

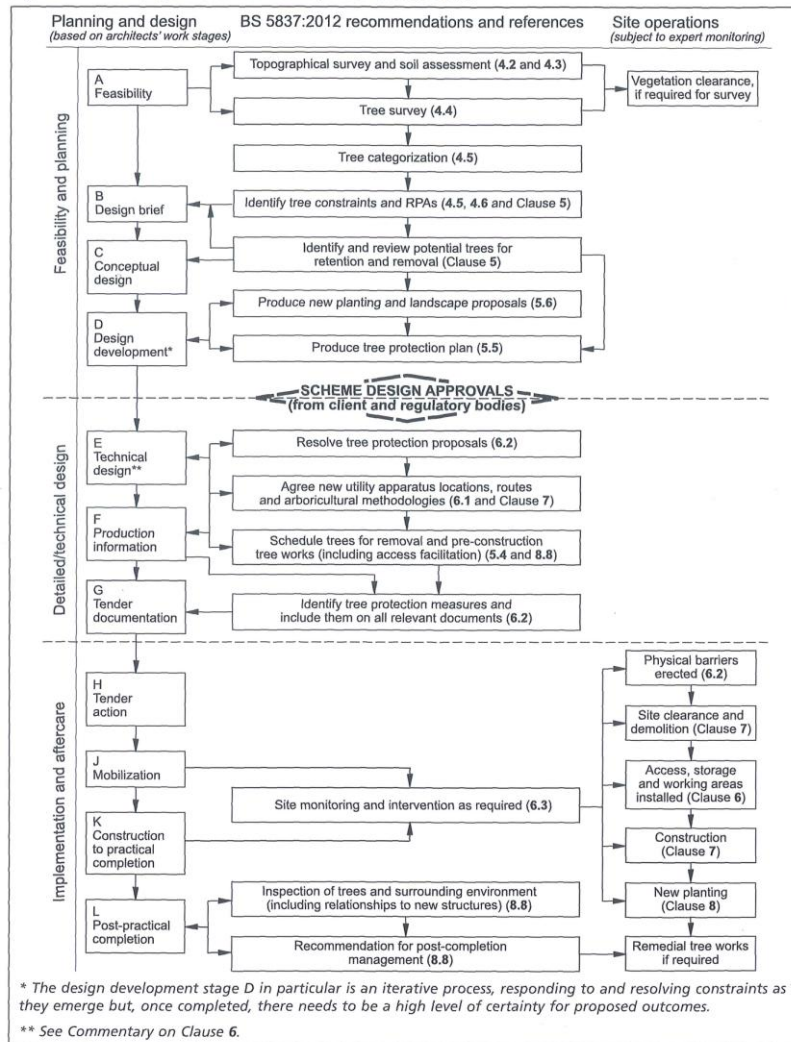


BH 1

Tree Survey Schedule

with Figure 1 Flow Diagram & Tree Survey Notes

Figure 1 The design and construction process and tree care



TREE SURVEY NOTES

These Tree Survey Notes have been prepared in accordance with the recommendations of **British Standard 5837:2012** and they define the criteria for pre –development tree surveys.

- Each tree/group/hedge/shelterbelt/woodland has been allocated a unique number (**No.**), where specifically requested and appropriate fees are agreed small durable numbered metal tags can be applied to each tree/group surveyed.
- The tree species (**Species**) is provided in both English and Latin name formats.
- Height assessments (**Ht**) are estimated in metres. This will be adequate for the majority of cases, but where accurate heights become a critical issue it may be necessary to return to site, as a separately commissioned exercise, to collect accurate measurements with the aid of optical instruments.
- Trunk/stem diameters (**Diam**) are measured in millimetres **at 1.5m above ground level** – where the tree is inaccessible the diameter is estimated as indicated by suffix #
- Radial crown spread assessments (**Brch Sprd**) are estimated in metres from the centre of the trunk/group to each of the four primary points of the compass (**N**-north; **E**-east; **S**-south and **W**-west) in order to achieve a representation of the crown shape which will be shown on the accompanying tree survey plan. These provide a general guide as to the main bulk outline of a tree/groups crown but **are not tape measured dimensions**. These would only be undertaken as part of a separately commissioned exercise, where precise dimensions are critical to the project at hand.
- Both the canopy ground clearance (**GC**) and the height & compass direction of the lowest major branch (**LMB**) are estimated and shown in metres
- An assessment of a tree/groups 'life stage' (**LS**) is made in terms of its site specific maturity as part of the surrounding landscape, taking into account its overall shape and form in that setting, and is recorded thus :-
Y - Young tree/group; **SM** - Semi-Mature tree/group; **EM** - Early-Mature tree/group;
M – Mature tree/group; **OM** - Over – mature tree/group
- Data on the structural condition (**Condition Comments**) of the tree/group is provided to give its visual appearance and any significant health and safety issues.
- Details of any recommended tree works required at the time of survey is given under the heading – **Preliminary Management Recommendations**.
- An estimate of a tree/groups remaining contribution in years (**RC**) is made and is recorded thus :-
0-5; 5-10; 10-20; 20-30; 30-40 or **>40** years.
- The category grading (**Cat**) for each tree/group is assessed according to the criteria provided within **BS5837:2012**. The assessment is made of the tree/group in its current condition and within the

environment encountered bearing in mind its suitability for retention as part of any future proposed development; although the exact layout detail of any specific scheme will not be known at the time of surveying. The trees have been classified into one of four categories and colour coded as BS5837 recommends :- **U** (dark red); **A** (light green); **B** (mid-blue) and **C** (grey). Please note that suffixed numerical sub-categories are also applied for guidance only and do not carry any cumulative or increased value for the tree/group. This colour coding scheme will be applied to all drawings provided.

Table 1 – Cascade chart for tree quality assessment

Category and definition	Criteria			Colour on plan
Trees unsuitable for retention				
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 (i.e. where, for whatever reason the loss of companion shelter cannot be mitigated by pruning) - Trees that are dead or are showing signs of significant, immediate, and irreversible overall decline - Trees infected with pathogens of significance to the health and/or safety of other trees nearby, or very low quality trees suppressing adjacent trees of better quality NOTE Category U trees can have existing or potential conservation value which it might be desirable to preserve.			Dark Red
Trees to be considered for retention				
	Criteria – Subcategories			
	1	2	3	
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)	Light Green
Category B Trees of moderate quality with an estimated remaining life expectancy of at least 20 years	Trees that might be included in the 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	Mid Blue
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 150mm	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	Grey



BJH.0458

TREE SURVEY SCHEDULE

Client : Orchard Homes Limited

Site Location : Ranelagh Road Site, Havant

Surveyor : Bernie Harverson M.Arb.

Date Surveyed : Original - 15th June 2009 **Verified** – April 2012

Tree No.	Species	Ht m	Diam mm	Brch Sprd m	GC m	LMB m	LS	Condition Comments	Preliminary Management Recommendations	Rem Con yrs	Cat
1	Bay Laurel <i>Laurus nobilis</i>	6	est 400	N3 E3 S3 W3	2	-	EM	Unable to access base of tree as it is off site-multi stemmed at ground level-yellowing of leaves	No work required at time of survey	>40	B1
2	Cherry <i>Prunus spp.</i>	4.5	170	N- E- S- W-	0	-	Y	Dead tree	Advise fell and stump grind	0-5	U
3	Apple <i>Malus domestica</i>	4.5	est 400	N2.5 E2.5 S2.5 W2.5	1	-	EM	Base and trunk smothered in ivy-epicormics-minor deadwood throughout-previously heavily topped-canker present on branchwork	No work required at time of survey	10-20	C1
H1	Hawthorn Holly Elderberry Field Maple Wych Elm	5	est 350	N2.5 E- S2.5 W-	0	-	M	Base and trunk smothered in ivy-multi stemmed at ground level-ivy through crown-crown shape dictated by group pressure-merged crowns	Remove ivy on worst affected trees	>40	B2
4	Plum <i>Prunus domestica</i>	4	150	N1.5 E1.5 S1.5 W1.5	1	-	Y	Multi stemmed at 0.5m above ground level-previously heavily topped	No work required at time of survey	10-20	C1
5	Sycamore <i>Acer pseudoplatanus</i>	6	200	N1.5 E1.5 S1.5 W1.5	0	-	Y	Suckers-growing through wire fence	No work required at time of survey	10-20	C1
6	Sycamore <i>Acer pseudoplatanus</i>	8	est 400	N4 E4 S4 W4	0	-	Y	Suckers-epicormics-stubs-previously crown lifted to 3m	No work required at time of survey	30-40	C1
7	Pedunculate Oak <i>Quercus robur</i>	16	est 800	N8 E6 S10 W5	2	-	M	Unable to access base of tree due to dense vegetation and allotment gate locked-smothered in ivy-epicormics-minor deadwood throughout-major stubs-previously crown lifted	No work required at time of survey	>40	B1

Grp 1	Sycamore x 2 Beech x 2	19	450	N8 E8 S8 W6	1	-	EM	Smothered in ivy-two Beech are sandwiched by the dominant end Sycamores-crown shape dictated by group pressure-merged crowns-minor deadwood throughout	No work required at time of survey	>40	B2
8	Sycamore <i>Acer pseudoplatanus</i>	19	800	N8 E6 S6 W8	3	-	EM	Base and trunk smothered in ivy-bifurcated at 3m above ground level-minor deadwood throughout	No work required at time of survey	>40	B1
Grp 2	Ash x 3 Sycamore x 2	16	500	N3 E5 S6 W8	2	-	EM	Base and trunk smothered in ivy -ivy through crown on one Ash-crown shape dictated by group pressure-merged crowns-minor deadwood throughout	No work required at time of survey	>40	B2
9	Goat Willow <i>Salix caprea</i>	6	250	N5 E1 S5 W5	1	-	EM	Ivy smothering-minor deadwood throughout-horse browsing damage to lower branches	No work required at time of survey	10-20	C1
10	Sycamore <i>Acer pseudoplatanus</i>	12	est 500	N5 E5 S5 W5	2	-	SM	Unable to access base of tree due to dense vegetation and it is off site-smothered in ivy-ivy smothering trunk and through crown	No work required at time of survey	>40	B1 / C1
Grp 3	Sycamore Elderberry Cherry Hawthorn	7	250	N3 E3 S3 W3	1	-	Y	Smothered in ivy-crown shape dictated by group pressure-merged crowns-poor quality trees of limited value	No work required at time of survey	10-20	C2
Grp 4	Hawthorn Lawsons Cypress Birch Elderberry	10	est 400	N4 E4 S4 W4	1	-	EM	Unable to access base of trees as they are off site-smothered in ivy-trunk and through crowns also smothered in ivy-some dieback in Hawthorn and Elder-minor deadwood throughout	No work required at time of survey	30-40	B2
Grp 5	Ash x 4	10	400	N5 E5 S5 W5	2	-	Y	Bark wounds-horse browsing damage-some trunks embedded in corrugated roof and have grown up through the concrete slab-crown shape dictated by group pressure-merged crowns	No work required at time of survey	10-20	C2
Grp 6	Field Maples	6 to 12	est 400	N4 E4 S4 W4	0	-	Y to SM	Unable to access base of trees due to dense vegetation and they are off site-a hedge line with one individual tree at eastern end-crown shape dictated by group pressure-merged crowns-some dieback-minor deadwood throughout	No work required at time of survey	>40	B2

H2	Hawthorn Elderberry Holly	5	est 400	N3 E3 S3 W3	0	-	M	Unable to access base of trees due to dense vegetation-ivy on base, trunk and through crowns-crown shape dictated by group pressure-merged crowns	Remove ivy on worst affected trees	>40	B2
H3	Hawthorn Elderberry	5	est 400	N3 E3 S3 W3	0		M	Unable to access base of trees due to dense vegetation-ivy on base, trunk and through crowns-crown shape dictated by group pressure-merged crowns	Remove ivy on worst affected trees	>40	B2
H4	Hawthorn Field Maple Elderberry	7	est 400	N4 E4 S4 W4	0		M	Unable to access base of trees due to dense vegetation-ivy on base, trunk and through crowns-crown shape dictated by group pressure-merged crowns	Remove ivy on worst affected trees	>40	B2 / C2



BH 2

Tree Root Protection Area Schedule & Plan BJH 01/02a

ROOT PROTECTION ZONE/AREA SCHEDULE

Client : Orchard Homes Limited

Site Location : Ranelagh Road Site, Havant

Tree No.	Tree Species	Cat	Diam mm	BS5837:2012 Table D1- Radial Protect.Area m	BS5837:2012 Table D1- Polygon Area m ²	Is An Offset Required To Cater For Existing Rooting Pattern Restrictions
1	Bay Laurel <i>Laurus nobilis</i>	B1	est 400	4.8	72	YES – the boundary wall and differences in levels will constrain the rooting pattern
2	Cherry <i>Prunus spp.</i>	U	170	n/a	n/a	NO – this tree should be removed for sound arboricultural management reasons regardless of any redevelopment proposals
3	Apple <i>Malus domestica</i>	C1	est 400	4.8	72	NO – free rooting to all directions
H1	Hawthorn Holly Elderberry	B2	est 350	4.2	55	YES – mutual suppression will focus rooting to the north and south sides
4	Plum <i>Prunus domestica</i>	C1	150	1.8	10	NO – free rooting to all directions
5	Sycamore <i>Acer pseudoplatanus</i>	C1	200	2.4	18	YES – consolidated and compacted track will focus rooting out into the allotments
6	Sycamore <i>Acer pseudoplatanus</i>	C1	est 400	4.8	72	YES – consolidated and compacted track will focus rooting out into the allotments
7	Pedunculate Oak <i>Quercus robur</i>	B1	est 800	9.6	290	NO – free rooting to all directions
Grp 1	Sycamore x 2 Beech x 2	B2	450	5.4	92	YES – consolidated and compacted track will focus rooting out into the allotments
8	Sycamore <i>Acer pseudoplatanus</i>	B1	800	9.6	290	YES – consolidated and compacted tracks will focus rooting out into the allotments
Grp 2	Ash x 3 Sycamore x 2	B2	500	6.0	113	YES – consolidated and compacted track will focus rooting out into the allotments
9	Goat Willow <i>Salix caprea</i>	C1	250	3.0	28	NO – free rooting to all directions

10	Sycamore <i>Acer pseudoplatanus</i>	B1 / C1	est 500	6.0	113	NO – free rooting to all directions
Grp 3	Sycamore Elderberry Cherry	C2	250	3.0	28	YES – mutual suppression will focus rooting to the east and west sides
Grp 4	Hawthorn Law. Cypress Birch	B2	est 400	4.8	72	YES – mutual suppression will focus rooting to the east and west sides
Grp 5	Ash x 4	C2	400	4.8	72	NO – concrete hard surfacing and stable blocks surround these trees
Grp 6	Field Maples	B2	est 400	4.8	72	YES – mutual suppression and competition from Ash trees will in places focus rooting to the south side
H2	Hawthorn Elderberry Holly	B2	est 400	4.8	72	YES – mutual suppression and presence of stable blocks will focus rooting to the north side
H3	Hawthorn Elderberry	B2	est 400	4.8	72	YES – mutual suppression will focus rooting to the east and west sides
H4	Hawthorn Field Maple Elderberry	B2 / C2	est 400	4.8	72	YES – mutual suppression and presence of industrial units will focus rooting to the north side



BH 3/4

Combined Tree Retentions & Removals Plan
& Revised Tree Protection Plan
BJH 03/04a

Figure 2 Default specification for protective barrier

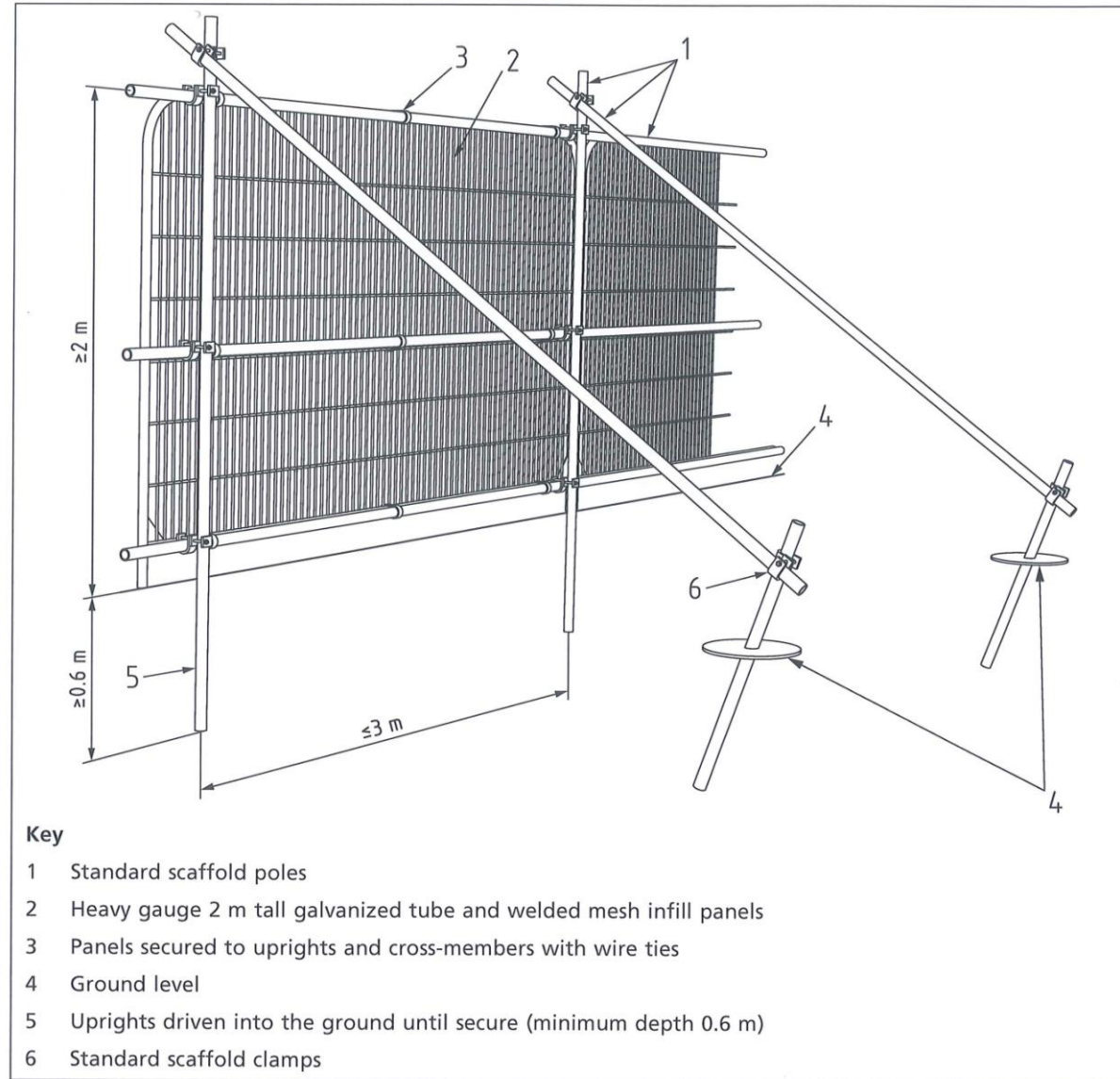
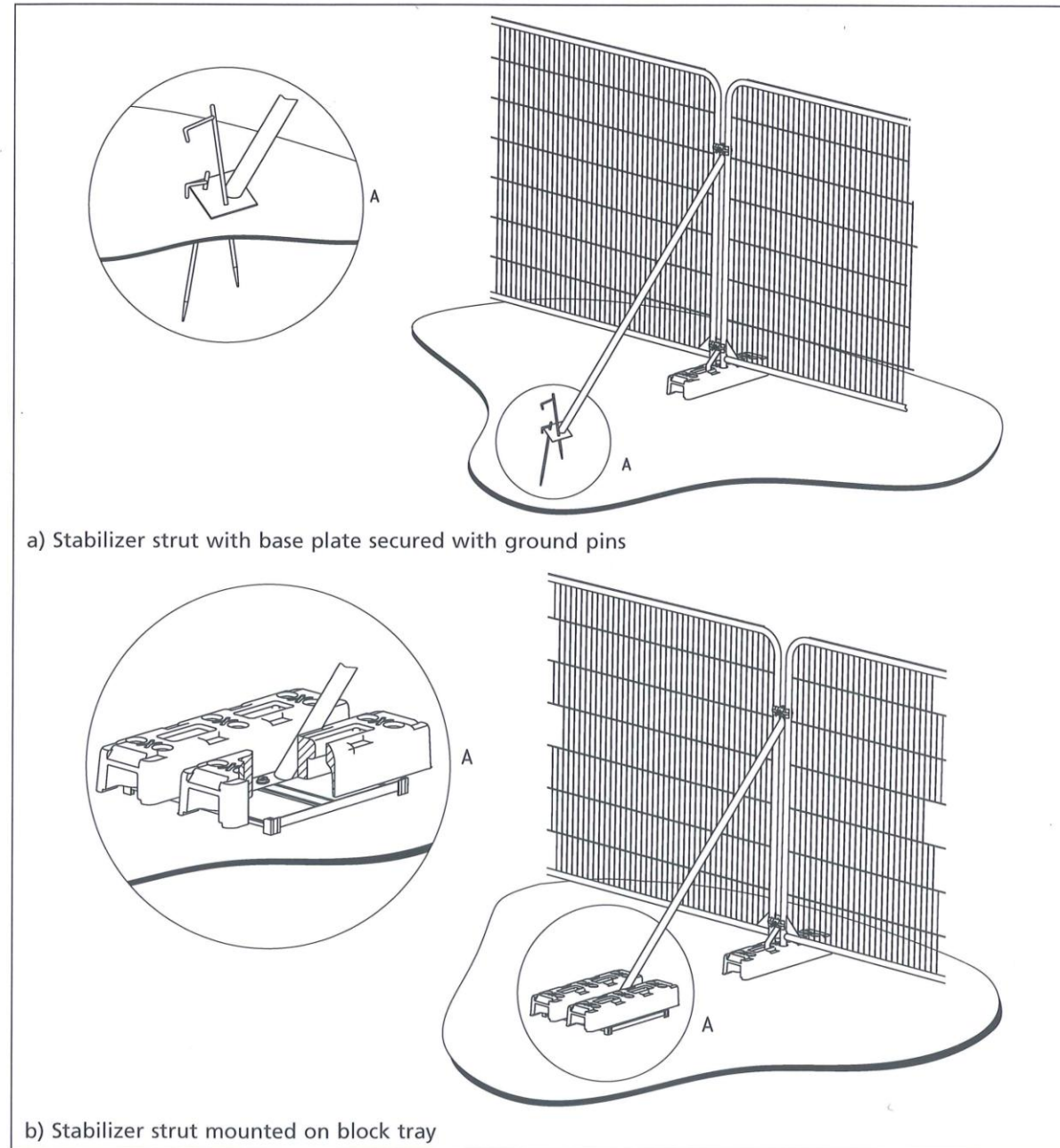


Figure 3 Examples of above-ground stabilizing systems

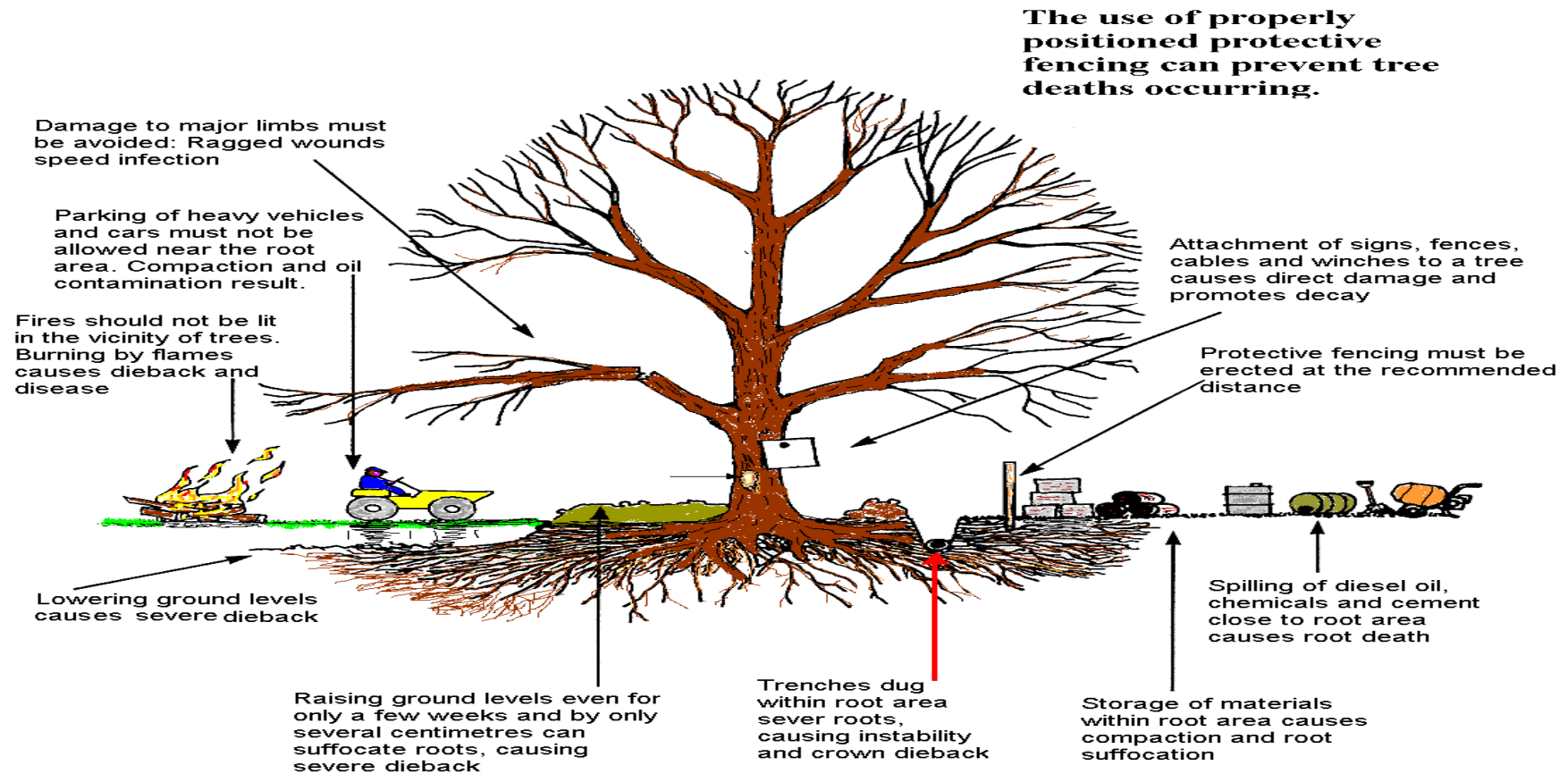


TREE PROTECTION AREA

KEEP OUT

- **NO EXCAVATION OR TRENCHING WORKS PERMITTED**
- **NO STORAGE OF PLANT OR MATERIALS PERMITTED**
- **NO VEHICLE ACCESS PERMITTED**
- **NO FIRE LIGHTING PERMITTED**
- **NO CHEMICAL HANDLING**
- **VEHICLES WORKING CLOSE TO PROTECTIVE FENCING MUST AVOID CONTACT WITH OVERHANG FROM TREE CANOPY**

Common causes of Tree Death



Please use copies of this as an on-site poster for personnel





BH 5

Tree Works Schedule

TREE WORK SPECIFICATION

Client : Orchard Homes Limited

Site Location : Ranelagh Road Site, Havant

Attention is drawn to the fact that some mature trees could provide suitable habitat for bird nesting (ivy and cavities) and bat roosting (ivy, branch cracks and cavities) and this might at certain times of year influence and possibly restrict the form of management which can be applied. Given the legal constraints imposed by the Habitat Regulations and the Wildlife and Countryside Act this may necessitate expert ecological advice being sought before proceeding with recommendations.

No	Species	Tree Works Recommended
1	Bay Laurel <i>Laurus nobilis</i>	Prune back in line with the boundary wall to give a more upswept form and avoid any conflict with development
2	Cherry <i>Prunus spp.</i>	- Fell to ground level - Grub out the stump
3	Apple <i>Malus domestica</i>	- Fell to ground level - Grub out the stump
H1	Hawthorn Holly Elderberry	- Prune back lightly on north side of retained section from Plots 1 to 10 to allow wooden boundary fence to be erected - Prune back heavily on south side of retained section from Plots 11 to 16 and 52 to 57 to achieve useable garden areas - Completely remove and grub out the section that is shown to be under the footprint of the new access road and also between Plots 14 and 15 where an access path is shown- with hand grubbing ONLY within the RPA of Oak T7 - Prune back lightly on south side of retained section beside Plot 16
4	Plum <i>Prunus domestica</i>	- Fell to ground level - Grub out the stump
5	Sycamore <i>Acer pseudoplatanus</i>	- Fell to ground level - Grub out the stump
6	Sycamore <i>Acer pseudoplatanus</i>	- Fell to ground level - Grub out the stump
7	Pedunculate Oak <i>Quercus robur</i>	No works required at this point in time
Grp 1	Sycamore x 2 Beech x 2	Trim back any branch overhang of the parking bays making all final cuts adjacent to living growth points and wherever possible removing whole smaller diameter branches rather than shortening them back
8	Sycamore <i>Acer pseudoplatanus</i>	No works required at this point in time
Grp 2	Ash x 3 Sycamore x 2	No works required at this point in time

9	Goat Willow <i>Salix caprea</i>	- Fell to ground level - Grub out the stump
10	Sycamore <i>Acer pseudoplatanus</i>	Crown lift to clear the development making all final cuts adjacent to living growth points
Grp 3	Sycamore Elderberry Cherry	- Fell and grub out those trees which are within the site boundary line - Off site tree- prune back and crown lift any low branch overhang of the site to give a more upswept form and maximise useable garden space
Grp 4	Hawthorn Law. Cypress Birch	Prune back low branch overhang of the site to give a more upswept form and avoid damage during construction as well as maximise useable garden space
Grp 5	Ash x 4	- Fell to ground level - Grub out the stumps
Grp 6	Field Maples	Prune back low branch overhang of the site to give a more upswept form and avoid damage during construction as well as maximise useable garden space – plus allow the acoustic fencing to be erected
H2	Hawthorn Elderberry Holly	- Prune back heavily on south side of retained section from Plots 72 to 74 to achieve useable garden areas and allow boundary fence to be erected - Prune back lightly on north side adjacent to parking bays for Plots 54/56 - Wherever possible make final cuts adjacent to main stem or a living growth point
H3	Hawthorn Elderberry	- Fell to ground level - Grub out the stumps
H4	Hawthorn Field Maple Elderberry	- Prune back heavily on north side to achieve useable garden areas and allow acoustic boundary fence to be erected - Wherever possible make final cuts adjacent to main stem or a living growth point



BH 6

NJUG 10 Extract

Extract taken from NJUG 10
NJUG 10 - NATIONAL JOINT UTILITIES GROUP**2. HOW ROOTS ARE DAMAGED**

2.1 Contrary to popular belief, the root system of a tree is not a mirror image of the branches, nor is there usually a ‘tap root’. The majority of the root system of any tree is in the surface 600mm of soil, extending radially in any direction for distances frequently in excess of the tree’s height. Excavation or other works within this area are liable to damage roots.

The root system

2.2 The base of the trunk typically flares out in buttresses, with these extending into the main lateral structural roots. These rapidly subdivide into the mass of smaller roots which serve to anchor the tree into the soil, and to conduct water and nutrients. Even a short distance (3m) from a large mature tree, most roots will be less than 10mm in diameter, but these may extend to well beyond the branch spread of the tree. A mass of fine roots, less than 1mm diameter, develop off all parts of this root system. These fine roots absorb the water and nutrients which are essential for the growth of the tree.

2.3 The main structural roots (close to the trunk) develop as the tree grows in response to the need for the tree to have physical stability. Beyond these major roots, root growth is influenced by the availability in the soil of water, air and nutrients. The cultivation of soil provides ideal conditions for root growth. Services are often cooler than surrounding soil, encouraging moisture within the soil to condense on the surface, thereby encouraging roots to grow close to the service. For all these reasons, root growth is often most prolific within the backfilled trench and in the soil around the services. The variability of soil conditions and the presence of obstacles to root growth results in a very variable and unpredictable distribution of the roots within the general guidance in para 2.1.

Types of damage

2.4 Root systems can be damaged by:-

- The severance of a root, for example by trenching, which will destroy all parts of the root beyond that point. Even roots less than 10mm diameter may be serving the fine roots over a wide area. The larger the root severed, the greater the impact on the tree.
- Damage to the bark on the root. The bark protects the root from decay, and is also essential for further root growth. It is loosely attached and easily damaged. If damage to the bark extends around the whole circumference, the root beyond that point will be killed.
- Compaction of the soil. Compaction which is avoidable may occur from storage of material or passage of heavy equipment over the roots. This can restrict or even prevent gaseous diffusion through the soil, and thereby asphyxiate the roots. The roots must have oxygen for survival, growth and effective functioning.
- Alterations in soil level. Lowering the level will strip out the mass of roots near the surface. Raising levels will have the same effect as soil compaction.
- Incorrect application of herbicide.
- Spillage of oils or other harmful materials.

2.5 If roots are damaged:-

1. close to the trunk, the anchorage and stability of the tree can be adversely affected.
2. anywhere along their length, all of the fine roots which they serve will be destroyed.

Damage to the fine roots by severance of a main root, or by compaction or alteration in levels, will prevent these fine roots from absorbing the water and nutrients which are essential for the well-being and growth of the tree. The effects of damage from different causes, for instance by successive excavations for different services, or by excavation in one part and compaction in another part of the system, will be cumulative.

2.6 If the root system is damaged, new roots must develop to sustain the tree. These may develop from damaged root or by increased growth of other parts of the system. It may take years to replace all the lost roots. Vigorous young trees are the most likely to be capable of rapid root regeneration, but mature trees find it very difficult to recover from major root damage, if at all. While roots may regenerate, they will not necessarily provide their original anchorage.

2.7 Trees with damage may not show any immediate symptoms. If the root system is capable of rapid regeneration the tree may recover without any noticeable ill-effects, but usually the symptoms will take several years to develop. Such symptoms may range from only minor branch dieback to deterioration and ultimate death of the tree, dependant on the severity of damage and the ability of the roots to regenerate.

2.8 There is frequently a need for operational land (e.g. substations) to be kept clear of weed growth for safety and as a fire precaution. Herbicides provide an efficient method of killing both herbaceous and woody weeds. There are several types of herbicide with different modes of action and persistence. The most attractive chemicals are those that can be applied to the ground, usually as a granule, and which remain active in the soil for long periods. The wide-ranging root system of a tree may extend into the operational land from adjoining properties, and may absorb some types of herbicides which have been applied to the ground. Material absorbed in one part of the root system can kill the whole tree.

2.9 Other materials which can leach into the soil can also damage the root system. For instance, oil spilled into the soil is broken down by soil bacteria which deplete the soil of oxygen and so asphyxiate the roots. Other materials may have a direct toxic effect on roots.

HOW TO AVOID DAMAGE TO TREES

4.1 This section gives general guidance on methods of work to minimise damage to trees which should be adopted by utilities. The local authority (or for privately owned trees, the owner or his advisor), should be informed about planned work at an early stage prior to commencement.

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

4.3 The precautions advocated in this section are applicable to any excavations or other works occurring within a distance from the tree equal to 4 times the circumference of the trunk (circumference measured around the trunk at a height of 1.5m above ground level; distance measured from the centre of trunk to nearest part of any excavation or other work). This area around the trunk is referred to as “the precautionary area” hereafter.

4.4 Although, ideally, services should be diverted or re-aligned outside the precautionary area, it is recognised that this will not always be practicable. Where works are required for the laying or maintenance of any service within the precautionary area, there are various techniques to minimise the damage. The appropriate method of laying will depend on the circumstances, such as:

- scope of the works (one off repair, or part of an extensive operation)
- degree of urgency (for restoration of supplies)

- soil conditions
- amenity value of tree
- cost

Acceptable techniques in order of preference are:-

1. **Trenchless**
2. Broken trench – hand dug
3. Continuous trench – hand dug

Excavation of open trenches by machine is totally unacceptable within the precautionary area.

4.5 Trenchless

4.5.1 Wherever possible trenchless techniques should be used. The pit excavations for starting and receiving the machinery should be located outside the precautionary area.

4.5.2 IN order to avoid damage to roots by the **mole**, it is recommended that the depth of run should be below 600mm. Techniques involving external lubrication of the mole with materials other than water (e.g. oil, bentonite) should be avoided, unless precautions are taken to ensure that there is no contamination of the soil within 600mm of the surface within the precautionary area.

4.6 Broken Trench

4.6.1 This technique combines hand dug trench sections with trenchless techniques. If excavation is unavoidable, it should be limited to practical access and installation around/below the roots. The trench is excavated by hand with precautions taken as for continuous trench below. Open sections of the trench should only be long enough to allow access for linking to the next section. The length of sections will be determined by local conditions, especially soil texture and cohesiveness, as well as the practical needs for access. In all cases the open sections should be kept as short as possible.

4.7 Continuous Trench

4.7.1 The object of the exercise is to use manual excavation so as to retain as many roots as possible, bearing in mind the need for working space, access to the service in question and room to install the new service. Hand digging needs to be undertaken with great care and for this reason is likely to require closer supervision than normal operations and an understanding by all operatives and staff as to exactly what is expected.

4.7.2 After careful removal of the hard surface material, digging should proceed with hand tools. All roots greater than 25mm diameter should be retained and worked around. Where clumps of smaller roots (including fibrous roots) are found these should also be retained. During the excavation great care should be taken to minimise damage to retained roots, including the bark around the roots. Roots with a diameter in excess of 25mm must not be severed without the advice of the owner of the tree or the local authority arboriculturist, who should respond within one working day. If severance is unavoidable, roots must be cut back using a sharp tool (as listed below), leaving the smallest wound.

Suggested tools required: fork, breaker bar, secateurs, handsaw (folding, silky or bow saw), post hole shoveller and hand fork and trowel.

4.8 Backfilling

4.8.1 Any reinstatement must comply with the requirements of street works in Great Britain must comply with the requirements of the code of practice approved under the New Roads and Street Works Act 1991 (Specification for the Reinstatement of Openings in Highways). Without prejudice to the requirements of this code as to the specification of materials to be used and the standards of workmanship to be observed, backfilling of any excavation should be carefully carried to avoid direct damage to the retained roots and excessive compaction of the soil around them.

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

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

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

4.10 Special Considerations when planning service routes

4.10.1 The potential for future conflict with trees can be reduced at the stage of initial planning approval by the appropriate alignment of services and the provisions for future tree and shrub planting. Appropriate and separate space should be provided for each. Local authorities should liaise with developers.

4.10.2 If planning requirements and site constraints dictate that trees (existing or to be planted) and services share the same area, consideration should be given to increasing the depth of services, if possible to a minimum of 600mm, and to laying the service in ducts which will resist root penetration but allow replacements to be laid without extensive excavation. As this may incur additional costs, allowance must be made for these costs and the responsibility for meeting them at the planning stage.

4.10.3 When laying new services or replacements, to avoid risk of future direct damage, allowance should be made for future root growth.

4.10.4 Services laid in clay or peat should be constructed to tolerate movements associated with swelling or shrinking of the subsoil caused by root activity. Special precautions for differential movement should be incorporated where services join rigid structures founded at a different depth to the service.



BH 7

Qualifications & Experience



QUALIFICATIONS AND EXPERIENCE

- My name is Bernie Harverson and I am a self employed independent arboricultural consultant in private practice. I take instructions primarily in the South of England but also on occasions work nationwide and abroad and have offices at : –
3 Foxcombe Cottages, South Harting, West Sussex GU31 5PL and also at Cedar Court, 5 College Street, Petersfield GU31 4AE
- I hold the following arboricultural qualification - **Master of Arboriculture** (Royal Forestry Society – 1976)
- I have over **forty** years of practical and managerial experience in the arboricultural industry including periods in both the public and private sectors.
- My Local Government sector experience comprises one year as a tree surgeon with Brighton Parks and nine years spent in Arboricultural Officer posts with both Westminster City Council and Portsmouth City Council
- My past practical experience in the private sector includes two years at Tilhill Forest Nursery and over ten years for various companies as a Climbing Arborist/Tree Surgeon.
- Managerial work in the private sector includes two years as manager of Beechings tree surgery company and twelve years with CBA Trees as an Arboricultural Consultant.
- As an independent self employed Arboricultural Consultant I now provide a comprehensive range of services including :-
tree surveys, appraisals, assessments and inspections with particular reference to planning and development and tree safety audits with a service offered as a climber to undertake full climbing inspections to better understand the condition of a given tree before prescribing a management strategy.
 - I also undertake litigation work appearing as an Expert Witness in Court Actions and at Planning Appeals, Hearings and Public Local Inquiries.

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