

APPENDIX 6

Arboricultural condition study

Annex 6.1 - Tree survey schedule

Annex 6.2 - Arboricultural glossary

A6. ARBORICULTURAL CONDITION STUDY

INTRODUCTION

- 6.1. This appendix presents the findings of an updated arboricultural survey (October 2007) and analysis of the trees at the Tower of London following an initial assessment carried out in May 2005. Peter Thurman of the Thurman Consultancy completed both surveys and has provided the information for this appendix. A summary of key issues is provided at the end of this appendix.

Survey methodology and limitations

- 6.2. The survey was carried out on October 10th, 2007 and the trees referred to here should be read in conjunction with Figure 2.2 in the main report and the survey schedule in Annex 6.1 of this appendix. All the trees at the Tower of London - young, semi-mature and mature – were assessed and recorded.
- 6.3. The tree survey has been based on a ground level tree assessment and examination of external features only. No plant tissue samples were taken and no internal investigation of the trees was carried out. No soil samples were taken or soil analyses carried out. The risk of tree-related subsidence to structures has not been assessed. We have no knowledge of existing or proposed underground services and features or proposed excavations or building works.

FINDINGS

Species range, age classes and life expectancy

- 6.4. A summary of the total tree population at the Tower - by age class and species - is as follows:

Table 6.1: Summary of the tree population

Tree Species	Quantity of young trees (and % of total)	Quantity of semi-mature trees (and % of total)	Quantity of mature trees (and % of total)	Totals by species
Ash	0	0	3 (3.4%)	3 (3.4%)
Crab apple	0	2 (2.27%)	0	2 (2.27%)
Elm	0	0	2 (2.27%)	2 (2.27%)
Lime	0	0	4 (4.54%)	4 (4.54%)
London plane	18 (20.45%)	1 (1.13%)	42 (47.72%)	61 (69.3%)
Mulberry	0	0	1 (1.13%)	1 (1.13%)
Common oak	7 (7.95%)	0	0	7 (7.95%)
Plum	0	1 (1.13%)	0	1 (1.13%)
Poplar	0	0	1 (1.13%)	1 (1.13%)
Sycamore	0	0	2 (2.27%)	2 (2.27%)
Tree of heaven	0	0	1 (1.13%)	1 (1.13%)
Wild cherry	3 (3.4%)	0	0	3 (3.4%)
TOTAL	28 (31.80%)	4 (4.54%)	56 (63.64%)	88

6.5. Notable statistics include:

- 64% of the tree population are mature and only 4.5% are semi-mature.
- 69% of the population are London planes
- Two species – oak and London plane – make up 77% of the population

6.6. Having a dominant tree species (or two) at the Tower gives a degree of unity to the site. However, the disadvantages of a near monoculture are that, should the London planes (and oaks) succumb to a serious disorder causing their death, the sudden loss of tree cover would be catastrophic. However, the London plane is a remarkably tough and resilient hybrid with (normally) a very long life expectancy – perhaps 400 years or more. Our native oak may be more at threat from certain pathogens including sudden oak death but the risk is not significant enough to stop planting them or creating near monocultures.

6.7. As little or no planting has been carried out over the last 30 years - except very recently – the tree population is unbalanced with too few semi-mature specimens present. The more recent plantings are restricted to the northern sections of the site. As stated in 2005, the over-reliance on mature trees may lead to a significant drop in tree numbers over the next 30 to 60 years as many of the mature specimens will start to senesce and decline and have to be removed. The following generation is not in place – certainly at least not in the central and southern parts of the site. This highly uneven age-class distribution should be cause for concern – where trees continue to be thought of as an integral part of the Tower landscape.

6.8. The vast majority of mature trees at the Tower have a low or poor (for species) life expectancy and the inevitable demise of mature trees together with the lack of semi-mature and middle-aged successors will combine to create a major drop in tree cover and amenity.

Tree management and maintenance

6.9. Following recommendations made by the Thurman Consultancy in 2005 it would appear that the rigorous tree pruning regime evident then has stopped or at least been significantly reduced. Consequently, although most of the mature specimens retain their strange overall form (long stems and mop-headed crowns), the crowns show signs of good re-growth. Some specimens have also produced strong epicormic growth on their stems. It appears that the lack of a clear management strategy has resulted in many of the mature trees at the Tower being regularly crown lifted, crown thinned and crown reduced producing the strange shaped trees we see today.

6.10. In 2005 the Thurman Consultancy raised concerns that the harsh pruning regime may now have to continue because once started, it may be difficult (and potentially hazardous) to stop. This is due to the fact that the resultant re-growth may be weakly attached and likely to split off (watersprout re-growth – after a crown reduction) or is very dense and unsightly (epicormic growth directly off the trunk and main stems – after a crown thinning). This concern remains. However, the encouraging re-growth may indicate that a phased pruning regime known as **crown restoration** may be attempted on some specimens and species – perhaps initially as

a trial (see Figure A6.1, Photograph 1). This pruning regime is described in the arboricultural glossary in Annex 6.2 of this appendix. Trees should be assessed on an individual basis. The rigorous and 'blanket' pruning regime of the past should no longer be considered a tree management option.

- 6.11. Some specimens have also (over the last two years) produced varying degrees of epicormic growth (see Figure A6.1, Photographs 2 and 3). This is the development of shoots arising from activated buds situated at the base of the tree and/or on the main stem(s). Rather than completely remove these (as would have occurred pre-2005), it may be worth experimenting with thinning this growth out leaving just a small percentage of shoots in the hope that these will develop into new branches. Such work would come under the auspices of crown restoration.

End-loaded branches

- 6.12. End loaded branches are large, heavy and elongated limbs that can be prone to slowly sinking under their own weight. Under certain conditions (e.g. changes in moisture levels in them) they may fail and break off. Some of these remain in place – on Trees 131, 132, 133 and 151 (see Figure A6.1, Photograph 4). These branches should be reduced in length to lessen the weight and loading – and therefore the risk of failure. Such work is itemised in the survey schedule.

Other future tree management options

- 6.13. The 2005 assessment came out against **pollarding** as a tree management option at the Tower because it was felt that many of the mature trees were not in a suitable condition to have this drastic operation thrust upon them.
- 6.14. However, in 2007 an encouraging response to little or no pruning and, as a method of managing some of the trees – particularly those in more confined spaces and/or those blocking desired views – means that pollarding may be a viable option. This is especially the case due to the fact that there is a lack of semi-mature and middle aged trees. Pollarding may act as a 'stop-gap'. Therefore, one or two 'expendable' and less prominent mature trees could be pollarded and their response monitored (e.g. T 125). However, as noted in 2005, any suggestion of pollarding at the Tower may meet with strong resistance.
- 6.15. The pollarding of more recent (and future) plantings is an entirely different suggestion and may have considerable merit.
- 6.16. As in 2005, it is still suggested that no tree **root pruning** takes place. .

Tree disorders

- 6.17. The following tree disorders are present and/or represent a threat to the tree population at the Tower of London:
 - As the Elms in Little Tower Hill are still alive and healthy the threat of them succumbing to **Dutch elm disease** remains.

- **Anthracnose of London plane** and **horse chestnut scale** continue to be present and this is likely to remain the case for the foreseeable future.
- **De-icing salt damage** also continues to be a problem especially on Tower Wharf. Possible solutions are detailed in our 2005 report.
- Due to the very wet summer this year a number of the London planes had **mildew** on their leaves. This is not a serious problem and purely a consequence of the weather.
- Tree 134, a Sycamore, shows signs of **Sooty Bark disease**. This is a common fungal disease – especially after a hot dry summer such as in 2006. The fungus is a ‘latent pathogen’ present on dead wood and within living, healthy sycamores.
- When trees are drought stressed the fungus can break out to invade large areas of bark and wood causing death of branches and whole trees. This tree should be assessed next spring. Its removal would be no great loss.
- The Mulberry (T170) has some limb dieback that has been colonised by a saprophytic fungus - *Auricularia auricula-judae*. Removal of this dead wood is recommended (and the props should be checked).

Trees and paving and trees close to walls and fences

- 6.18. In 2005 it was noted that the growth of tree roots and tree buttresses of a number of trees, especially in the central section around the White Tower were causing cobbles, kerbstones, and flagstones to lift. Some considerable work has been carried out to alleviate these trip hazards – although some still exist or have developed over the last two years. Around certain trees (e.g. T 141) non-flexible paving (cobble etc) has been removed and replaced with resin-bonded gravel (see Figure A6.1, Photograph 5). This is to be applauded – as long as the gravel and its sub-base are porous. If not, this surfacing will be detrimental to trees as it prevents/reduces water movement and gaseous exchange.
- 6.19. London plane trees 22 to 26, planted in the entrance/information area, have very small planting pits (see Figure A6.1, Photograph 6). Direct damage to the surrounding paving – causing paving lift – is likely to occur within the next 10 years. These pits are surfaced with metal grills that will soon be encroaching upon trunk growth. The surrounding paving does not appear to have porous jointing. In addition, it is likely that these trees will suffer from de-icing salt damage.
- 6.20. The mature London plane tree near the entrance point to the Tower (T 100) was not well protected during the development of this area. An attempt has been made to give the roots some porous surfacing but it is inadequate and paving lift is already occurring around the base of the tree (see Figure A6.1, Photograph 7).
- 6.21. In 2005 it was highlighted that, in Little Tower Hill, a number of mature trees are situated very close to the perimeter railings and wall. Tree 153 has caused direct damage to this wall (see Figure A6.1, Photograph 8). Consideration should be given to rebuilding this section of wall in a way that allows for future growth of this and other mature trees in the vicinity. This may be achieved by creating either a ‘boxed’

extension to the wall around the trunk or by the use of above ground level lintels that straddle the root buttresses of the tree.

- 6.22. In 2005, it was also noted that many of the new trees planted in Little Tower Hill and on the Moat Banks have been planted very close to existing walls and railings and may cause problems in the future. These trees are Ts 1 to 7, 9 to 17, and 18 to 21 – 20 trees in total (see Figure A6.1, Photograph 9). Eventually these structures will be damaged. To avoid this, the trees will need to be moved or the wall rebuilt with lintels or as 'boxes' around the trees.

Detailed inspections

- 6.23. As in 2005, none of the trees require a more detailed inspection using a Picus Tomograph. It is not known if climbing inspections (recommended in 2005) have been carried out and we have no knowledge of any findings from such assessments.
- 6.24. With regards to root geography, investigations using a Tree Radar instrument may be of use to plot tree root systems close to archaeology.

New tree planting

- 6.25. Not enough new planting is being carried out to prevent amenity loss over the next 50 to 100 years as existing mature trees have to be removed – especially in the central areas of the Tower. Some species are inappropriate (e.g. G28 and G29). There is an urgent need to find appropriate new planting positions that do not conflict with the important archaeology below ground.
- 6.26. Finding such planting positions must always therefore, involve below-ground investigations. This may be in the form of hand-dug trial trenches or the use of non-invasive ground penetrating tree radar and/or the various forms of archaeological geophysics. New trees should also not be planted too close to above-ground structures such as walls and fences that may be damaged by root or trunk growth.
- 6.27. The following tree species may be considered in future plantings.
- *Platanus orientalis* – the oriental plane (one of the parents of the London plane) resistant to Anthracnose of plane.
 - *Platanus x hispanica* 'Bloodgood' – A form of London plane resistant to Anthracnose of plane and de-icing salt.
- 6.28. The following species of tree are also considered to be tolerant of de-icing salt (and have appropriate stature for the Tower):
- *Quercus robur* – common English or pedunculate oak are already present at the Tower
 - *Ginkgo biloba* – maidenhair tree
 - *Acer platanoides* – norway maple
- 6.29. Together with pollarding, another solution to the problem of the lack of semi-mature trees and the predominance of mature specimens is to consider planting **pleached**

or otherwise **trained trees**. These can be obtained as semi-mature specimens – already clipped and shaped. They can be maintained at a given size and form without great skill or cost and desired views of the Tower would be much easier to control.

- 6.30. In order to create spaces for new planting, the premature removal of some specimens should be considered. Trees 27, G28, G29, 103, and 134 would be the most appropriate to remove for this reason. Trees 135, 171, 172 & 173 would be the next to consider.
- 6.31. New planting may benefit from the use of structural soils as backfill – especially in hard surface areas – and tree root deflectors or barriers.

KEY ISSUES

- 6.32. The key issues in relation to arboricultural condition and management are:
- The tree population at the Tower of London continues to have a poor and un-even age-class distribution despite recent plantings.
 - The aesthetic benefits of having just one or two dominant tree species out-weighs any potential (but small) risk of loss through pathogens.
 - After two years of little or no pruning, many of the mature specimens have produced good, healthy re-growth including epicormics. This suggests that crown restoration and thinning (not complete removal) of epicormic growth may be future maintenance options.
 - Trees should be assessed on an individual basis. The rigorous and ‘blanket’ pruning regime of the past should no longer be considered a tree management option.
 - Some specimens still have potentially hazardous end-loaded limbs.
 - Pollarding is a tree management option that ought to be trialled.
 - Mildew on London plane and Sooty Bark disease on Sycamore were recorded on this survey in addition to other disorders recorded in 2005.
 - Some specimens continue to suffer from de-icing salt damage.
 - Paving lift caused by tree root growth is still occurring although at the base of some trees, non-flexible paving has been replaced by resin-bonded gravel – which hopefully is porous.
 - Some new plantings have insufficient pit sizes, grills and porous surfaces around them.
 - The location of certain trees continues to cause damage to walls and railings. Others may do so in the future due to close proximity.
 - As in 2005, no trees require detailed investigation but it still may be beneficial to carry out a climbing inspection on a few.

- There are numerous options to consider with regards to new planting. This must not conflict with archaeology.
- Pleached or other forms of trained trees should be considered in new plantings. Pollarding young trees is also a valid option.
- In order to create spaces for new planting and therefore establish a more balanced aged population, the 'premature' removal of some specimens should be considered.
- New materials/products such as structural soil and root barriers may be of use.

ANNEX 6.1 – TREE SURVEY SCHEDULE

Tree Data Collected – Tower of London

Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
Note: Trees 1 to 7, 9 to 26 and G28 were only plotted on the 2005 plan – not surveyed. G29 was neither plotted nor surveyed in 2005 Trees 8 and 27 were previously listed and surveyed but not numbered							
1	Common Oak	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
2	Common Oak	Y	B	Very High	B	Sparse crown and close to perimeter wall and railings	Consider moving away from perimeter wall
3	Common Oak	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
4	Common Oak	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
5	Common Oak	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
6	Common Oak	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
7	Common Oak	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
8 (North of T157)	London Plane	S	A	Very high	A	Fine tree Low branches over path In lawn near path Formerly listed in schedule between Ts 149 and 150 but not numbered Horse Chestnut Scale	Crown lift to 2.5m – removing lateral branches only This work has been carried out No other work required

SURVEY NOTES:

Tree Number: Numbers indicated on plans and in previous reports. No trees are tagged. Please note discrepancies – **G** refers to a **Group of trees**
Notes in Arial font and blue are new or updated data from the October 2007 survey

Species: Common Name of tree

Age Class: Y = Young, S = Semi-mature, M = Mature

Condition: A = Good, B = Average, C = Poor, D = Dead/Dying/Diseased. This is a measure of the trees vigour/vitality – not a measure of structural integrity

Life Expectancy: Takes into account the species, its location, condition and management regime. Low = less than 25 years or as specified, Moderate = 25 to 50 years, High is 50 + years. Very High = 100 + years, Poor for species indicates a significant reduction in expected longevity for that species. For the London Planes at this site, this correlates with a “High” life expectancy described above. But, this is very poor for this species.

Value: Visual impact of the tree due to form, size, location and visibility – regardless of condition and life expectancy. A= Very High, B = High, C = Moderate, D = Low

Comments: Observations regarding condition, defects, surroundings and management

Work Required: Itemises recommended works, Monitor = continual assessment. **If ‘Assess in 2008’ is all that has been added to this column then no work is required at present**

Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
9	London Plane	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
10	London Plane	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
11	London Plane	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
12	London Plane	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
13	London Plane	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
14	London Plane	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
15	London Plane	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
16	London Plane	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
17	London Plane	Y	A	Very High	B	Fine young tree but close to perimeter wall and railings	Consider moving away from perimeter wall
Note – A Sycamore and an Ash amongst Ts 9 to 17 have been removed since 2005							
18	London Plane	Y	A	Very High	B	Fine young tree but close to wall Low branches over path	Consider moving away from perimeter wall Crown lifting required to 2.5m in 2008 or 2009
19	London Plane	Y	A	Very High	B	Fine young tree but close to wall Low branches over path	Consider moving away from perimeter wall Crown lifting required to 2.5m in 2008 or 2009
20	London Plane	Y	A	Very High	B	Fine young tree but close to wall Low branches over path	Consider moving away from perimeter wall Crown lifting required to 2.5m in 2008 or 2009

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Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
21	London Plane	Y	A	Very High	B	Fine young tree but close to wall Low branches over path	Consider moving away from perimeter wall Crown lifting required to 2.5m in 2008 or 2009
22	London Plane	Y	A	Very High	A	Planted in new paved entrance area Very little space for future trunk growth in paving Surrounding paving does not appear to be porous Risk of de-icing salt run-off into the pit	Consider enlarging paving pit and/or removing grill Assess porosity of surrounding paving Reduce risk of salt run-off Pollard?
23	London Plane	Y	A	Very High	A	Planted in new paved entrance area Very little space for future trunk growth in paving Surrounding paving does not appear to be porous Risk of de-icing salt run-off into the pit	Consider enlarging paving pit and/or removing grill Assess porosity of surrounding paving Reduce risk of salt run-off Pollard?
24	London Plane	Y	B	Very High	A	Planted in new paved entrance area Very little space for future trunk growth in paving Surrounding paving does not appear to be porous Risk of de-icing salt run-off into the pit Broken branch in crown Sparse crown Low branches	Consider enlarging paving pit and/or removing grill Assess porosity of surrounding paving Reduce risk of salt run-off Remove broken branch in crown Crown lift to 2.5m or pollard?
25	London Plane	Y	B	Very High	A	Planted in new paved entrance area Very little space for future trunk growth in paving Surrounding paving does not appear to be porous Risk of de-icing salt run-off into the pit Sparse crown Low branches	Consider enlarging paving pit and/or removing grill Assess porosity of surrounding paving Reduce risk of salt run-off Crown lift to 2.5m or pollard?

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Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
26	London Plane	Y	B	Very High	A	Planted in new paved entrance area Very little space for future trunk growth in paving Surrounding paving does not appear to be porous Risk of de-icing salt run-off into the pit Sparse crown Low branches	Consider enlarging paving pit and/or removing grill Assess porosity of surrounding paving Reduce risk of salt run-off Crown lift to 2.5m or pollard?
27 (near T 131)	Plum	S	C	Low	D	Small and runtish. Not in scale with surroundings Aphid damage and Blossom End Wilt Minor die-back Paving repaired	Fell and replace with more suitable species Unless this is a commemorative tree my recommendation (above) remains the same
G28	Wild Cherry	Y	B	Moderate	C	Group of 3 near T 157 previously plotted but not surveyed Middle one has sparse crown Not an ideal species – relatively short lived and small	None
G29	Parrotia and Crab Apples	S	B	Moderate	C	3 Parrotia + 2 Crab Apples Parrotia are large shrubs only Crab Apples are not an ideal species – relatively short lived and small	Consider removing Crab Apples and replace with more appropriate species
<p>Note: Most of the mature trees listed below – having been left unpruned over the last two years – show signs of good, if a little dense re-growth. In 2008 or 2009 consideration should be given to crown-renewal work to these trees.</p>							

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Comments: Observations regarding condition, defects, surroundings and management

Work Required: Itemises recommended works, Monitor = continual assessment. **If ‘Assess in 2008’ is all that has been added to this column then no work is required at present**

Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
100 (numbered 190 on some plans and not shown at all on others)	London Plane	M	B	Poor for species	A	Near new shop in an area recently developed Possible compaction and root severance during development High crown Lifted and some end-loaded limbs reduced Some fibre buckling on main scaffolds Small, non-porous area around base Trip hazards 5 young Plane trees planted in a line north of this tree These 5 trees now recorded separately – Ts 22-26 see above	Monitor Consider enlarging area of porous paving around base of tree Eliminate trip hazards
103	Hybrid Poplar	M	C/D	Low Less than 15 years	B	Buttress root damage on E side and compaction (?) Recently crown thinned and reduced Vigorous epicormic re-growth in crown and on trunk Possibly a re-grown pollard Some pruning wound cavities in crown Not pruned since before 2005	Assess in 2006 or fell and replace this winter Regrowth is prolific. If retained, consider crown renewal in 2008
104	London Plane	M	C	Poor for species	A	Crown thinned and lifted Wound cavity on scaffold limb on S side Numerous small wound cavities throughout crown Sparse crown Die-back – possibly de-icing salt damage	Assess in 2006 Monitor Consider ways of reducing degree of salt damage - see 2005 report
105	London Plane	M	B	Poor for species	A	Very sparse crown – minor die back Crown thinned and lifted Slight lean to N Trunk wound cavity on E side – small Severe die-back – possibly de-icing salt damage Dead wood	Monitor Assess in 2006 Consider ways of reducing degree of salt damage - see 2005 report Remove dead wood

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Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
106	London Plane	M	C	Poor for species	A	Slight lean to E Crown thinned and lifted Trunk wound cavity on W side @ 5m Sparse crown and minor twig die back	Monitor Assess in 2006 Assess in 2008
107	London Plane	M	C	Poor for species	A	Crown thinned and lifted Sparse crown Crown reduced over river Better growth in crown in 2007	Monitor Assess in 2006 Assess in 2008
108	London Plane	M	C	Poor for species	B	Crown thinned and lifted Narrow, suppressed crown Unbalanced crown reduction - Etiolated limb on S side Crown more sparse in 2007	Assess in 2006 Assess in 2008
109	London Plane	M	B	Poor for species	A	Crown thinned and lifted Etiolated limb on S side	Assess in 2006 Assess in 2008
110	London Plane	M	B	Poor for species	A	Crown thinned and lifted Squat, low and wide crown Also pruned back from buildings	Assess in 2006 Assess in 2008
111	London Plane	M	B	Poor for species	A	Trunk wound cavity on S side Crown thinned and lifted Unbalanced crown reduction	Assess in 2006 Assess in 2008
112	London Plane	M	B	Poor for species	A	Crown thinned and lifted Unbalanced (and unnecessary?) reduction Some etiolated limbs only slightly reduced	Assess in 2006 Assess in 2008
113	London Plane	M	B	Poor for species	A	Crown thinned and lifted Unbalanced reduction Cavity on top of lowest limb on S side	Assess in 2006 Assess in 2008

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Species: Common Name of tree

Age Class: Y = Young, S = Semi-mature, M = Mature

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Comments: Observations regarding condition, defects, surroundings and management

Work Required: Itemises recommended works, Monitor = continual assessment. **If ‘Assess in 2008’ is all that has been added to this column then no work is required at present**

Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
114	London Plane	M	B	Poor for species	A	Crown thinned and lifted Unbalanced reduction Trunk wound cavities on N and E side Etiolated limb on SE side – but pruned back Growing over tower – no need to prune back at present	Assess in 2006 Assess in 2008
115	London Plane	M	B	Poor for species	A	Slight paving lift Main fork @ 2m Crown thinned and lifted Break out cavity on S side of main trunk @ 8m	Assess in 2006 Assess in 2008 Monitor
116	London Plane	M	B	Poor for species	A	Slight paving lift Main fork @ 2.5m – possible cavity here Crown thinned and lifted Pruning wound cavity on E side of sub-dominant fork	Assess in 2006 Assess in 2008
117	London Plane	M	B	Poor for species	A	Main fork @ 3.5m Slight damage to raised bed wall Wall appears to have been repaired Crown thinned and lifted Poor growth over last 2 years – sparse crown	Assess in 2006 Assess in 2008
118	London Plane	M	B	Poor for species	A	Squat, wide crown Repaired damage to raised bed brickwork Small pruning wound cavity on N facing scaffold limb Sparse crown	Assess in 2006 Assess in 2008
119	London Plane	M	B	Poor for species	A	Squat, wide crown Trunk wound cavity on S side @ 3m Sparse crown	Assess in 2006 Assess in 2008

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Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
120	London Plane	M	B	Poor for species	A	Kerb lift Possibly a re-grown pollard from 5m Crown thinned and lifted End-loaded limbs – especially on E side	Assess in 2006 Assess in 2008 Monitor
125	London Plane	M	B	Poor for species	B	Old and new damage to buttress roots Some lifting of tarmac Crown thinned, lifted and reduced	Assess in 2006 Assess in 2008
126	London Plane	M	B	Poor for species	B	Crown thinned, lifted, thinned and reduced Close to Lanthorn Tower Grass surround poor – drying out (?)	Assess in 2006 Assess in 2008 Consider gravel rather than grass around base (?)
127	London Plane	M	B	Poor for species	B	Close to Lanthorn Tower Slight lift to paving and kerbing Crown thinned, lifted and reduced (away from tower only?) Unbalanced crown with some etiolated branches Epicormics	Assess in 2006 Crown reduce S side of crown (only) by 10% - not done Remove epicormics
128	London Plane	M	B	Poor for species	B	Crow thinned, lifted and reduced Slight lifting of kerb	Assess in 2006 Assess in 2008
129	London Plane	M	B	Poor for species	B	Crow thinned, lifted and reduced Slight lifting of kerb	Assess in 2006 Assess in 2008
130	London Plane	M	B	Poor for species	A	Crown thinned Small wound cavity on trunk @ 7m on S side and on lowest limb on W side	Assess in 2006 Assess in 2008

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Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
131	London Plane	M	B	Poor for species	A	Crown thinned Paving lift - repaired Recent crown reduction work has not removed some end-loaded limbs These are still present Minor wound to buttress root on SW side	Assess in 2006 Repair paving to make safe Reduce (3) end-loaded limbs on W side by 10% - under supervision Monitor
132	London Plane	M	B	Poor for species	A	Crown thinned End-loaded limbs on N and NE side These are still present	Assess 2006 Reduce (2) end-loaded limbs on N and NE sides by 10% - under supervision
133	London Plane	M	B	Poor for species	A	Crown thinned Wound/cavity on lowest limb on SE side of crown End-loaded/etiolated limbs on N, SE and NW sides These are still present Small wound cavity on main stem on SE side @ 8m	Assess in 2006 Climbing inspection Reduce (3) end-loaded limbs on N, SE and NW sides by 10% - under supervision Monitor
134	Sycamore	M	C	Low Less than 25 years	B	Crown thinned and lifted Minor paving lift - repaired Poor basal flare- possible changes in ground levels 30mm dia girdling root with wound exposed Slight lean to E Sparse crown and poor extension growth in 2007 – probably due to Sooty Bark Disease	Assess in 2006 Monitor Monitor Sever exposed length of girdling root Assess in Spring 2008 This disease can be terminal – especially on a stressed tree such as this one Due to its location and condition this is a prime tree for removal

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Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
135	Lime	M	C	Poor for species	B	Re-grown after heavy reduction @ 4.5m and subsequently reduced. Low triple fork @ 2.5m Crown thinned with dense re-growth and epicormics Minor twig die back in crown Minor paving lift	Assess in 2006 Remove deadwood in Autumn 2005 – done Thin out epicormics - under supervision Monitor
136	London Plane	M	B	Poor for species	A	Crown thinned 3 end loaded scaffold limbs, one on SE & two on SW side Slight lean to N Minor crown reduction recently carried out Epicormics	Assess in 2006 Reduce these 3 limbs by 10% - done Assess in 2008
137 (135 on some plans)	Lime	M	C	Poor for species	C/D	Paving lift (slight) - repaired Crown thinned, lifted and reduced resulting in very dense re-growth including epicormics on stem Weak forks with included bark on NW side of crown.	Monitor Assess 2006 or fell and replace this winter Thin out epicormics - under supervision
138	London Plane	M	C	Poor for species	A	Paving lift (slight) Crown lifted (to over 12m) thinned and reduced Weak re-growth Epicormics	Monitor Assess in 2006 Thin out epicormics - under supervision
139	London Plane	M	C	Poor for species	A	Crown thinned, reduced and lifted (to over 10m) Weak re-growth Possibly a re-grown pollard Minor epicormics	Assess in 2006 Assess in 2008

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Comments: Observations regarding condition, defects, surroundings and management

Work Required: Itemises recommended works, Monitor = continual assessment. [If ‘Assess in 2008’ is all that has been added to this column then no work is required at present](#)

Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
140	London Plane	M	C	Poor for species	A	Crown thinned, reduced, lifted (to over 10m) Possibly a re-grown pollard Small cavity @ base of crown on S side Minor epicormics	Assess in 2006 Assess in 2008
141	London Plane	M	C	Poor for species	A	Crown reduced recently Crown thinned and lifted (to over 10m) previously Small pruning wound cavity on S side of trunk @ 10m Adjacent paving recently repaired - bonded gravel now in place – is it porous? Timber post & Iron railing now partially enveloped in base of trunk on W side	Assess in 2006 Assess in 2008
142	London Plane	M	C	Poor for species	A	Crown reduced recently Crown thinned and lifted (to over 10m) previously Crown thinned again recently (why?) or response to last thinning has been poor Possibly a re-grown pollard 2 wound cavities on E side of crown	Assess in 2006 Assess in 2008 Monitor
143	London Plane	M	C	Poor for species	A	Crown reduced recently Crown thinned and lifted previously Possibly a re-grown pollard Low fence touching trunk Damage to paving soon	Assess in 2006 Assess in 2008
144	London Plane	M	C	Poor for species	A	Lifting of cobbled edging repaired – new damage? One girdling root 40mm dia Crown thinned and lifted previously End loaded limb on W side Possibly a re-grown pollard	Assess in 2006 Sever exposed length of girdling root - done Assess in 2008 Monitor

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Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
145	London Plane	M	C	Poor for species	A	Trunk base growing into paving Crown reduced recently Crown thinned and lifted previously Possibly a re-grown pollard Break-out cavity on upper-side of limb on SE Side End loaded limbs on S & SW side	Repair/adjust paving (?) - done Assess in 2006 Assess in 2008 Climbing inspection Monitor
146	Lime	M	C	Moderate 25 + years	B	Paving lift (slight) Triple fork @ 2m Recently crown lifted with epicormic re-growth Crown reduced previously Some branches touching adjacent buildings Horse Chestnut Scale	Monitor Thin out epicormics - under supervision
147	Lime	M	C	Moderate 25 + years	B	Paving lift (slight) Double fork @ 3m Recently crown lifted with epicormic re-growth Crown reduced previously Possibly a re-grown pollard (@ 5m)	Monitor Thin out epicormics - under supervision
148	London Plane	M	B	Poor for species	A	Adjacent kiosk base lifted by root action Crown reduced recently Crown thinned and lifted previously Minor damage to a buttress root Possibly a re-grown pollard	Monitor Assess in 2006 Assess in 2008
149	Sycamore	M	B	Moderate	B	Crown thinned Epicormics	Assess in 2006 Assess in 2008
150	Wych Elm	M	B	Low (Due to Dutch Elm Disease)	B	Crown thinned with masses of Epicormic re-growth No Dutch Elm Disease	Assess in 2006 Assess in 2008

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Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
151	London Plane	M	A	High	A	Crown thinned – slight End-loaded limb on N side over path	Assess in 2006 Reduce end-loaded limb by 10%
152	Wych Elm	M	B	Low (Due to Dutch Elm Disease)	B	Crown thinned with masses of epicormic re-growth No Dutch Elm Disease	Assess in 2006 Assess in 2008
153	London Plane	M	A	High	A	Crown thinned Major fork @ 4.5m Damage to perimeter wall and railings	Assess in 2006 Assess in 2008 Consider repairing wall and providing space for future growth of trunk
155	London Plane	M	B	Poor for species	A	Crown thinned and reduced with masses of waterspout re-growth Crown thinned and slightly reduced again recently (why?) or response to last pruning work has been poor Bonded gravel now in place around base – is it porous?	Assess in 2006 Assess in 2008
156	London Plane	M	B	Poor for species	A	Crown thinned Bonded gravel now in place around base – is it porous?	Assess in 2006 Assess in 2008
157	London Plane	M	A	High	A	Crown thinned – slight Bonded gravel now in place around base – is it porous?	Assess in 2006 Assess in 2008
168	Tree of Heaven	M	C	Moderate	B	One sided crown – S bias Leaning S Minor deadwood	Assess in 2006 Assess in 2008

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Tree Number	Species	Age	Condition	Life Expectancy	Value	Comments	Work Required
170 (numbered 154 on some planes)	Mulberry	M	C	Low	B	Propped over railings – some rubber bushes now worn Minor twig die back Some branch die back now with saprophytic fungus on bark - <i>Auricularia auricula-judae</i>	Assess in 2006 Monitor Prune out dead wood and reassess propping
171	Weeping Ash	M	C	Low	C	Trunk cavity @ 2.5 and @ 5m Growing into railings	Assess in 2006 Monitor Assess in 2008
172	Ash	M	C	Low	B	Crown thinned and reduced recently Watersprout re-growth	Assess in 2006 Assess in 2008
173	Ash	M	C	Low	B	Trunk cavity @ 4m (E side) Crown thinned and reduced Ivy growth Crown still quite sparse	Assess in 2006 Monitor Sever Ivy at base of trunk – not done - do now Inspect in spring 2008 when Ivy has died away

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ANNEX 6.2 - ARBORICULTURAL GLOSSARY

Crown lifting:

This involves the removal of main and/or lateral branches or portions of these which are below, or which extend below, a specified height. It is usually carried out to improve access or provide a specified ground clearance. Crown lifting may result in the canopy base being not at one single level but stepped to allow for different clearances, for example where a tree overhangs both a path and a road where different height clearances are required.

The entire removal of large limbs back to the main trunk should be avoided as large wounds may be more prone to colonisation by decay organisms. A series of numerous large pruning wounds - especially close together at the same height or in a column on the same side of a tree can cause major stem dysfunction as individual wound decay columns may coalesce.

Crown thinning:

This is the removal of a portion (ideally never more than 15% of the total) of secondary branches within the crown of a tree. It is usually confined to broad-leaved species. Crown thinning may include crown cleaning (removal of dead wood and crossing or rubbing branches) and does not alter the overall size or shape of the tree.

Common reasons for crown thinning are to allow more light to pass through the tree, reduce wind resistance or to lessen the weight of heavy branches and improve form.

Over thinning stresses the tree by removing energy reserves (starch) and reducing the rate of photosynthesis. It can also initiate aggressive, unwanted epicormic growth on interior branches, creating an unnatural look and causing very vigorous and weakly attached re-growth.

Severe over thinning can involve the removal of all lateral branches from the interior of the crown. This is often referred to as 'lion tailing'. This leaves too much weight at the end of the branch and causes limbs to over elongate creating substantially weakened and end-loaded (end-weighted) branches which may be inclined to fail or be more prone to storm damage.

If a tree has been over-thinned and later needs to be reduced (e.g. for safety reasons), there are often no inner branches to prune back to. This results in any reduction of the crown being more akin to lopping and topping.

Crown reduction:

This is the reduction, by a prescribed percentage, of the outline dimension of a tree's canopy, from the tips of limbs and branches toward the main trunk, by pruning back growth to an appropriately sized lateral branch (ideally no less than 30% of the diameter of the parent branch), twig or bud.

Crown reduction may be carried out to reduce the 'sail' effect of a tree's crown – to lower the risk of failure or damage in high winds or on exposed sites – especially on decayed and declining specimens. It can also be prescribed to aid recovery and stability after severe root damage or severance; to reduce the risk of end-loaded/elongated limbs failing and in tree-related subsidence cases in an attempt to reduce water uptake and clay soil shrinkage. It may

also be implemented to simply reduce the size of a tree's crown in a confined space or in order to maintain views or improve light levels.

Crown reduction also creates large numbers of pruning wounds that are prone to colonisation by decay organisms. It also removes stored energy reserves (starch) and reduces the rate of photosynthesis – the very things required for healthy tree growth. As with thinning, the resultant re-growth can be vigorous and weakly attached – thus prone to splitting off in even moderately low winds or winds from non-prevailing directions.

If a tree needs to be crown reduced – the best method (for it) and the least obvious (to us) is a sympathetic and lighter combination of both thinning and reduction.

Crown restoration:

Crown restoration pruning aims to improve the structure, form and appearance of trees which have been previously improperly pruned, vandalised or storm-damaged through the pruning out of weakened or damaged parts of the tree and the selection of appropriate healthy, well formed replacement growth that is allowed to develop. Such work may be phased over a period of years so that growth responses can be monitored and, if necessary, the pruning regime adjusted. This highly skilled work is best carried out under expert arboricultural supervision.

Pollarding:

This is the removal of the entire crown of a tree - back to the top of the trunk or the base of the main limbs - on a regular cycle and, preferably, from an early age.

Pollarded trees – lapsed or managed - are generally easy to identify. They usually have a normal trunk topped at a certain height with a distinctive branch system where the pollarding takes place.

On a lapsed pollard, where regular pruning has ceased, the crown re-grows from this point producing a concentration of branches of similar diameter and height.

On a managed pollard, the main limbs of the tree often produce swollen stubs or 'knuckles' where the crown is regularly pruned back to.

History

For hundreds of years, as with coppicing, pollarding was a traditional form of management where timber, firewood and foliage (for fodder) could be harvested on a regular basis.

New shoots growing from a coppice stool or pollard would produce fairly straight branches that would grow relatively quickly and be used for specific purposes. The branch re-growth would be cut on a cycle of anywhere between 7 to 40 years depending upon the size of branches required. By growing the new stems at the top of a 2-3m trunk instead of close to the ground as coppice, the new shoots could be kept out of reach of browsing livestock.

Pollarded trees have a distinctive appearance - unnatural and ugly to some - and were for this reason often used as boundary markers along field edges and especially within ancient woodlands where they would act as a living, permanent sign post for landowners. Traditional pollarded trees have been pruned and managed as pollards throughout their lives, and may even have been planted for that very purpose.

Many veteran trees in the UK are pollards. Having a low centre of gravity has enabled them to survive high winds.

In more recent years, perhaps the last 150, pollarding has also been carried out on ornamental trees as a method of maintaining large or vigorous species in confined spaces – such as narrow streets or small squares. Such pollarding can often be seen on the Continent - especially in France – where it has long been considered to be a perfectly acceptable way of managing trees.

For many years in Britain however, pollarding was frowned upon and often described as nothing more than crude butchery. Over the last 10 to 15 years attitudes towards it have changed somewhat and most arboriculturists now consider it to have a role to play in certain circumstances - as long as it is carried out correctly.

Problems associated with pollarded trees

Whenever a tree is pruned there is a risk that decay and disease organisms may enter via the resultant wounds. Pollarding is no exception. In fact, re-pollarding a lapsed pollard – thereby making many large wounds – obviously creates quite a significant risk of infection.

Pruning can also cause woody tissue - above and below ground - subject to become dysfunctional and there will be reduced carbohydrate storage and carbohydrate reserves. It may also compromise a tree's ability to maintain defensive boundaries against fungal colonisation, to effectively seal off boundaries between functional and dysfunctional wood and to produce new reaction wood to compensate for internal decay.

Another problem is that branch re-growth on a lapsed pollard may be poorly attached and/or heavily end-weighted and thus prone to breaking off – causing damage or injury. Furthermore, such breakages may tear a section of trunk away with it, which could then leave the tree in an unsafe condition or open up the heartwood to further attack from decay organisms.

The key is to continue to pollard regularly and at the same pruning points. The resultant knuckles described above become sealed off from the threat of decay and disease and the risk to health is minimised.

Unfortunately, re-pollarding a lapsed pollard aggressively can all too often lead to its death. It is therefore often advisable to reduce the crown in stages in order to return the tree to an active pollard.

