

Confidential

BOURNE ESTATE (SOUTH)

REGENERATION

ARBORICULTURAL IMPACT

ASSESSMENT



For



Project No:

10907

November 2012

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1.0 INTRODUCTION

- 1.1. Middlemarch Environmental Ltd ('Middlemarch') was commissioned by Campbell Reith Hill LLP ('CampbellReith') on behalf of the London Borough of Camden to undertake an Arboricultural Impact Assessment (AIA) in respect of the proposed development of land at the Bourne Estate, Holborn, situated in the London Borough of Camden.
- 1.2. The report details the impact that the proposed development will have upon the sites existing tree stock and sets out recommendations for the subsequent mitigation or avoidance of impact and recommendations for suitable protection measures.
- The study has been completed in accordance with guidance contained within British Standard BS5837: 2012 'Trees in relation to design, demolition and construction – recommendations'.
- 1.4. The Arboricultural Impact Assessment should be read in conjunction with the following documents:
 - Arboricultural Survey (May 2012) (Ref: RT-MME-111475A-02 Rev 1) undertaken by Middlemarch Environmental ; and
 - Design and Access Statement submitted in support of the planning application.
- 1.5. The Arboricultural Impact Assessment can be found in Appendix A.



2.0 SUMMARY AND CONCLUSIONS

TREE PRESERVATION ORDER AND CONSERVATION DESIGNATIONS

- 2.1. Consultation with Camden Council confirmed that there are no Tree Preservation Orders affecting the site, however it is noted that part of the site, containing several trees, is located within the Hatton Garden Conservation Area.
- 2.2. The trees within the site that are protected by virtue of being within the Conservation Area are trees 25-34 and those trees within Group 8 and those labelled as T1, T2. T3 and T4.

ARBORICULTURAL IMPLICATIONS ASSESSMENT

2.3. The proposed development will require the removal of trees across the site to permit its successful implementation. Overall the removal of twenty-three trees and eight groups is proposed.

ARBORICULTURAL METHOD STATEMENT

- 2.4. An Arboricultural Method Statement will be required for the site as various aspects of the proposed development will require works to be undertaken within the RPAs of retained trees. The purpose of a method statement is to ensure that all site operations can occur with minimal risk of adverse impact upon trees that are to be retained. The document will identify all areas where specific working methods will be required to ensure protection to trees. The document will also specify the location and extent of tree protection barriers and ground protection.
- 2.5. In relation to this development the method statement should address the following:
 - Suitable site access, material storage and site compound locations.
 - Protective barrier and ground protection locations and specifications.
 - Method for removal and alteration of existing hard surfaces within RPAs.
 - Method for construction of new hard surfaces within RPAs.
 - Proposed tree works.
 - Pre-commencement site meeting.

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APPENDIX A: ARBORICULTURAL IMPACT ASSESSMENT (MIDDLEMARCH ENVIRONMENTAL LTD)

ARBORICULTURAL IMPACT ASSESSMENT

THE BOURNE ESTATE HOLBORN LONDON

A Report to CampbellReith

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Report Number: RT-MME-113148

November 2012

ARBORICULTURAL IMPACT ASSESSMENT

THE BOURNE ESTATE HOLBORN LONDON

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1 OF 2

01 CAMPBELLREITH 02 MIDDLEMARCH ENVIRONMENTAL LTD

This study was conducted and compiled by Ed Lusk HND.Arb, PTI

This report is the responsibility of Middlemarch Environmental Ltd, It should be noted, that whilst every effort is made to meet the client's brief, no site investigation can ensure complete assessment or prediction of the natural environment

Contract Number C113148

November 2012

Middlemarch Environmental Ltd

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1. INTRODUCTION

1.1 **PROJECT INTRODUCTION**

In November 2012 Middlemarch Environmental Ltd was commissioned by CampbellReith to compile an Arboricultural Impact Assessment in respect of the proposed development of land at The Bourne Estate, Camden, London.

This report details the impact that the proposed development will have upon the sites existing tree stock and sets out recommendations for the subsequent mitigation or avoidance of impact and recommendations for suitable protection measures. The study has been completed in accordance with guidance contained within British Standard BS5837:2012 'Trees in relation to design, demolition and construction – Recommendations'.

1.2 SITE DESCRIPTION

The area under consideration, hereafter referred to as the site, is the southern section of The Bourne Estate; an Edwardian housing estate located in the Hatton Garden area of Holborn. The Bourne Estate was historically constructed between 1905 and 1909 and the majority of the original housing blocks forming the estate have been Grade II listed.

The southern section of the estate, which is located to the south of Portpool Lane, contains a mixture of original, Grade II listed, buildings and more recent development including two post-war housing blocks, Mawson House and Gooch House, ancillary buildings, including the tenants and residents association hall, and sports and play facilities.

The site, which extends to approximately 1.1ha in size, is located in central London at Ordnance Survey Grid Reference TQ 311 818.

The site is within administrative district of the London Borough of Camden, within the Holborn and Covent Garden Ward, and it is bounded by Portpool Lane to the north, Laney House to the east, Baldwin's Gardens and Verulam Street to the south and the buildings which front onto Grays Inn Road to the west.

The site is currently dominated by hardstanding with a number of buildings and areas of amenity grassland, shrub beds and scattered trees also present. The mature trees present across the site are predominantly specimens of London Plane (*Platanus x hispanica*) growing as street trees.

Scattered tree planting is also present within the amenity spaces on site. Species in these areas included Almond (*Prunus dulcis*), Silver Birch (*Betula pendula*), Cherry (*Prunus* spp.), Honey Locust (*Gleditsia triacanthos*), Norway Maple (*Acer platanoides*) and Silver Maple (*Acer saccharinium*).

The location of the trees within the site can be found on Middlemarch Environmental Ltd Drawing Number C113148-01.

1.3 DEVELOPMENT PROPOSALS

The proposed development of the site is relocation of the Multi Use Games Area (MUGA), construction of up to 75 new residential units and associated hard and soft landscaping improvement works.

The proposed development will require the demolition of several existing buildings across the site including the Tenants and Residents Association Hall, an electricity sub-station, the storage building and Mawson House.

The new residential units are to be provided in two new apartment Blocks. Block 1 will be located in the north-western quadrant of the site, fronting on to Portpool Lane, and Block 2 will be located on the southern boundary of the site, fronting onto Baldwin's Gardens. In keeping with the existing development of the wider Bourne Estate the proposed new Blocks will each be ground plus five storeys high.

1.4 DOCUMENTATION PROVIDED

This assessment is based upon the information provided by the client in addition to information collected by Middlemarch Environmental Ltd during a survey of the site undertaken in April 2012. The documents and drawings considered are detailed within Table 1.1.

| Author | Document | Drawing Number | Date |
|---------------------|-----------------------------------------------|----------------|------------|
| CampbellReith | Option 2 – Demolition of MUGA and Playground | GIS031 | July 2012 |
| CampbellReith | Option 2 – Construction of New MUGA | GIS032 | July 2012 |
| CampbellReith | Option 2 – Construction of Block 1 | GIS033 | July 2012 |
| CampbellReith | Option 2B – Demolition of MUGA and Playground | GIS034 | July 2012 |
| CampbellReith | Option 2B – Construction of New MUGA | GIS035 | July 2012 |
| CampbellReith | Option 2B – Construction of Block 1 | GIS036 | July 2012 |
| dally henderson llp | External Levels Strategy | 440-102 | Nov 2012 |
| dally henderson llp | Planting Plan | 440-003 | Nov 2012 |
| dally henderson llp | Landscape General Arrangement | 440-100B | Nov 2012 |
| MKSurveys | Topographical and Utility Survey | 17034 | April 2012 |

| Table 1.1: | Documentation | Provided |
|------------|---------------|----------|
|------------|---------------|----------|

2. STATUTORY PROTECTION

2.1 TREE PRESERVATION ORDER AND CONSERVATION AREA DESIGNATIONS

Consultation with Camden Council, in May 2012, confirmed that there are no Tree Preservation Orders affecting the site. However it is noted that part of the site, containing several trees, is located within the Hatton Garden Conservation Area.

The existence of the Conservation Area confers a degree of statutory legal protection upon the trees growing within it. In particular it should be noted that prior to undertaking any works to trees within a Conservation Area it is necessary to submit a section 211 notice to the Local Planning Authority giving six weeks' notice of the proposed works. In practice the submission of a planning application containing fully specified details of proposed tree works will usually meet this requirement.

The trees within the site that are protected by virtue of being within the Conservation Area are numbers 25, 26, 27, 28, 29, 30, 31, 32, 33 and 34. Additionally those trees within G8 and the additional trees labelled as T1, T2, T3 and T4 on Middlemarch Environmental Ltd Drawing Number C113148-01 are situated within the Conservation Area.

2.2 PROTECTED SPECIES

Bats

Mature trees often contain cavities, hollows, pealing bark or woodpecker holes which provide potential roosting locations for bats. Bats and the places they use for shelter or protection (i.e. roosts) receive European protection under The Conservation of Habitats and Species Regulations 2010 (Habitats Regulations 2010). They receive further legal protection under the Wildlife and Countryside Act (WCA) 1981, as amended. Consequently causing damage to a bat roost constitutes an offence.

It is noted that the Extended Phase 1 Habitat Survey undertaken by Middlemarch Environmental Ltd in May 2012, Report Number RT-MME-111475A-01, concluded that none of the trees on site contained features suitable for use by roosting bats.

Generally should the presence of a bat roost be suspected whilst completing works on any trees on site then an appropriately licensed bat worker should be consulted for advice.

<u>Birds</u>

Trees and hedgerows offer potential habitat for nesting birds which are protected under the Wildlife and Countryside Act WCA 1981 (as amended). Some species (listed in Schedule 1 of the WCA) are protected by special penalties. This legislation makes it an offence to intentionally or recklessly damage or destroy an active bird nest or part thereof.

As the trees and shrub beds on and adjacent to the site provide potential habitat for nesting birds all tree work should ideally be completed outside the nesting bird season (March to September inclusive). If this is not possible then the vegetation should be subject to a nesting bird inspection by a suitably experienced ecologist prior to commencement of works. If any active nests are identified then the vegetation, and a defined buffer zone, will need to remain in place until the young have naturally fledged.

3. ARBORICULTURAL IMPACT ASSESSMENT

All trees within and closely surrounding the site have been surveyed and each has been identified with a unique number. The location of the trees can be found on Drawing Number C113148-01. A schedule of the trees surveyed can be found within Appendix 1.

3.1 DEVELOPMENT DESIGN AND LONG-TERM IMPACTS

3.1.1 Potential Impact on the Amenity Value of Trees

Impacts

Tree Removal

The proposed development will require the removal of trees across the site to permit its successful implementation. Overall the removal of twenty-three trees and eight tree groups is proposed. The majority of the trees to be removed are located within the sites internal amenity areas and as such they do not typically have a high degree of visual prominence in the local landscape.

However it is noted that several trees in close proximity to the sites boundaries with adjacent properties, including St Alban's Church of England Primary School, will need to be removed and these specimens are considered to have a moderate visual amenity value.

Tree removal is required for six main reasons as discussed below:

- **Tree Condition:** Three of the trees to be removed (numbers 8, 10 and 12) are Category U specimens which are in a poor condition. The removal of these trees would be required in the short-term irrespective of the proposed development and as such their removal should not be a material consideration in the planning process.
- Bourne Estate Gardens Enhancement: The proposed development includes works to enhance the usability of Bourne Estate Gardens to provide new community facilities and opportunities. As part of the landscape strategy for this it has been identified that the removal of the lower value trees within this area is desirable.

In this respect, in addition to the removal of the Category U trees of no retention value, the removal of six trees is proposed. Four of the trees to be removed (numbers 2, 4, 14 and 15) to achieve the Bourne Estate Gardens Enhancement are Category B specimens and two (numbers 5 and 13) are Category C specimens. Additionally the removal of four Category C tree / shrub groups (G1, G2, G3 and G4) is proposed.

Whilst the retention of Category B trees, which are of a moderate quality and value, is usually desirable it can be seen that the landscape design has aimed to remove those Category B trees that are of limited visual significance within this area.

- Relocation of MUGA: As part of the proposed development it is necessary to relocate the existing MUGA to provide space for the construction of Block 1. The area which the MUGA is to be relocated to is currently in use as an amenity area and it contains a number of young trees which will require removal. Overall four trees (numbers 20, 21, 22 and 23) and two tree groups (G5 and G6) will require removal to permit relocation of the MUGA. All of these trees are Category C specimens of a low retention value and as such they should not necessarily be considered as a constraint to development.
- Construction of Block 1: Following relocation of the MUGA the construction of Block 1 is proposed. This aspect of the development will require the removal of four trees. Three Category C specimens (numbers 17, 18 and 19) and one Category B specimen (number 16).
- Construction of Block 2: The construction of Block 2, to the south of the site, will require the removal of five trees and two groups. Two of the trees to be removed (numbers 24 and 27) are Category B specimens and the reminder (numbers 25, 26 and 28) are Category C specimens. The two groups to be removed (G7 and G8) are both considered to be of Category C value.
- Courtyard Enhancement: The final aspect of development that will require the removal of trees is the enhancement of the existing courtyards around Buckridge House and Kirkeby House. In this respect the landscape strategy has identified that a single Silver Birch tree (T1) requires removal due to its poor spatial relationship to the existing development. Whilst not surveyed in detail as part of the initial arboricultural survey of the site, as this area was outside of the study area assessed at this time, it is considered that this tree is of a low, Category C, retention value due to its location within a small raised planter and its close juxtaposition to the existing development.

Overall the proposed development will require the removal of seven Category B trees, thirteen Category C trees and three Category U trees.

All trees and groups to be removed are shown on the Tree Removal Plan, Drawing Number C113148-01.

Tree Works

To permit space for the installation of scaffolding around Block 1 it may become necessary to undertake some access facilitation pruning to tree number 35. The works required will not be so significant as to impact upon the visual quality of the tree and thus no adverse amenity impact is likely.

The need for access facilitation pruning works should be considered and fully specified within an Arboricultural Method Statement for the site.

Mitigation/Avoidance

As mitigation of for the loss of trees across the site, and to deliver general landscape enhancements, a detailed landscape masterplan has been prepared by dally henderson landscape architects. An assessment of this document shows that extensive new tree and shrub planting is proposed across the site. It is considered that the proposed landscape planting will, over time, fully mitigate the visual loss associated within the proposed tree removal.

3.1.2 Proximity of Trees to Proposed Structures

Impacts

Branch Spread

The ultimate branch spread of the retained London Plan tree, number 35, may conflict slightly with the proposed new Block 1 building. However it is noted that this is a mature tree which has already attained its likely maximum size for the location in which it is growing and as such any conflict can be appropriately managed through minor pruning works to the trees canopy in the future. So long as such works are completed in accordance with best practice guidance they will not cause significant harm to the health or amenity value of the tree.

Shading

No significant shading of the proposed new buildings is likely to occur due to existing trees or due to the establishment and growth of the new trees proposed within the landscape masterplan. Where any shading of buildings does occur it is likely to be transient and it should be noted that the extent of shading likely will vary with tree species, canopy shape and size, foliage density, time of year and sun elevation and that such shading will often be seasonal and diffuse. Also it is important to note that existing and new trees could be used to provide privacy and screening, reduce overlooking between neighbouring properties and/or for screening of undesirable views.

Fruits, Pollen, Sap etc.

No significant problems with fruit fall, pollen dispersal or sap exudation are likely to occur across the site.

Mitigation/Avoidance

Access facilitation works will be required to tree number 35 to permit scaffolding installation, this will reduce canopy away from proposed building so that no further works are required to address issues with current branch spread. Some very minor lateral reduction of tree canopies maybe required in the future.

3.2 POTENTIAL IMPACTS FROM CONSTRUCTION PROCESSES OF THE PROPOSED DEVELOPMENT

3.2.1 Potential Root and Canopy Protection

To prevent harm occurring to retained trees during development it is recommended that construction works are excluded from the Root Protection Areas (RPA) of retained trees. Additionally works should not be undertaken beneath the canopy spread of retained trees where this can be avoided.

The RPA represents the minimum area around trees that must be left undisturbed to ensure their survival. The roots typically occupy the top 600 mm of soil and the fine roots which absorb water, oxygen and nutrients are situated in the top 100 mm of soil. Any incursion into the rooting zone of a tree can cause a notable impact upon a trees health.

The RPA and canopy spread of each tree to be retained is shown on Drawing Number C113148-02. Additionally details of the crown spread measurements are contained within Appendix 1 and a schedule of RPAs for trees on the site is located at Appendix 2.

Impacts

The proposed construction of the relocated MUGA and the construction of Block 2 will not require works to be undertaken in close proximity to retained trees. All aspects of the proposed works in respect of their construction will be located outside of the Root Protection Areas (RPAs) and canopies of the retained trees.

The proposed construction of Block 1 requires that works are undertaken in close proximity to a retained London Plane tree, tree number 35. Whilst works to construct the building, and its foundations, will be located outside of the trees RPA and canopy it will not be possible to erect tree protection fencing to the full extent of the trees RPA. However as the tree is located within an area of existing hard standing, which can be retained during the initial stages of development, it is considered that the potential for harm to occur to the trees root system can be adequately controlled.

Elsewhere across the site the proposed landscape enhancement will require works to be undertaken within the RPAs of retained trees. In particular new hard landscaping and the construction of paths and car parking spaces will involve works within the RPAs of several retained trees including numbers 1, 3, 6, 9, 32, 33, 34 and 35. The potential impact of such works and the recommended measures for mitigation/avoidance are discussed within Sections 3.2.2 to 3.2.12.

Mitigation/Avoidance

Construction Exclusion Zones

To minimise the potential for harm to occur to the root systems and canopies of retained trees during development it will be necessary to implement Construction Exclusion Zones throughout the site. These are areas surrounding the trees' RPAs and canopies in which no construction works, or related activities, will be undertaken.

It is recommended that the exclusion zones are to be afforded protection at all times through the use of tree protection barriers and/or ground protection (specified in accordance with BS5837:2012).

Drawing C113148-02 provides a draft Tree Protection Plan indicating the potential location of protective barriers and ground protection.

3.2.2 Site Construction Access

Impacts

The proposed development is to be constructed in phases with the demolition of the existing caretakers and storage buildings and of the Tenants and Residents Association Hall being undertaken first. Following this the relocated MUGA will be constructed prior to construction of Block 1. Upon completion of this work Mawson House will be demolished and the construction of Block 2 will commence.

Due to the complexities of the site and the need to maintain safe access for residents and emergency services throughout the development several options for site access are proposed as detailed upon Drawing Numbers GIS031 – GIS036 produced by CampbellReith.

In general it can be seen that the proposed access routes maximise the use of the existing road network and in all cases vehicle movements will only occur over existing sealed hard surfaces. Where vehicles need to pass within close proximity to retained trees, particularly T2, T3 T4 and 35, it can be seen that the potential for branch damage to occur is minimal as the trees have high canopies with a minimum of 5.0m clearance between ground level and their lowest branches. Additionally this means that it will not be necessary to undertake tree pruning works to provide canopy clearance for vehicles accessing the site.

Protective barriers should be installed to prevent vehicles accidentally encroaching into areas of unprotected ground within the RPAs of retained trees and to minimise the potential for collision damage to trees stems occurring.

Mitigation/Avoidance

All trees surrounding the access routes should be adequately fenced and ground protection installed (where required) to ensure that no damage to these specimens occurs during construction.

An Arboricultural Method Statement should be prepared to detail the tree protection measures to be implemented on the site.

3.2.3 Contractors Parking

Impacts

The location of contractor parking is yet to be determined but it is understood that it will be located outside of the exclusion zones. In this respect the nature of the site is such that there are ample opportunities to accommodate contractors parking within the site in areas away from retained trees.

Mitigation/Avoidance

Installation of barriers to ensure no parking occurs within the exclusion zones.

3.2.4 Site Cabins and Toilets

Impacts

Two options for the location of the site compound during the works to relocate the MUGA and construct Block 1 have been presented. In both cases it can be seen that site cabins will primarily be located outside of the exclusion zones. However during the construction of Block 1 it may be necessary to provide site accommodation within the exclusion zone adjacent to tree number 35. However as the area in which the site cabins may be located is already hard surfaced it is considered that the potential for harm to occur to the trees root system as a result of this is minimal.

The location of the contractor's compound during the construction of Block 2 is yet to be determined but it is understood that it will be outside the exclusion zones. If this is the case the site compound will not impact upon the retained trees.

Mitigation/Avoidance

Installation of protective barriers to ensure that trees are protected from physical damage resulting from works to establish a site compound. Where they can be located upon existing hard surfaces site cabins may be used to form part of the protective barrier.

3.2.5 Delivery and Storage of Materials

Impacts

The proposed locations for site deliveries and materials storage during the relocation of the MUGA and construction of Block 1 are identified upon the plans prepared by CampbellReith. The only potential conflict with retained trees relating to materials delivery and storage arises if Option 2B is adopted as this will involve provision of a delivery area adjacent to tree number 35. However it can be seen that the area for deliveries will utilise the existing hard surfaces, thus protecting the trees root system from harm, and that the height of the trees canopy is such that branch damage is unlikely to occur.

Mitigation/Avoidance

Ensure no storage occurs upon un-surfaced ground within the defined RPAs of the retained trees via the installation of protection barriers.

3.2.6 Demolition of Existing Structures

Impacts

The proposed development of the site will require the demolition of several buildings, the largest of which is Mawson House. The buildings to be demolished are not located in close proximity to any of the trees to be retained and it is not anticipated that any harm to retained trees, as a direct result of building demolition, will occur.

The proposed development will also require the demolition of a section of retaining wall to the periphery of the RPA of tree number 6. This work has the potential to impact upon the root system of the tree as it is located within a grassed area and any vehicular or machinery movements could cause compaction of the underlying soil.

Mitigation/Avoidance

To prevent any ancillary works associated with the demolition of the buildings from harming trees it will be necessary to install protective barriers prior to commencement of demolition works.

To prevent harm occurring to tree number 6 during works to demolish the section of wall it will be necessary to ensure that all works in this area are undertaken using hand tools, that only pedestrian access is permitted within the area and that ground protection is installed.

3.2.7 Removal of Hard Surfaces

Impacts

The removal of an existing paved path within the Bourne Estate Gardens will result in works being undertaken within the RPAs of tree numbers 1, 6 and 9.

The enlargement of the tree planting pits around trees T2, T3 and T4 will result in works within their RPAs and the preparatory works for the installation of new car parking spaces will require works within the RPAs of tree numbers 32, 33 and 34.

Also the removal and replacement of existing hard surfaces within the RPA of tree number 35 is proposed.

The removal of existing hard surfaces has the potential to result in root damage, particularly where roots are found to be growing at shallow depths beneath the existing surfaces. This may be particularly likely where the existing areas of hardstanding are aged and macadam surfaced as the condensation of soil moisture upon the underside of the macadam during hot weather, in conjunction with the presence of air spaces within the MOT sub-base, provide ideal conditions for the proliferation of opportunistic roots.

The presence of significant tree root activity immediately beneath macadam surfaces is typically evident from a visual inspection as incremental growth in root girth soon causes disruption and bulging of the surface.

The hard surfaces areas around trees T2, T3 and T4 are typically paved and whilst some lifting of paving, where it is in very close proximity to the stems of the trees, has occurred no significant disturbance across a wider area is evident. As such, and given that the works proposed in this area are necessary to increase the size of the planting pits in which the trees are growing it is not considered that there is a high potential for harm to occur to the trees.

The hard standing areas around tree numbers 32, 33 and 34 are currently macadam surfaced. There is little evidence of any significant root activity at a shallow depth although some disruption of the surfacing where it abuts the stems of the trees is evident. Subject to appropriate working methods being followed it is not considered that the proposed surface removal works in this area have the potential to impact significantly upon the trees.

The existing hard standing around tree number 35 is mainly macadam surfaced. Some disruption of the existing surface, particularly to the north of the tree, is evident and this may indicate the presence of shallow roots. To minimise the potential for root damage to occur it will be essential that works within this area are supervised and completed in accordance with a specific working methodology.

Mitigation/Avoidance

To prevent direct damage occurring to the stems of trees protective barriers should be installed prior to commencement of surface removal or alteration works.

The works to remove or alter hard surfaces shall be phased so that they occur towards the end of the construction as their retention throughout the main part of development will provide protection to any underlying tree roots.

All works to remove or alter hard surfaces within the RPAs of retained trees shall be completed under supervision and in accordance with a detailed specification to be set out in an Arboricultural Method Statement for the site.

3.2.8 Construction of Buildings

Impacts

Buildings

The proposed construction of Block 1 will require the erection of scaffolding and the provision of working space within the RPA of tree number 35. The areas likely to be affected by this work are already hard surfaced and as such it is considered that the potential for harm to the trees root system is minimal.

Mitigation/Avoidance

To minimise the risk of damage occurring to the trees crown during the erection of scaffolding it will be necessary to undertake some access facilitation pruning works, of a minor nature, to the tree.

The potential for direct damage to the stem of the tree will be controlled by the installation of protective barriers.

3.2.9 Construction of Roads, Footpaths and Hardstanding Areas

Impacts

There are several areas within the development where the construction of new areas of hardstanding is proposed within, or near to, the RPAs of retained trees.

The presence hard surfaces within the RPA of a tree can cause problems with gaseous exchange and water penetration and absorption. BS5837:2012 advises that no hard surface should exceed 20% of any existing un-surfaced ground within the RPA.

It can be seen that in most areas across the site the proposed works area the removal and replacement of the existing hard surfaces rather than construction of new areas of hardstanding and in these areas the potential for significant harm to occur to the retained trees can be controlled through adoption of appropriate working techniques.

However within Bourne Estate Gardens it is proposed to create a network of new informal footpaths and this will involve more extensive works, to bare ground, within the RPAs of tree numbers 1, 3 6 and 9.

To minimise the impact that the proposed development will have upon the retained trees it is essential that the proposed hard surfaces across the site are designed so that they are permeable and so that they can be installed in accordance with a no-dig methodology.

Mitigation/Avoidance

Wherever it is intended to undertake construction operations within the Root Protection Areas of trees precautions must be taken to maintain the condition and health of trees root systems.

In particular:

- Works shall be conducted in such a manner as to prevent physical damage to roots during demolition or construction, such as soil compaction or root severance.
- Provision for water and oxygen to reach the roots must be made and the soil structure must not be disturbed.
- Provision must be made for future root growth and precautions taken to ensure that such root growth does not cause unacceptable levels of damage to the finished construction.

• The soil must not be compacted and soil bulk density must be maintained at suitable levels for tree root growth and function. In this respect a soil bulk density of over 1.8g/cm3 is likely to impede root growth and function.

To achieve the above requirements for tree root growth and function the proposed new hard surfaces shall be designed so that:

- No excavation of bare ground is required for their installation; to ensure that physical root damage does not occur.
- The surface can be installed without compaction of the existing soils; thus ensuring damage to the soil structure does not occur.
- The surface is permeable; thus ensuring that oxygen and water can reach the root system and that CO² can diffuse vertically out of the soil as high concentrations can cause root suffocation.

There are various methods of creating such a surface however one that is commonly in use and is therefore recommended here is the use of a three dimensional cellular confinement system, such as CellWeb produced by Geosynthetics, to provide for load suspension above the existing soil grade and reducing vertical loads on the underlying soils.

It should be noted however that even should such an approach be adopted some impact upon the trees is likely and whilst they are of species that will typically adapt to changes in their growing environment some short term loss of vigour could be expected.

In summary mitigation measures shall be to utilise a 'no dig' construction technique to construct all areas of hard surface within the RPAs of the retained trees.

An appropriate method statement and protection plan should be developed to ensure all retained trees are suitably protected during the development. In accordance with BS5837:2012 all areas of construction activity within the RPA should be supervised by a suitably experienced arboriculturist.

3.2.10 Boundary and Ancillary Structures

Impacts

It is understood that it is proposed to install 2.4m high railings and gates to the perimeter of Bourne Estate Gardens; this will require works to be undertaken within the RPAs of tree numbers 1, 3 and 6. Elsewhere across the site no new boundary structures are proposed in proximity to retained trees.

In addition to the installation of railings to the perimeter of Bourne Estate Gardens it is noted that the landscape masterplan prepare for the site proposes the construction of a semi-circular 2.4m tall timber shelter around the stem of tree number 9. As this is a timber structure the nature of construction is likely to be similar to that of the fence installation.

Mitigation/Avoidance

The location of any concrete foundations and posts needs to be carefully considered to ensure no damage to the adjacent trees occurs. In particular new fence posts should not be constructed within 1m of the stem of any retained tree. This will reduce the amount of excavation for post foundations required within the RPAs of the retained trees. Excavation in these areas will need to occur by hand and under arboricultural supervision to ensure no root damage occurs.

Special construction techniques may be required where fence posts are likely to sever significant roots (in order to 'bridge' these areas and avoid severance of any significant roots close to trunks).

3.2.11 Site Gradients

Impacts

An examination of the proposed levels shows that no significant level changes within the RPAs of the retained trees are proposed. In particular no reductions in ground level within the RPAs of retained trees would appear to be required.

Some limited increase in ground level is proposed in some areas near to trees and this may actually be of benefit in permitting new hard surfaces to be constructed above existing grade using a no-dig methodology.

Mitigation/Avoidance

It is advised that where possible no level changes occur within the RPAs of the trees.

If any changes in levels within the defined RPA of the retained trees are required then a suitably experienced arborist should be consulted.

3.2.12 Service Requirements

Impacts

As the site was previously developed there are existing service connections throughout it and it as such it is considered that various opportunities to create new service connections without harming trees exist.

Mitigation/Avoidance

It is advised that the installation of any new services and drainage occur outside the RPAs of the retained trees. It is also advised that CCTV and lighting columns should not be situated in locations which will place future pressure on trees for crown pruning due to visibility/ shadowing.

4. ARBORICULTURAL METHOD STATEMENT

An Arboricultural Method Statement will be required for the site as various aspects of the proposed development will require works to be undertaken within the RPAs of retained trees.

The purpose of a method statement is to ensure that all site operations can occur with minimal risk of adverse impact upon trees that are to be retained. The document will identify all areas where specific working methods will be required to ensure protection to trees. The document will also specify the location and extent of tree protection barriers and ground protection.

In relation to this development the method statement should address the following:

- Suitable site access, material storage and site compound locations.
- Protective barrier and ground protection locations and specifications.
- Method for removal and alteration of existing hard surfaces within RPAs.
- Method for construction of new hard surfaces within RPAs.
- Proposed tree works.
- Pre-commencement site meeting.

REFERENCES AND BIBLIOGRAPHY

Arboricultural Advisory Information Services. (2007). 'Practice Note 12. Through Trees to Development'.

British Standards Institution. (2012). *British Standard 5837:2012, Trees in relation to design, demolition and construction – recommendations.* British Standards Institution, London.

Johnson & More (2004). Tree Guide, Collins. London

Middlemarch Environmental Ltd (2012) *Report Number RT-MME-111475A-01. Extended Phase 1 Habitat Survey – Bourne Estate.*

Middlemarch Environmental Ltd (2012) *Report Number RT-MME-111475A-02. Arboricultural Survey* – *Bourne Estate.*

NJUG Volume 4 (2007) Guidelines for the Planning, Installation and Maintenance of Utility Services in Proximity to Trees.

DRAWINGS

Drawing Number C113148-01 - Tree Removal Plan

Drawing Number C113148-02 - Draft Tree Protection Plan





APPENDICES

Appendix 1: Table A1.1 - Tree Survey Schedule Appendix 2: Table A2.1 - Root Protection Areas of Category A, B and C trees

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| Tree Species No. | | S or MS | Diam (mm) | H't (m) | Br | anch S | pread (| (m) | С | rown C | learan | се | Age | Phys Cond | Struc Cond | Est. Remain | Cat | Comments | Preliminary Management |
|---------------------|-----------------|------------|--------------|---------|------|--------|---------|-----|-----|--------|--------|-----|-----|--------------|---------------|--------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| | | | | | N | Е | S | W | N | E | S | W | | | | Contrib (Years) | | | Recommendations |
| 1 | London Plane | S | 940 | 20.0 | 11.0 | 13.0 | 6.0 | 7.0 | 3.0 | 4.0 | 4.0 | 6.0 | М | G | G | >20 | B1,2 | Growing in park next to building and road. Previously crown reduced off building. Trunk leans North. Exposed surface roots with erosion. Old pruning wounds occluding. Crown shape distorted due to proximity to building. | None required at time of survey. |
| 2 | Black Cherry | S | 260 | 9.0 | 4.0 | 3.0 | 3.0 | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 | EM | G | G | >20 | B2 | Growing in park next to building. Caged trunk protection. Trunk leans North. Previously crown lifted at 3.0m above ground level. Old pruning wounds occluding. | None required at time of survey. |
| 3 | London Plane | S | 460 | 20.0 | 8.0 | 4.0 | 8.0 | 6.0 | 3.0 | 5.0 | 3.0 | 4.0 | ЕМ | G | G | >20 | B2 | Growing in park next to building. Previously crown reduced off building. Growing on slope. Previously crown lifted 3.0m above ground level. Old pruning wounds occluding. Caged trunk protection occluding at base. | Remove cage. |
| 4 | Black Cherry | S | 310 | 14.0 | 3.0 | 4.0 | 4.0 | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 | ЕМ | G | G | >20 | B2 | Growing in park. Previously crown lifted 3.0m above ground level. Crown shape distorted due to group pressure. Old pruning wounds occluding. Caged trunk protection. Growing on slope. | None required at time of survey. |
| 5 | Black Cherry | S | 360 | 13.0 | 5.0 | 4.0 | 3.0 | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 | ЕМ | G | F | >10 | C1,2 | Growing in park on top of slope. Old pruning wounds occluding. Bifurcated at 3.0m above ground level. Co-dominant leaders. Crown shape distorted due to group pressure. Exposed surface roots due to erosion. Caged trunk protection. Bark wound to North at 0.1m to 1.2m above ground level occluding. | None required at time of survey. |

| Tree No. | Species | S or MS | Diam (mm) | H't (m) | Bra | Branch Spread (m) | | Crown Clearance | | | | | Phys Cond | Struc Cond | Est. Remain | Cat | Comments | Preliminary Management | |
|-------------|---------------------|------------|--------------|---------|------|-------------------|-----|-----------------|-----|-----|-----|-----|--------------|---------------|----------------|--------------------|----------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| | | | | | Ν | E | S | W | Ν | E | S | W | | | | Contrib (Years) | | | Recommendations |
| 6 | Manna Ash | S | 420 | 7.0 | 5.0 | 5.0 | 5.0 | 5.0 | 2.0 | 2.0 | 2.0 | 2.0 | EM | G | G | >20 | B2 | Growing in park. Caged protection around trunk - occluding. Multi-stemmed at 2.4m above ground level. Old pruning wounds occluding. | Remove caging. |
| 7 | Silver Birch | S | 110 | 10.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | EM | G | G | >20 | C1 | Developing tree. Growing next to existing boundary fence and footpath. Previously crown lifted over footpath. Old pruning wounds occluding. | None required at time of survey. |
| 8 | Rowan | S | 210 | 7.0 | 4.0 | 4.0 | 2.0 | 4.0 | 3.0 | 3.0 | 3.0 | 3.0 | EM | F | н | <10 | R | Caged protection around trunk and occluding at base. Bark wound at base to 1.3m above ground level occluding. Previously crown lifted 3.0m above ground level. Old pruning wounds occluding. Exposed surface roots with mechanical damage – mower. | Advise removal within 6 months. |
| 9 | London Plane | S | 1015 | 21.0 | 12.0 | 10.0 | 9.0 | 10.0 | 3.0 | 4.0 | 8.0 | 6.0 | Μ | G | G | >20 | B1,2 | Growing in park. Girdling roots at base. Previously crown lifted 3.0m above ground level. Old pruning wounds occluding. Exposed surface roots with mechanical damage - mower. Trunk leans to North. | None required at time of survey. |
| 10 | Norway Maple | S | 340 | 14.0 | 3.0 | 4.0 | 4.0 | 6.0 | 6.0 | 4.0 | 5.0 | 4.0 | EM | Ρ | Ρ | <10 | R | Exposed surface roots with mechanical damage - mower. Low crown density. Poor quality tree of limited value. Bark wound on trunk at 0.1m to 2.0m above ground level. | Advise removal within 6 months. |
| 11 | Flowering Cherry | S | 140 | 7.0 | 2.0 | 4.0 | 3.0 | 1.0 | 3.0 | 3.0 | 3.0 | 3.0 | EM | F | F | >10 | C1 | Growing in park. Caged trunk protection. Crown weighted East. Previously crown lifted 3.0m above ground level. Growing under T9. | None required at time of survey. |

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| Tree No. | Species | S or MS | Diam (mm) | H't (m) | Br | anch S | pread (| (m) | С | rown C | learand | ce | Age | Phys Cond | Struc Cond | Est. Remain | Cat | Comments | Preliminary Management |
|-------------|-----------------|------------|--------------|---------|-----|--------|---------|-----|-----|--------|---------|-----|-----|--------------|---------------|--------------------|------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| | | | | | N | E | S | w | N | E | S | w | | | | Contrib (Years) | | | Recommendations |
| 12 | Rowan | S | 200 | 11.0 | 2.0 | 2.0 | 2.0 | 2.0 | 3.0 | 3.0 | 3.0 | 3.0 | EM | Ρ | Ρ | <10 | R | Growing in park. Caged trunk protection and occluding into stem. Previously crown lifted 3.0m above ground level. Old pruning wounds occluding. Poor quality tree of limited value. Low crown density. | Advise removal within 6 months. |
| 13 | Black Cherry | S | 340 | 16.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | EM | G | F | >10 | C1,2 | Exposed surface roots with mechanical damage - mower. Growing in park. Epicormics on trunk. Bark wound on trunk at ground level to 0.4m above ground level occluding. Bifurcated at 4.0m above ground level. Co-dominant leaders. Old pruning wounds occluding. Minor deadwood in crown. | None required at time of survey. |
| 14 | Rowan | S | 180 | 7.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | ΕM | G | G | >20 | B1,2 | Growing in park next to road and existing boundary fence. Previously crown lifted 2.0m above ground level. Old pruning wounds occluding. Minor deadwood in crown. | None required at time of survey. |
| 15 | Rowan | S | 210 | 8.0 | 3.0 | 3.0 | 3.0 | 3.0 | 2.0 | 2.0 | 2.0 | 2.0 | EM | G | G | >20 | B2 | Growing in play park next to road and existing boundary fence. Previously crown lifted 2.0m above ground level. Old pruning wounds occluding. Good shape and form. | None required at time of survey. |
| 16 | London Plane | S | 550 | 14.5 | 7.0 | 7.0 | 7.0 | 7.0 | 6.0 | 4.0 | 7.0 | 5.0 | Μ | G | G | >20 | B1 | Growing on elevated area over school playground. Previously crown lifted and crown reduced. Old pruning wounds occluding. Minor deadwood in crown. Trunk shape distorted due to previous management. | None required at time of survey. |

| Tree No. | Species | S or MS | Diam (mm) | H't (m) | Br | anch S | pread (| (m) | C | rown C | learan | се | Age | Phys Cond | Struc Cond | Est. Remain | Cat | Comments | Preliminary Management |
|-------------|-----------------|------------|--------------|---------|-----|--------|---------|-----|-----|--------|--------|-----|-----|--------------|---------------|--------------------|------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| | | | | | N | E | S | w | Ν | E | S | W | | | | Contrib (Years) | | | Recommendations |
| 17 | Ash | S | 320 | 11.0 | 3.0 | 5.0 | 3.0 | 4.0 | 6.0 | 4.0 | 5.0 | 6.0 | EM | F | F | >10 | C2 | Growing next to existing boundary fence, playground and existing retaining wall. Growing on elevated bank 0.7m above ground level. Exposed surface roots. Bark wound to East at 0.2m above ground level occluding. Previously crown lifted and crown reduced. Old pruning wounds occluding. Part of linear group. | None required at time of survey. |
| 18 | Silver Maple | S | 340 | 11.0 | 3.0 | 5.0 | 2.0 | 5.0 | 6.0 | 5.0 | 8.0 | 6.0 | EM | F | F | >10 | C1,2 | Growing in elevated bank 0.7m above ground level. Crown shape distorted due to group pressure. Previously crown lifted and crown reduced. Old pruning wounds occluding with cavities. Exposed surface roots. Part of linear group. Growing next to playground, existing boundary fence and existing retaining wall. | None required at time of survey. |
| 19 | Silver Maple | S | 350 | 11.0 | 5.0 | 6.0 | 4.0 | 5.0 | 5.0 | 4.0 | 5.0 | 6.0 | EM | F | F | >10 | C1,2 | Growing in elevated bank 0.7m above ground level. Crown shape distorted due to group pressure. Previously crown lifted and crown reduced. Old pruning wounds occluding. Old pruning wounds occluding with cavities. Exposed surface roots. Part of linear group. Growing next to playground, existing boundary fence and existing retaining world. | None required at time of survey. |

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| Tree No. | Species | S or MS | Diam (mm) | H't (m) | Br | anch S | pread (| (m) | C | rown C | learand | ce | Age | Phys Cond | Struc Cond | Est. Remain | Cat | Comments | Preliminary Management |
|-------------|--------------|------------|--------------|---------|-----|--------|---------|-----|-----|--------|---------|-----|-----|--------------|---------------|--------------------|------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|
| | | | | | N | E | S | w | N | E | S | w | | | | Contrib (Years) | | | Recommendations |
| 20 | Almond | S | 190 | 6.5 | 2.0 | 4.0 | 2.0 | 2.0 | 3.0 | 2.0 | 2.0 | 5.0 | EM | F | F | >10 | C1,2 | Growing next to existing boundary fence on slope. Trunk leans East. Crown weighted East. Caged trunk. Previously crown lifted 2.0m above ground level. Old pruning wounds occluding. Crown shape distorted due to group pressure. | None required at time of survey. |
| 21 | Almond | S | 110 | 4.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | Y | F | F | >10 | C3 | Growing next to existing boundary fence on slope. Caged trunk protection. Growing under T20. Crown shape distorted due to group pressure. Trunk shape distorted due to previous management. | None required at time of survey. |
| 22 | Almond | S | 190 | 6.0 | 2.0 | 4.0 | 4.0 | 4.0 | 2.0 | 2.0 | 2.0 | 2.0 | EM | F | F | >10 | C2 | Suckers at base. Caged trunk. Growing on slope next to existing boundary fence. Crown shape distorted due to group pressure. Old pruning wounds occluding. | None required at time of survey. |
| 23 | Almond | S | 115 | 5.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 | EM | G | G | >10 | C1,2 | Caged trunk protection. Growing next to existing boundary fence. Old pruning wound occluding. Developing tree. | None required at time of survey. |
| 24 | Silver Birch | S | 320 | 13.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | 3.0 | 3.0 | 2.0 | EM | G | G | >20 | B3 | Growing next to building. Crown weighted and trunk leans West. Bifurcated at 2.0m above ground level. Old pruning wounds occluding. | None required at time of survey. |

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| Tree No. | Species | S or MS | Diam (mm) | H't (m) | Br | Branch Spread (m) | | Crown Clearance | | | | | Phys Cond | Struc Cond | Est. Remain | Cat | Comments | Preliminary Management | |
|-------------|-----------------|------------|--------------|---------|-----|-------------------|-----|-----------------|-----|-----|-----|------|--------------|---------------|----------------|--------------------|----------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| | | | | | N | E | S | W | Ν | E | S | W | | | | Contrib (Years) | | | Recommendations |
| 25 | Honey Locust | S | 450 | 15.0 | 7.0 | 2.0 | 2.0 | 6.0 | 4.0 | 4.0 | 3.0 | 5.0 | Μ | F | F | >10 | C1,2 | Bifurcated at 2.0m above ground level. Growing next to road and existing boundary fence. Previously crown lifted over road. Old pruning wounds occluding. Minor deadwood in crown. Crown shape distorted due to group pressure. | None required at time of survey. |
| 26 | Honey Locust | S | 350 | 14.0 | 2.0 | 2.0 | 5.0 | 4.0 | 7.0 | 9.0 | 8.0 | 10.0 | Μ | F | F | >10 | C1,2 | Bifurcated at 4.0m above ground level. Previously crown lifted over road. Growing next to road, existing boundary fence and T25. Crown shape distorted due to group pressure. Hanging deadwood in crown. | Remove major deadwood in crown. |
| 27 | Silver Birch | S | 390 | 13.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | 3.0 | Μ | G | G | >20 | B3 | Growing next to road and existing boundary fence. Multi-stemmed at 3.0m above ground level. Faciated limbs to South. Minor deadwood in crown. Old pruning wounds occluding. | None required at time of survey. |
| 28 | Silver Birch | S | 310 | 12.0 | 5.0 | 4.0 | 3.0 | 4.0 | 4.0 | 3.0 | 4.0 | 8.0 | Μ | F | F | >10 | C1,2 | Trunk leans West. Crown weighted West. Low crown density. Poor shape and form. Trunk and crown shape distorted due to group pressure. Bark wound at base occluding to South and West. | None required at time of survey. |
| 29 | Honey Locust | S | 495 | 21.0 | 4.0 | 4.0 | 4.0 | 4.0 | 8.0 | 6.0 | 7.0 | 8.0 | М | F | F | >10 | C1 | Low crown density. Grows in island flowerbed near to buildings. Cavity in trunk at 0.3-3.0m above ground level and occluding. Old pruning wounds occluding. Deadwood stubs. | None required at time of survey. |

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| Tree No. | ee Species S or o. MS | | Diam (mm) | H't (m) | Branch Spread (m) | | | | Crown Clearance | | | | Age | Phys Cond | Struc Cond | Est. Remain | Cat | Comments | Preliminary Management |
|-------------|--------------------------|---|--------------|---------|-------------------|-----|-----|-----|-----------------|-----|-----|-----|-----|--------------|---------------|--------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| | | | | | N | E | S | w | N | E | S | w | | | | Contrib (Years) | | | Recommendations |
| 30 | London Plane | S | 615 | 15.0 | 3.0 | 6.0 | 6.0 | 4.0 | 10.0 | 3.0 | 6.0 | 8.0 | М | G | G | >20 | B1,2 | Growing in tarmac next to road and building. Roots lift paving. Previously crown lifted 5.0m above ground level. Old pruning wounds occluding. Pollarded away from buildings. Part of linear group. Street tree. | None required at time of survey. |
| 31 | London Plane | S | 485 | 16.0 | 3.0 | 4.0 | 5.0 | 5.0 | 10.0 | 8.0 | 8.0 | 9.0 | Μ | G | G | >20 | B1,2 | Growing in tarmac next to road and building. Roots lift paving. Previously crown lifted 5.0m above ground level. Old pruning wounds occluding. Pollarded away from buildings. Part of linear group. Street tree. | None required at time of survey. |
| 32 | London Plane | S | 425 | 15.0 | 4.0 | 7.0 | 6.0 | 3.0 | 5.0 | 5.0 | 5.0 | 5.0 | EM | G | G | >20 | B1,2 | Growing in tarmac next to road and building. Roots lift paving. Previously crown lifted 5.0m above ground level. Old pruning wounds occluding. Pollarded away from buildings. Part of linear group. Street tree. | None required at time of survey. |
| 33 | London Plane | S | 430 | 15.0 | 4.0 | 4.0 | 6.0 | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | EM | G | G | >20 | B1,2 | Growing in tarmac next to road and building. Roots lift paving. Previously crown lifted 5.0m above ground level. Old pruning wounds occluding. Pollarded away from buildings. Part of linear group. Street tree. | None required at time of survey. |

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| Tree No. | ee Species So Io. N | | Diam (mm) | H't (m) | Br | anch S | pread (| (m) | C | rown C | learan | ce | Age | Phys Cond | Struc Cond | Est. Remain | Cat | Comments | Preliminary Management |
|-------------|---------------------------------------------------------------------------------|--------|--------------|---------|-----|--------|---------|-----|-----|--------|--------|-----|-----|--------------|---------------|--------------------|------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| | | | | | N | E | S | w | N | E | S | w | | | | Contrib (Years) | | | Recommendations |
| 34 | London Plane | S | 450 | 15.0 | 4.0 | 4.0 | 6.0 | 4.0 | 5.0 | 5.0 | 5.0 | 5.0 | EM | G | G | >20 | B1,2 | Growing in tarmac next to road and building. Roots lift paving. Previously crown lifted 5.0m above ground level. Old pruning wounds occluding. Pollarded away from buildings. Part of linear group. Street tree. | None required at time of survey. |
| 35 | London Plane | S | 720 | 15.0 | 7.0 | 9.0 | 7.0 | 8.0 | 5.0 | 5.0 | 5.0 | 5.0 | М | G | G | >20 | A2 | Growing in tarmac next to road and building. Roots lift paving. Previously crown lifted 5.0m above ground level. Old pruning wounds occluding. Part of linear group. Street tree. | None required at time of survey. |
| G1 | Hazel Holly Barberry Spotted Laurel Osmanthus Common Beech | M S | 300 | 5.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0.1 | 0.1 | 0.1 | 0.1 | EM | G | G | >20 | C1 | Managed bed of shrubs and trees. Coppiced Hazel stools. | None required at time of survey. |
| G2 | Pyracantha Hazel Privet | M S | 70 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.1 | 0.1 | 0.1 | 0.1 | EM | G | G | >10 | C1 | Managed border of shrubs. | None required at time of survey. |
| G3 | Spotted Laurel Cherry Ivy | M S | 75 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.1 | 0.1 | 0.1 | 0.1 | EM | G | G | >10 | C1 | Managed border of shrubs and flowers. | None required at time of survey. |
| G4 | Hazel Holly Spotted Laurel | M S | 60 | 1.5 | 1.0 | 1.0 | 1.0 | 1.0 | 0.1 | 0.1 | 0.1 | 0.1 | EM | G | G | >10 | C1,2 | Managed bed of developing trees and shrubs. | None required at time of survey. |
| G5 | Cherry Maple | S | 60 | 4.0 | 1.0 | 1.0 | 1.0 | 1.0 | 2.0 | 2.0 | 2.0 | 2.0 | Y | G | G | >10 | C2 | Newly staked developing trees with caged trunks. | None required at time of survey. |

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| Tree No. | Species S or MS | | Diam (mm) | H't (m) | Branch Spread (m) | | | | | Crown Clearance | | | | Phys Cond | Struc Cond | Est. Remain | Cat | Comments | Preliminary Management |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|--------|--------------|-------------|-------------------|------------|------------|------------|--------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------|--------------------------|--------------|---------------|--------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|
| | | | | | Ν | ш | S | W | Ν | E | S | W | | | | Contrib (Years) | | | Recommendations |
| G6 | Californian lilac Cherry Maples Bamboo Almond | S | 30 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.1 | 0.1 | 0.1 | 0.1 | EM | G | G | >10 | C1,2 | Newly staked developing trees with caged trunks.Managed shrubs in park. | None required at time of survey. |
| G7 | Stranviesa Rhododen- dron Viburnum Mahonia Firethorn | M S | 60 | 2.0 | 1.0 | 1.0 | 1.0 | 1.0 | 0.1 | 0.1 | 0.1 | 0.1 | EM | G | G | >10 | C1,2 | Managed shrubs in border. | None required at time of survey. |
| G8 | Lawson cypress | M S | 110 | 8.0 | 2.0 | 2.0 | 2.0 | 2.0 | 0.1 | 0.1 | 0.1 | 0.1 | EM | G | G | >10 | C1,2 | Part of linear group.Provides good visual separation.Grows next to park area and buildings. | None required at time of survey. |
| T1 | Silver Birch | S | <u>250</u> | <u>12.0</u> | <u>4.0</u> | <u>4.0</u> | <u>4.0</u> | <u>4.0</u> | <u>2.0</u> | <u>2.0</u> | <u>2.0</u> | <u>2.0</u> | Μ | F | F | >10 | C1 | Not inspected. Dimensions estimated. | None. |
| T2 | London Plane | S | <u>650</u> | <u>20.0</u> | <u>7.0</u> | <u>7.0</u> | <u>7.0</u> | <u>7.0</u> | <u>6.0</u> | <u>6.0</u> | <u>6.0</u> | <u>6.0</u> | М | G | G | >20 | B2 | Not inspected. Dimensions estimated.Previously pollarded. | None |
| Т3 | London Plane | S | <u>650</u> | <u>20.0</u> | <u>7.0</u> | <u>7.0</u> | <u>7.0</u> | <u>7.0</u> | <u>6.0</u> | <u>6.0</u> | <u>6.0</u> | <u>6.0</u> | М | G | G | >20 | B2 | Not inspected. Dimensions estimated.Previously pollarded. | None |
| T4 | London Plane | S | <u>650</u> | <u>20.0</u> | <u>7.0</u> | <u>7.0</u> | <u>7.0</u> | <u>7.0</u> | <u>6.0</u> | <u>6.0</u> | <u>6.0</u> | <u>6.0</u> | М | G | G | >20 | B2 | Not inspected. Dimensions estimated.Previously pollarded. | None |
| Key. Age Class. Y: Young = tree within first third of average life expectancy. EM: Early Mature = tree within second third of average life expectancy. M: Mature = tree within final third of average life expectancy. OM: Over Mature = tree beyond average life expectancy. | | | | | | | | . | Physiolo G: Good F: Fair = P: Poor Structur G: Good F: Fair = P: Poor | bgical C d = no h = sympt = poor al Cond d = no s = remed = signi | condition nealth proof oms of health. <u>dition.</u> structura lial structura | n <u>.</u> roblems ill health al defect ctural de ructural | s. efects. defects | ay be r | emedied. | | S: Single stemmed. MS Multi-stemmed. Major deadwood: branches in excess of 50 mm diameter. Minor deadwood: branches/twigs less than 50 mm diameter. <u>000:</u> Estimated dimension. | | |

Table A1.1 cont'd: Results of Arboricultural Survey

| Tree No. | Species | Category | Diameter at 1.5 m (mm) | Root Protection Radius (m) | Root Protection Area (m ²) |
|----------|-------------------------|-----------|---------------------------|-------------------------------|-------------------------------------------|
| 1 | London Plane | B1,2 | 940 | 11.28 | 399.78 |
| 2 | Black Cherry | B2 | 260 | 3.12 | 30.59 |
| 3 | London Plane | B2 | 460 | 5.52 | 95.74 |
| 4 | Black Cherry | B2 | 310 | 3.72 | 43.48 |
| 5 | Black Cherry | C1,2 | 360 | 4.32 | 58.64 |
| 6 | Manna Ash | B2 | 420 | 5.04 | 79.81 |
| 7 | Silver Birch | C1 | 110 | 1.32 | 5.47 |
| 9 | London Plane | B1, 2 | 1015 | 12.18 | 466.12 |
| 11 | Flowering Cherry | C1 | 140 | 1.68 | 8.87 |
| 13 | Black Cherry | C1,2 | 340 | 4.08 | 52.30 |
| 14 | Rowan | B1,2 | 180 | 2.16 | 14.66 |
| 15 | Rowan | B2 | 210 | 2.52 | 19.95 |
| 16 | London Plane | B1 | 550 | 6.60 | 136.87 |
| 17 | Ash | C2 | 320 | 3.84 | 46.33 |
| 18 | Silver Maple | C1,2 | 340 | 4.08 | 52.30 |
| 19 | Silver Maple | C1,2 | 350 | 4.20 | 55.42 |
| 20 | Almond | C1,2 | 190 | 2.28 | 16.33 |
| 21 | Almond | C3 | 110 | 1.32 | 5.47 |
| 22 | Almond | C2 | 190 | 2.28 | 16.33 |
| 23 | Almond | C1,2 | 115 | 1.38 | 5.98 |
| 24 | Silver Birch | B3 | 320 | 3.84 | 46.33 |
| 25 | Honey Locust | C1,2 | 450 | 5.40 | 91.62 |
| 26 | Honey Locust | C1,2 | 350 | 4.20 | 55.42 |
| 27 | Silver Birch | B3 | 390 | 4.68 | 68.82 |
| 28 | Silver Birch | C1,2 | 310 | 3.72 | 43.48 |
| 29 | Honey Locust | C1 | 495 | 5.94 | 110.86 |
| 30 | London Plane | B1,2 | 615 | 7.38 | 171.13 |
| 31 | London Plane | B1,2 | 485 | 5.82 | 106.43 |
| 32 | London Plane | B1,2 | 425 | 5.10 | 81.72 |
| 33 | London Plane | B1,2 | 430 | 5.16 | 83.66 |
| 34 | London Plane | B1,2 | 450 | 5.40 | 91.62 |
| 35 | London Plane | A2 | 720 | 8.64 | 234.55 |
| G1 | Various | C1 | 300 | 3.00* | 28.28* |
| G2 | Various | C1 | 70 | 0.70* | 1.54* |
| G3 | Various | C1 | 75 | 0.75* | 1.77* |
| G4 | Various | C1,2 | 60 | 0.60* | 1.13* |
| G5 | Various | C2 | 60 | 0.72* | 1.63* |
| G6 | Various | C1,2 | 30 | 0.36* | 0.41* |
| G7 | Various | C1,2 | 60 | 0.60* | 1.13* |
| G8 | Lawson cypress | C1,2 | 110 | 1.10* | 3.80* |
| T1 | Silver Birch | C1 | <u>250</u> | 3.00 | 28.00 |
| T2 | London Plane | B2 | <u>650</u> | 7.80 | 191.00 |
| T3 | London Plane | B2 | <u>650</u> | 7.80 | 191.00 |
| T4 | London Plane | B2 | <u>650</u> | 7.80 | 191.00 |
| Key: | optro of coop tree will | hin aroun | | | |

*: Around centre of each tree within group. 000: Estimated measurement.

Table A2.1: RPA and Approximate Root Protection Radius of

Category A, B and C Trees and Groups

MIDDLEMARCH ENVIRONMENTAL

QUALITY ASSURANCE

ARBORICULTURAL IMPACT ASSESSMENT

THE BOURNE ESTATE HOLBORN LONDON

A Report to CampbellReith

Contract Number: C113148

Report Number: RT-MME-113148

Revision: -

Description: Final

Date: November 2012

Checked by:

Lucy Philpott Arboricultural Manager

Approved by:

Dr Philip Fermor Managing Director



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