

LAND TO NORTH WEST OF BOORLEY GREEN HAMPSHIRE

ARBORICULTURAL IMPACT ASSESSMENT & METHOD STATEMENT

For



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Checked by:	
Date:	01/09/2017
Ref:	MILL21068aia-ams
Revision:	D: 30.04.2018

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1.0 Executive Summary

1.1. ACD was initially instructed, to carry out a tree survey, and present constraints details in accordance with BS5837:2012 *Trees in relation to design, demolition and construction*. This was to identify the quality and value of existing trees on the site, allowing decisions to be made as to the retention or removal of trees during development. Subsequently, the subject layout has been produced and is in line with recommendations of the British Standard. Adequate protection can be provided to ensure all retained trees are protected throughout development.

1.2. **This revision (D) has been drafted to incorporate the footpath connection with Winchester Road adjacent to the waste water treatment centre.**

1.3. The proposal comprises of 45.4ha to the north west of Boorley Green, is bounded by a small number of residential properties along Winchester Road to the east, the railway line to the west and farmland to the north and south. Hedge End railway station is across Shamblehurst Lane North just beyond the north-west corner of the site and the Botley Park Hotel and golf course is beyond Winchester Road. Trees within the site are along the boundaries of a mosaic of fields. This Phase 1 Reserved Matters application comprises 301 dwellings.

1.4. The relationship between the building and retained trees is sustainable and is not likely to result in any 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.

1.6. Some sections of proposed footpaths network will have to be constructed using a 'no dig' approach.

1.7. One small section of existing hard surfacing will need to be removed in a sensitive manor.

1.8. One section of highway, and a swale, will require supervised excavation to minimise impact on retained trees.

2.0 Introduction

2.1. Miller Homes Ltd and Gleeson Developments Ltd. instructed ACD Environmental to prepare the following impact assessment.

2.2. This revision (D) has been drafted to incorporate the footpath connection with Winchester Road adjacent to the waste water treatment centre.

2.3. Following the recommendations of the British Standard¹, 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.

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

2.5. This assessment is based on the supplied layout drawing, ref: P1388 Layout-ZQ and site survey, ref: A258/7834/1.

2.6. The controlling authority is Eastleigh Borough Council, who can be contacted at: Upper Market Street, Eastleigh House, Eastleigh, SO50 9YN.

2.7. 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).

2.8. Direct impact from development comes in six 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 from storage and vehicle movements within RPAs, 6) Soil contamination.

¹ BS5837:2012 *Trees in relation to design, demolition and construction- Recommendations*, London: British Standards Institute

2.9. 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.

2.10. 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.

3.0 Arboricultural Impact Assessment

3.1. Overview of proposed development

3.1.1. The site to be developed up to 680 units of residential housing. As part of a of this development a new road network will be built along with other residential infrastructure. The majority of the development will be built within the fields, retaining the trees on the outer edges.

3.1.2. This application is for phase one of the development which comprises 301 dwellings.

3.2. Tree Preservation Orders

3.2.1. There are no tree preservation orders (TPOs) present on any trees on, or adjacent to the site, nor is the site within a conservation area.

3.3. Previous planning applications and consents

3.3.1. Outline planning permission was granted in November 2016, reference: O/15/75953.

3.4. Trees proposed for removal

3.4.1. The following trees are proposed for removal:

- Category C (low quality): H7, H9 (section of), 10, G23 (3No.), 107-110, 117, 118, G139, 126, 128, 134 & 135
- Category B (moderate quality): 109-116, 119, 125, 127, 129, 130-133, 136 & 137, G26 (3No.).

3.4.2. The majority of the above trees were detailed for removal within the outline application highways improvements, so have already been assessed by the council. Upon scrutiny of the engineering details for the highways works, a few more trees within the roadside group have now to be removed.

3.4.3. In relation to the conception and design of development proposals, BS5837:2012 section 5.1.1 states: The constraints imposed by trees, both above and below ground should inform the site layout design, although it is recognised that the competing needs of development mean that trees are only one factor requiring consideration. Certain trees are of such importance and sensitivity as to be major constraints on development or to justify its substantial modification. However, care should be taken to avoid misplaced tree retention; attempts to retain too many or unsuitable trees on a site can result in excessive pressure on the trees during demolition or construction work, or post-completion demands for their removal.

3.4.4. It is therefore deemed acceptable to remove the trees listed and, as part of the detailed landscape design for the scheme, include suitable and sustainable replacements as and where appropriate. This will more than mitigate any loss that may be felt from tree removals, by providing robust long-term tree cover in keeping with the proposal and surrounding properties.

3.5. RPA encroachments

No.	Type	Description	Mitigation
18	T	Existing building and new surfacing restricts protection of entire RPA as interpreted on plan (adjusted from initial circle to account for highway)	This is an off-set notional RPA. The fencing has been extended to protect a greater area that more than compensates for this deviation (as per 5.3.1a of BS5837)
		Hard surface to be removed from within RPA	To be carried out sensitively, as per method statement
19	T	New footpath within RPA	A minor encroachment of less than 4% of the overall 327m ² RPA. 'No-dig' surfacing not proposed. The fencing has been extended to protect a greater area that more than compensates for this deviation (as per 5.3.1a of BS5837)
14	G	New footpath within RPA	To be installed using a 'no-dig' surface, as per method statement
12	G	New footpath within RPA	Minor encroachments into RPAs to north. 'No-dig' surfacing not proposed. The fencing has been extended to protect a greater area that more than compensates for this deviation (as per 5.3.1a of BS5837)
		New road within RPAs	Main spine road to pass through this natural gap in the central tree belt. Given likelihood of adoption, a 'no-dig' spec surface is not viable. Therefore, supervised excavation is proposed, as per method statement.
8	T	New footpath within RPA	To be installed using a 'no-dig' surface, as per method statement
26	G	Swale passes through tree belt to west of treatment works.	Small, but essential encroachment. Supervised excavation is proposed, as per method statement.
18	G	Swale partially within RPA	Supervised excavation is proposed, as per method statement.
20, 102 & 103	T	New footpath within RPA	To be installed using a 'no-dig' surface, as per method statement

3.6. Protection fencing

3.6.1. 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.

3.7. Shade and future pressure to prune

3.7.1. ACD have worked with the design team from the start of this project and we feel that the resulting proposed layout is both sustainable and results in juxtapositions between trees and buildings which will not bring future requests for excessive pruning and/or tree removal.

3.8. Services

3.8.1. Full details of the service and utility provisions for the site remain to be finalised. However, we have been in liaison with PFA Consulting Ltd and there is adequate space for utility trenches to access the site whilst avoiding RPAs and exclusion zones.

4.0 Arboricultural Method Statement

TO BE READ IN CONJUNCTION WITH THE APPENDED TREE PROTECTION PLAN REF: MILL21068-03

4.1. Phasing of operations & site supervision

4.1.1. The tree protection and other arboricultural works must be carried out in the following order:

	Operation	Present	Notes
1	Tree removals & surgery	Tree contractor	See Tree Protection Plan for trees to be removed
2	Protection barriers erected	Fencing contractor	See Tree Protection Plan for position and type of barriers
3	Pre-start meeting	ACD, site manager, groundwork, foreman, demolition foreman	To 'sign-off' protection prior to any plant activity, demolition & groundworks on site
4	Removal of hard surfaces near trees	ACD, demolition staff, site manager	Supervised by project arboriculturist. See method statement
5	No-dig surface installation	ACD, groundwork contractor, site manager	Groundwork staff to receive toolbox-talk from project arboriculturist. See method statement
6	Supervised excavation	ACD, groundwork contractor, site manager	ACD to supervise and work to be as per method statement
7	Removal of protection barriers and landscape work	ACD, landscape contractor, site manager	See method statement

4.1.2. Supervision is 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.

4.2. Construction exclusions zone

4.2.1. Barriers and/or ground protection must be used to protect all retained trees before any machinery or materials are brought onto the site, and before any demolition, development or stripping of soil commences.

4.2.2. Where all activity can be excluded from the RPA, vertical barriers must be erected to create the construction exclusion zone (CEZ). The default position of which is shown on the appended Tree Protection Plan.

4.2.3. Where, due to site constraints, construction activity cannot be fully or permanently excluded from all, or part of a tree's RPA, appropriate ground protection can be installed.

4.2.4. 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.

4.2.5. Inside the exclusion zone, 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.

4.2.6. 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 barriers

4.3.1. The construction exclusion zone will be protected as per the appended tree protection plan that shows the default alignment of the tree protection barriers, to be installed prior to any of the following taking place:

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

4.3.2. Stages of installation of barriers:

- 1) Hand clearance of any vegetation to allow clear working access.
- 2) Setting out of node points
- 3) Barriers 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 barriers 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 default barrier 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. The images below are alternative barrier designs that have been successfully used on site and that ACD are happy to support if a variation from the default style is required. If such a variation is necessary, the approval of the project arboriculturist will be obtained prior to any implementation on site.

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 <http://www.acdenvironmental.co.uk>)



Weld-mesh panels on scaffold uprights



Weld-mesh panels on wooden posts



Chain-link on angle-iron uprights

4.4. Ground protection

4.4.1. If required (or as shown on the appended tree protection plan), ground protection is to be installed as follows. It must be capable of supporting the expected loads and avoiding rutting, compaction and damage to the soil: as advised in section 6.2.3 of the British Standard.

4.4.2. Stages of ground protection installation:

- 1) No plant machinery to be used in the area of ground protection for whatever reason
- 2) Dismantle primary TPF and re-erect in secondary location as shown on TPP (if required) OR erect fencing to protect any newly exposed CEZ not to be covered by ground protection.
- 3) Any shrubs, saplings or trees to be removed, 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) Lay woven geotextile over existing ground surface by hand

- 5) Cover the area with compressible layer, woodchip, for example, using hand tools only
- 6) Cover compressible layer with side butting scaffold boards or plywood boards
- 7) Confirm surface is acceptable for use with project arboriculturist
- 8) Area ready for construction access

4.4.3. Any scaffolding required within the area will be erected with the uprights placed on spreader boards.

4.4.4. The boarding will be left in place until the construction works are finished.

4.4.5. A single thickness of boarding laid on the soil surface will provide sufficient protection for pedestrian loads. However, for wheeled or tracked construction traffic movements within the RPA, ground protection will involve the use of temporary cellular confinement systems, reinforced concrete slabs or track-board systems details of which are to be specified by the project engineer and approved for use by the project arboriculturist and local authority before construction commences.

4.4.6. Track-boards can be sourced from Trakmats Europe Ltd, 0845 6435388, www.trakmatseurope.com, or groundguards.com

4.4.7. There is to be no excavation within ground protection area whatsoever. This includes installation of services and associated utilities.



Scaffold board pedestrian ground protection



Vehicular ground protection trackway

4.5. Site storage, parking, welfare facilities, etc.

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

4.5.2. It is acceptable to place site cabins and walkways within the CEZ provided they are installed sensitively:

- Cabins must be placed on sleepers (or similar) to spread the load, avoiding point loading and associated soil compaction.
- The delivery of cabins should ensure that any unloading via 'hi-ab' crane can be carried out without impact on the crowns of retained trees.
- Walkways, if required, should be installed as per the ground protection specification.
- Any utilities for site compounds must be run above ground. For example, WC foul pipes/drainage and temporary electrical connections.

4.5.3. It is imperative that if cabins and walkways are installed, that fencing is erected to limit access to the protected areas. If amendments are made, the project arboriculturist should sign off the proposals prior to their implementation.

4.5.4. Contractor parking and storage areas should be sited outside the CEZ.

4.6. Tree surgery and removal

4.6.1. All trees to be removed are indicated on the TPP, and listed in the Arboricultural Impact Assessment section of this document.

4.6.2. If any surgery work is proposed, details will be submitted to, and approved by, the council, before being carried out.

4.6.3. All work will be carried out in accordance with BS3998² industry best practice and in line with any works already agreed with the council.

4.6.4. The tree surgeon shall ideally be chosen from The Arboricultural Association's Approved Contractor list. All work shall be undertaken at the appropriate time and with the consent and approval of the site agent.

4.6.5. The statutory protection^{3 4} 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.

4.6.6. 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.

4.6.7. 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.

4.7. Soft landscaping

4.7.1. All landscaping and associated ground preparation within exclusion zones will be carried out sensitively to ensure root damage is minimised as much as is practicable.

4.7.2. At no time is any heavy plant to be used within any protected area.

4.7.3. Removal of existing vegetation (including turf) will be carried out with hand tools only.

4.7.4. 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.

² BS3998:2010- *Recommendations for Tree Work*. London: British Standards Institute

³ *Wildlife and Countryside Act*. (1981) London: HMSO.

⁴ *Countryside and Rights of Way Act*. (2000) London: HMSO.

4.7.5. Tree protection barriers may be removed to allow access and then replaced as required/per approved documents (in liaison with the arboricultural clerk of works)

4.7.6. Levels (high spots) will not be reduced or excavated in any way. Use good quality topsoil 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.

4.7.7. Import materials by hand in wheelbarrow or using a digger sited outside the sensitive area.

4.7.8. Any excavation for planting pits must be dug using hand tools only.

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

4.8. Installation of underground services

4.8.1. 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.

4.8.2. 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 the case, the following methodology must be followed:

4.8.3. 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 an 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) Backfill trench with 200-300mm depth of excavated soil, or a mixture of excavated and imported topsoil to BS3882 (BSI, 2007), firming down with heels.
- 8) Repeat step 7 until trench is filled.
- 9) Re-erect tree protection fencing as per approved plan.

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

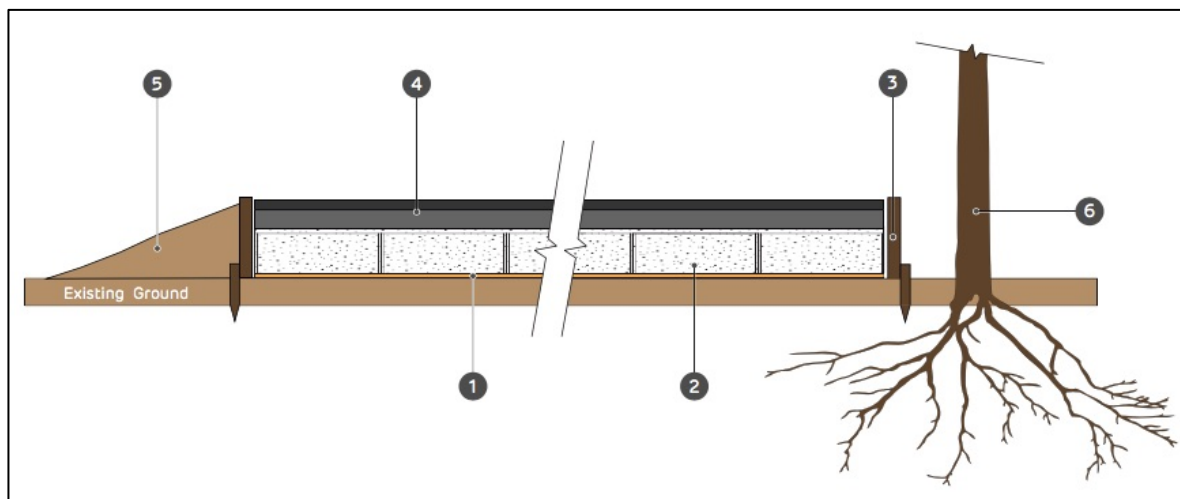
4.8.5. Alternatively, trenchless technology, such as thrust boring can be used in some instances and is particularly effective as it can pass directly under the tree, at a depth which is likely to avoid almost all impact on roots of the subject tree. As no access/thrust pits will be located within the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

4.8.6. Reference can be made to NJUG Vol 4⁵ for guidance, but any approach must be approved by the project arboriculturist and brought to the attention of the local authority tree officer.

4.9. Installation of 'no-dig' surface

4.9.1. To ensure that tree roots, within the ground under this proposed surface, continue to survive during and after construction a cellular confinement system (CCS) such a ProtectaWeb⁶ of 75-200mm depth is to be used.

4.9.2. The following example CCS spec is courtesy of Wrekin Products and shows an asphalt finish. Other surfaces can be used, and similar CCS are available from other suppliers.



- 1 Root-tex 30 geotextile
- 2 70-200mm deep ProtectaWeb tree root protection system infilled with 4/20 clean angular stone to BS EN 13242 / EN 12620
- 3 Treated timber edging (or other edging detail acceptable)
- 4 Asphalt surface to engineer's details
- 5 Soil graded to edging (if required)
- 6 Existing tree

4.9.3. Stages for Installation of the cellular confinement surface:

⁵ National Joint Utilities Group. (2010). *Volume 4: NJUG Guidelines For The Planning, Installation And Maintenance Of Utility Apparatus In Proximity To Trees (Issue 2) – Operatives Handbook*. NJUG.

⁶ Wrekin Products, www.wrekinproducts.com, 01543 440440.

- 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 Root-tex 30) 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 uncompacted.

- 10) Cover with a non-woven geotextile (Root-tex 30 or similar).
- 11) Install porous wearing surface.

4.9.4. 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 volume⁷)
- Maintain sufficient passage of water to the rooting area (12-40% by volume⁸)
- Avoid compaction by maintaining a soil structure sufficient to sustain root growth (soil bulk density below 1.4g/cc⁹).

4.9.5. 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.

4.9.6. 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.

⁷ Smith, R. J. (2006). *Tree Roots in the Built Environment*. HSO

⁸ Coder, D. K. (2000). *Tree Root Growth Requirements*. University of Georgia

⁹ Harris, C. M. (2004). *Arboriculture, Tree Management of Shade Trees and Vines*.

4.10. Hard surface removal

4.10.1. No hard surface removal within RPAs will occur without arboricultural supervision.

4.10.2. Stages for hard surface removal 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) Dismantle fencing as required to access area
- 4) Plant machinery to run only on existing hard surfaces with consent from arboriculturist
- 5) Plant may be used to carefully peel up existing tarmac and concrete
- 6) Other surfaces are to be removed by hand (paving etc.)
- 7) Where any sub base is not likely to contain roots and only on approval from project arboriculturist, it may also be carefully removed.
- 8) Underlying ground levels to be retained. No excavation to occur
- 9) Any exposed roots and surrounding newly exposed areas to be covered with up to 100mm of topsoil, from elsewhere on site, or imported topsoil to BS3882¹⁰ Soil may be placed in area by plant but must be spread by hand.
- 10) Tree protection fencing to be erected in final position as shown on plan

4.10.3. If the area around the retained trees is to be left following the removal of the existing hard surface, before a new hard surface is laid or soft landscaping implemented, then the line of protective fencing MUST be correctly re-established immediately the hard surface removal work has been completed.

¹⁰ BS3882:2007- *Specification for topsoil and requirements for use*. London: British Standards Institute.

4.10.4. If for whatever reason there is a delay before the area is left exposed prior to awaiting a new surface, then a temporary surface must be implemented or the area fenced off.

4.11. Supervised Excavation within RPAs

4.11.1. Stages of 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) Excavate with no-tines bucket, or by hand, under close supervision.
- 5) If roots are found, clear by hand around them.
- 6) 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.
- 7) Cleanly sever roots with bypass secateurs, loppers or pull cut saw at right angles to root. Avoid tearing or ripping the root.
- 8) Backfill as soon as possible to cover cut root ends.

4.11.2. 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.

4.12. Ditch Clearance Within Root Protection Areas

4.12.1. As an average tracked machine (<20 ton) applies less ground pressure than an average human, in principle the careful use of tracked excavators within RPAs is acceptable. Damage occurs when the excavator turns, chewing up the ground surface. Therefore, to avoid this the excavator must only travel in and out of the area in a linear manner, else ground protection matting must be used.

Stages for ditch clearance

- 1) Discuss procedure with project arboriculturist (via site meeting if appropriate).
- 2) Define sensitive area.
- 3) Remove tree protection fencing (if present) to allow access to area.
- 4) If access allows, use a small (<20ton) excavator with a bucket with no tines, to carefully remove debris avoiding excavation into original ditch profile, travelling in and out of the RPA in a single linear path to avoid turning. A banksman will be required. Any dumper used for transporting arisings must be sited outside the RPA.
- 5) If access is restricted, use hand tools to clear loose debris, avoiding excavation into the original ditch profile.
- 6) Once complete, erect tree protection fencing if required (see original tree protection plan).

4.13. Installation of boundary fencing within protected areas

4.13.1. Stages for installing wooden fence posts:

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 TPF to allow access to area.
- 3) Dig postholes using hand tools, avoiding damage to the protective bark covering larger roots. Roots smaller than 25mm diameter may be pruned back using either secateurs or a hand saw, leaving a clean cut.
- 4) Damage or severance of roots above 25mm diameter must be avoided. If roots of this size are discovered, the hole should be relocated. If there are a large number of such roots it may be necessary to relocate the hole by half a fence panels length and adjust the fence panels accordingly.

- 5) Line hole with non-porous lining, for example, durable polyethene bag.
- 6) Insert post and fill post-hole with concrete to just below ground level.
- 7) Trim polyethene to ground level and fill with clean topsoil.

Mark Welby RCarborA, FArborA, Dip Arb (RFS), Tech Cert (ArborA)
Director & Principal Arboriculturist
01 September 2017

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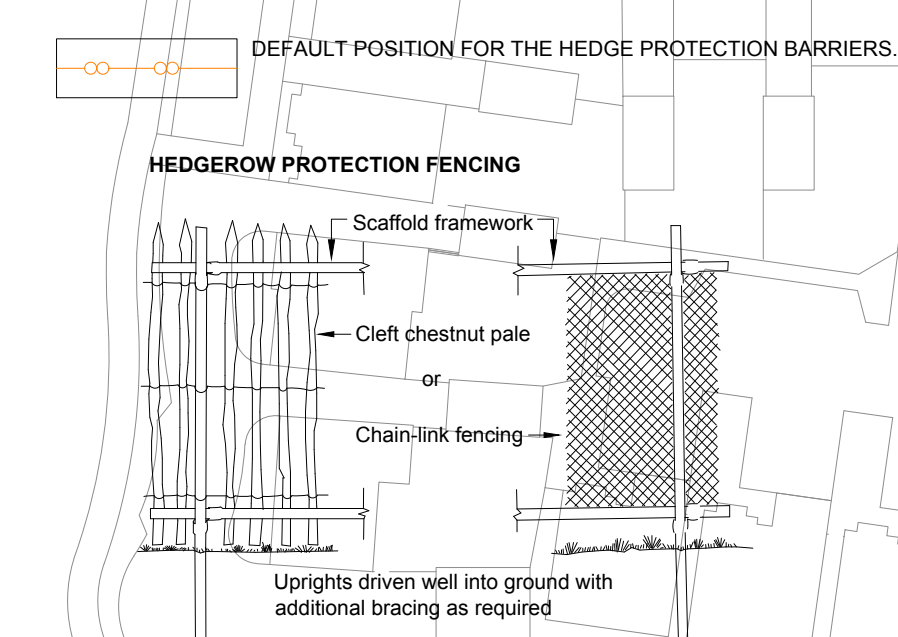
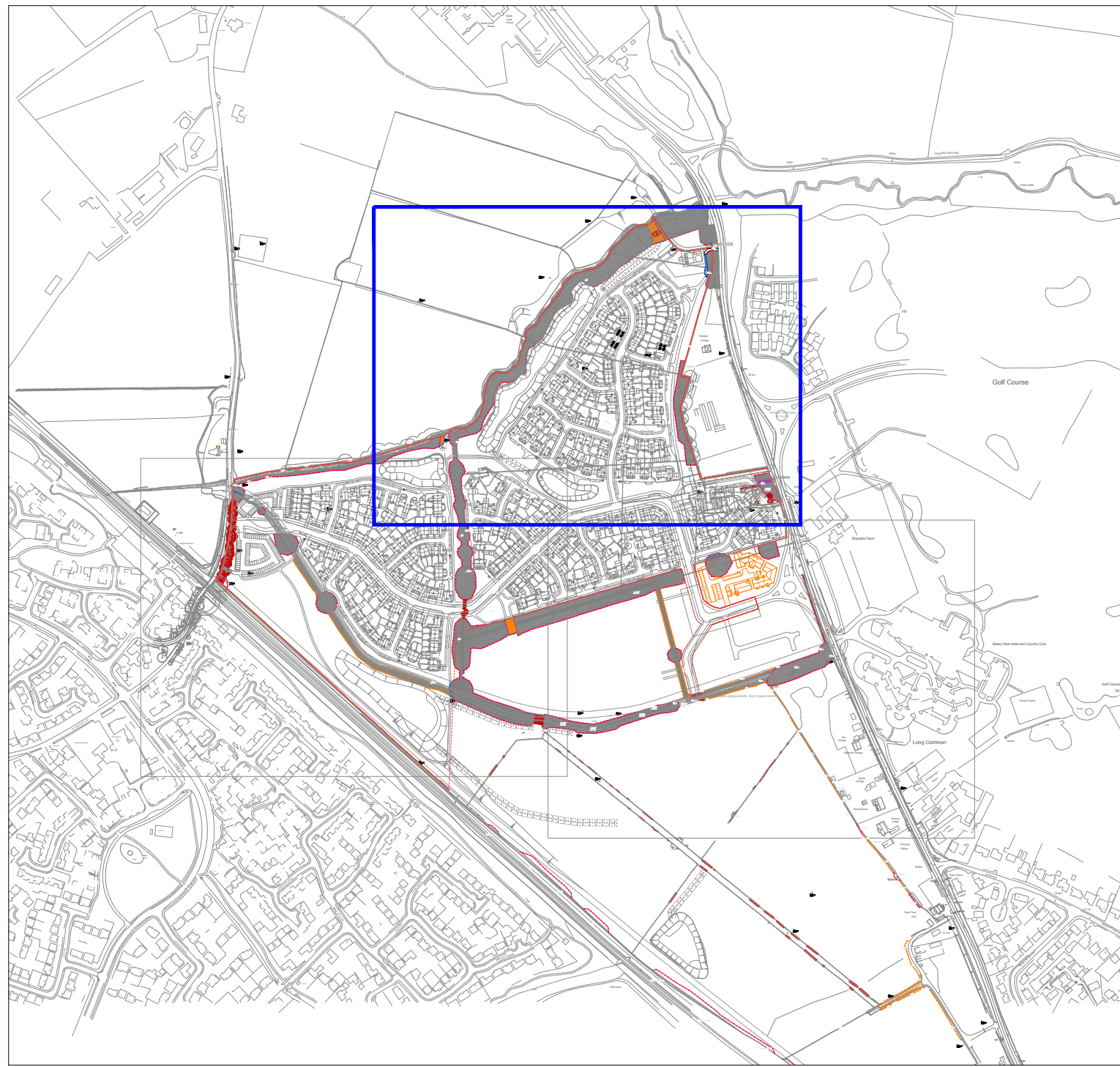
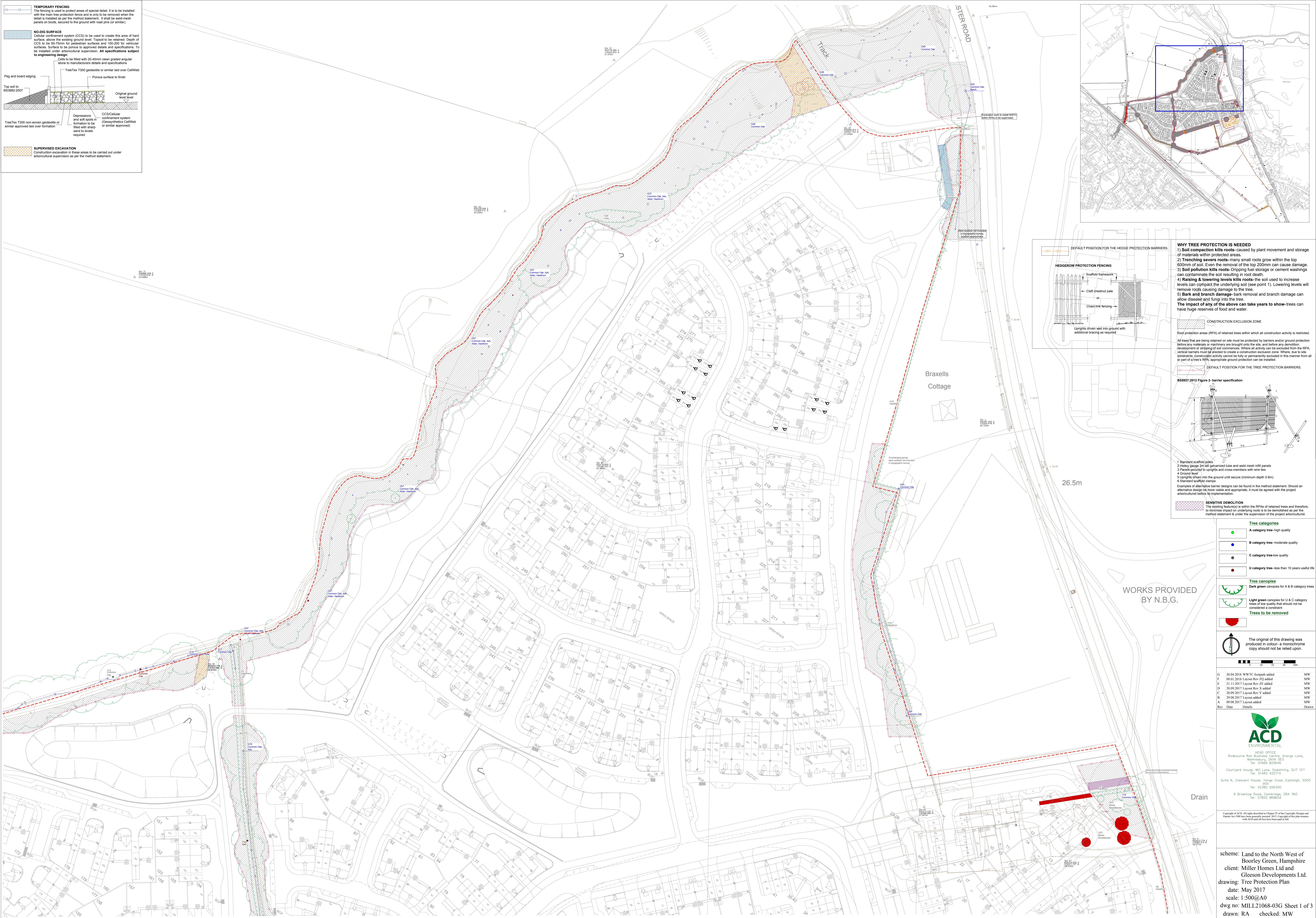
Appendix: Tree Protection Plan

MILL21068-03

TEMPORARY FENCING
The fencing is used to protect areas of special detail. It is to be installed with the main tree protection fence and is only to be removed when the detail is installed as per the method statement. It shall be weld mesh panels on posts, secured to the ground with road pins (or similar).

NO-DIG SURFACE
Cellular confinement system (CCS) to be used to create this area of hard surface, above the existing ground level. Topsoil to be retained. Depth of CCS to be 50-75mm for pedestrian surfaces and 100-200 for vehicular surfaces. Surface to be porous to approved details and specifications. To be installed under arboricultural supervision. All specifications subject to engineering design.
Cells to be filled with 20-40mm clean graded angular stone to manufacturers details and specifications
TreeTex T300 geotextile or similar laid over CellWeb
Peg and board edging
Top soil to BS3602:2007
Original ground level level
Porous surface to finish
Depressions and soft spots in formation to be filled with sharp sand to levels required
CCS/Cellular confinement system (Geosynthetic CellWeb or similar approved)

SUPERVISED EXCAVATION
Construction excavation in these areas to be carried out under arboricultural supervision as per the method statement.



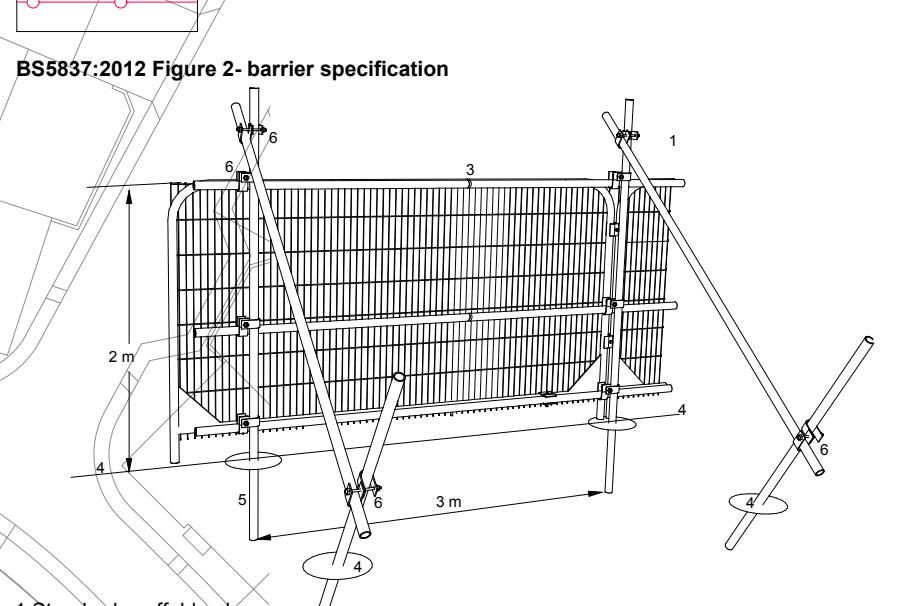
WHY TREE PROTECTION IS NEEDED

- 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) **Soil pollution kills roots**—Dripping fuel storage or cement washings can contaminate the soil resulting in root death.
- 4) **Raising & lowering levels 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.

CONSTRUCTION EXCLUSION ZONE

Root protection areas (RPA) of retained trees within which all construction activity is restricted. All trees that are being retained on site must be protected by barriers and/or ground protection before any materials or machinery are brought onto the site, and before any demolition, development or siting of soil commences. Where all activity can be excluded from the RPA, vertical barriers must be erected to create a construction exclusion zone. Where, due to site constraints, construction activity cannot be fully or permanently excluded in this manner from all or part of a tree's RPA, appropriate ground protection can be installed.



- 1 Standard scaffold poles
 - 2 Heavy gauge 2m x 100mm galvanized tube and weld 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 0.6m)
 - 6 Standard scaffold clamps
- Examples of alternative barrier designs can be found in the method statement. Should an alternative design be more viable and appropriate, it must be agreed with the project arboricultural before its implementation.

SENSITIVE DEMOLITION
The existing feature(s) is within the RPA(s) of retained trees and therefore, to minimize impact on underlying roots is to be demolished as per the method statement & under the supervision of the project arboricultural.

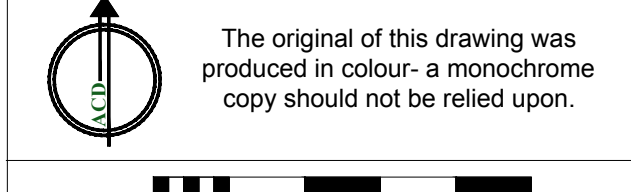
Tree categories

- A category tree—high quality
- B category tree—moderate quality
- C category tree—low quality
- U category tree—less than 10 years useful life

Tree canopies

- Dark green canopies for A & B category trees
- Light green canopies for U & C category trees of low quality that should not be considered a constraint
- Trees to be removed

WORKS PROVIDED BY N.B.G.



G	30.04.2018	WWTC	footpath added	MW
F	09.01.2018	Layout Rev J2	added	MW
E	21.11.2017	Layout Rev ZE	added	MW
D	28.09.2017	Layout Rev X	added	MW
C	28.09.2017	Layout Rev Y	added	MW
B	29.08.2017	Layout	added	MW
A	09.08.2017	Layout	added	MW
Rev	Date	Detail		Drawn

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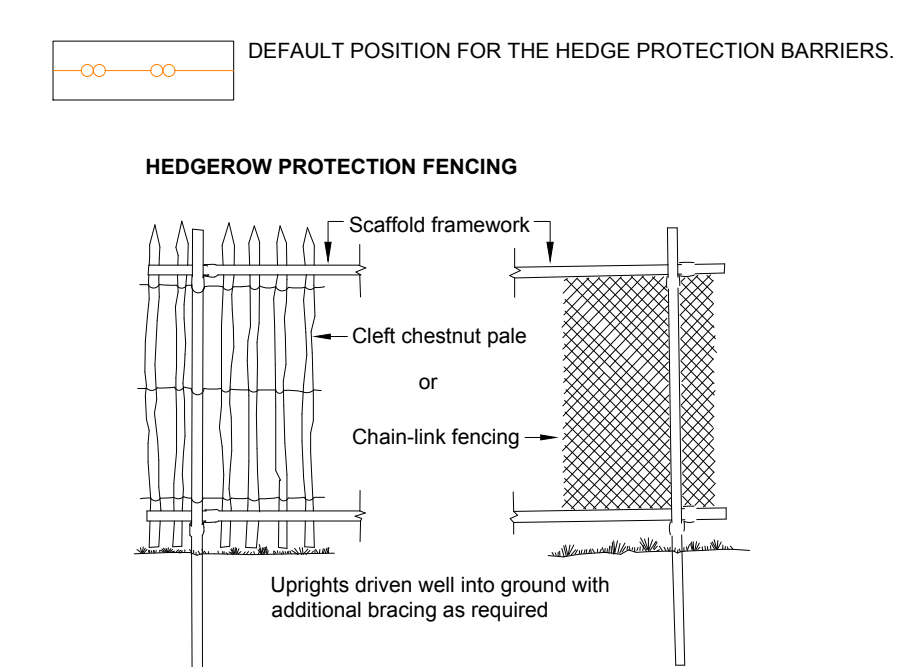
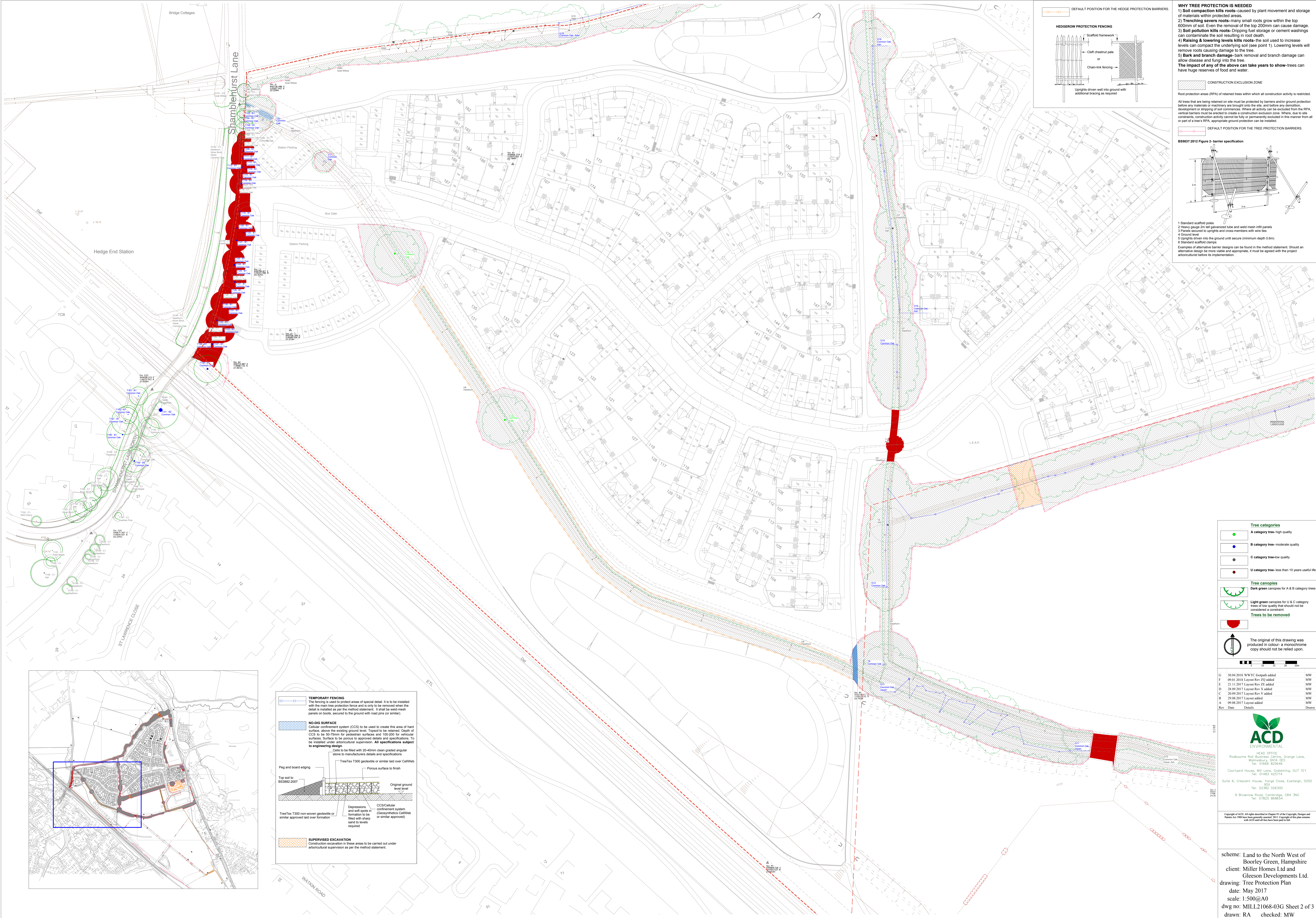
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client: Miller Homes Ltd and
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drawing: Tree Protection Plan
date: May 2017
scale: 1:500@A0
dwg no: MILL21068-03G Sheet 1 of 3
drawn: RA checked: MW



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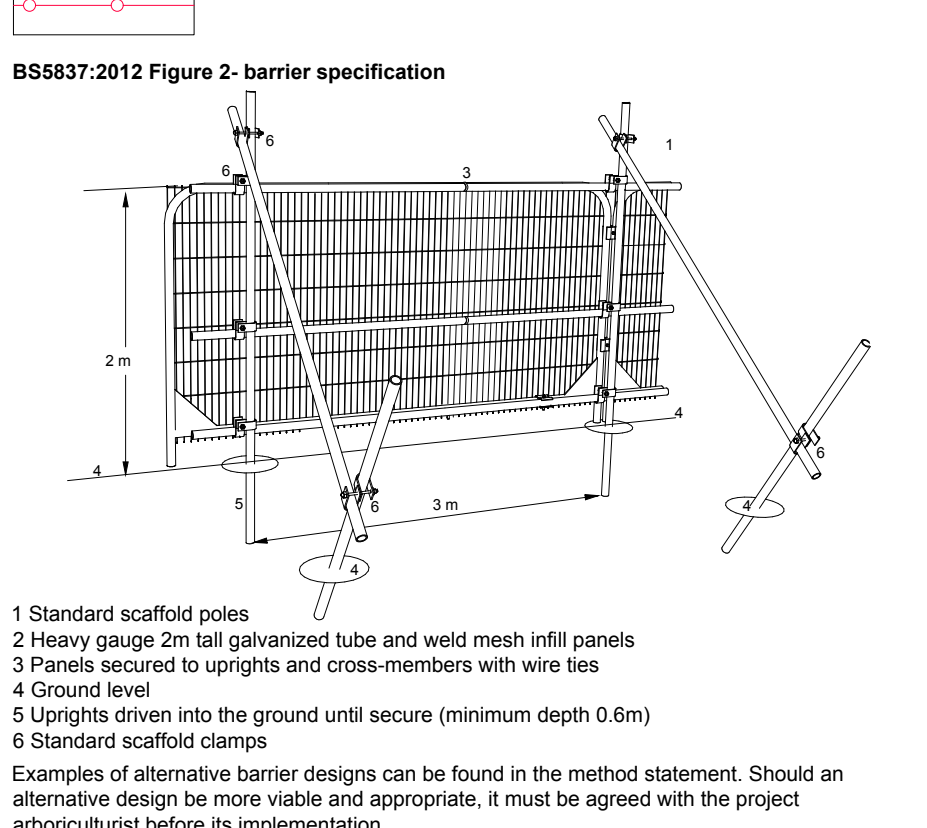
The impact of any of the above can take years to show-trees can have huge reserves of food and water.

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DEFAULT POSITION FOR THE TREE PROTECTION BARRIERS.



Tree categories

- A category tree-high quality
- B category tree-moderate quality
- C category tree-low quality
- U category tree-less than 10 years useful life

Tree canopies

- Dark green canopies for A & B category trees
- Light green canopies for U & C category trees of low quality that should not be considered a constraint

Trees to be removed

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

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F	09.01.2018	Layout Rev	R22 added	MW
E	21.11.2017	Layout Rev	ZE added	MW
D	28.09.2017	Layout Rev	X added	MW
C	28.09.2017	Layout Rev	Y added	MW
B	29.08.2017	Layout	added	MW
A	09.08.2017	Layout	added	MW
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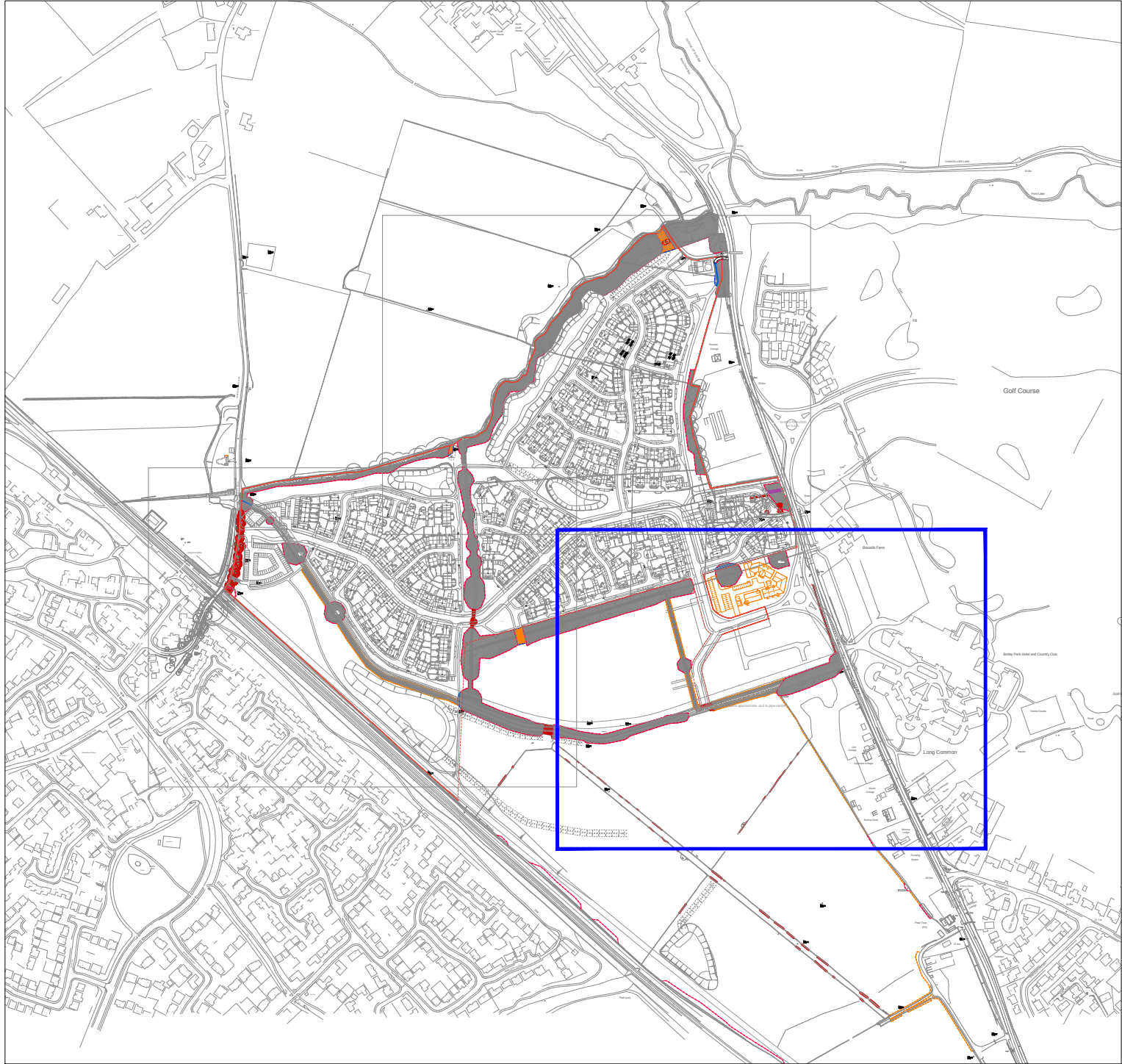
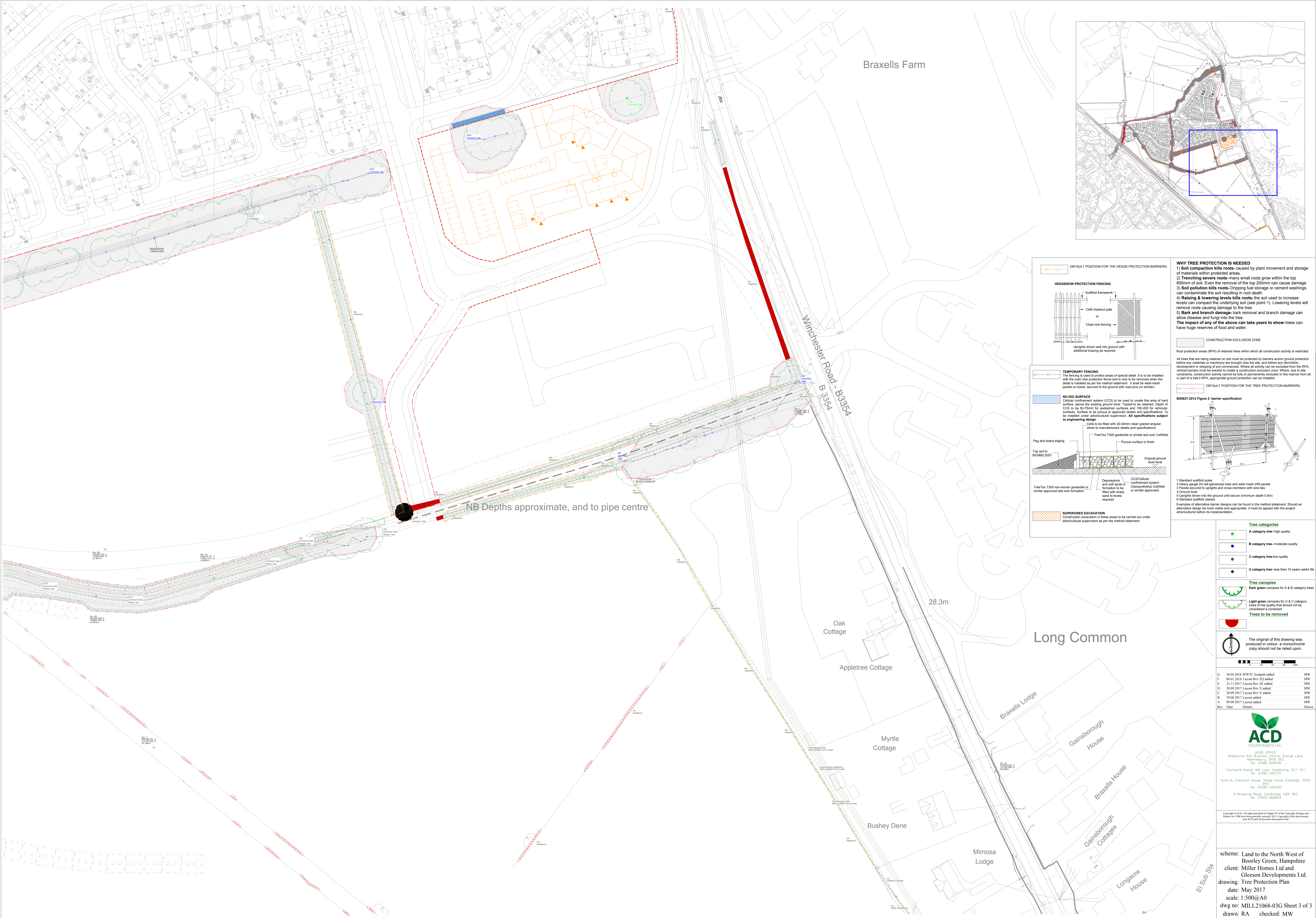
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drawing: Tree Protection Plan
date: May 2017
scale: 1:500@A0
dwg no: MILL21068-03G Sheet 2 of 3
drawn: RA checked: MW



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BS5837:2012 Figure 2: barrier specification

1 Standard scaffold poles
2 Heavy gauge 2m tall galvanized tube and weld mesh infill panels
3 Panels secured to uprights and cross members with wire ties
4 Ground level
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6 Standard scaffold clamps

Examples of alternative barrier designs can be found in the method statement. Should an alternative design be more viable and appropriate, it must be agreed with the project arboriculturist before its implementation.

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10 15 20 25m

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E	21.11.2017	Layout Rev ZE added	MW
D	28.09.2017	Layout Rev X added	MW
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