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Site Details: 28 Nicholas Way, Northwood, Middx, HA6 2TT

Prepared for: Mr. D. Fearon

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Title: DF_28NW_AIA_001

Published Date: 18th May 2016

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1.0 – Summary of Instruction

An Arboricultural Impact Assessment (AIA) in accordance with *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* was commissioned by our client, Mr. D. Fearon.

The AIA and report are required in support of an application for planning consent, to demonstrate that development proposals at the above address will not adversely impact on the physiological health and/or the structural condition of nearby trees.

The development scheme relates to:

- Proposed demolition of the existing detached house at 28 Nicholas Way;
- Construction of new detached family house;
- Associated hard and soft landscaping of outside areas (front and rear), including new tree planting.

Instructions were to:

- Carry out a tree survey in accordance with the British Standard *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* to:
 - Prepare an Arboricultural Impact Assessment (AIA) to evaluate the potential direct and indirect effects of the proposed design and associated construction activity on nearby trees.
 - Categorise the trees at and adjacent (if applicable) to the site to ascertain their suitability for retention.
 - Provide all relevant tree data including species, dimensions, life stage, condition assessments and make preliminary management recommendations where necessary.
 - Identify the tree constraints to the development to assist with scheme feasibility, conception and design.
 - Make recommendations for measures to be taken to protect the retained trees during the development process, to safeguard their short and long term health and condition, including those trees which are situated on adjacent properties / land to the proposed development site (if applicable).
 - Highlight the arboricultural implications that the development and associated processes may have on the retained trees and provide a method statement to show the necessary controls required to mitigate those implications.
 - Produce findings in a written report for submission to the local planning authority.

The British Standard Institute publication *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations* is referred to throughout this report. This is a nationally recognised standard typically used by Local Planning Authorities to assess planning applications.

It is frequently referred to in planning conditions to enforce protection or control of works that may be harmful to trees both on and off the site.

This report has been produced in accordance with *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations* for use by our client for planning purposes only. Information provided by third parties used in the preparation of this report is assumed to be correct.

2.0 – Report Limitations – (The scope of this report is restricted by the following limitations)

- All observations of tree conditions were from ground level, a visual assessment of external features only, assisted as required by the use of binoculars, a metal probe and a rubber sounding mallet (used for audible resonance testing) where necessary.
- Below ground tree roots and buried parts were not inspected.
- Tree positions were included on the Proposed Site Plan (1241 / P / 1) provided by Dusek Design Associates.
- The Proposed Site Plan (1241 / P / 1) was used to create the Tree Constraints and Tree Protection Plans in the AIA report.
- All measurements of tree heights, crown spreads and crown clearance from ground level are recorded to the nearest half metre for dimensions up to 10m and to the nearest metre for dimensions over 10m.
- Stem diameters are measured to the nearest 10mm or where inaccessible, estimated based on the visible features and characteristics of the tree in question. Stem diameter measurements are adjusted in accordance with Table D.1 of Annex D in BS 5837:2012 as required.
- Detailed background information is not known concerning the past history of the site, the soil type, geology or hydrology of the environs. No inspection material has been acquired by Tree Sense Arboricultural Consultants for assessment by a laboratory.
- Geotechnical analysis and soil assessment will be necessary at the site to understand the soil structure and sub soil conditions in respect of the scheme feasibility.
- Assessing the potential influence of trees upon load-bearing soils beneath existing and proposed structures, resulting from water abstraction by trees on shrinkable soils, was not included in the contract brief and is not, therefore, considered in any detail in this report. Tree Sense Arboricultural Consultants cannot be held responsible for damage arising from soil shrinkage or heave issues related to the retention or removal of trees on site.
- The recommendations made in this report relate to the assessment of the trees and their surroundings at the time of inspection. Treatment recommendations assume that the client understands that tree management is a continuing process, requiring regular attention and that as part of this process the condition of the trees should be thoroughly reassessed at regular, timely intervals, with hazard checks after periods of likely tree stress, e.g. after periods of severe weather.
- Weather conditions were dry and bright on the day of the survey.
- Where a tree is subject to a Tree Preservation Order (TPO) and/or stands within a designated Conservation Area, it will be necessary for the tree owner or his/her appointed agent to ensure appropriate compliance with planning requirements, before any recommended, non-urgent treatments can be undertaken. (See Section 12).
- This report is compiled into a single PDF file designed for electronic release. If printing this document, please note that the plan drawings may be a different size or orientation to the standard A4 / portrait of the rest of the report. Some PDF reader software may also automatically adjust the size of drawings included in this report. The Tree Constraints Plan and Tree Protection Plan are drawn to the scale indicated in Sections 8.1 and 9.1.1 respectively.

2.1 – Time Limits

It should be understood that trees are not static objects, but growing, living organisms; and their condition, size and relationship to buildings and other trees can change significantly and sometimes unpredictably over a period of time. Therefore this report has a validity period of 12 months from the date of publication and is subject to any suggested management recommendations being undertaken within the correct time frames.

2.2 – Severe Weather Limitations

Impacts of severe drought, storm, inundation, land slip or subsidence are not covered by this report.

2.3 – Tree Safety Matters / Tree Risk Assessment

The Arboricultural Impact Assessment (AIA) in accordance with *BS 5837:2012 (Trees in relation to design, demolition and construction - Recommendations)* is carried out in sufficient detail to gather data for and to inform the current project.

Our appraisal of the structural integrity of trees on and adjacent (if applicable) to the site is of a preliminary nature and sufficient only to inform the current project. The tree assessment is carried out from ground level as is appropriate for this type of survey, without invasive investigation.

The disclosure of hidden tree defects cannot therefore be expected. Whilst the survey is not specifically commissioned to report on matters of tree safety, we report obvious visual defects that are significant in relation to the existing and proposed land use. As such, General Management Recommendations (GMR) may be made regarding the assessed trees, in respect of good urban tree management.

2.4 – Visual Tree Assessment (VTA)

The Visual Tree Assessment (VTA) method of inspection is an internationally recognised tree hazard assessment method developed by Prof. Claus Mattheck: *Body Language of Trees – a handbook for failure analysis* (HMSO, 1994).

The basis of VTA is the identification of (external) symptoms which a tree produces in reaction to a weak spot or area of mechanical stress. These can then be interpreted in terms of potential direct impact hazard features within a tree.

The VTA method of inspection does not allow for opinions to be made concerning the risk of a trees potential to cause indirect impact on nearby structures. Indirect impact refers to potential problems caused by changes in soil moisture content in shrinkable soils (i.e. those soils with a high clay content); to which trees can be a contributing factor.

The tree inspection survey undertaken at the above site was conducted in accordance with Stage 1 of the VTA process.

3.0 – Background

Tree Sense Arboricultural Consultants were commissioned to undertake a tree survey at the above site and prepare an Arboricultural Impact Assessment (AIA) in respect of re-development proposals for the current owner, Mr. D. Fearon.

A previous AIA was undertaken by ACS Consulting for the former owner of the property (Mr. Lustig), prior to the release of the latest revision of the British Standard *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*.

The tree survey was undertaken by Tree Sense Arboricultural Consultants on the 8th September 2015 to re-assess the tree stock at the site and re-evaluate the tree constraints in accordance with the latest revision of The British Standard (*BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*).

The re-assessment of the tree stock at the site was cross referenced with the original data collected by ACS Consulting. The tree data was then updated accordingly to ensure the above and below ground constraints were calculated based on measurements recorded for the current tree stock and in line with guidelines detailed in the current British Standard - (*BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*).

The re-assessment of the trees at the site was necessary to ensure the recorded tree data was up to date, and relevant in respect of identifying the above and below ground constraints to the latest development proposal and design.

The Tree Constraints Plan (TCP) and Tree Protection Plan (TPP) in Sections 8.0 and 9.1 respectively are updated to indicate the tree constraints based on the updated data recorded at the time of the survey.

The TCP and TPP have been created using the latest site plan - *Proposed Site Plan (1241 / P / 1)*, which includes the current development proposal design, as provided by Dusek Design Associates.

3.1 - Process

The demolition and re-development proposal at the above property is currently in the initial feasibility, planning and design stage.

The Arboricultural Impact Assessment (AIA) in accordance with *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* was commissioned to be undertaken as part of the initial feasibility study at the planning stage of the process.

The elements of the AIA at this stage in the process were to undertake the tree survey, categorise the trees and identify the tree constraints to the development, with a view to assisting with the conceptual design and feasibility of the proposal.

The revised AIA was commissioned after an initial design proposal had been prepared and therefore, the tree constraints initially may not have been taken fully into consideration.

The identified tree constraints should inform and assist with the final design, including any necessary engineering solutions and demolition/construction methods which will need to be explored in respect of minimising damage to retained trees in the short and long term, both above and below ground level.

Additionally, the identified constraints will also determine the specification and positioning of tree protection measures to be employed at the site, to safeguard the trees above and below ground throughout the development process to completion.

Following the identification of tree constraints, the AIA evaluates the identified direct and indirect effects of the proposed design in relation to nearby trees. The assessment will consider the effect of any tree loss or damaging activities proposed in the vicinity of retained trees. Activities such as:

- *Demolition of existing structures and/or removal of existing hard surfaces.*
- *Installation of new permanent hard surfaces.*
- *The location and dimensions of all proposed excavations or alterations in ground levels.*
- *Construction of new structures above ground level.*

In addition to the permanent works, account should be taken to the buildability of the scheme in terms of access, plant machinery use, adequate operational space and provision for the storage of materials including topsoil, without inflicting damage to the retained trees. Post development pressure on nearby trees must also be closely considered and assessed.

As well as an evaluation of the extent of the impact on existing trees, the AIA includes and details within this document:

- a) *The tree survey;*
- b) *Trees selected for retention, clearly identified (e.g. by number) and/or marked on a plan with a continuous outline;*
- c) *Trees to be removed, also clearly identified (e.g. by number) and/or marked on a plan with a dashed outline or similar;*
- d) *Trees to be pruned, including any access facilitation pruning, also clearly identified and labelled or detailed as appropriate;*
- e) *Areas designated for structural landscaping that need to be protected from construction operations in order to prevent the soil structure being damaged;*
- f) *Evaluation of impact of proposed tree losses (if applicable);*
- g) *Evaluation of tree constraints and production of a draft tree protection plan including details of tree protection measures;*
- h) *Issues to be addressed by an arboricultural method statement where necessary in conjunction with input from other specialists associated with the project.*

4.0 – General Site Observations

The site at 28 Nicholas Way is accessed via a private driveway from the main carriageway. The property features an existing detached house with spacious garden areas which surround the house.

Outside areas feature numerous trees, many which were part of the historical estate/woodland before development of the Copsewood Estate residential area.

The majority of the tree stock features within the current rear garden or around the site boundaries. Some trees which would have been planted as part of the original development or as part of landscaping works also feature around the site. These ornamental trees are not typical of natural growing deciduous woodland, namely, evergreen Cypress and Cedar trees. Numerous coppiced Hornbeam trees also feature growing as understorey vegetation around the site, particularly along the north, south and western boundaries.

In respect of the Arboricultural Impact Assessment (AIA), not all of the significant trees around the site were assessed and recorded, as many are located well beyond 12 times their stem diameter away from the area of proposed development.

All trees which were recorded were selected accordingly and in line with the previous AIA survey conducted by ACS Consulting. The assessment of these selected trees will also ensure those trees further away will receive the necessary protection required during the development process.

The original full tree survey conducted by Ground Surveys Ltd. in May 2007 identified and numbered 85 significant trees around the site. The original AIA conducted by ACS Consulting recorded 23 of these significant trees, which were deemed to pose a potential constraint to the original development proposal for the previous property owner (Mr. D. Lustig).

Our re-evaluation survey included these 23 originally assessed trees, plus an additional 6 ornamental trees which were identified and duly recorded at that time.

In all, 29 significant individual trees and one group were recorded on site, including one neighbouring tree. All 29 individuals and the group were re-assessed for inclusion in the revised Arboricultural Impact Assessment (AIA).

A number of trees were originally proposed to be removed in relation to the previous owner's (Mr. Lustig) development scheme. It is understood that the removal of these trees was approved by the LPA at that time.

The same trees will also require removal based on the revised development proposal for the current owner (Mr. Fearon). Additionally, a few of the ornamental trees around the site recorded during the tree survey in September 2016 are likely to be removed in respect of scheme feasibility and the re-landscaping of outside areas. The additional trees concerned are all Cypress species.

All required tree removals are presented in greater detail in Section 8.2 – Tree Constraints Assessment & Findings.

It is understood that Tree Preservation Order (TPO 398) is in force at the site, which protects all Oak, Hornbeam, Birch and Scots Pine species on the site. The site also features within an “Area of Special Character”.

Due to the TPO 398 status at the site, all proposed tree removals will have to be re-evaluated and fully permissible by the LPA, either in writing or by the granting of Full Planning Permission.

4.0 – General Site Observations – Cont'd

A major tree re-planting scheme is proposed as part of the landscaping proposal, which will greatly mitigate the required tree losses at the site. A fully detailed landscaping proposal is to be submitted separately by the design team, which will include greater detail of all new tree planting; including size, species and location information.

For the purposes of the AIA report, the proposed new tree planting will include:

- 7 x Semi Mature *Carpinus betulus* (Hornbeam);
- 4 x Semi Mature *Betula pendula* (Silver Birch);
- 2 x Semi Mature *Quercus robur* (English Oak);
- *Fagus sylvatica* (Beech) hedging around the entire perimeter of the site.

All existing trees considered in the *BS 5837:2012* AIA study are shown on the Tree Constraints / Tree Protection Plans in Sections 8.0 and 9.1 respectively.

Details of all the individual trees surveyed for inclusion can be found in the Individual Tree Data Table in Section 5.0 and tree groups in Section 5.1. Further tree data comments are provided in Section 5.2.

5.0 – Individual Tree Survey Data

N.B. Tree Numbers in brackets relate to the numbering of trees on the original topographical survey conducted by Ground Surveys Ltd. in May 2007.

Tree No.	Species	Height (m)	Stem Diameter (mm)	Branch Spread (m)	Canopy Height (m)	Life Stage	General Comments Inc. Physiological and Structural Condition	Preliminary Management Recommendations	Estimated Remaining Contribution (Years)	Category
1 (84)	<i>Carpinus betulus</i> (Hornbeam)	15	7 @avg. 200 SE – 525	N – 6 E – 5 S – 4 W – 5	6	M	Physiological Condition – Good Structural Condition – Fair Historically coppiced tree. Some minor deadwood visible in the crown.	–	10+	C 1,2
2 (83)	<i>Quercus robur</i> (English Oak)	16	525	N – 9 E – 8 S – 5 W – 9	4	M	Physiological Condition – Fair Structural Condition – Fair Major and minor sized deadwood visible throughout the crown. In particular, a number of significantly sized dead branches are present on the north side.	SEE TREE DATA NOTES IN SECTION 5.2.	20+	B 1,2
3 (81)	<i>Carpinus betulus</i> (Hornbeam)	15	375	N – 4 E – 4 S – 4 W – 4	6	M	Physiological Condition – Good Structural Condition – Fair Some minor deadwood visible in the crown.	–	20+	B 1,2
4 (80)	<i>Quercus robur</i> (English Oak)	16	425	N – 6 E – 6 S – 3 W – 6	10	M	Physiological Condition – Good Structural Condition – Fair Major and minor sized deadwood visible throughout the crown, including broken out branches.	–	20+	B 1,2
5 (76)	<i>Quercus robur</i> (English Oak)	20	525	N – 7 E – 6 S – 6 W – 8	10	M	Physiological Condition – Good Structural Condition – Fair Some minor deadwood visible in the crown. Neighbouring tree, outside the management control of the applicant.	–	20	B 1,2
6 (79)	<i>Carpinus betulus</i> (Hornbeam)	15	8@avg. 200 SE – 575	N – 4 E – 4 S – 6 W – 4	3	M	Physiological Condition – Good Structural Condition – Fair Historically coppiced tree. Included bark evident at stem unions. Some minor decay around the stem base.	SEE TREE DATA NOTES IN SECTION 5.2.	10+	C 1,2
7 (78)	<i>Carpinus betulus</i> (Hornbeam)	15	1 – 200 2 – 200 3 – 200 4 – 200 SE – 400	N – 4 E – 4 S – 6 W – 6	3	M	Physiological Condition – Good Structural Condition – Fair Historically coppiced tree. Some minor deadwood visible in the crown.	–	10+	C 1,2

Tree No.	Species	Height (m)	Stem Diameter (mm)	Branch Spread (m)	Canopy Height (m)	Life Stage	General Comments Inc. Physiological and Structural Condition	Preliminary Management Recommendations	Estimated Remaining Contribution (Years)	Category
8 (72)	<i>Quercus robur</i> (English Oak)	14	375	N – 5 E – 4 S – 3 W – 5	10	M	Physiological Condition – Fair Structural Condition – Fair Sparse canopy. Major and minor sized deadwood visible throughout the crown.	GMR: Crown clean to remove hazardous deadwood.	10+	C 1,2
9 (69)	<i>Quercus robur</i> (English Oak)	18	550	N – 7 E – 7 S – 7 W – 7	6	M	Physiological Condition – Good Structural Condition – Fair Major and minor sized deadwood visible throughout the crown.	GMR: Crown clean to remove hazardous deadwood.	20+	B 1,2
10 (66)	<i>Quercus robur</i> (English Oak)	14	300	N – 4 E – 4 S – 4 W – 4	4	M	Physiological Condition – Fair Structural Condition – Fair Suppressed by dominant neighbouring trees. Sparse crown.	–	10+	C 1,2
11 (65)	<i>Quercus robur</i> (English Oak)	14	400	N – 4 E – 4 S – 4 W – 4	4	M	Physiological Condition – Fair Structural Condition – Poor Woodpecker holes and decay cavities observed on the stem.	GMR: Fell tree SEE TREE DATA NOTES IN SECTION 5.2.	<10	U
12 (67)	<i>Quercus robur</i> (English Oak)	18	525	N – 7 E – 7 S – 9 W – 7	8	M	Physiological Condition – Good Structural Condition – Fair Major and minor sized deadwood visible throughout the crown. Well balanced crown framework.	GMR: Crown clean to remove hazardous deadwood.	20+	B 1,2
13 (68)	<i>Chamaecyparis lawsoniana</i> (Lawson Cypress)	14	300	N – 3 E – 3 S – 3 W – 3	2	SM	Physiological Condition – Good Structural Condition – Good Some included bark at co-dominant stem union (2m). Minor deadwood internal to the crown, typical occurrence in dense evergreen species.	–	10+	C 1,2
14 (43)	<i>Cedrus atlantica</i> (Atlas Cedar)	20	450	N – 5 E – 5 S – 5 W – 5	4	SM	Physiological Condition – Fair Structural Condition – Fair Major and minor sized deadwood visible throughout the crown. Lower branch dieback on the main stem.	GMR: Clean stem and crown to remove hazardous deadwood.	20+	B 1,2
15 (44)	<i>Quercus robur</i> (English Oak)	14	375	N – 4 E – 6 S – 6 W – 6	9	M	Physiological Condition – Good Structural Condition – Fair Northern crown suppression by Hornbeam stands in the neighbouring property. Major and minor sized deadwood visible throughout the crown.	GMR: Crown clean to remove hazardous deadwood.	10+	C 1,2

Tree No.	Species	Height (m)	Stem Diameter (mm)	Branch Spread (m)	Canopy Height (m)	Life Stage	General Comments Inc. Physiological and Structural Condition	Preliminary Management Recommendations	Estimated Remaining Contribution (Years)	Category
16 (42)	<i>Quercus robur</i> (English Oak)	18	400	N – 7 E – 6 S – 7 W – 6	5	M	Physiological Condition – Fair Structural Condition – Fair Major and minor sized deadwood visible throughout the crown. Abundance of epicormic growth around the stem base.	GMR: Crown clean to remove hazardous deadwood.	10+	C 1,2
17 (18)	<i>Quercus robur</i> (English Oak)	16	475	N – 7 E – 6 S – 7 W – 6	5	M	Physiological Condition – Good Structural Condition – Fair Major and minor sized deadwood visible throughout the crown.	GMR: Crown clean to remove hazardous deadwood.	20+	B 1,2
18 (17)	<i>Quercus robur</i> (English Oak)	16	500	N – 8 E – 7 S – 8 W – 6	4	M	Physiological Condition – Good Structural Condition – Good Major and minor sized deadwood visible throughout the crown.	GMR: Crown clean to remove hazardous deadwood.	20+	B 1,2
19 (14)	<i>Quercus robur</i> (English Oak)	16	450	N – 5 E – 5 S – 7 W – 4	3	M	Physiological Condition – Good Structural Condition – Fair Major and minor sized deadwood visible throughout the crown.	GMR: Crown clean to remove hazardous deadwood.	20+	B 1,2
20 (12)	<i>Quercus robur</i> (English Oak)	16	475	N – 8 E – 7 S – 7 W – 5	3	M	Physiological Condition – Good Structural Condition – Fair Major and minor sized deadwood visible throughout the crown. Suspected bacterial infection, possibly Acute Oak Decline (AOD). Several wounds observed on the trunk exhibiting black/brown staining on the bark where bleeding from the stem has occurred.	GMR: Fell tree. SEE TREE DATA NOTES IN SECTION 5.2.	20+	B 1,2
21 (22)	<i>Quercus robur</i> (English Oak)	16	450	N – 6 E – 6 S – 3 W – 4	4	M	Physiological Condition – Good Structural Condition – Fair Major and minor sized deadwood visible throughout the crown.	GMR: Crown clean to remove hazardous deadwood.	20+	B 1,2
22 (11)	<i>Quercus robur</i> (English Oak)	16	450	N – 8 E – 4 S – 7 W – 6	3	M	Physiological Condition – Good Structural Condition – Fair Major and minor sized deadwood visible throughout the crown.	GMR: Crown clean to remove hazardous deadwood.	20+	B 1,2

Tree No.	Species	Height (m)	Stem Diameter (mm)	Branch Spread (m)	Canopy Height (m)	Life Stage	General Comments Inc. Physiological and Structural Condition	Preliminary Management Recommendations	Estimated Remaining Contribution (Years)	Category
23 (9)	<i>Quercus robur</i> (English Oak)	15	450	N – 5 E – 4 S – 7 W – 7	3	M	Physiological Condition – Good Structural Condition – Fair Major and minor sized deadwood visible throughout the crown.	GMR: Crown clean to remove hazardous deadwood.	20+	B 1,2
24 (8)	<i>Cupressus macrocarpa</i> (Monterey Cypress)	12	1 – 200 2 – 200 3 – 200 SE – 350	N – 3 E – 3 S – 3 W – 3	2.5	SM	Physiological Condition – Good Structural Condition – Fair	SEE TREE DATA NOTES IN SECTION 5.2.	10+	C 1,2
25 (20)	<i>Chamaecyparis lawsoniana</i> (Lawson Cypress)	11	1 – 150 2 – 125 3 – 175 SE – 250	N – 2 E – 2 S – 2 W – 2	1.5	Y	Physiological Condition – Fair Structural Condition – Fair Included bark at the stem unions (1m).	SEE TREE DATA NOTES IN SECTION 5.2.	10+	C 1,2
26 (19)	<i>Chamaecyparis lawsoniana</i> (Lawson Cypress)	11	1 – 150 2 – 200 3 – 125 SE - 275	N – 1 E – 1 S – 1 W – 1	2	Y	Physiological Condition – Poor Structural Condition – Fair	SEE TREE DATA NOTES IN SECTION 5.2.	10+	C 1,2
27 (13)	<i>Cupressus macrocarpa</i> (Monterey Cypress)	10	1 – 100 2 – 100 3 – 125 4 – 125 SE – 225	N – 1 E – 1 S – 1 W – 1	2	Y	Physiological Condition – Good Structural Condition – Fair	SEE TREE DATA NOTES IN SECTION 5.2.	10+	C 1,2
28 (21)	<i>Quercus robur</i> (English Oak)	16	500	N – 6 E – 6 S – 4 W – 6	3	M	Physiological Condition – Good Structural Condition – Fair Major and minor sized deadwood visible throughout the crown.	SEE TREE DATA NOTES IN SECTION 5.2.	20+	B 1,2
29 (10)	<i>Cupressus macrocarpa</i> (Monterey Cypress)	10	9 @ avg. 100 SE – 300	N – 1 E – 1 S – 1 W – 1	<1	Y	Physiological Condition – Good Structural Condition – Good	SEE TREE DATA NOTES IN SECTION 5.2.	10+	C 1,2

Key to Table 5.0

- 1) Height describes the height of the tree from ground level in metres
- 2) Stem Diameter is the diameter of the trunk in millimetres measured at 1.5m from ground level. For multi stemmed trees, a single stem diameter equivalent (SE) is calculated and is indicated beneath the measurements of each separate stem. (Est.) indicates the stem diameter was estimated due to the tree being obscured and/or inaccessible to measure.
- 3) Branch Spread is the length of branch spread from the centre of the tree in the direction of each cardinal point in metres
- 4) First Significant Branch Height and Direction – Clearance height from the ground of the first major structural branch of the trees' crown and it's direction of growth
- 5) Canopy Height is the distance between the lowest visible canopy branches and ground level in metres
- 6) Life Stage is represented as: Y= young (*in first third of life expectancy*), SM = Semi Mature (*in second third of life expectancy*), M= Mature (*final one third of life expectancy*). Trees considered to be beyond their likely life expectancy are normally classed as OM = Over Mature or V = Veteran
- 7) Physiological Condition relates to the vitality of the tree, Structural Condition relates to the presence of structural defects. (*i.e. dead branches, cavities, splits, included bark etc.*)
- 8) Estimated Remaining Contribution is an indication of the minimum useful contribution the tree will provide
- 9) Preliminary Management Recommendations detail any initial arboricultural practices to be undertaken before construction activity begins
- 10) Category grading is based on tree categorization guidelines provided within The British Standard 5837:2012 Trees In relation to design, demolition and construction - Recommendations (See 6.0 below)

Major deadwood = over 25m diameter, Minor deadwood = under 25mm diameter.

GMR = General Management Recommendation

5.1 – Tree Groups

The following information relates to trees assessed and recorded as groups or high hedges at the site.

Group 1 (G1)

Group one consists of approximately 20 individual Cypress trees which make up a high hedge line along the southeast edge of the main rear garden area. T6 (Hornbeam) features at the western end of the Cypress group.

Avg. Height: 15m

Avg. Stem Diameter: 200mm

Avg. Crown Spread:

Age Class: SM

Physiological Condition: Good

Structural Condition: Good

Group Category Grading: C 2

Comments and Recommendations

The Cypress trees in G1 are to be removed. G1 are not covered by TPO 398 and it is understood that the removal of trees in G1 was previously approved by the LPA in respect of the development proposal submitted by the previous property owner.

These trees will require removal to facilitate the current development proposal and being internal garden trees, their removal will not impact on local amenity or the wider treescape.

An exercise to replant 13 new semi mature, native deciduous trees and Beech hedging around the site perimeter is proposed as part of the landscaping plans at the site. A fully detailed landscaping proposal is to be submitted separately by the design team which will include details of all new tree planting; including size, species and location information.

5.2 – Tree Data Notes

The trees detailed individually in Table 5.0 and as groups in Section 5.1 above, are those considered as potentially affected by the proposed development project. The tree numbers in brackets relate to tree numbering on the original topographical survey plan conducted and presented by Ground Surveys Ltd In May 2007.

Tree dimensions were recorded following the tree survey conducted on the 8th September 2015. The survey was undertaken to re-assess the tree stock at the site and to collect up to date dimensions for calculating the above and below ground tree constraints at the site.

The tree constraints have been updated on the Tree Constraints and Tree Protection Plans in Sections 8.0 and 9.1 respectively, to reflect the changes since the previous proposal and to bring the findings in line with *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*.

Recommendations for tree surgery work may have been made in the interest of good tree management (*General Management Recommendations*) and are not necessarily required in relation to the proposed development project.

Any tree surgery work recommended must be undertaken following the correct procedures relating to trees covered by Tree Preservation Orders (TPO) or which are growing within a designated Conservation Area (if applicable). (See Section 12).

Any General Management Recommendation (GMR) which may have been made to remove hazardous deadwood from the crowns of TPO trees, does not require permission from the Local Authority before actioning. However, it is considered good practice to inform the Local Authority of the intended deadwood removal works.

All neighbouring trees are outside of the management control of the applicant.

All recommended tree work must be undertaken in accordance with guidelines set out in *BS 3998:2010 Tree work – Recommendations*. (See Section 13.0).

The tree survey identified that some of the assessed trees at the site will need to be removed, either because they are in such a condition that they are unsuitable for retention due to poor structural and/or physiological condition (Category 'U' trees), or to facilitate space for the development proposal where they pose a material constraint, regardless of their category grading.

Certain trees had been previously approved for removal, based on the previous development proposal. These trees are detailed along with other proposed tree removals in Section 8.2 below.

All tree removals which fall under TPO 398 will need to be re-evaluated by the LPA and the appropriate consent to remove them given.

The Tree Constraints Assessment Sections 7.0 – 8.4 provides details of the above and below ground constraints posed by the existing tree stock and a summary of those trees which will need to be removed on safety grounds and/or to facilitate space for the development.

All tree protection requirements to safe guard the retained tree stock are detailed in Sections 9.0 – 10.1 below.

The following sections provide information regarding the categorisation of the surveyed trees and the tree constraints identified following the tree survey at the site.

6.0 – Tree Categorisation

The purpose of Tree Categorisation as detailed in *BS 5837:2012 Trees in relation to design, demolition and construction – Recommendations*, is to identify the quality and value of existing tree stock, allowing informed decisions to be made concerning which tree(s) should be retained or removed should development occur. This process is the starting point of the tree survey, following a land survey and should, ideally, be undertaken before any site design or layout is proposed.

Once it has been established which trees are suitable to remain and are worthy of retention, the necessary measures to protect them throughout the course of the development project must be undertaken.

The following sections relate to the protection of the trees categorised for retention, during the construction process at the development site, and to trees which are growing adjacent to the development site.

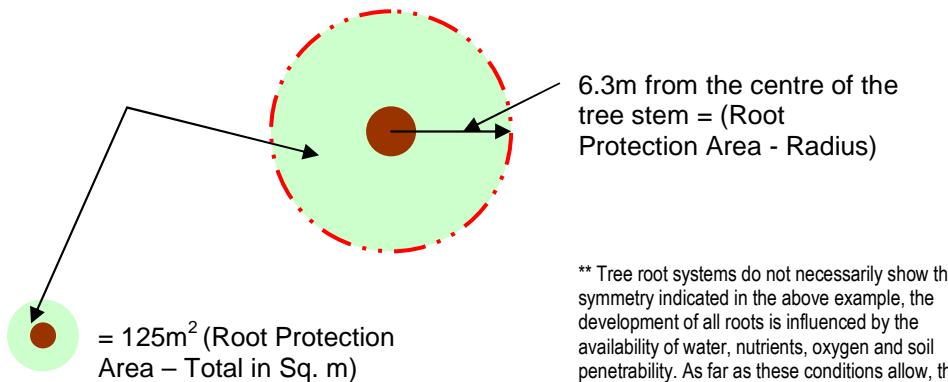
The first of these sections identifies and details the tree constraints at the site, which are required to assist with the design proposal and scheme feasibility and to ensure the correct levels of tree protection measures are later applied.

7.0 - Tree Constraints

The tree constraints are the influences the trees will have below and above ground level in relation to the development area. The below ground restraints are represented by the trees Root Protection Area (RPA), the above ground restraints are represented by the trees size and position, including shading patterns caused by crown density and spread which may affect light into newly developed buildings.

7.1 - RPA (Root Protection Area) – (Below Ground Constraints)

The RPA radius is taken from the centre of the tree stem, encircling the tree to give the RPA Area (example based on T1 shown below) **:



** Tree root systems do not necessarily show the symmetry indicated in the above example, the development of all roots is influenced by the availability of water, nutrients, oxygen and soil penetrability. As far as these conditions allow, the root system tends to develop sufficient volume and area to provide physical stability.

The following table indicates the Root Protection Areas (RPA) for the trees which were assessed as part of the Arboricultural Impact Assessment (AIA).

The RPA's have been calculated using stem diameter measurements (at 1.5m above ground level) collected at the time of the tree survey and are detailed in Table 5.0.

RPA calculations are made using formulae detailed in *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* – Section 4.6 and Table D.1.

Tree No.	RPA Radius (m)	RPA Area (m ²)
1 (84)	6.3	125
2 (83)	6.3	125
3 (81)	4.5	64
4 (80)	5.1	82
5 (76)	6.3	125
6 (79)	6.9	150
7 (78)	4.8	72
8 (72)	4.5	64
9 (69)	6.6	137
10 (66)	3.6	41
11 (65)	4.8	72
12 (67)	6.3	125
13 (68)	3.6	41
14 (43)	5.4	92

N.B. Tree numbers shown in brackets relate to the original topographical survey conducted by Ground Surveys Ltd. in May 2007.

7.1 - RPA (Root Protection Area) – (Below Ground Constraints) – Cont'd

The following table indicates the Root Protection Areas (RPA) for the trees which were assessed as part of the Arboricultural Impact Assessment (AIA).

The RPA's have been calculated using stem diameter measurements (at 1.5m above ground level) collected at the time of the tree survey and are detailed in Table 5.0.

RPA calculations are made using formulae detailed in *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* – Section 4.6 and Table D.1.

Tree No.	RPA Radius (m)	RPA Area (m ²)
15 (44)	4.5	64
16 (42)	4.8	72
17 (18)	5.7	102
18 (17)	6	113
19 (14)	5.4	92
20 (12)	5.7	102
21 (22)	5.4	92
22 (11)	5.4	92
23 (9)	5.4	92
24 (8)	4.2	55
25 (20)	3	28
26 (19)	3.3	34
27 (13)	2.7	23
28 (21)	6	113
29 (10)	3.6	41
G 1	2.4	18

N.B. Tree numbers shown in brackets relate to the original topographical survey conducted by Ground Surveys Ltd. in May 2007.

7.2 – Above Ground Constraints

The above ground constraints caused by tree locations, height and the spread of branches can pose constraints to the development project in respect of demolition work, new building design, position and operational space requirements.

For example, if the lateral branch spread of a tree extends into areas where development activity is likely, there is a risk of potential direct impact from site machinery and construction activity on the tree crowns which may cause damage to branches. Tree stems and exposed buttress roots are also above ground constraints which need to be considered in respect of possible impact damage to them. Post development pressure is also of material consideration in respect of future tree pruning requirements and frequency following completion of the development.

Shading issues should also be considered in respect of tree size, form and position in relation to the proposed new structure.

Species characteristics such as density of foliage, and whether trees are deciduous or evergreen are important factors to consider in respect of shading issues which may affect light levels into the proposed dwelling.

With regards to the tree stock at 28 Nicholas Way, the shading pattern caused by trees to the south and east of the site, through the main part of the day will be cast from northwest to due east, which will invariably create some shading in the garden and restrict some light into the building.

Nearby trees to the south and east of the dwelling being deciduous Oak and Hornbeam species will create dappled shading, which has been considered by the applicant and design team and found to be acceptable.

Any proposals for above ground service installations such as telecommunication cables should also be considered with close reference to the above ground constraints posed by the trees at the development site, their location and their crown spreads.

The Tree Constraints Plan (TCP) and Tree Protection Plan (TPP) in Sections 8.0 and 9.1 below, indicate the above and below ground constraints of all relevant trees at and adjacent to the site, with comments relating to the identified constraints in Sections 8.1 and 8.2.

8.1 - Tree Constraints Plan Notes:

The Tree Constraints Plan (TCP) in Section 8.0 is provided for illustrative purposes only, and is shown to approximate 1:500 scale based on the Proposed Site Plan (1241 / P / 1) supplied by Dusek Design Associates.

The TCP is provided only to indicate the position, category and numbering of all of the surveyed individual trees and provide an indication of the tree constraints by showing a graphic of the calculated Root Protection Areas (RPA) and the tree crown spreads.

RPA measurements can be found in the RPA table in section 7.1, crown spread measurements can be found in table 5.0 above.

Only the RPA measurements detailed in section 7.1 are to be used to measure out and determine the positioning and installation of the Construction Exclusion Zone (CEZ) fencing and ground protection at the site (if required), unless otherwise detailed or advised.

As described in section 7.1 above, tree root systems do not necessarily show the symmetry indicated in the above Constraints Plan, the development of all roots is influenced by the availability of water, nutrients, oxygen and soil penetrability. As far as these conditions allow, the root system tends to develop sufficient volume and area to provide physical stability.

Using the formula described in *BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations* (Section 4.6 of the standard), the calculated RPA should be shown as a nominal circle on the Tree Constraints Plan with a radius based on 12 times the stem diameter for a single stem tree.

8.2 – Tree Constraints Assessment & Findings

The identified constraints shown on the Tree Constraints Plan (TCP) in Section 8.0 were established following the tree survey undertaken in September 2015, using data collected at that time.

The tree constraints are to be used to assist with the final design and feasibility of the project and to determine the layout of tree protection measures to create the Construction Exclusion Zones (CEZ) at the site.

The following table indicates which trees will need to be removed based on safety grounds (Category U trees), or as part of re-landscaping proposals and/or to create the required space to facilitate the development in its current design.

Tree / Group No.	Species	Category Grading	Approval Status
2 (83)	<i>Quercus robur</i> (English Oak)	B 1,2	Previously Approved by LPA
6 (79)	<i>Carpinus betulus</i> (Hornbeam)	C 1,2	Requires LPA Approval
11 (65)	<i>Quercus robur</i> (English Oak)	U	Requires LPA Approval
20 (12)	<i>Quercus robur</i> (English Oak)	B 1,2	Previously Approved by LPA
24 (8)	<i>Cupressus macrocarpa</i> (Monterey Cypress)	C 1,2	Species not covered by TPO 398
25 (20)	<i>Chamaecyparis lawsoniana</i> (Lawson Cypress)	C 1,2	Species not covered by TPO 398
26 (19)	<i>Chamaecyparis lawsoniana</i> (Lawson Cypress)	C 1,2	Species not covered by TPO 398
27 (13)	<i>Cupressus macrocarpa</i> (Monterey Cypress)	C 1,2	Species not covered by TPO 398
28 (21)	<i>Quercus robur</i> (English Oak)	B 1,2	Previously Approved by LPA
29 (10)	<i>Cupressus macrocarpa</i> (Monterey Cypress)	C 1,2	Species not covered by TPO 398
G 1	<i>Chamaecyparis lawsoniana</i> (Lawson Cypress)	C 2	Species not covered by TPO 398

8.2 – Tree Constraints Assessment & Findings – Cont'd

Of the 10 individual trees and 1 tree group to be removed as listed in the table above, T2, T20, and T28 were previously approved for removal by the Local Authority in respect of development proposals approved for the previous property owner (Mr. Lustig).

It should however, be re-confirmed that these trees are still approved for removal, either in writing separately, or by the granting of Full Planning Permission.

T6 is a Hornbeam growing within the Cypress tree line of G1. This tree falls under the TPO 398 and therefore, the relevant permissions to remove this tree will also be required from the Local Authority.

T24, T25, T26, T27, T29 and those in G1 are all Cypress species trees and will require removal to facilitate the house re-development. The Cypress trees do not fall under TPO 398.

T11 is a Category U tree (unsuitable for retention) and being an English Oak, it is covered by TPO 398.

T11 will require permission to be removed, although the tree is considered structurally unsafe to retain in the garden which is considered to be a high target area.

In respect of the retained trees at the site, none of the trees are shown to pose an above or below ground constraint to the development proposal, in terms of the new house construction or associated hard landscaping. No RPA's are shown to be impacted upon by the proposed new building footprint in terms of foundation excavations and installation, or for the associated hard landscaping.

In all cases, crown heights and crown spreads of the retained trees do not pose an above ground constraint to the development or for the installation of infrastructure such as tree protection fencing and scaffolding.

To summarise, in terms of the proposed design, the Arboricultural Impact Assessment (AIA) can conclude that the scheme is feasible in the form of its current design, without adversely impacting upon the physiological health or structural condition of retained, on site or neighbouring trees.

All of the retained trees will however, warrant safeguarding above and below ground level throughout the course of the development against the adverse effects of site activity, including RPA sectors for neighbouring trees which are shown to cross into the development site.

Tree protection measures must be installed at the site to create Construction Exclusion Zones (CEZ) to safeguard the trees above and below ground level from the detrimental effects of construction activity etc.

If RPA's have been calculated to feature in areas of previously unmade ground, these should be wholly excluded where possible by barrier fencing and/or safeguarded using suitable ground protection measures as required.

Section 9.0 provides general information concerning Construction Exclusion Zones (CEZ) and why they must be installed at sites where trees (including their RPA's) would otherwise be exposed to construction related damage.

The Tree Protection Plan (TPP) in Section 9.1 indicates the layout of the required CEZ measures, with further tree protection requirements detailed in Sections 9.2 and 9.3.

All of the relevant arboricultural implications are addressed in Sections 10.0 and 10.1 below, detailing what control measures are required to mitigate the identified implications to the trees.

9.0 – Construction Exclusion Zone (CEZ) – (General)

Retained trees on and in close proximity to the site must be protected by barriers and/or suitable ground protection before any materials or machinery are brought onto the site, and before any demolition, development (including soil stripping) commences.

Where all activity can be excluded from the tree's Root Protection Area (RPA), vertical barriers are to be erected to create a Construction Exclusion Zone (CEZ). Where, due to site constraints construction activity cannot be fully or permanently excluded in this manner from all or part of a trees' RPA in unmade ground, suitable temporary ground protection is to be installed over exposed RPA sectors.

The RPA measurements of the surveyed trees (as shown in section 7.1 above) are used to determine the Construction Exclusion Zones (CEZ) around the trees, protecting them during the construction phases to eliminate the possibility of damage above or below ground level.

The CEZ is created by fencing off the area and/or installing suitable ground protection that is fit for purpose, using the calculated distance of the trees' RPA Radius as shown in the table in section 7.1 above.

The CEZ is required so that the calculated RPA's of trees remain undisturbed during the development process by excluding all activity from the area, or by protecting any exposed RPA sectors from pedestrian and vehicular traffic with suitable ground protection if exposed outside of the barrier fencing.

The CEZ should also be positioned to protect tree stems, buttress roots and any low tree branches which may travel beyond the calculated RPA. In these cases, barrier fences should be extended to incorporate the low crown branches behind them if possible.

The storage of building materials also must not occur within the CEZ. An area for storage of materials, fuels, spoil and the mixing of cement and concrete will be determined during the planning phase to ensure the RPA's of the trees are not affected. (See Arboricultural Method Statement (AMS) 10.1 below).

Materials which can be considered as contaminants such as cement, concrete mixings, spoil and fuels, whose accidental spillage would cause damage to a tree, should be stored and handled well away from the outer edge of any tree RPA. This also includes vehicle washings and care must be taken to ensure that sloping ground will not allow for contaminants to travel into the CEZ.

Fires on site should be avoided if possible. Where they cannot be avoided, they should not be lit where heat could affect foliage or branches. The potential size of the fire and wind direction should be taken into account when determining the fires location and it should be attended at all times until safe enough to leave. Notice boards, cables or other services must not be attached to the tree stems.

The CEZ must be considered as sacrosanct and not removed or altered without prior consultation with a Tree Sense Arboriculturist. The fencing should also display a sign with words to the effect of "Construction Exclusion Zone – Keep Out".

Care must also be taken to ensure that any site activity involving any cranes or vehicles with booms, jibs and counterweights can operate without coming into contact with the protected tree(s). CEZ fencing should be extended to encapsulate low spreading branches if they travel beyond the calculated RPA.

Direct impact from vehicles with tree crowns and stems can cause irreparable damage and may make their safe retention impossible. Consequently, any transit or traverse of plant in proximity to trees should be conducted under the supervision of a banksman, to ensure that adequate clearance from trees is maintained at all times.

9.1 – Tree Protection Plan (TPP)

NOTES

1. All dimensions are to be measured on site prior to the commencement of work and any discrepancy to be reported to the construction manager before construction.

2. All work to be carried out with correct building regulations and other legislation.

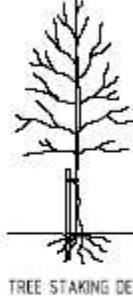
3. All contractors and sub-contractors must ensure that they have the correct issue of the planning and building regulations for the commencement of work and details before the commencement of work on site.

4. All materials are to be used and installed in strict compliance with the relevant manufacturers instructions and recommendations.

5. All work on site, managed and monitored as a result of the design, layout or this drawing, is to be fully co-ordinated for compliance. All contractors and sub-contractors are required to comply and co-ordinate all site and works to the instructions of the building regulations officer or the building regulations control centre in advance.

6. All drawings shown to date.

7. The type of soil/soils shown above ground level.



TREE STAKING SPECIFICATION

For selected standard trees o/a height 3.0-3.5m. Support using stakes extending to 1.0-1.2m above ground and 0.6-0.75m below ground level (depending on ground conditions).

Supported by single non reinforced tie 10mm from top of stake.

Remove stake at onset of or during the second growing season after planting.

LANDSCAPE SPECIFICATION

Landscape generally to be carried out in accordance with BS 8936 Part 1 1992. All new trees to be supplied as selected standards unless otherwise noted.

Overall height 3.0-3.5m and 18-21m, straight stem to BS 8936 Part 1 1992. Trees supplied with bare roots with polythene wrapping or as noted otherwise, and planted in a mix of 30 litres peat. Planting tools to be excavated and used with screened topsoil enriched with peat free compost/fernifer or similar mature stem deep, top dressed with 75mm deep forest bark mulch.

Site to be cleared of all builders rubble and rotavated levelled and filled before planting commences. Front gardens to be turfed and rear gardens seeded.

All turfing to BS 8936 1990.

Porous weeds are to be treated with trans-located herbicide during growing season (spot treated).

Tree and shrub planting to BS 8936 Part 1 1992.

Sub-soil areas below planting to be de-compacted before planting commences.

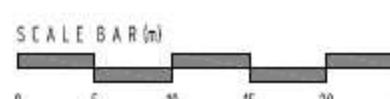
Tree protection to be carried out in accordance with BS 5837 2012.

DRIVeway SPECIFICATION

Driveway to be finished with permeable concrete pavers bedded on 50mm sharp sand on GEOTEXTILE membrane on 6-20mm graded aggregate sub-base (depth depending on soil conditions) on geotextile membrane on compacted sub-grade to falls.

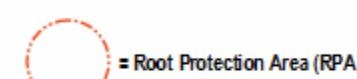
Pavers to be finished with compatible edging.

Crossover to be finished in black tarmac. Construction specification in accordance with local authorities requirements.



Key to Symbols

T# = Category B Tree



T# = Category C Tree



T# = Category U Tree

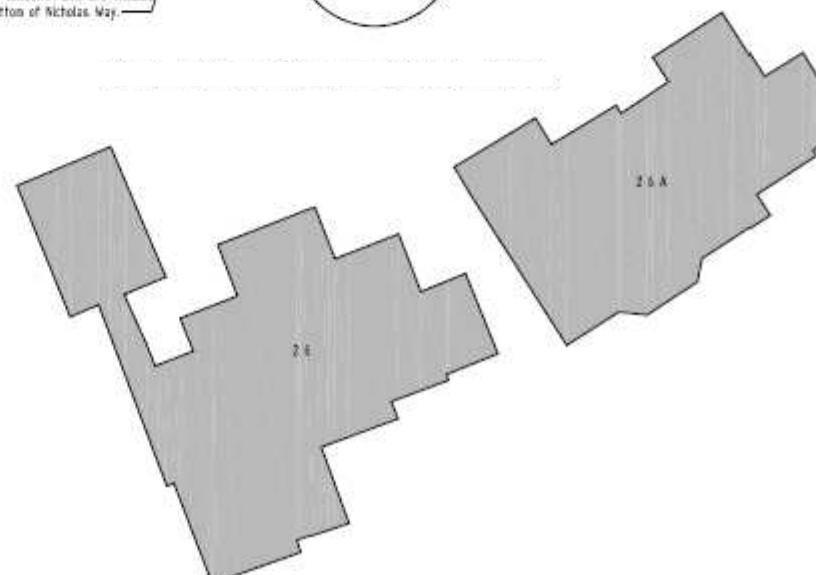
= Root Protection Area (RPA)

= Barrier Fencing – Construction Exclusion Zone (CEZ)

= Crown Spread (N, E, S, W)



= Temporary Ground Protection



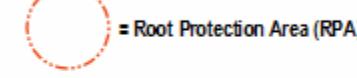
Key to Symbols

T# = Category B Tree



= Root Protection Area (RPA)

T# = Category C Tree



= Barrier Fencing – Construction Exclusion Zone (CEZ)

T# = Category U Tree



= Crown Spread (N, E, S, W)



= Temporary Ground Protection

9.1.1 – Tree Protection Notes

The above Tree Protection Plan (TPP) is for illustrative purposes only, and is shown to approximate 1:500 scale based on the Proposed Site Plan (1241 / P / 1) supplied by Dusek Design Associates.

The TPP is provided only to indicate the position, category and numbering of the surveyed trees to be retained and provide an indication of the tree constraints by showing a graphic of the calculated Root Protection Areas (RPA) and tree crown spreads.

Positions of barrier fencing and ground protection measures are shown on the plan and are to conform to the specifications detailed in Sections 9.2 and 9.3 respectively.
Do not scale from this drawing, all dimensions to be checked on site using details provided in Sections 5.0 and 7.1.

The indicated barrier fence line on the TPP to create the Construction Exclusion Zone (CEZ) at the of the site is suggested as the simplest and most effective layout to exclude all construction activity from the retained on site and neighbouring trees above and below ground level.

The CEZ in this position will prevent all construction access beyond the fencing safeguarding the trees above ground level and the calculated RPA's for all trees. (See Section 9.2 for the CEZ fencing specification required at the site.)

Ground protection is required to the south – southeast of the site as indicated in Yellow, as the CEZ barriers will need to be set back in this area to allow for the installation of scaffolding and allow adequate operational space.

Due to the nature of ground level differences in this area of the site, the ground protection required adjacent to T3 and T4 will need to comprise of a raised walkway to ensure the RPA sectors for these trees are safeguarded as they cannot be wholly excluded by the CEZ fencing due to operational restrictions. (See Section 9.3 for ground protection specification requirements at the site.)

All tree protection measures are to be installed before development work begins and after any preliminary management recommendations have been completed. CEZ's are to remain in place throughout the course of the entire development process until completion and must be the final part of the work site to be dismantled and removed.

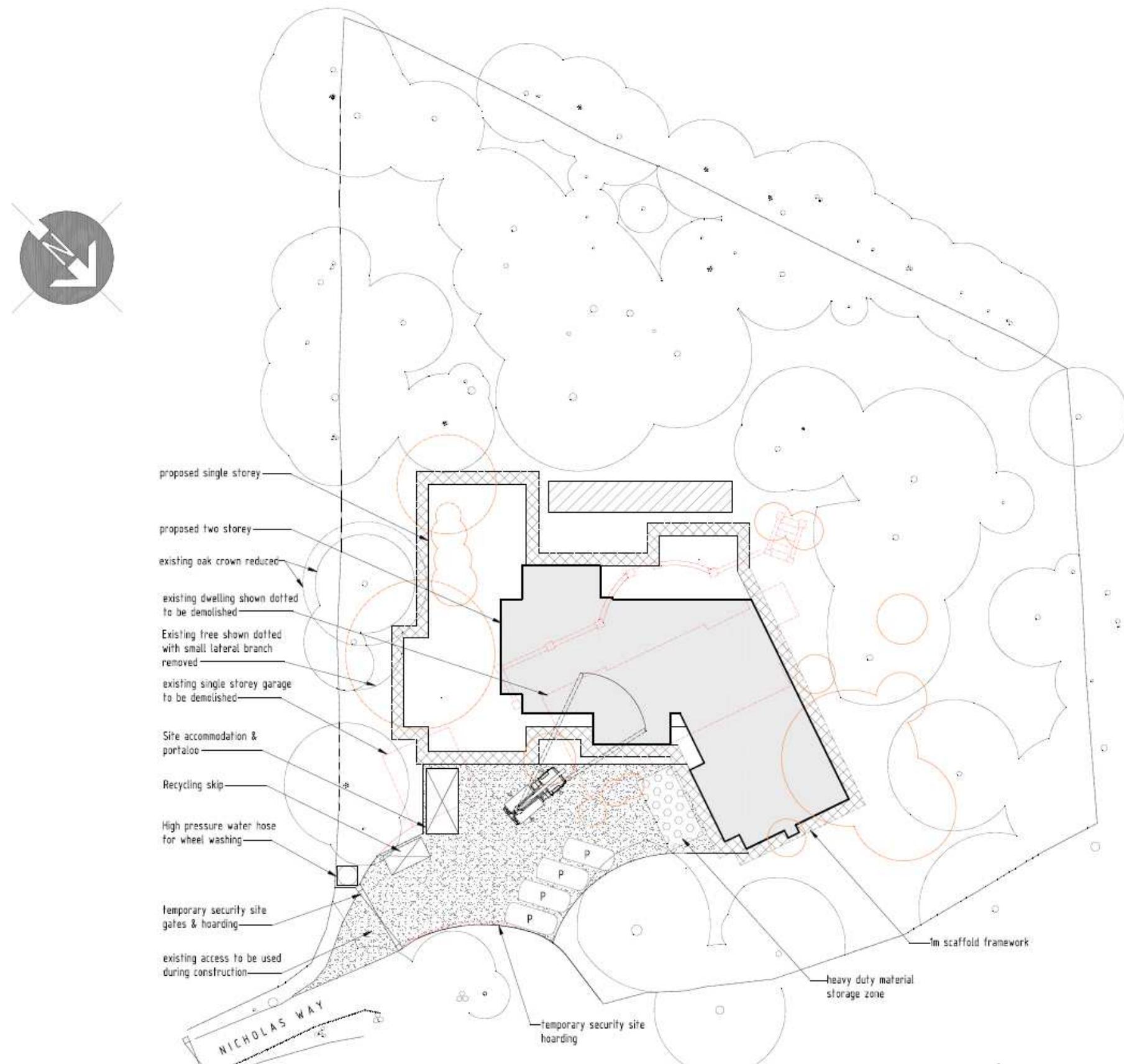
- **CEZ fencing must conform to the specifications detailed in Section 9.2.**
- **Ground protection measures must conform to the specifications detailed in Section 9.3.**

9.1.2 – Site Setup Plan (Not to Scale)

The following Site Setup Plan was provided by Dusek Design Associates with consideration paid to the findings of the tree constraints assessment and tree protection requirements.

Areas are defined for the storage of building materials, waste, skips and temporary site welfare facilities at the front of the site.

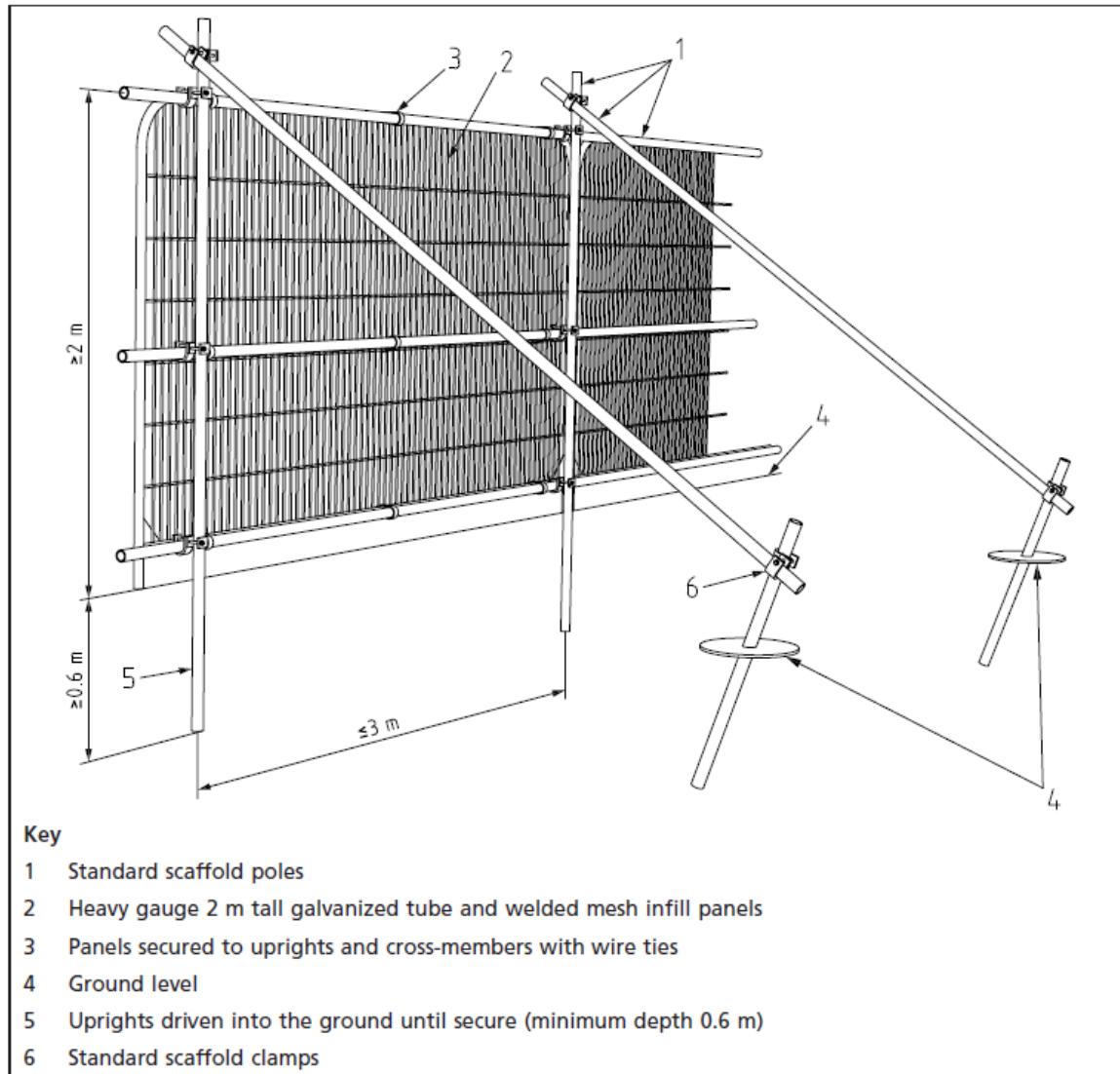
The site layout drawing is NOT TO SCALE and provided here as an informative only. The Site Setup Plan will also be submitted in full as a separate, accurately scaled document by the development team.



The following sections detail the Construction Exclusion Zone fencing and ground protection specifications as detailed in BS 5837:2012 Trees in relation to design, demolition and construction - Recommendations

9.2 - Protective Barrier Specification

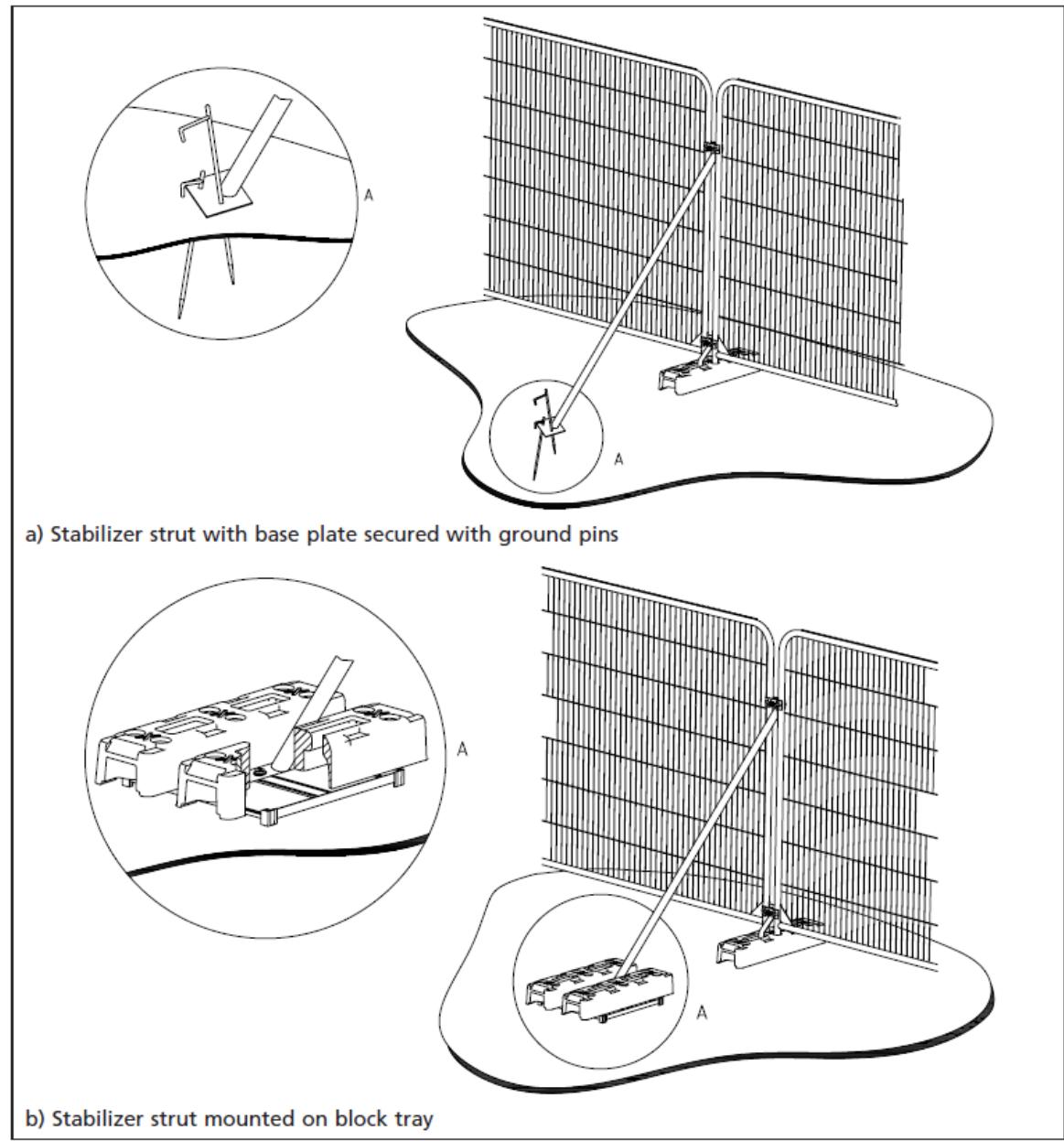
Figure 2 Default specification for protective barrier



N.B - Barrier fencing should be fit for the purpose of excluding construction activity and appropriate to the degree and proximity of work being undertaken around them. In most cases, barrier fencing should conform to and be installed to the specification shown in figure 2 above. This specification of fencing is preferred as it is resistant to impact, can be re used and allows for inspection of the protected area.

9.2 - Protective Barrier Specification (Cont'd)

Figure 3 Examples of above-ground stabilizing systems



N.B – Depending on the intensity of construction activity, site circumstances and associated risk of damaging incursion into a tree's RPA, an alternative level of protection may be suitable in place of the default level of protection.

Figures 3a and 3b above give examples of above ground stabilising systems which may be appropriate in certain circumstances.

In the case of the development project at 28 Nicholas Way, the Construction Exclusion Zone (CEZ) fencing will conform to the default specification as shown in Figure 2, installed as indicated on the Tree Protection Plan (TPP) in Section 9.1.

This specification of fencing is required as it is resistant to impact, not easily moved and allows for regular inspection of the Construction Exclusion Zone (CEZ).

No access is permitted beyond the CEZ fencing at any time throughout the development phases.

The barrier fencing must be installed following completion of all tree surgery and Preliminary/General Management Recommendations and prior to development works commencing. Tree protection measures such as the CEZ fencing and ground protection, must remain in situ throughout all phases of the development and must be the last apparatus to be removed on completion of the development project.

9.3 - Ground Protection Specification

Where construction working space or temporary construction access is justified within the RPA, this should be facilitated by a set-back in the alignment of the tree protection barrier.

In such areas, suitable existing hard surfacing that is not proposed for re-use as part of the finished design should be retained to act as temporary ground protection during construction, rather than being removed.

Where the set-back of the tree protection barrier would expose unmade ground to construction damage, new temporary ground protection should be installed as part of the implementation of physical tree protection measures prior to work starting on site.

New temporary ground protection should be capable of supporting any traffic entering or using the site without being distorted or causing compaction of underlying soil.

The ground protection might comprise one of the following:

- a) For pedestrian movements only, a single thickness of scaffold boards placed either on top of a driven scaffold frame, so as to form a suspended walkway, or on top of a compression-resistant layer (e.g. 100 mm depth of woodchip), laid onto a geotextile membrane;
- b) 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 (e.g. 150 mm depth of woodchip), laid onto a geotextile membrane;
- c) For wheeled or tracked construction traffic exceeding 2 t gross weight, an alternative system (e.g. proprietary systems or pre-cast reinforced concrete slabs) to an engineering specification designed in conjunction with arboricultural advice, to accommodate the likely loading to which it will be subjected.
- d) For wheeled or tracked movements, within a tree RPA, the ground protection should be designed by an engineer to accommodate the likely loading.

A “no dig” solution must be used to avoid root loss due to excavation. In addition the structure of the hard surface should be designed to avoid localized soil compaction. The use of a three dimensional cellular confinement system (CCS) acting as a load suspension layer is recommended and will avoid localized soil compaction by evenly distributing the carried weight over the track width and wheelbase of any vehicles that will use the access.

Temporary ground protection measures are required at the site where a set back of the CEZ fencing is required to the south – southeast of the site due to operational restrictions. To allow for the installation of scaffolding and operational access the CEZ fencing will need to be set back, which will expose unmade ground where marginal sectors of the RPA’s shown for T1, T3, T4 and T7 have been calculated.

As shown in blue above, the temporary ground protection measures must conform to these specifications. Due to differing ground levels, a combination of ground protection laid at ground level and as a suspended raised walkway will be necessary to create a level surface.

10.0 – Arboricultural Impact Assessment (AIA)

The potential direct and indirect impacts on the trees which may arise from the proposed development and related construction activity are as follows:

- **Soil compaction in tree root protection areas caused by:**
 - Development activity – pedestrian and plant movement around the site throughout the course of the development project;
 - Resulting rubble from the demolition phase entering into tree RPA's;
 - Storage of bulk building materials at the site;
 - Skips and storage of bulk building waste before collection and removal from the site;
 - Temporary site unit positions and contractor's car parking areas.
- **Root severance caused by:**
 - Excavations for the proposed new building foundations;
 - Excavations for the installation of new underground services, including new drainage runs and soakaways;
 - The removal of any existing hard surfaces.
- **Soil contamination caused by:**
 - Spilt or discharged building materials (including fuels and spillages resulting from the mixing and preparation of cement and concrete);
 - Building waste storage either short or long term (including skips).
- **Direct damage to trees above ground level (stems and crowns) caused by:**
 - Storing building materials against tree stems and buttress roots;
 - Vehicle collision with tree stems and crown branches;
 - Travel paths of crane booms and jibs coming into contact with tree crowns;
 - Fixing temporary lighting / signage etc to tree stems and branches;
 - Removal of trees and/or pruning of branches to facilitate operational space for the development;
- **Restriction of aqueous and gaseous exchange in the soil caused by:**
 - Non permeable hard surface installation in outside areas.

Site specific controls relating to mitigation measures to be implemented in respect of these implications can be found in the Arboricultural Method Statement 10.1 below.

10.1 – Arboricultural Method Statement (AMS)

The table below indicates the potential Arboricultural Implications at the site during the construction phases and details the appropriate control measures to be employed.

Implication	Control
<ul style="list-style-type: none"> Soil compaction in Root Protection Areas (RPA) <i>Soil compaction by pedestrian movements and wheeled/tracked plant operations can cause tree root death by compacting soil to a state which is detrimental to tree root health. Heavily compacted soil restricts aqueous and gaseous exchanges in the soil environment which are vital for healthy root development.</i> 	<ul style="list-style-type: none"> Following the removal of trees as detailed in Section 8.2, the RPA's calculated for the retained trees at the site must be wholly excluded from all site activity by the installation of barrier fencing to create a Construction Exclusion Zone (CEZ). (See <i>Tree Protection Plan 9.1</i>) The RPA's calculated for neighbouring trees which are shown to crossover the site boundary must also be wholly excluded from all site activity by the installation of barrier fencing to create a Construction Exclusion Zone (CEZ). (See <i>Tree Protection Plan 9.1</i>) Protective fencing to create a Construction Exclusion Zone (CEZ) is to be installed to the layout design shown in the Tree Protection Plan 9.1. Barrier fencing to create the CEZ must conform to the specifications detailed in Section 9.2 without deviation. Where a set back of the CEZ fencing is necessary to the south – southeast of the site to allow for operational access and installation of scaffolding, temporary ground protection must be installed to safe guard exposed sectors of calculated RPA's (<i>T1, T3, T4 and T7</i>). Temporary ground protection measures will be adequate for pedestrian access only and must conform to the specifications detailed in Section 9.3 without deviation. All pedestrian and vehicular access will be excluded entirely from all on site and neighbouring tree RPA's by the installed CEZ fencing and temporary ground protection measures. All plant machinery operations must only occur outside of the CEZ fencing and are not permitted to operate where ground protection is to be installed, which will be suitable for pedestrian access only. All tree RPA's will be safeguarded by the CEZ fencing, which will fully exclude access into areas of the site where RPA's have been calculated. For the demolition phase, the internal rooms and roof are to be dismantled and stripped. The existing dwelling will be demolished internally within its own footprint to ensure that the resulting rubble does not enter any part of the CEZ. ("Top down, pull back" method of demolition). Bulk building materials must be stored outside of the CEZ at all times. Temporary site facilities such as washroom, welfare and site office structures are also to be located outside of the CEZ fencing. Contractor's car parking will be available on the main carriageway (Nicholas Way) and nearby residential roads where unrestricted parking is available. Skips will be located at the front of the site on the existing driveway, for ease of removal and replacement via the main site access point from the Nicholas Way carriageway. A Site Setup Plan is provided in Section 9.1.2 as an informative only. A fully detailed and accurately scaled Plan will be submitted separately by the development team.

- **Soil compaction in Root Protection Areas (RPA) – Cont'd**

Soil compaction by pedestrian movements and wheeled/tracked plant operations can cause tree root death by compacting soil to a state which is detrimental to tree root health. Heavily compacted soil restricts aqueous and gaseous exchanges in the soil environment which are vital for healthy root development.

- All tree protection measures (CEZ fencing and temporary ground protection), must be installed before any materials or machinery is brought on to the site.
- CEZ fencing and temporary ground protection measures must remain in position and undisturbed throughout the course of the development project to completion.
- Tree Protection measures (barrier fencing and temporary ground protection) must be the last apparatus to be removed from the site on completion.
- Construction access on to the site will only be via the driveway access point from the Nicholas Way carriageway.
- A Site Setup Plan is provided in Section 9.1.2 as an informative only. A fully detailed and accurately scaled Plan will be submitted separately by the development team.
- The Site Setup Plan indicates designated areas for bulk material storage, skips and waste storage, temporary site facilities, material preparation areas and plant/vehicle use.
- If required, a Construction Management Plan (CMP) will need to be submitted by the appointed building contractors to the Local Planning Authority (LPA) for approval. The CMP must take fully into consideration the findings and recommendations made in this Arboricultural Impact Assessment (AIA) report.

- **Root severance**

Root severance caused by excavations or by the removal of hard standings inside Root Protection Areas (RPA) can result in the loss of abundant fibrous root networks. This loss of roots can greatly reduce a tree's ability to perform its physiological life processes. The loss of major woody roots can also compromise a tree's anchorage and greatly increase the risk of trees being wind thrown.

- Excavations for new foundations required in the construction of the proposed new house will not feature inside the calculated RPA of any retained trees at the site, or neighbouring trees assessed in the AIA.
- Geotechnical analysis and soil assessment by a structural engineer will be necessary at the site to understand in greater detail the soil structure and sub soil conditions in respect of foundation specification and design. (Remit of the associated Project Engineers)
- No excavations are proposed to be required inside of tree RPA's for the installation of new underground services (such as for foul water drainage and water mains pipes, or soakaways etc).
- If required, their locations and positions will need to be determined with consideration to the below ground tree constraints shown in this report and with further consultation with the project Arboriculturist.
- No existing hard surfaces are proposed for removal where they currently feature over calculated RPA sectors for retained trees.
- Any tree roots which are exposed during the course of any excavation works will be immediately wrapped or covered to prevent desiccation and protect from temperature changes whilst exposed and advised to the project Arboriculturist.
- Any roots exposed over 25mm in diameter will not be severed without prior consultation with the project Arboriculturist.

- **Soil contamination**

Soil contamination caused by the spillage of contaminant building materials such as concrete, fuels or paint for example, can severely pollute the soil in which tree roots populate. Heavily contaminated soil can lead to tree root death.

- Bulk building materials and waste (including skips) will be stored outside of the Construction Exclusion Zone (CEZ) at all times in designated site compound areas at the site.
- Contaminant materials such as oils, fuel, chemicals and gases will be stored and handled away from the CEZ and are to be stored and handled in accordance with the Control of Substances Hazardous to Health Regulations 2002 (COSHH).
- The preparation of building materials will occur only in designated site compound areas at the site and outside of the CEZ at all times.
- Consideration will be given at all times to ensure that sloping ground will not allow for any contaminating substances to travel into areas where tree RPA's may be affected.
- Should spillages of contaminates occur, water is readily available on site and will be used to flush spilt materials through the soil and avoid contamination to tree roots. At the time of any spillage the main contractor will immediately contact the Project Arboriculturist for advice.
- A Site Setup Plan is provided in Section 9.1.2 as an informative only. A fully detailed an accurately scaled Plan will be submitted separately by the development team.
- The Site Setup Plan indicates designated areas for bulk material storage, skips and waste storage, temporary site facilities, material preparation areas and plant/vehicle use.

- **Direct damage to trees above ground level (stems, buttress roots and crowns)**

Trees can be severely damaged by construction activity above ground level.

Tree stems, crown branches and buttress roots are all at risk of suffering direct impact damage from pedestrian and vehicle movements, material and waste storage around them, the use of cranes and other plant which use jibs or booms and by fixing temporary signs and lighting to them.

- T2, T6, T11, T20, T24, T25, T26, T27, T28, T29 and trees making up G1 are to be removed prior to the installation of tree protection measures.
- Where necessary, the relevant permissions required from the Local Authority must be granted for the removal of trees covered by TPO 398. (T2, T6, T11, T20, T28).
- All other tree to be removed (T24, T25, T26, T27, T29 and trees making up G1) are Cypress species which are not covered by TPO 398.
- All building materials to be used at the site will be stored at all times in designated storage areas, outside of the Construction Exclusion Zone (CEZ) fencing.
- All on site and neighbouring tree stems and buttress roots will be excluded behind the CEZ fencing, as indicated on the Tree Protection Plan in Section 9.1.
- All vehicles and plant machinery will only operate in areas outside of the CEZ at all times.
- All retained tree stems and buttress roots will be wholly excluded and safeguarded against any potential vehicle collision damage by the installed CEZ fencing.
- The CEZ fencing will exclude all pedestrian and vehicle access to trees above ground level.
- Crown heights have been measured for all retained trees and in all cases do not pose a height clearance, or crown spread constraint to the development or operational requirements, including the installation of scaffolding.
- **The CEZ fencing must remain in situ throughout all phases of the development to completion and will be the last apparatus to be removed from the site.**

<ul style="list-style-type: none"> • Direct damage to trees above ground level (stems, buttress roots and crowns) – Cont'd <p><i>Trees can be severely damaged by construction activity above ground level.</i></p> <p><i>Tree stems, crown branches and buttress roots are all at risk of suffering direct impact damage from pedestrian and vehicle movements, material and waste storage around them, the use of cranes and other plant which use jibs or booms and by fixing temporary signs and lighting to them.</i></p>	<ul style="list-style-type: none"> • The positioning of crane(s) at the site must closely consider the above ground constraints posed by tree crowns and branch spreads. • Crane positions must be determined to ensure that the travel paths of booms or jibs do not come into contact with any tree crowns. • Any crane use or operations involving plant machinery with jibs, booms etc will be conducted only under supervision of a banksman to ensure that adequate clearance from trees is maintained at all times. • Should there be an excessive build up of dust during the development, (particularly during the demolition phase), it may be necessary to periodically hose down the crowns of trees to prevent the build up of dust on the foliage which can block stomata in the leaves. • No signage or temporary lighting is permitted to be fixed to any tree stem or branch. • Site hoardings and fencing will display relevant signage with words to the effect of "Construction Exclusion Zone – Keep Out".
<ul style="list-style-type: none"> • Restriction of aqueous and gaseous exchange in the soil <p><i>The installation of new, non permeable hard standings over tree Root Protection Areas (RPA) can greatly restrict water and oxygen from entering the underlying soil.</i></p> <p><i>Tree roots depend heavily on goods availability of water, nutrients and the exchange of Oxygen, Nitrogen and Carbon Dioxide in the soil to survive.</i></p>	<ul style="list-style-type: none"> • There are no proposals for the installation of new, non permeable hard standings in outside areas where tree RPA's currently feature in unmade ground.

10.2 - Responsibilities

- It will be the responsibility of the main contractor to ensure that the planning conditions attached to planning consent are adhered to at all times and that a monitoring regime in regards to tree protection is adopted on site.
- The main contractor must assign tree protection monitoring duties to one or more individuals working at the site, who will be responsible for all tree protection monitoring and supervision.
- The individual(s) assigned tree protection monitoring duties must:
 - Be present on site for the majority of the time;
 - Be fully aware of (a) the Tree Protection Plan and (b) the tree protection measures to be installed and maintained throughout all phases of demolition and construction;
 - Be responsible for ensuring all tree protection measures are adhered to as detailed in the Arboricultural Method Statement (AMS) and in all other relevant sections of the Arboricultural Impact Assessment (AIA) report;
 - Ensure all site operatives **without exception** read and understand the tree protection and control measures detailed in the AMS and AIA report;
 - Keep a written record signed by all site operatives indicating they have read and understood the control measures detailed in the AMS and AIA report;
 - Maintain a written record of Tree Protection / Construction Exclusion Zone inspections, to be kept up to date by the person(s) who have been designated the inspection and monitoring duties;
 - Have the authority to stop any work that is causing, or has the potential to cause, harm to any retention trees;
 - Be responsible for ensuring that all site operatives including sub contractors are aware of their responsibilities toward on/off site trees and the consequences of the failure to observe these responsibilities;
 - Make immediate contact with the Project Arboriculturist in the event of any tree related problems occurring, whether actual or potential. (*Contact details including telephone number and email address is listed on the Title Page*)
- The Construction Exclusion Zone fencing, temporary ground protection and signs must be maintained in position at all times and checked on a regular basis by the on site person(s) who have been designated that responsibility.
- The main contractor will be responsible for contacting the Local Planning Authority and the Project Arboriculturist at any time issues are raised relating to the trees on site.
- If at any time pruning works are required permission must be sought from the Local Planning Authority first and then carried out in accordance with *BS 3998:2010 Tree Work – Recommendations* (As updated).
- The main contractor will ensure the build sequence and phasing is appropriate to ensure that no damage occurs to the trees during the construction processes. Protective fences will remain in position and undisturbed until completion of ALL construction works on the site.
- The main contractor will be responsible for ensuring sub-contractors do not carry out any process or operation that is likely to adversely impact upon any tree on site.

11.0 - Report Summary

This report has been produced following a tree survey conducted in accordance with BS 5837:2012 *Trees in relation to design, demolition and construction – Recommendations*. The assessment seeks to advise the development team on arboricultural matters, assist with scheme feasibility and to advise on the tree protection measures to be employed at the site throughout all construction phases of the development.

The information produced within this report follows the tree survey conducted on the 8th September 2015. The report provides an assessment of the trees associated with the above development site based on information supplied by the development team and observations recorded at the time of the survey.

It is concluded that the current proposed scheme is considered feasible from an arboricultural standpoint, based on the findings and recommendations detailed within this report.

The proposed removal of trees which are subject to TPO 398 must be granted permission by the Local Authority before actioning.

A major tree re-planting scheme is proposed as part of the landscaping proposal, which will greatly mitigate the required tree losses at the site.

A fully detailed landscaping proposal is to be submitted separately by the design team, which will include greater detail of all new tree planting; including size, species and location information.

Below is a summary of new tree planting proposed to be undertaken as part of the associated landscaping plans at the site:

- 7 x Semi Mature *Carpinus betulus* (Hornbeam);
- 4 x Semi Mature *Betula pendula* (Silver Birch);
- 2 x Semi Mature *Quercus robur* (English Oak);
- *Fagus sylvatica* (Beech) hedging around the entire perimeter of the site.

In terms of associated site activity, the protective Construction Exclusion Zone (CEZ) fencing and temporary ground protection measures to be installed at the site will ensure the safeguarding of all retained on site trees and neighbouring trees, both above and below ground level.

All building material storage areas, site facilities, material preparation areas and general access around the site by operational staff will not be restricted by the CEZ fencing in the required location.

If any design changes are made to any aspect of the proposed development project due to the identified tree constraints, operational restrictions, geotechnical concerns or otherwise, revisions or additions to tree protection, damage mitigation measures and site layouts will need to be made and a revised report produced.

This is a Development Control, not a Building Control focused document. In regard to the latter, this deals with foundation depth and design in relation to trees using NHBC/Zurich national guidance. For advice, consult with the local council Building Control Officer or an approved NHBC inspector in order to gain Full Plans Approval or a Completion Certificate. The latter are governed by the Building Act 1984 and Building Regulations 2010. As such the above Building Control issues are outside the remit of a Consulting Arborist.

Full detailed specification of the development project and engineering methods etc. will be supplied by the development team separately.

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12.0 – Legal and Planning Consents

- Appropriate legal and planning consent should be gained before undertaking any tree work; for example if the tree(s) are subject to a Tree Preservation Order (TPO), permission must first be obtained from the Local Authority. Permission is not required for emergency tree work on dead, dying or dangerous TPO trees; however the Local Authority should be advised.
- Six weeks notice is required to be given to the local authority via a Section 211 Notice for any proposed tree surgery work on trees situated within a designated Conservation Area. Again, permission is not required for emergency tree work on dead, dying or dangerous trees within a Conservation Area; however the Local Authority should be advised.
- Tree owners have a responsibility as a common law duty of care, as well as responsibilities under statutory law, to ensure that trees growing within the boundaries of their property are maintained to reduce to an acceptable level the risk of potential harm befalling other people or property.
- In the course of undertaking any tree work, the client is advised to ensure that operational assessments and procedures are in place, and to take due consideration of the legal requirements.
- Key legislation includes (but is not restricted to):
 - The Wildlife and Countryside Act (1981)
 - Occupiers Liability Act (1957/84)
 - Highways Act (1980/86)
 - Town and Country Planning Act (1990/Regulations 1999/Amendment 2008/09)
 - Anti-Social Behaviour Act (2003) – Part 8 (High Hedges)
 - The Countryside Rights of Way Act (2000)
 - The Conservation (Natural Habitats etc.) Regulations (1994)
 - The Badgers Act (1992)

13.0 - Tree Work Standards

The recommendations for tree surgery works made within this report have been done so in the interests of sound arboricultural management and to ensure tree surgery works are performed to a professional standard in accordance with *BS 3998:2010 Recommendations for tree work* (As updated).

All remedial tree surgery work which is suggested in this report must be undertaken to conform to standards and procedures set out in *BS 3998:2010 Recommendations for tree work* (As updated)

- Tree Sense Arboricultural Consultants are happy to recommend a trusted tree surgery contractor if required, to ensure that all recommended tree surgery work is performed to a high standard.
- Tree Sense Arboricultural Consultants only recommend contractors who are approved by The Arboricultural Association to ensure that the highest standards of tree surgery work are met at all times.

14.0 - Publications

- Other publications which are relevant to the development proposal to which further reference is advised includes but is not restricted to:
 - National House Building Council (N.H.B.C) Chapter 4.2 – (Building near trees);
 - National Joint Utilities Group (NJUG) Volume 4 – (Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees).

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