David Clarke Chartered Landscape Architect and Consultant Arboriculturist

David Clarke BSc (Hons) PD Arb (RFS) CMLI M Arbor A

ARBORICULTUAL REPORT:

ARBORICULTURAL IMPACT ASSESSMENT and ARBORICULTURAL METHOD STATEMENT

In relation to a Planning Application at:

38 Heath Drive, London, NW3 7SD

Compiled by:
David Clarke
BSc (Hons) Land Man, PD Arb (RFS), CMLI, M Arbor A

November 2013

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1.0 Instruction

1.1 I have been instructed by my client - Paul Godfrey at Zen Developments - to provide an appraisal of the likely impact to, and implications for, trees on, and adjacent to 38 Heath Drive, London, NW3 7SD in relation to a Planning Application on the site.

2.0 Introduction

2.1 Qualifications and Experience

2.1.1 I am David Clarke, I have a Bachelor of Science Honours Degree in Landscape Management from Reading University and I am a Chartered Landscape Architect and Chartered Member of the Chartered Landscape Institute (1998). I hold the Professional Diploma in Arboriculture (RFS) (2012) and I am a Professional Member of the Arboricultural Association. I have 20 years experience of working in both the private and public sector in relation to arboricultural and landscape issues.

2.2 Scope of this Report

2.2.1 This Arboricultural Implication Assessment and Arboricultural Method Statement form the Arboricultural Report for the Planning Application. They should be read in conjunction with Tree Protection Plan (TPP/38HDHL/010 A) and the Arboricultural Survey (Appendix A). The Arboricultural Report is aimed at identifying and addressing those matters concerning trees in relation to the Planning Application. It will clarify these issues:

- The principles and procedures to be applied to achieve a harmonious and sustainable relationship between trees and structures.
- The species, size, position and condition of those trees within the area of the proposed development where trees may potentially have some significance to the proposed development. The full survey schedule is set out in Appendix A.
- The impact of the proposed development upon these trees (and vice versa) including those trees to be removed due to the proposed development.
- Any measures that are required to protect retained trees during the proposed works.

2.2.2 The trees have been assessed (see Arboricultural Survey – Appendix A) as set out in BS BS5837: 2012 `Trees in relation to design, demolition and construction. Recommendations' (BS 5837:2012). Site visits to undertake the Arboricultural Survey were undertaken by me in September 2013 in preparation for this report.

2.2.3 Tree numbers within the text (T1-T20, G1-G2) relate to numbers designated as part of the Arboricultural Survey unless otherwise stated. The trees are plotted on the Tree Protection Plan (TPP/38HDHL/010 A) which accompanies the Arboricultural Report.

2.2.4 BS 5837: 2012 provides recommendations for the assessment of trees on development sites and suggests four categories into which trees should be placed for assessment purposes. These categories have been used as part of the assessment of trees within this report.

2.3 Relevant Background Information

2.3.1 It is understood that trees on the site are not protected by a Tree Preservation Order (TPO) but that trees on the site (with a trunk diameter of more than 75 millimetres measured 1.5 metres above ground level) are offered some protection due to the sites location within a Conservation Area.

2.3.2 It is recommended that this information be confirmed by anyone proposing to undertake any works to trees on the site. This information should include trees adjacent to the site which may potentially be protected. This should be undertaken in writing with the Local Authority before proceeding with any tree works.

2.4 Documents and Information Provided

2.4.1 All plans within this report are based upon drawings supplied by M R Partnership, London.

2.4.2 This document has been prepared in accordance with guidance set out in British Standard BS 5837: 2012 `Trees in relation to design, demolition and construction. Recommendations' (BS 5837:2012).

3.0 Report Limitations

3.1 The report is for the sole use of the client and its reproduction or use by anyone else is prohibited unless written consent is given by the author.

3.2 The report observations are to be considered as correct at the time of inspection only. Trees are a growing, living organism, and are readily affected by many environmental factors. As such their condition and circumstances can change in a very short period of time. Therefore this report should be construed as valid for an absolute maximum of 12 months from the date of survey provided all factors remain unchanged.

3.3 This is an arboricultural report and as such no reliance should be given to comments relating to buildings, engineering, soils or other unrelated matters. The inspection of trees was undertaken from ground level and they were not climbed. No samples of wood, roots, soils or fungus were taken for analysis. Observations of the trees were confined to what was visible from within the site and surrounding public places. A full hazard risk assessment of the trees was not undertaken.

3.4 The presence of TPOs, a Conservation Area, or other designations, may affect the use of the site and the management of trees on the site. These designations can be served on the application, or adjacent, sites at any time. The landowner, or his representatives, should therefore satisfy themselves as to the presence (or absence) of these designations prior to:

- Undertaking any works to trees on, or adjacent to, the site. Where necessary written permission from the Local Authority will be required prior to undertaking tree works.
- Undertaking any of the works specified in this Arboricultural Report before planning permission is granted.

4.0 Brief Description of the Application Site and the Planning Application

4.1 The application site is a residential property set in a large landscaped plot within Hampstead. It occupies a corner plot on the junction of Heath Drive and Finchley Road. The site consists of a range of tree species of varied age and condition. Large specimen trees consisting primarily of London Plane and Limes are located to the site frontage. They are prominent in the street scene. Smaller or garden quality trees are located to the rear boundary of the site. These are generally of limited amenity value

4.2 The application is for the construction of a five storey apartment building with a lower ground floor/basement over part of the footprint of the main building and a subterranean extension beneath the rear garden for a swimming pool and other facilities.

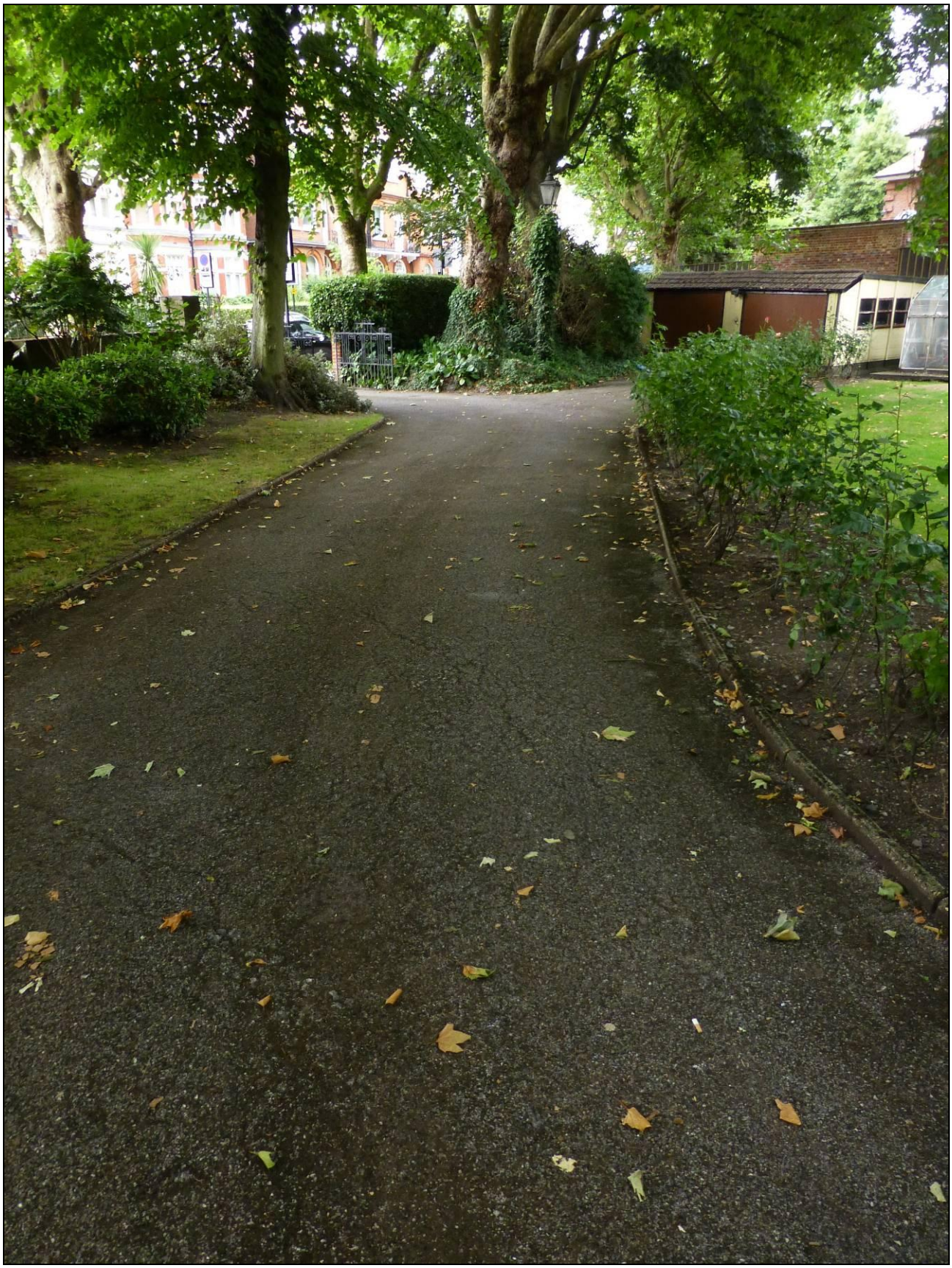
5.0 General principles for protection of trees during development

5.1 It is equally important to ensure the protection of trees both above and below ground. Guidance is provided in BS 5837: 2012 as to the protection of trees, before, during and after development.

5.2 The Arboricultural Impact Assessment will set out the potential impact of the proposals on trees and vice-versa. There is a need to protect trees and provide an Arboricultural Method Statement where proposals will impinge, or impact on the Root Protection Areas (RPAs) of retained trees. Root Protection Areas (RPAs) are a layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the tree's viability, and where the protection of the roots and soil structure is treated as a priority. These are set out as Construction Exclusion Zones and have been calculated as part of the Arboricultural Survey.

5.3 The RPA for each tree is initially plotted as a circle centred on the base of the stem. Where pre-existing site conditions or other factors indicate that rooting has occurred asymmetrically, a polygon of equivalent area may be produced. These factors include the morphology and disposition of the roots, when known to be influenced by past or existing site conditions - such as the presence of roads and structures - and site topography. Modifications to the shape of the RPA within this report reflect a soundly based arboricultural assessment of likely root distribution. The RPA may change its shape but not reduce its area whilst still providing adequate protection for the root system.

5.4 Proposals may impinge on RPAs but these should be minimal and construction techniques such as specialized foundation designs should be considered to reduce the impact of development. The proposals will relate specifically to the site conditions and each individual tree and its category within the BS 5837 grading system.



Photograph A - Looking north within the site along existing access road.

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6.0 Arboricultural Impact Assessment

6.1 As stated above British Standard recommendations (BS5837: 2012 `Trees in relation to design, demolition and construction. Recommendations.') provides a formula for calculating the Root Protection Area (RPA) recommended to protect existing trees that are to be retained. The shape of the root protection area and its exact location will depend upon arboricultural considerations but the area will normally be represented on a plan as a circle. Where pre-existing site conditions or other factors indicate that rooting has occurred asymmetrically, a polygon of equivalent area may be produced. The purpose of the RPA is to prevent physical damage to tree roots and to prevent damage to the soil structure in which they live by soil compaction, changes in soil levels or prevention of gas exchange to living roots.

6.2 These RPAs are shown on Tree Protection Plan (TPP/38HDHL/010 A) which also forms part of the Aboricultural Method Statement. Where incursion within the RPA of a retained tree is necessary as part of the construction process then a methodology will be in place to prevent, or reduce to an insignificant level, damage to trees.

6.3 Below (and within Appendix A) I have discussed the significance of the trees, the constraints that they are likely to pose to the proposed development (and vice-versa) and any tree works required in order to facilitate the development.

6.4 Summary of Tree Impact Assessment

6.5 There are 20 no. individual trees (T1-T20) and 2 no. groups of trees (G1-G2) which form the basis for this report and which could potentially be affected by the development proposals.

6.6 Trees recommended for removal for Arboricultural Reasons

Of these trees 1 no. individual tree is recommended to be removed for arboricultural reasons irrespective of any development of the site.

6.7 Schedule of trees recommended for removal for Arboricultural Reasons

Tree No.	Species (Common Name)	BS Category	Reason for recommended removal
T16	Cherry	U	Tree of poor form and condition.

6.8 Trees removed due to the application

Of the remaining trees 3 no. individual trees and 2 no. groups of trees will need to be removed to implement the construction of the proposals.

6.9 These are low quality and unremarkable `C' Category trees as set out in BS5837: 2012. Due to their internal position, relatively small size and existing vegetation screening they have limited visibility to the general public and, overall, their amenity value is low. However replacement planting of similar species could be considered within any landscape proposals for the site to maintain a comparable level of tree or vegetation cover on the site. Given the layout of the site there are sufficient areas of potential landscaping to achieve this.

6.10 The removal of these trees as part of this application is deemed not to be significant and will not have a detrimental long term impact on the visual amenity of the area.

6.11 Schedule of trees removed due to the application

Tree No.	Species (Common Name)	BS Category	Reason for removal
T14	Magnolia	C1	Construction of the proposals.
T17	Fruit	C2	Construction of the proposals.
T18	Bay	C2	Construction of the proposals.
G1	2 no. Magnolia	C2	Construction of the proposals.
G2	1 no. Fruit and 1 no. Holly	C2	Construction of the proposals.

6.12 Trees potentially affected by the application

The construction of the proposed building is within the RPAs and canopy spreads of retained trees. Additionally site access on the line of the existing access, construction activity and the removal or potential refurbishment of hard standing will take place within the RPAs of retained trees.

6.13 These potential impacts are set out and evaluated below and measures to prevent, or reduce, the effects of the proposals on these trees are set out in the Arboricultural Method Statement. The impact on retained trees from this Planning Application will not be significant as long as the proposals set out in this report are followed.

6.14 Schedule of trees potentially affected by the application

Tree No.	Species	BS Category	Reason for potential impact
T1	London Plane	B2	• Potential refurbishment of existing hard standing within RPA and canopy spread. • Construction Activity within RPA and canopy spread.
T2	Sycamore	B2	• Site access on line of existing access road within RPA and canopy spread. • Potential refurbishment of existing hard standing within RPA and canopy spread. • Construction Activity within RPA and canopy spread.
T3	London Plane	B2	• Site access on line of existing access road within RPA and canopy spread. • Potential refurbishment of existing hard standing within RPA and canopy spread. • Construction Activity within RPA and canopy spread.
T4	London Plane	B2	• Site access on line of existing access road within RPA and canopy spread. • Construction of building within 4% of RPA • Construction of building within canopy spread • Potential refurbishment of existing hard standing within RPA and canopy spread. • Construction Activity within RPA and canopy spread.
T5	Lime	B2	• Site access on line of existing access road within RPA and canopy spread. • Potential refurbishment of existing hard standing within RPA and canopy spread. • Construction Activity within RPA and canopy spread.
T6	London Plane	B2	• Site access on line of existing access road within RPA and canopy spread. • Potential refurbishment of existing hard standing within RPA and canopy spread. • Construction Activity within RPA and canopy spread.

T7	London Plane	B2	• Site access on line of existing access road within RPA and canopy spread. • Construction of building within 6% of RPA • Construction of building within canopy spread • Potential refurbishment of existing hard standing within RPA and canopy spread. • Removal of existing hard standing within 12% of RPA and within canopy spread. • Construction Activity within RPA and canopy spread.
T8	London Plane	B2	• Construction of building within 4% of RPA • Construction of building within canopy spread • Removal of existing hard standing within 15% of RPA and within canopy spread. • Construction Activity within RPA and canopy spread.
T9	Lime	B2	• Removal of existing hard standing within RPA and canopy spread. • Construction Activity within RPA and canopy spread.
T12	Lime	B2	• Removal of existing hard standing within RPA and canopy spread.
T13	London Plane	B2	• Removal of existing hard standing within RPA and canopy spread.
T20	Silver Birch	C2	• Removal of existing hard standing within potential RPA and canopy spread.

6.15 <u>Assessment of potential impacts on retained trees</u>

6.16 <u>Site Access</u>

Construction vehicles and vehicles connected with the proposed use of the site (once the development is complete) will access from the existing access point from Heath Drive. It is noted that this proposed as a `car free' development and that car movements within the site will therefore be limited.

6.17 The site access is within the RPAs of retained trees and has an existing tarmac surface. Further investigations to establish the full construction specification of this access are proposed within the Ground Protection Measures section of the Arboricultural Method Statement. This will assess their suitability for its use as Ground Protection Measures or the requirement to employ additional measures to protect the rooting areas of retained trees.

6.18 Demolition

It is not proposed to demolish any buildings within the RPAs of retained trees.

6.19 Removal or Refurbishment of Hard Standing Areas within RPAs

Hard standing forming the existing driveway and footpath network will be removed or potentially refurbished within the RPAs of retained trees to the site frontage (T1-T13) and Birch (T20). Where surfacing is to be removed altogether this will form part of the landscaped areas of the development. This element represents an improvement to the rooting environment of these trees. The refurbishment of the existing surface should be considered as having a neutral impact on retained trees as long as the same construction depths are utilised and a methodology is in place to prevent any damage to the roots, stems or branches of these trees during these works. This methodology is set out in the Arboricultural Method Statement.

6.20 Installation of Hard Standing within RPAs

No additional hard standing is proposed within the RPAs of retained trees.

6.21 Construction within RPAs

The construction of the building will take place within the RPAs of London Planes (T4, T7 and T8). There will be few, if any, structural roots over 25 mm diameter at the construction distance of the building (over 7.0 m in all instances) from the tree (Biddle `Tree Root Damage to Buildings Volume 1'). There may be fine (conducting) roots present depending on growing conditions in this area. In all instances these incursions are less than 6% of these RPAs and could be considered to be insignificant to their long term retention. Additionally in relation to Planes (T7-T8) the building incursion is offset by the removal of the existing tarmac driveway which consists of 12-15% of these RPAs. The inclusion of these areas into the landscaped areas of the development will improve the rooting environment for these trees

6.22 However these are mature, prominent trees and the retention and protection of these trees is seen as a priority as part of the scheme. Therefore the use of specialised foundation techniques is proposed to minimise the potential impact on these trees to an insignificant level by limiting or avoiding below ground excavation. Initial proposals are set out in the Arboricultural Method Statement and would be confirmed - in association with a structural engineer - within Planning Conditions for a Planning Approval. Care will also be undertaken during these works to protect these trees through the use of Tree Protection Fencing and Ground Protection Measures as set out below.

6.23 The location of the lower ground floor of the building has been designed to be outside the RPAs of retained trees. However the excavation of this area could impact on retained trees if not undertaken with care. Therefore an initial methodology has been set out in the Arboricultural Method Statement to protect the rooting areas of trees during these works. This would need to be confirmed as part of the Construction Method Statement for a Planning Approval.

6.24 <u>Construction Activity</u>

Uncontrolled construction activity could lead to direct or indirect damage to trees - both above and below ground. Therefore Tree Protection Fencing is proposed within the Arboricultural Method Statement to restrict and control construction activity and protect retained trees during the works.

6.25 Activity associated with the implementation of the proposals could take place within the potential RPAs of retained trees. This could involve pedestrian and vehicle movements, storage of plant or materials or the installation of scaffolding. Where possible existing hard standing materials will be retained and utilised as part of the development. Where there are no areas of hard standing then Ground Protection Measures will be used as set out in the Arboricultural method Statement.

6.26 Further investigations to establish the full construction specification of these hard standing materials are proposed within the Ground Protection Measures section of the Arboricultural Method Statement. This will assess their suitability for use as Ground Protection Measures or the requirement to employ additional measures to protect the rooting areas of retained trees. Overall these incursions are therefore considered to be minor and insignificant and will not have a detrimental impact on the long term viability or amenity value of these trees.

6.27 Levels

No ground level changes should take place within the RPAs of retained trees apart from those discussed and assessed within this report in relation to the construction of the building.

6.28 Proposed Development in Relation to Canopy Spreads and Tree Management

The proposed building is within the canopy spreads of London Planes (T4, T7 and T8). Tree works will be required to prune these canopies away from the proposed building to facilitate this element of the work and to prevent future damage to both the branches of the trees and the building. Additionally these works will also create a good relationship between the trees and the proposed building whilst allowing for some regrowth of the canopy. Works to these trees have been undertaken in the past:

T4 London Plane - pollarded to approximately 5.0 m and subsequently crown reduced/pruned to east to approximately 6.0 m from the tree

T7 London Plane - crown reduced/pruned to east to approximately 6.0 m from the tree

T8 London Plane - crown reduced/pruned to east to approximately 6.0 m from the tree

6.29 London Plane (T4)

Re-grown branches from pollards are weakly attached compared to un-pruned trees. They are liable to failure due to excessive weight loading applied by the size of the re-grown branches themselves or (for instance) during high winds. It is recommended - and is good practice - to maintained pollarded trees by cutting the new branches on a cyclical basis. The pollarded trees on this site have not been maintained for some time and the regrowth is significant. A maintenance programme is therefore recommended to bring these trees back into management and ensure their long term retention. These works would be recommended regardless of this planning application. These works will apply to T4 but also London Plane (T1), Sycamore (T2) and Lime (T9). Similar works have recently been undertaken to London Planes (T3 and T6) which are located outside the site within the highway pavement.

6.30 London Planes (T7 and T8)

Once trees have been crown reduced or pruned then cyclical pruning is proposed to maintain the reduced crown, whereby the new branches are periodically cut back close to their points of origin. In relation to T7 and T8 the extension growth following the crown

reduction is significant. There is the potential that this extended growth may fail due to poor attachment at the pruning point. A maintenance programme is therefore recommended to bring these trees back into management. These works would be recommended regardless of this planning application. The general principle is that, following reduction, there should still be a strong framework of healthy small-diameter branches and twigs (leaf-bearing structure), capable of producing dense leaf cover during the following growing season. This can be achieved with these trees.

6.31 Once these works have been undertaken there will be a clearance of at least 1.5- 2.0 m between the building and the trees. These proposals are therefore considered to be minor within the current structure and condition of the trees and their previous management and long term retention.

6.32 Pruning works are specified within the Arboricultural Method Statement and will be undertaken following guidance set out in BS 3998:2010 - `Tree Work - Recommendations' Following these works tree canopies are adequate to allow access around the site for both vehicles and pedestrians. No further pruning works to trees are therefore currently proposed as part of this planning application. Any future management of these trees will only be undertaken to maintain a physical separation between the building and the trees and therefore prevent damage to twigs or the fabric of the building.

6.33 <u>Shading</u>

The retained trees are located predominately to the southern and western site boundaries. The site is relatively open to the east. Several of the trees are under some form of ongoing management. This means that the canopies of these trees will not form a continuous or permanent screen to the site with gaps between the tree canopies allowing penetration of light to the site.

6.34 The design and layout of the building (and site) has reflected the presence of trees in general and the trees to the site frontage in particular. The design has set out to allow as much light as possible to reach the internal layout and to reduce any future pressure on trees. This has included the use of high levels of glazing.

6.35 There will be a pattern of shade and light across the site during the day which is part of the character of this site. Both direct sunlight and ambient light will reach the dwelling and garden areas and there will always be a significant part of the site which is not in shade. Any shading will not be excessive and will not lead to future pressure to remove these trees.

This is a common situation with trees in urban situations such as this. Trees will therefore not have a negative impact on the site through direct, or indirect shading leading to pressure to fell retained trees.

6.36 Herbicides and Pesticides

The use of herbicides and pesticides is not proposed within the RPAs of retained trees as part of this application. Should this change then chemicals will be specified which will not have an impact on retained trees.

6.37 Utility Routes

The exact location of services is not known at this stage. However it is assumed that they will connect to service runs to the existing building. They should therefore be able to be implemented without impacting on retained trees. Should this change then a methodology for the installation of utility routes which will not damage retained trees will need to be a Planning Condition as part of a Planning Approval.

6.38 Site Buildings and Storage of Materials and Plant

Poor placement of temporary structures (such as latrines), materials and plant can lead to direct damage to retained trees or indirect damage such as through the compaction of soils. The layout of the site has therefore been considered at this early stage to reduce or prevent any potential and significant damage to retained trees. This includes the use of Tree Protective Fencing and Ground Protection Measures (as set out above) and as discussed in the Arboricultural Method Statement.

6.39 End Use of the Proposal

The proposals will continue to have a residential use at the end of the project.

7.0 Recommendations

7.1 Existing trees can be easily damaged directly through root severance and, inadvertently, through soil compaction which disrupts the soil structure causing asphyxiation of roots and subsequent root dysfunction. Spillage of toxic materials can also cause root death. Protection for trees selected for retention is essential to ensure they are not affected by the development.

7.2 All trees to be retained should therefore be protected as set out in the Arboricultural Method Statement.

7.3 The location and siting of all utilities should be outside of the RPAs of retained trees as enforced on site. If incursions within RPAs are unavoidable then specialised installation techniques will need to be agreed with an arboriculturist before proceeding.

7.4 It is recommended that an arboriculturist is the main contact with the Local Authority Tree Officer and will notify them of the proposed schedule prior to work commencing on site.

7.5 The following issues in relation to the protection of retained trees will addressed within the Arboricultural Method Statement. Where necessary in conjunction with input from other specialists:

- Site access
- The use of Tree Protection Fencing
- Specialised Foundation Design
- Ground Protection Measures
- Removal of Hard Standing Areas
- Refurbishment of Hard Standing Areas
- Site Buildings and Storage of Materials and Plant
- Landscape proposals Including Pre-Development Tree Works

Photograph B - Showing the existing relationship between the building and trees.

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8.0 General

8.1 This document sets out the methodology for proposed works that affect trees on, and adjacent to, the site. Compliance with this (and subsequent) method statement will be a requirement of all relevant contracts associated with the development proposals. Copies of this document will be available for inspection on site. The developer will inform the local planning authority if the arboricultural consultant is replaced. This method statement should be read in conjunction with Tree Protection Plan (TPP/38HDHL/010 A).

9.0 Construction Site Access

9.1 Access for construction site traffic will follow the Designated Access Route which is shown on Tree Protection Plan (TPP/38HDHL/010 A). This is the existing access point to the site and is within the potential RPAs of retained trees. Measures to assess the suitability of the existing surface to support the weight loading of construction vehicles entering the site and to subsequently protect the RPAs of retained trees are set out below. These include the use of Tree Protection Fencing and the potential use of Ground Protection Measures.

10.0 Tree Protective Fencing

10.1 Root Protection Areas (RPAs) are the minimum areas (in m^2) which should be left undisturbed around each retained tree as Construction Exclusion Zones. These areas have been calculated and set out as part of the Arboricultural Survey and are shown on Tree Protection Plan (TPP/38HDHL/010 A). The protective distances where possible will be enforced by the use of robust fencing as outlined in BS 5837: 2012. The fencing will be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work taking place around the retained tree.

10.2 In this instance it is proposed to use 2.0 m high metal mesh panels on supporting rubber blocks and the existing boundary fencing.

10.3 The mesh panels will be joined together using a minimum of two anti-tamper couplers installed so that they can only be removed from inside the fence. The distance between the fence couplers will be at least 1.0 m and they will be uniform throughout the fence.

The panels will be supported on the inner side by stabilizer struts, which will (if possible) be attached to a base plate secured with ground pins. Where this is not possible - for instance due to the presence of retained hard standing - the stabilizer struts will be mounted on a block tray. Where space does not allow for a full panel to be erected then panels may overlap each other to fill a gap. Examples would include Heras fencing (See Photograph C below). Access will be restricted except for ground maintenance operations.

Photograph C - Tree Protective Fencing

10.4 The exact composition of the soil is unknown. Clay soil, for instance, compacts very easily when wet, so it is essential that fenced areas remain undisturbed before and during demolition and construction to prevent root asphyxiation.

10.5 Laminated site warning signs will be attached to the fencing. These signs will state:

***'*CONSTRUCTION EXCLUSION ZONE – NO ACCESS**

No storage of materials or use of machinery should take place within this area. These fences should remain intact unless under instruction from the site foreman following consultation with an Arborist.'

10.6 The positions of the Tree Protection Fencing are shown on the Tree Protection Plan (TPP/38HDHL/010 A).

10.7 Fencing will be erected before any vehicles enter the site in connection with the Construction Phase. Protective fencing will only be removed at the end of the Construction Phase or to facilitate access for grounds maintenance operations. Fencing will be maintained to ensure that it remains rigid and complete.

11.0 Ground Protection Measures

11.1 Construction processes in relation to the implementation of the proposals may occur within the RPAs of retained trees. These include site access, pedestrian activity, storage of plant and materials, erection of scaffolding and vehicle movements. Ground Protection Measures are therefore proposed to protect the underlying soil structure and prevent potential root damage during construction.

11.2 The protective fencing specified will first be erected as shown on Tree Protection Plan (TPP/38HDHL/010 A) prior to construction commencing.

11.3 Site Access and Storage of Materials and Plant

Where possible it is proposed to retain the existing hard standing materials within the site to support the proposed weight loadings within the site during the construction phase. These will be assessed to confirm that they have a load bearing capacity which is suitable to the scale of the proposals. At this stage an initial assessment has indicated that the existing driveway consists of a tarmac surface which shows some limited deformity, cracking or areas of depression. Therefore at this stage it is assumed that the driveway will be suitable as ground protection measures during the project.
However if - following a full assessment - this surface is not deemed to be adequate or additional measures are required then the following specifications will be used:

11.4 For pedestrian-operated plant up to a gross weight of 2 t, proprietary, inter-linked ground protection boards placed on top of a compression-resistant layer (150 mm depth of woodchip), laid onto a geotextile membrane will be used. The structure of this temporary hard surface will be designed to avoid localised compaction, by evenly distributing the carried weight over the track width and wheelbase of any vehicles or machinery that are proposed to use the area.

11.5 For wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system will be proposed to an engineering specification designed in conjunction with arboricultural advice. This system could include a proprietary systems or pre-cast reinforced concrete slabs which will accommodate the likely loading to which it will be subjected. In this instance the final design of the system used would be confirmed as part of a Planning Condition for a Planning Approval.

11.6 The structure of this temporary hard surface will be designed to avoid localised compaction, by evenly distributing the carried weight over the track width and wheelbase of any vehicles or machinery that are proposed to use the area.

11.7 Relevant Ground Protection Measures will be in place before any vehicle enters the site in connection with the demolition phase. It will be removed once construction works are complete.

12.0 **Removal or Refurbishment of Hard Standing Areas**

12.1 The application site consists of an existing driveway and footpath within the RPAs of retained trees. These may be refurbished as part of the proposals or removed altogether. Hand held tools or appropriate machinery will be used (under supervision) to remove the existing hard standing materials within the RPAs of trees. Excavation will be undertaken to existing construction depths and no deeper.

12.2 As soon as the existing hard standing is removed measures must be put in place immediately to protect the underlying soil structure and protect roots from direct and indirect damage (such a desiccation). This will mean that the replacement hard surface or soil will be laid immediately the existing top surface and sub-base is removed.

12.3 Where areas are formed into the landscaped areas of the site topsoil will be laid which will conform to BS 3882 (2007) - a good quality medium to light loam, free of perennial weeds. Stone content 20% dry weight. The spreading of soil within the RPAs of retained trees will be undertaken by hand.

13.0 **Specialised Foundation Design**

13.1 Construction of the building will take place within the RPAs of London Planes (T4, T7 and T8). It is recommended that specialised foundations are used to limit any below ground construction.

13.2 As set out in BS 5837 (2012) "*Construction within the RPA should accord to the principle that the tree and soil structure take priority…. Soil structure should be preserved at a suitable bulk density for root growth and function …. existing rootable soil retained and roots themselves protected".* The use of traditional strip footings can result in extensive root loss and should be avoided.

13.3 In this instance a piled and ground beam foundation with a suspended slab above the present ground level is proposed. However the final design will be determined by a Structural Engineer in consultation with an Arboriculturist. On site investigation (including the excavation of trial holes) will be undertaken to determine the optimal location of the piles whilst avoiding damage to roots which may be important to the stability of the tree. Trial holes will be dug using hand held tools to a minimum depth of 600 mm.

13.4 The smallest practical pile diameter will be used, as this reduces the possibility of striking major tree roots, and reduces the size of the rig required to sink the piles. A sleeved bored pile or screw pile is proposed to protect the soil and adjacent roots from the potentially toxic effects of uncured concrete.

13.5 Beams will be laid at or above ground level, and cantilevered as necessary to avoid tree roots identified by site investigation.

13.6 If this is a shrinkable soil, the foundation design should take account of the risk of indirect damage to the structure from subsidence or heave. The floor slabs could be constructed with a ventilated air space between the underside of the slab and the existing soil surface to enable gas exchange and venting through the soil surface.

13.7 The final detailed design of the foundations would be considered as part of a Planning Condition for the site.

14.0 Construction of Lower Ground Floor

14.1 The proposed lower ground floor basement has been designed to be outside the RPAs of retained trees. The following initial methodology has been proposed to prevent the excavation of the basement area having an indirect impact on retained trees such as through the collapse of the soil profile which could affect the integrity of an RPA. A final methodology would be set out as part of Planning Conditions for a Planning Approval.

14.2 The construction of the basement is proposed using contiguous piles so as to limit the impact on trees. Tree Protection Fencing will be set out to protect these trees as shown on Tree Protection Plan (TPP/38HDHL/010 A) at the start of the construction phase.

14.3 Steel sheet piles will be installed along the footprint of the basement using a piling rig such as a Giken Silent Piling system or similar to be approved. The body of the machinery will operate from outside the RPAs of retained trees or on load bearing materials. The basement would then be excavated to the underside of the proposed floor slab. The retaining wall for the basement would then be constructed in front of the sheet piles.

14.4 Access for machinery and pedestrians to the basement area will be via ramps or steps to avoid increasing the proposed excavated area by grading back or `battering' of the soil profile.

14.5 Care will be taken during the works to prevent compaction of soils and therefore to ensure that roots are not damaged

15.0 Site Organisation and Storage of Materials and Plant

15.1 During the proposed construction works attention will be paid to the protection and well being of retained trees. The site will be organised in such a manner so as to minimise the effects of the construction work on trees.

15.2 All access onto the site will be via the Designated Access Route (see Tree Protection Plan - TPP/38HDHL/010 A). This is the existing tarmac surface access to the site. Where necessary Ground Protection Measures will be installed to protect the rooting areas of trees - see above.

15.3 Given the constraints imposed by the trees to the site frontage it is proposed that all contractors parking, temporary site structures and storage of materials and plant to be used during the construction phase will be carefully stored outside of the enforced Construction Exclusion Zones (see Tree Protection Plan - TPP/10PASHH/010 A). This would include the use of the existing garage.

15.4 Alternatively should this option be impractical then materials can be brought to site in small loads which are applicable to that phase of the works. Additionally once construction has commenced it is possible that some materials can be stored within the building area. All these proposals are aimed at restricting the operational footprint of the site and therefore reducing the potential impact on retained trees.

15.5 All toxic substances such as oils, bitumen's and residues from concrete mixing will be retained by effective catchment areas. No toxic material will be discharged within 10 m of a tree stem. No fires will be lit within 10 m of a tree stem.

16.0 Landscape Proposals Including Pre-Development Tree Works

16.1 All landscaping will avoid soil re-grading and unnecessary disturbance within the RPAs of retained trees. Any ground works, such as planting of replacement trees or spreading of top soil, within the RPAs of retained trees will be undertaken using hand held tools or suitable machinery (under supervision). Appropriate machinery would include vehicles with low pressure tyres.

16.2 Pre-Development Tree Works - in relation to the Building.
It is proposed to re-pollard London Plane (T4) and crown reduce London Planes (T7 and T8). This will allow for some regrowth to occur without impacting on either the building or the tree and provide a harmonious and long term relationship between the trees and the building. Additionally it is proposed to undertake a further assessment of London Plane (T1), Sycamore (T2) and Lime (T9) and introduce a management regime for these trees which will possibly include re-pollarding.

16.3 The amount of material to be removed and the diameter(s) of the pruning cut(s) will be the minimum required for the purpose.

16.4 All works should be undertaken by a qualified Arboriculturist to BS 3998:2010 `Tree Work - Recommendations' to ensure that the health, amenity and viability of the trees are maintained.

17.0 Conclusion

17.1 The construction of the proposals will not be possible without the removal of trees. The implementation of the proposals will result in the removal of 3 no. individual trees and 2 no. groups of trees. These are low quality or unremarkable trees and are designated as `C' Category in BS 5837:2012. They are not readily visible from outside the site and their removal will therefore not have a significant impact on the visual amenity of the area and its enjoyment by the general public.

17.2 Site access on the line of the existing access, removal or refurbishment of hard standing, construction activity and construction of a building will take place within the RPAs or canopy spreads of retained trees. However the impacts on retained trees are assessed as being minimal and insignificant. Further protection will be provided as long as the recommendations and Arboricultural Method Statement are implemented. This will include the use of Tree Protection Fencing and Ground Protection Measures and specifications for the implementation of specific elements within the site development.

17.3 Retained trees will be protected during the construction phase. This report sets out how retained trees are an important part of the development of the site and how protection and retention of trees will be achieved. The effect on trees from the proposals will be minimal given the proposed site layout and conditions and providing that the Arboricultural Method Statement is implemented.

17.4 The proposals are acceptable in arboricultural terms and should receive planning consent.

Appendix A
Arboricultural Survey
38 Heath Drive, London, NW3 7SD

1.0 Introduction

1.1 I visited the site in September 2013 to inspect relevant trees in relation to a proposed planning application. Relevant trees are those within the area of the proposed development (both on and adjacent to the application site) which may potentially have some significance to the proposed development. These are generally within 12.0 m of the proposals including any potential activity (such as site access) associated with the proposals.

1.2 The survey includes the species, size, position and condition of these trees. A full list and description of Survey Terms is given below. Where possible trees were assessed as individual specimens, however, where trees formed distinctive groups within the landscape these were assessed and graded as groups.

1.3 This survey has been prepared following guidance set out in BS 5837: 2012 `Trees in relation to design, demolition and construction. Recommendations'. It seeks to offer guidance in relation to planning application discussions or designs for the site. As suggested by BS5837: 2012 all trees with a stem diameter of less than 75 mm at 1.5 m above ground level were excluded from the survey.

2.0 Description of Survey Terms

2.1 **Tree Reference Number** is the number allocated as part of this Arboricultural Survey. This may be different from other surveys undertaken on the site and the tree may, or may not, be tagged on site.

2.2 **Height** of the tree is measured in metres to the centre of the crown or the highest point of the tree. There is a tolerance of plus or minus 1.0 m.

2.3 **Crown Spread** is taken at compass points N, E, S and W from the centre of the tree stem. This is to the nearest 0.5 m. Where tree canopies spread off-site then estimations (est) have been made. With regard to groups the average canopy spread is given. Where individuals within the group are significantly different from this these are shown on the plan and the maximum spread stated within the report. The height of the canopy above ground level and direction of the `First Significant Branch' is given where relevant.

2.4 **Stem Diameters** are taken at 1.5 m above ground level unless otherwise stated. Where measurements of trunk diameter are not possible then estimations (est) have been made. This may be due to ivy on the trunk or where trees are not on the application site. The annotation ms refers to multi-stemmed trees.

2.5 **Root Protection Areas** (RPAs) are calculated from stem diameter measurements as set out in BS5837: 2012 `Trees in relation to design, demolition and construction. Recommendations'. RPAs are the areas (in m^2) around each retained tree which contain sufficient rooting volume to ensure the survival of the tree. The area will normally be represented on a plan as a circle or polygon. If shown as a circle the **Radius of Root Protection Area Zone** is included.

2.6 **Age Class** - A young tree (Y) is within its first $1/3^{rd}$ of life expectancy. A middle aged tree (MA) is within its second $1/3^{rd}$ of life expectancy and a mature tree (M) is within its final third of life expectancy. An Over Mature tree (OM) is beyond its average life expectancy and a Veteran (V) is usually beyond the typical age range for the species but of biological, cultural or aesthetic value.

2.7 **Physiological and Structural Condition** - Trees in a Good Physiological or Structural Condition have no visible problems or significant defects. Those in a Fair Condition have remedial symptoms or defects or where these symptoms or defects are not remedial but will not affect the **Estimate Remaining Useful Contribution** and those in a Poor Condition have defects which are not remedial and removal of the tree should be considered.

2.8 **Comments** give a description of the tree including its general form, description of any physical defects, disease or decay and other appropriate details based on the health, vitality and overall structural integrity. It also includes the environment in which the tree is growing. **Recommendations** for the management of the tree or group will be given where required.

2.9 A tree of good form has a shape that is typical of the species or has amenity in its own right. A tree with moderate form has been affected by its environment and is not typical of the species and has limited amenity value on its own right though it may have a collective amenity with adjacent trees. A tree with poor form has low quality and may also have structural defects which will affect its long term retention. **Canopy height above ground level** is given where this is applicable.

2.10 **Estimated Remaining Useful Contribution** is the estimated number of years that the tree will continue to make a safe and useful contribution to its surroundings, taking into account its current age, physiological and structural condition and its current location or environment. This assumes that there will be no changes within its immediate environment.

2.11 **Category Grading** - trees have been categorised in accordance with the cascade chart set out within BS5837: 2012.

2.12 The trees inspected as part of this report were inspected from the ground only and were not climbed. No samples of wood, roots, soils or fungus were taken for analysis. Observations of the trees were confined to what was visible from within the site and surrounding public places. A full hazard risk assessment of the trees was not undertaken.

2.13 Where access to trees is not possible and/or a certain identification is not possible then these trees are classified as `unidentified'.

Photograph D - Looking towards the existing garage
from the tarmac driveway.

Tree Schedule

Tree Ref No.	Species Common Name (Latin Name)	Height (m)	Stem Diameter (mm) ***Root Protection Area (m^2)***	Radius of Root Protection Area zone (m)	Branch Spread (m)	Age Class	Physiological/ structural Condition	Comments ● Preliminary Management Recommendations	Estimated Remaining Useful Contribution (years)	Category Grading
T1	London Plane (Platanus x hispanica)	16	790 **282.4**	9.5	N - 7.0 est E - 8.0 S - 9.0 W - 8.0 est	M	Good/Fair	Tree had previously been partially pollarded or reduced with significant regrowth from the pollard points. Crown weighted to south and west due to these removed branches. Electrical wore has been absorbed into the trunk 1,8 m to north. Compost heap within rooting area - full inspection of tree not possible. Some wound holes - partly occluded. Shrubs growing within branch junction. Some surface rooting to base to north east. Limited ivy growth to trunk. First significant branch at 4.0 m. Canopy to 1.0 m above ground level at lowest point to south east. ● Recommend further (climbing) investigation of pollard points to assess their integrity. The long term management of this tree will include re-pollarding on a cyclical basis. This would remove any mechanical stress which results from excessive weight loading on the pollard points. The pollard regime will in part be guided by the further investigations undertaken.	20+	B2

T2	Sycamore (Acer pseudoplatanus)	15	610 **168.3**	7.3	N - 7.0 E - 8.0 S - 3.0 W - 4.0 est	M	Good/Fair	Ivy to trunk. Previously pollarded at 5.0 m with significant regrowth above this. Pollard points appear soundly attached with no or limited signs of rot or mechanical deterioration. Crown unbalanced to north and east. First significant branch at 3.0 m to north. Canopy to 3.0 m above ground level in area of existing garage. ● Recommend further (climbing) investigation of pollard points to assess their integrity. The long term management of this tree will include re-pollarding on a cyclical basis. This would remove any mechanical stress which results from excessive weight loading on the pollard points. The pollard regime will in part be guided by the further investigations undertaken.	20+	B2
T3	London Plane (Platanus x hispanica)	11	890 **358.3**	10.7	N - 4.5 E - 4.0 S - 3.0 W - 3.5	M	Fair/Good	Offsite tree situated within pavement. Recently pollarded/crown reduced. Canopy over 4.0 m above ground level over site access. ● No preliminary management recommendations recommended at time of survey.	20+	B2
T4	London Plane (Platanus x hispanica)	15	1000 **452.4**	12.0	N - 6.0 E - 12.0 S - 8.0 W - 5.0	M	Good/Fair	Growing adjacent to site entrance. Growing or leaning to the east. Crown unbalanced to east. One limb previously reduced - 200 x 150 mm diameter - partly occluded. Ivy to base of tree. Previously pollarded at 5.0 m with significant regrowth above this. Pollard points appear soundly attached with no or limited signs of rot or mechanical deterioration. Additionally the crown of the tree has been reduced at 6.0 m to the east - with regrowth to approximately 12.0 m. ● Recommend further (climbing) investigation of pollard points to assess their integrity. The long term management of this tree will include re-pollarding on a cyclical basis. This would remove any mechanical stress which results from excessive weight loading on the pollard points. The pollard regime will in part be guided by the further investigations undertaken.	20+	B2

T5	Lime (Tilia spp)	16	440 **87.6**	5.3	N - 3.5 E - 4.0 S - 3.5 W - 3.0	MA	Good/Good	Growing adjacent to site entrance. Previously pruned. First significant branch at 4.0 m to north east, canopy to 2.5 m above ground level at lowest point - over site access. ● No preliminary management recommendations recommended at time of survey.	20+	B2
T6	London Plane (Platanus x hispanica)	11	720 **234.5**	8.6	N - 2.5 E - 2.5 S - 3.5 W - 4.0 est	M	Fair/Good	Offsite tree situated within pavement. Recently pollarded/crown reduced. First significant branch at 4.0 m. Canopy over 4.0 m above ground level over site access. ● No preliminary management recommendations recommended at time of survey.	20+	B2
T7	London Plane (Platanus x hispanica)	17	1030 **479.9**	12.4	N - 6.0 E - 12.5 S - 9.0 W - 8.0	M	Good/Fair	Crown unbalanced to east. The crown of the tree has been reduced at 6.0 m to the east - with regrowth to approximately 12.5 m. First significant branch at 4.0 m to north east. Canopy to 1.8 m above ground level at lowest point - to east. ● Recommend crown reduction to east to previous prune points. This will rebalance the canopy of the tree and relief any mechanical stress to retained stems.	20+	A2
T8	London Plane (Platanus x hispanica)	17	820 **304.1**	9.8	N - 6.0 E - 11.5 S - 12.0 W - 8.0	M	Good/Fair	Crown unbalanced to east. The crown of the tree has been reduced at 6.0 m to the east - with regrowth to approximately 11.5 m. Large limb removed to north - approximately 300 x 400 mm. First significant branch at 3.5 m to south east. Canopy to 2.0 m above ground level at lowest point - over driveway. ● Recommend crown reduction to east to previous prune points. This will rebalance the canopy of the tree and relief any mechanical stress to retained stems.	20+	A2

T9	Lime (Tilia spp)	16	430 **83.7**	5.2	N - 4.5 E - 3.0 S - 6.0 W - 4.0	M	Good/Fair	Crown weighted to south. Previously pruned - wounds partly occluded. Previously pollarded with regrowth now with included bark at branch junctions and co-joined stems which are a potential point of structural weakness and entry point for pathogens. First significant branch at 4.0 m. Canopy to 2.0 m above ground level at lowest point to east. ● The long term management of this tree will include re-pollarding on a cyclical basis. This would remove existing defects which have formed within the re-grown crown and remove any mechanical stress which results from excessive weight loading on the pollard points.	20+	B2
T10	Holly (Ilex spp)	4	90 **3.7**	1.1	N - 1.0 E - 1.5 S - 1.5 W - 1.0	Y	Good/Fair	Tree of moderate form to site frontage. Partly suppressed by adjacent trees. Canopy to ground level. ● No preliminary management recommendations recommended at time of survey.	10+	C2
T11	Lime (Tilia spp)	10	300 **40.7**	3.6	N - 5.0 E - 4.5 S - 4.0 est W - 5.0	MA	Good/Good	Canopies to 1.0 m above ground level at lowest point. Some basal growth present. Wounds to trunk are partly occluded - small cavities are present. ● Monitor cavities within tree as part of any regular tree inspection regime on the site.	20+	B2
T12	Lime (Tilia spp)	10	220 **21.9**	2.6	N - 4.5 E - 5.5 S - 4.5 est W - 3.0	MA	Good/Good	Canopies to 1.0 m above ground level at lowest point. Some basal growth present. Wounds to trunk are partly occluded - small cavities are present. ● Monitor cavities within tree as part of any regular tree inspection regime on the site.	20+	B2
T13	London Plane (Platanus x hispanica)		660 **197.1**	7.9	N - 8.0 E - 10.0 S - 10.0 W - 6.5	M	Good/Good	Offsite tree within pavement. Some limbs previously removed. Some limited bark damage to west at base of tree. ● No preliminary management recommendations recommended at time of survey.	20+	B2

T14	Magnolia (Magnolia spp)	8	338 (2 x 150 mm, 1 x 170 mm and 1 x 200 mm diameter stems) **51.7**	4.1	N - 4.0 E - 5.0 S - 7.0 W - 3.5	M	Good/Fair	Previously pruned. Some rot at prune points. Some limited surface rooting. First significant branch at ground level. Canopy to 1.8 m above ground level at lowest point to north east. ● No preliminary management recommendations recommended at time of survey.	20+	C1
T15	Pear (Pyrus spp)	5	200 est **18.1**	2.4	N - 2.5 E - 3.0 S - 2.5 W - 3.0 all est	MA	Good/Fair	Offsite tree raised 500 mm above ground level of application site. Canopy to below 1.0 m above ground level over application site. ● No preliminary management recommendations recommended at time of survey.	10+	C1
T16	Cherry (Prunus spp)	9	360 **58.6**	4.3	N - 2.5 E - 2.0 S - 5.0 W - 4.0	MA	Fair/Poor	Tree of poor form and condition. Previously pruned. Crown weighted to south and west. Some dieback in the crown. Ivy to trunk. Significant wound and cavity to base to east from ground level to 1.0 m. Wounding to east at 1.5 m above ground level. Bracket fungus to east associated with wounds and cavities. ● Recommend removal of tree.	Less than 10	U
T17	Fruit	4	216 (2 x 100 mm, 1 x 110 mm and 1 x 120 mm diameter stems) **21.1**	2.6	N - 3.5 E - 4.0 S - 3.0 W - 3.0	MA	Fair/Fair	Tree of moderate form. Previously pruned. First significant branch at 1.4 m. Canopy to 1.5 m above ground level at lowest point to south east. ● No preliminary management recommendations recommended at time of survey.	10+	C2
T18	Bay (Laurus nobilis)	8	210 **20.0**	2.5	N - 2.5 est E - 2.0 S - 2.0 W - 1.5	MA	Good/Good	Previously pruned. First significant branch below 1.0 m above ground level. Canopy to ground level over application site. ● No preliminary management recommendations recommended at time of survey.	20+	C2

T19	Fruit	8	200 est **18.1**	2.4	N - 3.5 est E - 3.0 S - 3.5 W - 3.5	MA	Fair/Fair	Offsite tree raised above application site - full inspection of tree not possible. Moderate form. First significant branch at 3.0 m to south (est). Canopy to 2.5 m above ground level at lowest point over the application site to south. ● No preliminary management recommendations recommended at time of survey.	10+	C2
T20	Silver Birch (Betula pendula)	14	350 **55.4**	4.2	N - 3.5 est E - 5.0 S - 4.5 W - 3.5	MA	Fair/Fair	Tree growing to site boundary on small raised bank approximately 450 mm above ground level of main site. Misshapen crown weighted to south and east. Previously pruned. Some epicormic growth associated with pruning cuts. First significant branch at 4.0 m to west. Canopy to 4.0 m above ground level at lowest point over the application site to south. ● No preliminary management recommendations recommended at time of survey.	10+	C2

Tree Ref No.	Species Common Name (Latin Name)	Height (m) range	Stem Diameter (mm) **Root Protection Area (m^2)** *Radius of Root Protection Area zone (m)*	Branch Spread - general (max) **(m)**	Age Class (general)	Physiological/ Structural Condition (general)	Comments (general) ● Preliminary Management Recommendations	Estimated Remaining Useful Contribution (years)	Category Grading
G1	2 no. Magnolia (Magnolia spp)	6	170 - 206 (1 x 100 mm and 1 x 180 mm diameter stems) **13.1 - 19.2** *2.0 - 2.5*	N - 3.0 E - 3.0 est S - 4.0 W - 4.0	MA	Fair/Fair	Trees of moderate form growing adjacent to existing property. Some dieback in the crown. Previously pruned. Canopy over existing property. Canopies to 1.8 m above ground level at lowest point. ● No preliminary management recommendations recommended at time of survey.	10+	C2

G2	1 no. Holly (Ilex spp) and 1 no. Fruit	5-6	90 - 140 **3.7 - 8.9** *1.1 - 1.7*	N - 2.0 E - 3.5 S - 2.5 W - 2.5	Y	Fair/Fair	Trees of moderate form to site boundary. Previously pruned. Canopies to 1.0 m above ground level at lowest point. ● No preliminary management recommendations recommended at time of survey.	10+	C2