Land at
Roundstone Lane
Angmering
Littlehampton
West Sussex

ARBORICULTURAL IMPACT ASSESSMENT

(INC. METHOD STATEMENT)

PREPARED BY

ACD ARBORICULTURE

FOR

ACD

Ecology

Arboriculture

Landscape Architecture

Space to live

David Wilson Homes

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1. EXECUTIVE SUMMARY

1.1. The proposed layout is in line with recommendations of BS5837 (BSI 2012 British Standards Institute). Adequate protection can be provided to ensure all retained trees are protected throughout development.

1.1. Survey data is extracted from, and reference should be made to, the tree survey that preceded this report. (ACD Ref: BSH17576trB). This survey pre-dates the revision to BS5837:2012 in April 2012.

1.2. The development proposals for the site are residential in nature. A new entrance feature is proposed on the western boundary with Roundstone Lane. Trees proposed for removal are limited to category 'R' specimens and sections of internal hedgerows.

1.3. Some site supervision will be required during the demolition of existing stable units and the installation of proposed hard surfacing, in addition to the monthly monitoring visits (to inspect the fencing).

1.4. The relationship between the buildings and retained trees is sustainable and does not result in any situations that may result in unreasonable pressure to prune requests from future occupants.

1.5. The arboricultural method statement and tree protection plan include details of all tree protection measures required, including provision for site supervision where required.

1.6. Any fencing and other tree protection measures should be erected after tree surgery but before any demolition or construction contractor enter the site, and before any soil stripping takes place.

1.7. There must be no changes in levels, service routing, machine activity, storage of materials or site hut positioning within areas to be protected and the protective fencing must remain in position for the duration of the construction process.

1.8. The controlling authority is Arun District Council Council, who can be contacted at:

Arun Civic Centre, Maltravers Road, Littlehampton, West Sussex BN17 5LF (01903) 737756.

2. INTRODUCTION

2.1. David Wilson Homes instructed ACD Arboriculture in July 2012 to prepare the following arboricultural report.

2.2. Following the recommendations of BS5837:2012 Trees in relation to design, demolition and construction- Recommendations (BSI 2012 British Standards Institute), this report includes the necessary information to support a planning application. It demonstrates that the impact, both direct and indirect, of the proposed development within the site, has been assessed and where appropriate, mitigation and tree protection proposed.

2.3. The implementation of any protection methods and special construction details recommended within this report are critical for ensuring the retained trees are successfully protected through the construction process and must be implemented prior to any work on site.

2.4. This assessment is based upon the supplied layout drawing, reference number ST-02-12 CAD Planning Layout and Siteline topographical survey, reference number 36RS001.

2.5. This assessment considers the impact of the development on the constraints posed by the retained trees (both beneath ground: the root protection area (RPA), and above ground: the canopy), and material considerations in relation to planning policy.

2.6. Direct impact from development comes in five main forms:

1) Surface installation within RPAs
2) Root loss from excavation for foundations, drainage and other utilities within RPAs
3) Soil stripping, removal and level changes within RPAs
4) Excessive access facilitation pruning to retained trees
5) Soil compaction/contamination, from storage and vehicle movements within RPAs

2.7. Indirect impact can come from changes to the site hydrology, future pressure to prune or fell, failure of trees exposed by removal of neighbouring trees, and other environmental changes which can take several years to manifest.

2.8. The RPA for each tree represents a minimum area in m² that should be left undisturbed around each retained tree. This is initially represented by a circle but is often adjusted to account for constraints to root growth within the site (primarily highways and buildings). It is therefore important to ensure the protection of trees both above and below ground. Recommendations are provided in the British Standard as to the protection of existing trees before, during and after development. This is achieved by ensuring the tree protection plan and arboricultural method statement are implemented before any commencement on site.

3. ARBORICULTURAL IMPACT ASSESSMENT

3.1. OVERVIEW OF PROPOSED DEVELOPMENT

3.1.1. The development proposals for the site are residential in nature. A new entrance feature is proposed on the western boundary with Roundstone Lane. Trees proposed for removal are limited to category 'R' specimens and sections of internal hedgerows.

3.2. TREES PROPOSED FOR REMOVAL & SURGERY

No.	Name	Operation	BS Cat
T18	Common Ash	Fell to ground level and remove	R
T19	Common Ash	Fell to ground level and remove	R
T20	Common Ash	Fell to ground level and remove	R
T22	English Oak	Crown lift western side to 4m only, to improve driveway clearance	A
T24	Sycamore	Off-site tree should be removed with land owners consent	R
G7	Mixed species (partial)	Fell selected stems to facilitate internal highway infrastructure	C
G10	Mixed species (partial)	Fell selected stems to facilitate internal highway infrastructure Management reduction works and removal of dead individuals to improve hedgerow condition	C

3.2.1. Trees to be removed are limited to category 'R' trees and some sections of hedgerow groups G7 and G10. In total three individual trees are identified within the curtilage of the site, trees nos. T18, T19 and T20. These trees are of low quality and value with limited wider landscape significance with a limited safe useful life expectancy of less than ten years. A single off-site tree no. T24 is of a reduced structural condition and should be removed for sound arboricultural reasons. Permission from the land owner will be required before the tree can be removed. All trees of moderate to high quality and value are to be retained.

3.2.2. Under the Hedgerows Regulations 1997, the outgrown understory hedgerow group G10 is considered 'important' given its historical presence, connections to other hedges, low percentage gaps (two recorded), mature trees and diversity of plant species. Some sections of this hedgerow are shown to be removed to facilitate the development proposals. Remaining sections are to be reduced in size through a series of proposed management surgery works. These management works will be beneficial in retaining a mature understorey screen, which will make a continued long term contribution to the overall character of the site.

3.3. DEMOLITION & SITE CLEARANCE

3.3.1. To ensure damage does not occur to trees highlighted for retention, tree protection fencing must be erected before ANY plant/vehicles entering site whatsoever. This should be subject to a pre-commencement site meeting between the developer, their project arboriculturist and a representative from the Local Authority.

3.3.2. There are two existing stable blocks on-site within the RPAs of adjacent trees nos. T16 and T22. To avoid root damage sensitive demolition will be required. This would include a pre-start meeting and 'toolbox' discussion before commencement of demolition works and on-site supervision with the project arboriculturist.

3.4. CONSTRUCTION AND PERMANENT HARD SURFACES WITHIN RPAS

3.4.1. The constructions of all proposed units are planned as outside the RPAs of all trees to be retained.

3.4.2. In section 7.4 of the British Standard, permanent hard surfacing within the RPAs of retained trees is addressed, and recommendations made.

3.4.3. There is an incursion into the RPAs of trees nos. T10 and T21 by proposed turning heads and T28 by a proposed garage unit. These encroachments are considered marginal, less than 2% of the total RPAs and will not be to the detriment of the trees. Therefore special construction measures/adjustment of the plans are not required.

3.4.4. Within the RPAs of off-site trees nos. T25 – T27 a footpath connecting to Cow Lane is proposed. This section has continually been used as an entrance and egress, and as such the ground is heavily rutted and compacted. It is unlikely there are significant roots in this area; therefore special construction measures are not required. The improvements to ground levels here will be to the benefit of adjacent trees.

3.4.5. Within the RPA of English Oak no. T22 a section of hard surfacing is proposed. This area covers approximately 16% of the total RPA. To avoid root damage, various design criteria must be met, ensuring a 'no-dig approach is taken, limiting impact on the trees. Design must be approved for use by the project arboriculturist.

3.5. PROTECTION FENCING

3.5.1. Figure 2 of the British Standard recommends a standard fencing design for tree protection. This is a weld mesh panel design, mounted upon a well-braced scaffold framework. This is perfectly adequate for this site and all the retained trees can be suitably protected by its erection before any works start on site whatsoever.

3.6. SHADE AND FUTURE PRESSURE TO PRUNE

3.6.1. The site layout has been assessed in terms of shading and future pressure to prune. In terms of the orientation of the site, and the relationship between the proposed buildings and the retained trees, the juxtaposition is viable for long-term tree retention and not dissimilar to many other relationships between trees and buildings in the surrounding area. It is considered unlikely that there would be any undue pressure to remove trees, or excessively prune from any future occupants.

3.7. SERVICES

3.7.1. Full details of the service and utility provisions for the site remain to be finalised. However, there is adequate space for utility trenches to access the site whilst avoiding RPAs and exclusion zones.

4. ARBORICULTURAL METHOD STATEMENT

TO BE READ INCONJUNCTION WITH THE APPENDED TREE PROTECTION PLAN REF: BSH17576-03

4.1. PHASING OF OPERATIONS, SITE SUPERVISION & MONITORING

4.1.1. The development process will be subject to arboricultural supervision and monitoring, especially areas where incursion into the RPA of retained trees is required. Therefore, in addition to monthly site monitoring visits, input and supervision from the project arboriculturist will be required at the following stages:

1) Pre-start site meeting with groundwork contractors, site manager and LPA arboricultural officer/landscape officer.
2) Removal of existing stable blocks
3) Installation of 'No-dig' driveway surfacing

4.1.2. Supervision is also required should any unplanned access and/or work be required in the construction exclusion zone.

4.1.3. Supervision will require the arboriculturist to be present throughout the task, to ensure all the arboricultural objectives are met. If the task is to take a long period of time, provided the arboriculturist is satisfied, and after an initial 'tool-box talk', the supervision may be reduced to telephone contact between the site foreman/contractor and arboriculturist.

4.1.4. Monitoring visits will initially occur on a monthly basis during time when the site is active, starting with the pre-start meeting (above). They will involve a visit from the project arboriculturist and a standard report form being completed and sent to both Client and LPA outlining the condition of tree protection on site, and if any defaults to the approved protection have been found. If required, remedial measures will be advised by ACD in liaison with the Client and LPA.

4.2. TREE PROTECTION AREAS

4.2.1. Based on tree survey data, tree protection areas have been determined for every retained tree. These areas are designed to protect at least a functional minimum of tree root mass in order to ensure that the trees survive the construction process.

4.2.2. Some trees on this site are subject to statutory protection by Tree Preservation Order. Damaging them is a criminal offence and is also contrary to planning conditions that, if breached, could lead to all work on site being stopped by the local authority.

4.2.3. It is the responsibility of everyone engaged in the construction process to respect the tree protection measures and observe the necessary precautions within and adjacent to them.

4.2.4. Inside the exclusion area of the fencing, the following shall apply:

- No mechanical excavation whatsoever
- No excavation by any other means without arboricultural site supervision
- No hand digging without a written method statement having first been approved by the project arboriculturist.
- No lowering of levels for any purpose (except removal of grass sward using hand tools)
- No storage of plant or materials
- No storage or handling of any chemical including cement washings
- No vehicular access
- No fire lighting

4.2.5. In addition to the above, further precautions are necessary adjacent to trees:

- No substances injurious to tree health, including fuels, oil, bitumen, cement (including cement washings), builders sand, concrete mixing and other chemicals shall be stored or used within or directly adjacent to the protection area of retained trees
- No fire shall be lit such that flames come within 5m of tree foliage.

4.3. **TREE PROTECTION FENCING**

4.3.1. The tree protection plan (see the latest revision of: BSH17576-03) shows the alignment of tree protection fencing (TPF), which is to be installed prior to any of the following taking place:

- Demolition
- Plant and material delivery
- Soil stripping
- Utility installation
- Construction works
- Landscaping

4.3.2. <u>Stages for installation of TPF:</u>

1) Hand clearance of any vegetation to allow clear working access.

2) Setting out of fencing points

3) Fencing erected

4) Site meeting with project arboriculturist to ‘sign-off’ tree protection fencing.

5) Site accessible to demolition/construction traffic

4.3.3. Once erected, all TPF will be regarded as sacrosanct, and will not be removed or altered without prior recommendation by the project arboriculturist and approval of the local planning authority.

4.3.4. The typical TPF construction is suitable for areas of high intensity development, and shall comprise of interlocking weld-mesh panels, well braced to resist impacts by attachment to a scaffold framework that is set firmly into the ground. A detailed specification can be found on the TPP.

4.3.5. If any alternative method of barrier construction is proposed, consultation with the project arboriculturist will be obtained to clarify the efficacy of the revised design prior to informing the local planning authority and obtaining their consent.

4.3.6. Once barriers and/or ground protection have protected the exclusion zone, construction work can commence.

4.3.7. All weather notices should be erected on the barriers (for example see figure below).

Tree protection sign (download from www.acdarb.co.uk)

4.4. SITE STORAGE, PARKING, WELFARE FACILITIES, ETC.

4.4.1. The site will require provision for; site storage, contractor parking, welfare facilities, temporary services/drainage, material drop of points, etc.

4.4.2. No details of these provisions are available at the time of writing of this report.

4.4.3. None of the above provisions will be sited within RPAs of retained trees without the input or the project arboriculturist and the consent of the Local Authority.

4.5. **TREE SURGERY AND REMOVAL**

4.5.1. Tree surgery works are limited to the removal of the three on-site category 'R' trees, sections of hedgerow groups G7 and G10, the proposed management works to hedgerow group G10 and crown lifting of English oak T22.

No.	Name	Operation	BS Cat
T18	Common Ash	Fell to ground level and remove	R
T19	Common Ash	Fell to ground level and remove	R
T20	Common Ash	Fell to ground level and remove	R
T22	English Oak	Crown lift western side to 4m only, to improve driveway clearance	A
T24	Sycamore	Off-site tree should be removed with land owners consent	R
G7	Mixed species (partial)	Fell selected stems to facilitate internal highway infrastructure	C
G10	Mixed species (partial)	Fell selected stems to facilitate internal highway infrastructure Management reduction works and removal of dead individuals to improve hedgerow condition	C

4.5.2. All trees to be removed are indicated on the Tree Protection Plan.

4.5.3. Under the Hedgerows Regulations 1997, the outgrown understory hedgerow group G10 is considered 'important' given its historical presence, connections to other hedges, low percentage gaps (two recorded), mature trees and diversity of plant species. Some sections of this hedgerow are shown to be removed to facilitate the development proposals. Remaining sections are to be reduced in size through a series of management surgery works. These management works will be beneficial in retaining a mature understorey screen, which will make a continued long term contribution to the overall character of the site

4.5.4. If any further surgery works are proposed, they will be submitted to, and approved by, The Council, before being carried out.

4.5.5. All works will be carried out in accordance with BS3998 (BSI 2010 British Standards Institute) industry best practice and in line with any works already agreed with the Council.

4.5.6. The statutory protection afforded by the Wildlife and Countryside Act (1981) and Countryside and Rights of Way Act (2000) will be adhered to. If further advice is required, particularly if bats are discovered during tree work, it will be obtained from Natural England or other competent persons and recommendations adhered to.

4.5.7. The stumps of any trees removed from within the Construction Exclusion Zone or the RPAs of retained trees will be either; cut flush to ground level and left in situ or ground out using a stump grinder. They will not be winched out.

4.5.8. All operations shall be carefully carried out to avoid damage to the trees being treated or neighbouring trees. No trees to be retained shall be used for anchorage or winching purposes.

4.6. **SOFT LANDSCAPING**

4.6.1. All landscaping and associated ground preparation within exclusion zones will be carried out sensitively to ensure root damage is mitigated as much as is practicable. At no time is any heavy plant to be used within any protected area. Removal of existing vegetation will be carried out by hand, turf may be removed using a mechanical turf stripper or by hand.

Turfing

4.6.2. Stages for turfing gardens and open spaces:

1) No plant/machinery to be used in the area for whatever reason
2) Contact project arboriculturist to hold pre-start site meeting and 'toolbox' talk before starting work
3) Remove TPF to allow access to area.
4) Re-erect TPF to secondary location (if required and shown on plan)
5) Do not reduce any high spots or excavate in any way.
6) Existing poor quality turf may be removed with a turf stripper.
7) Use good quality top-soil to level any low-lying areas and hollows, and provide a fine tilth to lay turf on. This imported soil must not result in a level increase of more than 100mm in any area.
8) Import turves by hand in wheelbarrow
9) Lay turves

Planting

4.6.3. Should the soil be compacted or have a poor structure that may hinder the development of any new planting, soil decompaction techniques may be used upon consultation with the project arboriculturist.

4.6.4. Stages for planting within tree protection areas:

1) No plant machinery to be used in the area for whatever reason
2) Contact project arboriculturist to hold pre-start site meeting and 'toolbox' talk before starting work
3) Remove TPF to allow access to area.
4) Re-erect TPF to secondary location (if required and shown on plan)
5) Remove existing vegetation by hand, turf may be removed using a mechanical turf stripper.
6) Do not reduce any high spots or excavate in any way.
7) Import good quality top-soil by hand (with wheelbarrow) into area.
8) Level to a depth of no more than 100mm with hand tools
9) Dig individual planting pits for each plant by hand (including hedging which must not be trench planted)
10) Any mulch should also be imported and spread by hand.

4.6.5. No works will be carried out within any protected areas if the soil moisture is of a level likely to allow compaction to occur.

4.7. **INSTALLATION OF UNDERGROUND SERVICES**

4.7.1. Mechanical trenching for the installation of underground apparatus and drainage severs any roots present and can change the local soil hydrology in a way that adversely affects the health of the tree. For this reason, particular care should be taken in the routeing and methods of installation of all underground apparatus. Wherever possible, apparatus should be routed outside RPAs. Where this is not possible, it is preferable to keep apparatus together in common ducts. Inspection chambers should be sited outside the RPA.

4.7.2. Where underground apparatus is to pass within the RPA, detailed plans showing the proposed routeing should be drawn up in conjunction with the project arboriculturist. In such cases, trenchless insertion methods should be used: Microtunnelling, Surface-launched directional drilling, Pipe ramming or Impact moling (see BS5837:2012 Table 3), with entry and retrieval pits being sited outside the RPA. Provided that roots can be retained and protected, excavation using hand-held tools might be acceptable for shallow service runs. If this is case, the following methodology must be followed:

4.7.3. Stages for installing services by hand within tree protection areas:

No plant machinery to be used in the area for whatever reason

1) Contact project arboriculturist to hold pre-start site meeting and 'toolbox' talk before starting work
2) Remove just enough tree protection fencing to allow access to area and facilitate trenching
3) Remove any surface vegetation or existing hard surfaces using hand tools
4) Using and air-pick excavate the trench, keeping to minimum dimensions required
5) Roots occurring in clumps of 25 mm diameter and over are encountered they will be retained, and kept damp by covering with hessian (re-wetted as required). If required, these should be severed only following consultation with an arboriculturist, as such roots might be essential to the tree's health and stability
6) Feed in services.
7) Back fill trench with 200-300mm depth of excavated soil, or a mixture of excavated and imported top-soil to BS3882 (BSI 2007 British Standards Institute), firming down with heels
8) Repeat step 7 until trench is filled
9) Re-erect tree protection fencing as per approved plan

4.7.4. The method of excavation above, for trenching within RPA's, is using air excavation. This tool utilises compressed air to remove soil from around tree roots causing minimal damage and can be run of a typical site compressor. ACD can provide details of contractors supplying air excavation services if required.

4.7.5. Alternatively trenchless technology, such as thrust boring can be used in some instances and is particularly effective as it can pass directly under the tree, at a depth which is likely to avoid almost all impact on roots of the subject tree. As no access/thrust pits will be located within the RPAs of the subject trees, the need for arboricultural supervision is limited.

4.8. **DEMOLITION CLOSE TO TREES**

4.8.1. All TPF to be installed as per approved Tree Protection Plan prior to any plant arriving on site.

4.8.2. Sensitive demolition will occur under supervision from the project arboriculturist

4.8.3. Stages for demolition within tree protection areas:

1) No plant machinery to be sited on any exposed rooting area
2) Contact project arboriculturist to hold pre-start site meeting and 'toolbox' talk before starting work
3) Buildings to be folded in on themselves
4) Removal debris by hand or with plant machinery not located on any exposed rooting area.
5) Floor to be broken up with had held breaker and pieces removed by hand. Slab floor can be lifted carefully by machinery if appropriate
6) Underlying ground levels to be retained. No excavation to occur
7) Any exposed roots and surrounding newly exposed areas to be covered with up to 100mm of topsoil, from elsewhere on site, or imported top-soil to BS3882 (BSI 2007 British Standards Institute). Soil may be placed in area by plant but must be spread by hand.
8) Tree protection fencing to be erected in final position as shown on plan

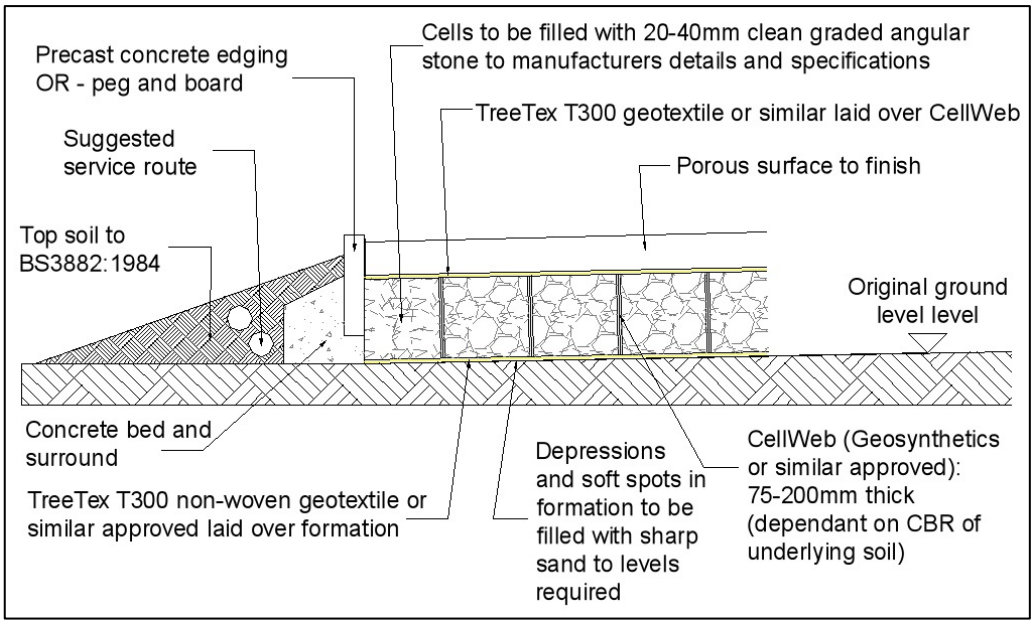
4.8.4. No reduction in levels of the underlying soil surface will occur.

4.8.5. At no point are any heavy machinery permitted within the RPA.

4.8.6. Contamination of the soil by fuel and lubricant leaks must be avoided at all cost. If such a situation arises the project arboriculturist must be notified to assess the situation and prescribe remedial measures.

4.9. **INSTALLATION OF PERMANENT HARD SURFACING**

4.9.1. To ensure that tree roots, within the ground under this proposed surface, continue to survive during and after construction a cellular system such a CellWeb (Geosynthetics Ltd, 01455 617139, www,geosyn.co.uk) of 75-200mm depth is to be used .



No-dig cross-section

4.9.2. Stages for Installation of the cellular confinement surface:

1) Contact project arboriculturist to hold pre-start site meeting and 'toolbox' talk before starting work

2) Dismantle TPF and re-erect in secondary location as shown on TPP

3) Remove existing vegetation by using a specific herbicide (as advised by a specialist) or manual removal with hand tools only. Agreed removal of shrubs, saplings or trees, within the protected areas of retained trees are to be cut, or ground out to just below ground level rather than grubbed or winched out, which can damage roots of retained trees.

4) Retain all original ground levels after vegetation removal. No excavation whatsoever.

5) Remove any existing hard surfaces (paving, tarmac etc.) Hand tools should be used if possible. If machinery is required for this operation, it must be used only on existing surfaces or outside the protection areas and tree canopies (approval from project arboriculturist must be sought before using machinery). The sub base of existing surfaces or foundations should be left in situ where possible to avoid unnecessary root disturbance and provide a base for the new surface.

6) Install a non-woven Geotextile (such as TreeTex T300) directly over soil grade level (levelled where necessary, by non-compacted washed sand) and fix in place.

7) Lay the cellular system over the Geotextile, which is secured open under tension during the infill process with steel staples or wooden pegs.

8) Install kerbs and edgings directly on top of existing soil grade level. For light structures, a treated peg and board may be acceptable. For more substantial structures, railway sleepers, haunched concrete with road pins, drilled kerbstones, gabions or cast in situ kerbs will be appropriate.

9) Fill the cellular system ensuring any machinery works only on already filled areas. Typical infill consists of no fines angular granular material 20-40mm, which will remain un-compacted.

10) Cover with a non-woven Geotextile (such as TreeTex T300).

11) Install porous wearing surface.

- Small Block Paving
- Washed Gravel
- Porous Asphalt

4.9.3. Any variation to the above specification must meet the following design criteria for low-invasive surfaces to provide the conditions for continued tree survival and growth:

- Maintain oxygen diffusion through new surface to rooting area (5-12% by volume (Roberts, Jackson et al. 2006 TSO)).
- Maintain sufficient passage of water to the rooting area (12-40% by volume(Coder 2000 University of Georgia)).
- Avoid compaction by maintaining a soil structure sufficient to sustain root growth (soil bulk density below 1.4g/cc (Harris 2004 Prentice Hall)).

4.9.4. Site analysis of the soil type and its structural characteristics will be required prior to determining the specific depth of products to be adopted for example, footpaths normally require a depth of 75mm and, 100mm to 200mm depths are used for residential driveways, while greater depths may be required for the passage of heavier traffic such as for construction access and delivery vehicles.

4.9.5. If ground levels are to be raised more than 150mm this should be achieved by the use of a granular material, which does not inhibit vertical gaseous diffusion. For example: no-fines gravel, washed aggregate, structural soil (min. 20% sand content) or cobbles.

4.10. **EXCAVATION WIHTIN RPAS**

4.10.1. Stages for excavation within RPAs:

1) Contact project arboriculturist to hold pre-start site meeting, 'toolbox' talk and supervise the operation.
2) Remove TPF to allow access to area (if required).
3) Identify sensitive area.
4) Remove hard surface if necessary (see relevant section of this report).
5) Excavate with no-tines bucket, or by hand, under close supervision.
6) If roots are found, clear by hand around them.
7) If roots found are greater than 25mm diameter then cover with damp hessian and keep moist until backfilled. If excavation requires all roots to be severed then proceed as below.
8) Cleanly sever roots with bypass secateurs, loppers or pull cut saw at right angles to root. Avoid tearing or ripping the root.
9) Backfill as soon as possible to cover cut root ends.

24.2. If, for whatever reason, the project arboriculturist feels that a tree's stability has been compromised during the operation, then the LPA shall be contacted and the arboricultural officer (or appropriate landscape officer) notified. A decision can then be made as to the best way forward.

5. BIBLIOGRAPHY

BRE (1990). Climate and site development part 3 : improving microclimate through design, Building Research Establishment.

BSI (1989). BS4043- Recommendations for transplanting root-balled trees. London, British Standards Institute.

BSI (2007). BS3882- Specification for topsoil and requirements for use. London, British Standards Institute.

BSI (2012). BS5837: Trees Iin relation to design, demolition and construction- Recommendations. London, British Standards Institute.

Coder, D. K. D. (2000). Tree Root Growth Requirements, University of Georgia.

Harris, C., Matheny (2004). Arboriculture, Tree Management of Shade Trees and Vines, Prentice Hall.

Littlefair, P. J., M. Santamouris, et al. (2000). Environmental site layout planning : solar access, microclimate and passive cooling in urban areas, Building Research Establishment.

Mattheck, C. and H. Breloer (1995). The body language of trees : a handbook for failure analysis, HMSO.

NJUG (2007). Volume 4: NJUG Guidelines For The Planning, Installation And Maintenance Of Utility Apparatus In Proximity To Trees (Issue 2) – Operatives Handbook, National Joint Utilities Group.

Roberts, J. J., N. Jackson, et al. (2006). Tree roots in the built environment. London, TSO.

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12th July 2012

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APPENDIX 1: TREE PROTECTION PLAN

BSH17576-03

Pound House

Tall Trees

MANOR NURSERY

The Retreat
Dane Villa
Poundville
Belmont
The Chantrelles
Flint Cottage
Silver Birch
Dane Acre
ESS
WILKINSON CLOSE
Bramley Cottages
NURSERY ROAD
WHITFIELD CLOSE

ROUNDSTONE LANE

A280 ANGMERING BYPASS

POUND PLACE

RUGBY CLUB

PUMPING STATION

POS

PLAY AREA

COMMUNITY GARDEN

Existing stable unit to be demolished and hard standing removal under on-site supervision of project arboriculturist.

Access to be determined

Existing stable unit to be demolished and hard standing removal under on-site supervision of project arboriculturist.

Proposed roadway to be constructed as a 'no-dig' surfacing solution. Area to be fenced off until prior to construction works.

Existing entrance feature has extensive historical use, heavily rutted and unlikely to contain significant rooting mass.

WHY TREE PROTECTION IS NEEDED

1) **Soil compaction kills roots** - caused by plant movement and storage of materials within protected areas ,

2) **Trenching severs roots**- many small roots grow within the top 600mm of soil. Even the removal of the top 200mm can cause damage.

3) **Poisoning kills roots** - fuel, cement, lime, tar, drainage or cement washings can contaminate the soil resulting in root death.

4) **Raising & lowering kills roots**- the soil used to increase levels can compact the underlying soil (see point 1). Lowering levels will remove roots causing damage to the tree.

5) **Bark and branch damage**- bark removal and branch damage can allow disease and fungi into the tree.

The impact of any of the above can take years to show- trees can have huge reserves of food and water.

Update

TREE PROTECTION FENCING & EXCLUSION ZONE

All fencing shall be installed prior to any plant activity on site whatsoever, including: demolition, utility installation, groundworks, and soil stripping.

Once erected, all TPF will be regarded as sacrosanct, and will not be removed or altered without the prior written approval of the project arboriculturist and the local planning authority. The TPF is suitable for areas of high intensity development, and shall comprise of interlocking weld-mesh panels, well braced to resist impacts by attachment to a scaffold framework (see BS 5837:2005 for details). Where no access or limited access for construction be proposed, consultation with the project arboriculturist will be obtained to clarify the efficacy of the revised design prior to informing the local planning authority and obtaining their consent. Once the exclusion zone has been protected by barriers and/or ground protection, construction work can commence. All weather notices may be erected on the barriers.

1 Standard scaffold poles
2 Heras gauge 2 m tall galvanized tube and welded mesh infill panels
3 Panels secured to uprights and cross members with wire ties
4 Ground level
5 Uprights driven into the ground until secure (minimum depth 0.6 m)
6 Standard scaffold clamps

TEMPORARY FENCING

Temporary fencing is used to protect areas of special detail and is to be removed when the detail is installed as per the method statement & under the supervision of the project arboriculturist.

NO-DIG ROADWAY SURFACE

The area of hard surface is to be laid above the existing ground level. Existing ground is to be:
Surface to be porous to approved details and specifications.
To be installed under arboricultural supervision
All spec to be submitted to project arboriculturist

Cells to be filled with 20-40mm clean graded angular crushed stone to approved details and specifications

TreeFlex T300 geotextile or similar laid over Cellweb

Precast concrete edging OR - peg and board

Suggested service route

Top soil to BS3882:2007

Concrete mow strip surround

TreeTex T300 non-woven geotextile or similar approved laid over formation

Porous surface to finish

Original ground level

Depressions in formation to be filled with sharp sand as levels required

Cellweb (or similar approved) to be laid on (dependant on CBR of underlying soil)

SENSITIVE DEMOLITION

The existing features are within the RPAs of adjacent trees to be retained and therefore to minimise impact on underlying roots they are to be demolished as per the method statement & under the supervision of the project arboriculturist.

TREE TO BE RETAINED

TREE TO BE REMOVED

A CATEGORY TREE
B CATEGORY TREE
C CATEGORY TREE
X CATEGORY TREE

ROOT PROTECTION AREA (RPA) FOR RETAINED TREES

RESTRICTIONS WITHIN TREE PROTECTION AREAS

Inside the exclusion area of the fencing, the following shall apply:

- No mechanical excavation whatsoever
- No excavation by hand without project arboriculturist site supervision
- No hand digging without a written method statement having first been approved by the project arboriculturist.
- No lowering of levels for any purpose (except removal of grass sward using a flail mower)
- No storage of plant or materials
- No storage or handling of any chemical including cement washings
- No mixing of chemicals
- No fire lighting

In addition to the above, further precautions are necessary adjacent to trees:

- No chemicals including petrol, diesel, oil, bitumen, cement (including cement washings), builders sand, concrete mixing and other chemicals shall be stored or used within or directly adjacent to the protection zone of retained trees.
- No fire shall be lit such that flames come within 5m of tree foliage.

PHASING, SUPERVISION & MONITORING OF DEVELOPMENT

Before any work starts on site, the tree protection measures shown on this plan are to be installed and a pre-start site meeting with the project arboriculturist, groundwork contractors, site manager and LPA arboricultural officer/landscape officer held. Following this meeting, the demolition and construction phases are subject to monthly site monitoring visits from project arboriculturist.

Additional site supervision and input from the project arboriculturist is to occur:

1. During the removal of existing stable blocks
2. During the installation of the 'no-dig' drive surfacing

Supervision is also required should any unplanned access and/or work be required in the construction exclusion zone

The original of this drawing was produced in colour- a monochrome copy should not be relied upon.

0 5 10 15 20m

Rev	Date	Details	Drawn

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