beneath). Limes are tolerant of heavy pruning and are often managed as pollards. Old limes tend to support a lot of small dead branches. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Tilia+x+europaea for more info.
Oak	22	18	Deciduous, long lived tree native and common throughout Europe with very durable timber. Excellent habitat tree - provides food and shelter for thousands of native species. Can be very attractive as a mature open grown specimen though not particularly ornamental, having no autumn colour or showy flowers. Responds well to pruning. Visit http://www.pfaf.org/user/Plant.aspx?LatinName=Quercus+robur for more info.
Silver Maple	30	20	Deciduous tree native to N. E. America. Cut leaved version is regularly planted. Outstanding autumn colour. Irregular, airy domed crown, often with weeping outer branches.

The figures quoted regarding typical height and canopy spread should be treated as approximate. Actual heights and spreads vary according to several environmental factors such as soil conditions, climate, and the presence of competing vegetation. The figures quoted are not the maximum dimensions that the species may attain.

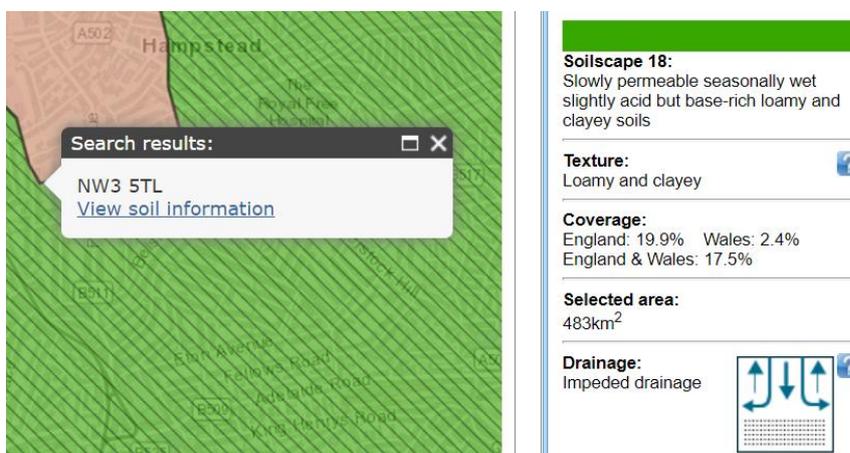
4. Local Geology and Soils

4.1. Desktop Research

4.1.1. Desktop research into local geology based on the postcode NW3 5TL obtained the following results:



Source: <https://mapapps.bgs.ac.uk/geogyofbritain/home.html>



Source <http://www.landis.org.uk/soilscapes/>

4.2. Site Investigations

4.2.1. We are unaware of any specific investigations into soil properties at the site.

4.3. Conclusion and Relevance

4.3.1. Based on the information reproduced in Section 3.1, local soils are assumed to have a clay texture.

4.3.2. Clay soils may be especially prone to compaction and slurring caused by general construction activity. Both of which significantly impair root function. This must be guarded against by the use of boards to protect any soils where roots are growing. When planting new trees, species should be selected that can tolerate heavy soils.

4.3.3. Trees of most species are less likely to root deeply in clay soils. Any new surfacing over tree roots should avoid deep excavation and have good load-spreading properties.

5. Statutory Protection – TPOs and Conservation Area Status

Before undertaking most works on trees protected by a tree preservation order³, consent needs to be formally obtained from the local authority. Where trees are located in a conservation area (but not protected by a TPO), works are generally not permitted without first giving the local authority six weeks' notice of intention⁴. Unauthorised works to protected trees, or trees in a conservation area, may result in criminal prosecution and a fine. Where works are required to implement a fully approved development, no such consent or notice is required.

5.1. Desktop Research

5.1.1. We are informed, by Rav Curry of London Borough of Camden via email correspondence on 7th September 2022 that:

5.1.2. The site is within The Fitzjohn's Netherhall Conservation Area.

5.1.3. There is one tree preservation order affecting a tree within the site. The tree affected is T1 (our numbering system).

5.1.4. There are no tree preservation orders affecting trees immediately adjacent to the site.

5.2. Felling Licences

5.2.1. Felling licences issued by the Forestry Commission are sometimes required before removing trees. However, these licenses are aimed toward woodland and forestry management. Felling licences are NOT required for any of the following:

- Lopping, topping or pollarding.
- Removal of small trees (stem diameter less than 8cm) or fruit trees.
- Works to any trees growing within domestic gardens, orchards, or the Inner London boroughs.
- Operations involving less than five cubic meters of timber in any quarter year.
- Thinning and understorey clearing operations.
- Dangerous trees, nuisance trees, some diseased trees.
- Where removal is required to enable a fully approved development.

5.2.2. More detailed guidance can be found at <https://www.gov.uk/government/publications/tree-felling-getting-permission>

5.2.3. Hence a felling licence is **not** required relating to this development.

³ <https://www.gov.uk/guidance/tree-preservation-orders-and-trees-in-conservation-areas>

⁴ During this time, the local authority may elect to create a tree preservation order or to inform the applicant that they have no objection to the proposed works. If the local authority does not respond within six weeks, then the intended work may be undertaken. Note: the local authority cannot refuse consent for works to trees within a conservation area; they may only create a tree preservation order if they wish to have further control over what works are undertaken.

6. Planning Policy Context

6.1. National Policy

6.1.1. The National Planning Policy Framework 2021 Policy 12, Paragraph 131 is specifically aimed at urban trees:

131. Trees make an important contribution to the character and quality of urban environments, and can also help mitigate and adapt to climate change. Planning policies and decisions should ensure that new streets are tree-lined⁵⁰, that opportunities are taken to incorporate trees elsewhere in developments (such as parks and community orchards), that appropriate measures are in place to secure the long-term maintenance of newly-planted trees, and that existing trees are retained wherever possible. Applicants and local planning authorities should work with highways officers and tree officers to ensure that the right trees are planted in the right places, and solutions are found that are compatible with highways standards and the needs of different users.

6.1.2. Policy 15, Paragraphs 174, 175, and especially 179 and 180 are aimed at conserving and enhancing the natural environment, habitat and biodiversity. All trees provide some habitat and increase the biodiversity of a site. Native trees such as oaks can support an abundance of algae, lichens, mosses, insects, birds, fungi, reptiles and even mammals.

15. Conserving and enhancing the natural environment

174. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- a) protecting and enhancing valued landscapes, sites of biodiversity or geological value and soils (in a manner commensurate with their statutory status or identified quality in the development plan);
- b) recognising the intrinsic character and beauty of the countryside, and the wider benefits from natural capital and ecosystem services – including the economic and other benefits of the best and most versatile agricultural land, and of trees and woodland;
- c) maintaining the character of the undeveloped coast, while improving public access to it where appropriate;
- d) minimising impacts on and providing net gains for biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;
- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and
- f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.

175. Plans should: distinguish between the hierarchy of international, national and locally designated sites; allocate land with the least environmental or amenity value, where consistent with other policies in this Framework⁵⁰; take a strategic approach to maintaining and enhancing networks of habitats and green infrastructure; and plan for the enhancement of natural capital at a catchment or landscape scale across local authority boundaries.

Habitats and biodiversity

179. To protect and enhance biodiversity and geodiversity, plans should:

- a) Identify, map and safeguard components of local wildlife-rich habitats and wider ecological networks, including the hierarchy of international, national and locally designated sites of importance for biodiversity⁵¹; wildlife corridors and stepping stones that connect them; and areas identified by national and local partnerships for habitat management, enhancement, restoration or creation⁶²; and
- b) promote the conservation, restoration and enhancement of priority habitats, ecological networks and the protection and recovery of priority species; and identify and pursue opportunities for securing measurable net gains for biodiversity.

180. When determining planning applications, local planning authorities should apply the following principles:

- a) if significant harm to biodiversity resulting from a development cannot be avoided (through locating on an alternative site with less harmful impacts), adequately mitigated, or, as a last resort, compensated for, then planning permission should be refused;
- b) development on land within or outside a Site of Special Scientific Interest, and which is likely to have an adverse effect on it (either individually or in combination with other developments), should not normally be permitted. The only exception is where the benefits of the development in the location proposed clearly outweigh both its likely impact on the features of the site that make it of special scientific interest, and any broader impacts on the national network of Sites of Special Scientific Interest;
- c) development resulting in the loss or deterioration of irreplaceable habitats (such as ancient woodland and ancient or veteran trees) should be refused, unless there are wholly exceptional reasons⁶³ and a suitable compensation strategy exists; and
- d) development whose primary objective is to conserve or enhance biodiversity should be supported; while opportunities to improve biodiversity in and around developments should be integrated as part of their design, especially where this can secure measurable net gains for biodiversity or enhance public access to nature where this is appropriate.

181. The following should be given the same protection as habitats sites:

- a) potential Special Protection Areas and possible Special Areas of Conservation;
- b) listed or proposed Ramsar sites⁶⁴; and
- c) sites identified, or required, as compensatory measures for adverse effects on habitats sites, potential Special Protection Areas, possible Special Areas of Conservation, and listed or proposed Ramsar sites.

6.2. Regional Policy

- 6.2.1. The London Plan 2021⁵ is the Spatial Development Strategy for Greater London. It sets out a framework for how London will develop over the next 20-25 years and the Mayor's vision for Good Growth.
- 6.2.2. The Plan is part of the statutory development plan for London, meaning that the policies in the Plan should inform decisions on planning applications across the capital. Borough's Local Plans must be in general conformity with the London Plan, ensuring that the planning system for London operates in a joined-up way and reflects the overall strategy for how London can develop sustainably, which the London Plan sets out⁶.
- 6.2.3. Chapter 8 relates to the natural environment. Within this chapter, Policies G1 and G2 promote green infrastructure and stress the importance of conserving London's Green Belt. Policies G3 and G4 relate to Metropolitan Open land and Open Space. Whilst trees are an intrinsic part of all of the above; they are not specifically mentioned in these policies.



- 6.2.4. Policy G5 is relevant to this report as it promotes the greening of London by including the planting of new trees and retaining existing trees where possible.

Policy G5 Urban greening

- A Major development proposals should contribute to the greening of London by including urban greening as a fundamental element of site and building design, and by incorporating measures such as high-quality landscaping (including trees), green roofs, green walls and nature-based sustainable drainage.
- B Boroughs should develop an Urban Greening Factor (UGF) to identify the appropriate amount of urban greening required in new developments. The UGF should be based on the factors set out in Table 8.2, but tailored to local circumstances. In the interim, the Mayor recommends a target score of 0.4 for developments that are predominately residential, and a target score of 0.3 for predominately commercial development (excluding B2 and B8 uses).
- C Existing green cover retained on site should count towards developments meeting the interim target scores set out in (B) based on the factors set out in Table 8.2.

Table 8.2 - Urban Greening Factors

Surface Cover Type	Factor
Semi-natural vegetation (e.g. trees, woodland, species-rich grassland) maintained or established on site.	1
Wetland or open water (semi-natural; not chlorinated) maintained or established on site.	1
Intensive green roof or vegetation over structure. Substrate minimum settled depth of 150mm – see livingroofs.org for descriptions. ^A	0.8
Standard trees planted in connected tree pits with a minimum soil volume equivalent to at least two thirds of the projected canopy area of the mature tree – see Trees in Hard Landscapes for overview. ^B	0.8
Extensive green roof with substrate of minimum settled depth of 80mm (or 60mm beneath vegetation blanket) – meets the requirements of GRO Code 2014. ^C	0.7
Flower-rich perennial planting – see RHS perennial plants for guidance. ^D	0.7
Rain gardens and other vegetated sustainable drainage elements – See CIRIA for case-studies. ^E	0.7
Hedges (line of mature shrubs one or two shrubs wide) – see RHS for guidance. ^F	0.6
Standard trees planted in pits with soil volumes less than two thirds of the projected canopy area of the mature tree.	0.6
Green wall – modular system or climbers rooted in soil – see NBS Guide to Façade Greening for overview. ^G	0.6
Groundcover planting – see RHS Groundcover Plants for overview. ^H	0.5
Amenity grassland (species-poor, regularly mown lawn).	0.4
Extensive green roof of sedum mat or other lightweight systems that do not meet GRO Code 2014. ^I	0.3
Water features (chlorinated) or unplanted detention basins.	0.2
Permeable paving – see CIRIA for overview. ^J	0.1
Sealed surfaces (e.g. concrete, asphalt, waterproofing, stone).	0

- 6.2.5. Further guidance on the UFG has been prepared by the Greater London Authority and can be found here: <https://www.london.gov.uk/what-we-do/planning/implementing-london-plan/london-plan-guidance/urban-greening-factor-ugf-guidance> A UGF calculator tool has also been prepared to help applicants calculate the score of a scheme and present the score as part of their application.
- 6.2.6. Policy G6 promotes biodiversity and access to nature, though trees are not specifically mentioned.

- 6.2.7. Policy G7 is of most relevance to this report as it specifically relates to trees and woodlands:

Policy G7 Trees and woodlands

- A London's urban forest and woodlands should be protected and maintained, and new trees and woodlands should be planted in appropriate locations in order to increase the extent of London's urban forest – the area of London under the canopy of trees.
- B In their Development Plans, boroughs should:
- 1) Protect 'veteran' trees and ancient woodland where these are not already part of a protected site.
 - 2) Identify opportunities for tree planting in strategic locations.
- C Development proposals should ensure that, wherever possible, existing trees of value are retained⁷. If planning permission is granted that necessitates the removal of trees there should be adequate replacement based on the existing value of the benefits of the trees removed, determined by, for example, i-tree or CAVAT or another appropriate valuation system. The planting of additional trees should generally be included in new developments – particularly large-canopied species which provide a wider range of benefits because of the larger surface area of their canopy.

⁵ https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf

⁶ <https://www.london.gov.uk/what-we-do/planning/london-plan/new-london-plan/london-plan-2021>

⁷ Category A, B and lesser category trees where these are considered by the local planning authority to be of importance to amenity and biodiversity, as defined by BS 5837:2012

7. Arboricultural Impact Assessment

7.1. Overview

7.1.1. It is proposed to extend the existing dwelling and alter the car parking and landscaping to the front of the site, as indicated on the drawings in Appendix 6. The existing layout is indicated in black, and the footprint of the proposed layout is indicated in red.

7.1.2. The table below summarises the potential impact on trees due to various activities.

Activity	Trees Potentially Affected
Tree Removal: Retention Category A	None
Tree Removal: Retention Category B	None
Tree Removal: Retention Category C	T7, T8, G9, T11, T13 and T14
Tree Removal: Retention Category U	T12
Tree Pruning	None
RPA: Foundations	None
RPA: New Hard Surface	None
RPA: Replace Existing Hard Surface	None
RPA: Underground Services	None
RPA: Change of Ground Levels	None
RPA: Soil Compaction	Trees adjacent the construction area (preventable by installing tree protection measures)

7.1.1. Other potentially damaging activities often associated with construction sites include demolition or the careless use of plant machinery, hazardous materials, or fires. All of the above potential impacts are considered in detail throughout this Section.

7.2. Tree Removal

7.2.1. All trees to be removed are indicated on the Tree Removal Plan and are listed below:

7.2.2. **Retention Category A:** It is proposed to retain all Retention Category A trees.

7.2.3. **Retention Category B:** It is proposed to retain all Retention Category B trees.

7.2.4. **Retention Category C:** It is proposed to remove T7, T8, G9, T11, T13 and T14. These trees are located within the footprint of the proposal or so close to it that their retention is not practical.

7.2.5. These are relatively small trees or have a relatively low amenity value. Consequently, their removal shall not have a significant impact on the visual amenity of the locality, and they are not considered to be a material planning consideration.

7.2.6. **Retention Category U:** It is proposed to remove T12. This tree is located within the footprint of the proposal, so its retention is not possible.

7.2.7. Trees within this category should be removed regardless of development proposals. Consequently, the removal of Category U trees is not considered to be a direct impact of the development.

7.2.8. None of the trees to be removed are protected by a tree preservation order or considered worthy of special protection.

7.2.9. Details specific to each tree can also be found in the Tree Data Schedule.

7.3. Mitigation Planting

- 7.3.1. The site offers some opportunity to plant additional new trees as part of a post-development landscaping scheme.

7.4. Impact on Tree Canopies

- 7.4.1. The retained tree canopies are sufficiently far from proposed building works and high over access routes such that they should not be impacted by construction activity. Consequently, no pruning works are required to enable the build. The accompanying Arboricultural Method Statement specifies protection measures throughout the site to ensure that no canopies are accidentally damaged.

7.5. Impact on Tree Roots

Foundations:

- 7.5.1. No foundations are proposed within the Root Protection Area of any retained tree. Consequently, no restrictions on foundation design or implementation are considered necessary from an arboricultural perspective.

New Surfaces:

- 7.5.2. No new surfaces are proposed within the Root Protection Areas of any trees.

Underground Services:

- 7.5.3. The proposal requires no underground services to be excavated through any Root Protection Areas.

Changes in Ground Levels:

- 7.5.4. No changes to ground levels are proposed over Root Protection Areas.

Soil Compaction:

- 7.5.5. The majority of tree roots lie within the upper soil horizons. This is because the availability of oxygen decreases with depth, and roots need to breathe to stay alive. In addition, nutrients are more readily available in the form of organic matter close to the soil surface.

- 7.5.6. Healthy soils contain about 25% air space between solid particles. Increased loading of the soil caused by construction activity causes air to be squeezed out as the soil becomes compacted, preventing roots from breathing. Even an increase in pedestrian activity may cause some soil compaction.

- 7.5.7. It is important therefore that ground compaction and soil disturbance over Root Protection Areas should be avoided during the construction phase. This may be done by installing protective fencing and ground protection measures as recommended within the accompanying Arboricultural Method Statement.



7.6. Demolition Activities

- 7.6.1. The tree protection measures specified within the accompanying Arboricultural Method Statement should be installed prior to the commencement of all demolition activities (including soil stripping) to prevent any detrimental impact on tree health. Where this is not practicable, demolition of structures within Construction Exclusion Zones shall be undertaken very early on in the demolition phase, and the protective barriers installed immediately thereafter.

7.7. Waste and Materials Storage

- 7.7.1. All hazardous materials (including cement and petrochemical products) will need to be controlled according to COSHH regulations in order to ensure there is no detrimental impact on tree health. Provision shall need to be made to ensure that cement spillage avoids all Root Protection Areas.
- 7.7.2. Areas designated for the storage of building materials and waste products will need to be approved by the local authority. Root Protection Areas should be avoided. Where this is not possible, suitable ground protection measures will need to be installed.

7.8. Cabins and Site Facilities

- 7.8.1. Consideration should be given to the location of any site welfare facilities in terms of potential impact on trees. Where it is proposed to install cabins or site facilities in Root Protection Areas, the project arborist should be consulted and approval obtained from the local authority.

7.9. Boundary Treatments

- 7.9.1. No changes are proposed to the existing boundary features that might impact upon trees.

7.10. Impact of Retained Trees on the Development

- 7.10.1. Adequate space has been allowed between all retained trees and habitable rooms of the proposal. Consequently, the proposal shall not result in increased pressure to remove or overly prune any of the retained trees.
- 7.10.2. The foundations and any new surfaces should be designed to accommodate all potential impacts due to future tree rooting activity. These include potential vegetation related subsidence, vegetation related heave, and lifting of surfaces / light structures due to direct root pressure.

7.11. Summary

- 7.11.1. Only low-quality or small trees are to be removed to enable the build. No Retention Category A trees, or Retention Category B trees, are to be removed.
- 7.11.2. No pruning works are required to enable the proposal.
- 7.11.3. No foundations are proposed within RPAs.
- 7.11.4. No hard surfacing is proposed in RPAs.
- 7.11.5. Adequate space has been allowed between the proposal and all trees such that no future pressure to overly-prune or remove trees shall occur as a consequence of the proposal.
- 7.11.6. So long as suitable protection measures are implemented during demolition and construction stages, and some mitigation planting is implemented, I see no arboricultural reasons why the proposal should not proceed.

7.12. Arboricultural Method Statement

- 7.12.1. The accompanying Arboricultural Method Statement specifies restrictions on construction activities to ensure minimal impact on retained trees. All of the potential impacts noted in this section are accounted for in the Arboricultural Method Statement. So long as these protection measures are fully implemented, there shall be no long-term detrimental impact on the health of the adjacent trees.

8. Photographs

Refer also to the Tree Constraints Plan for photo locations

Photo 1.



Photo 2.



Photo 3.



Photo 4.



Photo 5.



Photo 6.



Photo 7.



Photo 8.



Photo 9.



Photo 10.



Appendix 1: BS 5837: 2012 – Guidance Notes

This Standard prescribes the principles to be applied to achieve a satisfactory juxtaposition of trees and structures. It sets out to assist those concerned with trees in relation to design, demolition and construction to form balanced judgements.

It acknowledges the positive contribution trees may offer to a site, as well as the negative aspects of retaining inappropriate trees. It addresses the negative impacts that construction activity may have upon trees and offers mitigation strategies to minimise these impacts.

The Standard suggests a three stage approach to ensure best practice is followed when developing close to trees:

A1.1 Stage 1: Survey Details and Notes

A ground level visual survey was undertaken. No climbed inspections or specialist decay detection were undertaken. Only trees with a stem diameter over 75mm, which lie within the site boundary or relatively close to it, were included.

Where applicable, trees with significant defects have been highlighted and appropriate remedial works have been recommended. However, this report should not be seen as a substitute for a full *Safety Survey* or *Management Plan* which are specifically designed to minimise risk and liability associated with responsibility for trees.

Wherever practicable dimensions were obtained using diameter tapes, logger's tapes, distometers and clinometers. Where obstacles prevent accurate measurement, dimensions are estimated. Trees on privately owned third party are surveyed from the best available vantage point and observations relating to the condition of these trees should be treated accordingly. All height measurements should be regarded as approximate.

Data is recorded for each tree and is presented in a Tree Data Schedule. Each tree is allocated a **Retention Category** according to its size, amenity value, condition and safe useful life expectancy. The categories are allocated independently of development proposals. Our interpretation of the Retention Categories is explained below:

A1.1.1 Retention Categories

A Category: Trees of high quality and amenity value. Usually, mature trees with a significant life expectancy which would enhance any development. Retention of these trees is strongly encouraged.

B Category: Trees of moderate quality and amenity value. Usually these are maturing trees or younger trees with exceptional form. Retention of these trees is desirable though the removal of occasional specimens may be acceptable.

C Category: Trees of low quality or small specimens with a relatively low amenity value. These trees are not considered to be a material planning constraint and their removal will generally be seen as acceptable in order to facilitate development.

U Category: Trees of such low quality that their removal is recommended regardless of development proposals.

Occasionally trees are borderline and do not fall neatly into one of the categories A, B or C. In such cases we apply a superscript (+/-) such that:

C⁺ Indicates borderline C/B, though Category C is deemed to be most appropriate.

B⁻ Indicates borderline C/B, though Category B is deemed to be most appropriate.

The British Standard suggests that each of the A, B and C categories may be further subdivided (A1, A2, A3, B1, B2, B3 etc) such that subcategory 1 denotes mainly arboricultural values, subcategory 2 denotes mainly landscape values and subcategory 3 denotes mainly cultural values (including conservation). Multiple subcategories may be used.

Our experience suggests that these subdivisions lack clarity and can be confusing. Within this report subcategories are **not** denoted. Where appropriate, the use of phrases such as '*Part of a formal group*', or '*Has a high ecological value*', or '*Offers good screening to the site*' are incorporated into the observation section of the Tree Data Schedule. We believe this conveys all relevant landscape and cultural information without any confusion.

Tree Constraints Plan (TCP). This indicates the position, crown spread, Retention Category and Root Protection Area of each tree. It is used to inform where development may proceed without causing damage to trees.

Root Protection Area (RPA). This is the area around each tree likely to contain the majority of roots. It should ideally remain undisturbed to avoid a detrimental impact on tree health. For single stemmed trees It is calculated according to the formula “radius of RPA” = “12 x stem diameter”. Where a tree has more than one stem, the equivalent-single-stem diameter is usually recorded. This is calculated by adding the squares of the stems and then finding the square root of this total. The radius of the Root Protection Area is then calculated by multiplying the equivalent-stem-diameter by 12.

Shade Constraints. The previous Standard (BS 5837 2005) suggested that shade constraints should be indicated on the TCP. These are denoted as a circle-segment drawn northwest to due east with a radius equal to the height of the tree. These do not represent the actual shade pattern which varies through the seasons. Rather, they indicate the area most shaded by the tree throughout the course of the year. Ideally habitable room windows should be located outside of these shade constraints. Where we consider it appropriate, we will include shade constraints information on our Impact Assessment Plan or Proposed Layout Plan.

A1.2 Stage 2: Arboricultural Impact Assessment

After the initial survey and the production of the Tree Constraints Plan, arborists and designers are encouraged to work together to establish a design proposal with minimal impact on the high quality trees. An assessment should be made of all possible impacts including the impact that the trees may have upon the proposal. The arborist may recommend mitigation strategies to minimise these impacts and help achieve a more harmonious juxtaposition between buildings and trees.

A1.3 Stage 3: Arboricultural Method Statement

This type of report specifies the measures necessary to protect trees against damage from construction activity. The Method Statement should be written in a manner that it may be conditioned and enforced by the local authority upon granting of planning permission. The site manager should be familiar with all aspects of the Method Statement and should ensure that all persons working on the site are aware of those aspects which appertain to their work. This includes service installation engineers and operators of plant machinery.

Appendix 2: Survey Methodology

Ground level visual surveys are carried out using the *Visual Tree Assessment* technique described by Mattheck and Broeler (1994) and endorsed by the Arboricultural Association (LANTRA Professional Tree Inspection course, 2007).

Structural condition is assessed by inspecting the stem and scaffold branches from all angles looking for weak branch junctions or symptoms of decay. Particular attention is paid to the stem-base. Cavities are explored using a metal probe in order to assess the extent of any decay. If this is not possible further inspection is recommended in the form of a climbed inspection or using specialist decay detection equipment.

The physiological condition is assessed by inspecting the stem, branches and foliage for symptoms of disease. The overall vigour of the tree is also taken into account.

Where significant defects are observed, recommendations are made according to a scale of priority in order to reduce the likelihood of structural failure. The position of the tree and its potential targets are taken into account.

Measurements are obtained using a diameter tape, clinometer, distometer and loggers tape. Where this is not practical measurements are estimated.

Some trees are surveyed as groups, though this is usually avoided close to areas likely to be developed.

Finally, a *Retention Category* is allocated as described in Appendix 1.1.1.

Appendix 3: Explanation of Tree Data & Glossary

This section explains the terms used in the **Tree Data Schedule** (see Section 3 and Appendix 6).

A2.1 General Observations

Numbering System:	Each item of vegetation has its own unique number prefixed by a letter such that T1=Tree 1, G2=Group 2, H3=Hedge 3 and W4=Woodland 4, S5=Shrub 5.
Age Categories:	
Young	Usually less than 10 years old.
Semi-Mature	Significant future growth to be expected, both in height and crown spread (typically below 30% of life expectancy).
Early-Mature	Full height almost attained. Significant growth may be expected in terms of crown spread (typically 30-60% of life expectancy).
Mature	Full height attained. Crown spread will increase but growth increments will be slight (typically 60% or more of life expectancy).
Veteran	A level of maturity whereby significant management may be required in order to keep the tree in a safe condition.
Over Mature	As for veteran except management is not considered worthwhile.
Species:	Common names and Latin names are given.
Height:	Measured from ground level to the top of the crown.
Stem Diameter:	Taken at 1.5m above ground level where possible. On multi-stemmed trees this measurement may be taken at ground level, though usually an indication of the number of stems and average diameter is given, e.g. 3 x 30cm.
Crown Height:	Measured from ground level to the height at which the main crown begins. Where the crown is unbalanced it is measured on the side deemed to be most relevant. This is usually the side facing the area of anticipated development.
Tree Diagram:	This scaled drawing is computer generated based on measurements taken for stem diameter, crown height and spread, and overall height. It is designed to help the reader rapidly assess the data. It is not an accurate representation of the form of the tree.
Crown Spread:	Measured N, E, S & W, taken from the centre of the stem and usually rounded up to the nearest metre.
Observations:	If a tree's position is considered to be relevant it will be commented upon (e.g. overhanging a children's play area). Tree form and pruning history are also recorded along with an account of any significant defects. Defects and descriptive terms are dealt with in more detail at the end of this section.
Recommendations:	Usually based on any defects observed and intended to ensure that the tree is in an acceptable condition.
Priority Scale:	Depending upon the threat posed by the tree, and the likelihood of failure, recommendations should be carried out according to the following priority scale:
Urgent	To be carried out as soon as possible.
Very High	To be carried out within 1 month.
High	To be carried out within 3 months.
Moderate	To be carried out within 1 year.
Low	To be carried out within 3 years.
Inspection Frequency:	An interval of 6 months, 1 year, 1.5 years or 3 years is allocated before the next inspection is due. Wherever practical, consideration should be given to seasonal changes so that deciduous trees are not always surveyed in winter when they have no leaves, or in summer when leaves may obscure branches within the upper crown.
Vigour:	An indication of growth rate and the tree's ability to cope with stresses:
High	Having above average vigour.
Moderate	Having average vigour.
Low	Having below average vigour.
Very Low	Tree is struggling to survive and may be dying.
Physiological Condition:	
Good	Healthy and with no symptoms of significant disease.
Fair	Disease present or vigour is impaired.
Poor	Significant disease present or vigour is extremely low.
Very Poor	Tree is dying.
Structural Condition:	
Good	Having no significant structural defects.
Fair	Some defects observed though no high priority works are required.
Poor	Significant defects found. Tree requires monitoring or remedial works.
Very Poor	Major defects which will usually require significant remedial works or tree removal.
Amenity Value:	
Very High	Exceptional specimen, observable by a large number of people.
High	Attractive specimen, observable by a significant number of people.
Moderate	One of the above factors is not applicable.
Low	Unattractive specimen or largely hidden from view.
Life Expectancy:	The estimated number of years before the tree may require removal. Classified as (<10), (10 – 20), (20 – 40), or (40+).
Retention Category:	These are explained in detail in Appendix 1.

A2.2 Evaluation of Defects

Cavities, wounds, deadwood etc are all evaluated as follows:

Major	Such that structural integrity is, or will become, compromised and the tree is, or will inevitably become, hazardous.
Significant	A defect that may over time become a major defect, though not necessarily so. This will depend on the vigour of the tree and its ability to deal with decay etc.
Minor	A defect that is unlikely to develop into a major defect.

General Glossary

Aerobic	Conditions in which oxygen is freely available, or to biomechanical processes that depend on the presence of oxygen.
Anaerobic	A condition marked by the absence of oxygen; Generally such areas are unsuitable for normal life and growth of plant tissues. These sites tend to be populated by bacteria capable of surviving low oxygen conditions often associated with Slime Flux.
Arboriculture	The culture and management of trees as groups and individuals primarily for amenity and other non-forestry purposes.
Arborist	A person possessing the technical competence through experience and related training to provide management of trees or other woody plants in a landscape setting. Generally involved with the development or management of trees for visual amenity or land management rather than the growth of trees for product or profit.
Barrier zone	A layer within an annual increment of wood which contains abnormal xylem cells, laid down by the cambium in response to wounding or other trauma.
Bracket	A type of fruiting body produced by various fungal species, plate like to hoof like in shape and often a one sided attachment to the wood or bark.
Branch bark ridge	A ridged area located at the union of a branch to a trunk or stem.
Branch Collar	Trunk tissue that forms around the base of a branch between the main stem and the branch, or between a main branch and a lateral branch. As a branch decreases in vigour or begins to die, the collar usually becomes more pronounced and completely encircles the branch.
Brown Rot	Form of decay where cellulose is degraded, while lignin is only modified.
Buttress Root	Roots that emerge from the base of the tree stem, normally large and well developed that rapidly reduce in diameter to create the Root Plate this offers structural support for the tree. Buttress roots divide rapidly forming the connection between the stem and the transport roots.
Cabling Bracing	Installing cables within the crown of a tree to prevent collapse.
Cambium	A thin layer of actively growing and dividing cells, located between the xylem (sapwood) and bark of a plant; the part responsible for radial growth of a tree stem or branch.
Canopy	The topmost layer of twigs and foliage in a woodland, tree or group of trees.
Canker	A localised area of dead bark and cambium on a stem or branch, caused by fungal or bacterial organisms, characterised by woundwood development on the periphery. This may be annual or perennial.
Cavity	An open and exposed area of wood, where the bark is missing and internal wood has been decayed and dissolved.
Chlorotic	Also Chlorosis. A condition of the plant marked by yellowing of normally green foliage, often indicating nutrient deficiency or plant dysfunction.
Co-dominant stems/trunk	Are forked branches or trunks of nearly the same size in diameter and lacking a normal branch union.
Compacted soils	Soils in which the air-space (oxygen space) has been reduced or eliminated, reducing water infiltration and percolation, reducing root presence and inhibiting new root development.
Compartmentalisation	The physiological process that creates the chemical and mechanical boundaries that act to limit the spread of disease and decay organisms.
Compression Wood Conservation Area	Abnormal wood formed on the lower side of branches and curved stems, with physical properties different from normal wood. In Great Britain, designated areas of architectural or historical interest, in which there are special procedures for planning applications. Additionally tree works cannot generally be undertaken without prior notification (Currently 6 weeks) to the relevant local planning authority. See also Tree Preservation Orders.
Core Sample	A sample of wood extracted from a trunk or branch, using an increment borer tool. The resulting core can be analysed for characteristics of growth, wood strength, structure, decay, and for species identification.
Crotch	The union of two or more branches; the auxiliary zone between branches.
Crown	The upper canopy of a tree, including upper trunk, scaffold branches, secondary branches, stems and leaves.
Crown lifting / raising	Crown Lift The removal of the lowest branches, usually to a given height. It allows more residual light and greater clearance underneath for vehicles etc.
Crown reduction	The reduction of a tree's height or spread while preserving its natural shape.
Crown thinning	The removal of some of the density of a tree's crown, usually 5-25% allowing more light through its canopy and reducing wind resistance.
Deadwood (noun)	Deadwood is often present within the crown or on the stems of trees. It may be an indication of ill health, however, it may also indicate natural growth processes. If a target is present beneath the tree, deadwood may fall and cause injury or damage and should be removed, otherwise deadwood can remain intact for conservation purposes (insects, fungi, birds etc.).
Deadwood (verb)	The removal of dead branches from a tree's canopy, usually of a specified size (in diameter).
Decay	Progressive deterioration of organic tissues, usually caused by fungal or bacterial organisms, resulting in loss of cell structure, strength, and function. In wood, the loss of structural strength.
Decay Detection	The assessment of decay within a tree has been traditionally difficult, but recent advances have made it possible to achieve accurate representations of the internal section of a tree in both 2D and 3D, removing doubt over the condition of the tree and allowing accurate management decisions.
Defoliation	The losing of plants foliage.
Dieback	Progressive death of buds, twigs and branch tissues, on individual limbs resulting in Deadwood, or throughout the canopy, extreme cases can result in Stag Heading.
Epicormic shoots	Fast growing, weakly attached shoots/branches that often grow as a response to stress factors upon a tree or branch removal.
Failure	In connection with tree hazards, a partial or total fracture within the wood tissue or loss of cohesion between roots and soil. (In total failure affected parts will snap or tear away completely, Partial failure there is a crack or deformation, which results in an altered distribution of mechanical stress.
Feeder Roots	Fine fibrous Water and nutrient absorbing roots located in the outer root system.
Flush-Cut	In trees and shrubs, a pruning cut close to the parent stem, which removes the branch bark ridge.
Foliage	The live leaves or needles of the tree; the plant part primarily responsible for photosynthesis.
Formative pruning	The trimming of a tree to remove weaknesses and irregularities which may lead to problems. The formative pruning operation is aimed at reducing the potential for future weaknesses or problems within the tree's crown.
Girdling Root	In woody plants, a root that grows across the buttress, or across other roots, eventually causing constriction of the radial growth.
Growth Increment	The incremental growth added as new annual ring develops each season over existing wood. This is seen as (growth) rings in cross-sections of wood.
Hazard beam	An upwardly curved branch in which strong internal stresses may occur without the compensatory formation of extra wood (longitudinal splitting may occur in some cases).
Heartwood	Inner non functioning tissues that provide structural support to trunk.

Heave	In relation to shrinkable clay soils, expansion due to rewetting of a volume of soil previously subjected to the removal or water by plant / trees following felling or root severance. Also in relation to root growth, the lifting of pavements and other structures by radial expansion. Also in relation to tree stability, the lifting of one side of a wind rocked root plate.
Included Bark	Bark that becomes embedded in a crotch between branch and trunk or between co-dominant stems, usually found in narrow or tight crotches, and causes a weak structure.
Increment Borer	A tool that cuts and extracts a narrow cylinder of wood from a tree for analysis of the wood tissue and growth increments.
Limb	A large lateral branch growing from the main trunk or from another larger branch.
Lopping	In trees, a general term that related to the removal of branches from a tree.
Mycelium	A mass of growing filaments (hyphae) formed by fungi.
Mycorrhizae	The symbiotic relationship between roots and certain beneficial fungi. Mycorrhizae are the combined root / fungal growth.
Occluding tissue	The general term of wood, cambium and bark that develop around the site of a wound on a woody plant
Pathogen	A microorganism that causes diseases within another organism.
Phloem	The principle conductive tissue that the products of Photosynthesis are transported around the plant
Pollard	A term for a pollarded tree.
Pollard head	The swollen section of branch / stem that forms behind the pollarding cut.
Pollarding	The complete or partial removal of the crown of a young tree so as to encourage the development of numerous branches either for amenity or historically as fodder, repeated management is required cyclically to maintain the feature
Reaction Wood	Wood with distinctive anatomical characteristics, formed in parts of leaning or crooked stems and in branches to provide additional strength / support. In hardwoods, tension wood usually forms. In conifers, compression wood is usually found.
Reaction Zone	A zone normally darker than surrounding wood that denoted the boundary often a defensive one between functional sapwood and dysfunctional or decaying wood.
Remedial pruning	The removal of old stubs, deadwood, epicormic growth, rubbing or crossing branches and other unwanted items from the tree's crown.
Resistograph	Invasive decay detection technique whereby the resistance offered by the timber to a spinning probe is measured and plotted.
Root Barriers	Both Buildings and services can benefit from the installation of root barriers to protect a soil volume from the ingress of roots.
Root Collar	The basal area of the tree; transition zone from trunk to root. Also sometimes called trunk flare.
Root Plate	The primary support area for the tree; an area of the root system close to the base that structurally anchors the tree to the soil.
Root Zone	The area and volume of soil around the tree in which roots are expected. May extend to three or more times the branch spread of the tree, or several times the height of the tree.
Sail Area	That area or the tree subjected to wind load.
Sapwood	Xylem wood tissue, usually light in colour, representing the outer growth rings of the wood. Usually living, reactive wood tissue, in a healthy tree. See heartwood
Scaffold limbs / scaffold Branches	The branches that from the main network framework of the crown of a tree.
Soft Rot	A kind of wood decay, were a fungi degrades cellulose within the cell wall, without causing overall degradation.
Soil Compaction	The compression of soil, causing a reduction of pore space and an increase in the density of the soil. Air is squeezed out and nutrients become locked. Tree roots cannot grow in compacted soil.
Sonic Decay Detection	Non invasive method whereby sound waves are passed through the tree and the speed is measured. Slow speeds indicate decay and a tomography picture representing the inner stem is produced.
Stag Heading	In a tree, a state of dieback were dead branches protrude beyond the current living crown.
Stump Grinding	The removal of a tree stump using a specialist grinding machine.
Subsidence	In relation to vegetation, the removal of water by plant growth resulting in localised shrinkage in the soil volume.
Suppressed	Trees which are dominated by surrounding vegetation and whose crown development is restricted from above.
Target	Any person or object within reach of a falling tree or part of a tree that may be injured or damaged.
Target Pruning	The pruning of a branch were the wound affects only branch material, often result in a target shaped wound.
Tension Wood	Reaction wood typically formed on the upper side of limbs or curved stems; characterized by lack of cell wall lignifications (higher ratios of cellulose to lignin).
Tight Union / Tight Crotch	Also, narrow crotch. A crotch with a narrow angle between branches, often having included bark.
Tomography	The comparison of sound or stress waves through the tree allows the creation of a 2D or 3D representation of the internal structure of a stem or branch section and highlights areas of damage. Virtually non-injurious.
Topping	Cutting large limbs back severely, without regard to form or habit of the tree. Cuts are usually made between lateral branch nodes. This practice is extremely injurious to trees, and promotes decay and structural weakness within the crown.
Tree Preservation Order	In Great Britain, an order made by the local planning authority, were consent must be gained before undertaking all but exempt works to a tree.
Veteran Tree	Veteran trees are often found in large parks or estates and commonly affected by extensive decay or have been subject to extensive works. These trees are retained for historical importance and often pose greater risk than normal, which is generally justified. They need careful management and often propping or bracing to support them, some require fencing to limit access.
Vigour	Active, healthy growth of plants: ability to respond to stress factors.
Visual Tree Assessment (VTA)	An assessment of the mechanical condition of trees based upon their 'body language'. Trees are dynamic and respond to faults / decay / environmental factors in various ways, these responses can be indicative of structural integrity.
Wetwood	An infection caused by bacteria living inside the plant tissues. The bacteria ferment the plant fluids, resulting in death of nearby cells, and often causing exudations of fluid from the bark, often referred to as a Slime Flux.
White Rot	A kind if wood decay were a fungi attacks the lignin within the wood matrix
Witches Broom	A deformed or unusual growth of twigs from adventitious buds, caused by insects, disease, or dieback of twigs and buds.
Wood	Secondary Xylem; the main structural support and water conducting tissue of trees and shrubs.
Wound Wood	Wood with atypical features, formed in the vicinity of a wound and a term to describe the occluding tissues around a wound
Xylem	Plant tissues with special function of translocation of water and dissolved nutrients.

Appendix 4: Author's Qualifications

Qualifications & Experience of Joe Taylor - MArborA, FdSc (Arboriculture)

Joe began his career in Arboriculture as a tree surgeon/climber. During his time as a tree surgeon, Joe has achieved City & Guilds NPTC qualifications in Chainsaw Maintenance and Cross Cutting, Tree Climbing and Rescue, Safe Use of Manually Fed Wood-chipper and Supporting Colleagues Undertaking Tree Related Operations.

Joe obtained a Foundation Degree in Arboriculture at Askham Bryan College in 2015 which he passed with merit. Joe is a professional member of the Arboricultural Association, the International Society of Arboriculture and the Royal Forestry Society and regularly attends industry related seminars in order to keep abreast of industry best practice.

Studying at Askham Bryan College reinforced Joe's passion for trees and drove his enthusiasm to learn more. Learning how trees interact with their surrounding environment and their importance within our urban and rural landscapes highlighted an interest in pursuing a career in consultancy.

Since working for Crown Consultants Joe has undertaken numerous surveys and produced numerous reports for the purpose of planning (BS 5837), tree condition surveys, subsidence risk assessments, root surveys and decay detection investigations.

Appendix 5: Further Information

Building Near Trees – General

National Joint Utilities Group publication # 10 (1995), *Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees*. Downloadable at www.njug.demon.co.uk/pdf/NJUG%20Publication10.pdf

NHBC Standards Chapter 4.2., *Trees and Buildings*.

Horticulture LINK project 212. (University of Cambridge, 2004), *Controlling Water Use of Trees to Alleviate Subsidence Risk*.

Tree Planting and aftercare

See www.trees.org.uk/leaflets.php# for downloadable leaflets on selecting a garden tree, planting, aftercare and veteran tree management.

British Standards

BS 5837: 2012. Trees in Relation to Design, Demolition and Construction – Recommendations.

Bs 3998: 2010. Recommendations for Tree Work.

BS 3936: 1992. Nursery Stock. Part 1: Specification for Trees and Shrubs.

BS 3936: 1992. Nursery Stock. Part 10: Specification for Groundcover Plants.

BS 4043: 1989. Transplanting Root-balled Trees.

BS 8004: 1986. Foundations.

BS 8103: 1995. Structural design of Low-Rise Buildings.

BS 8206: 1992. Lighting for Buildings.

BS 8545:2014. Trees: From nursery to independence in the landscape – Recommendations

BS 3882: 2015. Topsoil.

BS 4428: 1989. General Landscaping Operations (excluding hard surfaces).

Permission to do Works to Protected Trees / Tree Law

Forestry Commission (Edinburgh, 2003), *Tree Felling – Getting Permission*. Country Services Division - Forestry Commission. Downloadable at [www.forestry.gov.uk/website/pdf.nsf/pdf/wgsfell.pdf/\\$FILE/wgsfell.pdf](http://www.forestry.gov.uk/website/pdf.nsf/pdf/wgsfell.pdf/$FILE/wgsfell.pdf)

Transport and the Regions (Department of the Environment, 2000), *Tree Preservation Orders, A Guide to the Law and Good Practice*. Downloadable at www.communities.gov.uk/publications/planningandbuilding/tposguide

C. Mynors, *The Law of Trees, Forests and Hedgerows* (Sweet and Maxwell, London, 2002)

Communities and Local Government website with numerous downloadable documents, from: <http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/>

Lighting Levels

P.J. Littlefair, *B.R.E. 209: Site layout planning for daylight and sunlight A guide to good practice*. B.R.E. Bookshop, London.

British Standards Institution. Code of practice for day lighting. *British Standard BS 8206: Part 2 (1992)*.

Chartered Institution of Building Services Engineers. *Applications manual: Window Design* (London, 1987).

NBA Tectonics. A study of passive solar housing estate layout. ETSU Report S-1126. Harwell, Energy Technology Support Unit (1988).

I.P. Duncan; D. Hawkes, *Passive solar design in non-domestic buildings. ETSU Report S-1110*. Harwell, Energy Technology.

P. J. Littlefair, *Measuring Daylight, BRE Information Paper 23/93 f3.50*. (Advises on measuring daylight under the real sky or an artificial sky, allowing for the changing nature of sky light).

High Hedges

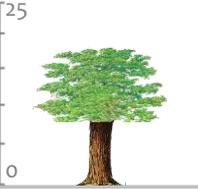
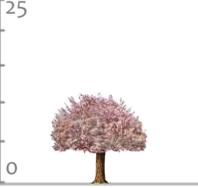
Communities and Local Government website with numerous downloadable documents, from: <http://www.communities.gov.uk/planningandbuilding/planning/treeshighhedges/>

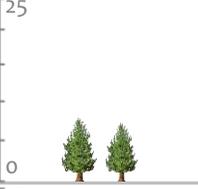
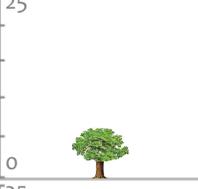
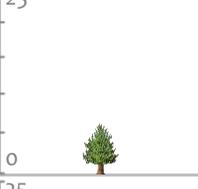
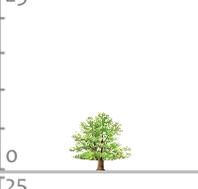
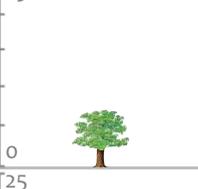
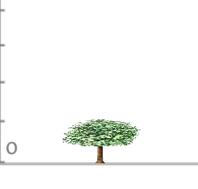
Tree Specific Websites

www.crowntrees.co.uk	Crown Consultants site containing useful information
www.trees.org.uk	Arboricultural Association
www.rfs.co.uk	Royal Forestry Society of England, Wales and N. Ireland
www.treehelp.info	The Tree Advice Trust
www.woodland-trust.org.uk	The Woodland Trust
www.treecouncil.org.uk	The Tree Council

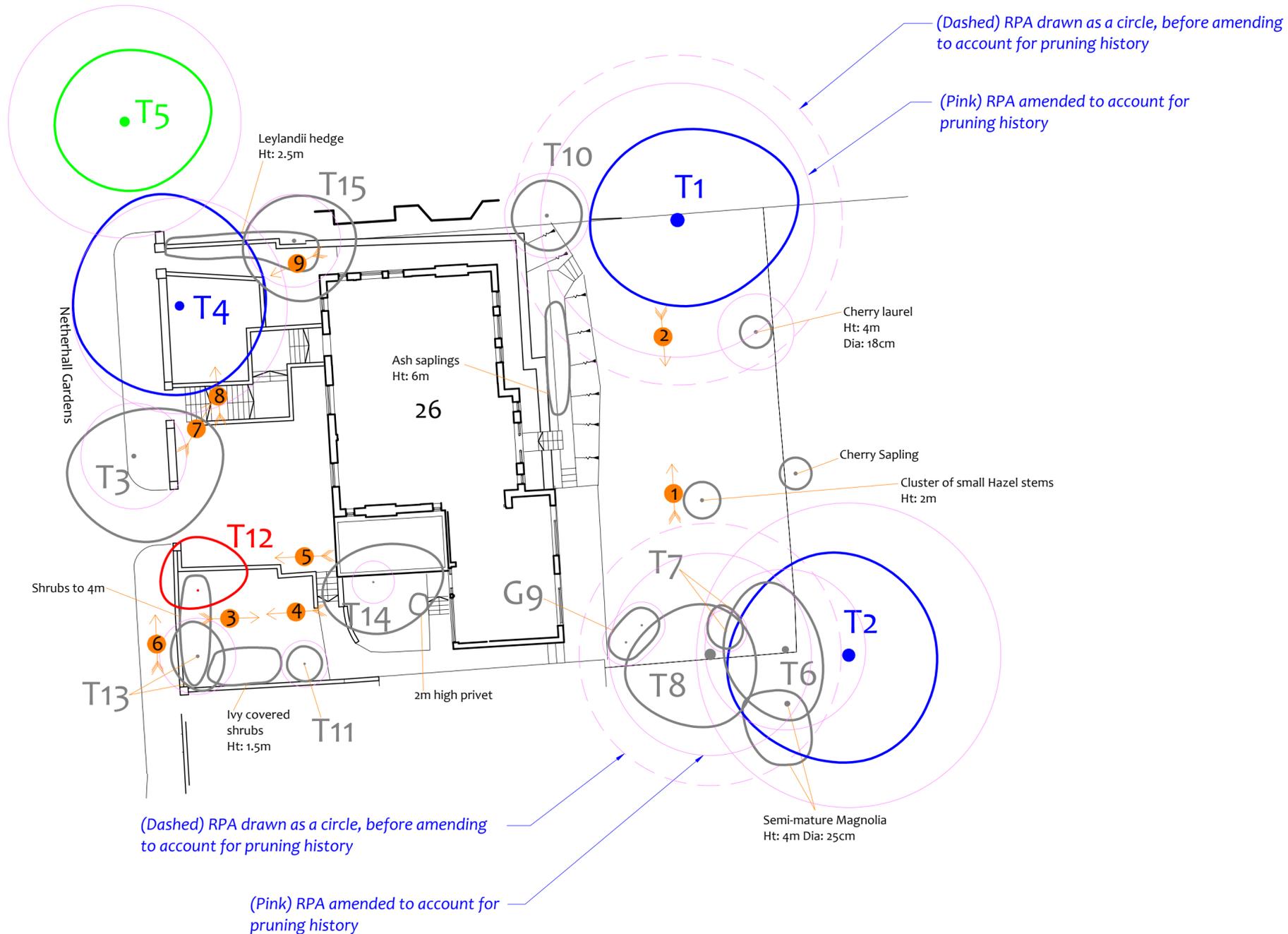
Appendix 6: Tree Data Schedule and Drawings

The Tree Data Schedule and any drawings accompanying this report follow this page. They are also provided as separate documents for ease of printing and screen viewing.

Reference G = Group H = Hedge	Age & Species	Height (m)	Crown Ht (m)	Diameter (cm)	Crown Spread (m)			Scaled Tree Diagram (m)	Notes	Recommendations (Independent of any development proposals)		Vigour		Amenity Value	
					W	N	E			Priority	Inspect Freq (yrs)	Physiological Condition	Structural Condition	Life Expectancy (yrs)	Retention Category
					S										
T1	Mature Oak Quercus robur.	18	9	78	5	5	7		Form: Twin-stemmed at 4m with a balanced crown. History: Heavily reduced. Defects: No defects observed.	No action required.		Moderate Fair	High 40+	B -	
										n/a	1.5				
T2	Mature Lime Tilia sp.	20	5	72	7	6	5		Position: Situated on third party land. Form: Single stemmed and vertical with a slightly unbalanced crown. History: No evidence of significant pruning. Defects: No defects observed. Other: Limited inspection, dimensions estimated.	Remove ivy and inspect stem for defects.		Moderate Fair	Moderate 40+	B	
										Moderate	1.5				
T3	Semi-Mature Cherry Prunus sp.	11	4	25	4	2.5	5		Position: Street tree. Form: Single stemmed and vertical with a well-formed crown. History: Multiple pruning wounds due to crown reduction. Defects: Significant bark wound at base. Bacterial canker infection.	No action required.		High Fair	Moderate 40+	C +	
										n/a	1.5				
T4	Early-Mature Lime Tilia sp.	19	2	51	6	6.5	5		Position: Situated within the front garden. Form: Twin-stemmed at ground level with a balanced crown. History: No evidence of significant pruning. Defects: No defects observed. Other: Recorded stem diameter is equivalent for two stems (35cm, 37cm).	No action required.		High Good	High 40+	B +	
										n/a	1.5				
T5	Early-Mature Silver Maple Acer saccharinum.	17	2	55	4	4	5		Position: Street tree. Form: Single stemmed and vertical with a well-formed crown. History: Heavily reduced. Defects: No significant defects.	No action required.		High Good	High 40+	A	
										n/a	1.5				
T6	Semi-Mature Lime Tilia sp.	7	0.5	38	3.5	4	2		Position: Situated within the rear garden. Form: Multi-stemmed at ground level with an unbalanced crown. History: Previously topped at 3m. Defects: No significant defects observed. Other: Recorded stem diameter is equivalent for five stems (6cm, 11cm, 18cm, 20cm & 23cm).	No action required.		Moderate Fair	Low 20-40	C	
										n/a	3				
T7	Young Holly Ilex aquifolium.	5.5	0	10	1	1.5	1		Position: Situated within the rear garden. Form: Twin-stemmed at 1m with a balanced crown. History: No evidence of significant pruning. Defects: No significant defects observed.	No action required.		High Fair	Low 20-40	C	
										n/a	3				

Reference G = Group H = Hedge	Age & Species	Height (m)	Crown Ht (m)	Diameter (cm)	Crown Spread (m)			Scaled Tree Diagram (m)	Notes	Recommendations (Independent of any development proposals)		Vigour		Amenity Value	
					W	N	E			Priority	Inspect Freq (yrs)	Physiological Condition	Structural Condition	Life Expectancy (yrs)	Retention Category
					S										
T8	Semi-Mature Lime Tilia sp.	12	3.5	62	5	3	2.5		Position: Situated within the rear garden. Form: Single stemmed and vertical with a balanced crown. History: Previously topped at 7m. Defects: No significant defects observed.	No action required.	3	High Good Fair	Low 20-40 C+		
										n/a					
G9	Young Holly Ilex aquifolium.	av 7	av 1	av 11	1	1	1		Position: Situated within the rear garden. Form: Two close growing specimens, both single stemmed and vertical with a balanced crown. History: Lower foliage lightly trimmed. Defects: No significant defects observed.	No action required.	3	High Good Good	Low 40+ C		
										n/a					
T10	Young Japanese Maple Acer japonicum.	5	2.5	20	2	2	2		Position: Situated on third party land. Form: Multi-stemmed at 1.5m with a balanced crown. History: No evidence of significant pruning. Defects: No significant defects. Other: Limited inspection, dimensions estimated.	No action required.	3	High Good Good	Low 20-40 C		
										n/a					
T11	Young Holly Ilex aquifolium.	5	0.5	11	1	1	1		Position: Situated within the front garden. Form: Single stemmed and vertical with a narrow, upright habit. History: No evidence of significant pruning. Defects: No significant defects.	No action required.	3	High Good Good	Low 20-40 C		
										n/a					
T12	Young Holly Oak Quercus ilex.	6	0	11	2	3	3		Position: Situated within the front garden. Form: Multi-stemmed at 1m with a compact crown. History: No evidence of significant pruning. Defects: No significant defects. Other: Needs removing to allow adjacent walls to be replaced.	Remove.	N/A	High Good Fair	Low <10 U		
										Low					
T13	Young Ash Fraxinus excelsior.	6	2	18	1.5	2	1.5		Position: Situated within the front garden. Form: Multi-stemmed at 1m with a narrow, upright habit. History: No evidence of significant pruning. Defects: No significant defects.	No action required.	3	Moderate Fair Fair	Low <10 C-		
										n/a					
T14	Semi-Mature Goat Willow Salix caprea.	4	2	10	3	2	4		Position: Situated within the front garden. Form: Multi-stemmed at 2m with a compact crown. History: No evidence of significant pruning. Defects: No significant defects.	No action required.	3	High Good Fair	Low 20-40 C		
										n/a					

Reference G = Group H = Hedge	Age & Species	Height (m)	Crown Ht (m)	Diameter (cm)	Crown Spread (m)			Scaled Tree Diagram (m)	Notes	Recommendations (Independent of any development proposals)		Vigour	Amenity Value
					W	N	E			Priority	Inspect Freq (yrs)	Physiological Condition	Life Expectancy (yrs)
					S							Structural Condition	Retention Category
T15	Semi-Mature Leyland Cypress X Cupressocyparis leylandii.	6	2.5	22	3	2.5	3.5		Form: Multi-stemmed at 2m with a compact crown. History: No evidence of significant pruning. Defects: No significant defects.	No action required.		Moderate	Low
	n/a				3	Good	10-20 C						



Drawing No: CCL 11259 / TCP
 Title: Tree Constraints Plan (Existing Layout)
 Site: 26 Netherhall Gardens NW3 5TL
 Scale: 1:200 Paper Size: A2

Tree Retention Categories
 Stems & canopies shown

- Category A tree
- Category B tree
- Category C tree
- Category U tree

Trees of high quality with an estimated life expectancy of 40+ years. Usually large trees with significant presence or smaller trees with excellent form. Retention of these trees is highly desirable.

Trees of moderate quality with a life expectancy of 20+ years. Usually maturing trees, or younger trees with good form. Retention of these trees is desirable though less than Category A trees

Unremarkable trees of low quality and merit. Individual specimens are not considered to be a material planning consideration.

Trees unsuitable for retention due to their very poor condition.

Tree Constraints Plan

BS 5837 Root Protection Area (radius = 12xstem diameter)

Root Protection Area needing amendment due to site conditions, e.g. presence of existing road or building.

Root Protection Area having been amended to account for site conditions

T1 = Tree No 1 G2 = Group No 2 H3 = Hedge No 3



Tree Ref.	Species	Height (m)	Root Protection Area		
			Radius (m)	m ²	Square (m)
T1	Oak	18	9.4	275	16.6
T2	Lime	20	8.6	235	15.3
T3	Cherry	11	3.0	28	5.3
T4	Lime	19	6.1	118	10.8
T5	Silver Maple	17	6.6	137	11.7
T6	Lime	7	4.6	65	8.1
T7	Holly	5.5	1.2	5	2.1
T8	Lime	12	7.4	174	13.2
G9	Holly	7	1.3	5	2.3
T10	Japanese Maple	5	2.4	18	4.3
T11	Holly	5	1.3	5	2.3
T12	Holly Oak	6	1.3	5	2.3
T13	Ash	6	2.2	15	3.8
T14	Goat Willow	4	1.2	5	2.1
T15	Leyland Cypress	6	2.6	22	4.7

Overview

It is proposed to extend the existing dwelling and alter the car parking and landscaping to the front of the site, as indicated on the drawings in Appendix 6. The existing layout is indicated in black, and the footprint of the proposed layout is indicated in red.

The table below summarises the potential impact on trees due to various activities.

Activity	Trees Potentially Affected
Tree Removal: Retention Category A	None
Tree Removal: Retention Category B	None
Tree Removal: Retention Category C	T7, T8, G9, T11, T13 and T14
Tree Removal: Retention Category U	T12
Tree Pruning	None
RPA: Foundations	None
RPA: New Hard Surface	None
RPA: Replace Existing Hard Surface	None
RPA: Underground Services	None
RPA: Change of Ground Levels	None
RPA: Soil Compaction	Trees adjacent the construction area (preventable by installing tree protection measures)

Other potentially damaging activities often associated with construction sites include demolition or the careless use of plant machinery, hazardous materials, or fires. All of the above potential impacts are considered in detail throughout this Section.

Tree Removal

All trees to be removed are indicated on the Tree Removal Plan and are listed below:

Retention Category A: It is proposed to retain all Retention Category A trees.

Retention Category B: It is proposed to retain all Retention Category B trees.

Retention Category C: It is proposed to remove T7, T8, G9, T11, T13 and T14. These trees are located within the footprint of the proposal or so close to it that their retention is not practical.

These are relatively small trees or have a relatively low amenity value. Consequently, their removal shall not have a significant impact on the visual amenity of the locality, and they are not considered to be a material planning consideration.

Retention Category U: It is proposed to remove T12. This tree is located within the footprint of the proposal, so its retention is not possible.

Trees within this category should be removed regardless of development proposals. Consequently, the removal of Category U trees is not considered to be a direct impact of the development.

None of the trees to be removed are protected by a tree preservation order or considered worthy of special protection.

Details specific to each tree can also be found in the Tree Data Schedule.

Impact of Retained Trees on the Development

Adequate space has been allowed between all retained trees and habitable rooms of the proposal. Consequently, the proposal shall not result in increased pressure to remove or overly prune any of the retained trees.

The foundations and any new surfaces should be designed to accommodate all potential impacts due to future tree rooting activity. These include potential vegetation related subsidence, vegetation related heave, and lifting of surfaces / light structures due to direct root pressure.

Summary

Only low-quality or small trees are to be removed to enable the build. No Retention Category A trees, or Retention Category B trees, are to be removed.

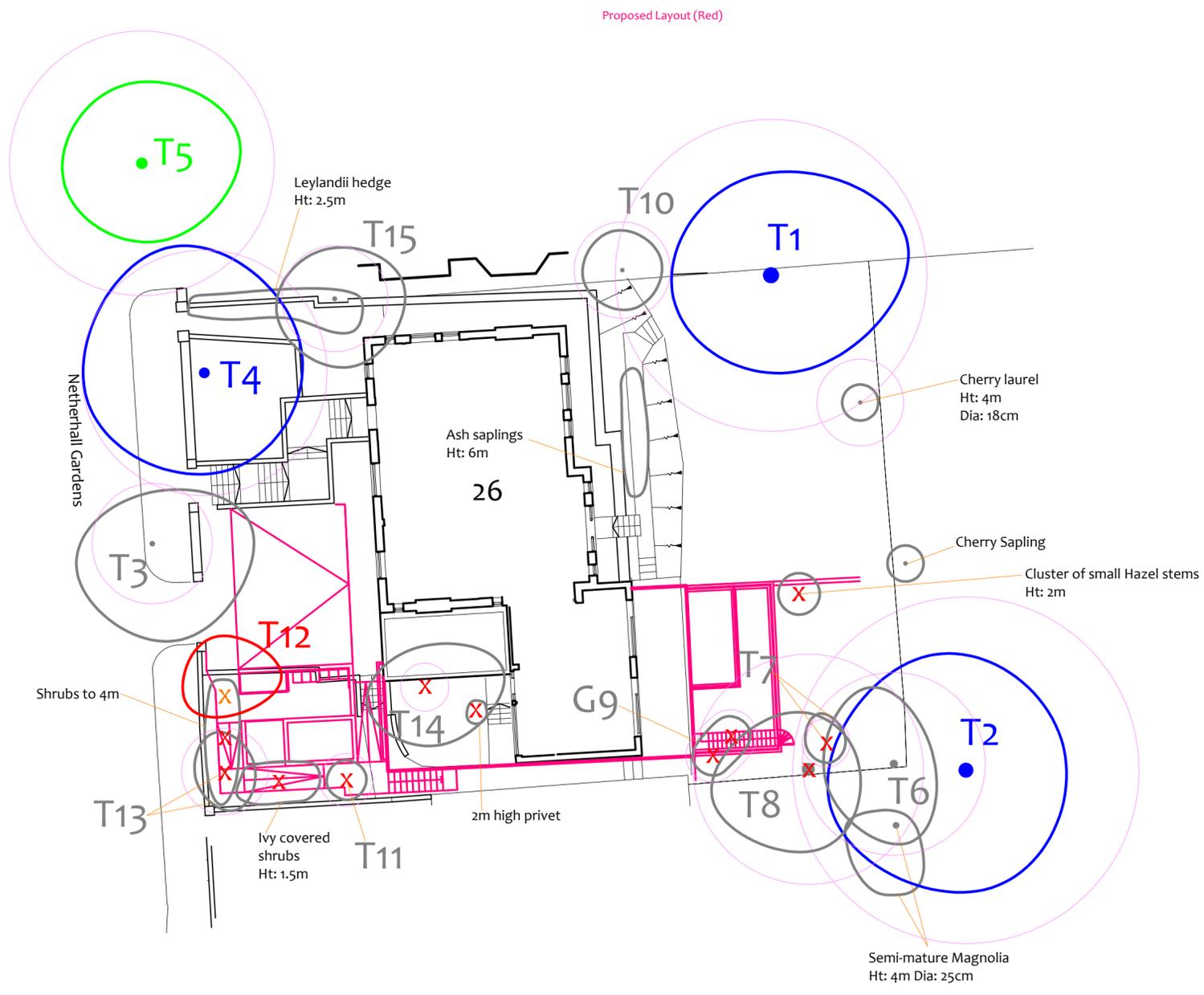
No pruning works are required to enable the proposal.

No foundations are proposed within RPAs.

No hard surfacing is proposed in RPAs.

Adequate space has been allowed between the proposal and all trees such that no future pressure to overly-prune or remove trees shall occur as a consequence of the proposal.

So long as suitable protection measures are implemented during demolition and construction stages, and some mitigation planting is implemented, I see no arboricultural reasons why the proposal should not proceed.



Drawing No:	CCL 11259b / IAP Rev: 1
Title:	Impact Assessment Plan (Existing Layout with Proposals Overlaid)
Site:	26 Netherhall Gardens NW3 5TL
Scale: 1:200	Paper Size: A2



Tree Retention Categories	
Stems & canopies shown	
	Category A tree
	Category B tree
	Category C tree
	Category U tree

Trees of high quality with an estimated life expectancy of 40+ years. Usually large trees with significant presence or smaller trees with excellent form. Retention of these trees is highly desirable.

Trees of moderate quality with a life expectancy of 20+ years. Usually maturing trees, or younger trees with good form. Retention of these trees is desirable though less than Category A trees.

Unremarkable trees of low quality and merit. Individual specimens are not considered to be a material planning consideration.

Trees unsuitable for retention due to their very poor condition.

Impact Assessment Plan

	BS 5837 Root Protection Area (radius = 12xstem diameter)
	Root Protection Area needing amendment due to site conditions, e.g. presence of existing road or building.
	Root Protection Area having been amended to account for site conditions
T1 = Tree No 1	G2 = Group No 2 H3 = Hedge No 3

	Tree to be removed to facilitate the proposal
	Tree to be removed due to its low quality
	Proposed pruning

Tree Ref.	Species	Height (m)	Root Protection Area	
			Radius (m)	Square (m)
T1	Oak	18	9.4	16.6
T2	Lime	20	8.6	15.3
T3	Cherry	11	3.0	5.3
T4	Lime	19	6.1	10.8
T5	Silver Maple	17	6.6	11.7
T6	Lime	7	4.6	8.1
T7	Holly	5.5	1.2	2.1
T8	Lime	12	7.4	13.2
G9	Holly	7	1.3	2.3
T10	Japanese Maple	5	2.4	4.3
T11	Holly	5	1.3	2.3
T12	Holly Oak	6	1.3	2.3
T13	Ash	6	2.2	3.8
T14	Goat Willow	4	1.2	2.1
T15	Leyland Cypress	6	2.6	4.7

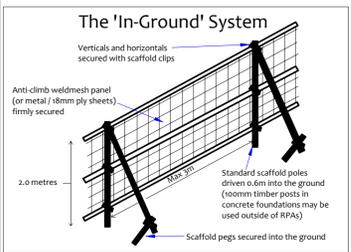
Tree Protection Barriers

The purpose of tree protection barriers is to keep construction activity away from Restricted Activity Zones or Construction Exclusion Zones. They should be appropriate to the nature and proximity of activity within the site. The barriers should be erected prior to the commencement of all activity including demolition, soil stripping and delivery of materials and demolition (except where existing structures require demolition to enable the barriers to be installed). Barrier systems are specified below and should be installed according to the legend on the Tree Protection Plan.

The In-Ground System

This system may be installed where indicated by a solid purple line on the Tree Protection Plan. It should be robust enough to withstand occasional knocks by plant machinery and, once installed, shall remain in place throughout the entire construction phase.

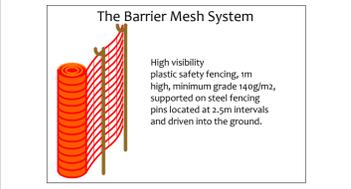
Vertical scaffold poles are driven into the ground, onto which are affixed horizontal scaffold poles and diagonal bracing struts. Weldmesh panels (or similar - e.g. Heras type fencing panels, or 18mm-plywood boards) are secured to this scaffold framework using sturdy clips (e.g. standard scaffold clips). The system is illustrated in the diagram to the right and is based on BS 5837 guidelines.



The Barrier-Mesh System

Where indicated by a thick red line (solid or dashed) on the Tree Protection Plan, it shall be acceptable to install a less robust system than those specified above. This is because of the nature of construction activity or the distance from tree protection areas. The purpose of such a system shall be to demarcate the protection zone. It is not intended that such fencing will withstand knocks by construction machinery.

In this system, high visibility plastic safety fencing, 1m high, minimum grade 14g/12m is supported on steel fencing pins located at 2.5m intervals.



Stem Protection – Timber Boxing

Where indicated by a tanquette square on the Tree Protection Plan, it shall be necessary to install robust plywood boxing to protect a tree stem. The plywood boxing specification is indicated in the diagram opposite. The actual size of the plywood boxing shall be determined by the extent of the root flare at the base of each stem. The box shall be large enough to avoid contact with any part of the tree that it surrounds. No flungs shall be attached to any part of the tree. Instead, it shall be free standing or attached to the ground or adjacent structures (e.g. walls or fences). It shall be made firm enough to withstand occasional knocks from any plant machinery that may operate in its vicinity.

Restrictions in Specific Zones

Restricted Activity Zone

Within this zone, tree roots are likely to be present where access will be required to facilitate construction. The following restrictions shall apply:

- No vehicles or plant machinery shall park or operate unless a suitable load spreading surface is in place. The load spreading surface shall be installed and/or maintained as specified under the heading **Ground Protection Measures**. This shall remain in place throughout the entire demolition and construction phase and until any new permanent hard surfacing is installed. Any pedestrian activity (other than very occasional staff also require a suitable load spreading surface).
- Removal of existing structures such as walls, steps and hard surfaces (where applicable) shall be undertaken using hand tools or a mechanical excavator operating from outside the Restricted Activity Zone and carefully marshalled by the project arborist.
- No excavation shall occur in this zone without consulting the project arborist and obtaining approval from the local authority.
- Existing ground levels shall be retained undisturbed.
- No new permanent or temporary structures shall be erected other than those shown on the planning application documents unless approved by the local authority.
- Underground services shall not be installed in this area without prior consultation with the project arborist and a methodology agreed and approved by the local authority.
- If roots are encountered in excess of 25mm diameter, they shall be retained wherever possible and protected with damp sacking during times that they are unearthed. Any roots in excess of 25mm that need to be severed shall be pruned with secateurs.
- Storage of materials and spoil shall be avoided unless it has been agreed with the project arborist that the ground protection measures are adequate to ensure no soil compaction or contamination occurs. All hazardous materials (including non-essential cement products) shall be forbidden.
- No fires shall be permitted.

General Restrictions - Throughout the Site

Preparatory Works

No demolition, removal of surfaces, or soil stripping shall commence until the protective fencing and ground protection measures are installed to the satisfaction of the local authority.

Fires

No fires shall be permitted beneath any tree canopy or within 5m of any tree stem, branch or foliage. No fires shall be permitted within any Construction Exclusion Zone or Restricted Activity Zone. No fires shall be permitted in the vicinity of any exposed tree roots.

Canopy Protection

In order to protect tree canopies the following restrictions shall apply throughout the site:

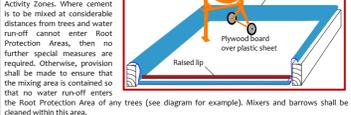
- No machinery in excess of 2m shall pass beneath the canopy of any tree without being carefully marshalled in order to ensure that no branches are damaged.
- If materials require installation or delivery beneath tree canopies, this shall be done without the use of overhead cranes.
- If materials are to be installed or delivered close to tree canopies (but not beneath them) and a crane is required, they shall be carefully marshalled in order to ensure that branches are not accidentally damaged.
- Wherever possible, cables should be routed in a direction directly away from the tree stem rather than tangentially across the rooting zone. The location of all such cables shall be determined after consultation with the project arborist and approved by the local authority.

Storage of Spoil and Materials

Storage of materials and spoil shall be avoided in any Construction Exclusion Zones and Restricted Activity Zones unless it has been agreed with the project arborist that the ground protection measures are adequate to ensure no soil compaction or contamination occurs. All hazardous materials (including non-essential cement products) shall be forbidden.

Hazardous Materials

Any mixing of cement based materials shall take place outside the Construction Exclusion Zones and Restricted Activity Zones. Where cement is to be mixed at considerable distances from trees and water runoff cannot enter Root Protection Areas, then no further special measures are required. Otherwise, provision shall be made to ensure that the mixing area is contained so that no water runoff enters the Root Protection Area of any trees (see diagram for example). Mixers and barrows shall be cleaned within this area.



All other chemicals hazardous to tree health, including petrol and diesel, shall be stored in suitable containers as specified by current COSHH Regulations, and kept away from Root Protection Areas.

Underground Services

No underground services (including soak-aways) shall be located in any part of the Construction Exclusion Zones or Restricted Activity Zones unless done so in a manner detailed in a specific Method Statement and approved by the local authority.

Notices

Suitable weather-proof notices should be displayed to identify tree protection zones. They should state the purpose of the fencing and that it should not be moved, or traversed, other than by authorised personnel.

Removal of Tree Protection Barriers

Removal of protective fencing or ground protection measures shall be done after all major construction work is complete and their removal has been approved by the appointed arborist.

Ground Protection Measures

Within Restricted Activity Zones, soils containing roots may be subject to compaction due to general construction activity (including pedestrian activity and use of plant machinery). In order to minimise compaction, it is proposed to ensure that a suitable load-spreading surface is in place at all times. Any existing hard surfacing may be retained where engineers consider it adequate to spread the load of construction traffic. Otherwise it shall be reinforced or replaced with adequate ground protection measures.

Unless specified otherwise, ground protection shall consist of 40mm OSB boards laid at double thickness and screwed together to prevent slippage. The ground shall first be made even by raking, or by adding a few centimetres of sand or woodchips. Where only pedestrian traffic will occur boards or planks may be supported by a scaffold framework. The scaffold may be founded on poles driven into the ground and/or onto blocks (to raise the scaffold) with additional couplings to make the framework secure.

Where engineers consider OSB boards to be inadequate (e.g. for large plant machinery where the tracks may chew up the timber) sturdier ground protection measures will be installed such as road plates, or 100mm of 7-40mm angular gravel installed in 3D cellular confinement system (e.g. CalveoTM).

If a piling mat is required, engineer's specifications should be referred to.

The ground protection measures shall be installed and approved before commencement of demolition and construction activity and before the arrival of plant machinery or materials. They shall remain in place until all heavy construction activity is complete or until they are due to be replaced with a new hard surface.

Construction Exclusion Zones

Within Construction Exclusion Zones the following restrictions shall apply:

- Tree Protection Barriers shall be erected and maintained throughout the entire project as indicated on the Tree Protection Plan and under the header 'Tree Protection Barriers'.
- These shall remain in place at all times except when authorised landscaping works are being undertaken. At such times, adequate ground protection measures shall be installed, and excavation shall be limited to that required for new planting. Furthermore, the project arborist shall be consulted prior to any works being undertaken in these zones.
- No construction activity or excavation shall occur unless agreed otherwise by the project arborist and local authority.
- No vehicles or plant machinery shall be driven or parked.
- No tree works, other than those specified on this document shall be undertaken.
- No alterations of ground levels or conditions shall occur.
- No chemicals or cement washings permitted.
- No spoil shall be stored.
- No fires shall be permitted.
- All hazardous materials (including non-essential cement products) shall be forbidden.
- Removal of hard surfaces, structures or turf shall be done using hand operated tools only and supervised by the project arborist.

Tree Works Specification

The following table specifies the tree works which will be required prior to the commencement of construction activity:

Tree Reference	Action Required	Notes
T7, T8, T9, T10, T13 and T14	Remove.	Stumps of trees within the RPAs of retained trees shall be removed with a stump grinder NOT a mechanical excavator.
T5		Trees to be removed are indicated by a thin, dashed line.

General Restrictions - Throughout the Site Continued

Site Hoarding

If site hoarding shall be installed over the Root Protection Area of any tree, the following restrictions shall apply:

- Ground levels shall be maintained as existing.
- Post holes shall not exceed 300mm x 300mm.
- No post hole shall be excavated within 1.5m of any tree stem.
- Post holes shall be excavated using hand tools or by a post-hole auger attached to plant machinery sited outside of Root Protection Areas.
- Roots in excess of 25mm shall be retained wherever possible.
- Roots in excess of 25mm shall be pruned with sharp secateurs.
- Pruning shall be minimal and only undertaken where absolutely necessary to facilitate the site hoarding. It shall be undertaken by a reputable tree surgeon working to BS 3998 (2019).
- Site hoarding may be installed in place of the specified tree protection measures subject to the approval of the local authority with regard to its location and specification.

Siting of Cabins

Cabins shall be located outside of Construction Exclusion Zones and Restricted Activity Zones unless agreed otherwise by the project arborist. Where this is being considered, the project arborist shall be consulted and specific tree protection measures agreed. The following general restrictions will apply:

- All services to and from site cabins shall be installed above ground through any Root Protection Areas.
- No excavation shall occur within Root Protection Areas to enable cabins to be installed.
- The cabins shall be founded on a suitable load spreading surface.

Fence Posts or Decking Posts

If permanent fencing or decking is to be installed within Root Protection Areas, the following restrictions shall apply:

- All post holes shall be excavated by hand and kept as narrow as possible (maximum diameter 300mm).
- Exploratory post holes shall be dug before committing to post / panel positions. If any roots in excess of 25mm are encountered they are to remain intact and the post hole shall be relocated slightly. The fencing system must permit such flexibility (i.e. where fixed panel widths are used, all post holes must be excavated before committing to the final location).
- Any roots in excess of 25mm which are severed shall be neatly pruned back with secateurs. This will encourage healing and reduce the likelihood of infection.
- Walls shall be avoided over Root Protection Areas unless their foundations may be spanned over roots using a beam system.
- Hedges may be planted within Root Protection Areas using hand tools to minimise excavation.

Use of Heavy Plant

All machinery operatives are to be made aware of any Construction Exclusion Zones and Restricted Activity Zones that apply to the site. All machinery operatives are to respect these zones and ensure that no damage occurs to trees due to the careless use of machinery. Mechanical excavators should have tracks rather than wheels to help spread their load. They should be carefully marshalled when working close to tree canopies.

Lighting, Bollards, CCTV and associated Cables

If any of the above are to be installed close to tree canopies or within Root Protection Areas of retained trees, installation methods shall be detailed in a specific Method Statement and approved by the local authority. Consideration should be given to the following:

- Pruning of branches to enable sufficient clearance for light and views. Branches should be removed to the branch collar (as per British Standard 3998 (2019)).
- Post holes must be excavated by hand or using an appropriate sized auger. No other form of mechanical excavation may be used.
- Wherever possible, cables should be routed in a direction directly away from the tree stem rather than tangentially across the rooting zone. The location of all such cables shall be determined after consultation with the project arborist and approved by the local authority.

Timing of Operations

Activity within the site shall be phased according to the following chronology:

Order	Phase	Activity
1st.		Planning conditions relating to trees to be identified and discussed with the Project arborist and site manager.
2nd.		All specified tree removal to be undertaken (see Header -Tree Works Schedule).
3rd.	Pre-Construction Phase	Install the tree protection barriers (fencing and ground protection boards - see Headers -Tree Protection Barriers and Ground Protection Measures).
4th.		Pre-Commencement site meeting: Tree protection barriers inspected. Additional protection measures to be agreed. Variants to be agreed. Location of underground services to be agreed. Extent of excavation to be agreed. Scope of future inspections / monitoring to be agreed.
5th.		Arboricultural Method Statement to be revised and approved if necessary.
Protection measures confirmed acceptable by the project arborist		
6th.	Demolition and Construction Phase	Demolish existing structures and remove existing surfaces where applicable.
7th.		Install new buildings, hard surfaces and services taking into account restricted activities as specified in this Arboricultural Method Statement.
8th.		Site meeting with project arborist. Landscaping restrictions to be agreed. Condition of retained trees to be assessed and mitigation agreed. Ground conditions to be assessed and ground remediation to be agreed.
9th.	Post-Construction Phase	Remove protective barriers (fencing and ground protection measures as applicable).
10th.		Undertake restricted landscaping operations within Root Protection Areas, including (where applicable) boundary treatments, pedestrian surfaces, decking and any proposed tree planting.

Personnel and Accountability

This table should be completed at the Pre-Start Meeting or earlier.

Position	Name	Contact Phone & email	Roles
Project Manager	Insert Details	Insert Details	Liaising with site manager & project arborist regarding any potential issues relating to trees. Scheduling of meeting, excavations and inspections. Overseeing this monitoring schedule. Instructing the project arborist and arranging access. Liaising with local authority regarding discharge of planning conditions and variances to the Arboricultural Method Statement.
Site Manager	Insert Details	Insert Details	Day to day monitoring of tree protection measures. Fortnightly supply of site photographs showing all tree protection measures. Induction of all contractors. Reporting to the Appointed Arborist of any incidents or potential variations to the agreed tree protection measures. Liaising with LPA Tree Officer over all arboricultural matters. Initial inspection and signing off of tree protection barriers including ground protection measures. Monthly site visits and inspections. Reporting to the local authority following site inspections and any variation or incidents.
Project Arborist	Crown Tree Consultancy	08000 14 13 30 0203 797 7449 Info@crowntrees.co.uk	Receipt of reports from the appointed arborist. Liaising with the appointed arborist to agree suitability of tree protection measures and any variations. Enforcement. Advice and assistance with the discharge of planning conditions relating to trees.
Local Authority	London Borough of Camden	Rav Curry & Nick Bell Rav.Curry@camden.gov.uk Nick.Bell@camden.gov.uk	Receipt of reports from the appointed arborist. Liaising with the appointed arborist to agree suitability of tree protection measures and any variations. Enforcement. Advice and assistance with the discharge of planning conditions relating to trees.
Additional Contact	Insert Details	Insert Details	Insert Details
Additional Contact	Insert Details	Insert Details	Insert Details

Site Monitoring Schedule

Inspection	Site Attendees	Comments
Pre-Start Desk-top To occur prior to any works taking place on the site.	N/A.	Project Manager and Site Manager to study this Method Statement & contact the Project Arborist to agree a protection measures plan.
Pre-Start Meeting After tree works completed & tree protection barriers / ground protection measures installed. Prior to any other activity, inc. demolition & soil stripping.	Site manager, project arborist, Tree Officer invited.	Tree protection fencing locations & specification checked. Ground protection measures checked. Contractors to be inducted to all relevant aspects of the Arboricultural Method Statement. Responsibilities checked and acknowledged. Adherence to the Arboricultural Method Statement to be discussed and agreed. Report on findings to be sent to the local authority tree officer (see accompanying reporting template).
Monthly Inspection and Reporting To occur once per calendar month throughout the entirety of the project until the local authority agree that tree protection measures may be removed.	Site manager and project arborist.*	Tree protection fencing locations & specification checked. Ground protection measures checked. Past month, present and future month – activities and adherence to Arboricultural Method Statement discussed and checked. Report on findings to be sent to the local authority tree officer within 5 working days.
Any ground disturbance in Restricted Zones & Construction Exclusion Zones Including demolition, soil stripping, removal of hard surfaces, excavation for new surfacing, foundations, service trenches etc.	Site manager, project arborist.	Two week's notice to be given prior to commencement. Excavation to be as specified in this Method Statement. Excavations to be recorded and photographed. Mitigation measures to be employed specified by the project arborist.
Post-Construction Meeting Post external construction activity but prior to removal of fencing & landscaping operations.	Site manager, project arborist, Tree Officer invited.	Retained trees inspected. Ground conditions assessed and mitigation measures agreed where appropriate. Further landscaping operations and restrictions to be agreed.

* Where agreed with the L.A. it may be acceptable to supply photographs of the fencing to avoid the necessity for a site visit.

Tree Data Schedule - Retained Trees Only

Reference	Age & Species	Height (m)	Crown Spread (m)	Crown Spread (m)	Scaled Tree Diagram (m)	Notes	Recommendations (development proposals)		Priority	Impact (Propriety)	Physiological Condition	Structural Condition	Life Expectancy (years)	Retention Category
							Priority	Impact (Propriety)						
T1	Mature Oak Quercus robur.	18	9	35	5	Position: Twin-stemmed at 1m with a balanced crown. Form: Healthy. History: No defects observed. Defects: None.	No action required.	n/a	1.5	Moderate	Fair	High	40+	B -
T2	Mature Lime Tilia sp.	20	5	7	6	Position: Skewed on third party land. Form: Single stemmed and vertical with a slightly unbalanced crown. History: No defects observed. Defects: Lateral inspectors, dimensions estimated.	Remove by and inspect claim for defects.	Moderate	1.5	Moderate	Fair	Moderate	40+	B
T3	Semi-Mature Cherry Prunus sp.	11	4	25	4	Position: Street tree. Form: Single stemmed and vertical with a well-formed crown. History: Healthy. Defects: Significant bark wound at base. Bacterial canker infection.	No action required.	n/a	1.5	High	Fair	Moderate	40+	C +
T4	Early-Mature Lime Tilia sp.	19	2	51	6	Position: Skewed within the front garden. Form: Twin-stemmed at ground level with a balanced crown. History: No evidence of significant pruning. Defects: Recorded stem diameter is equivalent for two stems (35cm, 32cm).	No action required.	n/a	1.5	High	Good	High	40+	B +
T5	Early-Mature Silver Maple Acer saccharinum.	17	2	55	4	Position: Street tree. Form: Single stemmed and vertical with a well-formed crown. History: Healthy. Defects: No significant defects.	No action required.	n/a	1.5	High	Good	High	40+	A
T6	Semi-Mature Lime Tilia sp.	7	0.5	35	4	Position: Multi-stemmed at ground level with an unbalanced crown. Form: Previously topped at 3m. History: No significant defects observed. Defects: Recorded stem diameter is equivalent for five stems (6cm, 16cm, 18cm, 20cm & 23cm).	No action required.	n/a	3	Moderate	Fair	Low	20-40	C
T10	Young Japanese Maple Acer japonicum.	5	2.5	30	2	Position: Skewed on third party land. Form: Multi-stemmed at 1.5m with a balanced crown. History: No evidence of significant pruning. Defects: Lateral inspectors, dimensions estimated.	No action required.	n/a	3	High	Good	Low	20-40	C
T15	Semi-Mature Leyland Cypress X Cypress x park hybrid.	6	2.5	22	3	Form: Multi-stemmed at 1m with a compact crown. History: Healthy. Defects: No evidence of significant pruning. No significant defects.	No action required.	n/a	3	Moderate	Good	Low	10-20	C

Tree Protection Plan

BS 5837 Root Protection Area (radius = 12xstem diameter)
 Root Protection Area needing amendment due to site conditions, e.g. presence of existing road or building.
 Root Protection Area having been amended to account for site conditions
 T1 = Tree No 1 G2 = Group No 2 H3 = Hedge No 3

Tree Retention Categories
 Stems & canopies shown
 Category A tree
 Category B tree
 Category C tree
 Category U tree

Drawing No: CCL 11259 / TPP Rev: 2
 Title: Tree Protection Plan (Existing Layout with Proposals Overlaid)
 Site: 26 Netherhall Gardens NW3 5TL
 Scale: 1:200
 Paper Size: A1

