

**ARBORICULTURAL IMPACT ASSESSMENT  
For a proposed development**

**At**

Upper Parliament Street  
Toxteth, Liverpool

**For Submission to**  
Liverpool City Council

**On the Instructions of:**  
FMBUK Ltd

**Date of Site Visits:**  
23 September 2016  
13 February 2017

**Report Ref:**  
DTCL.119.AIA.2017

**Report Date:**  
09 March 2017

**Revisions**  
23 October & 10 November 2017



DEALGA'S TREE CONSULTANCY LTD  
Suite 9 St Andrews Business Centre  
91 St Mary's Road, Garston, Liverpool, L19 2NL  
T: (0151) 494-5606: M: (07595) 530720  
E: [Dealga@dealgas-treeconsultancy.co.uk](mailto:Dealga@dealgas-treeconsultancy.co.uk)  
[www.dealgas-treeconsultancy.co.uk](http://www.dealgas-treeconsultancy.co.uk)



## **Contents**

	<b>Disclaimers</b>	<b>3</b>
<b>1</b>	<b>Background &amp; Introduction</b>	<b>4</b>
<b>2</b>	<b>The Site &amp; Surroundings</b>	<b>5</b>
<b>3</b>	<b>The Trees &amp; Impacts</b>	<b>7</b>
	<b>3.7 The impacts on amenity of tree removal</b>	<b>8</b>
	<b>3.8 The impacts of construction on retained trees</b>	<b>9</b>
	<b>3.9 Additional Protection for Tree 61</b>	<b>11</b>
	<b>3.10 New tree planting</b>	<b>13</b>
<b>5</b>	<b>Conclusions &amp; Recommendations</b>	<b>16</b>
	<b>Appendix 1 Air Spade</b>	<b>17</b>
	<b>Appendix 2 Cellular Confinement Systems</b>	<b>18</b>

## **Disclaimers**

### **General - Trees**

Unless otherwise stated tree inspections have been undertaken from ground level and using non-invasive techniques only. Comments on the condition and safety of any tree relate to the condition of the tree at the time of survey. It should be recognised that tree condition is subject to change due to, for example, the effects of disease, wind or nearby development works. Changes in land use are also significant in respect of risk assessment. Trees should therefore be inspected at intervals relative to identified site risks.

Unless otherwise specified, no checks have been carried out in respect of statutory controls that may apply, e.g. Tree Preservation Orders, Conservation Areas or planning conditions. In addition, prior to undertaking any tree works, it is necessary to ensure due diligence is followed in respect of protected species and habitats.

### **Copyright & Non Disclosure Notice**

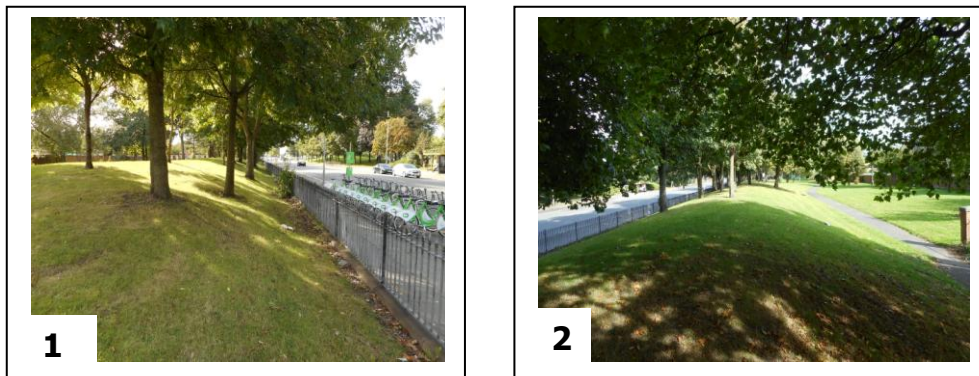
The content and layout of this report are subject to copyright owned by Dealga's Tree Consultancy Ltd (DTCL) save to the extent that copyright has been legally assigned to us by another party or is used by Dealga's Tree Consultancy Ltd under license. This report may not be copied or used without our prior written agreement for any purpose other than the purpose indicated in this report.

### **Third Party Disclaimer**

Any disclosure of this report to a third party is subject to this disclaimer. The report was prepared by Dealga's Tree Consultancy Ltd at the instruction of, and for the use by, our clients named within the report. This report does not in any way constitute advice to any third party who is able to access it by any means. Dealga's Tree Consultancy Ltd excludes to the fullest extent lawfully permitted, all liability whatsoever for any loss or damage arising from reliance on the content of this report.

## 1 Background and Introduction

- 1.1 A planning application has been submitted to Liverpool City Council (LCC) for permission to develop the eastern part of a site on Upper Parliament Street in Liverpool for residential accommodation with associated car parking. This will involve the removal of a number of trees to accommodate the development. Other trees would need to be removed as part of proper arboricultural management and the removal of some of these would facilitate the proposed development. The tree avenue effect to Upper Parliament Street (Photographs 1 & 2) would be removed to accommodate the development but this would be restored by planting a new avenue of trees post development.



**Photos 1 & 2:** Two views of the tree avenue frontage of the site to Upper Parliament Street: **1** looking to the west / southwest; and **2** looking to the east /northeast.

- 1.2 This Arboricultural Impact Assessment (AIA) has been prepared to support the submission of the planning application. The trees have been surveyed and a detailed assessment made of any impacts of the proposed development on the trees to be retained on site and solutions to any impacts are provided. This AIA Report complies with the guidance contained in the relevant British Standard, **BS5837: 2012** '*Trees in relation to design, demolition and construction – recommendations*'.

## 2 The Site and Surroundings

- 2.1 The site is located on the southern side of Upper Parliament Street, Toxteth in Liverpool. It is bounded to the west with Mulgrave Street and Kimberly Close; to the north by Upper Parliament Street and the Liverpool Women's Hospital across the road; to the south by residential accommodation located on Kimberley Close, Verulam Close and Carlingford Close; and to the east with Princes Primary Special School which is off Kingsley Road.
- 2.2 The site is open and maintained as a public green space. There is a formal gateway entrance off Mulgrave Street (Photograph 3), with similar gated entrances off Kimberly Close, Verulam Close, Carlingford Close and Upper Parliament Street, (Photograph 4), all of which are linked via a footpath network.



**Photo 3:** The formal gate entrance off Mulgrave Street.



**Photo 4:** The formal gate entrance off Upper Parliament Street.

- 2.3 The site contains 91 trees that can be classified as individuals none of which are the subjects of any tree preservation orders. The site is not located within a Conservation Area but it is adjacent to two, i.e. Liverpool City Council Conservation Areas, No 2 Canning Street and No 24 Princes Road. In the past the site seems to have been the location of Georgian / Victorian housing that has been demolished and is now a public green space with trees and formal footpaths. The boundary with Upper Parliament Street is a raised bund with trees that provides a buffer to the busy road beyond (Photographs 1 & 2).
- 2.4 Many of the trees on the site seem to have been planted comparatively recently (within the last 30 years or so) as they comprise small specimens of alder, apple, aspen, cherry, horse chestnut and willow. The plantings are in groups with some individually located specimens (Photographs 5, 6, 7, 8, 9 & 10).

## 2 The Site and Surroundings (Continued)



**Photos 5 & 6:** Two representative views of the group and individual trees planted across the site; both views are of the eastern part of the site looking to the west / southwest.



**Photos 7 & 8:** Two further representative views of the trees at the western end of the site.



**Photos 9 & 10:** Examples of individual specimen trees that are in poor condition

### 3 The Trees & Impacts

- 3.1 The tree survey identified 91 individual trees across the entire site, a third of which are outside the area proposed for development and are therefore unaffected by the proposals. The individual trees have been categorised in line with the requirements of BS5837: 2012 as set out in Table 1 of the Standard 'Cascade chart for tree quality assessment'. The categories of tree quality are colour coded and set out as:

'Trees unsuitable for retention – Category **U**'; and

'Trees to be considered for retention – Categories **A**, **B** & **C**'

The numbers of trees and groups of trees in each category are shown in Table 1 below, and the detail on each tree is set out in the attached tree survey schedule. One tree (**1**) is in category '**A**'; and three (**3**) trees are categorised as '**B**'; **70** trees are category '**C**'; and **17** trees are in category '**U**'.

**Table 1:** The numbers of the trees and groups in each category

Description	Cat.	Tree Numbers	Total
<b>Trees of high quality</b> with an estimated Remaining life expectancy of at least 40 years,	<b>A</b>	T60	1
<b>Trees of moderate quality</b> with an estimated remaining life expectancy of at least 20 years.	<b>B</b>	T15, T21 & T54	3
<b>Trees of low quality</b> with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150mm	<b>C</b>	T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T17, T18, T19, T20, T22, T23, T24, T25, T27, T30, T31, T33, T34, T35, T36, T37, T38, T40, T43, T44, T45, T46, T47, T48, T52, T55, T57, T58, T61, T62, T63, T64, T65, T68, T69, T70, T71, T72, T73, T74, T75, T76, T77, T78, T79, T80, T81, T82, T83, T84, T85, T86, T87, T88, T89 & T90	70
Trees in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	<b>U</b>	T16, T22, T26, T28, T29, T32, T39, T41, T42, T49, T50, T51, T53, T56, T59, T66 & T91	17

- 3.4 As stated at §3.1 above a third of the trees are located outside the area where development is proposed, i.e. Trees **T61** to **T91**. Of these two would need to be removed for sound arboricultural reasons, i.e. **T66** a regenerating whitebeam stump and **T91** which is a regenerating crack willow stump. One tree, **T79** is a cherry with a hanging branch and this would need to be pruned out.

### 3 The Trees & Impacts (Continued)

- 3.5 Fifty seven (**57**) trees would need to be removed to accommodate the development as set out in Table 2 below, and as shown in the schedule of trees attached to this report. Of these, thirteen (**13**) would need to be removed for sound arboricultural management reasons irrespective of the development. Some are in decline, while others have been damaged extensively (Photographs 11 & 12).

<b>Table 2:</b> Trees that would be removed to accommodate the proposed development
T1, T2, T3, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, <b>T16</b> , T17, T18, T19, <b>T20</b> , T21, T22, T23, T24, T25, <b>T26</b> , T27, <b>T28</b> , <b>T29</b> , T30, T31, <b>T32</b> , T33, T34, T35, T36, T37, T38, <b>T39</b> , T40, <b>T41</b> , T42, T43, T44, T45, T46, T47, T48, <b>T50</b> , <b>T51</b> , <b>T52</b> , T54, T55, <b>T56</b> , T57, T58, <b>T59</b> & T60.

The trees whose condition would dictate removal in any event are shown in red boldface type



**11**

**Photo 11:** Damage to the lower trunk of a willow



**12**

**Photo 12:** Poor specimens that are stressed and not developing well

- 3.6 The trees on the boundary of the site with Upper Parliament Street would be removed because they are located on a bund which would have to be levelled to accommodate the development. However, the tree avenue effect would be restored post development by planting nine (**9**) trees along the frontage with Upper Parliament Street.

#### 3.7 Impacts on amenity of tree removal

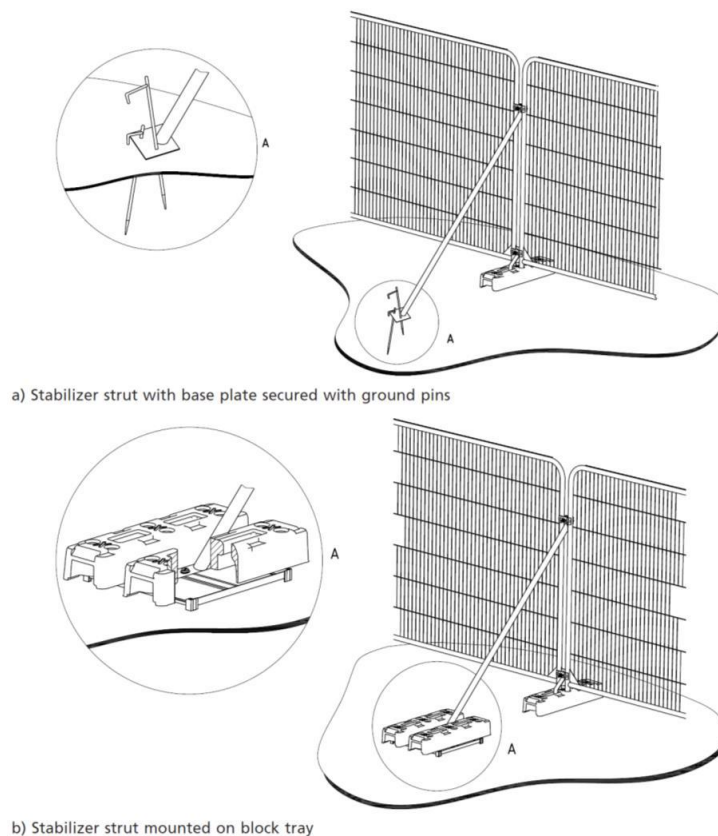
- 3.7.1 Removal of **57** trees at the western end of the site to accommodate the proposed development would have an impact on the visual amenities of the area. However, this would be mitigated by planting an informal avenue of eight (**9**) trees on the frontage with Upper Parliament Street.
- 3.7.2 There would be some minor loss of visual amenity of the views from the rear gardens of the properties on Carlingford Close, but this could be mitigated by new tree planting in and around the proposed car parking area. A total of eight (**12**) new trees would be planted within the car park and a further four (**6**) trees would be planted in the areas of open space directly behind the buildings and adjacent to the disabled parking bays.

### 3 The Trees & Impacts (Continued)

#### 3.8 The impacts of the proposed construction on retained trees

- 3.8.1 The impacts of the proposed development of the residential units, access road and parking area on the trees retained on the site would be minimal. Any impact would be mitigated by creating construction exclusion zones (CEZ) around the trees and preventing any construction works or activity from taking place inside the CEZ. The CEZ would be defined by protective fencing that conforms to that specified in BS5837: 2012, as shown in **Figure 1** and Photographs 13 & 14 below. The proposed locations of the protective fencing are shown on the attached tree constraints drawing DTCL.119.1.AIA.03.Rev.A

**Figure 1:** Tree Protective Fencing – as per BS5837: 2012



### 3 The Trees & Impacts (Continued)

Fencing Specifications: Fence panels shall be 2m high x 3m long.

As Heras® type fencing can be easily moved; it must be mounted on rubber or concrete base plates and secured as shown in Figure 1 above. In order to provide semi-permanent protection using stabilizing struts and base plates and the Heras sections secured by 'U-Bolts' or Scaffold Clamps as shown in the photographs below.



**13**

**Photo 13:** This shows close up of 'U-Bolts' clamping the panels together

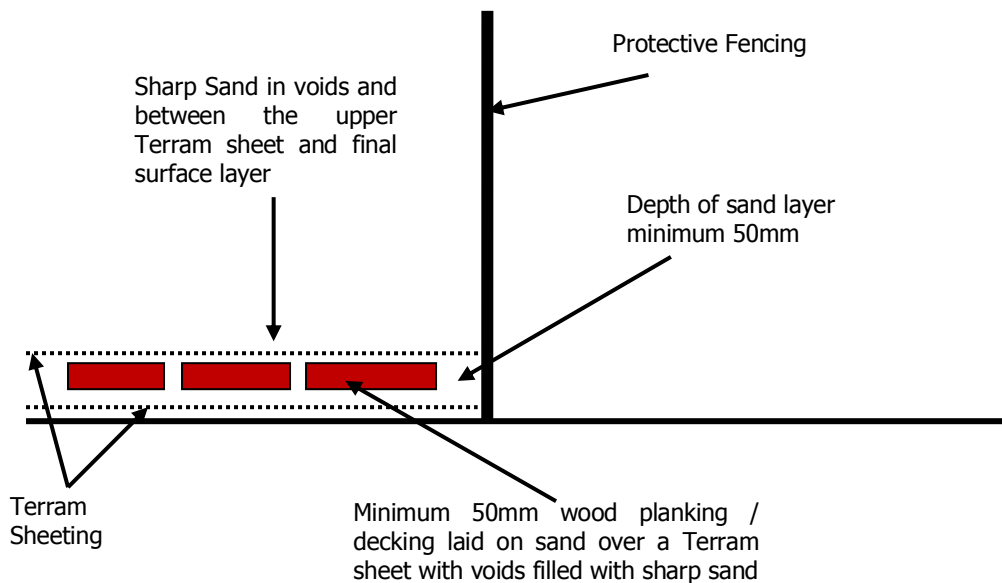


**14**

**Photo 14:** This shows the fencing in place around an individual tree.

- 3.8.2 Because the proposed construction would come close to the RPA of **T4** (*Robinia pseudoacacia*) and **T61** (*Platanus x hispanica (acerifolia)*) temporary ground protection to protect the RPA from construction activity would be installed as shown in Figure 2 below

**Figure 2** Ground Protection for Construction close to the RPA

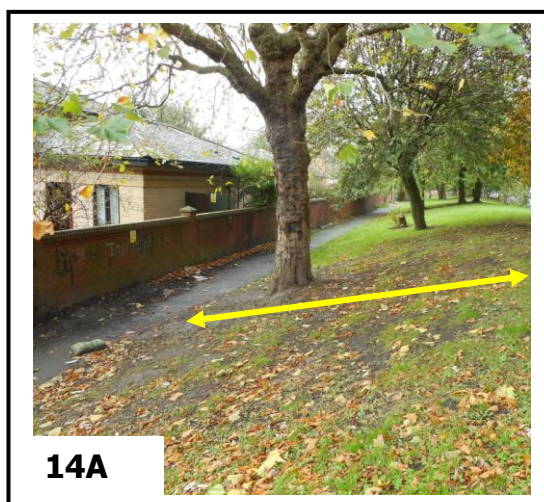


### 3 The Trees & Impacts (Continued)

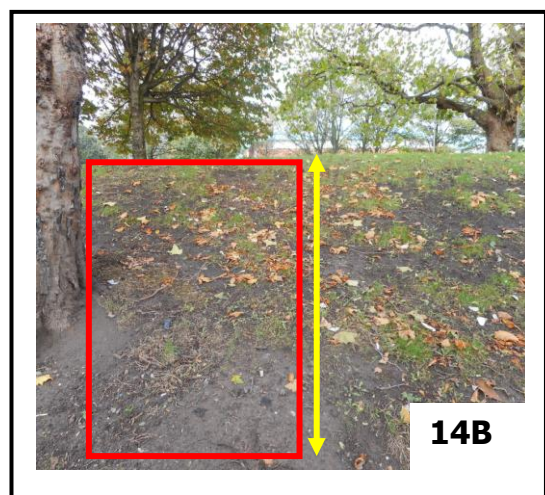
- 3.8.3 It is anticipated that the underground services to the site would connect to existing services at Verulam Close, Carlingford Close and possibly Upper Parliament Street. Therefore the provision of services to the development would not impact any of the retained trees or their root zones
- 3.8.4 Construction access to the site would be from Carlingford Close and thus this would not have any impact on the retained trees. The construction site compound would be located just beyond the entrance to the site off Carlingford Close as shown on the attached tree protection plan drawing (DTCL.119.1.AIA.03.Rev A).

#### 3.9 Additional Protection for the London plane tree (T61)

- 3.9.1 In addition to the protective fencing and the ground protection set out at §3.8 above, it will be necessary to site a footpath and a bin store close to the London plane tree that is **T61**. This will require additional methods to allow the tree to be retained safely and in good health. The location of the area requiring the additional protective measures is shown on drawing DTCL.119.AIA.03.Rev A.
- 3.9.2 Because the tree is located at the base of a mound/bund and the development will be located on the east side it will be necessary to excavate the mound/bund to accommodate the development (Photograph 14A & B).



**Photo 14A:** This shows the location of **T61** at the base of the mound/bund with the location of the development arrowed.

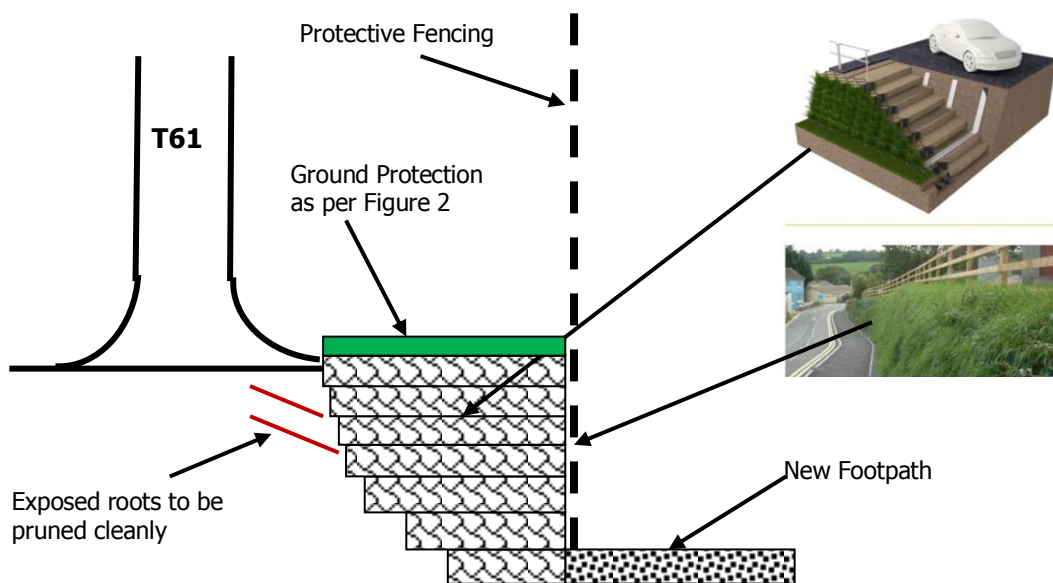


**Photo 14B:** This shows the juxtaposition of T61 and the excavation line (arrowed yellow) and the area on the east side the tree that will have ground protection installed (squared red).

# 3

- 3.9.3 Before excavation of the mound/bund using mechanical plant the area of the root zone to the east of the excavation line (yellow arrows in Photographs 14A & B) would be excavated using compressed air via an Air Spade to a depth of 1000mm to expose any roots, please refer to Appendix 1 for details of the Air Spade methodology.
- 3.9.4 Once the roots are exposed and large woody roots would be cut cleanly using a purposed produced hand saw and secateurs for smaller diameter roots. The exposed face of the pruned roots would be retained using stratified CellWeb™ panels. These provide very strong retaining ability as shown in Figure 3. The front edge of the CellWeb panels would be seeded / turfed to provide a natural finish.

**Figure 3:** Air Spade Excavation, Root Pruning and Retaining Detail



**Sketch Drawing Not To Scale – for Illustrative Purposes Only**

- 3.9.5 Following the excavation, root pruning and stabilisation, the tree would be subjected to a programme of tree health care (THC) using bio-stimulant fertilizers, mycorrhizal suspensions and Biochar. The entire root zone of **T61** would be decompacted using compressed air injected into the soil with the Air Spade and released at 20 – 30 bars. The entire root zone area of the tree would be treated with an organic mulch of composted wood chip, forest bark or equivalent to a minimum depth of 75 cm.

### 3 The Trees & Impacts (Continued)

3.9.7 The new footpaths can be installed in proximity to **T61** using a 'no dig' methodology that utilises a proprietary cellular confinement system. The systems recommended are the CellWeb™ or ProtectaWeb™ confinement systems which spread the load as detailed in Appendix 2. The final surface for the cellular confinement system shall either porous tarmac or block paviers.

#### 3.10 New tree planting

3.10.1 The frontage to Upper Parliament Street would be planted with nine (**9**) trees to create an informal avenue effect. The car parking area would be planted with (**9**) new trees and three (**3**) additional trees would be planted within the main footpath off Carlingford Close. In addition, six (**6**) new trees would be planted in the areas of open space directly behind the buildings and adjacent to the disabled parking bays. Therefore **27** new trees in total would be planted. The locations of the new trees are shown on drawing DTCL.119.1.AIA.04.Rev.D.

3.10.2 It is proposed that 15 new trees would be planted in the area of the site that is not being developed, i.e. from Verulam Close to Mulgrave Street. The locations of the new trees are shown on drawing DTCL.119.1.AIA.06.

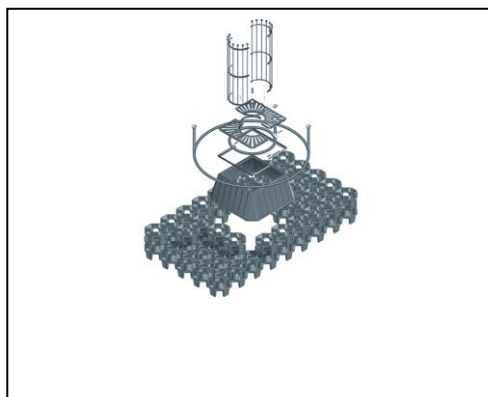
3.10.3 Within the developed area the proposed new trees would be close to the new construction and others would be located within the car parking area and the main footpath. Therefore, columnar or upright species are recommended. The species that would be planted are Upright/Columnar English Oak (*Quercus robur* 'Fastigiata'); Silver Birch (*Betula pendula*) and Wild Service Tree (*Sorbus torminalis*). All three species are native and would be beneficial for wildlife. Both the fastigate English oak and the Silver Birch are widely planted in Liverpool and thus are locally native. The columnar variety of the English Oak is just that, a native variety of English Oak. The wild service tree is also known as the 'Chequer Tree'. It is native to the midlands and south and in recent years is being planted in Cheshire and the North West.

3.10.4 The trees would be root balled or container grown specimens. The nine (**9**) fastigate oak trees on the frontage of the development with Upper Parliament Street would be 20/25cm girth to provide an immediate impact to the street scene. The remaining **18** trees would be 18/20cm girth specimens. The trees would be pit planted using the Green Blue Urban Strata Cell Arborsystem® which is a soil cell planting system developed specifically for trees planted in urban locations, which is shown in **Figure 4**.

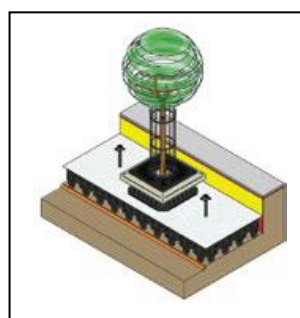
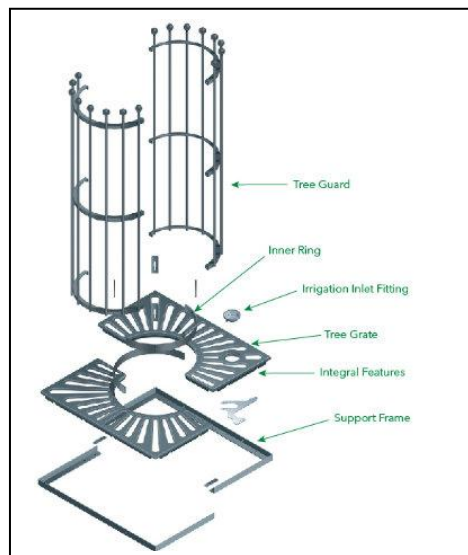
3.10.5 Seven (**7**) of the fastigate oak trees in the part of the site that is not being developed which front onto Upper Parliament Street and Mulgrave Street would be 20/25cm girth and the remaining eight (**8**) trees would be 18/20cm girth. In addition to fastigate English oak, the new trees would be comprised of four (**4**) columnar lime trees (*Tilia cordata* Greenspire); three (**3**) fastigate English oak trees and one (**1**) wild service tree. The specification for the new trees is at Table 3.

## The Trees & Impacts (Continued)

**Figure 3** - Diagram of the Green Blue Urban Strata Cell Arborsystem®



This system would be implemented across the frontage and the car parking area. This will facilitate lateral growth of the roots such that the area of soil available to each tree is maximised, and results in little if any compaction in the root zones, as shown in the photograph and diagram below.



**Table 3 – Tree Planting Specification****New Trees within the Development**

<b>No.</b>	<b>Tree Species</b>	<b>Size</b>	<b>Planting</b>	<b>Maintenance</b>
<b>6</b>	<i>Betula pendula</i> Silver Birch	18/20 cm girth Container grown	Pit Planted using Green Blue Urban Strata Arbor System	Irrigate during the growing season; remove weeds/grass as necessary.
<b>17</b>	<i>Quercus robur</i> 'Fastigiata' Upright English Oak	20/25 cm girth Container grown	Pit Planted using Green Blue Urban Strata Arbor System	Irrigate during the growing season; remove weeds/grass as necessary.
<b>4</b>	<i>Sorbus torminalis</i> Wild Service Tree	18/20 cm girth Container grown	Pit Planted using Green Blue Urban Strata Arbor System	Irrigate during the growing season; remove weeds/grass as necessary.

**New Trees in the area not developed**

<b>No.</b>	<b>Tree Species</b>	<b>Size</b>	<b>Planting</b>	<b>Maintenance</b>
<b>7</b>	<i>Quercus robur</i> 'Fastigiata' Upright English Oak	20/25 cm girth Container grown	Pit Planted using Green Blue Urban Strata Arbor System	Irrigate during the growing season; remove weeds/grass as necessary
<b>3</b>	<i>Quercus robur</i> 'Fastigiata' Upright English Oak	18/20 cm girth Container grown	Pit planted supported by two low stakes, cross member & single tree tie.	Mulched with composted wood chip or equivalent to 100mm. Adjust tie after the first & second seasons, remove stakes & ties at the end of the third seasons.
<b>1</b>	<i>Sorbus torminalis</i> Wild Service Tree	18/20 cm girth Container grown	Pit planted supported by two low stakes, cross member & single tree tie	Mulched with composted wood chip or equivalent to 100mm. Adjust tie after the first & second seasons, remove stakes & ties at the end of the third seasons.
<b>4</b>	<i>Tilia cordata</i> 'Greenspire' Columnar Lime	18/20 cm girth Container grown	Pit planted supported by two low stakes, cross member & single tree tie	Mulched with composted wood chip or equivalent to 100mm. Adjust tie after the first & second seasons, remove stakes & ties at the end of the third seasons.

## 4 Conclusions and Recommendations

It is concluded that:

- 4.1 The proposed development requires the removal of 57 trees in the eastern section of the site.
- 4.2 Some of the 57 trees need to be removed in any event on account of their condition and for reasons of proper arboricultural management.
- 4.3 The remaining trees in the western part of the site would be unaffected by the proposed development except for one London plane tree which is **T61**.
- 4.4 Tree **T61** would be retained with additional protection measures that are in line with the recommendations in BS5837: 2012 and current arboricultural industry best practice.
- 4.5 The trees that would be removed to accommodate the development would be replaced with an informal avenue of nine (9) trees on the Upper Parliament Street frontage; twelve (12) trees within the rear car parking/footpath area; four (6) trees in the open spaces behind the building(s); and 15 trees in the part of the site that is not being developed.
- 4.6 The replacement trees would be 18/20cm and 20/25cm girth root balled / container grown specimens, pit planted using the Green Blue Urban Strata Cell Arborsystem®.
- 4.7 All tree removal work would be undertaken by a competent and qualified arboricultural contractor under the direct supervision of a consulting arboriculturist and to the requirements of BS3998: 2010 '*Tree work – Recommendations*'.

It is recommended that:

- 4.8 Planning permission is granted for the proposed development subject to a condition that requires the preparation of a detailed Arboricultural Method Statement (AMS) to be submitted to and agreed in writing by the Council.

### Attachments:

Upper Parliament Street Tree Schedule Data Table  
 Drawing DTCL.119.1.AIA.01  
 Drawing DTCL.119.1.AIA.02.Rev.A  
 Drawing DTCL.119.1.AIA.03.Rev.A  
 Drawing DTCL.119.1.AIA.04.Rev.D  
 Drawing DTCL.119.1.AIA.05  
 Drawing DTCL.119.1.AIA.06

**Dr D P O'Callaghan, FICFor, F Arbor A, MISA**  
**Chartered Arboricultural Consultant**

**10 November 2017**

C:/D/NAS/Mega/DTCL Projects/DTCL.119/Reports/Upper Parliament St.119.AIA.v0.3

## APPENDIX 1

### Air Spade® excavation for the installation of services



**Picture 1:** This shows the excavation process using an Air Spade



**Picture 2:** This shows the process of hand excavation below the root zone following the exposure of roots using an Air Spade

## APPENDIX 2 – CELLULAR CONFINEMENT SYSTEMS

## CellWeb™ Root Protection System

# CellWeb

## Tree Root Protection System



fig. 1

Problems associated with the construction of new developments around mature or any existing trees is well documented. BS5837 (1991) and later APN1 (1996) offer guidelines to those concerned with the protection of trees during the construction process.

The provision of car parking facilities and access roads around trees can lead to problems culminating in the premature loss of the tree itself unless preventative measures are taken to protect the tree roots during and after construction. (fig. 1)



fig. 2

Vehicular traffic above tree roots creates compaction of unconfined sub-soils causing oxygen depletion and even a loss of vital nutrients. Creating an impermeable surface above tree roots by installing a compacted sub base for load support also adds to these problems.

The solution is CellWeb, a three dimensional Cellular Confinement System that provides a load transfer blanket significantly reducing vertical loads on unprotected tree roots. (fig. 2)

Please contact:

**Geosynthetic Limited**  
Fleming Road,  
Harrowbrook Ind. Estate,  
Hinckley, LE10 3DU.


Telephone: 01455 617139

Facsimile: 01455 617140 Email: [sales@geosyn.co.uk](mailto:sales@geosyn.co.uk)

[www.geosyn.co.uk](http://www.geosyn.co.uk)

## APPENDIX 2 – CELLULAR CONFINEMENT SYSTEMS

### Further details of the CellWeb™ Tree Root Protection System



# CellWeb

The CellWeb System uniquely prevents rutting action of sub-soils by confining infill material within the hoop structure of the panel, increasing the infills shear strength. The use of a CellWeb System increases the load capacity of granular infill by up to 50% reducing the overall construction depth required. Perforated cell walls permit through drainage and also provides frictional interlock of the infill again increasing the shear strength of the system.

A non woven geotextile filtration/separation membrane is used beneath the system to prevent migration of materials and also to aid with drainage vertically through the system.

The CellWeb panels are infilled with a clean angular gravel which provides load support and permits air and moisture transfer to the roots ensuring the long term preservation of the tree root structure. (fig. 5)

Surfacing materials are at the discretion of the client, however for specific advice please contact our sales office.

**WITHOUT CELLWEB**

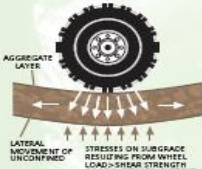


fig. 3

**WITH CELLWEB**

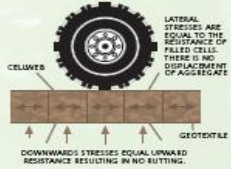


fig. 4

## Benefits

of using CellWeb

- Reduction in construction depth.
- Prevent compaction of sub-soils.
- Prevent oxygen/nutrient depletion.
- Environmentally friendly option.
- Fast and economic installation.
- Technical support available.

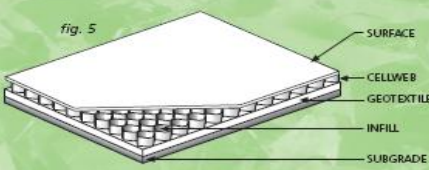


fig. 5

CellWeb is available in four cell depths; 75mm, 100mm, 150mm and 200mm.

The cell depth required is dependant upon specific site conditions. For specification details or project specific design assistance please contact our sales office.

Please contact:

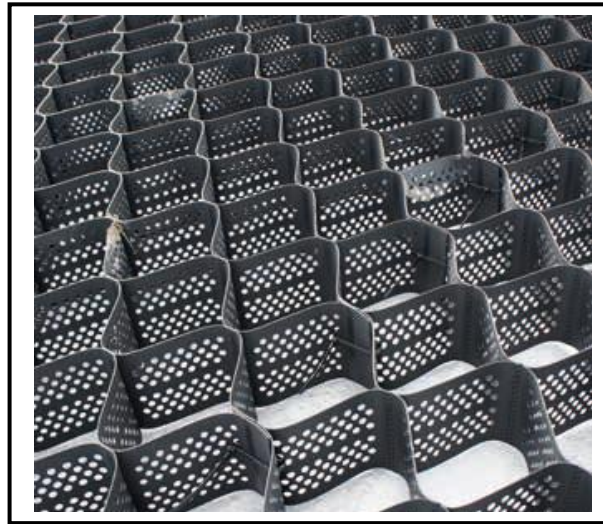
**Geosynthetic Limited**  
 Fleming Road,  
 Harrowbrook Ind. Estate,  
 Hinckley, LE10 3DU.

Telephone: 01455 617139  
 Facsimile: 01455 617140 Email: sales@geosyn.co.uk

[www.geosyn.co.uk](http://www.geosyn.co.uk)

## APPENDIX 2 – CELLULAR CONFINEMENT SYSTEMS

The ProtectaWeb™ Cellular Confinement System



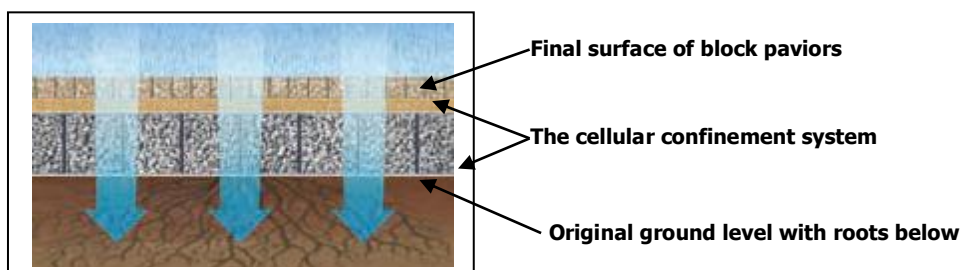
**ProtectaWeb™ Structure**



**Installation of ProtectaWeb™ on site**

## APPENDIX 2 – CELLULAR CONFINEMENT SYSTEMS

Further detail of ProtectaWeb™ Cellular Confinement System



A schematic diagram showing how a cellular confinement system allows the percolation of air & water to the roots below.



## **DEALGA'S TREE CONSULTANCY LTD**

Suite 9 St Andrews Business Centre  
91 St Mary's Road, Garston  
Liverpool L19 0LA

T: (0151) 494-5606  
M: (07595) 530720

E: [Dealga@dealgas-treeconsultancy.co.uk](mailto:Dealga@dealgas-treeconsultancy.co.uk)  
W: [www.dealgas-treeconsultancy.co.uk](http://www.dealgas-treeconsultancy.co.uk)