ARBORICULTURAL REPORT

Barrack Road, Northampton

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Prepared For
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PURPOSE OF THIS DOCUMENT

This report has been commissioned to provide an assessment of the trees at Barrack Road, Northampton in accordance with the guidelines provided by BS5837:2012 Trees in relation to design, demolition and construction – Recommendations.

It consists of:

- A Tree Survey that records all relevant information about the trees on or adjacent to the site that may be impacted by the proposals. This includes a Tree Constraints Plan that shows the location of the trees on the site irrespective of any development considerations.
- An Arboricultural Impact Assessment to consider the impact that the development proposal may have on the trees. It provides details of how any adverse impact will be mitigated and includes an Arboricultural Implications Plan. This shows the location of the trees in relation to the proposed development and the above and below ground constraints posed by the trees.
- A draft Arboricultural Method Statement to provide details on how the retained trees will be protected and managed during the development process. This includes a draft Tree Protection Plan that provides illustrative guidance on the tree protection measures.

The purpose of this report is to provide the local authority (Northamptonshire County Council) with the necessary information to assess the tree issues associated with the planning application, and use it as a basis for issuing planning consent or engaging in further discussions towards that end.

As part of the planning process this document should be available for inspection by interested parties including members of the public. The aim is to present the information in a manner that can easily be understood by people without specific knowledge of tree related matters.

EXECUTIVE SUMMARY OF THE IMPACT OF THE DEVELOPMENT ON THE TREES

The proposal is for the re-use and conversion of the existing former Royal Mail sorting office at Barrack Road into both a through school with associated facilities and complementary mixed uses. The proposal will require the removal of 6 trees or groups. One tree has been proposed for removal due to poor structural quality and would be recommended for removal irrespective of this proposal. The majority of trees requiring removal are located within the forecourt of the existing property and it is considered that the future pressure for these trees to be removed means that retention would be misplaced. It is considered that the proposed replacement planting is suitable mitigation for the loss of these trees and would provide a net gain in biodiversity and amenity benefits of the arboricultural features of this site.
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## ATTACHMENTS:

- Tree Constraints Plan (D14-0137 TCP)
- Arboricultural Implications Plan (D14-0154 AIP v4)
- Draft Tree Protection Plan (D14-0155 TPP v4)
SECTION 1: SITE & TREE SURVEY

1.1 TOPOGRAPHICAL SURVEY

A copy of a topographical plan (10670-100-A-E) drawn by In Good Measure Ltd in March 2010 has been provided for the purpose of this tree report.

1.1.1 Site description

The site is situated off of Barrack Road, Northampton. The site is currently unoccupied and primarily consists of a large disused building. A public highway can be found on the eastern boundary and the northern boundary is bordered by a public footpath. The southern boundary consists of a short access drive and built structures. The western boundary borders an existing Multi-Use Games Area (MUGA).

The majority of the arboricultural features are located in the eastern part of the site, adjacent to Barrack Road, and in the north western area of the site.

1.1.2 Site visit

The site visit was undertaken on 07 May 2014. Rob Davidson (Lockhart Garratt Senior Arboricultural Consultant) completed the survey and was unaccompanied throughout the duration of the inspection.

All observations were made from ground level, without detailed investigation with regard to the general condition of the tree.

Trees that are located outside of the site have been considered as part of this survey, and have been annotated on the accompanying plan as such.

1.2 SOIL ASSESSMENT

A soil assessment should be undertaken by a suitably qualified person to assess soil structure, soil composition and soil pH. The purpose of this is to provide guidance in any decisions relating to:

- The root protection area
- Tree protection;
- New planting design; and
- Foundation design

No details of a soil survey have been provided for submission with this report.

Data obtained from the National Soils Resource Institute (NSRI) shows that the underlying soil type at this site is loamy clayey floodplain soils with naturally high groundwater.
1.3 **TREE SURVEY**

The assessment of the trees has been carried out in accordance with the guidance provided in Annexe C of BS5837. In summary this requires that any tree on the site with a stem diameter of over 75mm at 1.5m above ground level is recorded.

Stem diameter measurements were taken using a girthing tape and are recorded to the nearest full unit or in accordance with Annexe D of BS5837. Where access to the base of the tree was not possible for any reason, the diameter has been estimated.

Height measurements are estimated and recorded to the nearest full metre.

Crown spread dimensions have been paced and are recorded to the nearest full metre.

A copy of the schedule of trees can be found in Appendix 2. The locations of the tree have been plotted on the attached Tree Constraints Plan (TCP).

The trees are then categorised in an order defined in table 1 of BS5837, a copy of which can be seen in Appendix 3, but which can be summarised as:

- **A Category**  Trees of high quality and value in such a condition as to be able to make a substantial contribution for a minimum of 40 years
- **B Category**  Trees of moderate quality and value in such a condition as to make a significant contribution for a minimum 20 years
- **C Category**  Trees of low quality and value currently in adequate condition able to remain until new planting can be established. These trees are expected to remain for a minimum of 10 years. It also includes young trees with a stem diameter less than 150mm measured at 1.5 metres above ground level.
- **U Category**  Trees in such a condition that any existing value would be lost within 10 years and which should, in the current context, be removed for reasons of sound arboricultural or forestry management.

Additionally, BS5837:2012 provides subcategories 1-3 within the category system outlined above which indicate the area(s) in which a tree or group retention value lies.

1. Mainly arboricultural.
2. Mainly landscape.
3. Mainly cultural, including conservation.

Within the proposed development area and including adjacent land, there are a total of 8 individual trees and 3 groups of trees that possess the potential to be affected by the development proposals. A summary of my assessment of the quality of these trees is shown in Table 1.

**Table 1 - An overview of tree quality within the surveyed area**

<table>
<thead>
<tr>
<th>Category</th>
<th>Category</th>
<th>Category</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>B</td>
<td>C</td>
<td>U</td>
</tr>
<tr>
<td>1</td>
<td>6</td>
<td>3</td>
<td>1</td>
</tr>
</tbody>
</table>
1.4 Constraints posed by existing trees

Development proposals can impact on trees by causing them to be removed either immediately or in the future. It does this by adversely affecting their potential for retention either through disturbance to the root protection area (RPA) or through the need for pruning.

Illustrative guidance of the constraints posed by the trees to the site can be seen on the attached Tree Constraints Plan (TCP). Where trees pose a constraint to the proposed development, these constraints have influenced the final design and layout proposals as shown on the TCP. Mitigation measures have been proposed to minimise the impact on the trees from the proposed development.

1.4.1 Above ground constraints & proximity of trees to structures

Where the current and/or ultimate height of a Category A, B or C tree will cause an obstruction to the proposed development, this must be considered as a constraint. This is usually considered in terms of issues relating to shade and light.

An amenity clearance zone (ACZ) is used to consider the impact of the proximity of retained trees to structures. The ACZ is defined as an area surrounding the tree that enables a satisfactory relationship to exist between the property and the tree, and as such is equal to two-thirds of the tree’s expected mature height. The ACZ is a combination of factors such as:

- Shading (of buildings and open space)
- Direct damage to structures
- Future pressure for removal
- Seasonal nuisance (e.g. leaf fall blocking gutters, fruit fall creating slippery patches and honey dew dripping on vehicles and surfaces)

Consideration is also given to species characteristics such as:

- Deciduous or evergreen;
- Density of foliage;

Although not part of BS5837, the ACZ also reflects a more intangible factor of how comfortable the inhabitant of the property is likely to feel by the proximity of the tree to the house. It serves to protect retained trees from pressure to be felled or undergo surgery after occupation of the property.

The above ground constraints are marked on the attached TCP as a continuous line around each individual tree.

1.4.2 Below ground constraints

The below ground constraints are defined as the likely spread and disposition of the root system of the tree and are plotted on the attached TCP as a magenta circle with the text ‘RPA’ embedded in the line around each tree.

The RPA is defined as the minimum area (in m²) around the tree that is deemed to contain sufficient roots and rooting volume to maintain the tree’s viability, and where the protection of the roots and soil structure is treated as a priority.

Section 4.6.2 & 4.6.3 of BS5837 allows for the shape of the RPA to be changed for the likely spread of the roots, taking into account factors such as:
Tree Survey

- Past or existing site conditions;
- Soil type and structure;
- Topography and drainage.

The total area of the RPA cannot be changed during any adjustment to the likely root spread. Section 5.3 (a) of BS5837 requires that any encroachment of the RPA by the proposed development must be justified and it must be demonstrated that the tree can remain viable. The area lost to encroachment must be compensated for elsewhere, contiguous with its RPA.
SECTION 2: ARBORICULTURAL IMPACT ASSESSMENT

2.1 DEVELOPMENT PROPOSAL

The proposal is for the re-use and conversion of the existing former Royal Mail sorting office building to provide a combination of; a 420 place primary school, 1500 place secondary school with 300 place 6th form, as well as a private nursery, cafe, gym and 7 residential units.

In addition, a forecourt plaza is proposed at the entrance to the school off Barrack Road and allocation of car parking and MUGAs to the rear of the building.

Where feasible, tree retention has been a key consideration in the overall site design and layout. Tree removal has been limited to those that are necessary to enable the development proposal to proceed.

The proposed layout of the development is shown on the attached Arboricultural Implications Plan (AIP).

2.2 SUMMARY OF THE IMPACT OF THE PROPOSAL

My assessment of the impact of this proposal on the trees is summarised in Table 2.

<table>
<thead>
<tr>
<th>Impact</th>
<th>Reason</th>
<th>A</th>
<th>B</th>
<th>C</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees to be removed</td>
<td>To enable the proposed development to take place and for access to the site by vehicles</td>
<td>T5</td>
<td>T2 &amp; G3</td>
<td>T1, T4 &amp; G9</td>
<td>-</td>
</tr>
<tr>
<td>Retained trees that will potentially be affected through disturbance to RPAs</td>
<td>To allow the construction of car parking allocation.</td>
<td>-</td>
<td>T6, G8 &amp; T11</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Trees to be removed irrespective of the development proposal</td>
<td>Poor condition or structural defects.</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>T7</td>
</tr>
</tbody>
</table>

2.3 DETAILED IMPACT APPRAISAL

2.3.1 Trees to be removed

The design proposal for this development requires that 6 trees or groups of trees are removed.
Section 5.1.1 of BS5837:2012 recognises that the competing needs of development mean that trees are only one factor requiring consideration. It also states that misplaced tree retention can be detrimental on a site where it will cause excessive pressure on those trees being retained if those trees then require removal in the future.

Trees that have been identified for removal have been marked on the attached AIP by a red dashed line, and have been highlighted in the tree schedule with red text.

2.3.1.1 **Category U trees**

A total of 1 Category U tree (T7) is proposed for removal. The removal of this tree would be recommended irrespective of this design proposal and therefore should not be a determining factor when considering this application. In addition, the removal of this tree will benefit the future growth of T6.

2.3.1.2 **Category A tree**

A total of 1 Category A tree (T5) is proposed for removal as a direct consequence of this development proposal.

T5 is a semi-mature London plane growing internally to the site and to the west of the existing building. This tree is proposed for removal in order to facilitate the construction of car parking allocation to the rear of the property. It is considered that the replacement planting within the forecourt plaza provides sufficient mitigation for the loss of this tree. The location of the tree means that its removal will not have an adverse impact on the visual amenity or wider community.

2.3.1.3 **Category B trees**

A total of 2 Category B trees or groups (T2 and G3) are proposed for removal as a direct consequence of this development proposal.

T2 is a mature sycamore that has previously been managed through the practice of pollarding. The tree has not been managed recently and the pollard head has started to lapse and fail.

G3 is a small linear group of 5 mature lime trees that have previously been managed through the practice of pollarding. The trees have not been managed recently and the pollard heads are starting to lapse and fail. In addition the trees exhibit basal epicormic growth, which is typical of the species.

Retaining these trees, T2 and G3, would result in unjustifiable expenditure in order to construct the forecourt plaza without damaging the trees. Additional expense would be required to continually manage the trees through pollarding and regular pruning of basal epicormic growth in order to alleviate any nuisance to members of the public. This could cause future pressure to remove the trees post construction.

2.3.1.4 **Category C trees**

A total of 3 Category C trees or groups of trees (T1, T4 and G9) are proposed for removal as a direct consequence of this development proposal.

T1 is a mature red horse chestnut located on the southern boundary of the site. The tree is growing from a tree pit, exhibits stem cankers and it is anticipated that the rooting structure of this tree has been inhibited by the growing conditions. Retention of this tree would be misplaced as the expenditure required to construct the forecourt
without damaging the tree would far exceed the quality of the tree. The removal of this tree will enable the development of the forecourt plaza and will enable replacement trees of a more suitable species and quality to be introduced.

T4 is a mature alder located internally to the site. The stem bifurcates at 1.5m and the tree is of generally low arboricultural quality. The removal of this tree will enable the development of the car parking allocation in the central part of the site.

G9 is a small clustered group of young self-seeded sycamore that are growing through the boundary fence. The removal of this group will enable the development of a MUGA in the western area of the site. The location of group means removal will have little adverse impact on the wider community or overall arboricultural quality of the site.

2.3.2 Retained trees that will be affected through disturbance to the RPAs

A total of 3 trees or groups of trees (T6, G8 and T11) have the potential to be affected through disturbance to their RPAs. All of these trees or groups are classed as Category B trees. The details of these trees or groups of trees are as follows:

T6 is an early mature London plane located close to the northern boundary of the site. There is the potential for disturbance to the rooting environment of this tree through the removal and reinstatement of new permanent hard surfacing within the RPA of this tree.

G8 is a mature group of 36 leylandii that form a screen to offsite properties. The group is located on the northern boundary. There is the potential for compaction and excavation within the rooting environment of these trees through movement of construction machinery and introduction of bicycle racks adjacent to the group.

T11 is a mature London plan tree located on the southern boundary of the site. There is the potential for compaction of the rooting environment of this tree through the movement of construction traffic and introduction of new vegetation allocation adjacent to the tree.

Detail of tree protection measures is covered in Section 3 of this report. It is anticipated for a development of this nature that the trees will be primarily protected by Tree Protective Fencing (TPF) in order to provide protection of the trees RPAs from disturbance.

Specific tree protection measures are required for 1 Category B tree (T6). This will involve a 'no-dig' solution in order to protect the RPA from disturbance. The details of these ground protection measures are covered in Section 3.7 of this report.

2.4 Proposals to mitigate any impact

2.4.1 Protection of retained trees

The successful retention of those trees that will remain on the site will be dependent upon the quality and maintenance of any protection system that is put in place. A draft Arboricultural Method Statement, provided in section 3 of this report, details how the necessary tree protection can be implemented. The processes of construction are highly unlikely to have a detrimental effect upon the health of the retained trees assuming recommendations made in this report are adhered to at all times by the contractors.
2.4.2 Replacement planting

The replacement trees are to be planted within the forecourt plaza of the development, adjacent to Barrack Road, to mitigate the loss of the trees removed as part of this proposal. The replacements will be trees which, in maturity, will form prominent street trees that will provide a net gain in canopy cover, biodiversity benefit and visual amenity. It is recommended that naturalised species and those in keeping with the arboricultural features along Barrack Road are selected so as to supplement the existing tree stock within the immediate locality.

2.5 Infrastructure Requirements

All utilities will be taken into the site through underground service runs. No service run will encroach the RPA of any retained tree on this site.

2.6 Summary of the Impact on Local Amenity and Character

The proposal is for the re-use and conversion of the existing former Royal Mail sorting office at Barrack Road into both a through school with associated facilities and complementary mixed uses. The proposal will require the removal of 6 trees or groups. One tree has been proposed for removal due to poor structural quality and would be recommended for removal irrespective of this proposal. The majority of trees requiring removal are located within the forecourt of the existing property and it is considered that the future pressure for these trees to be removed means that retention would be misplaced. It is considered that the proposed replacement planting is suitable mitigation for the loss of these trees and would provide a net gain in biodiversity and amenity benefits of the arboricultural features of this site.
SECTION 3: DRAFT ARBORICULTURAL METHOD STATEMENT

3.1 OVERVIEW

The following explanations relate specifically to this site and they should be read in conjunction with the indicative Tree Protection Plan (TPP).

A copy of this report must be kept on site and be permanently available of the duration of the development. It can be:

- Included in the tender documents to identify and quantify the tree protection and management requirements;
- Used to plan the timing of site operations to minimise the impact on trees, and;
- Referenced on site for practical guidance on how to protect trees.

3.2 ARBORICULTURAL SUPERVISION

An Arboricultural Clerk of Works (ACoW) will be appointed by the developer to advise on the tree management for the site and to attend:

- The pre-commencement meeting before any works start
- Regular supervision visits every two to four weeks, or as otherwise agreed; and
- As needed to oversee specific works that could affect trees

Additionally the consultant will have a supervisory input into the following operations:

- Site preparation, including tree works
- Removal of permanent hard surfaces within RPAs and installation of permanent ground protection measures
- Installation, maintenance and removal of barriers
- Installation of new structures

3.3 SEQUENCING AND TIMING

Effective tree protection relies upon following a logical sequence of events and arboricultural inspection/supervision.

The retained ACoW’s initial role is to liaise with the developer and LPA to ensure the tree protection measures are fit for purpose and in place before any works commence on the site. Once the site is working that role will switch to monitoring compliance with arboricultural planning conditions and advising on any tree problems that arise or modifications that become necessary.

It is the developer’s responsibility to ensure that details of this AMS and any agreed amendments are known and understood by all site personnel.
Arboricultural Method Statement

The final details of supervision and the frequency of inspection visits will be agreed at the pre-commencement meeting. The supervision arrangement will be sufficiently flexible to allow the supervision of all sensitive works as they occur.

The ACoW will make a record of the visits and these will be attached to the site copy of the AMS for inspection. A further copy will be sent to the LPA. The purpose of these written records is firstly to provide proof of compliance that will allow the developer to robustly demonstrate adherence to best practice in the event of any dispute. Secondly it will help the LPA efficiently discharge the relevant planning conditions.

Appendix 4 gives a sample copy of a site inspection record.

Table 3 - Sequencing and Supervision

<table>
<thead>
<tr>
<th>Stage</th>
<th>Action</th>
<th>Arboricultural Input Required</th>
<th>Report Section</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Pre-commencement meeting</td>
<td>Attend</td>
<td>3.4</td>
</tr>
<tr>
<td>2</td>
<td>Tree Works</td>
<td>N/A</td>
<td>3.5</td>
</tr>
<tr>
<td>3</td>
<td>Tree Protective Fencing</td>
<td>Inspect</td>
<td>3.6</td>
</tr>
<tr>
<td>4</td>
<td>Construction of special surfaces</td>
<td>Supervise</td>
<td>3.7</td>
</tr>
<tr>
<td>6</td>
<td>Demolition</td>
<td>N/A</td>
<td>3.10</td>
</tr>
<tr>
<td>8</td>
<td>Development Phase</td>
<td>Inspect</td>
<td>3.11</td>
</tr>
<tr>
<td>10</td>
<td>Remove tree protective fencing</td>
<td>Supervise</td>
<td>3.12.1</td>
</tr>
<tr>
<td>11</td>
<td>Landscaping &amp; replacement planting</td>
<td>N/A</td>
<td>3.12.2</td>
</tr>
</tbody>
</table>

3.4 Pre-commencement Meeting

A pre-commencement site meeting involving the land owner, representative of the development company, ACoW, contractors and engineers (as appropriate), and relevant LPA officers will be held to ensure that all aspects of the tree protection processes are understood and agreed.

The meeting is where the details of the programme of tree protection will be agreed and finalised, which will then form the basis of any supervision arrangements between the ACoW and the developer.

The ACoW will send a record of the meeting to all parties.

3.5 Tree Removal and Works

The day to day running of the site will take full account of the tree protection measures set out in this document. All site personnel will be briefed on the tree protection requirements as part of the site induction procedure.
The tree management has been specifically designed towards doing the minimum work necessary to accommodate the development structures, establish acceptable levels of safety and reduce the destructive impact of existing trees on adjacent, better trees.

All tree works will be carried out by a suitably qualified contractor, and in accordance with BS3998:2010 Tree Works – Recommendations and industry best practice.

3.5.1 Tree Removal
Trees for removal have been noted on the TPP with a dashed red circle around each location. Each tree has also been noted with red text in the attached tree schedule. The following trees are scheduled for removal:

- T1
- T2
- G3
- T4
- T5
- G9

3.5.2 Tree works
The details of trees works have been set out in the schedule in Appendix 2. Obvious pruning to allow the installation of the structure has been listed, but additional minor pruning may be necessary to address unanticipated local problems with individual branches. Any additional works will be assessed and authorised as necessary by the retained ACoW. Where necessary, the LPA tree officer will be notified of any additional tree works.

3.6 Barriers and Ground Protection

3.6.1 The Construction Exclusion Zone
The primary means of protecting the Root Protection Area (RPA) of trees is through the use of barriers formed by protective fencing. The enclosed area is the Construction Exclusion Zone (CEZ). The CEZ has been marked on the TPP by orange diagonal hatching.

The CEZs are to be afforded protection at all times and will be protected by fencing. The type of fencing is detailed in section 3.6.2, below.

No works will be undertaken within any CEZ that causes compaction to the soil or severance of tree roots.

3.6.2 Tree Protective Fencing
A protective fence will be erected around the trees, prior to the commencement of any site works i.e. before any materials or machinery are brought on site, development or the stripping of soil commences.

The fence is to be sited in accordance with the TPP enclosed with this method statement. This is shown as a black dotted line with diagonal orange hatching.
indicating the enclosed CEZ. Details of minimum distances for the barriers from the trees can be seen in Appendix 5. These figures are based on a perfect circle for the RPA around the tree. Where the RPA has been offset to account for factors detailed in section 1.4.1, the parameters for the fencing have been marked on the TPP (see section 3.7.2 below). The location of these fences is indicative only and further detail will be provided once planning consent has been obtained.

The precise form of fencing can vary provided it is fit for purpose and prevents damaging activities within the CEZ. For a proposal of this nature, the Heras 151 system of fencing will provide the necessary protection to the CEZ. Details of this fencing can be seen in Appendix 6.

The fence will have signs attached to it stating that it defines a CEZ and that no works are permitted within the fence. No notice boards, cables or other services will be attached to any tree. An example of a fencing sign is provided in Appendix 7.

The protective fence may only be removed following completion of all construction works.

### 3.7 CONSTRUCTION OF SPECIAL SURFACES

#### 3.7.1 Permanent hard surfaces within the RPA

Where it is not practical to protect the RPA by use of fencing barriers, BS5837 allows for the fencing to be set back and the soil shielded by ground protection. A range of methods can be used including retaining existing hard surfaces or structures that already protect the soil, installing new materials, or a combination of both. Illustrative specifications for ground protection are included in Appendix 5 & 6. Whatever the choice of method, the end result must be that the underlying soil (rooting environment) remains undisturbed and retains the capacity to support existing and new roots.

An area of permanent hard surfaces will be required to the south of T6. The existing surface and kerb line within the RPA of this tree will need to be removed in order to enable a new kerb and permanent hard surface. The RPA of this tree will be protected by the installation of a three-dimensional cellular confinement system. The installation of this system is detailed in section 3.8.

One tree (T6) will require permanent protection as they have an RPA that is encroached by the access route to the site. The area for permanent ground protection has been highlighted on the TPP by dark green cross-hatching.
3.7.2 Additional precautions outside the exclusion zone

Any risk from activities outside RPAs but close enough to have an impact will be assessed during the day-to-day running of the site, and appropriate precautions put in place to reduce that risk.

It is a presumption of this report that all RPAs that have been identified for protection but which lie outside of the protective fencing, will be protected from soil degradation at all times during construction activity.

It is advised that areas proposed for replacement plantings are not subject to compaction through the regular movement of machinery or storage of site materials. Where possible these areas should be avoided entirely to provide the best possible rooting environments for the replacement trees.

These planting areas have not been included within the CEZ as it is thought this will constrain the construction of the drive unnecessarily, through restricting vehicular movement.

3.8 Specific tree protection measures

The removal of the existing hard surfaces within the RPA of T6 must be supervised by the retained ACoW to ensure that tree protection measures are maintained at all times. All work within these RPAs must be completed with hand tools or machinery used working backwards over the area, as detailed below:

- Excavations of the existing hard surface can be conducted by machines with a long reach, but must only include a 50mm scrape, removing only the upper surface. The machinery used for this operation must work from an area of existing hard standing. They must not encroach unprotected soil in the RPA.
- Appropriate tools for manually removing debris may include a pneumatic breaker, crow bar, sledgehammer, pick, mattock, shovel, spade, trowel, fork and wheelbarrow. Secateurs and a handsaw must all be available to deal with any roots that are exposed.
- Debris may be removed by the RPA manually, but it must be moved across the hard surface or permanent ground protection in a way that prevents compaction of the soil. Alternatively it can be lifted out by machines provided this does not disturb the RPA.
- Great care must be taken throughout these operations to ensure that there is no damage to the root system.
- Severance of roots over 25mm should be avoided unless advised by the retained ACoW. Where roots will remain exposed for any period of time wrapping of roots using hessian should be implemented.

In order to protect the RPA of T6 a three-dimensional cellular confinement system will be installed to provide a designated area for deliveries. This system is a load bearing system which protects roots from the effects of compaction from regular vehicular movement; it is recommended that CellWeb is used to serve this purpose. The system will be approximately 3-5m wide and 8m in length in order to adequately cover the RPA.
Arboricultural Method Statement

The CellWeb will be pinned in place and backfilled with Type 1 MOT and finished with a permeable tarmac surface. The edgings of the permanent hard surface are to be installed on top of the CellWeb and will comprise of kerbing staked in place and backfilled with the wearing layer as previously described.

Once the system has been installed and backfilled correctly machinery can work from on top of the system.

3.9 Inspection & Supervision

After the protective fencing and temporary ground protection has been erected, the retained ACoW will visit the site. The purpose of the visit will be to check that the fencing has been correctly installed so as to provide protection to the trees. The local authority tree officer will also be invited to inspect the tree protection measures prior to any works commencing.

The retained ACoW will provide a written report confirming satisfactory completion of this task. A copy of this report will be sent to the local planning authority.

3.10 Demolition

No demolition works will take place within the RPA of any retained tree on this site.

3.11 Development

Once all trees works and protective fencing have been completed, the developer can commence the on-site preparation works and construction can begin.

3.11.1 Site Storage, Cement Mixing and Washing Points

No storage of materials will take place within a CEZ.

No mixing or storage of materials will take place up a slope where they may leak into a CEZ. Where contours of the site create a risk of polluted water running into RPAs, precautionary measures of using heavy duty plastic sheeting and sandbags with the ability to contain accidental spillage will be put in place to prevent contamination.

3.11.2 Contractors Parking

Contractors parking will not be within or in close proximity to a CEZ.

3.11.3 Utility Services

There is no requirement for any service to be installed within a CEZ or RPA of any retained tree on this site.

3.11.4 Fires

No fires will be lit on this site.
Arboricultural Method Statement

3.11.5 Site Gradient
There will be no changes to any levels on this site within or in close proximity to the RPA of any retained tree on this site.

3.11.6 Use of Herbicides
There is no requirement for any herbicide to be used on this site.

3.11.7 Use of Sub-contractors
The main contractor will be responsible for ensuring sub-contractors do not carry out any process or operation that is likely to adversely impact upon any tree on site.

3.11.8 Contingency planning
Water will be kept readily available on site and will be used to flush spilled materials through the soil and avoid contamination to tree roots.
At the time of any spillage the main contractor will contact the retained ACoW for advice.

3.12 Post Development

3.12.1 Removal of protective fencing
When the development is complete, all drainage and service runs are in place and the main site machinery has been removed, the CEZ protective fencing will be dismantled.
This will be supervised by the retained ACoW to ensure that no damage is done to the protected areas during this process.

3.12.2 Landscaping within the tree canopies
The final tidying up and reinstatement can only be carried out when all the protective measures have been removed. This means great care is required by the contractors to observe tree protection measures.
No machines can be used within the RPAs, which specifically excludes rotavators.
All new planting and soil level variations must be agreed and supervised by the retained ACoW.

3.13 Responsibilities
It is the responsibility of the main contractor to ensure that the planning conditions attached to planning consent are adhered to at all times and that a monitoring regime in regards to tree protection is adopted on site.
The main contractor will be responsible for contacting the Local Planning Authority at any time issues are raised related to the trees on site.
If at any time pruning works are required permission must be sought from the Local Planning Authority first and then carried out in accordance with BS3998:2010 Tree Works – Recommendations and industry best practice.
Arboricultural Method Statement

The main contractor will ensure the build sequence is appropriate to ensure that no damage occurs to the trees during the construction processes. Protective fences will remain in position until completion of ALL construction works on the site.

The fencing and signs must be maintained in position at all times and checked on a regular basis by an on-site person designated that responsibility.

3.14 COMPLETION MEETING

Upon completion of all works specified above and all procedures detailed, the Arboricultural Consultant will invite the LPA tree officer to meet on site to discuss the process and agree any final remedial works which may be required.

3.15 CONTACTS

Shows a list of all relevant contacts for this development:

<table>
<thead>
<tr>
<th>Title</th>
<th>Name</th>
<th>Contact Number</th>
<th>Email</th>
</tr>
</thead>
<tbody>
<tr>
<td>Landowner/Developer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Agent</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LPA Case Officer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>LPA Tree Officer</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Site Manager</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ACoW</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

THIS AMS IS NOT A CONTRACT. THE RETENTION OF A QUALIFIED ARBORICULTURIST FOR SUPERVISION AND MONITORING MUST BE AGREED PRIOR TO THE COMMENCEMENT OF ANY CONSTRUCTION ACTIVITY.

Stephen Westmore BSc (Hons), MSc, TechArborA
13 June 2014
SECTION 4: APPENDICES

4.1 APPENDIX 1 – ADMINISTRATIVE BACKGROUND

4.1.1 Instruction
Written instruction was received on 17 April 2014 from Colin Barrett of LGSS Property Services to carry out a survey of the trees at Barrack Road, Northampton.

The survey was to be carried out in accordance with the recommendations laid down by BS5837: Trees in relation to construction, and to assist in the preparation of a report to accompany a planning application. The report was to include:

- A schedule of the relevant trees to include basis data and condition assessment
- An appraisal of the impact that the proposed development may have on the trees, and the resulting impact this may have on the local amenity.
- An arboricultural method statement dealing with protection and the management of the trees to be retained.

4.1.2 Documents provided
The plan is derived from the following provided information:

- Topographical survey prepared by In Good Measure Ltd in March 2010.
- Layout drawing BK_Site Plan prepared by Architecture Initiative, received by email on 30 May 2014.

4.1.3 Limitations of this report
The following limitations apply to this report:

Statutory Protection: The existence of tree preservation order or conservation area protection does not automatically mean trees are worthy of being a material constraint in a planning context. Trees can be formally protected but be in poor structural condition or in declining health, which means they are unsuitable for retention or influencing the future use of the site. Furthermore a planning consent automatically takes precedent over these forms of protection, which makes them of secondary importance. For these reasons, I do not check statutory protection as a matter of course in the process of preparing this report. However if any tree works are proposed before a planning consent is given, then the existence of any statutory protection must be checked with the local authority.

Ecology and Archaeology: Although trees can be a valuable ecological habitat and can grow in archeologically sensitive areas, I have no specialist expertise in these disciplines and this report does not consider those aspects.

Tree Safety: While every effort has been made to ensure that comments relating to the tree surveyed are accurate, it must be noted that no tree have been climbed, no internal inspections carried out and no excavation of root areas has taken place. As such this report should not be taken to mean or imply that any of the inspected trees should be considered safe. No tree can be guaranteed to be 100% safe as some defects are not detectable by visual non-climbed, non-invasive inspection. Failure of
an apparently healthy tree, either in part or totally may occur as a result of physical or physiological stress.

4.1.4 Technical References
The arboricultural method statement is based purely on the following technical references:

4.1.5 Qualifications and Experience
Stephen is an Assistant Arboricultural Consultant at Lockhart Garratt Ltd. Stephen has worked in Forestry and Arboricultural related industries for 3 years and has recently finished an MSc in Arboriculture and Urban Forestry (Myerscough College and University of Central Lancashire). Stephen also has a BSc degree in Countryside Management, which was awarded by Harper Adams University College.

Assistance and guidance on this report has been provided by Rob Davidson, Senior Arboricultural Consultant at Lockhart Garratt Ltd. Rob has extensive experience working in the arboricultural industry and has a HND in Arboriculture.
## 4.2 Appendix 2 – Tree Survey

<table>
<thead>
<tr>
<th>Tree No.</th>
<th>Tag No.</th>
<th>Species</th>
<th>Health</th>
<th>Size</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A</td>
<td>Oak</td>
<td>Good</td>
<td>100</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>B</td>
<td>Elm</td>
<td>Good</td>
<td>150</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>C</td>
<td>Ash</td>
<td>Poor</td>
<td>75</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>D</td>
<td>Beech</td>
<td>Fair</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>E</td>
<td>Cherry</td>
<td>Fair</td>
<td>50</td>
<td></td>
</tr>
</tbody>
</table>

**Tree Survey Details**

- **Measurement Units:** All measurements are in meters (m).
- **Health:**
  - Good: Trees in excellent condition, no significant defects.
  - Fair: Trees with minor defects,不影响结构的完整性。
  - Poor: Trees with significant defects,可能影响结构的完整性。
- **Size:**
  - Diameter at Breast Height (DBH): Measured at 1.3 meters above ground level.
  - Height: Measured from the ground to the top of the tree.

**Recommendations**

- Trees with a diameter at breast height (DBH) greater than 20 cm should be assessed for potential hazards to structures or roads.
- Trees with significant defects should be considered for removal or managed with appropriate pruning techniques.

---

**Additional Information**

- [Source: Lockhart Garratt](www.lockhart-garratt.co.uk)
- [Location: 14-0152 Barrack Road AIA V5 SW 130614]
Table 1: Cascade chart for tree quality assessment

<table>
<thead>
<tr>
<th>Category and definition</th>
<th>Criteria (including subcategories where appropriate)</th>
<th>Identification on plan</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trees unsuitable for retention (see note)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Category U</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years</td>
<td>- Trees that have a serious, irreparable, structural defect such that their early loss is expected due to collapse, including those that will become available after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning)</td>
<td>See Table 2</td>
</tr>
<tr>
<td></td>
<td>- Trees that are dead or are showing signs of significant, immediate, and irreversible decline</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality</td>
<td></td>
</tr>
<tr>
<td><strong>NOTE</strong> Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Mainly arbicultural qualities</td>
<td>2 Mainly landscape qualities</td>
<td>3 Mainly cultural values, including conservation</td>
</tr>
<tr>
<td><strong>Category A</strong></td>
<td>Trees that are particularly good examples of their species, especially if rare or unusual; or those that are essential components of groups or formal or semi-formal arbicultural features (e.g. the dominant and/or principal trees within an avenue)</td>
<td>Trees, groups or woodlands of particular visual importance as arbicultural and/or landscape features</td>
</tr>
<tr>
<td>Trees of high quality with an estimated remaining life expectancy of at least 40 years</td>
<td>Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or woodland)</td>
<td>See Table 2</td>
</tr>
<tr>
<td><strong>Category B</strong></td>
<td>Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though removable defects including unsympathetic past management, and storm damage), such that they are unlikely to be suitable for retention for beyond 40 years or trees lacking the special quality necessary to merit the category A designation</td>
<td>Trees present in numbers, usually growing as groups or woodlands, such that they attract a higher collective rating than they might as individuals; or trees occurring as collectives but situated so as to make little visual contribution to the wider locality</td>
</tr>
<tr>
<td>Trees of moderate quality with an estimated remaining life expectancy of at least 20 years</td>
<td>Trees with material conservation or other cultural value</td>
<td>See Table 2</td>
</tr>
<tr>
<td><strong>Category C</strong></td>
<td>Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories</td>
<td>Trees present in groups or woodlands, but without this conferring on them significantly greater collective landscape value; and/or trees offering low or only temporary/short term landscape benefits</td>
</tr>
<tr>
<td>Trees of low quality with an estimated remaining life expectancy of at least 10 years, or young trees with a stem diameter below 150 mm</td>
<td>Trees with no material conservation or other cultural value</td>
<td>See Table 2</td>
</tr>
</tbody>
</table>
### 4.4 Appendix 4 – Sample Site Inspection Record

<table>
<thead>
<tr>
<th>Site</th>
<th>Date</th>
<th>Surveyor</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developer</td>
<td>Planning Application No.</td>
<td></td>
</tr>
<tr>
<td>Site Agent</td>
<td>Contact No:</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Was all tree protective fencing in place?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was CEZ to agreed dimensions</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was debris/storage/groundwork evident within CEZ?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are any special works scheduled for coming build period?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Was there any evidence of damage to trees?</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Give details:

Any amendments proposed to plan
Give details:

See additional sheet

Signed: [Developer/Main contractor for and on behalf of:]
Name: [Developer/Main contractor for and on behalf of:]
Consulting arborist for and on behalf of: [Developer/Main contractor for and on behalf of:]
Company: [Developer/Main contractor for and on behalf of:]

Circulation:

<table>
<thead>
<tr>
<th>Name</th>
<th>Address</th>
</tr>
</thead>
<tbody>
<tr>
<td>LPA</td>
<td></td>
</tr>
<tr>
<td>Developer head office</td>
<td></td>
</tr>
<tr>
<td>Site agent</td>
<td></td>
</tr>
<tr>
<td>Architect</td>
<td></td>
</tr>
<tr>
<td>ACoW</td>
<td></td>
</tr>
</tbody>
</table>

Add photographs as required
## 4.5 **Appendix 5 – Tree Constraints Data**

<table>
<thead>
<tr>
<th>Tree No</th>
<th>Species</th>
<th>Stem Diameter (mm)</th>
<th>Circle Radius (m)</th>
<th>RPA (m²)</th>
<th>Length of sides of a square (m)</th>
<th>Minimum barrier distance (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>London Plane</td>
<td>330</td>
<td>4.0</td>
<td>49</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>8</td>
<td>Leylandii</td>
<td>200</td>
<td>2.4</td>
<td>18</td>
<td>4</td>
<td>2.1</td>
</tr>
<tr>
<td>9</td>
<td>Sycamore</td>
<td>150</td>
<td>1.8</td>
<td>10</td>
<td>3</td>
<td>1.6</td>
</tr>
<tr>
<td>10</td>
<td>Birch</td>
<td>300</td>
<td>3.6</td>
<td>41</td>
<td>6</td>
<td>3.2</td>
</tr>
<tr>
<td>11</td>
<td>London Plane</td>
<td>500</td>
<td>6.0</td>
<td>113</td>
<td>11</td>
<td>5.3</td>
</tr>
</tbody>
</table>
Appendices

Explanatory Notes

**General:** The basic data listed in the first two columns is identical to that listed in the schedule in Appendix 2. The data in columns 3-5 are derived from the stem diameter by a simple calculation as described in BS5837 and summarised Appendix 2.

**Circle Radius:** The circle radius has been calculated by obtaining the stem diameter (measured at 1.5m above the ground) in millimetres and multiplying it by 12. Where the tree is multi-stemmed, an average stem diameter is calculated by the following formula specified in section 4.6.1 (a) & (b) of BS5837:

\[
\sqrt{(\text{stem diameter } 1)^2 + (\text{stem diameter } 2)^2 \ldots + (\text{stem diameter } 5)^2}
\]

For trees with more than five stems (not illustrated in Annex C), the combined stem diameter should be calculated as follows:

\[
\sqrt{\left(\text{mean stem diameter}\right)^2 \times \text{number of stems}}
\]

This total is then divided by 1000 to provide a circle radius in metres.

**RPA Areas:** The RPA has been assessed according to the recommendations set out in section 4.6 of BS5837. It is calculated by multiplying the radius squared by 3.142 (π).

**Length of sides of a square:** Section 5.5.3 of BS5837 recommends that the ground protection and barriers should be shown as a polygon surrounding the stem of the tree. With a circle, the distance from the edge of the circle to the centre will remain constant, but with a square, the distance from the centre of the tree to the sides of the square is less than the distance to the corner of the square. The area of the square must remain the same as the area of the circle. In order to ensure that it is the case, the length of side of the square is calculated at the square root of the RPA area.

**Minimum barrier distance:** This is the closest point that a side of the square can be to the centre of the tree. Figure 1 graphically illustrates the differences between a square and a circle in area. Where the distance from the centre of the tree to the corner of the square (A) is greater than the radius of the circle (r), but the distance from the centre of the tree to the side of the square (B) is greater than the radius of the circle (r), the total area will remain the same. The minimum barrier distance from the tree is calculated by taking the length of the side and dividing it by two.

*Figure 1 - Graphical explanation for calculating the RPA*
Clarification note on the RPA radius: The RPA radius is not the automatic minimum distance of the tree protection. It is a notional figure for use as a means of calculating the actual area of the RPA. BS5837 clarifies this at:

3.7 root protection area (RPA) – layout design tool indicating the minimum area around a tree deemed to contain sufficient roots and rooting volume to maintain the trees viability, and where the protection of the roots and soil structure is treated as a priority.
4.6 APPENDIX 6 – TREE PROTECTIVE FENCING
4.7 **Appendix 7 - Example of protective fencing signage**

![Protective Fencing and Tree Protection Area](image)

*PROTECTIVE FENCING. THIS FENCING MUST BE MAINTAINED IN ACCORDANCE WITH THE APPROVED PLANS AND DRAWINGS FOR THIS DEVELOPMENT.*

*TREE PROTECTION AREA  
KEEP OUT!  
(TOWN & COUNTRY PLANNING ACT 1990)  
TREES ENCLOSED BY THIS FENCE ARE PROTECTED BY PLANNING CONDITIONS AND/OR ARE THE SUBJECTS OF A TREE PRESERVATION ORDER. CONTRAVENION OF A TREE PRESERVATION ORDER MAY LEAD TO CRIMINAL PROSECUTION. ANY INCURSION INTO THE PROTECTED AREA MUST BE WITH THE WRITTEN PERMISSION OF THE LOCAL PLANNING AUTHORITY.*

(Lockhart Garratt is able to provide useable, weather-proof copies of this sign if required, for attaching to the protective fencing. If required, please contact us for further details)
4.8 **Appendix 8 – Permanent Ground Protection**

**CellWeb™**

**Tree Root Protection System**

The CellWeb™ TRP cellular confinement system protects tree roots from the damaging effects of compaction and desiccation, while creating a stable, load-bearing surface for vehicular traffic.

CellWeb™ offers an alternative to the traditional methods of constructing roadways and building foundations that involve excavation, which can result in tree root severance and soil compaction from the passage of vehicles. Such damage can severely influence tree health, and in extreme cases, lead to death. CellWeb™ can be sensitively installed onsite and under the canopies of trees without negative effects.

Trees are valuable landscape features and a vital environmental resource. Increasingly, contractors are being required to ensure the health and survival of trees curing and beyond the construction period. Although this is enshrined in BS 5837: Trees in Relation to Construction: Recommendations (2000) and Tree Preservation Order legislation, it presents several issues when implementing construction projects near to trees:

- Root severance caused by excavation, leaving tree roots to decay, lose stability and with a diminished capacity to utilise soil water and nutrients.
- Destruction of soil structure and compaction due to the passage of heavy vehicles, restricting the flow of water and air to tree roots.
- Need for construction access, new roadways and hard surfaces that require engineering-standard load-bearing foundations that meet building regulations.
- Need for high-performance, cost-effective drainage and roadways in the vicinity of tree roots.

The CellWeb™ System overcomes these issues and helps contractors to comply with tree health guidelines by creating a load-bearing base that is water-permeable, stable and durable.

With no need for excavation, the system is quick and easy to install, reducing construction time and saving costs and making it suitable for temporary and permanent solutions.

Glynebourne Wood
Restoration path in recreational woodland built using a CellWeb™ foundation which was covered with BioCell 600 and then filled with woodchip to create a porous surface.
Product features

CelWeb™ comprises an expandable cellular mattress that is then filled with a clear stone sub-base and above a Tyrone T 300 Geotextile.

The honeycomb-like structure is made of robust high-density polyethylene (HDPE) that is simply switched out and filled with clean angular material. Just like traditional roadways, the strength of the structure comes from the binding together of the infill, but with CelWeb™ this is achieved without connection and without reduction in permeability.

Perforated cell walls allow the angular infill to bind with the contents of the adjacent cell, but with sufficient space for the movement of water and air to the root system. As the infill contains no fines and the geotextile layers prevent clogging from particles washing into the system, the structure remains permeable to water over time and protects the roots for the lifetime of the tree.

As well as being quick and easy to install, CelWeb™ also dramatically cuts down the depth of sub-base required, in most cases by as much as 50%, further reducing costs. CelWeb™ significantly reduces surface settling, increasing the long-term performance of the finished surface and ensuring that tree roots remain protected from vertical loads.

CelWeb can be used as a permanent solution or alternatively the system can be used in a temporary situation. In a temporary application, the system can be used for the required period of time, then removed for use on another site or recycled, thereby adding to CelWeb’s green credentials.

Please call 01455 617 139 or email sales@geosyn.co.uk for further information.
4.9 **APPENDIX 9 – EXAMPLE METHODOLOGY FOR CONSTRUCTION OF SURFACE**

(This document has been produced by Geosynthetics Ltd for the installation of the Cellweb Tree Root Protection System – it does not apply to other products which may serve a similar purpose).

![Construction Methodology](image)

When considering damage to tree roots, in applications of vehicular access and parking, the risk of oxygen depletion caused by compaction of subsoil's, site clearance damaging the root source and type of reinforcement are areas which need to be given due consideration.

Other risk factors are:

- Creating an impermeable surface
- Causing a rise in the water table due to construction
- Increasing ground level
- Contamination of subsoil's

### 1. Compaction

When looking at site conditions and use, the following information should be considered to enable a load bearing structure capable of supporting traffic to be proposed:

- Californian Bearing ratio (CBR) – Standard test method for measuring soil strength
- Soil types
- Water table
- Maximum load (vehicles)
- Acceptable rut depth
### Appendices

<table>
<thead>
<tr>
<th>Reinforcement type</th>
<th>Cellweb Cellular Confinement 150mm deep</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type and Depth of engineered infill material</td>
<td>Clean, angular. Usually 40mm to 20mm.</td>
</tr>
</tbody>
</table>

#### 2. Dig (site strip)

Site stripping does damage some root structure prior to construction; however, the use of no-dig construction elevates the access road requiring edge protection.

#### 3. No dig

| 3.1. Remove surface vegetation | Use a suitable herbicide suitable for the specific vegetation and not harmful to the tree root system |
| 3.2. Place geotextile separation filtration layer | Use a Treetex T300 non woven Goetextile over the prepared sub-grade. Overlap dry joints by 300mm. |

The three dimensional cell structure, is formed by ultrasonically welding polyethylene (perforated) strips / panels together to create a three dimensional network of interconnecting cells. A high degree of frictional interaction is developed between infill and the cell wall, increasing the stiffness of the system.

| 3.4. Edge restraint | A treated timber edging is usually acceptable. |

#### 4. Cellular Confinement and Backfill Material.

Expand the Cellweb 2.56m wide panels to the full 8.1 metre length. Pin the Cellweb panels with staking pins to anchor open the cells and staple adjacent panels together to create a continuous mattress. Infill the Cellweb with a no fines angular granular fill (typically 4-20mm) within each open cell. The use of cellular confinement reduces the bearing pressure on the subsoil by stabilising aggregate surfaces against rutting under wheel loads. Comparisons between cellular confinement and traditional aggregate and geogrid-reinforced structures demonstrate a 50% reduction in construction thickness of the granular material.
Appendices

5. Surfacing Options

<table>
<thead>
<tr>
<th>Block Paving:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1. Lay second layer of Treetex T300 Geotextile separation fabric over the infilled Cellweb sections</td>
</tr>
<tr>
<td>5.2. Lay sharp sand bedding layer compacted with a vibro compaction plate to recommended depth.</td>
</tr>
<tr>
<td>5.3. Place block paviors as per manufacturers instructions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Tarmac:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Place 25mm surcharge of the granular material above the Cellweb system and lay the bitumen base and wearing courses.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Loose Gravel:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.4. Ensure Cellweb is completely filled.</td>
</tr>
<tr>
<td>5.5. Place decorative aggregate to required depth</td>
</tr>
<tr>
<td>NOTE: A treated timber edge should be provided to restrict gravel movement.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Grass Blocks:</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.6. Place second layer of Treetex T300 Geotextile separation fabric over the infilled Cellweb sections</td>
</tr>
<tr>
<td>5.7. Place 50/50 rootzone bedding layer to the required depth</td>
</tr>
<tr>
<td>5.8. Lay recycled Duo Block 500 Grass Protection System infilled with 50/50 rootzone mix.</td>
</tr>
<tr>
<td>5.9. Seed as per architects instructions.</td>
</tr>
<tr>
<td>(Alternatively the Grass Blocks may be infilled with gravel.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Concrete Slab</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.0 Lay Cellweb as previous and place second layer of Treetex Geotextile directly over the filled panels. Pour concrete base as specified.</td>
</tr>
</tbody>
</table>

Below are illustrations of the correct stapling procedure for joining both edges and ends of panels together;

Panel Edges:

Panel Ends:

If you have any queries about installation please contact Geosynthetics Ltd on 01455 617139
4.10  APPENDIX 10 – SITE GUIDANCE FOR WORKING IN THE RPA

4.10.1 General Guidance for Working in RPAs

a) What is the purpose of this guidance?

This guidance sets out the general principle that must be followed when working in the RPA. Where more detail is required, it will be supplemented by illustrative specifications in other appendices to this document. Before work starts on site, the purpose of this guidance is to demonstrate to the LPA that tree protection issues have been properly considered and to provide a written record of how they will be implemented.

Once the site work has started, this guidance is specifically for the site personnel to help them understand what has been agreed and explain what is required to fully meet their obligations to protect trees. All personnel working in the RPA must be properly briefed about their responsibilities towards important trees based on this guidance.

b) What are the RPAs?

RPAs are the areas surrounding important trees where disturbance must be minimised if they are to be successfully retained. All RPAs close to the construction area are identified on the Tree Protection Plan attached to this report. Damage to roots re degradation of the soil through compaction and/or excavation within the RPA will damage the tree. Any work operations within the RPA must be carried out with great care if trees are to be successfully retained.

c) When should this guidance be followed?

Anyone entering a RPA must follow this guidance if the trees are to be retained unharmed. Anyone working in a RPA must take care to minimise excavation into existing soil levels and limit any fill or covering that may affect soil permeability. There are two main scenarios where this guidance must be followed when entering and working within a RPA:

i. Removal of existing surfaces/structures and replacement with new surfaces, structures or landscaping

ii. Preparation and installation of new surfacing structures and/or landscaping.

d) Where does this guidance apply?

This guidance should always be read in conjunction with the site plans illustrating the areas where specific precautions are necessary. Each area where precautions are required is annotated on the plans as identified on their keys. All plans are illustrative and are intended to be interpreted in the context of the site conditions when the work commences. All protective measures should be installed according to the prevailing site conditions and agreed as satisfactory by the appropriate supervising officer before any demolition or construction works commence.

e) What references is this guidance based on?

This guidance is based in the assumption that the minimum general standards for development issues are those set out in BS5837 (2012): Trees
in relation to design, demolition and construction – Recommendations, and the NJUG Vol.4 Issue 1: Guidelines for the planning, installation and maintenance of utility apparatus in proximity to trees.

f) Preventing adverse impact to the RPA beyond the immediate work area

Any part of the RPA beyond the agreed work area must be isolated from the work operations by protective barriers or ground protection to at least the minimum standard described in BS5837 for the duration of the work.

g) Excavation and dealing with roots

All excavation must be carried out carefully using spades, forks and trowels, taking care not to damage the bark and wood of any roots. Specialist tools for removing soil around roots using compressed air may be an appropriate alternative to hand digging, if available. All soil removal must be undertaken with care to minimise the disturbance of roots beyond the immediate area of excavation. Where possible, flexible clumps of small roots, including fibrous roots, should be retained if they can be displaced temporarily or permanently beyond the excavation without damage.

If digging by hand, a fork should be used to loosen the soil and help locate any substantial roots. Once the roots have been located the trowel should be used to clear the soil away from them without damaging the bark. Exposed roots that are to be removed should be cut cleanly with a sharp saw or secateurs 10-20cm behind the final face of the excavation.

Roots temporarily exposed must be protected from direct sunlight, drying out and extreme temperatures by appropriate covering. Roots 2.5-10cm in diameter should only be cut in exceptional circumstances. Roots greater than 10cm in diameter should only be cut after consultation with the appropriate supervisory officer.

h) Arboricultural supervision

Any work within the RPA requires a high level of care. Qualified arboricultural supervision is essential to minimise the risk of misunderstanding and misinterpretation. Site personnel must be properly briefed before any works commence.

Ongoing work must be inspected regularly, and on completion, the work must be signed off by the arboriculturist to confirm compliance by the contractor. In the context of this guidance, an appropriate supervising officer would be an arboriculturist.

4.10.2 Installation of new surfaces in RPAs

a) Basic Principles

New surfacing is potentially damaging to trees because it may require changes to existing ground levels. This can result in damage to the soil structure affect the efficient exchange of water and gases in and out of the soil. Mature and over mature trees are much more likely to suffer as a result of these changes. These impacts can be minimised by reducing the extent of changes within the RPA. The most suitable surface will be one that is permeable (allowing the movement of water and gas), load bearing (to avoid
compaction) and requires little or no excavation (to limit root damage). The actual specification is an engineering issue that needs to be addressed by a suitably qualified professional, and is beyond the scope of this report.

b) Establish the depth of excavation and surface gradient

The precise location and depth of roots within the soil is unpredictable and can only be established once digging has commenced. Ideally, all RPAs should be no-dig, but this is often not possible on undulating surfaces. New surfacing normally requires an evenly graded sub-base layer, which can be made up to high points with granular, permeable fills such as crushed stone or sharp sand. This sub-base must not be compacted. Some limited excavation may be required to achieve this, and this is not necessarily damaging to trees if it is done carefully and no large roots are cut. The top 5mm of soil on grass surfaces is unlikely to contain any tree roots and therefore the removal of this will not impact the tree. It may be possible to dig deeper than this depending on local conditions, but this would need to be assessed by the retained arboricultural consultant.

On undulating surfaces, finished gradients/levels must be planned with sufficient flexibility so as to allow changes to occur if the excavation of high points reveals unexpected large roots. If roots are less than 25mm in diameter, it would normally be acceptable to cut these. However, for roots over 25mm diameter, cutting them may cause damage to the tree and further excavation may not be possible. In this case, the surrounding levels must be adjusted to take account of these high points, by filling with suitable material. If this is not possible and it is necessary to cut larger roots, discussions should be held with the retained arboricultural consultant before any final decision is made.

c) Base and finish layer

Once the sub-base layer is finished, the load-spreading surface is installed on top, without compaction. Generally, the load-spreading surface will normally be cellular and filled with crushed stone – care must be taken as different products produce different results, and the detail must be confirmed prior to installation. Suitable finishes included washed gravel, permeable tarmac or permeable block paving. For lightly loaded surfaces such as pedestrian footpaths, preformed concrete slabs may be appropriate if the sub base is prepared as detailed above.

d) Edge Retention

Conventional kerb retention set in concrete trenches is likely to cause damage to the roots and should be avoided. Effective edge retention within the RPA must be custom designed to avoid significant excavation in to existing soil surfaces. Generally, the use of pre-formed edging secured by metal pins or wooden pegs will be sufficient to ensure minimal impact on the trees.

e) Installing new surfacing on top of existing surfacing

It may be possible/preferable in some instances to use existing surfaces as the base for a new surface. This will not normally result in any significant excavation that could damage the roots, so no special precautions are
required. However, if large roots appear above the existing surface, then the precautions and procedures detailed above must be followed.