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Springwell School, Barnsley

Arboricultural Implications Assessment

Report for Barnsley Partnership for Learning
(Laing O'Rourke)

October 2009

Institute of Chartered Foresters
Registered Consultant

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SUMMARY

Greengage Arboriculture & Ecology was commissioned to carry out an arboricultural *implications assessment of Springwell School, Barnsley. The site is proposed for the* construction of a new school building and associated facilities. This report assesses the direct and indirect impact of the development proposal on the existing trees.

A pre-development tree survey of the site has been carried out previously and this survey has informed this assessment. The site contains a large number of trees, the majority of which are middle-age and early-mature trees growing in belts close to the *boundaries. The most common* trees are sycamore, silver birch, Himalayan birch and various *Sorbus* species. The site adjoins woodland on the southern and eastern boundaries. The previous survey assessed 106 individual trees and shrubs, six groups of trees and five hedges.

A small number of trees on the site are protected by Tree Preservation Order. These are two black poplar, an ash and a pear tree, all located close to the northern boundary.

The proposed development will require the felling of nine individually assessed trees, which include two trees of moderate quality and value (B category) and six trees of low quality and value (C category). The proposed development will also require the felling of part of a group of young trees, which are of moderate quality and value. It is also proposed to fell an additional eight trees because they are in poor condition (R category) or they are of low value and their felling will benefit adjacent better quality trees.

The proposed development will involve the construction of steps and hardstandings, as well as level changes, within the Root Protection Area of a small number of retained trees. It is considered that the impacts associated with this construction can be adequately minimised or mitigated by the adoption of appropriate construction methodologies. The production of an arboricultural method statement is recommended to detail agreed methodologies. In the absence of agreement on appropriate methodologies to protect these trees there is a risk of significant damage being caused to them.

No significant indirect impacts on trees to be retained have been identified. The proposed layout provides sufficient space for the retention of trees without them becoming a nuisance which may lead to their felling or major tree works in the future.

There is an arboricultural impact associated with the loss of individual trees on the site, but this is low because the trees to be felled represent a small proportion of the total number of trees on the site. The landscape masterplan shows that extensive tree *planting is proposed and it is considered that the development proposal will lead to a net* increase in the local arboricultural resource and an enhancement of the site's amenity value.

1. INTRODUCTION

1.1 Scope and Brief

This arboricultural report was commissioned by Laing O'Rourke on behalf of Barnsley Partnership for Learning. Laing O'Rourke have been appointed by Barnsley Metropolitan Borough Council to design and construct new school buildings and facilities under Phase 2 of the Barnsley Building Schools for the Future (BSF) programme.

The report was prepared by Guy Morrison, Principal Arboriculturist and Partner of Greengage Arboriculture & Ecology. He is a Chartered Forester and Registered Consultant with the Institute of Chartered Foresters. He is also a Professional Member of the Arboricultural Association and holds the Royal Forestry Society Professional Diploma in Arboriculture.

The scope of the report was to prepare an arboricultural implications assessment report to assess the direct and indirect impacts of the development proposal on the existing trees and shrubs. The assessment is accompanied by a schedule for facilitation works to trees that are necessary in order to accommodate the proposed development, as well as remedial works necessary to improve tree condition and address tree hazards.

A pre-development tree survey of the site had been carried out previously. This *Tree Survey Report* (Greengage, 2009) should be referred to when reading this report.

Arboricultural implications assessment reports have been commissioned for the three sites that form Phase 2 of the Barnsley BSF programme. These are Springwell School, Greenacre School and land to the west of Engine Lane, near Shafton. The former two sites are existing schools proposed for improvement, while the latter site is farmland proposed for development as a new school. This report relates to the Springwell School site.

1.2 Site Description

A full description of the site and the site location plans are provided in the tree survey report (Greengage, 2009) and this should be read alongside this report. A summary of the site description is provided below.

Springwell School is a local authority pupil referral unit. The site is located at St Helen's Boulevard, Carlton Road, Barnsley, S71 2AT (site centre OS grid ref. SE 358 087).

The site is an L-shaped parcel of land with an area of approximately 2.4ha. The site comprises existing school buildings and associated parking, access routes, tarmac playground and a grass playing field. The site is accessed from St Helen's Boulevard to the south.

The majority of the site area is essentially flat. It has been levelled in the past and there are short steep banks on the western, northern and eastern boundaries. The surrounding land slopes down relatively steeply in Spring Wood to the east of the site.

The school contains a large number of trees, the majority of which are middle-age and early-mature trees growing close to the boundaries.

At the southern entrance to the site are a group of early-mature silver birch and hybrid service trees, plus a single rowan and manna ash, all growing in mown grass.

The western boundary of the site has a narrow belt of middle-age and early-mature sycamore, silver birch and Himalayan birch trees planted on an embankment. To the north-west of this is a group of younger mixed broadleaved trees, which are also planted on an embankment.

Close to the northern boundary are two mature black poplar trees, plus a number of early-mature sycamore and ash, with goat willow, a group of planted young rowan and single mature pear tree.

There are very few trees growing on-site close to the eastern boundary, other than solitary early-mature Swedish whitebeam, silver birch and sycamore trees. Beyond the eastern boundary and to the south of St Helen's Boulevard is Spring Wood. This has been planted with mixed broadleaved species. There are also areas of naturally regenerated hawthorn and goat willow scrub.

Despite the restricted access to the school grounds, there is a relatively high public visibility of many of the trees on the site. These are visible from surrounding public viewpoints, including the B6132 Carlton Road, bowling alley and St Helen's Boulevard. Footpaths on the eastern and northern boundaries also offer public viewpoints into the site and there are further views of the site's trees from the houses on Aldbury Close.

1.3 Statutory Tree Protection

The Local Planning Authority (LPA) has previously confirmed (e-mails dated 27/04/09 and 28/04/09) that there are a number of trees on the site protected by Tree Preservation Orders (TPOs). Barnsley MBC TPO 20/1973 protects the trees numbered 88-91 on the Tree Survey, plus a number of individual trees in

the off-site woodland area TPO G116. The LPA have confirmed that site is not located in a Conservation Area.

TPOs place various restrictions on the felling, pruning or damaging of trees, subject to various exemptions (DETR, 2000; DCLG, 2008). Permission is required from the LPA to fell or prune trees covered by the TPO, or to carry out any other operations that may damage the trees. There are a number of exemptions, such as the felling of dead, dying and dangerous trees, but it is recommended that the LPA is consulted on all planned works to agree on whether a formal application for permission is required.

Tree felling on non-residential land is also controlled by the need to obtain a Felling Licence from the Forestry Commission before felling more than $2m^2$ of timber (or $5m^2$ if timber is not sold) per three month period, subject to various exemptions (FC, 2005).

2. THE EXISTING TREE RESOURCE

2.1 Tree Survey Methodology

A tree survey was carried out on the site in accordance with BSS5837:2005 '*Trees in relation to construction – Recommendations*' (BSi, 2005). The tree survey report (Greengage, 2009) should be referred to for the survey methodology.

The trees' overall quality and value for retention was assessed in accordance with BS5837:2005 Table 1. This was dependent on the trees' physiological and structural condition, safe useful life expectancy and arboricultural, landscape, cultural and ecological value. Arboricultural and landscape value takes account of the trees' amenity value, which was determined by tree size, prominence, visibility, appropriateness, attractiveness and screening value. Trees were assigned to the following quality and value categories:

Quality and value	Characteristics
Category A	Those of high quality and value: 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: 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 150mm.
Category R	Those in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural management.

The root protection area (RPA) radius and area for each tree was calculated in accordance with BS5837:2005. The RPA is an area of ground that provides sufficient soil rooting volume to ensure the survival of the tree. Where there are no likely impediments to rooting, a circular RPA is shown on the *Tree Constraints Plan*. Where restrictions on rooting are present, a non-circular shape with an identical area has been plotted to reflect the likely response of the roots to the soil rooting environment.

2.2 Tree Survey Results

The full survey results are shown in the *Tree Survey Report* (Greengage, 2009) and accompanying *Tree Constraints Plan* (Greengage drawing no. 011-02-1-3). An extract of the survey information is provided in the arboricultural impact and works schedule (Appendix A).

The survey assessed 106 individual trees and shrubs, six groups of trees (831m^2 total on-site area) and five hedges (67m length).

Two trees of high quality and value (A category) were identified on the site. These are the two black poplar trees (no.s 89 and 90 on the tree survey) located close to the site's northern boundary. Both trees are protected by TPOs.

Thirty two individually surveyed trees and three groups of trees were assigned to the moderate quality and value category (B category). These include a significant number of middle-age and early-mature sycamore and silver birch trees growing in the belt close to the western boundary. Other trees in this category include early-mature and mature sycamore, ash and pear growing close to the northern boundary and early-mature silver birch and assorted *Sorbus* species growing adjacent to the existing buildings and close to the southern boundary.

Sixty five individually surveyed trees, three groups of trees and all the surveyed hedges were assigned to the low quality and value (C category). These include younger and smaller trees that are easily replaced, those with significant structural defects and wounding (which nevertheless have a safe useful life expectancy of more than ten years) and trees of poor form, such as multi-stemmed trees or those with strongly leaning stems and very irregular crowns.

Seven trees were in a poor condition and require felling because of their condition, irrespective of any development proposal (R category). Many of these are birch trees with significant bark wounds and associated decay at the stem bases, which appear to have been caused by mower and strimmer damage.

3. IMPACT ASSESSMENT

3.1 The Development Proposal

The layout of the development proposal and proposed levels are shown on the project *Sketch Landscape Masterplan* (AWP drawing no. BP4L_SPR_AWP_DR_94_BW_LL_01 Rev.P11) and this arboricultural impact assessment was based on this proposal and associated plans.

It is proposed to develop the site by improving the school facilities. The existing school buildings and facilities will all be demolished and will be replaced with a new school building constructed at the north-eastern end of the site. The building will be accessed by a looped tarmac vehicle drive and tarmac pedestrian paths from the south. Car-parking is proposed alongside the drive and in areas close to the southern boundary, utilising a porous system, and in the south-western corner of the site, with tarmac surfacing.

It is proposed to construct various facilities, including a soft-play area, sensory garden and vegetable patch with polytunnel to the north of the proposed school building. A hard games court and small synthetic sports pitch are proposed for construction to the west of the proposed school building and a grass sports pitch is proposed to the south. A location for an energy centre has been identified to the west of the building and this is accessed by a tarmac vehicle drive and access yard.

It is proposed that there will be some re-levelling of the site in order to accommodate the construction of the new building and sports pitches, but this will be relatively limited as the site has been previously levelled. A small retaining wall is proposed for construction to the south-west of the school building and south of the proposed energy centre.

It is proposed that water, gas, electricity and telecommunication services will enter the site from Carlton Road to the west. It is proposed that excess surface water drainage will discharge to an existing sewer in Aldbury Close the north and foul-water will connect to an existing man-hole in the woodland band on the western boundary.

3.2 Typical Development Impacts

Impacts by trees can be divided into direct and indirect impacts. Direct impacts refer to the removal of trees to facilitate the development and physical damage caused to retained trees during construction works. Indirect impacts refer to future pressures on the trees arising from their location in relation to the proposed use of the site.

Damage can be caused to trees in various ways during construction works. Direct damage to the roots is commonly encountered and is caused by excavation, for example to construct foundations or hardstandings or to install services. Roots are generally most frequent in the upper 600mm of soil, with many encountered at far shallower depth, and significant root damage can be caused by site soil stripping.

Damage to the soil may be as equally damaging to trees as direct root damage. Compaction is a commonly encountered problem and causes long-lasting damage to the soil. The anaerobic conditions which are often caused by compaction are unsuitable for most plant rooting and may cause tree decline. Compaction soil damage by vehicle movement is most common on, but not restricted to, high clay-content and poorly drained soils. Damage to tree rooting conditions is also caused during hard-standing construction where impermeable construction prevents the infiltration of water and oxygen to the roots.

Direct damage to trees by construction at close distance can be minimised or even eliminated by the adoption of special construction methodologies. These include non-dig permeable hardstanding construction, pile and beam foundation design and non-trenched service installation. All these methodologies require careful design and supervision if they are to be used to minimise impact on trees.

Other common causes of tree damage on construction sites are accidental bark damage or branch breakage by vehicles and plant, fire damage, herbicide damage and soil pollution by cement-based products, diesel, hydraulic oil and other chemicals.

Trees may face indirect impacts where their retention in relation to the development causes a significant nuisance to future users of the site. This may lead to future pressure to fell the trees or prune them heavily in a way that destroys their form and much of their value. Another significant indirect impact is where indirect space has been allowed for the future crown-spread of the tree and BS5837 advises that trees should not be retained on the basis that their crown spread can be controlled by periodic pruning unless this is a desired management outcome. It is also important to allow space for trees to grow and develop without causing significant nuisances such as severe loss of light to adjacent property.

3.3 Arboricultural Impacts

The arboricultural impact of the development proposal was determined by overlaying the *Tree Constraints Plan*, proposed *Sketch Landscape Masterplan* and the existing *Topographical Plan* (Malcolm Hughes Land Surveyors drawing no. 9986/1&2), all in CAD. The *Site Sections, Drainage Strategy* and *Combined Services Drawing* were analysed to identify potential conflicts.

Potential direct impacts were identified where construction is proposed within or close to the RPA of existing trees. The existing and proposed levels were also analysed to identify where level changes in or close to the RPA of existing trees could have an impact.

Potential indirect impacts were identified where construction or activity is proposed within or close to the crown-spread of the trees or within the area of potential shade, which on the *Tree Constraints Plan* is shown as a segment from north-west to east, with radius equivalent to current tree height (in accordance with BS5837:2005). Very few of the trees on the site are mature trees that have grown to their maximum height and account was taken of potential future growth to the potential maximum heights given for each species in Appendix B.

Direct impacts

The proposed development will require the removal of nine individually assessed trees which lie on the line of the proposed construction works:

no. 6 - Bastard service tree (C cat.)
no. 48 - Sycamore (C cat.)
no. 59 - Silver birch (C cat.)
no. 60 - Silver birch (C cat.)
no. 86 - Weeping willow (R cat.)
no. 87 – Aspen (C cat.)
no. 92 - Swedish whitebeam (B cat.)
no. 114 - Silver birch (C cat.)
no. 115 - Silver birch (B cat.)

The proposed development will also require the removal of part (approximately 25%) of the group of young mixed broadleaves G68 (B cat.), which lies in the line of construction works.

In addition to the trees, it will be necessary to remove the ornamental shrub bed G103 (C cat.), the Lawson cypress hedge section H112 (C cat.) and the dog rose no. 113 (C cat.).

The felling of eight trees is also proposed because they are in poor condition and require felling irrespective of any development, or they are of low value and their felling will benefit adjacent better quality trees. These trees are:

no. 13 - Himalayan birch (R cat.)
no. 19 - Himalayan birch (R cat.)
no. 26 - Silver birch (R cat.)
no. 32 - Silver birch (R cat.)
no. 45 - Silver birch (R cat.)
no. 78 – Sycamore (C cat.)
no. 86 - Weeping willow (C cat.)

no. 101 - Sycamore (C cat.)

The proposal will involve construction and proposed level changes within the RPA of several trees. These are:

no. 1-2 - Proposed construction of steps
no. 5 - Proposed tarmac footpath construction
no. 51-55 - Connection of foul-water sewer to existing man-hole
no. 88-91 - Proposed tarmac footpath construction and re-grading (part of RPA only)
no. 93-94 - Re-grading to reduce levels (part of RPA only)
no. 105, 106 and 108 - Proposed porous car-park construction

In all these cases it is considered that the impact of the proposed works can be adequately minimised or mitigated by the adoption of appropriate construction methodologies. Revisions to existing construction methodologies may include the construction of hardstandings or steps with minimal or no-dig construction, hand-digging of trenches for drainage installation and supervision to ensure that non-essential re-grading do not take place within the trees' RPA. It is recommended that an arboricultural method statement is produced to detail the methodologies and procedures that are developed and agreed to afford the protection to these trees (see section 4.5). It should be noted that there is potential to cause significant damage to the health and stability of some of these trees (possibly leading to their removal) if appropriate methodologies and retention of existing levels cannot be agreed.

All other proposed construction work will take place beyond the RPA of individual trees to be retained and at least 1.0m beyond the canopy spread of groups of trees and shrubs to be retained. It is therefore possible to adequately protect all retained trees from impacts associated with the construction works. There should be no significant impact on the health of the retained trees, subject to their satisfactory protection in line with the recommendations of this report.

Indirect impacts

No significant indirect impacts on trees to be retained have been identified. The proposed layout provides sufficient space for the retention of trees without them becoming a nuisance that prompts their felling or major tree works in the future.

The belt of trees on the southern-half of the western boundary are all relatively young trees that can be expected to grow from their current height of approximately 7-13m to a maximum height which is likely to exceed 20m as the trees mature. This will undoubtedly create shading to the main school building located to the north-east, but this is not considered to be significant. It should be noted that this group of trees has been planted relatively densely and will require thinning in the future, removing tree stems to allow the balanced and stable growth of the remaining trees.

Impact summary

There is an arboricultural impact associated with the loss of individual trees on the site, but this is low because trees to be felled represent a small proportion of the total number of trees on the site. All the moderate quality trees to be felled are small-growing species or relatively young examples of larger-growing species and do not have significant public amenity value. All other trees to be felled are of low or poor quality and value.

The *Sketch Landscape Masterplan* shows extensive areas of tree planting are proposed, particularly on the site boundaries and at the main entrance to the site. It is considered that the development proposal will lead to a net increase in the local arboricultural resource and an enhancement of the site's amenity value.

4. RECOMMENDATIONS

4.1 Arboricultural works

The arboricultural impact and works schedule (Appendix A) contains recommendations for arboricultural works that are necessary to facilitate the development.

Trees to be removed to facilitate the development or because of their condition are shown on the *Sketch Landscape Masterplan* and the *Tree Protection Plan.*

No urgent works are proposed and all the preliminary work recommendations could be postponed for up to 12 months until a development proposal receives planning permission and development commences.

All works should be carried out by experienced arboricultural contractors and should comply with BS3998:1989 '*British Standard Recommendations for Tree Work*'.

Appropriate permission should be sought were works are planned to trees protected by TPOs (see section 1.3 and Appendix A). Because of the time that has lapsed since the original confirmation (see section 1.3), it is recommended that the presence or absence of TPOs is re-confirmed before any felling or arboricultural works are carried out.

There is an exemption from the above statutory controls on tree felling and pruning for works strictly necessary to implement development that has received full planning permission. It is recommended that no tree felling is carried out until full planning permission has been gained and that trees to be felled are strictly limited to those shown on the *Tree Protection Plan* and listed in this report.

4.2 Tree Protection

It is recommended that all trees and hedgerows on site are protected in accordance with the *Tree Protection Plan*.

Trees to be retained on the site should be protected by protective fencing. This should be erected before any work commences on site, including demolition and preliminary earthworks, and it should remain until all construction has finished.

This fencing should be constructed from 2.4m high Herris-type weld-mesh panels securely attached to a robust timber framework. The framework shall comprise a vertical and horizontal framework posts, well-braced against impact. Vertical posts will be placed at a maximum spacing of 3.0m and driven at least 600mm

into the ground. The *Tree Protection Plan* shows the location and detailing of the proposed fencing.

The area contained by the protective fencing will be referred to as the construction exclusion zone. This zone should protect the RPA and ensure that trees to be retained and their essential rooting zone is not damaged during the works. Within the construction exclusion zone, all damaging operation should be excluded. In particular, the following activities should be prohibited within the zone:

- changes in levels;
- excavation;
- storage of materials
- movement or parking of plant and vehicles;
- siting of site cabins or other temporary buildings;
- mixing of materials and chemicals; and
- disposal of liquids.

In addition to the above no fires should be lit within 20m of the crown of any retained trees.

Utility services and drainage should be planned and routed so they do not pass through the RPA of trees to be retained. Where this is unavoidable, the impact should be assessed and measures taken to reduce the impact. Measures and procedures to be utilised should comply with BS5837:2005 and *'NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees'* (NJUG, 2007) and should be detailed in an arboricultural method statement.

4.3 Protected Species

Trees on the site may be used for nesting by birds during the spring and summer. Nesting birds and their nests are legally protected and wherever possible the felling or pruning trees should be avoided between 1 March to 30 August to avoid an impact on nesting birds. Where it is necessary to carry out the work during this period then advice should be sought from a suitably qualified Ecologist.

Trees may be used by bats for roosting, and both bats and their roosts are legally protected. Bat roosts within trees are usually associated with features such as cavities, cracks, loose bark and dense ivy.

A formal bat roost potential survey has not carried out, but it was noted that trees numbered 88-91 on the tree survey are mature trees with a small number of potential bat roosting features.

It is understood that ecology surveys will be commissioned at a later date and it is recommended that the Ecologist considers the bat roosting potential of all trees proposed for felling or pruning, in advance of this work taking place.

4.4 Replacement planting

The *Sketch Landscape Masterplan* shows extensive tree planting on the site, which will mitigate any tree loss and lead to an enhancement of the site's amenity value.

The detailed landscape proposals have not yet been developed, but it is recommended that the proposed tree planting incorporates the use of a significant proportion of large-growing trees such as appropriate species of oak, ash, lime, maple and beech wherever space and design objectives allow. Such trees generally provide greater public amenity value than smaller-growing ornamental species.

It is recommended that native broadleaved species predominate in the tree planting scheme as they generally have higher biodiversity value. However limited planting with conifers, such as pine and larch, may also be appropriate to provide visual interest and smaller-growing ornamental trees may also be appropriate, especially within more formally landscaped areas close to the proposed school building. Planting of fruit trees on vigorous large-growing root-stocks will also be appropriate, particularly around the vegetable garden to the north of the proposed school building.

4.5 Further details

The arboricultural impact and works schedule (Appendix A) recommends the development and adoption of an arboricultural method statement where construction works are proposed within the RPA of trees to be retained (see section 3.3). This relates to the proposed construction of steps, tarmac footpaths and porous car-parking, as well as connection to an existing sewer and the re-grading of existing ground levels.

It is recommended that an arboricultural method statement is produced and this should detail procedures and methods which are developed and agreed to protect trees and their rooting environment during the construction and demolition works.

5. REFERENCES

Reports, books and standards

BSi. 1989. *BS 3998:1989 British Standard Recommendations for Tree Work.* British Standards Institute.

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Plans and drawings

Barnsley Building Schools for the Future Phase 2 - Springwell School - Tree Constraints Plan. Greengage Arboriculture & Ecology drawing no. 011-02-1-3

Barnsley BSF - Springwell SEN School - Topographical Survey Plan. Anthony Walker and Partners drawing.

Barnsley BSF - Springwell SEN School - Sketch Landscape Masterplan. Anthony Walker and Partners drawing no. BP4L_SPR_AWP_DR_94_BW_LL_01 Rev.P11

Barnsley BSF - Springwell SEN School - Tree Protection Drawings. Anthony Walker and Partners drawing no. BP4L_SPR_AWP_DR_94_BW_LL_08 Rev.P02

Barnsley BSF - Springwell SEN School – Site Sections. Anthony Walker and Partners drawing no. BP4L_SPR_AWP_DR_94_BW_LL_09 Rev.P02

Springwell Combined Services Drawing. No drawing no.

Springwell SEN – Drainage Strategy. BDP drawing no. BP4L_SPR_BDP_DR_93_ BW_LL_001 Rev.P02

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APPENDIX A – ARBORICULTURAL IMPACT AND WORKS SCHEDULE

Appendix A. Arboricultural Impact and Works Schedule

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
1	Sycamore	MA	B_2	2.88	26	Construction of steps proposed within RPA. Minimal excavation of RPA during step construction recommended. Recommend that appropriate construction methodology is agreed and included in an arboricultural method statement. RPA located in area proposed for re-grading with a proposed decrease in levels. Recommend arboricultural method statement to consider retention of existing levels within RPA.	No action
2	Sycamore	MA	B_2	2.76	24	Construction of steps proposed within RPA. Minimal excavation of RPA during step construction recommended. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement. RPA located in area proposed for re-grading with a proposed decrease in levels. Recommend arboricultural method statement to consider retention of existing levels within RPA.	No action

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
3	Sycamore	MA	C_{123}	2.04	13	RPA located in area proposed for re-grading with a proposed decrease in levels. Recommend arboricultural method statement to consider retention of existing levels within RPA.	No action
4	Sycamore	MA	B_2	2.88	26	RPA located in area proposed for re-grading with a proposed decrease in levels. Recommend arboricultural method statement to consider retention of existing levels within RPA.	No action
5	Sycamore	MA	B_2	2.76	24	Proposed tarmac footpath located in RPA close to stem. Minimal excavation of RPA during hard standing construction recommended. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement. RPA located in area proposed for re-grading with a proposed decrease in levels. Recommend arboricultural method statement to consider retention of existing levels within RPA.	No action
6	Bastard service tree	EM	C_{123}	3.12	31	Tree stem located in proposed tarmac footpath.	Fell tree to facilitate development.
7	Stump	MA	R	NA	NA	None	No action
8	Himalayan birch	MA	C_{123}	1.56	8	None	No action

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
9	Himalayan birch	MA	C_{123}	1.32	5	RPA located in area proposed for re-grading with a proposed decrease in levels. Recommend arboricultural method statement to consider retention of existing levels within RPA.	No action
10	Himalayan birch	MA	C_{123}	1.44	7	None	Crown-lift to 2.5m height above proposed tarmac footpath.
11	Himalayan birch	MA	C_{123}	1.2	5	None	No action
12	Himalayan birch	MA	C_{123}	1.2	5	None	No action
13	Himalayan birch	MA	R	NA	NA	None	Fell tree because of poor condition (see *Tree Survey Report*).
14	Sycamore	MA	C_{123}	2.88	26	None	No action
15	Sycamore	MA	C_{123}	3.36	35	None	No action
16	Sycamore	MA	C_{123}	1.92	12	None	No action
17	Sycamore	MA	B_2	3.72	43	None	No action
18	Sycamore	MA	C_{123}	2.64	22	None	No action
19	Himalayan birch	MA	R	NA	NA	None	Fell tree because of poor condition (see *Tree Survey Report*).
20	Silver birch	EM	B_2	2.64	22	None	No action
21	Silver birch	EM	B_2	2.40	18	None	No action
22	Sycamore	MA	B_2	2.76	24	None	No action
23	Sycamore	MA	B_2	3.12	31	None	No action
24	Silver birch	EM	C_{123}	3.24	33	None	No action
25	Silver birch	EM	B_2	3.12	31	None	No action
26	Silver birch	EM	R	NA	NA	None	Fell tree because of poor condition (see *Tree Survey Report*).
27	Sycamore	MA	C_{123}	1.8	10	None	No action
28	Sycamore	MA	B_2	3.24	33	None	No action

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
G29	Mixed broadleaves	Y	C_{123}	CS	CS	None	No action
H30	Lawson cypress cv	Y	C_{123}	CS	CS	None	No action
31	Sycamore	MA	B_2	2.64	22	None	No action
32	Silver birch	EM	R	NA	NA	None	Fell tree because of poor condition (see *Tree Survey Report).*
33	Sycamore	MA	C_{123}	3.6	41	None	No action
34	Silver birch	MA	C_{123}	2.28	16	None	No action
35	Himalayan birch	MA	C_{123}	1.68	9	None	No action
36	Laburnum	MA	C_{123}	1.4	6	None	No action
37	Silver birch	EM	B_2	3.24	33	None	No action
38	Hawthorn	MA	C_{123}	1.7	9	None	No action
39	Silver birch	MA	C_{123}	1.2	5	None	No action
40	Silver birch	MA	C_{123}	1.44	7	None	No action
41	Sycamore	MA	C_{123}	2.88	26	None	No action
42	Laburnum	MA	C_{123}	2.1	14	None	No action
43	Sycamore	MA	C_{123}	2.57	21	None	No action
44	Silver birch	MA	C_{123}	3.6	41	None	No action
45	Silver birch	MA	R	NA	NA	None	Fell tree because of poor condition (see *Tree Survey Report).*
46	Sycamore	MA	C_{123}	2.93	27	None	No action
47	Sycamore	MA	C_{123}	2.09	14	None	No action
48	Sycamore	MA	C_{123}	2.73	23	Proposed 2.4m weldmesh fence at 0.5m.	Fell tree to facilitate development.
H49	Lawson cypress cv	Y	C_{123}	CS	CS	None	No action
50	Silver birch	MA	C_{123}	1.8	10	None	No action

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
51	Sycamore	MA	C_{123}	2.47	19	Potential new foul-water sewer pipe and connection to existing manhole. Install pipe according to NJUG Vol.4. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement.	No action
52	Sycamore	MA	C_{123}	2.04	13	Potential new foul-water sewer pipe and connection to existing manhole. Install pipe according to NJUG Vol.4. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement.	No action
53	Himalayan birch	MA	C_{123}	1.2	5	Potential new foul-water sewer pipe and connection to existing manhole. Install pipe according to NJUG Vol.4. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement.	No action
54	Sycamore	MA	C_{123}	1.56	8	Potential new foul-water sewer pipe and connection to existing manhole. Install pipe according to NJUG Vol.4. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement.	No action

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
55	Sycamore	MA	C_{123}	2.04	13	Potential new foul-water sewer pipe and connection to existing manhole. Install pipe according to NJUG Vol.4. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement.	No action
56	Hawthorn	EM	C_{123}	2.1	14	None	No action
57	Silver birch	EM	B_2	3.00	28	None	No action
58	Silver birch	MA	C_{123}	1.32	5	None	No action
59	Silver birch	EM	C_{123}	1.92	12	Proposed retaining wall within RPA.	Fell tree to facilitate development.
60	Silver birch	EM	C_{123}	2.28	16	Tree stem in line of proposed retaining wall.	Fell tree to facilitate development.
61	Silver birch	Y	C_{123}	1.1	4	None	No action
62	Silver birch	EM	B_2	2.64	22	None	No action
63	Sycamore	MA	C_{123}	2.03	13	None	No action
64	Silver birch	EM	C_{123}	1.56	8	None	No action
65	Silver birch	EM	B_2	2.64	22	None	No action
H66	Lawson cypress cv	Y	C_{123}	CS	CS	None	No action
H67	Lawson cypress cv	Y	C_{123}	CS	CS	None	No action
G68	Mixed broadleaves	Y	B_2	CS	CS	Proposed energy centre and retaining wall within part of tree and shrub group.	Fell part of group (approximately 25%) to facilitate development. Fell trees to 2.5m beyond line of retaining wall.
69	Goat willow	MA	C_{123}	2.8	25	None	No action
70	Alder	MA	B_2	1.92	12	None	No action
71	Silver birch	EM	C_{13}	3.6	41	None	Remove split hanging branch. Reduce split stem to main fork 1.0m below split.

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
72	Sycamore	EM	B_1	5.52	96	None	Remove basal sprouts to improve tree form.
73	Goat willow	EM	C_{123}	3.98	50	None	No action
74	Sycamore	EM	C_{123}	3.36	35	None	Remove basal sprouts to improve tree form.
75	Goat willow	EM	C_{123}	4.23	56	None	Reduce crown-spread by 2.5m on S side to allow planting of proposed hedgerow.
76	Goat willow	EM	C_{123}	4.28	58	None	Reduce crown-spread by 2.5m on S side to allow planting of proposed hedgerow.
77	Sycamore	EM	B_1	3.60	41	None	Remove basal sprouts to improve tree form.
78	Sycamore	MA	C_{123}	1.9	11	None	Fell tree to improve the form and development of tree no. 79 (see *Tree Survey Report*).
79	Sycamore	EM	B_1	4.56	65	Proposed polytunnel within RPA. Tree overhanging proposed polytunnel	Crown-lift tree on south side to 2.0m above proposed polytunnel.
G80	Mixed broadleaves	Y/ MA	C_{123}	CS	CS	None	No action
81	Rowan	MA	C_{13}	1.08	4	None	No action
82	Rowan	MA	C_{13}	1.08	4	None	No action
83	Rowan	MA	C_{13}	1.08	4	None	No action
84	Rowan	MA	C_{13}	0.96	3	None	No action
85	Unknown	Y	C_{13}	0.7	2	None	No action
86	Weeping willow	Y	R	NA	NA	Tree located in area of proposed hardstanding.	Fell tree of poor condition (see Tree Survey Report) to facilitate development.
87	Aspen	Y	C_{13}	1.2	5	Tree proposed for removal for landscape reasons	Fell tree.

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
88	Ash	EM	B_1	5.88	109	Proposed pedestrian tarmac area located in RPA. Minimal excavation of RPA during hard standing construction recommended. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement. Tree protected by TPO.	Crown clean to remove split and hanging branches. Consult LPA before carrying out work to confirm proposed works are exempt from the need to obtain permission.
89	Black poplar	Mat	A_1	10.8	366	Proposed pedestrian tarmac area located in RPA close to stem. Minimal excavation of RPA during hard standing construction recommended. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement. RPA includes area proposed for re-grading with a proposed decrease in levels. Recommend arboricultural method statement to consider retention of existing levels within RPA. Tree protected by TPO.	No action

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
90	Black poplar	Mat	A_1	11.04	383	Proposed pedestrian tarmac area located in RPA close to stem. Minimal excavation of RPA during hard standing construction recommended. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement. RPA includes area proposed for re-grading with a proposed decrease in levels. Recommend arboricultural method statement to consider retention of existing levels within RPA. Tree protected by TPO.	No action
91	Pear	Mat	B_1	5.76	104	Proposed pedestrian tarmac area located in RPA close to stem. Minimal excavation of RPA during hard standing construction recommended. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement. RPA includes area proposed for re-grading with a proposed decrease in levels. Recommend arboricultural method statement to consider retention of existing levels within RPA. Tree protected by TPO.	No action
92	Swedish whitebeam	EM	B_2	4.20	55	Proposed change in levels to create sports pitch reduces levels by approx. 250mm.	Fell tree to facilitate development.

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
93	Silver birch	Mat	B_1	5.10	82	Proposed change in levels to create sports pitch reduces levels within part of RPA. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement.	No action
94	Sycamore	MA	C_{13}	5.67	101	Proposed change in levels to create sports pitch reduces levels within part of RPA. Recommend that appropriate construction methodology is agreed and included in arboricultural method statement.	No action
95	Silver birch	Mat	B_1	4.20	55	None	No action
96	Hawthorn	EM	C_{13}	3	28	None	No action
97	Silver birch	MA	C_{13}	1.56	8	None	No action
98	Silver birch	MA	C_{13}	1.9	11	None	No action
99	Silver birch	MA	C_{13}	1.44	7	None	No action
100	Cherry laurel	EM	C_{13}	2.79	24	None	Coppice shrub.
101	Sycamore	MA	C_{13}	2.4	18	None	Fell tree because of poor condition (see *Tree Survey Report*).
102	Wild cherry	MA	C_{13}	1.8	10	None	No action
G103	Ornamental shrubs	Mat	C_{123}	CS	CS	None	Remove shrub group for landscaping purposes.
104	Cabbage palm	EM	C_{13}	1.68	9	None	No action

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
105	Bastard service tree	Mat	B_1	4.32	59	Porous construction car park proposed within RPA. Minimal excavation of RPA during hard standing construction recommended. Recommend that appropriate construction methodology is agreed and included in Arboricultural Method Statement.	No action
106	Bastard service tree	EM	C_{13}	3.12	31	Porous construction car park proposed within RPA. Minimal excavation of RPA during hard standing construction recommended. Recommend that appropriate construction methodology is agreed and included in Arboricultural Method Statement.	No action
107	Manna ash	MA	B_1	2.40	18	None	No action
108	Silver birch	EM	B_1	3.84	46	Porous construction car park proposed within RPA. Minimal excavation of RPA during hard standing construction recommended. Recommend that appropriate construction methodology is agreed and included in Arboricultural Method Statement.	No action
109	Rowan	EM	B_1	2.88	26	None	No action
110	Silver birch	EM	B_1	3.72	43	None	No action
111	Silver birch	EM	B_1	3.36	35	None	No action
H112	Lawson cypress	MA	C_{123}	CS	CS	Hedge in line of proposed tarmac vehicle access.	Remove hedge to facilitate development.
113	Dog rose	MA	C_{13}	CS	CS	Hedge in line of proposed development.	Remove shrub to facilitate development.

No.	Species	Age class	Categ-ory grade	RPA radius (m)	RPA area (m^2)	Impact	Facilitative and remedial arboricultural works
114	Silver birch	MA	C_{13}	1.32	5	Tree in line of proposed tarmac vehicle access.	Fell tree to facilitate development.
115	Silver birch	EM	B_1	3.00	28	Tree in line of proposed porous car park.	Fell tree to facilitate development.
G116	Mixed broadleaves	Y/ MA	B_2	CS	CS	Off-site woodland - No impacts. Woodland includes individual trees covered by TPO.	No action
G117	Mixed broadleaves	MA	B_2	CS	CS	Off-site woodland - No impacts	No action

Key: Y - young MA - Middle-age EM - early mature Mat - mature CS - over mature

APPENDIX B – SPECIES LIST AND POTENTIAL TREE HEIGHT

Appendix B. Potential ultimate height for tree and large shrub species and cultivars on the survey site

Species	Common name	Potential mature tree height (m)		
		Estimated for site*	UK (NHBC, 2006)**	UK (More & White, 2003)***
Acer campestre	Field maple	12		14
Acer platanoides	Norway maple	22	18	25
Acer pseudoplatanus	Sycamore	28	22	35
Alnus glutinosa	Alder	20	18	25
Betula pendula	Silver birch	18	14	25
Betula utilis	Himalayan birch	15		20
X Cupressocyparis leylandii	Leyland cypress	25	20	40
Chamaecyparis lawsoniana	Lawson cypress	25	18	40
Chamaecyparis lawsoniana cv.	Lawson cypress cultivar	15		≤20 (variable)
Cordyline australis	Cabbage palm	8		12
Corylus avellana	Hazel	12	8	15
Crataegus monogyna	Hawthorn	12	10	15
Fraxinus excelsior	Ash	25	23	30
Fraxinus ornus	Manna ash	12		16
Laburnum anagyroides	Common laburnum	9	12	9
Populus nigra	Black poplar	25	25	25
Populus tremula	Aspen	18		25
Prunus avium	Wild cherry	18	17	25
Prunus insititia	Damson	8	10	6
Prunus laurocerasus	Cherry laurel	6	8	6
Prunus padus	Bird cherry	10		10
Pyrus communis	Pear	12	12	≤15
Quercus petraea	Sessile oak	28		30
Ribes sanguineum	Flowering currant	4		
Rosa canina	Dog rose	6		
Salix sepulcralis 'Chrysocoma'	Weeping willow	16	16	20
Salix caprea	Goat willow	10		10
Salix fragilis	Crack willow	22	24	25
Sambucus nigra	Elder	6		
Sorbus aucuparia	Rowan	12	11	15
Sorbus intermedia	Swedish whitebeam	12		15
Sorbus x thuringiaca 'Fastigiata'	Hybrid service tree	10		10
Tilia x europaea	Common lime	28	22	40

Viburnum opulus	Guelder rose	4		

* - Maximum height of trees and shrubs growing under similar conditions in the local area. Estimate takes account of site exposure and ground conditions.
** - Average height attained by healthy trees growing in favourable ground and environmental conditions.
** - Height generally attained by healthy open-grown trees growing in their appropriate conditions and climatic range.