Arboricultural Impact Assessment and Arboricultural Method Statement for Proposed Mineral extraction at Hamble

CEMEX UK Materials Ltd

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1.0 INTRODUCTION

A site visit and tree inspection survey was carried out on the 11th June 2020, within and adjacent to the planning application redline boundary, for the proposed sand and gravel quarry at Hamble. The survey was carried out by Alex Finn (TechArborA), Senior Arboricultural Manager at Cemex UK Operations Limited.

The purpose of the survey was to inspect the existing tree resource within and adjacent to the site redline boundary, to assess the potential impact of the proposed quarry and infrastructure on the existing trees, and to identify where necessary appropriate mitigation measures are required and where trees might have to be removed.

2.0 SCOPE

The survey identifies and reports on the general condition and amenity value of significant trees and vegetation situated within the influence of the proposed “development”, including any adjacent trees that may be affected.

British Standard BS5837:2012 “Trees in design, demolition and construction, Recommendations” has been used as the basis for the assessment. It is intended the information contained in this survey will be used to ensure that the decisions made in respect of the future development proposals consider the tree resource. Trees worthy of retention and which are beneficial to the screening and the softening of the site have been identified. Conversely, less valuable trees, which are of lower importance due to their poor condition or for other reasons, have also been identified; these trees may be considered as suitable candidates for removal.

Where trees are located on third party land or are found to be inaccessible due to ground conditions all measurements are estimated.

Guidance as to the stand-off distances required to prevent damage to retained trees during the extraction phases, have been calculated and are shown as dashed circles on the Tree Constraints Plan (TCP). These areas are referred to as the Root Protection Areas (RPAs).

It is important that this survey is referred to prior to any site excavation, soil moving, and infrastructure works commencing. The main priority being the protection of those trees identified within the survey, which are of amenity value, are in third party ownership, or where they are found to be designated with a Tree Preservation Order (TPO) or within a Conservation Area (CA).

In general, only individual and groups of trees which are in excess of 150mm dbh are included in the survey.

Trees considered to be outside of the zone of influence of the “development” have not been included in the survey and are not recorded on the associated tree survey plans.

Where it has been found there are trees which have not been included on the original base topographical survey, and it has been thought necessary to include them, then these have been marked onto the tree survey plans in their approximate positions only and marked “AP” (approximate position).

The positions of these trees should therefore only be used for reference and general guidance only. If it is thought that there is a danger that the works could influence the tree’s health, then it will be necessary to carry out further surveying work to confirm their exact positions in relation to the development.

3.0 METHODOLOGY

The trees included in this survey have been assessed from ground level individually with the aid of the Cascade Chart for Tree Quality Assessment BS 5837:2012 (see Appendix A).

Trees that have been recorded have been given a reference number which can be found within the Tree Survey (see Section 6) and on the supplied drawings.

Assessment is based mainly around the useful life expectancy of the tree(s) and their condition and contribution (amenity value) to the area, which has been categorised using four letters and four colours, the values of which are shown on the Cascade Chart for Tree Quality Assessment (Appendix 1). The letters have then been divided further using one to three sub-categories under one of three sub-headings.

All the colour categories and reference numbers have been marked onto the accompanying Tree Constraints Plan and the Tree Protection Plan.

Branch spread in general has been measured on four sides and recorded together with confirmation on which side of the tree the measurement was taken.

Stem diameters has been generally measured at 1.5m above ground.

Current tree heights have been measured using a SUUNTO Height Meter PM-5/1520, serial number 823208, except where trees are inaccessible when estimated measurements will have been recorded.

Where trees are surveyed as woodlands or groups rather than individuals, in order to calculate their RPAs, the largest recorded DBH on trees located on the outer edges has been used. All other dimensions recorded are averaged out.

Where due to local constraints i.e. impenetrable vegetation or trees located in private properties, and it is not possible to gain direct access to the trees, field data will have been estimated.

Where base topographical plans are not available or additional trees are added, it will sometimes be necessary to calculate the approximate position of these trees. Where this occurs trees will be mark with the letters “AP” (approximate position).

4.0 PLANS

4.1 Tree Constraints Plans

To accompany this survey, a Tree Constraints Plan (TCP) has been produced. All trees included in the survey have been illustrated and colour coded by reference to the Cascade Chart for Tree Quality Assessment, as shown in Appendix A.

Each colour which represents the assigned tree category has been marked onto the plan. This enables the reader to instantly see the trees and areas of highest or lowest merit and where they are located.

Where individual trees are not represented on the original topographical base plan, they have been illustrated in their approximate positions and marked “AP”.

RPAs are calculated by using the tree’s trunk diameter measured at 1.5m above ground level. The measurements are multiplied to provide a minimum area around the tree which should be left undisturbed during the “development”, in order to remove the risk of decline and ensure the survival of the trees.

There is also scope to carry out some construction works within the RPA using proven measures; however, these should be avoided if possible. Where these methods are required, they will be recommended within an AMS which will be required once the development design has been finalised.

Where tree canopies extend further than the RPA, care will be needed not to damage these during site works. Some pruning back may be accommodated where this is an issue. All work, however, should only be carried out after further assessment and advice from the project Arboriculturist in accordance with BS 3998 “Recommendations for tree work” or latest research.

4.2 Tree Protection Plans

A Tree Protection Plan (TPP) has been included with this report which is represented on a separate plan to the TCP. This plan will show the precise location and specification of the erection of tree protective fences and any other relevant physical protection measures, including ground protection to protect the RPA (root protection area).

Specifications in respect of recommended tree protection fencing can be found in Appendix B at the end of the survey.

4.3 Protective Status of Trees and Hedgerows

Trees may be legally protected by a Tree Preservation Order (TPO) or located within a Conservation Area (CA).

There is a potential for large penalties to be attracted for illegally carrying out works on protected trees without formal permission to do so.

Information supplied by reference to Eastleigh Borough Council's (EBC) web page on 31/11/2021, established that there are not any TPOs or a Conservation Area located within the red line site boundaries.

It is advised that prior to planning permission however, that if any proposed tree works is required, that further searches are made in case amendments have been made.

It should also be noted that where it is intended to fell in excess of 5 cubic metres of timber in any calendar quarter, it will be necessary to obtain a Felling Licence from the Forestry Commission. There are some exemptions to this regarding dead, dying and dangerous trees and this will only be necessary prior to planning approval, or where planning consent is given but there is a change in the proposals, or the trees were not included in the original planning application.

Under the 1997 Hedgerow regulations it is against the law to remove most countryside hedgerows without permission (pre planning consent). To obtain permission to remove a hedgerow, an application to the local planning authority must be made. If the Council decides to prohibit removal of an important hedgerow, it must be advised within 6 weeks of the application. If a hedgerow is removed without permission (whether it is important or not) an unlimited fine may be imposed. It may also be necessary to replace the hedgerow. However, a hedge must meet certain criteria set out if it is considered to be important.

5.0 OBSERVATIONS

The site, which is a former airfield, is broadly rectangular in shape with a tree lined main line railway forming the northern boundary.The residential areas of Satchell Lane and Astral Gardens are found on the eastern and southern boundaries, with Hamble Lane and a wooded margin forming the western boundary.

The proposed mineral extraction area currently comprises of rough grassland and scrub, with a mosaic of field boundary trees, ranging in ages from young through to mature trees. No over mature or veteran trees are apparent within the redline boundary.

Mature trees are most prominent on the northern, eastern and part of the western boundaries which provide important amenity screening to the site

The predominate species is English oak, with common ash, common alder, silver birch, sycamore and willow, with an under storey of holly, goat willow, field maple and hawthorn (refer to Table 1 below).

There are many unclassified paths within the site, as it tends to be used by the local community for dog walking and recreational use.

6.0 PROPOSED WORK

It is proposed to extract 1.7 million tonnes of sand and gravel over 6-7 years followed by importation of inert materials for restoration, taking up to 13 years overall.

Access to the site is to be created from Hamble Lane on the western boundary.

7.0 TREE SURVEY

All the site information used for the assessment and grading of individual trees, groups, woodlands and hedgerows has been recorded into the following Tree Survey Table (Table 1) using the Cascade Chart for Tree Quality Assessment BS 5837:2012 (Appendix 1) from which the table template has also been taken.

Table 1

CEMEX UK Operations Limited					Date: December 2021										
Tree reference number	Species	Height (m)	Dbh	No of stems	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Height of crown clearance (m)	Age class	Physiological condition	Structural condition	Preliminary management recommendations	Estimated remaining contribution	Category grading
T1	English oak	5	270	2	4	4	4	4	2	Y	Good	Good	None	10+	C1
T2	English oak	10	565	2	7	7	7	7	0.3	M	Good	Good	None	20+	A1
T3	English oak	14	1050	1	6.5	6.5	6.5	6.5	1	M	Good	Good	None	20+	A1
T4	English oak	8	425	2	3	3	3	3	2	SM	Good	Good	None	20+	B1
T5	Sycamore	16	520	2	3	6	7	7	1.5	M	Good	Good	None	20+	C1
T6	English oak	15	1000	1	6	6	5	5	4	M	Good	Fair	In decline	10-	C1
T7	Sycamore	20	670	5	5	7	3	7	2	M	Good	Good	None	20+	B1
T8	English oak	20	1100	1	7.5	8	8	8	2	M	Good	Fair	None	20+	B1
T9	Holly	14	400	1	3	3	4	6	0.01	M	Good	Good	None	20+	B1

CEMEX UK Operations Limited					Date: December 2021										
Tree reference number	Species	Height (m)	Dbh	No of stems	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Height of crown clearance (m)	Age class	Physiological condition	Structural condition	Preliminary management recommendations	Estimated remaining contribution	Category grading
T10	Sycamore	19	335	3	5	6	2	6	3	M	Good	Fair	None	10+	C1
T11	English oak	19	900	1	9	12	7	7	4	M	Good	Good	None	20+	B1
T12	English oak	15	700	1	3	8	7	7	2.5	M	Good	Fair	None	10-	C1
T13	English oak	18	700	1	7	8	7	4	4	M	Good	Good	None	20+	B1
T14	English oak	18	700	1	4	8	8	10	4	M	Good	Good	None	20+	B1
T15	English oak	18	700	1	11	10	6	7	4	M	Good	Fair	None	10-	C1
T16	English oak	17	350	1	3	8	4	2	4	SM	Fair	Fair	None	10+	C1
T17	English oak	20	1050	1	3	12	5	8	3	M	Fair	Poor	None	10-	C1
T18	English oak	20	700	1	3	12	5	10	3	M	Good	Good	None	20+	B1
T19	Ash	20	700	1	9	12	4	10	3	M	Fair	Fair	None	10-	C1

CEMEX UK Operations Limited					Date: December 2021										
Tree reference number	Species	Height (m)	Dbh	No of stems	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Height of crown clearance (m)	Age class	Physiological condition	Structural condition	Preliminary management recommendations	Estimated remaining contribution	Category grading
T20	English oak	17	350	1	6	3	8	10	4	M	Fair	Good	None	10+	C1
T21	English oak	20	900	1	8	10	8	8	3	M	Fair	Good	None	10+	C1
G1	Ash	8	150	1	2	2	2	2	2	Y	Good	Good	None	10+	C2
G2	Goat willow	8	300	4+	3	3	3	3	0.01	Y	Good	Good	None	10+	C2
G3	English oak, Silver birch, Willow	12	250	1	3	3	3	3	0.3	SM	Good	Good	None	10+	C2
G4	Crab apple, Willow, Field maple, English oak	12	250	1+	3	3	3	3	0.01	Y/SM	Good	Good	None	10+	C2
G5	Ash, Common alder, English oak	14	350	1	4	4	4	4	2	SM	Good	Good	None	20+	B2
G6	Poplar, English oak, Ash	16	500	4	7	7	7	7	1	M	Good	Good	None	20+	B2
G7	English oak,Ash,Hawthorn	16	450	1	6	6	6	6	0.1	SM	Good	Good	None	20+	B2
G8	English oak, Silver birch, Ash, Sycamore	16	450	1	7	7	7	7	1	M	Good	Good	None	20+	B2
G9	Goat willow	10	300	4+	3	3	3	3	1	SM	Good	Good	None	10+	C2
G7	English oak,Ash,Hawthorn	16	450	1	6	6	6	6	0.1	SM	Good	Good	None	20+	B2

CEMEX UK Operations Limited					Date: December 2021										
Tree reference number	Species	Height (m)	Dbh	No of stems	Canopy Spread N (m)	Canopy Spread E (m)	Canopy Spread S (m)	Canopy Spread W (m)	Height of crown clearance (m)	Age class	Physiological condition	Structural condition	Preliminary management recommendations	Estimated remaining contribution	Category grading
G8	English oak, Silver birch, Ash, Sycamore	16	450	1	7	7	7	7	1	M	Good	Good	None	20+	B2
G9	Goat willow	10	300	4+	3	3	3	3	1	SM	Good	Good	None	10+	C2

8.0 ARBORICULTURAL IMPACT ASSESSMENT

After identifying the position of the trees and calculating the RPAs, the proposed footprint of the extraction area and associated infrastructure has been overlaid onto the TCP, to enable possible areas of conflict to be identified. Trees which could potentially be impacted upon by the proposed development have been identified using this approach.

Most of the trees that are subject of this survey are semi mature or mature, and it can generally be considered that the older the tree, the more likely they will be susceptible to disturbance and changes to their environment. Damage can be commonly caused by:

- Compaction around the trees, causing asphyxiation and a reduction in the availability of water and minerals to the roots.
- Ground level changes.
- Physical damage to the roots by cutting and severing or removal of bark.
- Spillage of contaminants; and
- Physical damage to the stem and branches.

The effects of the damage may not be immediately apparent, and often it is the case that the tree does not show any symptoms until after the first year. Such symptoms may range from dieback in the crown, to deterioration and ultimate death, depending upon the severity of the damage and the ability of the roots to recover and regenerate.

It is likely that the health of a small number of trees which are to be retained are at risk of being affected by the development proposals due to the following activities:

- Machinery and access roads.
- Level changes, earthworks and creation of bunds.
- Canopies that extend into the site; and
- Plant site, installation route of services and conveyors where applicable.

It is observed that the tree resource within the influence of the proposed extraction areas and associated construction requirements, such as the haul road, plant site and bunds, are confined to the boundaries of the site, except for a group of low category internal trees in the south eastern corner which will have to be removed (refer to table 2 below).

It is generally considered desirable to retain the outer boundary trees where practical as they are an important asset due to the amenity value they provide, in the form of screening and landscape values to the site.

The exception is where access to the site is required to be created. The ideal location for this, which has been carefully considered for suitability and of least impact, is to be located on the western boundary with Hamble Lane. To enable this, it will be a requirement to remove 3 trees which are detailed in table 2 below.

As it is recognised there is a threat to the health of the remaining trees from the proposed mineral extraction, due to the risk of soil compaction and the cutting or severing of roots, branches or stems from heavy machinery, it will be necessary to ensure there is an adequate unexcavated stand-off area (root protection area), and there is temporary protection provided for the duration of the extraction and restoration period.

8.1 Summary of trees to be removed due to direct conflict with the quarry operations

From a total survey of 21 individual trees, 9 groups of trees, it will only be necessary to remove 3 individual trees and 1 small group of trees. These trees and groups are identified in Table 2 below.

Table 2

Trees to be removed			
Tree ref number	**Species**	**Category**	**Reason**
T5	English oak	C1	Access road
T6	English oak	C1	Access road
T7	English oak	B1	Access road
G4	Ash	C2	Extraction area

In summary this accounts for 2 individual category C trees (T5,T6), 1 category B individual tree (T7) and 1 category C group of trees (G4)

It is otherwise not envisaged that it will be a necessity to remove any other trees due to the extraction proposals. It is anticipated that the removal of these C category trees and a single B category tree, will have little impact on the amenity of the area due to the contribution of the remaining trees, which are found along the boundaries of the site.

8.2 Trees to be retained but are at risk of being influenced by the quarry operations

Where it is found that trees are at risk from influence of the quarry operations, but can be retained, it will be necessary to ensure that they are adequately protected during the operational extraction phases of the quarry and initial restoration period.

This is likely to consist of providing tree protection fencing. (refer to section 9.4) which must be maintained intact to prevent accidental encroachment into the RPAs. Details of positioning of the protective fencing can be found on the TCPs and detailed in Appendix B.

It is unlikely that any other protection such a ground protection will be needed but if for any reason it is found necessary to work within the RPAs of trees it will be necessary to consult further with the project Arboriculturist and detailed in the AMS

It is not proposed to carry out any hard surfacing within the RPAs but should there be a requirement to do so then it will be necessary to consider non evasive construction techniques such as use of a Cellular Confinement System (CCS) where it is deemed practical to do so. This must be addressed in detail through the AMS further to consultation with the project Arboriculturist.

8.3 Remaining trees on site adjacent to proposed quarry operations

Due to consultation and careful planning during the development and design stage it will not be necessary to remove any further trees across the site as recommended stand-off RPAs have been calculated and allowed for to prevent damage. If, however for any unlikely reason it becomes apparent further trees need to be removed, it will be necessary to consult with the project Arboriculturist and notify the MPA in writing.

9.0 ARBORICULTURAL METHOD STATEMENT

The successful retention of trees depends upon the quality of the tree protection and the administrative and site supervision procedures, to ensure that protective measures are adopted and remain in place for the duration of the development activity. An effective method of doing this is through an Arboricultural Method Statement (AMS), which can be specifically referred to as a planning condition. An AMS for this site is set out in detail below:

9.1 General level changes within RPAs

It is understood it is not proposed to carry out any major increase/decrease in level changes in the RPAs, but where necessary small changes, up to 150mm below ground level may be tolerated. However, generally changes in levels in the RPAs must be avoided where possible.

When using mechanical machinery, it can be placed either outside the RPA or by using temporary approved ground protection. Alternatively, it can be carried out by hand, but which ever method is used it is important that the existing surface or the finished surface is not heavily compacted. In no circumstances should soils be increased or lowered around the stems of trees as this will in time likely have a detrimental effect to the tree's health.

Where it is proposed to cut the soil surface in excess of 150mm, the depth of the proposed cutting will much depend on the tree's rooting depth, and each tree will need to be assessed individually. This may involve carrying out and exploratory hand dig to ascertain the rooting depths. Where surface roods are found, or roots found within the profile to be cut, it will be necessary to consult with the project Arboriculturist.

It may be the case where cutting cannot be avoided in areas of high root density, further trees will have to be considered for removal, or the soils left at their original level. It may be the case in these circumstances to consider incorporating retaining walls within a landscape scheme, but these must be located outside the RPAs.

9.2 Changes in drainage or water run off within the RPA

Where diversion of water away from trees occurs, for example because of changes in drainage run off, consideration should be given to installing irrigation systems to replace natural surface water sources.

This also applies to the opposite where water is inadvertently directed to trees, which could saturate soils and cause water logging, ultimately ending with reduction of trees health and possible even causing the tree(s) to die. In this case water should be allowed to drain away before it reaches the tree(s). If either of these are found to be a possibility it may be necessary to consult further with the project Arboriculturist for advice.

9.3 Tree Surgery Work

Before work commences it will be necessary for the project Arboriculturist to produce a schedule, which details and confirms the tree work that will be required, in order to implement the proposed works. Further reference to the TPP, other than the trees identified to be removed in Table 2 above, it is likely that only a small amount of additional tree work will be required.

This is likely to affect trees either side of the entrance (T8-T15) where some minor cutting back may be a requirement for sight lines, but this will be dependant on the marking out of the site prior to works commencing and will need to be confirmed at that time.

All work must be carried out by a competent tree surgeon to British standard recommendations BS 3998:2010 Tree work-Recommendations or as modified by more recent research.

It is advisable to select a contractor from the local authority list and preferably one approved by the Arboricultural Association. Telephone 01242 522152, website www.trees.org.uk/contractors.htm Their Register of Contractors is available free from The Malthouse, Stroud Green, Standish, Stonehouse, Gloucestershire GL10 3DL

9.4 Temporary Tree Protection Fences and Ground Protection

9.4.1 Temporary Tree Protection Fences

Before any materials or machinery are brought onto site and before any work commences, other than approved tree work, it will be necessary to erect protective fencing around the trees adjacent to the development area that are to be retained.

All protective fencing should be clearly marked with signage to inform that it is a “Tree Protection Area Keep Out”, together with a contact number to report any issues relating to the tree protection area(s).

Once erected, protective fences and any ground protection must be regarded as sacrosanct and must not be removed or altered without the prior approval of the project Arboriculturist, or where appropriate the LPA. Exceptions being where there is proposed development within these areas, and special approved construction and working methods have been approved and are adopted.

The protective fence should remain intact for the duration of the works, and should any breaches occur during this period, then work must be stopped until repairs can be completed.

Once extraction, landfilling and restoration has been completed, it will be necessary to remove the protective fencing. Once removed is important to ensure that heavy machinery is not used

within the RPAs unless suitable ground protection is adopted following further consultation with the project Arboriculturist.

The type and specification of protective fences is determined by the site suitability. Recommendations for this site can be found in Appendix B.

9.4.2 Temporary Ground Protection

Temporary ground protection must be adopted where it is necessary to provide a working platform within the RPAs in unprotected areas, such as for example preparation for the CCS and installation of utilities. This is only likely to be needed during the construction of the access following the removal of trees T5-T7.

The method and placement of temporary ground protection must be carefully considered and approved to suit the loading of the proposed machinery. For temporary protection against heavy traffic, the use of a breathable geotextile membrane overlaid with proprietary systems or pre-cast reinforced concrete slabs, must be utilised. Where there is only light traffic, other forms of ground protection may be used, subject to the approval of the project Arboriculturist. This may be in the form of scaffold boards laid on a wood chip layer on top of a geotextile membrane.

9.4.3 Permanent Ground Protection or Cellular Confinement System (CCS)

To avoid ground compaction and root damage from the proposed permanent hard surface access road, within the RPA of tree T8, it will be necessary to consider non-evasive construction methods. These areas are shown shaded in orange on the TPP.

These areas will need to be temporary fenced off from the development after removal of adjacent trees, with protective fencing (ref 9.4.1 above) until such time it is necessary to construct the hard surface areas. The protective fence should at this point be moved back to the outer limits of the hard-surfaced areas within the RPAs.

Construction in these areas should ideally be undertaken in dry weather between May and October when the ground is at its driest and least prone to compaction.

Prior to any works any ground vegetation should be killed off using a translocated herbicide that will not affect desirable vegetation. To prevent severe oxygen depletion in the soil during the process of decomposition, all dead organic material should be removed.

Where the bell mouth of the proposed access road is located within a small portion of the RPA of tree T8, it is recommended a no dig/limited dig construction method is used, such as a *Cellular Confinement System (CCS) (refer to Appendix C). The minimum footprint area

required for the CCS is marked in orange on the TPP. This area can be “squared” off to outside the RPA to make installation practical.

CCS systems are designed to provide a subbase to act as a load suspension layer and can accommodate most types of traffic and hard surfacing. Installation can be with a no dig or limited dig (not recommended unless trial hand digging does not expose any roots near the surface) operation depending on the existing ground levels, which can be raised if necessary, using a granular material to provide a flat bed.

Where it is required to carry out regrading works, by reducing levels to accommodate the CCS, it is advised that the project Arboriculturist is consulted to approve and oversee the works.

It is important that all heavy mechanical machinery is not permitted to work within the RPAs, unless working from temporary suitable ground protection such as heavy-duty road mats or the no dig CCS. The method of placement of temporary ground protection must be carefully considered to avoid compaction of soils and approved to suit the loading of the proposed machinery. Therefore, the ground protection must be placed from the previously protected area when working within the RPAs. Any work on unprotected bare soils must be avoided at all costs unless carried out by hand.

Final surfacing should be permeable to allow moisture to penetrate through the road surface and hydrate the soils around the trees. It is likely for lighter used surfaces that suitable lower grades of CCS associated with loading can be used. It is advised that design models for specific sites is prepared by the product manufacturer, and installation is monitored by the project Arboriculturist or manufacturer.

Where edge protection is required, traditional construction methods must be avoided as this will likely result in damage to tree roots. Therefore, effective edge protection within the RPAs must be custom designed to avoid significant excavation into the existing soil levels. For most surfaces, the use of pre-formed edging secured by metal pins or wooden stakes is normally an effective way of minimising adverse damage. If for any reason this is not practical or cannot be achieved, then further consultation with the project Arboriculturist will be required, to consider alternative solutions to minimise any risk of damage which may require exporitory handigging.

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9.5 Trees that fall within the influence of footpath construction

It is proposed to provide a footpath around part of the western boundary and northern boundary. As the footpath is to not be hard surfaced in anyway, but be laid to grass, it will not

be a requirement to offer any mitigation where it is found to be in the RPAs of trees. However, there maybe some removal of minor understorey but where this is required, all work will be carried out on foot and any brash left in habitat piles. It is not envisaged that it will be a requirement to remove any established trees other than saplings.

9.6 Hedgerows which have the potential to be influenced by the proposed quarry operations

It is understood there are no sections of hedgerows to be removed within the redline area. Where hedgerows are retained it is recommended a minimum of a 3m standoff is provided which must be maintained for the duration of the development. It is not practical or necessary to provide protective fencing for any hedges although it is likely boundaries will be made secure and these fences will double up for hedgerow protection.

9.7 Utilities

At the time of the survey, it was not confirmed where utilities are to be routed. However, it is advised where possible these should be located beyond the RPAs of all trees to be retained.

Where it is unavoidable, and utilities are proposed to be sited within RPAs, it will be necessary to consider the effects that the installation may have on their health. Utilities should only be installed where approved mitigation can be adopted by further consultation with the project Arboriculturist.

In these circumstances where practical it will be necessary to minimise root damage using broken trench or directional drilling (trenchless) techniques. These should be located at a minimum depth of 1.5m below ground level, and all receptor pits, where direct drilling is used, must be placed outside RPAs (refer to extract of Volume 4 National Joint Utilities Group Guidelines Appendix D).

As an alternative to trenchless techniques, which should only be adopted where less invasive methods cannot be used, a possible solution is to hand excavate any trenching. These excavations must be carefully dug using hand tools, in order to avoid any damage to the protective bark covering of larger roots or worse severing of roots. It may be necessary, in long stretches where there are concentrated areas of roots, to use a soil vacuum to remove the surrounding soil. If this is found to be the case, then it is recommended that further advice is given by the project Arboriculturist.

It is important to ensure most roots with a diameter of 25mm and greater are retained, as well as most of the finer roots. It is appreciated that it is not always possible to avoid the removal of some of the finer roots, but this must be kept to a minimum. Where these roots must be cut, then this should extend back to a side root and be undertaken using a sharp tool such as secateurs or a sharp hand saw to leave the smallest possible wound.

Directly following excavation all retained exposed roots must be covered and wrapped in damp hessian which must not be allowed to dry out until back filling is carried out. Where back filling

is carried out soils must only be lightly compacted and should be backfilled in the order the soil types were excavated.

Where Inspection chambers and manholes are to be installed, these should ideally be located outside the RPAs of the retained trees to avoid unnecessary damage to tree roots. However, if it is unavoidable or it is necessary to make improvements to existing manholes within RPAs, it will be necessary to consult further with the project Arboriculturist, but generally the same methodology above in protecting roots should be adopted.

It is advisable prior to any development, at the pre-commencement meeting, the final route of utility runs, receptor pits and mitigating installation techniques are confirmed, and then approved by the project Arboriculturist and/or the Local Planning Authority (LPA) where relevant.

Where existing utilities are found within the RPAs of retained trees, and it is required that they are removed, it will be necessary to consult further with an Arboriculturist to prevent damage to the trees, but in general these should be left in situ where it is possible to do so.

10.0 SCHEDULING OF WORK

It is advised that continued consultation with the mineral operator, architects, planners and civil engineers is carried out during the development of the AMS.

It is essential that pre-commencement meeting is held on site before any of proposed extraction or site preparation works begins. This should be attended by the site manager/agent, the project Arboriculturist and if required a Council representative.

All tree protection measures detailed in this report must be fully discussed so that all aspects of their implementation and sequencing are understood by all the parties. Any clarification or modifications must be recorded and circulated to all parties in writing. It may be appropriate for the tree surgery contractor to also attend this meeting.

It will be necessary thereafter to monitor and assess the site throughout the extraction and restoration period. Provided the guidelines are followed then it is considered that trees of value around this site should be able to be retained with minimal damage.

Table 3

Proposed scheduling of works in order to protect retained trees		
Timescale	**Task**	**By whom/responsibility**
Post Planning Approval	Submission of and AMS (if required) and final TPP as a condition agreed and approved by the MPA	To be arranged by the mineral operator with the project Arboriculturist
Predevelopment	Pre commencement meeting with all relevant parties	To be arranged by the mineral operator
	Preliminary tree work specification drawn up approved and sent for tender.	To be arranged by the mineral operator with the project Arboriculturist and site manager
	Pre-construction tree work including tree removal implemented and supervised	As above
	Erection of protective barriers and ground protection as agreed and approved	As above
	Carry out supervisory visits as agreed and report findings and recommendations	As above
During the development	Carry out supervisory visits as agreed and report findings and recommendations	As above
Post development	Phased removal of protective barriers with restoration landscaping	As above

	Inspect retained trees and carry out remedial tree work as necessary	To be arranged by the mineral operator and the project Arboriculturist

11.0 SUMMARY AND CONCLUSIONS

It is proposed to submit a planning application seeking approval for mineral extraction from an area of grassland scrub at Hamble Airfield in Eastleigh borough. As the application area is surrounded by trees it is necessary to assess and identify the impact the development proposals might have.

Careful planning and continued consultation during the preparation of the tree survey and phasing plans has minimised the need to remove any trees identified as of merit. From a total of 21 individual trees and 9 groups of trees it is proposed to remove 3 trees and one small group of internal trees. It is considered unlikely that the removal of the trees, identified in the survey, will significantly change the amenity of the area due to the protection and retention of the remaining trees located on the site boundaries.

Provided suitable protection is adopted to these trees during the operation of the site and during the restoration phases, and where RPAs are compromised and mitigation offered by means of an AMS, it is reasonable to conclude the proposed development will have minimal effect on the amenity of the area in respect of loss of trees.

Appendix A CASCADE CHART FOR TREE QUALITY ASSESSMENT

Table 1 Cascade chart for tree quality assessment

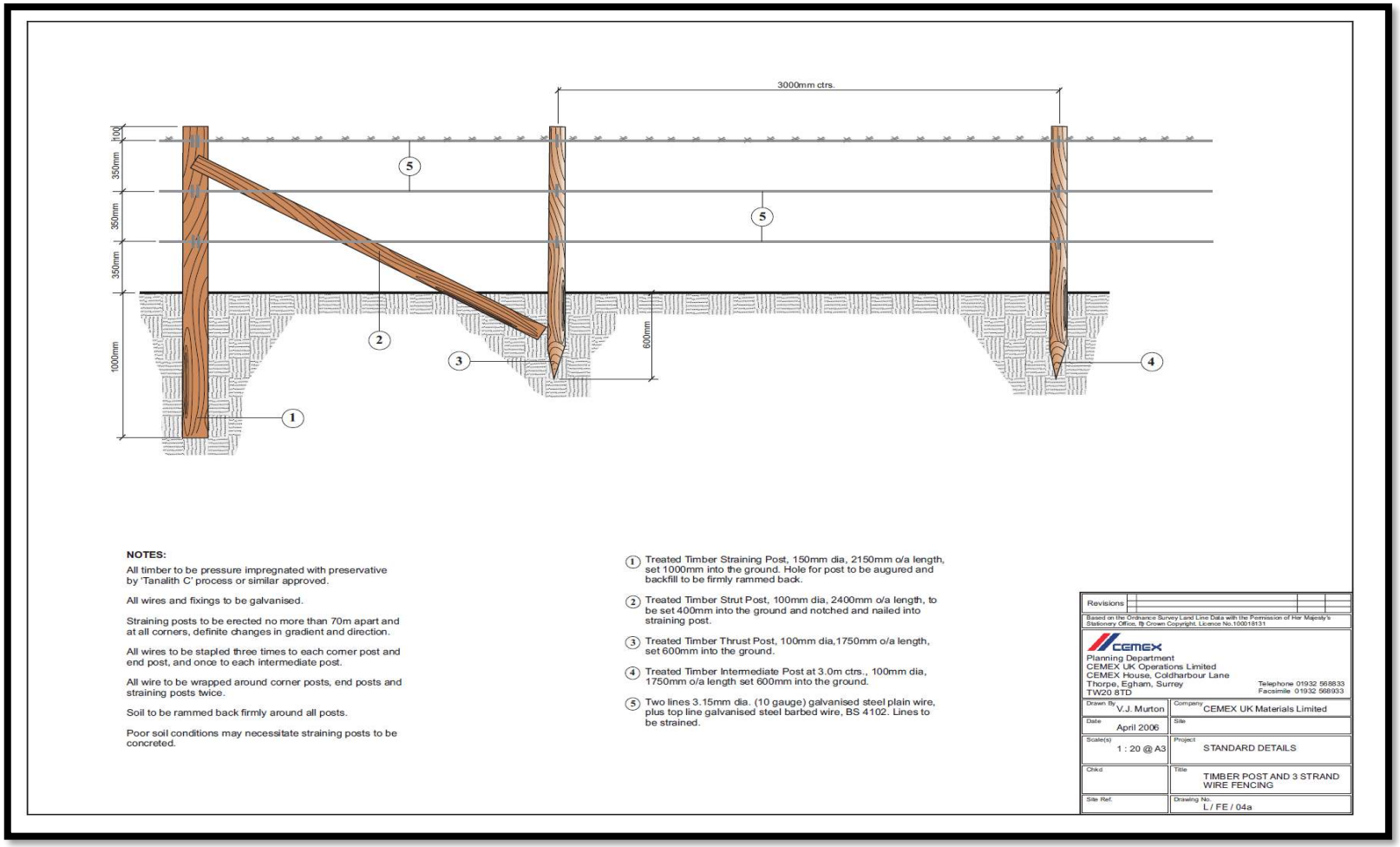
Category and definition	Criteria (including subcategories where appropriate)			Identification on plan
Trees unsuitable for retention (see Note)				
Category U Those in such a condition that they cannot realistically be retained as living trees in the context of the current land use for longer than 10 years	• Trees that have a serious, irremediable, structural defect, such that their early loss is expected due to collapse, including those that will become unviable after removal of other category U trees (e.g. where, for whatever reason, the loss of companion shelter cannot be mitigated by pruning) • Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline • 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 *NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5.7.*			See Table 2
	1 Mainly arboricultural qualities	**2 Mainly landscape qualities**	**3 Mainly cultural values, including conservation**	
Trees to be considered for retention				
Category A **Trees of high quality** with an estimated remaining life expectancy of at least 40 years	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 arboricultural features (e.g. the dominant and/or principal trees within an avenue)	Trees, groups or woodlands of particular visual importance as arboricultural and/or landscape features	Trees, groups or woodlands of significant conservation, historical, commemorative or other value (e.g. veteran trees or wood-pasture)	See Table 2
Category B **Trees of moderate quality** with an estimated remaining life expectancy of at least 20 years	Trees that might be included in category A, but are downgraded because of impaired condition (e.g. presence of significant though remediable 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	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	Trees with material conservation or other cultural value	See Table 2
Category C **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	Unremarkable trees of very limited merit or such impaired condition that they do not qualify in higher categories	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/transient landscape benefits	Trees with no material conservation or other cultural value	See Table 2

Table 2 **Identification of tree categories**

Category (from Table 1)	Colour [A)]	RGB code [A)]
U	Dark red	127-000-000
A	Light green	000-255-000
B	Mid blue	000-000-255
C	Grey	091-091-091

[A)] Colours verified against http://safecolours.rigdenage.com/palettefiles.html#files [viewed 2012-03-26].

Appendix B Recommended Protective Fencing



NOTES:

All timber to be pressure impregnated with preservative by 'Tanalith C' process or similar approved.

All wires and fixings to be galvanised.

Straining posts to be erected no more than 70m apart and at all corners, definite changes in gradient and direction.

All wires to be stapled three times to each corner post and end post, and once to each intermediate post.

All wire to be wrapped around corner posts, end posts and straining posts twice.

Soil to be rammed back firmly around all posts.

Poor soil conditions may necessitate straining posts to be concreted.

(1) Treated Timber Straining Post, 150mm dia, 2150mm o/a length, set 1000mm into the ground. Hole for post to be augured and backfill to be firmly rammed back.

(2) Treated Timber Strut Post, 100mm dia, 2400mm o/a length, to be set 400mm into the ground and notched and nailed into straining post.

(3) Treated Timber Thrust Post, 100mm dia,1750mm o/a length, set 600mm into the ground.

(4) Treated Timber Intermediate Post at 3.0m ctrs., 100mm dia, 1750mm o/a length set 600mm into the ground.

(5) Two lines 3.15mm dia. (10 gauge) galvanised steel plain wire, plus top line galvanised steel barbed wire, BS 4102. Lines to be strained.

Revisions

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Drawn By: V.J. Murton	Company: CEMEX UK Materials Limited
Date: April 2006	Site:
Scale(s): 1 : 20 @ A3	Project: STANDARD DETAILS
Chkd:	Title: TIMBER POST AND 3 STRAND WIRE FENCING
Site Ref:	Drawing No.: L / FE / 04a

Appendix C Fact Sheets 1 and 2 Use of Cellweb TRP in Root Protection Areas (RPAs)

Tree Root Protection Using Cellweb TRP®

Fact Sheet 1: Use of Cellweb TRP® in Root Protection Areas (RPA's)

Introduction

Cellweb TRP® is a cellular confinement system that confines aggregate materials and makes them stronger. This behaviour allows the depth of pavement construction to be reduced. It also minimises compaction of soils below road pavements constructed using the Cellweb TRP® tree root protection system. Cellweb TRP® is used around the world to provide cost effective road and railway construction, as well as Tree Root Protection.

Cellular confinement was developed by the US Army Corps of Engineers during the 1970s to allow construction of roads for military equipment quickly and easily using whatever local soil material was available (especially across beaches). Since then the method has been developed and it is now routinely used in road and rail construction as well as in tree root protection. There is an extensive research base that demonstrates the performance of cellular confinement and it is a method of pavement construction that is recognised by the US Federal Highways Administration.

Characteristics of Cellweb TRP®

Pokharel et al (2009) stated that about one fifth of pavement failures in the US occur due to either weak subgrades or inefficient load transfer from the sub-base. Cellweb TRP® can improve the strength of road pavement construction to deal with these problems. It is a three dimensional interconnected honeycomb of cells made from HDPE. The cells are filled with aggregate sub-base and laterally confine the material when it is loaded, thus increasing the bearing capacity of the layer. This results in a thinner layer of aggregate being required to achieve the same performance.

It also allows uncompacted open graded aggregate to be used in the sub-base construction which is a vital part of any tree root protection system.

Cellweb TRP® is available in a range of height and aspect ratios to suit different load applications.

Use of Cellweb TRP® in RPAs

The use of Cellweb TRP® tree root protection system for building roads, car parks and other vehicular pathways includes a sub-base infill material of clean angular stone which does not need to be compacted. This immediately provides a layer of material that will absorb compaction energy applied to the top of materials placed over it. Compaction of soils by construction machinery does not extend to a great depth. This is the reason why earthworks materials are normally placed in thin layers because compaction only occurs in the top few hundred mm at most. With the lightweight compaction plant used on most development sites the maximum depth that compaction will extend to is between 150mm and 200mm. Thus, if an 80mm layer of asphalt is placed over a 150mm deep Cellweb TRP® system the compaction reaching the base of the construction and the natural soil will be minimal. This effect was demonstrated by Lichter and Lindsey (1994) where a trial area was trafficked by a front-end loader and only suffered significant compaction of the soil to a depth of 100mm.

The use of Cellweb TRP® also spreads the wheel loads from traffic. There has been extensive research published on the performance of these systems from the original work by the US Army Corps of Engineers (Webster 1981) to more recent studies such as that by Emersleben and Meyer (2008).

Figure 1 - In situ density test prior to construction of pavement

The research shows that Cellweb TRP® acts as a stiff raft to distribute wheel loads and reduce their magnitude at the base of the construction by 30% to 36% (without any asphalt or other surfacing). Once the surface is taken into account, the pressure applied by traffic to soil below roads or pavements constructed using no-dig methods will be significantly reduced and thus compaction will also be reduced. Note, compaction is not prevented but it is reduced, thus maintaining the soil bulk density at levels that are suitable for tree root growth.

The effectiveness of the Cellweb TRP® no-dig construction in reducing soil compaction has been demonstrated in trials carried out by the Environmental Protection Group Limited. Two parking bays were constructed over a fine sand soil, one with a Cellweb TRP® cellular confinement sub-base. The parking bays were surfaced with asphalt and then used by cars for four weeks on a daily basis. It is well known that compaction of soils occurs in the first few passes of a vehicle, so the maximum adverse effects on compaction of soil below the pavement should have been achieved. In situ density tests were carried out on the sand below the pavement before and after construction (Figure 1).

Tree Root Protection Using Cellweb TRP®

Fact Sheet 1: Use of Cellweb TRP® in Root Protection Areas (RPA's)

Figure 2 - Cellweb TRP® in construction.

Figure 3 - In situ density tests post-trafficking.

The results in Figure 4 show that compaction of the soil below the Cellweb TRP® pavement was noticeably lower than that below the normal pavement. The increase in compaction below the normal pavement is similar to the increase found on a number of construction sites by Alberty et al (1984).

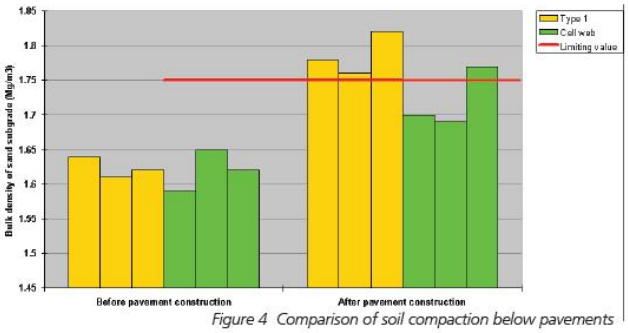

Figure 4 Comparison of soil compaction below pavements

The use of layers of uncompacted material has also been shown by others to reduce compaction of natural soil by construction plant (Lichter and Lindsay 2004). However, these were temporary layers intended to be removed after construction was finished and they are not suitable for incorporation into a permanent car park surface. Nonetheless, it does demonstrate the effectiveness of no-dig techniques using Cellweb TRP®. It is important to note that the specific properties of cellular confinement systems (eg material type, strength, welding at joints, perforations, etc) will affect how each one behaves in trials such as this. Therefore the results are only applicable to the Cellweb TRP® system.

Note

So called tree root protection systems that use Type 1 sub-base or any similar material that requires compaction will not prevent compaction of soils around the tree roots. Type 1 is also not very permeable to air and water and will limit the availability to roots. Therefore geogrid reinforced Type 1 is not suitable for tree root protection.

References

Alberty CA, Pellet HM and Taaylor DH (1984). Characterisation of soil compaction at construction sites and woody plant response. Journal of Environmental Horticulture, 2, 48-53.

Lichter J M and Lindsay P A (1994). The use of surface treatments for the prevention of soil compaction during site construction. Journal of Arboriculture 20 (4) July 1994.

Pokharel SK, Han R, Parsons RL, Qian Y, Leshchinsky D and Halahmi I (2009). Experimental study on bearing capacity of geocell-reinforced bases.
Emersleben A and Meyer N (2008) The Use of Geocells in Road constructions over Soft Soil: Vertical Stress and Falling Weight Deflectometer Measurements. EuroGeo4, Edinburgh, Scotland.

Webster S L (1981). Investigation of beach sand trafficability enhancement using sand-grid confinement and membrane reinforcement concepts. Geotechnical Laboratory, U.S. Army Corps of Engineers Waterways Experiment Station, Vicksburg, Mississippi. Technical Report GL-79-20(2), February, 1981.

Tree Root Protection Using Cellweb TRP®

Fact Sheet 2: Water and Oxygen Transfer Through the Cellweb TRP® System

Water and Oxygen Transfer Through the System

Water and oxygen are the lifeblood of trees without which they will wither and die. It is important to design developments in and around the root protection area (RPA) of existing trees to maximise the availability of water and oxygen to the roots. This can be achieved in a number of ways using the Cellweb TRP® tree root protection system.

The main causes of reduced water and oxygen availability for tree roots are:

- Compaction of the soil around the roots
- Covering the ground surface with impermeable cover which prevents water infiltration.

Both of these effects can be reduced or prevented by using Cellweb TRP® tree root protection within an appropriately designed road or car park surface.

Compaction of Soil

The use of Cellweb TRP® tree root protection system for building roads, car parks and other vehicular pathways includes a sub-base infill material of 20mm to 40mm or 4mm to 20mm clean angular stone which does not need to be compacted. This immediately provides a layer of material that will absorb compaction energy applied to the top of materials placed over it. Cellweb TRP® also spreads the wheel loads from traffic which reduces compaction, thus maintaining the soil bulk density at levels that are suitable for tree root growth.

The effectiveness of the Cellweb TRP® no-dig construction in reducing soil compaction has been demonstrated in trials carried out by the Environmental Protection Group Limited (See Fact Sheet 1).

Water and Oxygen Availability

The Cellweb TRP® tree root protection system is constructed using 20mm to 40mm or 4mm to 20mm gravel infill and has perforated cell walls. The pore spaces between the aggregate particles are greater than 0.1mm in diameter and are therefore defined as macropores (Roberts 2006). This open structure is far more permeable than typical soils and allows the free movement of water and oxygen within it so that supplies to trees are maintained as shown in Figure 1. The use of continuous permeable surfacing and intermittent gaps in impermeable surfacing are recognised ways of providing water and air infiltration pathways through a pavement surface into the tree root zone (Ferguson 2005).

The Cellweb TRP® system incorporates the Treetex® geotextile at the base. This is a very robust geotextile that is resistant to puncturing. Crucially for tree root protection it does not have a water breakthrough head that other geotextiles may have. Therefore it will always be free draining and will not limit oxygen availability to the roots.

Breakthrough Head

All geotextiles are by their nature permeable, however in order to develop optimum water-flow performance, some types of geotextiles (eg, thermally bonded types) require a minimum depth of water to develop over them.

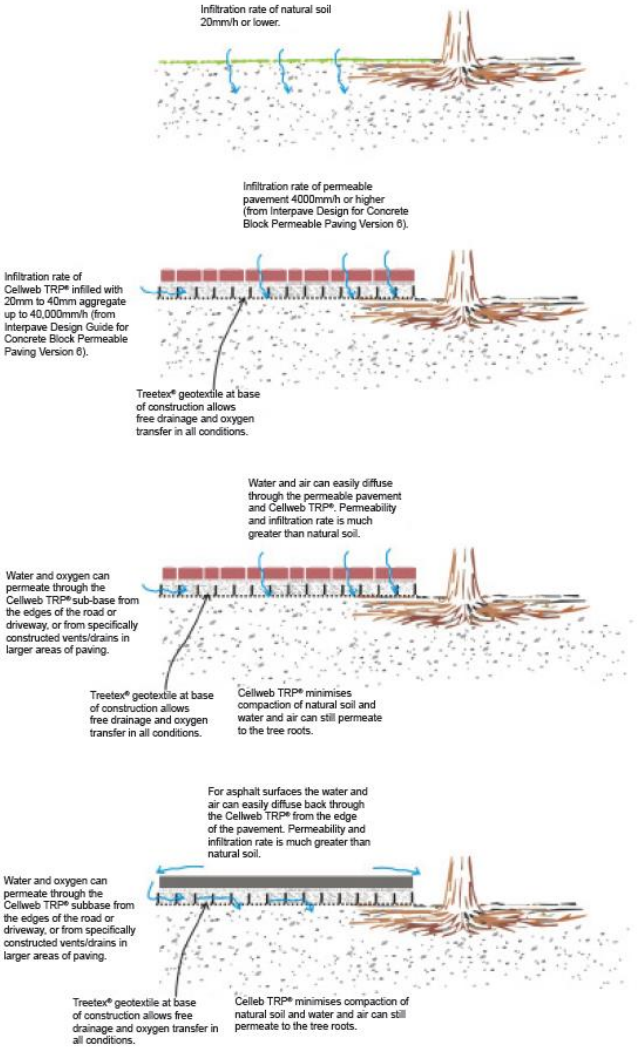

Figure 1 Water and oxygen availability in Cellweb TRP® tree root protection pavements

Therefore a layer of up to 50mm of water can build-up over some geotextiles after rainfall. Treetex® needle punched geotextiles however remains free draining at all times as it has "zero breakthrough head" which means it does not require a build up of water to permeate.

Appendix D

Extract from NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees

NJUG Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees

Telecommunications Code (Schedule 2). Paragraph 19 of the Telecommunications Code enables operators to require the lopping of trees which overhang the street and obstruct or interfere with the working of their lines.

4. HOW TO AVOID DAMAGE TO TREES

This section gives general guidance on methods of work to minimise damage to trees. The local authority (or for privately owned trees, the owner or their agent), should be consulted at an early stage prior to the commencement of any works. This will reduce the potential for future conflict between trees and apparatus.

4.1 Below Ground

Wherever trees are present, precautions should be taken to minimise damage to their root systems. As the shape of the root system is unpredictable, there should be control and supervision of any works, particularly if this involves excavating through the surface 600mm, where the majority of roots develop.

4.1.1 **Fine Roots**

Fine roots are vulnerable to desiccation once they are exposed to the air. Larger roots have a bark layer which provides some protection against desiccation and temperature change. The greatest risk to these roots occurs when there are rapid fluctuations in air temperature around them e.g. frost and extremes of heat. It is therefore important to protect exposed roots where a trench is to be left open overnight where there is a risk of frost. In winter, before leaving the site at the end of the day, the exposed roots should be wrapped with dry sacking. This sacking must be removed before the trench is backfilled.

4.1.2 **Precautions**

The precautions referred to in this section are applicable to any excavations or other works occurring within the Prohibited or Precautionary Zones as illustrated in Figure 1 – 'Tree Protection Zone'.

4.1.3 **Realignment**

Whenever possible apparatus should always be diverted or re-aligned outside the Prohibited or Precautionary Zones. Under no circumstances can machinery be used to excavate open trenches within the Prohibited Zone.

The appropriate method of working within the Precautionary Zone should be determined in consultation with the local authority (or for privately owned trees the owner or their agent) and may depend on the following circumstances;

- the scope of the works (e.g. one-off repair or part of an extensive operation)
- degree of urgency (e.g. for restoration of supplies)
- knowledge of location of other apparatus
- soil conditions
- age, condition, quality and life expectancy of the tree

Where works are required for the laying or maintenance of any apparatus within the Prohibited or Precautionary Zones there are various techniques available to minimise damage.

Acceptable techniques in order of preference are;

a) Trenchless
Wherever possible trenchless techniques should be used. The launch and reception pits should be located outside the Prohibited or Precautionary Zones.
In order to avoid damage to roots by percussive boring techniques it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the equipment with materials other than water (e.g. oil, bentonite, etc.) must not be used when working within the Prohibited Zone. Lubricating materials other than water may be used within the Precautionary Zone following consultation and by agreement.

b) Broken Trench - Hand-dug
This technique combines hand dug trench sections with trenchless techniques if excavation is unavoidable. Excavation should be limited to where there is clear access around and below the roots. The trench is excavated by hand with precautions taken as for continuous trenching as in (c) below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases the open sections should be kept as short as possible and outside of the Prohibited Zone.

c) Continuous Trench - Hand-dug

The use of this method must be considered only as a last resort if works are to be undertaken by agreement within the Prohibited Zone. The objective being to retain as many undamaged roots as possible.

Hand digging within the Prohibited or Precautionary zones must be undertaken with great care requiring closer supervision than normal operations.

After careful removal of the hard surface material digging must proceed with hand tools. Clumps of roots less than 25mm in diameter (including fibrous roots) should be retained in situ without damage. Throughout the excavation works great care should be taken to protect the bark around the roots.

All roots greater than 25mm diameter should be preserved and worked around. These roots must not be severed without first consulting the owner of the tree or the local authority tree officer / arboriculturist. If after consultation severance is unavoidable, roots must be cut back using a sharp tool to leave the smallest wound.

4.1.5 **Backfilling**

- Any reinstatement of street works in the United Kingdom must comply with the relevant national legislation (see: **Volume 6 – 'Legislation and Bibliography'**). In England this relates to the requirements of the code of practice – 'Specification for the Reinstatement of Openings in Highways' approved under the New Roads and Street Works Act 1991. Without prejudice to the requirements relating to the specification of materials and the standards of workmanship, backfilling should be carefully carried out to avoid direct damage to roots and excessive compaction of the soil around them.

- The backfill should, where possible, include the placement of an inert granular material mixed with top soil or sharp sand (not builder's sand) around the roots. This should allow the soil to be compacted for resurfacing without damage to the roots securing a local aerated zone enabling the root to survive in the longer term.

- Backfilling outside the constructed highway limits should be carried out using the excavated soil. This should not be compacted but lightly "tamped" and usually left slightly proud of the surrounding surface to allow natural settlement. Other materials should not be incorporated into the backfill.

4.1.6 **Additional Precautions near Trees**

- Movement of heavy mechanical plant (excavators etc.) must not be undertaken within the Prohibited Zone and should be avoided within the Precautionary Zone, except on existing hard surfaces, in order to prevent unnecessary compaction of the soil. This is particularly important on soils with a high proportion of clay. Spoil or material must not be stored within the Prohibited Zone and should be avoided within the Precautionary Zone.

- Where it is absolutely necessary to use mechanical plant within the Precautionary Zone care should be taken to avoid impact damage to the trunk and branches. A tree must not be used as an end-stop for paving slabs or other materials nor for security chaining of mechanical plant. If the trunk or branches of a tree are damaged in any way advice should be sought from the local authority tree officer / arboriculturist.

See TABLE 1 –'Prevention of Damage to Trees Below Ground' below for summary details regarding causes and types of damage to trees and the implications of the damage and the necessary precautions to be taken to avoid damage.

Appendix D Glossary of Terms

Arboricultural Impact Assessment (AIA) A study, undertaken by an arboriculturist, to identify, evaluate and possibly mitigate the extent of direct and indirect impacts on existing trees that may arise as a result of the implementation of any site layout proposal.

Arboricultural Method Statement (AMS) The methodology for the implementation of any aspect of development that has the potential to result in loss of or damage to a tree.

Construction Exclusion Zone Area based on the RPA (in m^2), identified by an arboriculturist, to be protected during development, including demolition and construction work, by the use of barriers and/or ground protection fit for purpose to ensure the successful long-term retention of a tree.

Crown or Apron clearance Height or spread in meters of the lowest significant branches above ground level.

Diameter Trunk diameter measured at 1.5 metres above ground level or at the base of trees where they are twin or multi stemmed.

DBH Estimated tree stem diameter at breast height.

Height The height of a tree measure using a clinometer where accessible.

Management recommendations General comments on the condition of the tree, group or woodland and recommendations for future work

Pruning The removal of living or dead parts of a plant or tree. Such parts may be soft growth, branches, limbs or sections of the trunk or stem.

Root Protection Area (RPA) Layout design tool indicating the area surrounding a tree that contains enough rooting volume to ensure the survival of the tree, shown in plan form in m^2

Species The species is based on visual field observation and lists the common name. On in depth surveys the botanical name may also be listed. In the unlikely event, where there is some doubt over tree identity, sp is noted after the genus name to indicate the species cannot be reliably identified at the time of the survey. Where there is more than one species in a group ,only the most frequent are noted and not all the species present may be listed.

Spread Measurement of the largest extent of the trees branch growth.

Structural condition Description of any decayed or physical defects.

Tree Constraints Plan (TCP) Plan prepared by an arboriculturist for the purposes of layout design showing the RPA and representing the effect that the mature height and spread of retained trees will have on layouts through shade, dominance, etc.

Tree Protection Plan (TPP) Scale drawing prepared by an arboriculturist showing the finalised layout proposals, tree retention and tree and landscape protection measures detailed within the Arboricultural method statement (AMS), which can be shown graphically.

Tree Root Preservation Service (TRPS) A non-evasive foundation construction system designed to prevent damage to tree roots and adapted for specific site use in conjunction with an arboriculturist