

Arboricultural Impact Assessment
&
BS5837 Tree Survey
at
Land off Providence Hill, Bursledon
for
Foreman Homes Ltd



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1 Instruction

To inspect the trees on and adjacent to the site in relation to British Standard 5837:2012 Trees in relation to design, demolition and construction - Recommendations. To give recommendations to reduce the impact of such development where feasible.

I have been instructed due to my qualifications and experience in Arboriculture. I am a qualified member of the Institute of Chartered Foresters, Royal Institute of Chartered Surveyors, a Chartered Environmentalist and have a Professional Diploma in Arboriculture awarded by the Royal Forestry Society, Technicians' Certificate awarded by the Arboricultural Association, HNC in Forestry and a member of the Arboricultural Association, International Society of Arboriculture and the Royal Forestry Society. I started in the industry as a forestry contractor in 1995, progressing to the surveying and management of arboricultural contracts for a national forestry company, the running of the arboricultural part of a horticultural business overseas. From 2000 I worked in Local Government, initially at a Borough Council and subsequently at Hampshire County Council. Since August 2006 I have been practicing as an independent Arboricultural Association Registered Consultant; providing arboricultural advice to private individuals, companies, developers, architects, structural engineers, landscape architects and local authorities.

2 Limitations

The survey of the trees was of a preliminary nature carried out from ground level. Detailed investigations were not carried out and no tree climbed. The conclusions are based on my own observations, qualifications and experience in arboriculture. All dimensions recorded are estimated. No soil assessments have been undertaken.

3 Site details

The site is to the north east of the A27 Providence Hill and to the south west of the M27. Vehicular access is to be from the A27 through the proposed development opposite 33 Providence Hill. Additional pedestrian access is to be through the proposed development to the west / Orchard Lodge.

4 Proposals

The proposals are to outline planning permission to construct 141 new dwellings with associated vehicular and pedestrian access and car parking.

5 Drawings

Land off Providence Hill, 16.115.03 revision K received 24th April 2019 by HGP Architects

Drawings and documents have been provided by the client for the purposes of this assessment and associated documents.

6 Tree Preservation Orders and Conservation Areas

No details have been sought from the Local Planning Authority (LPA) on whether the trees on or adjacent to the site are protected by Tree Preservation Order (TPO) or within a Conservation Area. This impact assessment has been carried out to assess which trees are worthy of retention and how the proposed scheme may affect them.

It is understood the area to the north west outside the site is subject to Conservation Area.

7 **Summary**

The main arboricultural feature of the site and locality are:

- o Open space to the south east
- o Woodland to the south west and north west
- o Field boundaries within the site

These trees are to be retained and industry standard construction methods and tree protection methods (tree protection barriers, ground protection, site monitoring) must to be used to reduce the impact of the works upon them.

Provided the trees to be retained are protected throughout the development in accordance with this Arboricultural Impact Assessment and Appendix 1: Method Statement the impact upon the retained trees and the character of the area is likely to be insignificant.

8 **Findings**

Please see Appendix 2: BS5837 Tree Survey Sheet for specific details.

8.1 Vehicular and pedestrian access

The proposed vehicular access is through the permitted development to the south west opposite 33 Providence Hill. Once within the development site, the access travels through the and parts of hedge H320/C will need to be removed in part to facilitate the development of the site. Replacement trees and shrubs are to be planted to mitigate the partial loss of this hedge.

8.2 In the south-eastern part of the site the proposed pedestrian access passes adjacent to G355, T355.1C, T355.2C, T358C, G359C and T360C. Minor tree works (pruning of branches less than 50mm diameter may be necessary to facilitate the construction of the access through the line of vegetation. Where the pedestrian access is within the root protection area (RPA) of retained trees and hedges the pedestrian access will need to be constructed using a no-dig (following removal of the leaf litter and herbaceous layer) cellular confinement system (CCS) as part of an industry standard special surface construction. See Appendix 4: Special surface construction for additional details. The entire final wearing course within the RPA must be load bearing and porous to allow the free exchange of air and water, for instance:

- o large particle resin bonded surfaces
www.green-tech.co.uk/store/product_info.php?products_id=476
- o gravel surfacing
www.ced.ltd.uk/documents/4.pdf
www.geosyn.co.uk/brochures/DuoBlock_02.pdf
www.netlon.co.uk/turfsystems/prod-netpave50.htm
- o block paving
www.geosyn.co.uk/brochures/Formpave_01.pdf

8.3 Other suppliers and materials may be used as long as they do not cause contamination, excessive compaction and maintain the free exchange of air and water.

- 8.4 The thickness of the CCS structures may vary due to their different uses. Therefore, as the access is for pedestrian use, the thickness of the CCS must be >75mm with the final porous wearing course on top (>75mm) for a full depth of >150mm. Guidance from the manufacturer in this matter is essential to ensure that the correct thickness of CCS is used for the specified use to avoid significant compaction of ground within the RPA.
- 8.5 As the final wearing course is unlikely to be installed until the end of the construction works, the CCS may suffer damage and not perform to its full design potential until the full depth of construction is achieved. Therefore, the footway construction is to be excluded from site construction access and / or the area can be protected by ground protection to allow for pedestrian access. Any works within the fenced area for the footway construction is to be supervised by an Arboriculturalist.
- 8.6 The thickness of the construction will have a bearing upon the relationship to areas of the pedestrian access not made from a CCS structure, for instance the link to the adjacent proposed hard surface. Excavation will be required at this point to taper the above ground construction down to the adjacent surface. The excavation for this link to the existing hard standing will need to be carried out beyond the RPA of the retained trees to reduce the impact upon the trees. The excavation must be carried out in accordance with Appendix 1: Method Statement.
- 8.7 This footway continues on to connect with Dodwell Lane. Where the construction is within the RPA of retained trees, the same above ground construction applies.
- 8.8 The turning head adjacent to H19 is partially within the RPA of the retained trees and therefore also needs to be an above ground construction with a greater depth of CCS (more than 100mm for the base layer CCS and 100mm for the final wearing course) due to the vehicular use.
- 8.9 Acoustic fence and bund
The acoustic fence and bund is within the site and distant from the trees outside the site to the north east. Trees to be removed to allow the construction of the bund and acoustic fence are part of H320/C, part of H337/C, T352/C and part of H353/C. The construction must be kept distant from the RPA and canopy spread of the trees where feasible. If this is not achievable then the minimum encroachment must be implemented and advice sought from the appointed Arboricultural Consultant (NQF Level 4 or higher in Arboriculture) on measures to mitigate the impact. Replacement trees and shrubs are to be planted in the same locality to mitigate the loss of this hedge.
- 8.10 Proposed dwellings
The proposed site layout has been developed to minimise the impact upon retained trees and hedges whilst allowing for the efficient use of the site. Where encroachment within the RPA of retained trees and hedges the encroachment is minimised to lessen the impact of development upon the retained tree and hedge features.
- 8.11 Trees will need to be removed to allow the development of the site. These trees are detailed in Appendix 2: BS5837 Tree Survey. The loss of these trees is to be mitigated through the replacement tree planting throughout the site.

8.12 Services

Any new services should avoid the RPAs of retained trees. If this is not possible then the route of the services must be designed by an Engineer in consultation with an Arboriculturalist. Further advice is available in Appendix 1: Method Statement and NJUG Volume 4 "Guidance for the planning, installation and maintenance of utility services in proximity of trees".

8.13 It is anticipated that all services will enter the site from the south west via the adjoining sites.

8.14 Surface water drainage from attenuation ponds are shown within W316B and adjacent to G355U. The excavation for these services must be carried out under direct supervision of an Arboricultural Consultant to help to identify the most appropriate route and to help avoid future management problems associated with such excavation works adjacent to trees.

8.15 Site monitoring and tree protection measures

BS5837:2012 Trees in relation to design, demolition and construction - Recommendations states in paragraph 6.3:

Wherever trees on or adjacent to a site have been identified within the tree protection plan for protective measures, there should be an auditable system of arboricultural site monitoring. This should extend to arboricultural supervision whenever construction and development activity is to take place within or adjacent to any RPA.

8.16 Therefore, it is necessary for site monitoring to occur for the proposed works. Details of the occasions and frequency of site monitoring will be given in Appendix 1: Method Statement, Arboricultural Method Statement Summary table: Timing of operations

8.17 Tree protection measures are necessary to aid the retention of the trees. The details of these tree protection measures are specified in Appendix 1: Method Statement and Tree Protection Plan.

8.18 Site compound

The site compound must be located >1m distant from tree protection measures to avoid the potential for harm to retained trees. If there is insufficient space for storage within the site materials may need to be delivered to site on an 'as required basis' and the use of an offsite storage compound may be necessary.

8.19 Soft landscaping

Within the RPA of retained trees there must be no changes of grade (up or down) and the amount of new planting limited to reduce the impact upon the retained trees through severance or damage to tree roots.

8.20 Post development

Falling branch debris is a regular maintenance issue and should be treated as such. A routine of tree survey and inspection will identify foreseeable failures allowing them to be resolved prior to them becoming an issue.

8.21 Falling leaves, seed and needle debris is a regular maintenance issue and should be

treated as such. If desired, then www.suraflow.co.uk (which prevents debris falling in the gutter through the coanda effect), mesh (www.guttergrid.co.uk or similar) or 'hedgehog' (www.hedgehoggutterbrush.com or similar) inserts can be used to filter out tree debris. Down pipes can also be installed with traps that are easily cleaned or chains used as the down pipe (which requires no cleaning).

8.22 Soils

No soil assessments have been made. In the event of shrinkable soils being found on the site, it will be for an engineer to design the foundations in accordance with the current industry guidance to reduce any potential risk of tree related subsidence to an acceptable level.

8.23 Other trees

This report considers the trees that may significantly be affected by the proposed development. Any trees not mentioned or not surveyed are sufficiently distant that the proposed works are unlikely to have an influence upon them.

9 **Conclusion**

The main arboricultural features of the site are to be retained and tree protective measures must be utilised to minimise the impact of the proposals upon the trees.

The principles and details of the Arboricultural Impact Assessment and Appendix 1: Method Statement and Tree Protection Plan must be followed to reduce the impact upon the trees.

10 **Recommendations**

That, following any permission from the Local Planning Authority, the principles and details of the Arboricultural Impact Assessment and Appendix 1: Method Statement and Tree Protection Plan is followed to reduce the potential for harm to the retained trees during development.

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Appendix 1: Method Statement (for protection of trees during development) and Tree Protection Plan

Please refer to “Tree Protection Plan” reference J862.21 (2 sheets) dated April 2019.

Appendix 2: BS5837 tree survey

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
W18	Woodland	>18	c700 (Oak)	<9	<9	<9	<9	2	Mature	Good	No works required. Works required for development: Post development tree condition survey for safety prior to occupation as public open space.	B	>20	12.0
H19	Hedge (Hawthorn & Holly) with high canopy of Oak	<16	<600	7	7	7	7	3	Mature	Fair Considerable damage to lower stems from horses. Significant ground disturbance from horses.	Exclude horses from within 3m of base of hedge and trees. Works required for development: Clear adjacent dwellings by c7m. Crown lift to 3m.	C	>10	7.2

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
W316	Various	-	-	-	-	-	-	-	-	Fair – poor – dead. Mature woodland with perimeter of young / middle aged trees. Dominant oak with occasional birch, ash, rowan, and cherry. Understory generally sparse but includes holy, hazel and cherry laurel. Significant mature trees with dominant crowns generally set back within the woodland. 2 x groups of Poplar are located within the eastern side of the woodland and are recommended for removal – loss of companion shelter will require consideration and may dictate the requirement for surgery to retained trees. Trees on the southern perimeter possess imbalanced crowns resulting from power line clearance pruning. BS category for individual trees is variable and assessed as graded from 'B' through to 'U' however, woodland is a significant feature in the landscape and is therefore considered to be of greater collective value and graded accordingly.	Restructure woodland edge - carry out selective thin to perimeter trees to favour trees of good form / condition. Plant British native shrub species to create understory and improve structure of perimeter. Carry out surgery to mature trees as necessary to reduce the risk of damage resulting from loss of companion shelter; surgery to include crown reductions, reduction of over long limbs and re balancing of crowns. Retain standing dead wood for habitat where appropriate. Works required for development: Arboricultural Consultant, with Engineer and Site Manager, to identify route through woodland for outflow from pond to minimise impact upon adjacent trees. Specification for outflow construction to be detailed at this time. Arboricultural Consultant supervision of excavation works for outflow from attenuation pond. Post development tree condition survey for safety prior to occupation as public open space.	B	20+	-

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
G317	Aspen <i>Populus tremula</i>	22	c250	-	5	-	-	2.5 east	Middle aged	Fair 2 x groups within woodland. Intermediate crowns becoming dominant. Generally good vitality shown by normal twig and leaf size, structure, colour and density. Livestock browsing damage to perimeter stems up to c1.8m height - occasional dead stems adjacent to paddocks. Many trees removed due to implementation of adjacent planning permission. Trees at c1 – 4m centres.	Remove all stems to ground level and treat with herbicide. Consider loss of companion shelter for retained trees – refer to general recommendation for W316. Works required for development: As above.	U	-	-
T318	English Oak	19	510	10	10	1	6	2.5 north		Fair Intermediate crown. Fair vitality shown by slightly sparse foliage in crown. Crown imbalanced and suppressed on the south side. Occasional moderate dead wood up to 4m x 50mm diameter. Occasional crossing rubbing branches. Strands of barbed fence wire included into west side of lower trunk.	Remove dead wood >25mm diameter. Works required for development: No works required.	C	10-20	6.1
T319	English Oak	15	565	8	8	8	8	2 east	Mature	Good Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Branch structure with good 'u' shaped tension unions. Occasional moderate dead wood up to 3m x 50mm diameter. Occluded wounds to east side of lower trunk where barbed wire previously attached.	Remove dead wood >25mm diameter. Works required for development: No works required.	B	20+	6.8

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
H320	Hawthorn	7	c200	-	3	-	3	2 east	Middle aged	Fair Field boundary hedge. Intermediate crowns. Generally good vitality shown by normal twig and leaf size, structure, colour and density. Multiple stems from base. Habitat value – connectivity.	Lay and gap up to develop Low-level shoot regeneration. Prune to manage dimensions at c3m height x c1m spread from centre line. Works required for development: Remove sections necessary for access road, dwellings, and bund construction. Remainder to be laid as rural hedge and additional replacement tree and hedge planting to be implemented to retain partial landscape feature.	C	10-20	2.4
T321	English Oak	10	270	5	0	2	5	2 south	Young	Poor Heavily suppressed crown. Fair vitality shown by moderate epicormic growth. Co-dominant stems from tight fork at c2m. Wound to north side of trunk.	Remove. Works required for development: As above.	U	<10	-
T322	English Oak	11	526	7	7	7	7	2	Middle aged	Good Dominant crown. Fair vitality shown by slight epicormic growth on scaffold. Slightly congested crown with crossing rubbing branches. Barbed fence wire included into north side of lower trunk.	Selectively remove crossing and rubbing branches. Works required for development: Crown lift to 4m over proposed watercourse.	B	20+	6.3

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
H323	Hawthorn	7	c200	4	-	4	-	2	Mature	Fair - Poor Field boundary hedge. Intermediate crowns. Vitality ranging from good – poor with dieback evident in some locations. Multiple stems from base. Gaps in hedge line. Habitat value.	Reduce to c1m height to encourage low-level shoot regeneration. Gap up to develop continuous hedge feature. Works required for development: As above. Maintain as hedge. Crown lift to 4m over proposed watercourse.	C	10-20	2.4
T324	English Oak	13	605	5	6	7	6	2	Middle aged	Fair Dominant crown. Fair vitality shown by slight epicormic growth on scaffold. Slightly congested crown with crossing rubbing branches. Occasional moderate dead wood up to 2m x 50mm diameter. Branch structure with good 'u' shaped tension unions. Wound to north side of trunk at c0.4m – decayed. Swelling in south side of trunk at c1.2m. Ground compaction beneath canopy (livestock trampling).	Remove dead wood >25mm diameter. Works required for development: No work required.	C	10-20	7.3
T335	English Oak	9	345	4	4	4	2	2	Middle aged	Fair Intermediate crown. Good vitality shown by normal twig and leaf size, structure, colour and density. 2 x stems from tight main fork at c1.5m with minor included bark. Swept lower trunk. Ground compaction beneath canopy (livestock trampling).	No work required. Works required for development: No work required.	C	10-20	4.1

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T336	Wild Cherry <i>Prunus avium</i>	10	200 265	3	7	5	4	2.5	Middle aged	Very poor Intermediate crown. Fair vitality shown by moderately sparse canopy. Imbalanced crown. Extensive livestock browsing damage below 1.8m and associated decay. Ground compaction beneath canopy (livestock trampling).	Remove. Works required for development: Remove.	U	<10	-
H337	Hawthorn	7	c150	-	3	-	3	1.8	Mature	Fair Field boundary hedge. Vitality ranging from good – fair with some sections of canopy showing slightly sparse foliage. Multiple stems from base. Habitat value – connectivity.	Lay and gap up to develop Low-level shoot regeneration. Prune to manage dimensions at c3m height x c1m spread from centre line. Works required for development: Maintain as hedge. Remove section to allow water course and acoustic bund / fence construction.	C	10-20	1.8
T338	English Oak	13	380	5	6	7	7	2	Middle aged	Fair Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Occasional crossing and rubbing branches. Livestock browsing damage within lower crown. Surface roots. Ground compaction beneath canopy (livestock trampling).	Selectively remove damaged / crossing and rubbing branches. Works required for development: Remove.	C	10-20	4.6

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T339	English Oak	10	240 270	5	2	4	5	2	Middle aged	Poor Co-dominant crown. Fair vitality with slight epicormic growth on scaffold. Imbalanced crown. 2 x principal stems from tight fork at c0.5m with minor included bark. Extensive livestock browsing damage below c1.8m. Ground compaction beneath canopy (livestock trampling).	Consider tree removal to allow increased space for development of adjacent tree. Works required for development: Remove.	C	10-20	4.3
T340	English Oak	10	318	5	5	5	2	2	Middle aged	Fair Co-dominant crown. Imbalanced crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Wound to south side of trunk at c1.2m (c300 x 15mm). Surface roots. Ground compaction beneath canopy (livestock trampling).	No work required. Works required for development: Remove.	C	10-20	3.8
T341	English Oak	10	322	4	5	5	4	2	Middle aged	Poor Dominant crown. Fair vitality shown by slightly sparse foliage in north side of canopy. Moderate livestock browsing damage below c1.8m and associated dead branch on north side. Strip wound with decay to north side of trunk ground to c1.6m. Ground compaction beneath canopy (livestock trampling).	Remove dead wood > 25mm diameter. Works required for development: Remove.	C	10-20	3.9

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T342	English Oak	9	324	5	5	5	5	2	Middle aged	Good Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Occasional crossing and rubbing branches. Surface roots. Ground compaction beneath canopy (livestock trampling).	Selectively remove crossing and rubbing branches. Works required for development: Remove.	B	20+	3.9
T343	English Oak	9	340	4	4	4	4	2.5	Middle aged	Fair Dominant crown becoming intermediate. Good vitality shown by normal twig and leaf size, structure, colour and density. Moderate livestock browsing damage below c1.8m Surface roots. Ground compaction beneath canopy (livestock trampling).	No work required. Works required for development: Remove.	C	10-20	4.1
T344	English Oak	11	412	6	5	5	5	2.5	Middle aged	Good Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Good "U" shaped branch unions. Ground compaction beneath canopy (livestock trampling).	No work required. Works required for development: Remove.	B	20+	4.9
T345	English Oak	11	275 210	5	5	5	5	2.5	Middle aged	Fair Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Tight forks throughout the crown. Dead wood of up to 2m x 25mm diameter in lower crown. 2 x stems from tight main fork at c1m with minor included bark. Surface roots. Ground compaction beneath canopy (livestock trampling).	Remove dead wood >25mm diameter. Works required for development: Remove.	C	10-20	4.2

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T346	English Oak	10	c270	4	3	4	3	2.5	Middle aged	Fair Intermediate crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Dead branch 4m x 100mm diameter in north side of crown. Swept lower trunk.	Remove dead wood >25mm diameter. Works required for development: Remove.	C	10-20	3.2
T347	English Oak	11	c220 c210	4	4	4	4	2.5	Middle aged	Fair Intermediate crown. Good vitality shown by normal twig and leaf size, structure, colour and density. 2 x stems from tight main fork at c0.3m with slight included bark. Wound to south side of trunk (c200mm x 50mm) at c1m.	No work required. Works required for development: Remove.	C	10-20	3.0
T348	English Oak	10	290	4	4	4	4	2.5	Middle aged	Good Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Good "U" shaped branch unions.	No work required. Works required for development: Remove.	B	20+	3.5
T349	English Oak	10	100 150 170 150 200	3	2	4	3	2.5	Middle aged	Fair Intermediate crown becoming suppressed. Fair vitality shown by slightly sparse foliage. 5 x co-dominant stems from fork at c0.6m with occasional slight bark inclusion. Partially occluded livestock browsing damage up to c1.5m. Surface roots. Ground compaction beneath canopy (livestock trampling).	No work required. Works required for development: No work required.	C	10-20	3.5

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T350	English Oak	10	227	4	3	1	3	2.5	Middle aged	Fair Intermediate crown becoming suppressed. Good vitality shown by normal twig and leaf size, structure, colour and density. Occasional crossing and rubbing branches. Imbalanced crown. Livestock browsing damage to trunk and lower branches. Surface roots. Ground compaction beneath canopy (livestock trampling).	Selectively remove crossing / rubbing branches and dead branch stubs. Works required for development: No work required.	C	10-20	2.7
T351	English Oak	10	302	5	3	4	4	2.5	Middle aged	Fair Intermediate crown becoming dominant. Good vitality shown by normal twig and leaf size, structure, colour and density. Livestock browsing damage to trunk and lower branches. Surface roots with trampling damage. Ground compaction beneath canopy (livestock trampling).	Selectively remove damaged branches. Works required for development: Remove.	C	10-20	3.6
T352	English Oak	8	230	3	5	5	5	2.5	Middle aged	Fair Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Livestock browsing damage up to c1.8m.	No work required. Works required for development: No work required.	C	10-20	2.8

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
H353	Hawthorn	8	c150	/	4	/	4	2.5	Mature	Fair Field boundary hedge with occasional hazel and elderberry located between hedge and paddock. Intermediate becoming suppressed. Vitality ranging from good – fair with some sections of canopy showing slightly sparse foliage. Multiple stems from base. Habitat value – connectivity.	Lay and gap up to develop Low-level shoot regeneration. Prune to manage dimensions at c3m height x c1m spread from centre line. Works required for development: Maintain as hedge. Remove section to allow water course and acoustic bund / fence construction.	C	10-20	1.8
T354	English Oak	20	935	11	/	10	10	2.5 west	Mature	Fair Dominant crown. Fair vitality shown by moderate epicormic growth on scaffold within south east canopy together with frequent dead wood up to 7m x 125mm diameter. Generally typical moderate dead wood of up to 3m x 75mm diameter in remainder of crown. Occasional crossing and rubbing branches. Scaffold with generally good "U" shaped tension unions. Debris (timber planks) at main fork. Swelling in lower trunk between c0.6m and 1m. Ground compaction beneath south west side of canopy (livestock trampling).	Selectively remove crossing / rubbing branches. Remove dead wood >25mm diameter. Remove debris from main fork. Reduce crown to c17m height by radial spread of c8m. Works required for development: As above.	B	20+	11.2

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
G355	Sycamore	19	-	-	-	-	-	-	-	Fair – Poor Group of sycamore at c 1 – 6m centres. Intermediate crowns becoming suppressed and etiolated. Good vitality shown by normal twig and leaf size, structure, colour and density. Several trees with swept lower trunks and co dominant stems from tight forks with moderate to severe included bark.	Management as a group desirable – remove. Replant with appropriate replacement trees. Works required for development: Post development tree condition survey for safety prior to occupation as public open space. Arboricultural Consultant, with Engineer and Site Manager, to identify route through woodland for outflow to minimise impact upon adjacent trees. Specification for outflow construction to be detailed at this time.	U	<10	-
T356	English Oak	11	3 x c200	6	6	3	5	2.5	Middle aged	Fair Intermediate crown becoming suppressed. Good vitality shown by normal twig and leaf size, structure, colour and density. Imbalanced crown – suppressed on south side. 3 x stems from c1.2m.	No work required. Works required for development: Crown lift to 3m.	C	10-20	3.5
T357	English Oak	11	c250	4	3	2	4	2	Middle aged	Fair Intermediate crown becoming suppressed. Good vitality shown by normal twig and leaf size, structure, colour and density. Imbalanced crown – suppressed on south side.	No work required. Works required for development: Remove.	C	10-20	3.0

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T358	English Oak	13	336	4	6	-	5	2	Middle aged	Fair Intermediate crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Tight fork at c2m. Barbed fence wire around and included into lower trunk.	Remove attached barbed wire and fix to alternative fence support. Works required for development: Arboricultural Consultant, with Engineer and Site Manager, to identify route through woodland for outflow to minimise impact upon adjacent trees. Specification for outflow construction to be detailed at this time.	C	10-20	4.3
G359	Hazel <i>Corylus avellana</i>	9	c150	4	4	4	4	-	Mature	Poor 2 x stools with Intermediate crowns. Fair vitality shown by slightly sparse foliage throughout canopies. Multiple stems from base. Extensive and severe livestock browsing damage up to c1.8m.	Coppice 2 x stools. Works required for development: No work required.	C	10-20	1.8
T360	English Oak	14	290 345	6	6	5	4	2.5 north	Middle aged	Fair Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Previously pruned to clear overhead power lines. 2 x co-dominant stems from tight fork and slight included bark. Barbed fence wire around and included into eastern stem. Surface roots with livestock trampling damage.	Remove attached barbed wire and fix to alternative fence support. Works required for development: No work required.	C	10-20	4.5

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T361	Common Ash	15	200 210	4	4	0	4	5 north	Middle aged	Poor Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. 2 of 4 stems previously removed to improve clearance to overhead power lines. 2 x stems remain originating from tight fork at base with moderate included bark. Unsuitable long term juxtaposition between tree and power lines.	Remove. Works required for development: No work required.	U	<10	-
H362	Hazel	6	c100	-	-	-	-	-	Mature	Fair - Poor Section of field boundary hedge with gaps - dominated by hazel with occasional yew and hawthorn. Recently reduced to c1.8m height beneath overhead power lines. Habitat value – connectivity.	Confirm ownership. Gap up with British native species. Coppice hazel. Manage at c2m height to avoid conflict with overhead services. Works required for development: No work required.	C	10-20	1.2
T363	English Oak	10	c330	0	6	5	5	-	Middle aged	Poor Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Crown imbalanced due to pruning to accommodate overhead power lines. Trunk leans at c10 degrees to the south. Located c0.5m to the south of field boundary. Unsuitable long term juxtaposition between tree and power lines.	Confirm ownership. Remove. Works required for development: No work required.	U	<10	-

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T364	Lombardy Poplar <i>Populus italica</i>	27	c300 c470	2	2	2	2	4 north	Mature	Fair Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. 2 x stems from tight fork at base with moderate included bark. Minor livestock browsing damage to the north side of lower trunk. Barbed fence wire fixed to lower trunk. Located on field boundary / top of embankment. No access for 360 degree inspection.	Confirm ownership. Consider removal – encourage development of British native trees and hedge species. Works required for development: No work required.	C	10-20	5.6
T365	Common Ash	15	360 over ivy	5	5	6	3	2 north	Middle aged	Fair Intermediate crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Main fork at c3m obscured by ivy. Wound to trunk between c0.3m and 1.3m (c500mm x 50mm) with decay. Located on field boundary / top of embankment. No access for 360 degree inspection.	Sever ivy, strip ivy sing hand tools from trunk and main fork up to c3m Re-inspect. Works required for development: No work required.	C	10-20	4.3
T366	Lombardy Poplar	26	2 x c355	3	3	3	3	-	Mature	Fair Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. 2 x stems from fork at c0.7m. Extensive livestock browsing damage on north side of trunk up to c1.8m. Located on field boundary / top of embankment. No access for 360 degree inspection.	Confirm ownership. Consider removal – encourage development of British native trees and hedge species. Works required for development: No work required.	C	10-20	5.0

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T367	Lombardy Poplar	28	c600	3	3	3	3	-	Mature	Fair Co-dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Main fork at c 5m. Hawthorn stems included into lower trunk. Localised livestock browsing damage on north side of trunk at c1m. Located on field boundary / top of embankment. No access for 360 degree inspection.	Confirm ownership. Consider removal – encourage development of British native trees and hedge species. Works required for development: No work required.	C	10-20	7.2
T368	Lombardy Poplar	21	c340 c200 c150	3	3	3	3	-	Mature	Fair Intermediate crown. Good vitality shown by normal twig and leaf size, structure, colour and density. 3 x stems from tight main fork at c1.2m. Extensive livestock browsing damage on north side of subsidiary stems. Barbed fence wire attached to north side of lower trunk. Located on field boundary / top of embankment. No access for 360 degree inspection.	Confirm ownership. Consider removal – encourage development of British native trees and hedge species. Works required for development: No work required.	C	10-20	4.2
T369	Silver Birch	15	c400	-	-	-	-	-	Mature	Fair Suppressed crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Crown wholly over field to the south of the site. Swept lower trunk leans at c45 degrees to the south. Located on field boundary / top of embankment. No access for 360 degree inspection.	No work required. Works required for development: No work required.	C	10-20	4.8

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T370	English Oak	12	204	5	5	2	4	2.5 north	Young	Fair Intermediate crown becoming suppressed. Good vitality shown by normal twig and leaf size, structure, colour and density. Crown suppressed on south side by adjacent poplar.	No work required. Works required for development: No work required.	C	10-20	2.4
T371	English Oak	9	238	4	5	4	3	2.5 north	Young	Fair Intermediate crown becoming suppressed. Good vitality shown by normal twig and leaf size, structure, colour and density. Crown previously pruned on north east side to improve clearance to adjacent overhead power lines. Livestock browsing damage on north and west side of trunk – damage partially occluded. Slight swelling in trunk at c1m.	No work required. Works required for development: No work required.	C	10-20	2.9
T372	English Oak	9	c340	7	4	4	6	2 north	Middle aged	Fair Intermediate crown. Fair vitality shown by slightly sparse foliage in upper canopy. Occasional tight forks. Livestock browsing damage to lower branches.	Selectively remove damaged branches. Works required for development: Crown lift to 4m over access.	C	10-20	4.1
T373	English Oak	9	221	5	0	0	5	2 west	Young	Poor Heavily suppressed crown. Good vitality shown by normal twig and leaf size, structure, colour and density. "S" shaped trunk. Form likely to become increasingly impaired by group pressures.	Remove. Works required for development: No work required.	U	<10	-

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T374	Common Ash	21	c620	9	8	-	4	4 north	Mature	Fair Co-dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Crown imbalanced - suppressed on west side. Frequent moderate dead wood up to 3m x 50mm diameter plus dead branch (6m x 100mm diameter) located in western crown at c 6m. Historic branch failure with rip out wounds at c17m (central crown) and 6m (western crown). Heavy stem extends to north west over site. Large pruning wound on north side of trunk at c 1.5m. Barbed fence wire fixed to and girdling lower trunk. No access for 360 degree inspection. Species susceptible to branch failures.	Confirm ownership. Works required for development: No work required.	C	10-20	7.4
T375	Common Ash	20	c220 c400	8	3	-	5	6 north	Mature	Fair Intermediate crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Occasional dead wood up to 1m x 25mm diameter. Subsidiary stem from c1m on north side with livestock browsing damage and included barbed fence wire. Ivy. Ground compaction beneath canopy (livestock trampling). Tree located on boundary. No access for 360 degree inspection.	Sever ivy. Remove subsidiary stem from north side. Remove dead wood >25mm diameter. Works required for development: No work required.	B	>20	4.6

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T376	English Oak	20	540	11	6	-	7	3.5 north	Mature	Fair Intermediate crown. Fair vitality shown by slightly sparse foliage in south east canopy. Occasional moderate dead wood up to 4m x 75mm diameter. Good "U" shaped branch unions. Tree house fixed to west side of trunk at c 1.7m. Barbed fence wire fixed to and partially occluded in north side of trunk. Located adjacent to stream. Ground compaction beneath canopy (livestock trampling). Tree located on boundary. No access for 360 degree inspection.	Remove dead wood >25mm diameter. Lift crown to 4m over gated access. Works required for development: No work required.	B	>20	6.5
T377	English Oak	13	c200	5	3	-	4	2.5 north	Young	Fair Suppressed crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Imbalanced crown weighted to north west over access. Swept lower trunk with occluded wounds and barbed fence wire fixed at c0.5m. Form likely to become increasingly impaired by group pressures. Tree located on boundary. No access for 360 degree inspection.	Confirm ownership. Remove. Works required for development: No work required.	U	<10	-

Tree no.	Species	Height (m)	Trunk diameter (mm) at 1.5m	Canopy spread (NESW) (m)				Crown Height (m)	Age class	Condition	Recommendations	BS5837 category	Useful remaining life expectancy	Root protection area (radius in m)
T378	Lombardy poplar	20	320	2	2	2	2	-	Middle aged	Fair Dominant crown. Good vitality shown by normal twig and leaf size, structure, colour and density. Increment strip on north west side of trunk at c2m. Tree located on boundary. No access for 360 degree inspection.	Confirm ownership. Consider removal – encourage development of British native trees and hedge species. Works required for development: No works required.	C	10-20	3.8
G601	Oak (c5)	c12	c350	6	6	6	6	3	Mature	Fair Intermediate canopies. Good vitality shown by normal twig and leaf size, structure, colour and density. Horse damage to lower stems.	No work required. Works required for development: Crown lift to 3m. Remove dead wood >25mm diameter.	C	10-20	4.2
T602	Oak	c10	c400	5	5	5	5	4	Mature	Fair Dominant canopy. Fair vitality shown by slightly sparse canopy. Access road at base on north side.	No work required. Works required for development: Crown lift to 3m. Remove dead wood >25mm diameter. Remove if necessary for acoustic bund construction.	C	10-20	4.8
G604	Birch, Oak, Cherry, Sycamore, Ash	10	c350	5	5	5	5	2	Middle aged	Good Intermediate canopies. Good vitality shown by normal twig and leaf size, structure, colour and density. Off site.	No work required. Works required for development: Cut back group to clear construction of acoustic bund and fence by 1m to allow construction access.	B	>20	4.2

General notes

Tree survey carried out by Mr D Sykes and B Abbatt March 2014, September 2016 and January 2016. We have not checked whether the site is within a Conservation Area or whether the trees are under Tree Preservation Order (TPO). Prior to any tree works confirmation of whether these legal restrictions apply to the site or trees ought to be sought from the Local Planning Authority (LPA). If the trees stand within a Conservation Area designated under the Town and Country Planning Act the LPA will normally

require 6 weeks notice of intention to carry out any tree works as detailed in the survey. If the trees are under TPO then the LPA will normally require an application for any tree works. Some tree works are exempt, for instance if the trees are dead or dangerous, and certain works can be carried out without application. It is necessary to give the LPA at least five days notice prior to carrying out any of these tree works under these exemptions. This survey, with recommendations, can be used to support any such application or notice. If this document is used to support a planning application, then the tree works required for development may be permitted under any subsequent planning application.

Wildlife issues are of significant concern to the general public. A balance has to be found between the protection of wildlife and the need for safety when managing trees. The Wildlife and Countryside Act (1980) and Countryside Rights of Way Act (2000) give statutory protection to wild birds, bats, mammals, some invertebrates and plants. It is important to ensure that this legislation is properly considered when carrying out any works to trees.

Bird nests were not identified whilst on site. However, any Arborist carrying out the tree works should ensure that there is no disturbance to nesting birds prior to the works being carried out. Further guidance upon the appropriate timing of the works can be sought from DEFRA, if necessary. Where nesting birds are found, further information should be sought from DEFRA 08459 33 55 77 or helpline@defra.gsi.gov.uk. Prior to any works being implemented the tree contractor must identify whether there are any bats or birds using the tree as roost or nest. If such habitation is identified then the tree contractor must obtain the necessary licence from Natural England (0845 601 4523 www.naturalengland.org.uk) to carry out the works.

In this instance, considering the size of the trees, their location and features I believe that there is a medium potential of bats using the mature trees as a roost site. A bat survey prior to tree works is not recommended as it would be difficult to determine the location of any exit point from the roost within the tree by a bat survey and also confusion may also arise from bats travelling from other roosts. Any such exit could more easily be identified by a competent tree worker. During the tree works the contractor should carry out the tree works with bats as an active consideration and follow the current industry best practice, e.g. Arboricultural Association Guidance Note 1 Bats in the context of tree work operations 2011, which a competent tree contractor should be familiar with.

Typical significant defects that are to be identified can be referred to in "Hazards from Trees, a general guide", "Principles of tree hazard assessment and management" both by David Lonsdale and "The body language of trees" by Claus Mattheck published by the Forestry Commission and the Department of the Environment respectively.

Trees are dynamic structures and as such their condition and health may change in a short period of time, particularly in relation to changes in their immediate environment and circumstances, as such the survey relates to the visible condition found on the day of the survey.

All tree works to be carried out to BS3998: Recommendations for Tree Works (including the biosecurity measures). Biosecurity measures: To minimise the potential for contamination of the tree from other tree works it is appropriate to sterilise tools to be used before and after the works are implemented. Appropriate disinfectant includes Propellar or Cleankill Sanitizing spray. Loose debris is to be brushed off prior to treating with disinfectant to ensure appropriate application. See [http://www.forestry.gov.uk/pdf/FCMS028-guidance.pdf/\\$file/FCMS028-guidance.pdf](http://www.forestry.gov.uk/pdf/FCMS028-guidance.pdf/$file/FCMS028-guidance.pdf) for further information on Biosecurity and <http://www.forestry.gov.uk/forestry/inf-d-9fjd2d> for disinfectant information.

Appendix 3: Key to BS5837 tree survey

No	Tree number.	
Species	Species of tree.	
Height	Height measured in metres and rounded to the nearest metre.	
Stem Ø	Stem diameter at 1.5metres following normal Forestry conventions or immediately above the root flare for multiple stemmed trees, in millimetres.	
abf	Above basal or root flare.	
Branch Spread	Branch spread in metres taken at the four cardinal points to derive an accurate representation of the crown.	
Height of crown	Height in metres of crown clearance above adjacent ground level.	
Life stage (Age)	Young	A tree considered to be less than approximately 20 years old.
	Middle aged (Early Mature)	A tree in approximately the first 1/5th of its normal life span with apical dominance (rapidly growing with a clear main leader) and not yet fully at its environmental potential full height.
	Mature (Semi mature and Mature)	A tree in its 2/5ths to 5/5ths of its normal life span with apical dominance lost and at its environmental potential full height.
	Over mature	A tree beyond the normal life span for the location with apical dominance lost and with symptoms of canopy decline.
	Veteran	A tree of interest biologically, aesthetically or culturally because of its age and is old relative to others of the same species.
Condition (Physiological and Structural)	Good	A tree of typical physiological and structural condition that requires only general tree works to facilitate its retention in the landscape.
	Fair	A tree of impaired physiological and / or structural condition that may require remedial and general tree works to facilitate its retention in the landscape.
	Poor	A tree of significantly impaired physiological and / or structural condition that will require remedial and general tree works to facilitate its retention in the landscape if feasible.
Preliminary management recommendations	As per BS3998: 2010 Recommendations for Tree Works.	
Category grading	See below Table 1.	
Estimated remaining contribution (years)	Estimated remaining contribution in years (e.g. < 10, >10, >20, >40).	
Root protection area	See below Table 2.	
OI	Over ivy	
INAC	Inaccessible	
LS	Land survey, i.e. data provided by the land survey.	
c	circa / about	
All measurements in metres are approximate and rounded to the nearest metre.		

Table 1 - Cascade chart for tree quality assessment, BS5837: 2012 Trees in relation to construction - Recommendations

TREES UNSUITABLE FOR RETENTION			
CATEGORY AND DEFINITIONS	CRITERIA		
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. <i>NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve; see 4.5 of BS5837:2012</i>		
TREES TO BE CONSIDERED FOR RETENTION			
CATEGORY AND DEFINITIONS	CRITERIA - SUBCATEGORIES		
	1 Mainly arboricultural values	2 Mainly landscape values	3 Mainly cultural values, including conservation
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)
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
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.

Root protection area (RPA)

Extract from BS5837:2012.

4.6.1 For single stem trees, the RPA (see 3.7) should be calculated as an area equivalent to a circle with a radius 12 times the stem diameter. For trees with more than one stem, one of the two calculation methods below should be used. In all cases, the stem diameter(s) should be measured in accordance with Annex C, and the RPA should be determined from Annex D. The calculated RPA for each tree should be capped to 707 m².

a) For trees with two to five stems, the combined stem diameter should be calculated as follows:

$$\sqrt{(\text{stem diameter } 1)^2 + (\text{stem diameter } 2)^2 \dots + (\text{stem diameter } 5)^2}$$

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

$$\sqrt{(\text{mean stem diameter})^2 \times \text{number of stems}}$$

4.6.2 The RPA for each tree should initially be plotted as a circle centred on the base of the stem. Where pre-existing site conditions or other factors indicate that rooting has occurred asymmetrically, a polygon of equivalent area should be produced. Modifications to the shape of the RPA should reflect a soundly based arboricultural assessment of likely root distribution.

4.6.3 Any deviation in the RPA from the original circular plot should take account of the following factors whilst still providing adequate protection for the root system:

- a) the morphology and disposition of the roots, when influenced by past or existing site conditions (e.g. the presence of roads, structures and underground apparatus);
- b) topography and drainage;
- c) the soil type and structure;
- d) the likely tolerance of the tree to root disturbance or damage.

Appendix 4: Special surface construction

Greenfix Bulk Density Tree Root Protections Solutions

Established trees that experience sudden compaction of the soil frequently suffer root death and crown dieback. This often occurs because of the inability of the tree to adapt quickly to the rapid change in soil conditions. Also, oxygen supply to roots is governed by soil structure and texture; in loose or coarse textured soils the air gaps between the soil particles are relatively large and so atmospheric oxygen diffuses readily into the soil, and the waste product of respiration, carbon dioxide, can diffuse away. Sudden compaction of existing tree root areas can result in the death and decay of a large proportion of the existing root system.

Locations can differ greatly, even in close proximity. Trees in various locations will adapt very differently to meet the conditions of its environment. For this reason, should sudden changes to the bulk density or porosity be required, generic protections cannot hope to cover all eventualities. Only calculated, site specific control measures can ensure the reduction of changes to the established trees environment.

TECHNICAL SUPPORT FOR YOUR PROJECT

Greenfix offer a full range of services for site specific solutions for your tree root protection and bulk density requirements. These services expand across all stages of the industry, and are completely free of charge. For full assistance please do not hesitate to contact Greenfix on 01608666027

Greenfix technical team can attend both design and on-site support to offer recommendations for the project according to the British Standard 5837.

Our engineering team can calculate recommendations based on both CBR and bulk density values for true site specific tree root protection solutions. For any assistance completing the questionnaire please do not hesitate in contacting us.

Tree Root Protection solutions can be calculated on Bulk Density free of charge. Simply request a questionnaire by emailing james@greenfix.co.uk. This will be completed and returned to you within 7 working days. A PDF detail of the Geoweb build-up will also be provided for your use within your specification.

Once the tenders have been approved, Greenfix will continue to assist, and be available to attend site the date of installation. This support is to provide the contractor with recommendations of correct installation for tree root protection.



Examples of Geoweb solutions available to discuss on-site with the Greenfix technical team

Control measures within tree rooting areas can be challenging, especially where increasing levels are a concern. Greenfix offer the availability of pre-site meetings in order to recommend possible solutions to your clients requirements.

Example of solutions available.

Often on sites, construction traffic is required through tree rooting areas but the final access will only be for light vehicles, such as a driveway for cars. This can cause issues with the required 200mm level increase. A solution is to layer two 100mm Geoweb on-top of one another. This will provide the control measure for the construction access phase. On completion, the top 100mm layer of Geoweb can be removed, leaving the bottom layer in-situ to provide the permanent access for lighter traffic.

Piling rig and Heavy duty crane access

Laying of the Geoweb Tree Root Protection can be achieved for higher demand weight applications. The depth required can be calculated for site specific requirements via Greenfix should you require.



Geoweb Tree Root Protection Installation Guide

Installation Recommendation

1. **Preparation of the subgrade ready for Geoweb tree root protection no dig solution. Whilst inside the tree rooting area, all actions must ensure no detrimental effect on the ground condition. The tree rooting area is the surface which is being protected**
 - Removal of surface vegetation using prior agreed methods with local authority. No methods of removal which will cause compaction to the subgrade can be used. This includes the use of plant, vehicles and machinery. Examples of appropriate methods include hand tools or herbicide
 - When creating a level subgrade, do not grade off humps or level off through compaction, as these may contain tree roots. Rather infill hollows with a permeable material such as clean stone or sharp sand to create a level surface.
 - All external debris, such as rocks and waste, should be removed
 - When an existing hard surface is scheduled for removal, care should be taken not to disturb tree roots that may be present beneath. Hand held tools or appropriate machinery should be used to remove the existing surface, working backwards over the area so not trafficking the exposed area
2. **TRP4000 Non-woven Geotextile**
 - Lay out the TRP4000 over the prepared area, overlapping joins by a minimum of 300mm, dependent on soil conditions
 - When overlapping the TRP4000, ensure the overlap is in the same direction as the Geoweb will be extended. This will ensure the geotextile does not pull up when extending the Geoweb
 - If a site specific solution has been provided by Greenfix which includes a sub-base, this will require installation through non compaction methods
3. **Installation of the Geoweb panels**
 - Lay out the collapsed Geoweb on the TRP4000 and secure at one end in the middle of the width.
 - Extend the panel to 6.6m length, and secure its length at the other end
 - Extend the width of the Geoweb to 2.6m wide, and secure each corner
 - Ensure the panel is secured at 6.6m x 2.6m, as this will achieve the 259mm by 224mm cell diameter required.
4. **Connection of the panels to create one single mattress**
 - All panels must be adjoined to one another both side by side and end to end
 - Simply connect the Geoweb with the supplied ATRA® keys, through the aligned slots



1. Infill of the Geoweb for tree root application

- Compacted, non-porous material, such as M.O.T. Type 1 / crushed stone with fines should not be used for tree root protection
- Infill Geoweb panel with 4-20mm clean angular stone, ensuring Geoweb is not visible and is overfilled by a minimum 25mm. Plant and tracked vehicles should not drive on exposed Geoweb as this will lead to tearing and damage.
- Infill towards the tree, using the filled Geoweb cells as the working platform
- For a stone specification sheet please contact Greenfix Ltd go to www.greenfix.co.uk

2. Compaction of the infilled material

- Compaction of the Geoweb system is not required on generic site conditions, as the infill will secure its own level when trafficked over a short time
- If on poor / site specific conditions, complete 4 passes of a non-vibrating, smooth wheeled roller over the 25mm overfill. Refill and roller as necessary to ensure a 25mm surcharge remains

3. Edging options

- Where edging is required for light structures, such as footpaths, above ground peg and treated timber edging may be acceptable. Where areas of hard surface require edge support, the use of pinned sleepers, gabions or non-invasive haunch kerbing can provide appropriate solutions.
- For recommendations and details (CAD or PDF), please contact Greenfix for assistance

4. Surface options available

- Geoweb acts as a sub-base to all available surfaces on the market, including asphalt, block-paving, resin bound, grass vegetation or gravel etc.
- For tree rooting areas, the surface must be porous unless approved otherwise by local authority.
- For details of surface options please contact Greenfix for assistance

Additional Greenfix services available

For an on-site installation visit on the day of installation on any purchase of Geoweb TRP, please contact Greenfix for recommendations and support.

Site specific calculations and technical recommendations are also available via Greenfix.

Greenfix can offer an on-site visit to recommend correct installation to the calculated recommendation if it has been complete via Greenfix

Geoweb infill material for Tree Root Protection Clean Angular Stone 4-20mm

Specification for open graded infill material for Geoweb cellular confinement within tree root protection applications. The no fines material is to ensure high ratio void space which corresponds with ideal soil void ratios for tree root health.

Material to BSEN1342 or BSEN12620. Crushed gravel is not permitted.

Properties of material	Test	Value
Grading of particle size	BSEN 13242	Grading 4-20mm
Fines Content	BSEN 13242	f ₄
Shape flakiness index	BSEN 13242	Fl ₂₀
Resistance to fragmentation	BSEN 13242	LA ₃₀
Resistance to wear	BSNE 13242	M _{DE} 20
Water absorption rate BSNE 1097-6:2000 clause 7	BSNE 13242	WA ₂₄₂
For typical WA>2% magnesium sulphate soundness	BSNE 13242	MS ₁₈
Acid soluble sulphate content air-cooled blast furnace slag	BSNE 13242	AS _{0.1}
Acid soluble sulphate content non air cooled blast furnace slag	BSNE 13242	AS _{0.2}
Total sulphur aggregates other than air cooled blast furnace slag	BSNE 13242	<1% by mass
Total sulphur air cooled blast furnace slag	BSNE 13242	<2% by mass

Sieve Size mm	Percentage of 4-20mm passing
40	100
31.5	98 - 100
20	90 - 99
10	25 - 70
4	0 - 15
2	0 - 5
1	-

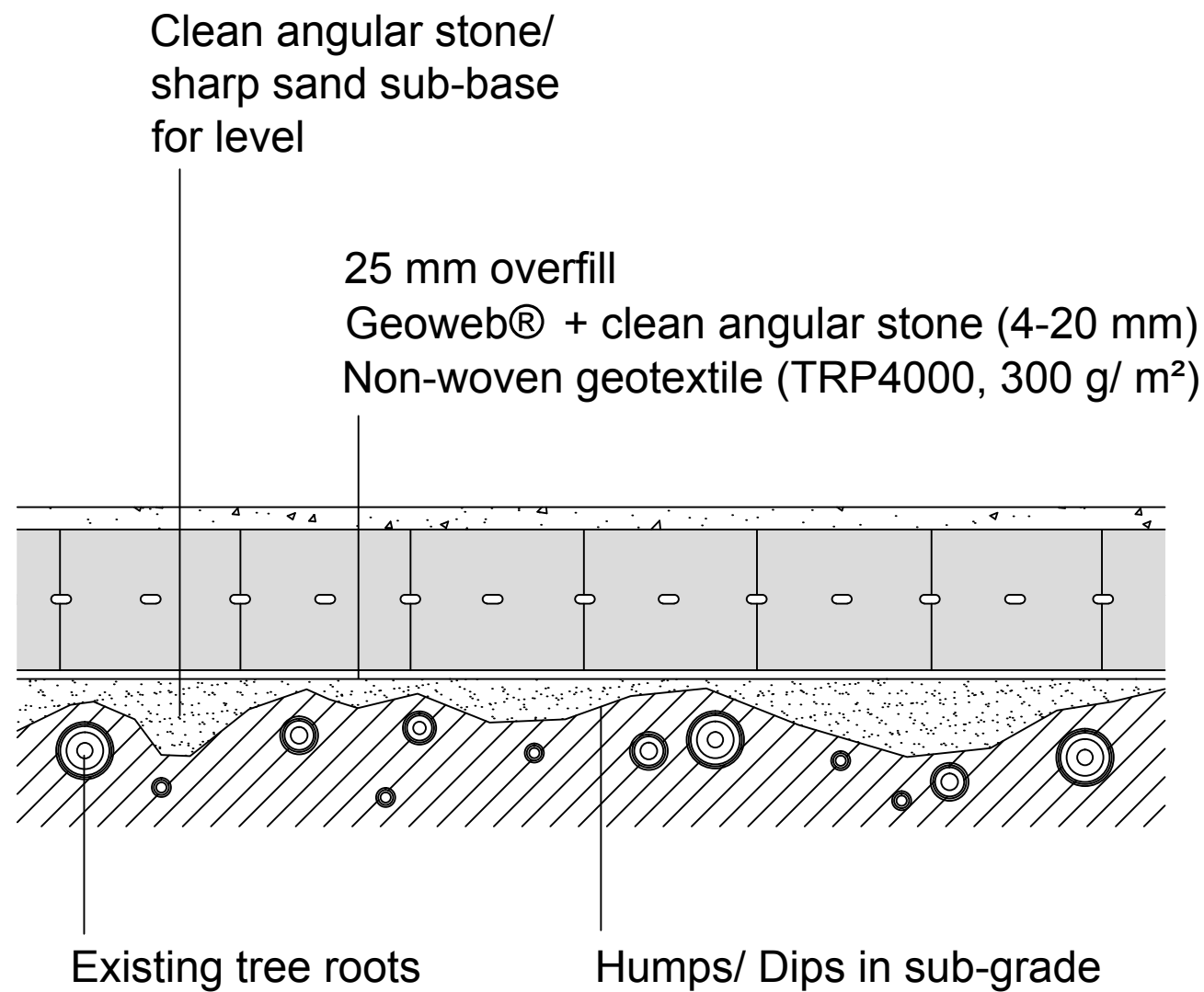


Air cooled blast furnace and steel slag should be free from Dicalcium silicate and iron disintegration in accordance with BSEN 13242:2002, 6.4.2.2 V5

Leaching of materials for blast furnace slag and other recycled materials should meet requirements of the Environmental waste acceptance criteria for inert waste when tested in accordance with BSEN 12457-3

On poor site conditions which require compaction, this should be minimum 4 passes of a smooth wheeled roller at max weight 1000kg/m width without vibration.

NO-DIG TREE PROTECTION SYSTEM



Adjacent Geoweb® units to be joined with Atra-keys.

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Project: Tree root protection
Preliminary design
Distributor: Greenfix soil stabilisation and erosion control

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DATE 20.10.2015

SCALE NTS

SHEET 1



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