

ARBORICULTURAL REPORT

SPACE PLACE

CASCADES, GRAVESEND

CASCADES LEISURE CENTRE, THONG LANE, GRAVESEND DA12
4LG

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1. EXECUTIVE SUMMARY

- S.1 The report has been produced in accordance with the methodology set out in BS5837:2012 "Trees in relation to design, demolition and construction – Recommendations".

Figure 1 Site information

SITE DETAILS	
Address	Cascades Leisure Centre, Thong Lane, Gravesend, DA12 4LG
Local Planning Authority	Gravesham Borough Council
TPO status of site	Information not available at time of writing
Conservation Area	Information not available at time of writing
Soil Assessment	Freely draining lime-rich loamy soils

- S.2 A total of 24 individual trees and 20 tree groups are the subject of this report which has been written in accordance with BS 5837.
- 9 individual trees and 5 tree groups have been categorised as B grade of moderate quality and value.
 - 15 individual trees and 15 tree groups have been categorised as C grade of low quality and value.

2. INTRODUCTION

BRIEF

2.1 Lloyd Bore have been instructed by Space Place to carry out a survey of significant trees on land at Cascades, Gravesend, Cascades Leisure Centre, Thong Lane, Gravesend DA12 4LG, in accordance with the principles of British Standard BS 5837:2012, 'Trees in relation to design, demolition and construction – *Recommendations*' (The BS) and to prepare the following information to accompany a planning application:

- details of significant trees including an assessment of condition using BS 5837 categorisation.
- a plan showing tree survey information, categorisation and root protection areas.

SITE CHARACTER:

Figure 2 Aerial photograph.



SCOPE OF THIS REPORT

- 2.2 This report covers trees on and adjacent to the site. It is concerned with the impact the development may have on nearby trees and the effect retained trees may have on the development. Its purpose is to allow the architects and designers to assess the potential impacts and constraints presented by the trees and inform their designs for any potential development.

SUMMARY OF THE GENERAL IMPACT OF DEVELOPMENT ON TREES

- 2.3 Development can adversely impact upon trees in a number of different ways, if arboricultural issues are not considered at an early stage of the development process. Considered and careful planning will prevent valuable trees being to development, damaged during the demolition and construction phases, or lost following completion of development from pressures to prune or remove.
- 2.4 Damage to the branches or trunk may be quite apparent, but it is damage caused to the below ground portion of the tree which is less obvious and may have the most devastating long-term effect on the future health and safe retention of a tree. Tree roots can be asphyxiated and die if the rooting environment becomes compacted or soil structure damaged or contaminated. This can easily occur, particularly on clay soils, even with the passage of light vehicles or pedestrians. It is important, therefore, that the root protection area (RPA)¹ is left undisturbed. Where this is unavoidable the disturbance can be minimised by following a strict working methodology and through innovative engineering design. Building lines should be at least 2m outside the RPA to allow the movement of materials, the erection of scaffolding around the new structure and the installation of new services.
- 2.5 Trees are long lived organisms, which take time to mature, and if their protection is considered at an early stage, they can complement and increase the value of a development. Construction and demolition activities, including removal of existing hard surfaces, changes of land levels and services routes, must be considered at the design stage to achieve an appropriate relationship between existing trees and new structures.

LEGISLATION

- 2.6 The tree protection status noted in Figure 1 was accurate at the time of report production but can be subject to change. It is therefore the responsibility of any persons undertaking tree work operations to the trees which are the subject of this report and in accordance with our recommendations, to undertake their own statutory checks.
- 2.7 The Occupiers Liability Act (1957 and 1984) places a duty of care upon tree owners to ensure that no reasonably foreseeable harm takes place due to tree defects. This report will therefore consider the need for works to be undertaken for safety reasons, as well as work required to facilitate the proposal.

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

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

ECOLOGICAL CONSTRAINTS

- 2.9 The Wildlife and Countryside Act 1981, as amended, The Conservation of Habitats and Species Regulations 2017 and the Countryside and Rights of Way Act 2000, provide statutory protection to species of flora and fauna including birds, bats and other species that are associated with trees. These could impose significant constraints on the use and timing of access to the site. It is the responsibility of the main contractor and tree surgery contractor to ensure that no protected species are harmed whilst carrying out site clearance or tree surgery works. Unless competent to do so, the advice of an ecologist must be sought.

3. SITE VISIT AND OBSERVATIONS

SITE VISIT

- 3.1 A site visit was undertaken on 28/11/2022. The weather was partially cloudy and still.

METHODOLOGY

- 3.2 The trees are inspected from ground level only. Whilst every effort is made to ensure that the comments relating to the trees surveyed are accurate it must be noted that no climbing of trees, internal inspections or excavations of the root areas have been undertaken. All trees with a trunk diameter of 75mm or above are surveyed. All dimensions are accurately measured on site unless otherwise indicated.
- 3.3 Hedges and shrub masses are identified where appropriate. Information collected is in accordance with recommendations in subsection 4.4.2.5 of BS 5837 and includes species, height, diameter, branch spread, crown clearance, age class, physiological condition, structural condition and remaining contribution. Each tree is then allocated one of four categories (U, A, B or C) to reflect its suitability as a material constraint on development. Surveyed trees are identified with a prefix 'T' and a unique number on the Tree Survey Plan. Groups of trees are identified with the prefix 'G' and hedges with the prefix 'H'. The tree canopies and their spread are shown with green shapes and Root Protection Areas (RPAs) are indicated by a solid blue line. The label attached to each tree shows the individual tree number and the grading of the tree.

TREE SURVEY PLAN

- 3.4 The Tree Survey Plan is based on a topographical survey. Some trees not included on the topographical survey have also been included in the tree survey. Where this has occurred, trees have been plotted by eye whilst on site. This can be found at Appendix 3.

THE SUBJECT TREES

- 3.5 A total of 24 individual trees and 20 tree groups are the subject of this report which has been written in accordance with BS 5837.

Figure 3 Tree / Group / Hedge / Woodland categories.

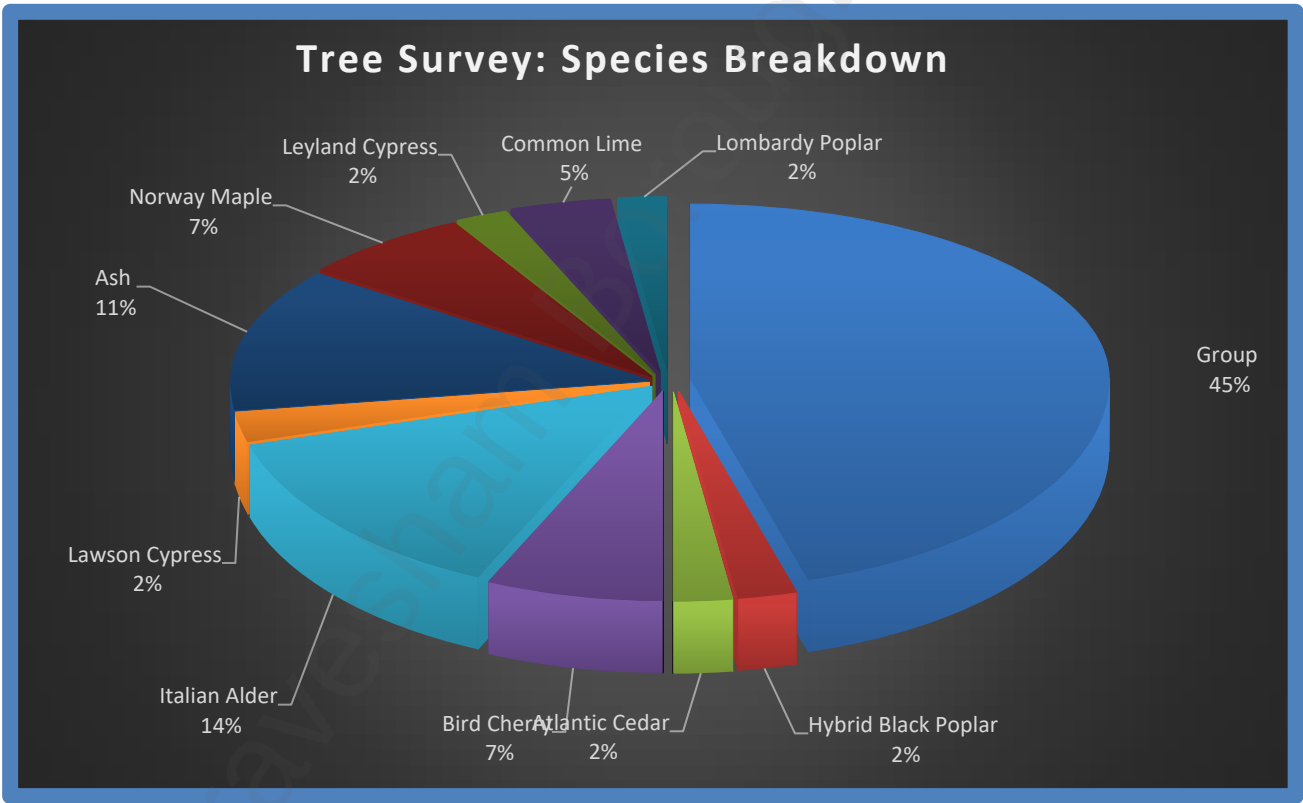
BS CATEGORY	Individual trees	Groups	Hedges	Woodlands
A				
B	9	5		
C	15	5		
U				

SPECIES AND AGE DISTRIBUTION

Figure 4 Age distribution

Young	G42
Semi Mature	G2, G3, G9, T11, G13, G14, T15, G16, T17, T19, T20, T22, T29, T30, G31, G32, G33, T36, G39, G41, G43
Early Mature	G1, G4, T5, G6, G7, T8, T10, T12, G18, T21, T23, T24, T25, T26, T28, G34, T35, G37, T38, T44
Mature	T27, T40
Over Mature	
Veteran	

Figure 5 Species Distribution



4. CONSIDERATIONS FOR DESIGN

ROOT PROTECTION AREAS (RPAS)

- 4.1 The root protection areas shown on the tree survey plan show the theoretical root protection areas based on the ideal circular rooting area. The British Standard allows for the shape of the RPA of retained trees to be altered under certain circumstances (see below), but not reduce its area whilst still providing adequate protection for the root system:
- a. The likely tolerance of the tree to root disturbance or damage, based on factors such as species, age and condition and presence of other trees.
 - b. The morphology and disposition of the roots, when known to be influenced by past or existing site conditions (e.g. the presence of roads, structures and underground services).
 - c. The soil type and structure.
 - d. Topography and drainage.
 - e. Where any significant part of a tree's crown overhangs the provisional position of tree protection barriers, these parts may sustain damage during the construction period. In such cases, it may be necessary to increase the extent of tree protection barriers to contain and thereby protect the spread of the crown. Protection may also be achieved by access facilitation pruning.
- 4.2 Trees have the potential to intercept light into windows and cast shade onto external landscape areas. The design of any new development must take into account existing and proposed tree positions. It should be borne in mind that up to half the light received through a window is from ambient or non-directional scattered light that is reflected from other surfaces and not directly from the sun.
- 4.3 Proposed landscape treatment should be designed with growth of trees and shrubs in mind, relative to buildings, window positions and gardens. Tree and vegetation cover does have the benefit of providing shelter from the wind and shade in the summer months.
- 4.4 Where hard surfacing is to be installed within the Construction Exclusion Zone (CEZ) the excavations and disturbance to the tree roots must be kept to a minimum to avoid long term health issues for the tree. To avoid damage to tree roots from compaction or mechanical damage, a no dig construction method such as a cellular confinement system should be used. This spreads the surface pressure beneath the surface and helps prevent compaction of the soil. This no dig system should be topped with a porous surface to permit gaseous and water diffusion between the surface and the soil beneath. When non-permeable materials are present above roots, the gas cannot diffuse out and is trapped in the soil around the roots. When concentrated, carbon dioxide is detrimental to the development and function of tree roots and consequently the whole tree. It is also essential that the tree roots are able to maintain an adequate supply of water and oxygen from the soil around it, which non-porous materials hinder. The use of bitumen along with the use of other non-permeable materials within the CEZ is therefore prohibited.
- 4.5 It is important that all aspects of the development process are considered with respect to protection of trees and their root zones, and proposed tree positions. This includes for the design

of underground services, which often occurs independent of initial planning design and can escape scrutiny at the development control stage.

- 4.6 All services should be designed so as not to cause damage to retained trees. In this respect reference should be made to the current National Joint Utilities Group (NJUG): Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees.
- 4.7 Roots of existing and newly planted trees have the potential to cause damage to structures, foundations and services. This should be taken into consideration by the project engineer and Landscape team when designing these elements.

5. APPENDIX 1 - TREE SURVEY KEY

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

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

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

Ht: Height in metres.

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

NSEW: Crown spread at the four cardinal points. $\emptyset$ = average crown radius.

Cr ht: Height of canopy above ground level.

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

Life exp: Estimated remaining contribution in years.

Age Class:

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

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

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

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

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

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

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

CATEGORY A

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

CATEGORY B

Those of moderate quality and value: those in such a condition as to make a significant contribution (a minimum of 20 years is suggested).

CATEGORY C

Those of low quality and value: currently in adequate condition to remain until new planting could be established (a minimum of 10 years is suggested), or young trees with a stem diameter below 150 mm.

CATEGORY U

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

CRITERIA (SUBCATEGORIES)

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

6. APPENDIX 2 - TREE SURVEY SHEETS

Tree Ref No.	Common Name	Botanical Name	Height (m)	No. of Stems	Stem dia. (mm)	Root Protection Radius (m)	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Crown Clearance (m)	Age class	Physical Condition	Structural Condition	Comments	Est. Rem. Contr. (Yrs)	BS: 5837 Grade
G1	Group	Tilia X europaea (Common Lime), Fraxinus excelsior (Ash), Acer platanoides (Norway Maple), Alnus cordata (Italian Alder)	14	1	400	4.8	4.5	4.5	4.5	4.5	4	EM	Good	Good		20+	B2
G2	Group	Acer platanoides (Norway Maple)	10	1	270	3.24	2	3	2.5	3	3	SM	Good	Fair	Crown distorted due to group pressure.	10+	C1
G3	Group	Pinus sylvestris (Scots Pine), Thuja plicata (Western Red Cedar), Chamaecyparis lawsonia (Lawson Cypress)	11	1	350	4.2	2.5	2.5	2.5	2.5	0	SM	Good	Good		10+	C1
G4	Group	Acer platanoides (Norway Maple), Fraxinus excelsior (Ash), Sorbus intermedia (Swedish Whitebeam)	12	1	330	3.96	4.5	4.5	4.5	4.5	4	EM	Fair	Fair	Major bark wounding on stem. Minor bark wounding on stem.	10+	C1
T5	Hybrid Black Poplar	Populus x canadensis	13	1	630	7.56	3.5	6.5	3.5	3.5	5	EM	Fair	Fair	Poor shape & form. Decay present on stem. Previously reduced; extensive re-growth from cutting points.	10+	C1
G6	Group	Acer platanoides (Norway Maple), Sorbus intermedia (Swedish Whitebeam)	11	1	370	4.44	4	4	4	4	5	EM	Good	Good		10+	C1

Tree Ref No.	Common Name	Botanical Name	Height (m)	No. of Stems	Stem dia. (mm)	Root Protection Radius (m)	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Crown Clearance (m)	Age class	Physical Condition	Structural Condition	Comments	Est. Rem. Contr. (Yrs)	BS: 5837 Grade
G7	Group	Acer platanoides (Norway Maple), Aesculus hippocastanum (Horse Chestnut)	14	1	500	6	6	6	6	6	4	EM	Good	Good	Horse Chestnut is a commemorative tree.	20+	B1
T8	Atlantic Cedar	Cedrus atlantica	16	1	690	8.28	5	5	5	5	4	EM	Good	Good		20+	B1
G9	Group	Acer platanoides (Norway Maple), Sorbus aucuparia (Rowan), Crataegus monogyna (Hawthorn), Acer palmatum (Japanese Maple)	7	1	230	2.76	2.5	2.5	2.5	2.5	2.5	SM	Fair	Fair		10+	C1
T10	Bird Cherry	Prunus padus	8.5	1	280	3.36	2.5	2.5	2.5	2.5	3.5	EM	Fair	Fair		10+	C1
T11	Italian Alder	Alnus cordata	14.5	2	300;460	6.59	5	5	5	5	2.5	SM	Good	Fair	Stem divides at ground level. Adjacent to hard-standing.	10+	C1
T12	Bird Cherry	Prunus padus	9	3	300;250;290	5.83	3.5	6.5	3.5	3.5	4	EM	Good	Fair	Stem divides at ground level.	10+	C1
G13	Group	Chamaecyparis lawsonia (Lawson Cypress)	15	1	600	7.2	4	4	4	4	0	SM	Good	Good		10+	C1
G14	Group	Chamaecyparis lawsonia (Lawson Cypress)	14	1	600	7.2	4	4	4	4	0	SM	Good	Good		10+	C1
T15	Bird Cherry	Prunus padus	9	1	250	3	1.5	3	1.5	1.5	4.5	SM	Fair	Fair	Unable to access tree for inspection. Diameter estimated.	10+	C1

Tree Ref No.	Common Name	Botanical Name	Height (m)	No. of Stems	Stem dia. (mm)	Root Protection Radius (m)	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Crown Clearance (m)	Age class	Physical Condition	Structural Condition	Comments	Est. Rem. Contr. (Yrs)	BS: 5837 Grade
G16	Group	<i>Chamaecyparis lawsonia</i> (Lawson Cypress)	14	1	500	6	4.5	4.5	4.5	4.5	0	SM	Good	Fair		10+	C1
T17	Lawson Cypress	<i>Chamaecyparis lawsonia</i>	14	1	500	6	5	5	5	5	0	SM	Good	Fair		10+	C1
G18	Group	<i>Acer platanoides</i> (Norway Maple), <i>Sorbus intermedia</i> (Swedish Whitebeam)	10	1	350	4.2	2.5	2.5	2.5	2.5	3.5	EM	Good	Good		10+	C1
T19	Ash	<i>Fraxinus excelsior</i>	10	1	400	4.8	5	5	5	5	5	SM	Fair	Fair	Offsite tree. Unable to access tree for inspection. Diameter estimated.	10+	C1
T20	Ash	<i>Fraxinus excelsior</i>	11.5	1	410	4.92	3	2	3	3	2.5	SM	Fair	Fair	Tree located within raised bed. Multiple stems above 1.5m. Trunk has engulfed metalwork just below union.	<10	C1
T21	Norway Maple	<i>Acer platanoides</i>	12	1	500	6	4.5	4.5	4.5	4.5	4	EM	Good	Fair	Unable to inspect stem due to undergrowth. Diameter estimated. Adjacent to hard-standing.	10+	C1
T22	Norway Maple	<i>Acer platanoides</i>	9	1	250	3	3	2	3	3	3	SM	Good	Fair	Unable to inspect stem due to undergrowth. Stem divides above 1.5m. Diameter estimated.	10+	C1
T23	Italian Alder	<i>Alnus cordata</i>	14	1	500	6	2.5	2.5	2.5	2.5	2	EM	Good	Good	Adjacent to hard-standing.	20+	B1

Tree Ref No.	Common Name	Botanical Name	Height (m)	No. of Stems	Stem dia. (mm)	Root Protection Radius (m)	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Crown Clearance (m)	Age class	Physical Condition	Structural Condition	Comments	Est. Rem. Contr. (Yrs)	BS: 5837 Grade
T24	Italian Alder	<i>Alnus cordata</i>	15	1	500	6	3.5	6.5	3.5	3.5	2	EM	Good	Good	Offsite tree. Unable to access tree for inspection. Diameter estimated. Adjacent to hard-standing.	20+	B1
T25	Italian Alder	<i>Alnus cordata</i>	15	1	500	6	3.5	6.5	3.5	3.5	2	EM	Good	Good	Offsite tree. Unable to access tree for inspection. Diameter estimated. Adjacent to hard-standing.	20+	B1
T26	Italian Alder	<i>Alnus cordata</i>	15	1	500	6	3.5	6.5	3.5	3.5	2	EM	Good	Good	Offsite tree. Unable to access tree for inspection. Diameter estimated. Adjacent to hard-standing.	20+	B1
T27	Ash	<i>Fraxinus excelsior</i>	13	1	680	8.16	7	7	7	7	5	M	Fair	Good		20+	B1
T28	Italian Alder	<i>Alnus cordata</i>	14	2	280;440	6.26	6	6	6	6	2	EM	Good	Good	Stem divides at ground level.	20+	B1
T29	Norway Maple	<i>Acer platanoides</i>	9	1	370	4.44	3	2	3	3	3	SM	Good	Fair	Stem divides above 1.5m. Adjacent to hard-standing.	10+	C1
T30	Ash	<i>Fraxinus excelsior</i>	8	1	350	4.2	5	5	5	5	2.5	SM	Fair	Good	Tree located within raised bed.	10+	C1
G31	Group	<i>Fraxinus excelsior</i> (Ash)	12	1	370	4.44	6	6	6	6	5	SM	Fair	Good	Situated on top of bank.	20+	B1
G32	Group	<i>Betula pendula</i> (Silver Birch)	12	1	250	3	2	3	2.5	3	3	SM	Good	Good		10+	C1

Tree Ref No.	Common Name	Botanical Name	Height (m)	No. of Stems	Stem dia. (mm)	Root Protection Radius (m)	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Crown Clearance (m)	Age class	Physical Condition	Structural Condition	Comments	Est. Rem. Contr. (Yrs)	BS: 5837 Grade
G33	Group	Fraxinus excelsior (Ash), Pinus sylvestris (Scots Pine), Acer campestre (Field Maple)	10	1	200	2.4	2	3	2.5	3	0	SM	Good	Fair	Located on bank.	20+	B1
G34	Group	Acer platanoides (Norway Maple), Populus nigra 'Italica' (Lombardy Poplar)	13	1	350	4.2	2.5	2.5	2.5	2.5	5	EM	Good	Good	One Lombardy Poplar north of hedge adj. to fence.	10+	C1
T35	Leyland Cypress	X Cupressocypariss leylandii	16	1	1000	12	5.5	5.5	5.5	5.5	0	EM	Good	Fair	Unable to inspect stem due to undergrowth. Diameter estimated.	10+	C1
T36	Common Lime	Tilia X europaea	12	1	600	7.2	3.5	6.5	3.5	3.5	4	SM	Fair	Fair		<10	C1
G37	Group	Acer platanoides (Norway Maple), Platanus X hispanica (London Plane), Fraxinus excelsior (Ash)	14	1	450	5.4	6	6	6	6	4	EM	Good	Good		20+	B2
T38	Lombardy Poplar	Populus nigra 'Italica'	18	1	650	7.8	1	1	1	1	10	EM	Fair	Good		10+	C1
G39	Group	Acer platanoides (Norway Maple), Fraxinus excelsior (Ash)	10	1	250	3	2	3	2.5	3	2	SM	Fair	Fair		10+	C1
T40	Ash	Fraxinus excelsior	12	1	620	7.44	8	8	8	8	3	M	Fair	Good		20+	B1
G41	Group	Fraxinus excelsior (Ash)	10	1	300	3.6	3	2	3	3	4	SM	Fair	Fair		10+	C2

Tree Ref No.	Common Name	Botanical Name	Height (m)	No. of Stems	Stem dia. (mm)	Root Protection Radius (m)	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Crown Clearance (m)	Age class	Physical Condition	Structural Condition	Comments	Est. Rem. Contr. (Yrs)	BS: 5837 Grade
G42	Group	Sambucus nigra (Elder), Crataegus monogyna (Hawthorn), Acer campestre (Field Maple), Prunus spinosa (Blackthorn)	4	1	75	0.9	1	1	1	1	0	Y	Fair	Good		10+	C2

7. APPENDIX 3 - TREE SURVEY PLAN

Please see attached plan: Tree Survey Plan

Gravesham Borough Council